

Environmental Monitoring Report

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

Quarterly Monitoring Report 2015 – Q2 Environmental

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

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**NAM NGIEP 1
POWER COMPANY**

Nam Ngiep 1 Hydropower Project

Quarterly Monitoring Report (QMR)

**ENVIRONMENT
April to June 2015**

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ABBREVIATIONS / ACRONYMS

ADB	Asian Development Bank
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	meter
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
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 close of the 2nd quarter of 2015, cumulative construction progress was 28.18% completed. The NNP1 EMO has achieved a number of key environmental management monitoring. On the site inspections, a total of 67 non-compliances including eight Non-Compliance Reports, were issued to the sub-contractors for environmental performance. Most significant issues found are related to 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. A report is expected in July 2015 with recommendations for systems upgrades to mitigate the issues.

Importation, transportation, storage and use of explosive materials are complied with the Government's requirements where the Project's Contractor obtained permits from the Ministry of Interior, Ministry of Public Work and Transport as well as the local governments. Inspections of the storage area and procedures used are audited by the relevant local Government Departments prior to permit renewal annually. Fuels used on site are supplied by local suppliers whose licenses were approved by the Government. The import of sulfuric acid for water filtration systems at the tunnel outlet and re-regulating dam also received Government approval. The storage, handling and disposal of the hydrocarbon, sulfuric acid and containers follow the Site Specific Environmental and Social Monitoring and Management Plans (SS-ESMMPs).

April to June typically experienced hot and dry conditions with the start of monsoon storms. This created 'first flush' flows in river systems which could generally lead to elevated pollutants concentration in river systems despite low discharge from the Project site. From April to June 2015, a few surface water parameters slightly exceeded the National Environmental Standard including Dissolved Oxygen, Chemical Oxygen Demand, Biochemical Oxygen Demand, Total coliforms and fecal coliforms. A Total Coliform spike was recorded in the Nam Ngiep within the project area but this was unlikely to be a result of project activities as there was very little discharge from the site over the period.

In June 2015, NNP1PC worked with consultants confirmed the findings of the previous IEE study regarding biodiversity values along the 230kV Right Of Way (ROW) between the Tower 54 and the dam site. The report concluded the habitat is not pristine and has been disturbed by human activity (e.g. selective logging) and other factors such as weeds over a number of decades. These practices have not ceased and remain as significant pressures. No vegetation types were recorded in the survey area that are considered Natural Habitat, according to ADB safeguard Policy Statement (June 2009) definition.

During the conduct of the IEE update (May 2014), it was identified that the alignment impacted a commercial eucalypt plantation operated by Oji Paper Company and that compensation costs would be significant. A new alignment to avoid this plantation has been developed. In June 2015, NNP1PC concluded its investigation of the potential environmental and social impacts of this re-alignment in line with ADB Safeguard Policy (2009) requirements.

The proposed re-alignment, approximately 12.8km, transverses the land of two villages however the path of the re-alignment is relatively remote and does not affect any village settlements or permanent structures. This forest type is considered fragmented isolated within a broader landscape dominated fallow. No vegetation types were recorded in the survey area that are considered Natural Habitat, according to ADB safeguard Policy Statement (June 2009) definition.

Waste management training was carried out for NNP1 staff, contractors and villagers. A purpose built storage and office are being constructed on the school grounds of Ban Hat Gnuin and the Waste Bank is expected to be operating in July 2015. The EMO encouraged villagers to collect and separate their household wastes in preparation for the community waste bank program commencement.

The Watershed Working Plan was reviewed by ADB and IAP during their visit to the Project site in the 1st week of May 2015. It is recommended that the working plan is simplified through a close supervision of ADB watershed consultant. The NNP1 EMO is in progress since then for following up with GOL on the working plan while in parallel communicating the review points with ADB watershed consultant. This working plan was also discussed with the NNP1 watershed consultant for further review and incorporation into NNP1 Watershed Management Plan.

The NNP1 EMO achieved a good progress on biodiversity baseline survey within the watershed area to have survey consultant executing the field work in reference to the approved survey design by ADB. The procurement of the survey consultant was concluded in late April 2015. The survey team commenced their survey since the first week of June 2015. Camera traps were successfully installed by mid-June 2015 to provide motion records expected from certain species until end of July 2015. Some species survey was completed in the 3rd week of June 2015 and focused on certain areas with relatively high diversity value. The botanist also completed their ground truth survey in the last week of June 2015. There will be a continuous work of some species surveys for reptiles and amphibians in July 2015.

The NNP1 has recruited a Biomass Removal Plan (BRP) consultant in April 2015. A series of discussions and workshops between the biomass consultant and NNP1 EMO team were organised to conclude the first draft BRP in the last week of May 2015. This draft was then circulated to ADB and MONRE for their comments in the first week of June 2015. The BRP consultant has undertaken a revision following comments and recommendations made by ADB and MONRE. It is expected that the revision will be concluded by mid-July 2015 and obtained an approval from MONRE by the end of July 2015.

A kick off meeting between MONRE's Department of Environmental Quality Promotion (DEQP) and Xaysomboun Provincial authority was held in the first week of June 2015. The meeting concluded that the establishment of Xaysomboun ISP technical committee is necessary before the execution of ISP training program.

Regarding the safety related issues, in the 2nd quarter of 2015, there were a total of 14 incidents, comprising 5 Motor Vehicle Incidents (MVI), 4 Lost Time Injuries, 3 Near Misses and 2 Fire Incidents. MVI have again been the largest number of incidents (5 out of 14 in Q2 of 2015 and 22 out of 43 cumulatively). There were no injuries sustained in the Q2 MVI incidents. All have been due to vehicle malfunction, loss of concentration or lack of good sense by drivers. This continues to be a focus of attention for safety inspection and training.

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 township 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 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.

This Quarterly Monitoring Report (QMR) provides a summary of environmental monitoring activities from 1 April to 30 June, 2015. It is the third QMR since the signing of the Asian Development Bank (ADB) Facility Agreement in August 2014. 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 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 township, Bolikhamxay province.

2. CONSTRUCTION PROGRESS DURING THE REPORTING PERIOD

By the end of June 2015, the overall cumulative construction progress was 28.18% completed compared to the previous quarter of 20.14%. Main construction activities and respective progresses made during the period of April to June 2015 are shown in Figure 1 and 2 below:

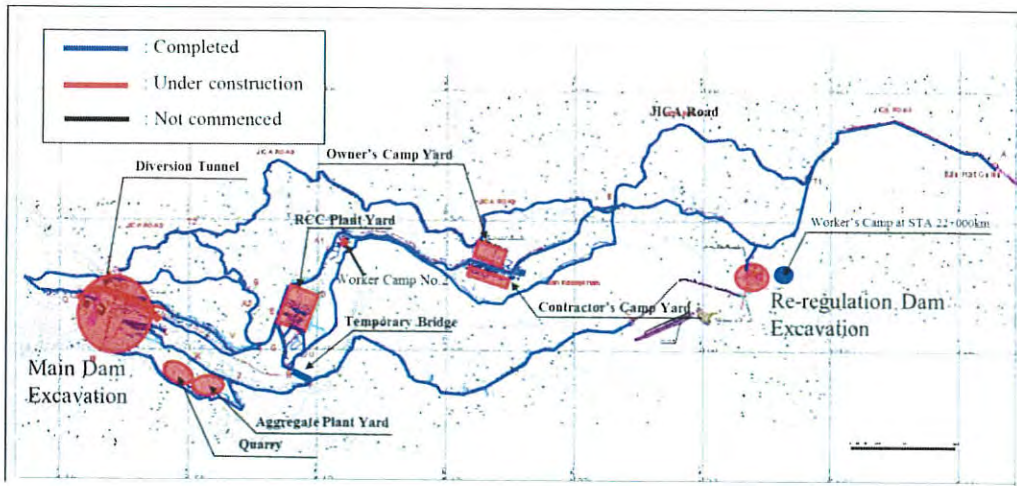


Fig. 1: Current Status of Civil Works up to June 2015

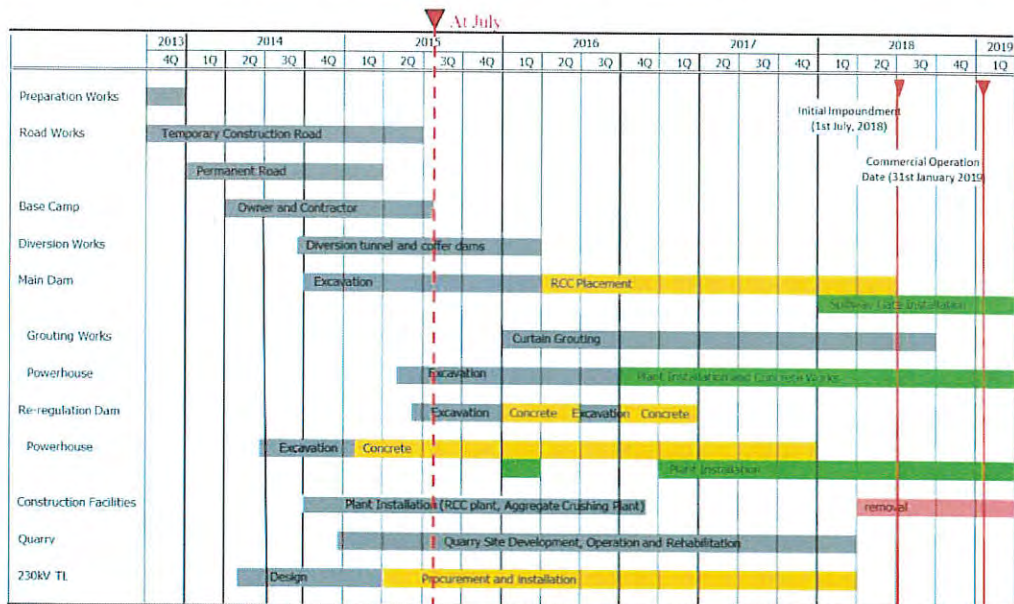


Fig. 2: Overall Construction Progress up to June 2015

2.1 ACCESS ROADS

The main project access road links Ban¹ Nonsomboun in Bolikhamxay Province to the dam site at a distance of 52km. The upgrade was required to improve the drainage and hauling capacity. At the dam site there are 13 internal temporary roads that link construction facilities. By the end of June 2015, all internal road construction was completed.



Photo 1 and 2: Completion of Access Roads by June 2015

2.2 MAIN QUARRY

Groundbreaking on the main quarry began in March 2015, with topsoil and overburden removal continuing through the 2nd quarter. The quarry is located on the right bank downstream of the main dam (see Figure 2). It is serviced by temporary roads T9 and T11,

¹ Ban in Lao language means “village”

and is 4.8 km away from the nearest village of Ban Hatsaykham. The quarry will have an area of 7 hectares and a capacity of 1,784,553 m³. Trucks will haul materials to the nearby Aggregate Crushing Plant for processing.

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 (see also section 3.1 for these thematic areas). The site rehabilitation will be provided to the EMO for review approximately 1 year before its closure.



Photos courtesy of Obayashi Corporation

Photo 3: Main Quarry Overburden Removal, June 2015

2.3 SPOIL DISPOSAL AREAS (PERMANENT)

Along the main access road to the dam site (left bank) from STA 24+700 to STA29+600 there are seven permanent spoil disposal areas, with between 53,510m³ to 372,918m³ capacity. On the right bank two spoil areas (6 and 7) are located within easy access to the main dam construction site. Spoil area preparation included vegetation clearing, earth works, slope protection and drainage installation. The Contractor submitted the revised Detailed Work Program and SS-ESMMP for the two spoil areas (6 and 7) at the right bank on 13 September 2014 which was approved by the EMO on 4 February 2015. All spoil areas were operating within the 2nd quarter of 2015 with approved SS-ESMMPs, managed and will be recovered according to the approved Detailed Work Programs and SS-ESMMPs which are available on the NNP1PC website.

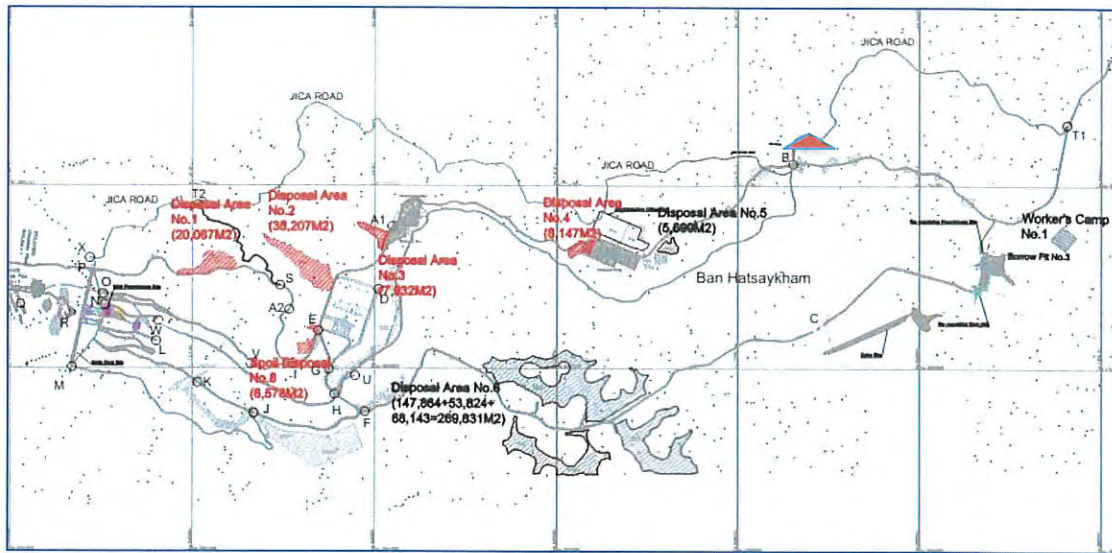


Fig. 3: Left bank Spoil Disposal Areas

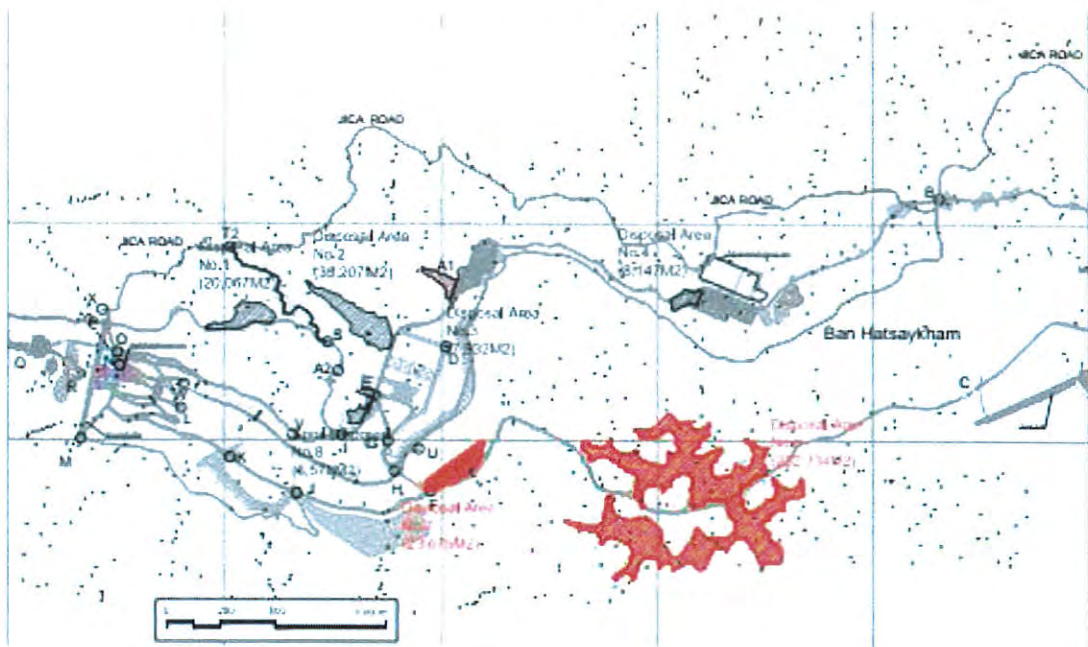


Fig. 4: Right Bank Spoil Disposal Areas

2.4 MAIN DAM EXCAVATIONS

The main dam is located 6km upstream from the re-regulating dam. At the conclusion of the reporting period (June 2015), approximately 82% of the main dam foundation excavations were completed.



Photo 4 and 5: Main Dam Excavations, June 2015

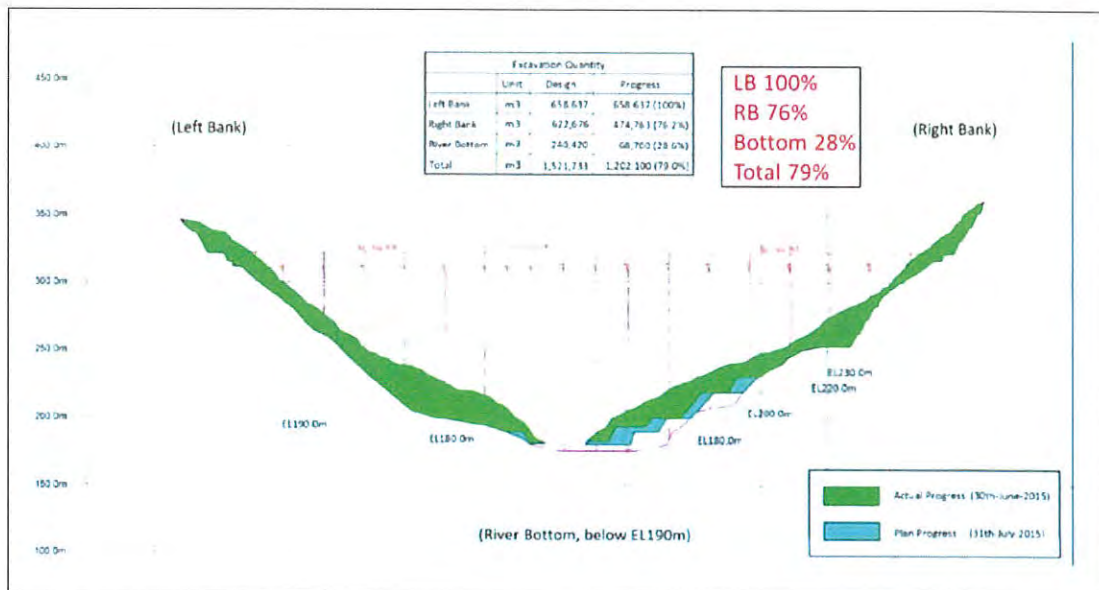


Fig. 5: Progresses of the Main Dam Excavations by June 2015

2.5 RIVER DIVERSION TUNNEL

The river diversion tunnel when completed will be 625.9m long and a breakthrough was achieved on 30 June 2015. Tunneling excavation continues with concrete casting and arch lining applied to completed sections.



Photo 6: The Breakthrough at the Top Bench on 30 June 2015



Photo 7: Shotcrete Lining of the Tunnel Wall



Photo 8: The Outlet Diversion Tunnel

Photos courtesy of Obayashi Corporation



Photo 9: The Inlet Diversion Tunnel

2.6 RE-REGULATING DAM

Work on the re-regulating dam commenced on the left bank with the construction of the river diversion (flood protection) levee, and then excavating into the river bed behind the levee for the construction of the regulating dam power station. Vegetation clearing and preliminary earthworks (basic site preparation) commenced in February 2014, but was suspended for the wet season. The work was recommenced in October 2014 and by June 2015 all earth works were completed, which included the left bank flood protection levee. Approximately 27% of main body work were also completed.



Photo 10: Regulation Excavation (left bank) the background, June

Photo courtesy of Obayashi Corporation

Dam Powerhouse with flood levee in 2015

2.7 WORKER CAMPS

By the conclusion of the reporting period in June 2015, nine worker camps were operating at the Project site. The following table is a list of company names including camps and respective worker numbers. In addition, construction of the main contractor’s camp was 90% completed (and occupied), and the Project owner’s camp was 69% completed.

Company Names		Number of workers
1	Songda 5 Joint Stock Company Camp (Songda) – Civil Works	877
2	Right Tunnel Camp (RT) – Civil Works	368
3	Pang-Onkham (PAKC) – Civil Works	322
4	Sinohydro Camp (SH)	186
5	Obayashi Corporation – Civil Works (Main contractor)	143
6	Phoukhong Construction Sole Company (PKCC) – Civil Works	127
7	TCM Engineering Camp (TCM) – Civil Works	85
8	Loxley SRI Consortium – 230kV Transmission Line	49
9	Vilayvannh & Keota Concrete Sole Company (V&K) – Civil Works	48
10	Lao Security Services*	9
11	PEK*	8
12	Keochaleun Electrical Engineering*	8
TOTAL		2,230

* Contractor shares quarters.

Table 1: Sub-contractor Camps and Workers on site As of June 2015



Photo 11: Songda Camp Number 2



Photo 12: TCM Camp



Photo 13: Grey Water Treatment System at the RT Camp Located next to the Kitchen



Photo 14: Grey Water Treatment System at the Owner Base Camp

2.8 230kV TRANSMISSION LINE

2.8.1 Biodiversity Assessment

The 230 kV transmission line will extend approximately 120 km from the NNP1 dam site in Bolikhamxay Province to Nabong sub-station outside Vientiane Capital, and will have a right of way (ROW) of 35 meters. By June 2015 construction works including ROW clearing and access road construction were completed for 7.5km (7% of the alignment) between Tower 51 and Tower 29. The works are subject to a SS-ESMMP preparation, placing restrictions on range of activities that may impact on local communities and the environment.

An Initial Environmental Examination (IEE) of the 230kV transmission line for 125km was conducted by Environmental Research Institute, Chulalongkorn University (ERIC) (2012) and updated by Environmental Resource Management (ERM) (May 2014). The updated IEE (including a standalone Biodiversity Assessment Report) provided an assessment of potential

impacts on biodiversity values considering ADB Safeguards Policy Statement (2009) and IFC Performance Standard 6. The ADB requested that additional environment assessment of biodiversity values within the northern segment of the alignment (i.e. 'high condition habitat') be conducted between Tower 54 and the dam site, a distance of approximately 21.6km.

In June 2015, the NNP1PC worked with consultants to confirm and refine the findings of the previous study regarding biodiversity values along the alignment section. The report concluded, "The vegetation within and surrounding the proposed ROW is generally of average to poor quality and has been highly disturbed by a long history of human activities such as agriculture and logging. It is assumed that the forests have also been degraded selective logging by local villagers over many years. These practices have not ceased and remain as significant pressures." Additionally, "approximately 6 ha of Upper Mixed Deciduous forest will be removed for the alignment. The habitat is not pristine and has been disturbed by human activity (e.g. selective logging) and other factors such as weeds. This vegetation type is modified habitat due to the significant level of disturbance". No vegetation types were recorded in the survey areas that are considered Natural Habitat, according to ADB safeguard Policy Statement (June 2009) definition.

2.8.2 IEE Assessment for a Realignment Section

During the conduct of the IEE update (May 2014), it was identified that the alignment impacted a commercial eucalypt plantation operated by Oji Paper Company and that compensation costs would be significant. A new alignment to avoid this plantation has been developed. In June 2015, NNP1 concluded its investigation of the potential environmental and social impacts of this re-alignment in line with ADB Safeguard Policy (2009) requirements. The proposed re-alignment, approximately 12.8km, transverses the land of two villages however the path of the re-alignment is relatively remote and does not affect any village settlements or permanent structures. This forest type is considered fragmented and isolated within a broader landscape dominated by fallow. No vegetation types were recorded in the survey areas that are considered Natural Habitat, according to ADB safeguard Policy Statement (June 2009) definition.

2.9 OTHER CONSTRUCTION RELATED FACILITIES

There are 9 engineering workshops located on site, one for each subcontractor. The layout and scale of each workshop relates to the types of works required. Generally, a workshop will consist of two or three vehicle service bays, an engineering workshop, holding (stock) yard, a hazardous materials storage facility and an administration office.

Under construction or operation are also the Conventional Vibration Concrete (CVC) Plant, Rolling Compacted Concrete (RCC) Plant, and Aggregate Yard. The RCC plant will receive sorted and proceeded aggregate to produce concrete that will be used for the actual dam construction. The CVC plant is operational and produces conventional concrete mainly for shotcrete of the diversion tunnel excavation and re-regulation powerhouse.



Photo 15: Roller Compacted Concrete plant



Photo 16: Aggregate Crusher Plant (with conveyor system under assembly), June 2015



Photo 17: Conventional Vibrating Concrete plant (to right of photo, under construction)

3. ENVIRONMENTAL MANAGEMENT MONITORING

3.1 CONTRACTOR SS-ESMMPs

Since the issuance of the Notice to Proceed in October 2014 to the Civil Works (Main) Contractor, Obayashi Corporations, environment and social safeguards have been monitored and managed by one in-house Environmental Specialist and two Environment and Safety Officers. These officers work in consultation with Obayashi site engineers and sub-contractor managers. NNP1’s EMO and SMO provided technical support to fill gaps in the current main contractor structure of the Environment and Social Department.

Monitoring of construction activities is critical to identify potential or actual non-compliance issues that require corrective actions. Under the NNP1’s EMP, the company is required to review the contractor Site Specific Environmental Management and Monitoring Plans (SS-ESMMPs) to 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. Once NNP1 is satisfied and approve the content of the SS-ESMMP, works can proceed.

Once construction commences, the NNP1 assess the compliance to approved mitigation measures outlined in the SS-ESMMPs against 18 thematic areas, or sub-plans (Table 2). The SS-ESMMPs provide the necessary details on what the contractor will do to avoid, minimize or mitigate the applicable social and environmental impacts at a particular site.

SP01: Erosion and Sediment Control	SP11: Quarry and Construction Layout
SP02: Water Availability and Pollution Control	SP12: Unexploded Ordnance (UXO) Survey and Disposal
SP03: Emission and Dust Control	SP13: Construction of Work Camps
SP04: Noise and Vibration	SP14: Traffic and Access
SP05: Waste Management	SP15: Training and Awareness
SP06: Hazardous Material Management	SP16: Project Personnel Health Program
SP07: Vegetation Clearing	SP17: Emergency Preparedness
SP08: Landscaping and Re-vegetation	SP18: Physical Cultural Resources
SP09: Biodiversity Management	
SP10: Spoil Disposal	

Table 2: Thematic Areas (sub-plans) of SS-ESMMPs

During the months of April to June 2015, the EMO received and approved twelve (12) Site Specific (SS-ESMMPs) for access roads, dam, camp and 230 kV transmission line construction as shown in Appendix 1.

3.2 COMPLIANCE MONITORING AND MANAGEMENT

Monitoring of non-compliances is carried out independently once a week by EMO and the Civil Works Contractor, and every two weeks by both the Contractor and EMO in each Workers' Camp, including water treatment and discharge from excavations and other sensitive construction areas. In the 1st quarter of 2015, the NNP1PC introduced a new system to manage minor issues of Contractor non-compliances in an effort to reduce reporting, but still be effective at monitoring corrective actions. It's effectively a two-tier system composing of: Tier 1 *Observation of Non-Compliance (ONC)*, and Tier 2 *Non-Compliance Reporting (NCR)*. All subcontractors' compliance is managed through the Civil Works Contractor, Obayashi Corporation. The 2-Tiers System was introduced as a means to provide the contractors an opportunity to correct an issue in an agreed manner and timeframe.

During routine (weekly) inspections, the EMO Compliance and Monitoring team visits all sites and meet with the subcontractors' site engineers and/or managers to assess environmental compliance against the approved SS-ESMMPs. Where a minor breach is observed during the site inspections, an agreement is made onsite with the Contractor on the proposed corrective actions and the implementation timeframe. This agreement is then recorded as the *Observation of Non-Compliance*. At the conclusion of each week all *Observation of Non-Compliances* are reported to the Civil Works Contractor for their follow-up. The EMO site

inspections in the following week will determine if the issues have been corrected. Generally, failure to undertake an agreed correction under the ONC triggers an NCR.

Identified issues that have the potential for significant environmental and social harms are managed via the *ONC's* procedure. In these situations, corrective requirements are managed via NCRs.

3.2.1 Non-Compliance Reporting (Tier 2)

A non-compliance reporting (NCR) system was initiated by the NNP1 in April 2014. The NCR is now a standard operating procedure. The primary purpose of generating a NCR is to raise awareness on environmental issues as well as tracking and facilitating appropriate corrective actions by the contractors. A NCR is generated when the main contractor or sub-contractor fails to meet the required mitigations outlined in the SS-ESMMP, for example, elevated levels of coliform present in discharge water, exceeding specified criteria. See Appendix 2: Total Non-Compliances For the Reporting Period for more explanations on the 3 levels of NCRs.

3.2.2 Results of Non-Compliance Monitoring

Over the reporting period of April to June 2015, a total of 67 non-compliances, which includes 8 NCRs, were issued. This compares to 54 in the last quarter. Out of which, about 36% are related to hazardous waste management (storage and handling) and 34% are related to the camps' grey, black and kitchen Waste Water Treatment Systems (WWTS). These are now subject to technical expert review. Thus, the NCRs for these WWTS will remain open, subject to design change and success of new systems to process wastewater.

Hazardous Waste Management (disposal and/or storage)	24
WWTS Function and Management	23
Solid Waste Management	8
Spoil Disposal Management	6
Construction Site Effluent Discharge	4
Surface Water Drainage Management	1
Other (use of invasive plant on site)	1
TOTAL	67

Table 4: Summary of Key Non-Compliances including 8 NCRs from April to June 2015

Over the mentioned period, a total of 44 out of 67 non-compliances (66%) were resolved. With assistance from subcontractors, hazardous management issues are generally quickly resolved such as minor spill cleanup, storage facility improvements, oil collection, drainage system improvements and so on.

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' WWTs 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 3rd Quarter of 2015 after the completion of the review.

Importation, transportation, storage and use of explosive materials are complied with the Government's requirements where the Project obtained permits from the Ministry of Interior, Ministry of Public Work and Transport as well as the local governments. Inspections of the storage area and methodology used are inspected by the relevant local Government Departments prior to permits renewal annually. Fuels used on site are supplied by local suppliers who have licenses approved by the Government. The import of sulfuric acid for water filtration systems at the tunnel outlet and re-regulating dam also received approval. The storage, handling and disposal of hydrocarbon, sulfuric acid and their containers follow the Site Specific Environmental and Social Monitoring and Management Plans (SS-ESMMPs).

More details on the non-compliances issued by site can be found in the Appendix 2.

3.3 WASTE MANAGEMENT

3.3.1 Landfill Management

With approximately 2200 workers on site, the project generates approximately 117m³ of uncompressed solid waste each month. Each cubic meter of solid wastes is approximately 200kg, but this increases to 500kg when compressed. This will occur after the transfer to the completed landfill. Originally two temporary pits (each of approximately 300m³ capacity) were installed at the landfill site since March 2015 by the Civil Work Contractor. Once a permanent landfill construction is completed, wastes in these pits will be exhumed and placed in the properly designed landfill. The filling rate of the temporary pits for uncompressed wastes is about one pit every three months. Currently one temporary pit is full and covered with clay, while the 2nd pit is nearing full. A third pit will be required in July 2015.

On 22 June 2015, the NNP1PC commissioned the services of 2 external consultants to review the current designs of the camps' Waste Water Treatment Systems, and the NNP1 landfill. A final landfill design will be submitted by the consultants in July 2015 with a construction expected to commence in the 3rd quarter of 2015.

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.

The program commenced on 22 June 2015. Food wastes are routinely collected from Obayashi, PAKC, Right Tunnel, V&K, and Song Da camps' canteens. The NNP1 provided training to canteen staff on the correct procedures to separate and store food wastes, including hygiene related matters. Villagers are instructed on safety requirements to enter the construction area to collect food. Although the Animal Fodder Collection Program is an initiative of the NNP1, villagers have agreed that the company does not take any responsibility for the welfare of animals under villagers' cares.



Photo 18: EMO Staff Checked Food Waste Quality at the TCM Camp



Photo 19: Villager Site Safety Training

3.3.3 Hazardous Waste Management

3.3.3.1 Hazardous Materials Inventory

From April to June 2015, the NNP1, OC and sub-contractors conducted a hazardous materials inventory for all of main construction sites, engineering workshops and sub-contractors' camps. In addition, hazardous materials were audited jointly with the Contractor and sub-contractors at the risky 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 currency of Hazardous Material documentation, and also an evaluation of the general management procedures and training (including emergency response, hazardous materials handling, safety, and refueling area). Hazardous Materials Inventory and findings from the HazMat Management Audit are presented in Appendix 2 and 3.

Some hazardous and non-hazardous wastes were sold to Khunmixay Factory for processing. The NNP1PC conducted due diligence inspections including waste handling, loading, transferring and off loading procedures at the Khounmixay Factory. A list of wastes sold in the 2nd quarter can be found in the Appendix 5.



Photo 20: Tyres were loaded onto Trucks at Song Da Camp



Photo 21: Cleaning up of Hazardous Waste Storage Area after Material Collection

3.3.3.2 Medical Wastes Management

Medical wastes in the reporting period were almost negligible- mainly used swabs, cotton balls and bandages generated from worker's camps. No sharp objects were generated as there was no clinic located on site. Once a clinic is opened, medical related wastes will be temporarily stored inside sealed disinfected drums. Medical sharp equipment including syringes will also be stored in disinfected drums. Once full, they will be transferred to Vientiane landfill for incineration.



Photo 22: A New Clinic Located at the Project Site due to be Opened in the Last Quarter of 2015



Photo 23: A Medical Waste Bin Outside the new Clinic to be Opened on Site in the forth Quarter of 2015

The NNP1PC also conducted a social and environmental safeguard due diligence assessment of the Vientiane landfill incinerator facility in November 2014 and found no issue of concern.



Photo 24: Sign at the Entrance



Photo 25: Incinerator Building



Photo 26: Incinerator

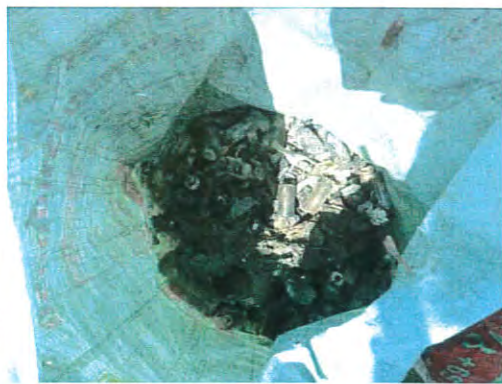


Photo 27: End Products after Incineration

3.3.4 Training

Waste management trainings for NNP1PC staff in the Vientiane and Pakxan offices were conducted on 11 May, 22 and 30 June 2015 respectively. The main purpose of these trainings was to raise staff awareness regarding sources, impacts from improper waste management and disposal, types of wastes found in the Project areas and separation, how to reduce and dispose of wastes. The training also described NNP1PC waste management plan, activities and updated the status of waste management.



Photo 28: Waste Management Training Conducted at Ban Thaheua



Photo 29: Waste management training conducted at Ban HatGnuin



Photo 30: Waste Management Training For Staff in Vientiane in May



Photo 31: Waste Management Training for staff at Pakxan Offices in June 2015

Waste management training was conducted at three villages: Ban Hat Gnuin, Ban Hatsaykham, and Ban Thaheua from 12-13 May 2015. The main purpose of the training was to explain to local villagers about the definitions and sources of wastes, how to reduce and dispose of wastes, what the Community Waste Bank Program is and types of waste that the program will purchase. The EMO staff also encouraged local villagers to start collecting and

separating their wastes at their own houses so that they can later sell when the Community Waste Bank Program starts.

A Community Recycle Bank is planned to be opened in Ban Hat Gnuin where recycle materials such as glasses, cans and cardboard can be sold by villagers for cash. A purpose built storage and office is being constructed on the school grounds. By the end of June, the storage was 60% completed and is expecting to be operating in July 2015.



Photo 32: Community Recycle Bank Was Being Constructed



Photo 33: Individual Storage Cell for Recyclables

3.4 ENVIRONMENTAL MONITORING

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

- Surface Water (river) quality monitoring;
- Groundwater (village wells);
- Effluent discharge;
- Construction Area Discharge;
- Air quality;
- Noise and dust; and
- Vibration.

The monitoring results are compared against the National Environmental Standard. For the purposes of simplified reporting, information on parameters that are outside this Standard is the focus of this section. The 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

To assist the company's understanding of the condition of surface water in the catchment and its construction activity impacts downstream, water quality monitoring is conducted at 12 locations in the Nam Ngiep catchment: six (6) sites are located in the upper Nam Ngiep above the NNP1 Project and include the Nam Ngiep main tributaries, and the lower reaches of the Nam Chiane and Nam Phouan system; four (4) sites are located in the Nam Ngiep below the Project construction site; and one site on the lower Nam Xao. In addition, there is one Nam Ngiep monitoring site within the construction area (NNG04), and one immediately

downstream (NNG05). These two are reference sites for NNP1 Project impacts. Site NNG09 is located immediately above the project construction area, and is the control site for pre-NNP1 water quality condition.

Monitoring location map, description of each monitoring point and surface water quality monitoring parameters can be found in the Appendix 6.

April to June typically experience hot and dry conditions with the onset of monsoon rain. This creates 'first flush' flows in river systems. This can generally lead to elevated pollutants concentration in river systems with low discharge. The surface water parameters that exceeded Lao National Environmental Standard (Surface Water Quality Guideline) include Dissolved Oxygen (DO), Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Total coliforms and fecal coliforms which are described in details below.

3.4.1.1 Dissolved Oxygen (DO)

During May, the DO was recorded slightly lower than the National Surface Water Quality Standard (measured between 5.4-5.89 mg/l compared to the Guideline of more than 6 mg/l) at Nam Ngiep upstream at Ban Phiangta (NNG01), Nam Ngiep upstream of Nam Phouan confluence (NNG02), Nam Ngiep downstream of Nam Xao confluence (NNG06), Nam Ngiep at the Bridge of Road 13 (NNG08) and Nam Xao upstream of Nam Ngiep confluence (NXA01). The recorded levels, although slightly below the standard, were not considered to present a major risk to aquatic life. The results found in April and June complied with the National Standards.

3.4.1.2 Chemical Oxygen Demand (COD)

The Chemical Oxygen Demand (COD) is an expression of the amount of water-dissolved oxygen used to break down compounds in the water which cannot be broken biologically. The higher the COD reading, the greater concentration of pollutants found.

During April to June, elevated levels of COD across most monitoring stations were observed. The concentration continued to hike from an average of 6.4 mg/l in April, 13.5 mg/l in May and 12 mg/l in June as illustrated in Figure 5 below. This reflects that the land based stored pollutants from farms and human settlement areas were being transported into the river systems by storm events.

Month-Year	Guideline (mg/L)	River Name								Nam Chiane	Nam Phouan	Nam Xao	Houay Soup	
		Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	
		NNG01	NNG02	NNG03	NNG09	Nam Ngiep NNG04	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
April-15	<5.0	5.6	5.2	5.2	ND	ND	ND	ND	5.4	ND	9	ND	8	
May-15	<5.0	18.7	26.1	13.1	8.6	10.2	10	9.8	10.4	ND	22.3	ND	6.5	
June-15	<5.0	9.2	11.2	13	9.6	7.9	10	10	9.4	9.1	9.2	6.5	12.8	30.5

Note: ND – not detected

Table 5: Results of the Chemical Oxygen Demand from April to June 2015

3.4.1.3 Biochemical Oxygen Demand

Biochemical Oxygen Demand (BOD) measures the amount of oxygen consumed by microorganisms in decomposing organic matter in the river. Biochemical Oxygen Demand 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.

The lower Nam Chiane (NCH01) and Nam Phouan confluence (NNG02), both are located upstream of the Project site, recorded slightly higher BOD levels than the Guideline in April and May 2015. The BOD result was also slightly high for Houay Soup for June 2015.

Month-Year	Guideline (mg/l)	River Name								Nam Chiane	Nam Phouan	Nam Xao	Houay Soup	
		Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	Station	
		NNG01	NNG02	NNG03	NNG09	Nam Ngiep NNG04	NNG05	NNG06	NNG07	NNG08	NCH01	NPH01	NXA01	NHS01
April-15	1.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.6	ND	ND	
May-15	1.5	1.4	1.7	1.2	ND	1.1	ND	ND	ND	ND	2.6	1.1	1.3	
June-15	1.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	1.1	2

Table 6: Observed BOD Level from April to June 2015

3.4.1.4 Fecal and Total Coliform

During the 2nd quarter, fecal and total coliforms exceeded guidelines in May and June as highlighted in yellow below, most likely as a result of first flus flows due to rains mobilizing land based pollutants. A Total Coliform spike was recorded within the project area, but this was unlikely to be a result of project activities as there was very little discharge from the site

over that month (see also section 3.4.2). Surface water coliform characteristics for the quarter were generally elevated above and below the project area, and increasing towards June.

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													
April-15	*	490	790	1,300	0	0	0	0	0	0	4,900	460	0	
May-15	*	4,600	790	490	1,700	13,000	2,200	3,100	2,300	490	14,000	280	1,700	
June-15	*	33,000	7,900	1,600	13,000	1,300	2,300	3,300	4,900	2,300	2,300	3,300	790	240
April-15	**	350	330	240	0	0	0	0	0	0	490	330	0	
May-15	**	4,600	790	330	330	790	330	790	230	79	9,400	280	700	
June-15	**	17,000	1,700	350	2,200	790	790	170	790	220	2,300	350	280	240

* Total Coliforms Standard is <5000 MPN/100ml

**Fecal Coliform Standard is <1000 MPN/100ml

Table 7: Results of Total and Fecal Coliforms from April to June 2015

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 worker camps. When no discharge is observed, such as the case where effluent is being held in tanks, no monitoring is conducted. During the 2nd quarter, two camps were discharging effluents: Right Tunnel (RT) and Sinohydro camps. The results of those that exceeded the standards are presented below.

		Site Name	RT Camp	Sino Hydro camp
		Station	EF05	EF06
Month Year	Parameter	Guideline		
April-15	BOD (mg/L)	<30	15	37
May-15	BOD (mg/L)	<30	30.8	
June-15	BOD (mg/L)	<30	13	
April-15	COD (mg/L)	<125	102	129
May-15	COD (mg/L)	<125	100	
June-15	COD (mg/L)	<125	20	
April-15	TSS (mg/L)	<50	58.6	11.9
May-15	TSS (mg/L)	<50	211	
June-15	TSS (mg/L)	<50	12.8	
April-15	Ammonia-nitrogen (mg/L)	<10	8	15
May-15	Ammonia-nitrogen (mg/L)	<10	8	
June-15	Ammonia-nitrogen (mg/L)	<10	8	
April-15	Fecal coliform (MPN/100mL)	-	-	-
May-15	Fecal coliform (MPN/100mL)	-	160,000	
June-15	Fecal coliform (MPN/100mL)	-	54,000	
April-15	Total Coliform (MPN/100mL)	<400	160,000	24,000
May-15	Total Coliform (MPN/100mL)	<400	160,000	
June-15	Total Coliform (MPN/100mL)	<400	54,000	

Table 8: Results of Effluent Discharge Monitoring from April to June 2015

Right Tunnel Camp: It was found that the BOD, COD, TSS, Fecal and Total coliform exceeded the National Standards for the quarter. The estimated volume being discharged was approximately 21.6m³ per day.

During the 1st quarter an aeration system and water hyacinth were put in place as part of a system upgrade, however results for the 2nd quarter suggested that little improvement was achieved to water quality. Seepage from the system continues to be a problem and additional improvements to the system have been requested to the sub-contractor. Thus, the EMO has requested that the waste water treatment system (WWTS) designs for all contractors were reviewed (see also section 3.5.2.1).



Photo 34: Right Tunnel Grey Water Treatment Pond



Photo 35: Right Tunnel Camp Effluent Discharge (seepage) Location

Sino Hydro Camp: It was found that the BOD, COD, Ammonia-nitrogen, fecal coliform and Total Coliform exceeded the National Standards for the quarter. Discharge from this WWTS enters a road side earth drain. Total volume was not estimated during the quarter but was significantly less than Right Tunnel.



Photo 36: Sinohydro grey water treatment system discharge location

3.4.2.1 Corrective Actions

Waste water discharge from the camps continues to be a problem caused by ineffective systems (grey and black). The EMO has requested that all camps provided detailed designs of the systems which would be subject to review of an independent consultant. From the review it is expected that camp systems will be overhauled by the 4th Quarter of 2015. Sub-contractors will be required to monitor for effectiveness. The review was implemented in June 2015 with a report expected in July 2015.

3.4.3 Groundwater Quality Monitoring

Three wells were installed by NNP1PC at Hatsaykham village for domestic consumption purposes. There was also a pre-existing well at HatGnuin village. These boreholes/wells were tested against twenty two (22) parameters which include the following:

1. pH
2. Sat. DO (%)
3. DO (mg/l)
4. Conductivity ($\mu\text{s}/\text{cm}$)
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 coliform (MPN/100ml)
21. Fecal coliform (MPN/100ml)
22. E. coli (MPN/100ml)

Month Year	Parameter	Site Name	Ban Hatsaykham			Ban Hat Gnuin
			Station	GHSK01	GHSK02	GHSK03
		Guideline				
April-15	pH	6.5 -9.2	6.48	6.14	6.22	
May-15	pH	6.5 -9.2	7.43	7.89	8.42	
June-15	pH	6.5 -9.2			6.74	6.72
April-15	Fecal coliform (MPN/100ml)	0	0	0	0	
May-15	Fecal coliform (MPN/100ml)	0	0	0	0	
June-15	Fecal coliform (MPN/100ml)	0			0	2,300
April-15	E.coli (MPN/100ml)	0	0	0	0	
May-15	E.coli (MPN/100ml)	0	0	0	0	
June-15	E.coli (MPN/100ml)	0			0	2,300

Note: sampling could only be conducted in one well at Hatsaykham village due to faulty pumps

Table 9: Results of Ground Water Quality Monitoring from April to June

All water quality parameters in Ban Hatsaykham well met with the National Environmental Standard, except pH, which was slightly below the accepted range. In this instance, pH was largely dictated by local geology and not human activities. The pH levels recorded do not present a risk to human health. For Ban Hat Gnuin (GHGN01), fecal coliform and E. coli bacteria exceeded the applicable guideline in June 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 rain events.

Through routine consultation, NNP1PC conveyed messages to villagers on the presence of the bacteria in the water obtained from those boreholes. There is also an ongoing extension services to inform the villagers about the need to improve domestic hygiene and boil water before use.

3.4.4 Construction Area Discharge Water Monitoring

Over the reporting period, two construction sites were discharging effluents into the natural environment: *Regulation Dam* and *Diversion Tunnel Outlet*. These sites produce potentially large volumes of water both underground and/or trapped surface water. Both sites operate for 2x10hour shifts per day and for six days a week, but the requirement to treat the sites waste water is 24hrs a day, seven days a week. An effluent filtration system that controls pH and removes some total suspended solids 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 to the filtration system. Sediment ‘cake’ is disposed of at Spoil Area 6. Once the water is filtered and treated to meet the required guideline, it is discharged directly into the Nam Ngiep.



Photo 37: Pooled Effluent Water at the Tunnel Outlet Excavation Site (April, 2015)



Photo 38: The Effluent Filtration System used at the Tunnel Outlet Excavation Site which is Situated on the Upper Left Bank of the Tunnel Excavations

A total of nine (9) discharge parameters were tested at these sites:

- | | |
|-------------------------|------------------------|
| 1. pH | 6. Temperature |
| 2. Sat. DO (%) | 7. Turbidity (NTU) |
| 3. DO (mg/l) | 8. TSS (mg/l) |
| 4. Conductivity (µs/cm) | 9. Oil & Grease (mg/l) |
| 5. TDS (mg/l) | |

Key parameters that are outside the prescribed standards are highlighted in yellow as the following:

Month Year	Parameter	River Name	Diversion Tunnel Outlet	Regulating Dam
		Station		
		Guideline	DS01	DS08
April-15	pH	6.0 -9.0	12.27	8.43
April-15	pH	6.0 -9.0	8.47	9.49
May-15	pH	6.0 -9.0	9.34	8.63
May-15	pH	6.0 -9.0	8.57	10.08
June-15	pH	6.0 -9.0	8.81	8.81
June-15	pH	6.0 -9.0	8.12	8.61
April-15	TSS (mg/l)	50	2,872.0	97.2
April-15	TSS (mg/l)	50	5.9	60.1
May-15	TSS (mg/l)	50	967.0	36.9
May-15	TSS (mg/l)	50	24.1	178.0
June-15	TSS (mg/l)	50	15.3	20.5
June-15	TSS (mg/l)	50	76.5	7.5

Table 10: Results of Construction Area Discharge Water Monitoring from April to June

All water from the regulation dam site in June was treated by the filtration system before discharging into the Nam Ngiep. This is reflected in the results which show a significant improvement to discharge water's pH and TSS levels. Prior to June, sediment-laden water was rudimentary treated via a series of sediment ponds, which was considerable less effective than the filtration system.

During April and May the tunnel outlet excavation site discharge water recorded elevated TSS and pH, but this improved in June with the commissioning of additional sediment ponds coupled to the sites filtration system. An NCR 2 was issued to the contractor to improve the system and this work was concluded in June 2015.

3.4.5 Air Quality Monitoring

The dust emission monitoring was carried out for 72 consecutive hours in targeted villages by starting the monitoring on the non-working days to obtain a record of at least 20 hours of ambient conditions. During June 2015, dust emission monitoring was conducted in Ban Hatsaykham, Ban Hat Gniun and Ban Thaheua. There was an incomplete recording at Ban Thaheua due to power outage. However, all village recordings were within the Lao National Environmental Standard for Air Quality set at an average of 0.12mg/m³ in 24 hours as shown in Table 11, 12 and 13 below.

Ban Hat Gniun - Dust Emission Average in 24h			
Period	00 to 24 Hours	24 to 48 Hours	48 to 72 Hours
Start Time	11/06/2015 09:48:57	12/06/2015 09:48:57	13/06/2015 09:48:57
End Time	12/06/2015 09:48:57	13/06/2015 09:48:57	14/06/2015 09:48:57
Average Data Recorded in 24h	0.0246	0.0309	0.0363
Guideline Average in 24h	0.12	0.12	0.12

Table 11: Dust Emission Average at Ban Hat Gniun in 24 Hours

Ban Hatsaykham - Dust Emission Average in 24h			
Period	00 to 24 Hours	24 to 48 Hours	48 to 72 Hours
Start Time	14/06/2015 11:02:57	15/06/2015 11:02:57	16/06/2015 11:02:57
End Time	15/06/2015 11:02:57	16/06/2015 11:02:57	17/06/2015 11:02:57
Average Data Record in 24h	0.0296	0.0244	0.0363
Guideline Average in 24h	0.12	0.12	0.12

Table 12: Dust Emission Average at Ban Hatsaykham in 24 Hours

Ban Thahuea - Dust Emission Average in 24 h			
Period	00 to 24 Hours	24 to 48 Hours	48-72 Hours
Start Time	21/06/2015 11:27:56	22/06/2015 11:27:56	
End Time	22/06/2015 11:27:56	22/06/2015 16:26:56	
Average Data Recorded in 24h	0.0267	0.0253	No electricity supply
Guideline Average in 24h	0.12	0.12	

Table 13: Dust Emission Average at Ban Thahuea in 24 Hours

3.4.6 Noise Monitoring

The noise monitoring program was carried out from 10.30 am for 72 consecutive hours in selected villages by starting the monitoring on the project non-working days (Sunday), to obtain a record of at least 20 hours of ambient conditions.

Noise monitoring was resumed in June 2015 after the equipment was fixed and carried out in Ban Hatsaykham, Ban Hat Gniun and Ban Thaheua. There was an incomplete recording at Ban Thaheua due to power outage. The recorded values were measured against the Lao National Environment Standard 2009 and revealed that all village recordings were within the allowable maximum value of 115 dB(A) but the recorded average for Ban Hat Gniun and Thaheua were slightly exceeded the allowable value of 55 dB(A) from 6:00-22:00 as summarized in Table 14 below.

Parameter	Site Name		
	Ban Hat Gniun	Ban Hatsaykham	Ban Thaheua
Recorded Maximum dB(A)	83.0	82.6	83.7
Standard Maximum	115	115	115

Recorded Average dB(A)	59.12	48.08	57.99
Standard Average for Residential Area from 6-22:00	55	55	55

Table 14: Noise monitoring results

The Compliance Team is monitoring the nearby sites to ensure that the noise level is kept within the allowable standard during the working hours.

3.4.7 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

NNP1PC is in progress for the development of the NNP1 Watershed Management Plan (WMP). The plan development was strategized to have engagement with several consultants such as a watershed consultant who will develop the overall NNP1 WMP, a biodiversity consultant who will develop the sub-plan of biodiversity management within watershed area and a fishery consultant who will develop the sub-plan of integrated fishery management.

The procurement of the watershed consultant was concluded in late May 2015. Series of discussion were made between the consultant and NNP1 EMO team particularly on overall watershed and biodiversity program with its milestones, necessary information for plan development, as well as detailed timeframe for the planned activities. A short visit of watershed consultant was made in the 3rd week of June 2015 to: 1) understand the current status and challenges toward WMP development; 2) formulate operational guidance in reference to the first objective which also provides detailed timeframe for planning activities; and 3) follow up with recommendations from the mission visit of ADB, IAP and LTA in the first week of May 2015 as well as key milestones for the watershed program.

A watershed study, as one of the key aspects for WMP development, was commenced by NNP1 EMO Team from early March to June 2015 focusing on field observation within NNP1 watershed area. The results provide the overview of recent situation within NNP1 watershed area which will be further analyzed by watershed consultant for problem and root cause assessment and defining the specific goals of the WMP. The interim report submitted by the watershed consultant was produced with detail planning activities that were inline with the deadline of key milestone achievement.

In parallel with the WMP progress, the procurement of the fishery consultant for the development of Integrated Fishery Management Plan (IFMP) was concluded in the 3rd week

of June 2015. The NNP1 EMO started the discussion with the fishery consultant particularly on: 1) expected content of the IFMP that will defines the clear connection to NNP1 WMP and to also envision the future reservoir fishery management; 2) To follow up with deep analysis based on existing Project fishery information as well as recent fish habitat mapping and fish catch monitoring; 3) detail timeframe for IFMP development to match with WMP development timeframe. It fishery consultant planned to visit the Project site together with first interim report in late July or early August 2015.

3.5.1.2 Watershed Working Plan

The Watershed Working Plan was formulated by the Government of Lao PDR (GoL) in coordination with the NNP1 EMO last January 2015. It is understood that this working plan focuses on actions over the initial of two years of the program (2015-16), with an emphasis on planning, agency establishment and early actions. Once the NNP1 WMP is in place then this action plan will be superseded. The high level discussion commenced in March 2015 prior to further endorsement by the minister of the Ministry of Natural Resource and Environment (MONRE).

This working plan was reviewed by ADB and IAP during their visit to the Project site in the 1st week of May 2015. It is recommended that the working plan is simplified through a close supervision of ADB watershed consultant. The NNP1 EMO is in progress since then for following up with GOL on the working plan while in parallel communicating the review points with ADB watershed consultant. This working plan was also discussed with the NNP1 watershed consultant for further review and incorporation into NNP1 WMP.

3.5.2 Biodiversity Management

3.5.2.1 Biodiversity Baseline Survey

The NNP1 EMO achieved a good progress on biodiversity baseline survey within the watershed area to have survey consultant executing the field work in reference to the approved survey design by ADB. The procurement of the survey consultant was concluded in late April 2015. Prior to commencing the actual fieldwork, the survey consultant produced more detailed working plan for species and botanical surveys and, spatial analysis on habitat assessment. As part of the preparation work, the consultant also managed the procurement of camera traps and the coordination work with MONRE's Department of Forestry and Resource Management (DFRM), PONRE and District authority particularly on the access to National and Provincial Protected Areas. The survey team commenced their survey since the first week of June 2015.

The camera traps were successfully installed by mid-June 2015 to provide motion records expected from certain species until end of July 2015. Some species survey was completed in the 3rd week of June 2015 and focused on certain areas with relatively high diversity value. The botanist also completed their ground truth survey in the last week of June 2015. There will be a continuous work of some species surveys for reptiles and amphibians in July 2015 with the purpose of observing the seasonal change from the dry to rainy season.

It is expected that the survey consultant will wrap up the survey work, data analysis and reporting requirements in July 2015 to meet the submission deadline for biodiversity baseline survey report on 1 August 2015. Once the report is produced, the NNP1 EMO team will initiate the discussion on the development of biodiversity management sub-plan under the WMP.

3.5.2.2 Biodiversity Offset Management Plan

The Company has already progressed its offset sites selection process through recent discussions in July 2015 with the Provincial Office of Natural Resources and Environment of Xaysomboun and Bolikhamxay provinces. The candidates for offset sites have been proposed by Xaysomboun and Bolikhamxay provinces. The NNP1PC is conducting ground truth surveys of the proposed offset sites at the start of the dry season (October) and is expected to take about 8 weeks. The survey report (the Offset Site Survey Report) is expected to be issued in December 2015 and will be reviewed by BAC, ADB, Lenders Technical Advisor (LTA), and Independent Advisory Panel (IAP) before being presented to the consensus building workshop (Workshop). Therefore, the Workshop for offset site selection is now planned in the early January 2016.

3.6 BIOMASS CLEARANCE

Progresses on the development of a Biomass Removal Plan (BRP) as a key document for biomass clearance work have been on track.

The NNP1PC has recruited a BRP consultant in April 2015. Series of discussions and workshops between the biomass consultant and NNP1 EMO team were made to conclude the first draft in the last week of May 2015. The draft of BRP was then circulated to ADB and MONRE for their comments in the first week of June 2015. The BRP consultant has undertaken the revision following the comments and recommendations made by ADB and MONRE. It is expected that the revision will be concluded by mid-July 2015 and obtained an approval from MONRE by end of July 2015.

The NNP1 EMO also held further discussions with senior management on the biomass clearance program in which additional planning and scoping work are needed particularly on detailed planning and timeframe for contractors to start clearing works, preparing environment safeguard documents such as SS-EMMP, supervision and monitoring of clearance works. The NNP1PC planned to recruit other consultants for this planning and scoping works whilst searching for a potential contractor to carry out clearance works.

The team also discussed, based on the practice from other hydropower project in Lao PDR, that the effective clearance work should be started within the dry season period. Therefore, it is likely that the contractual agreement between the NNP1PC and clearance contractor is obtained by end of September for commencing the work sometimes in October 2015.

4. OTHER SUPPORT PROGRAMS

4.1 INTEGRATED SPATIAL PLANNING PROGRAM

The NNP1 has committed to support the planning of Integrated Spatial Plan (ISP) for Xaysomboun Province following the recommendation from ADB and IAP in 2014. The ISP is understood to cover the whole Xaysomboun Province administrative area in which the existing and future land uses can be identified. The information will benefit and/or be used for: 1) the protection of NNP1 watershed area in which certain zones or areas of interests are needed for conservation and sustainable management; 2) NNP1 Watershed Management Plan to ensure that management activities will be in line with formulated land use maps. During the discussion with ADB and IAP mission team, it was agreed that the support fund will be in the total amount of \$50,000.

Since then, NNP1PC closely coordinates with MONRE Department of Environment and Quality Promotion (DEQP) and PONRE of Xaysomboun for realization of planning activity. Through the guidance from MONRE DEQP, PONRE of Xaysomboun had submitted the official request letter in February 2015 for the technical assistance of DEQP. The official request letter was acknowledged and endorsed by the Minister of MONRE and the activity plan was formulated by DEQP in the expected timeframe of 8 months.

During the visit of ADB and IAP mission team in early May 2015, MONRE's DEQP was able to show the activity plan for providing technical assistance on the program which is expected to be completed within 8 months (May-December 2015). MONRE's DEQP had later on requested NNP1 for budget approval to execute consultation work and training programs for Xaysomboun Provincial authorities as scheduled.

The kick off meeting between MONRE's DEQP and Xaysomboun Provincial authority was held in the first week of June 2015. The meeting concluded that establishment of Xaysomboun ISP technical committee is necessary before the execution of ISP training program.

4.2 HOUAY NGUA PROVINCIAL PROTECTED AREA CONSERVATION MANAGEMENT PROGRAM

The NNP1 provided \$48,000 to Bolikhamxay PONRE for forest management training for staff and local villages, establishment of checkpoints at either end of the access road through the Houay Ngua Provincial Protected Area (PPA), and forest patrolling by Bolikhamxay PONRE and Provincial Forestry College students. These activities were conducted between August and December 2014. Bolikhamxay PONRE has requested ongoing support for the program.

The Bolikhamxay PONRE discussed with NNP1 EMO in May 2015 to conduct a consultation and joint site visit comprises of Bolikhamxay PONRE, NNP1 EMO team, relevant authorities and village communities nearby Houay Ngua PPA with the aims: 1) Revisit the awareness raising program that have been conducted by District Forest Office through support of NNP1PC; 2) Seek better option and/or solution for forest resource collection and agriculture

practices which may be related to forest encroachment; and 3) Review the effectiveness of Houay Ngoua PPA Conservation Program supported by NNP1PC. The outcomes are expected to answer the request on continuous support for this Program such as through opportunity of long term funding from EPF as well as to provide inputs or recommendations that can be incorporated into NNP1 Watershed Management Plan formulation.

The consultation and joint site visit was commenced in the 2nd week of June 2015. The field report was produced by NNP1 EMO team incorporating the outcomes from discussions. NNP1 EMO will continue to follow up with the activity related to Houay Ngoua PPA particularly to decide on continuous support fund or opportunity for other sources of fund.

4.3 ENVIRONMENTAL PROTECTION FUND (EPF)

According to the Project Concession Agreement (CA), NNP1PC has an obligation to provide \$990,000 throughout the concession period to the Environmental Protection Fund (EPF), in which, \$180,000 has to be provided before the Commercial Operation Date (COD).

The NNP1 held a discussion with an EPF Director in August 2014 with regards to the process of transferring and the use of NNP1 Fund. It was suggested that the NNP1 sent a letter to EPF indicating such payment.

ADB and IAP mission team visited EPF in early May 2015 for a better understanding of the EPF mechanisms and the potentials for channeling the fund for NNP1 biodiversity program which includes: 1) supporting biodiversity conservation management program in Bolikhamxay and Xaysomboun Provinces, each for an amount of \$50,000 and; 2) supporting country wide biodiversity conservation program. Based on the preliminary discussion between EPF and NNP1 EMO team, the first payment to EPF of \$180,000 is possible to be channeled to NNP1 Project target Provinces through Community and Biodiversity Investment (CBI) windows. This option can be further communicated with the two Provinces but NNP1 EMO team is required to support the preparation of good proposals based on EPF technical guidelines. The first payment to EPF was finally made in 2015.

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 NNP1PC, 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 strengthened its safety team in the period by the appointment of a second experienced safety specialist, a 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. However both Owner and Contractor are intent

on further strengthening their professional safety staff with more international construction safety experience in the near future. Advertising for internal and external candidates have been placed and interviews have been taken place. Budget is allocated for the Owner to employ a senior professional experienced in construction safety management and a second safety officer, a combined total of 9 persons from Owner and Contractor.

5.2 SAFETY PATROLS, COMMITTEES AND MEETINGS

In October 2014, a Joint Monthly Safety Patrol was established. Every month the Patrol meets together on site for a whole morning when three or more different sections of the construction works are visited and inspected for safety hazards. The Patrol comprises all the safety officers and their senior managers representing the Owner, the Contractor and each subcontractor. All participants visit every location together. The Patrol culminates in a 30 minute wrap-up meeting that runs through the safety hazards identified and the corrective action to be taken, if still outstanding. A report is circulated to all participants within 24 hours of the meeting with documentation of the actions necessary.

One week later the same participants spend at least one hour at a Safety Committee Meeting when the safety hazards from the Patrol are reviewed for actions taken and outstanding, all reportable safety incidents are discussed with respect to risk avoidance in the future, and a special safety topic is chosen for presentation by a selected individual nominated beforehand. Discussion by participants is encouraged. The meeting is minuted.

From February 2015, in the weeks when the Joint Monthly Safety Patrol does not take place, the safety officers from the Owner, Contractor and all Subcontractors participate together in their own inspection of the construction site, visiting all active areas of work, reporting back to their respective management.

Periodic inspections of the various construction activities are therefore made on a regular basis and in respect of specific incidents that occur on site.

5.3 SAFETY TRAINING

All the training that the Safety Officers of the Owner and Contractor carried out in the period April to June 2015 is provided in the Contractor's Monthly Progress Reports and is summarised in Table 15 below. This includes all training by external and internal trainers and toolbox talks given by Owner, Contractor or Subcontractor personnel.

Month & Year	Number of Training Courses	Cumulative Total Number of Trained Workers in Each Month	Training Courses/ Topics

April, 2015	94	1,959	Induction, general, working at height, chemicals, vehicles and driving, cutting tiles and rebar, accident reporting, flood evacuation, HIV
May, 2015	68	2,106	Induction, general scaffolding, vehicles and driving, welding, lightening, and working at height
June, 2015	51	1,839	Induction, general, lightening, housekeeping, tunnel works, lifting with slings, cutting tiles and rebar, flood evacuation, vehicles and driving

Table 15: Safety Training for the Reporting Period from April to June 2015

5.4 SAFETY CLASSIFICATION AND STATISTICS

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

		<u>Cum. Total</u>	<u>2015 Q2 Total</u>
LTI	Lost Time Incident	(7)	[4]
RI	Recoverable Injury	(3)	[0]
NM	Near Miss (Reported)	(7)	[3]
PD	Property Damage	(1)	[0]
FI	Fire Incident	(3)	[2]
MVI	Motor Vehicle Incident	(22)	[5]
	Total	(43)	[14]

During the 17-month period from February 2014 to 30 June 2015, there were 43 reported incidents. The distribution in number by type is shown in parenthesis above with the cumulative totals in rounded brackets and the Q2 amount in square brackets. In the second Quarter of 2015, there were 14 incidents, comprising 5 Motor Vehicle Incidents, 4 Lost Time Injuries, 3 Near Misses and 2 Fire Incidents.

Motor Vehicle Incidents (MVI) have again been the largest number of incidents (5 out of 14 in Q2 of 2015 and 22 out of 43 cumulatively). There were no injuries sustained in the Q2 MVI incidents. All have been due to vehicle malfunction, loss of concentration or lack of good sense by drivers. This continues to be a focus of attention for safety inspection and training. With the steep increase in the number of vehicles using the near completed access roads in areas of the construction site, with steep escarpment, for purposes of disposal of excavated material for dam, powerhouse and tunnel excavations, there is still a significant emphasis on vehicle maintenance and driver ability to keep workers safe in these circumstances.

The distribution of incidents by type and over time can be seen in the histogram and graph in the illustration below. The different categories of incident and number each month are represented by different coloured blocks. The graph shows the frequency of incidents and is the number of incidents divided by the number of workers on site expressed as a percentage, plotted against time. The highest recorded number of incidents in any one month was 6 in both November 2014 and June 2015 when the number of workers was 1,177 and 2,187 respectively with the greatest frequency to-date being 0.5% or 1 incident per month per 200 workers in November 2014. This compares with an average over the Project to-date to 30 June 2015 now reduced to 0.04%, or 2.5 incidents per month and an incident every 435 man-months.

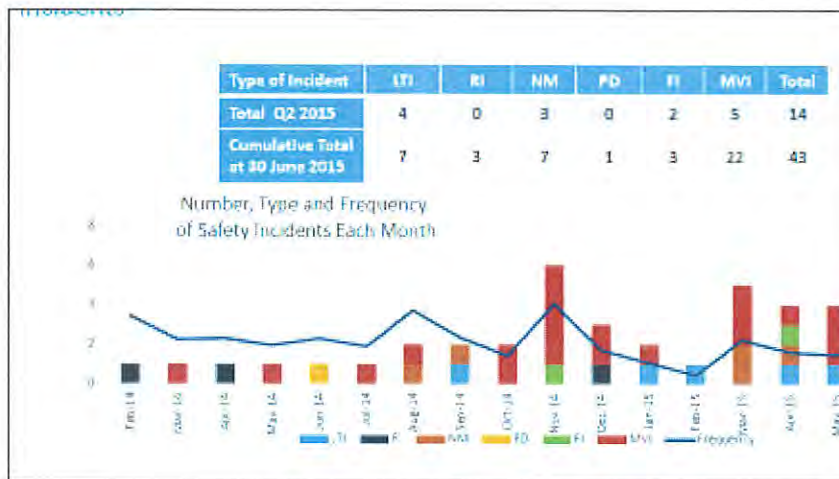


Fig. 5: Summary of Safety Incidents from February 2014-June 2015

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

The total 43 incidents recorded to 30 June 2015 are tabulated below. 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.

A summary report of safety incidents which occurred during the month and statistical analysis of safety performance such as lost time as provided by the Civil Contractor in their June 2015 Report is extracted and provided below:

- Total working hours until this end of last month: 3,379,669 hours
- Total working hours in this month: 435,034 hours
- Total working hours until the end of this month: 3,814,703 hours
- Total working hours without accident: 1,785,112 hours
- Number of Lost Days: 353 days
- Performance parameters:
 - Accident Frequency = 0.52 < 1.00 (Target)

Accident Severity Rate = 92.54 < 350 (Target)

(Note)

1. Total Working hours, number of works X working hours (8 hours) – break time (1 hours) * not include any overtime
2. Number of Accident, Count only the accident by which workers could not work equal to or more than 2 consecutive days.
3. Number of Loss Day, days of no-working day by accident X 300/365
4. Accident frequency rate; =(the number of injured/death person)/ (total working hours) X 1,000,000.
5. Accident Severity Rate= (Number of Loss day)/ (total working hours) X1,000,000.

6. APPENDICES: ENVIRONMENTAL MONITORING RESULTS

APPENDIX 1: LIST OF SS-ESMMPs APPROVED DURING APRIL TO JUNE, 2015

No	List of SS-ESMMP	Received SS-ESMMP	Approved Date by EMO
Access road construction activities			
1	SS-ESMMP CP for A Road	29-Apr-15	4-May-15
2	SS-ESMMP CP for P1 Road	27-May-15	10-Jun-15
3	SS-ESMMP CP for P2 Road	27-May-15	10-Jun-15
4	SS-ESMMP CP for T1 and T2 Road	21-May-15	10-Jun-15
5	SS-ESMMP CP for T4 Road	23-May-15	10-Jun-15
6	SS-ESMMP CP for T9 Road	23-May-15	10-Jun-15
7	SS-ESMMP CP for T13 Road	21-May-15	10-Jun-15
Entire construction activities			
Clearing and Earthwork			
8	SS-ESMMP CP for Slope Protection and Slope Drainage of Main Dam	06-May-15	06-May-15
9	SS-ESMMP CP for Construction of Limb Grouting Tunnel of Main Dam	18-May-14	29-June-15
Equipment installation			
10	SS-ESMMP CP for Installation & Operation of RCC Belt Conveyor System	20-Jun-15	24-Jun-15
Camp Yard			
11	SS-ESMMP CP for Contractor's Camp	14-May-15	11-Jun-15
230 kV Transmission Line Construction			
12	SS-ESMMP CP for Clearing right of way	29-Apr-15	18-Jun-15
13	SS-ESMMP CP for Foundation Erection and Stringing work	12-Jun-15	18-Jun-15
Total		13	13

APPENDIX 2: TOTAL NON-COMPLIANCES FOR THE REPORTING PERIOD

According to the Owner ESMMP-CP, Chapter 10.3, the NCRs are categorized into 3 levels: NCR Level 1, NCR Level 2 and NCR Level 3 on the basis of importance, and communications requirements for the inspection will be commensurate with the severity of the non-compliance situation. The three levels of non-compliance situations are:

Non-Compliance Level 1

The level 1 is a non-compliance situation that is not consistent with requirements, but not believed to represent an immediate or severe threat to human and environment. Repeated Level 1 concerns may become Level 2 concerns if left unattended and overdue. Corrective

action also may be suggested by coordination and discussion with the Contractor's site construction supervisor to be implemented no later than expected due date.

Non Compliance Level 2

The level 2 is a non-compliance situation that has potential significance and requires expeditious corrective action and site-specific attention, as well as raising of non-compliance level 1 that is unattended and overdue. Repeated Level 2 concerns may become Level 3 concerns if left unattended and overdue.

Non-compliance level 1 and 2 is to be issued NNP1PC Environmental Officer, and verified and approved by EMO Manager with suggested corrective action to be implemented no later than expected due date. Special follow-up of corrective measures is required.

Non Compliance Level 3

The level 3 is a critical non-compliance situation, including observed significant damage on the environment or a reasonable expectation of very severe impending damage, as well as raising of non-compliance level 2 that is unattended and overdue.

Non-compliance level 3 is to be reported to the NNP1PC Managing Level (i.e. ESD Deputy Managing Director), and then Managing Director for approval. When non-compliance level 3 is identified and Construction Contractor is acknowledged, implementation as per suggested corrective action shall be carried out as expeditious as practical for closure within the due date. In case of overdue, the financial penalty may be applied to Construction Contractor in accordance with contractual obligations and/or agreements between NNP1PC and Construction Contractor.

During the 2nd Quarter, there was one NCR level 2 issued to the Contractor on 28 April 2015 which was associated with a direct discharge of wastewater from the sediment ponds at the diversion tunnel outlet into Nam Ngiep without treatment using the installed effluent filtration system (see also Table 10). This issue was later closed by the end of the 2nd Quarter when the effluent filtration system was used.

No.	Site Name	New Non-Compliances in the 2 nd Quarter of 2015 (include those unresolved and carried over from the 1 st Quarter)				Closed Non-Compliances (resolved) in the 2 nd Quarter				Carried Over Non-Compliances (unresolved) into the 3 rd Quarter			
		Observation	NCR Level 1	NCR Level 2	NCR Level 3	Observation	NCR Level 1	NCR Level 2	NCR Level 3	Observation	NCR Level 1	NCR Level 2	NCR Level 3
Camp Sites													
1	RT Camp	9	0	0	0	6	0	0	0	3	0	0	0
2	Song Da Camp No.02	9	0	0	0	6	0	0	0	3	0	0	0
3	Song Da Camp No.01	6	0	0	0	4	0	0	0	2	0	0	0
4	Sino hydro camp	5	2	0	0	4	0	0	0	1	2	0	0
5	V&K Camp	4	0	0	0	3	0	0	0	1	0	0	0
6	Song Da Workshop	3	1	0	0	1	1	0	0	2	0	0	0
7	TCM Camp	3	0	0	0	3	0	0	0	0	0	0	0
8	Owner base camp	3	2	0	0	2	0	0	0	1	2	0	0
9	PKC Camp	2	0	0	0	2	0	0	0	0	0	0	0
10	Contractor camp	2	0	0	0	1	0	0	0	1	0	0	0
11	MV-DC Camp	1	1	0	0	1	1	0	0	Demobilized / decommissioned			
Construction Related Facilities													
12	Songda batching plant	2	0	0	0	2	0	0	0	0	0	0	0
14	CVC plant	2	0	0	0	2	0	0	0	0	0	0	0
13	Aggregate Plant Yard	1	0	0	0	1	0	0	0	0	0	0	0
Diversion Tunnel													
15	Outlet	5	0	1	0	4	0	1	0	1	0	0	0
Spoil Disposal Sites													
16	Spoil disposal N#7	1	0	0	0	1	0	0	0	0	0	0	0
17	Various construction	0	1	0	0	0	1	0	0	0	0	0	0

APPENDIX 3: HAZARDOUS MATERIALS AUDIT RESULTS FOR APRIL TO JUNE 2015

Site	PKC Fuel station and storage		Songda Camp		TCM fuel station and HazMat storage		RT work shop		V&K Camp		Songda Work shop		CVC Plant		Sinohydro camp		Sinohydro fuel station		Sinohydro Explosive Storage Area		Songda CVC Plant			
	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6
Storage area																								
1 Floor of storage area is impervious	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2 Fully bunded with capacity >120% of combined container	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3 Bunds in adequate condition	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4 Closed storage protected from rainfall and flood level	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5 Storage area is well ventilated	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6 Oil trap linked to the storage area	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7 Located not close to camp, office and watercourse	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8 Storage has a fence and lock	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9 Incompatible hazardous materials and chemicals stored	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10 Explosives stored in underground facilities or in	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
11 Explosive storage facilities are locked and access is restricted	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Site	PKC Fuel station and storage						Songda Camp						TCM fuel station and HazMat storage						RT work shop						V&K Camp						Songda Work shop						CVC Plant						Sinohydro camp						Sinohydro fuel station						Sinohydro Explosive Storage Area						Songda CVC Plant					
	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6																		
Containers																																																																		
12 Containers leak-proof and in good condition	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
13 Metallic (Iron) containers without corrosion (rust)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
14 Container chemically compatible with material	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
15 Container closed unless material added or used	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
16 Refuelling equipment without leakages observed	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
Labels																																																																		
17 Restricted access signs outside facility	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
18 Display of labels with words "Hazardous products/wastes"	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
19 Label describes hazards for users	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
20 PPE request sign posted within premises	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
21 Procedures for HazMat handling posted within	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
22 Procedures for emergency response posted within premises	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						

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			Sino hydro			Songda cvc plant			Total				
		4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6					
1	Used oil / hydraulic fluids/ cooking oil	29d	27d	29d	2d, 15sd	11co	0	3d	3d	18d	38d	2d, 16d	1d	2d	1sd, 1co	3co	0	0	0	0	0	0	0	1d	0	0	0	0	1d	74d, 49d, 15d, 1co, 14co			
2	Used oil mixed with water	0	0	0	0	0	0	0	0	3d	4d	5d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4d, 5d, 1sd			
3	Other petroleum residues	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
4	Empty used oil drum/container	12d, 1sd	8d	4d	1d, 15sd	1d, 14sd, 8co	5d	6d, 4sd	1d, 3sd	37d	33d	3d	4d, 2sd	9d	20sd	19sd	7sd	1sd	0	7sd	0	6d	5d	0	1d	34d, 27sd	63d, 27sd, 31sd	54d, 31sd					
5	Used oil filters	9u	17u	20u	67u	0	0	0	0	80u	100u	130u	1u	0	0	0	0	0	0	0	0	0	0	0	0	157u	117u	167u					
6	Contaminated soil, sawdust and concrete	1b	2b	4b	3b	0	0	0	0	6b	0	0	0	1b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10b	3b	5b	
7	Contaminated textile and material	1b	1b	2b	1b	0	0	0	0	1b	1b	1b	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3u	2b	3b	
8	Contaminated used rubber (hydraulic) hose	1sd	1sd	1sd	1d	0	0	0	0	6d	4d	5d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8d	4d, 1sd	5d, 1sd	
9	Contaminated grease	0	1d	1d	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1d	1d	
10	Empty contaminated grease drum/container	1d	2d	1d	4co	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1d, 2d	2d	1d	
11	Empty contaminated bitumen drum/container	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	Used tire	130u	107u	118u	0	0	1u	0	0	49u	15u	43u	149u	54u	6u	4u	4u	1u	1u	0	13u	24u	0	2u	335u	199u	280u						
13	Chemical mixed with water and chemical waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
14	Empty used chemical drum/container	0	0	0	0	0	0	0	0	117d	4d	9d	0	0	31d	45d	8d	28 d, 1 d	14 d	21 d	0	0	0	0	0	176d, 15d	63d	47d					
15	Solvent residues and containers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
16	Acid and caustic cleaners	0	4 bo	7 bo	120 bo	0	0	0	0	144 bo	168 bo	180 bo	0	18 bo	0	0	0	0	0	0	0	0	0	0	0	0	264 bo	190 bo	187 bo				
17	Empty paint and spray cans	5ca	0	0	2ca	4ca	1ca	0	0	0	0	0	0	0	0	0	0	1ca	0	0	0	0	0	0	0	7ca	2ca	4ca					
18	Used battery	14u	0	1u	0	0	0	0	4u	0	9u	6u	1u	2u	0	0	0	0	0	0	0	0	0	0	0	24u	1u	12u					
19	Ink cartridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

20	Halogen/fluorescent bulbs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
21	Electrical and electrical waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
22	Pesticide waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
23	Infectious and medical waste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
24	Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

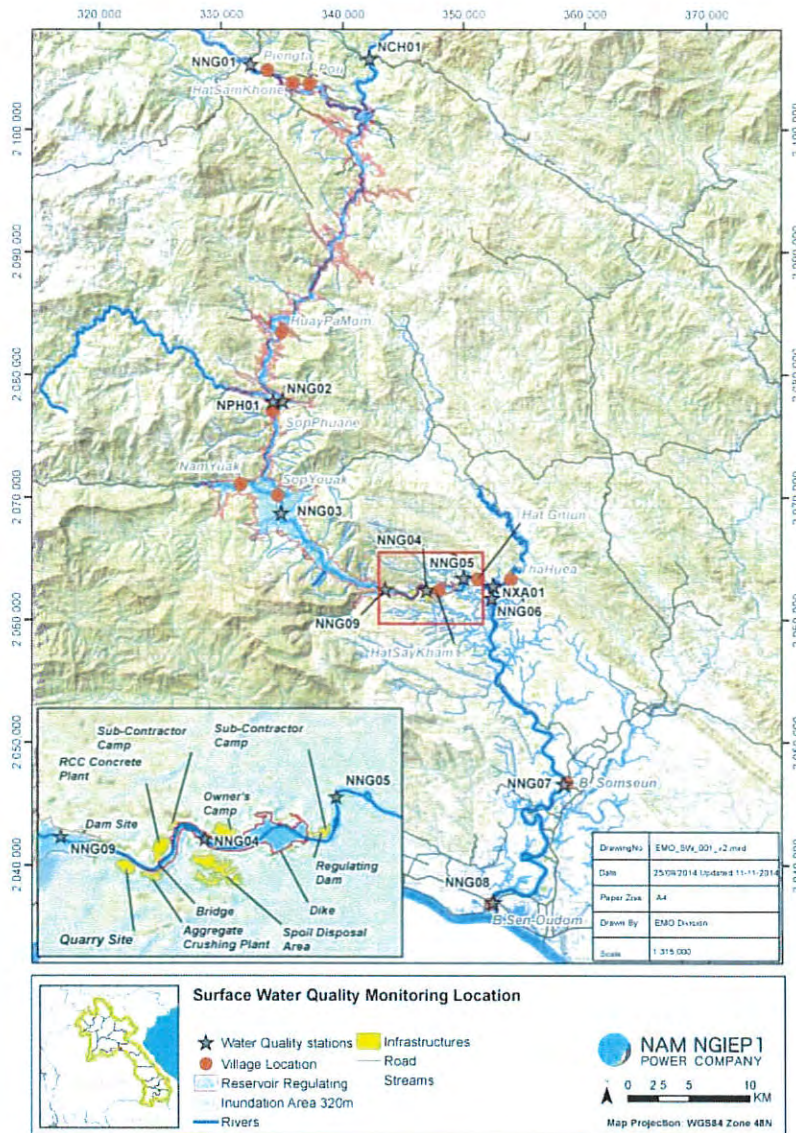
APPENDIX 5: AMOUNT OF WASTES SOLD IN THE 2ND QUARTER

Date	Types of waste	Site						Total	
		PKC Camp		RT camp		Songda CVC plant			
27 April 2015	Used tyres	-	-	-	-	111	u	111	u
	Used tyres	-	-	38	u	-	-	38	u
4 May 2015	Used tyres	-	-	14	u	-	-	14	u
	Used oil	-	-	26	d	-	-	26	d
	Contaminated soil	-	-	3	d	-	-	3	d
	Contaminated textile	-	-	1	d	-	-	1	d
	Empty used oil drums	-	-	1	d	-	-	1	d
	Empty used chemical drums	-	-	90	d	-	-	90	d
	Used batteries	-	-	16	u	-	-	16	u
21 June 2015	Scrap metal	3,000	kg	-	-	-	-	3,000	kg
22 June 2015	Scrap metal	-	-	-	-	5,000	kg	5,000	kg
25 June 2015	Used oil	-	-	15	d	-	-	15	d
	Contaminated soil	-	-	1	d	-	-	1	d
	Contaminated textile	-	-	5	b	-	-	5	b
	Empty used oil drum	-	-	5	d	-	-	5	d
	Used tyres	-	-	58	u	-	-	58	u
	Used batteries	-	-	690	Ams	-	-	690	Ams
	Plastic bottles	-	-	250	kg	-	-	250	kg

APPENDIX 6: SURFACE WATER QUALITY MONITORING CODE AND LOCATIONS

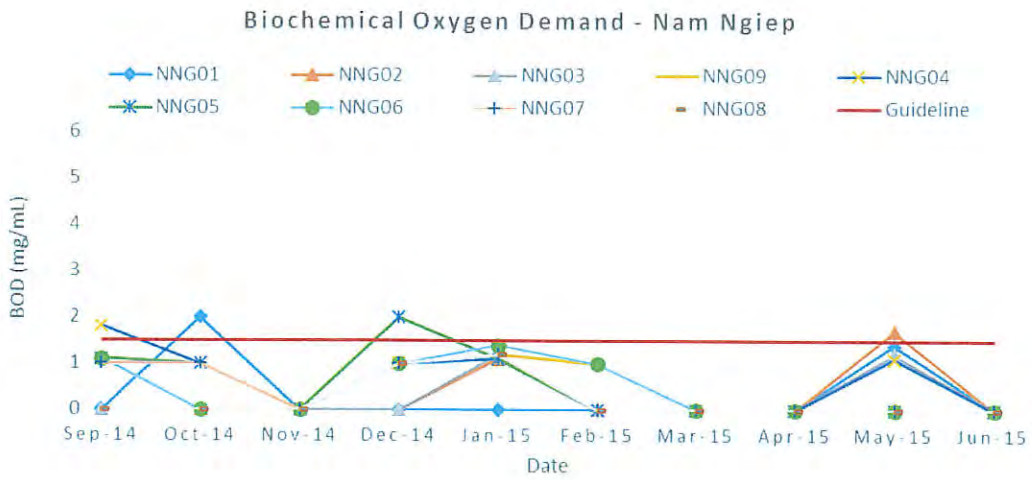
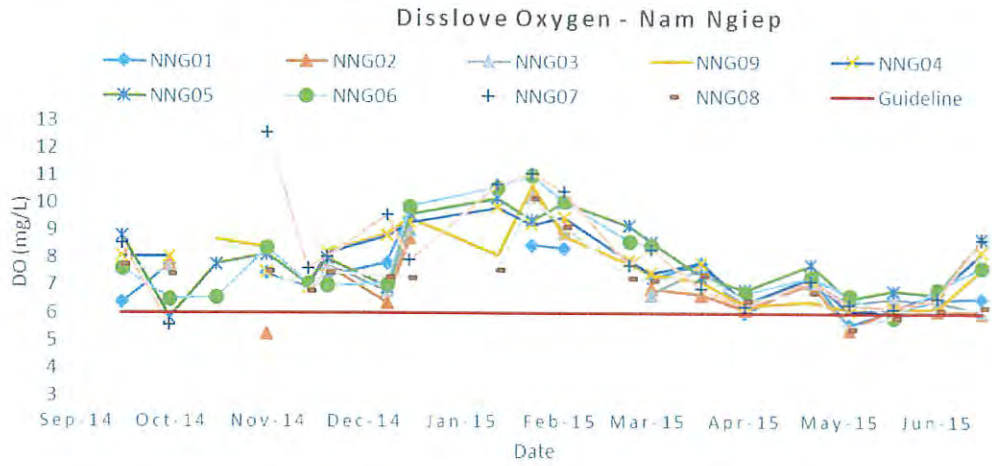
Site Code	Location station
NNG01	Nam Ngiep Upstream of Ban Phiengta
NNG02	Nam Ngiep Upstream of Nam Phouan Confluence
NNG03	Nam Ngiep Downstream of Ban Sop-Yuak
NNG09	Nam Ngiep Upstream Main Dam
NNG04	Nam Ngiep Downstream RT Camp
NNG05	Nam Ngiep Upstream of Ban Hat Gniun
NNG06	Nam Ngiep Downstream of 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

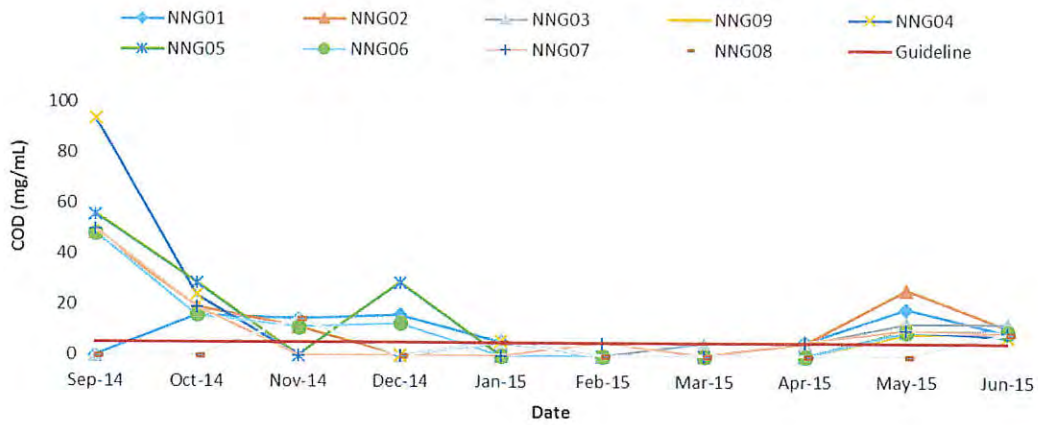


APPENDIX 7: KEY TRENDS OF WATER QUALITY MONITORING FROM SEPTEMBER 2014 TO END OF JUNE 2015 (ONLY PARAMETERS THAT EXCEEDED GUIDELINE STANDARDS)

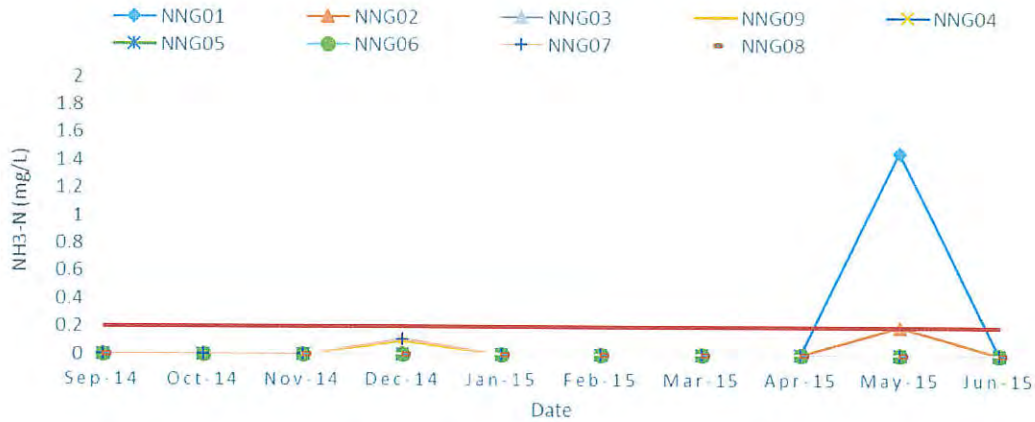
Nam Ngiep Surface Water main channel



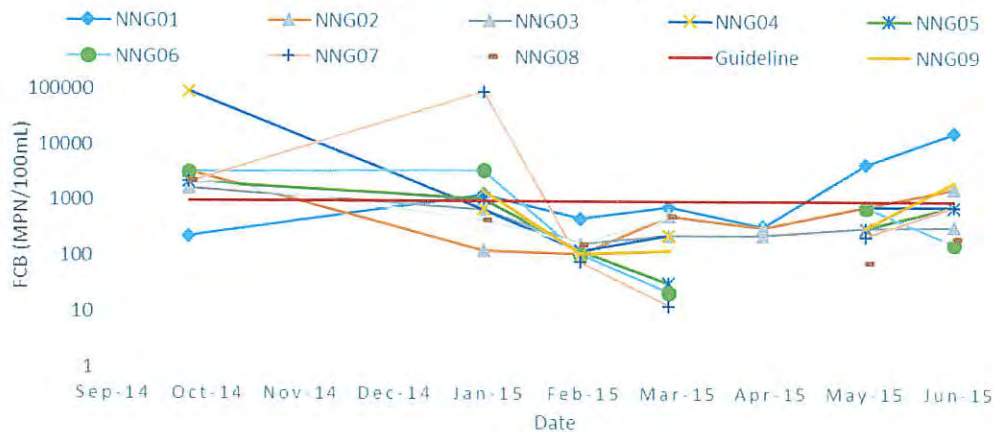
Chemical Oxygen Demand - Nam Ngiep

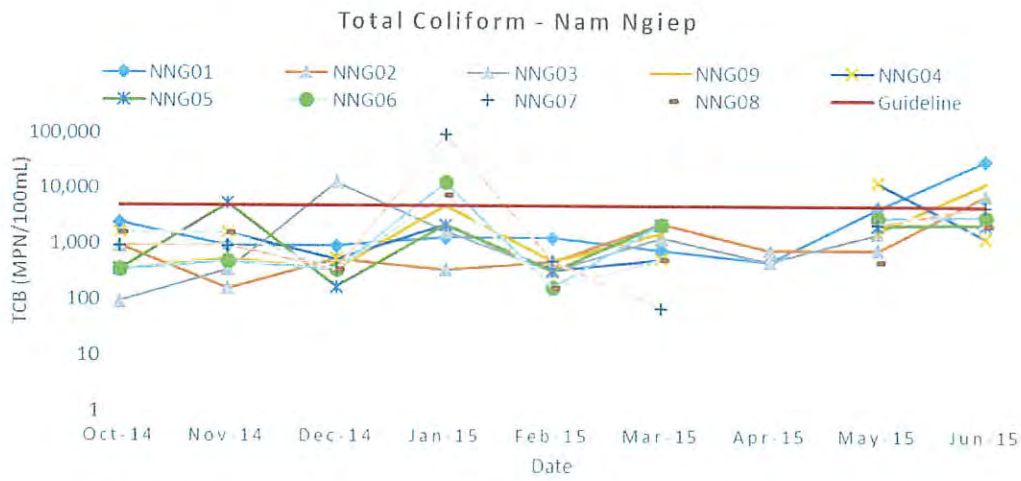


Ammonia Nitrogen - Nam Ngiep

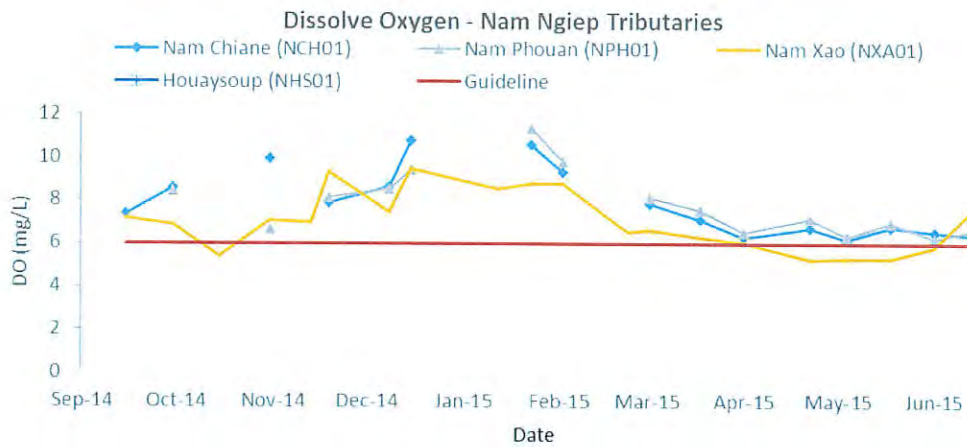


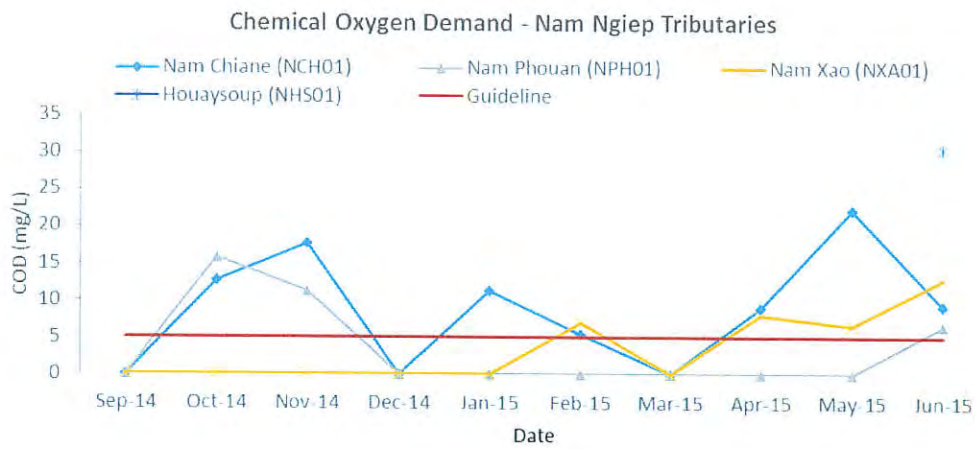
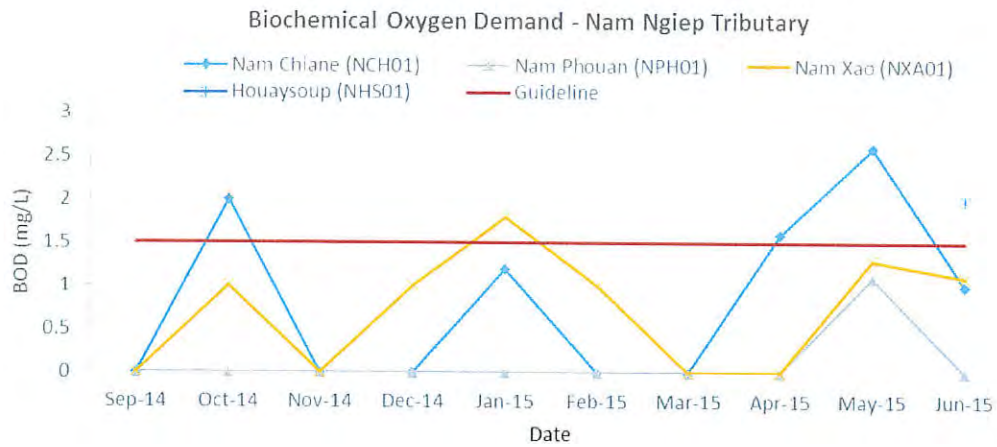
Fecal Coliform - Nam Ngiep

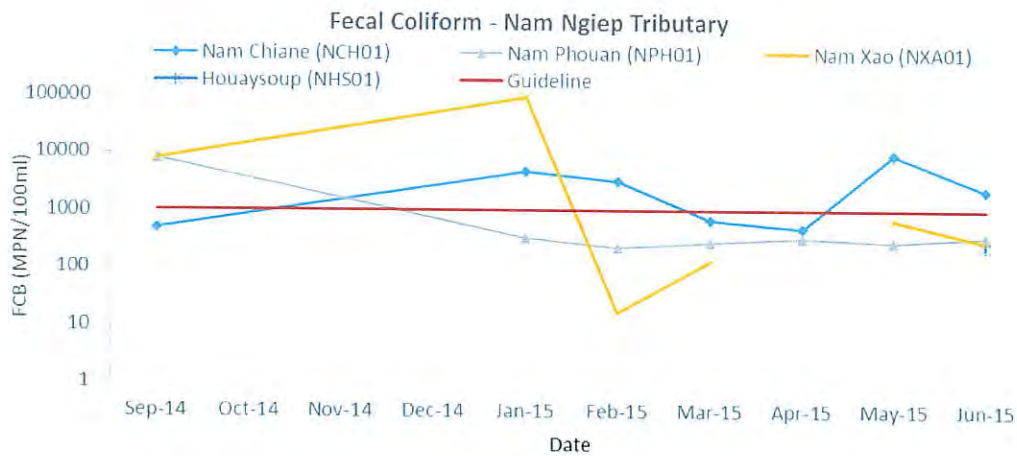
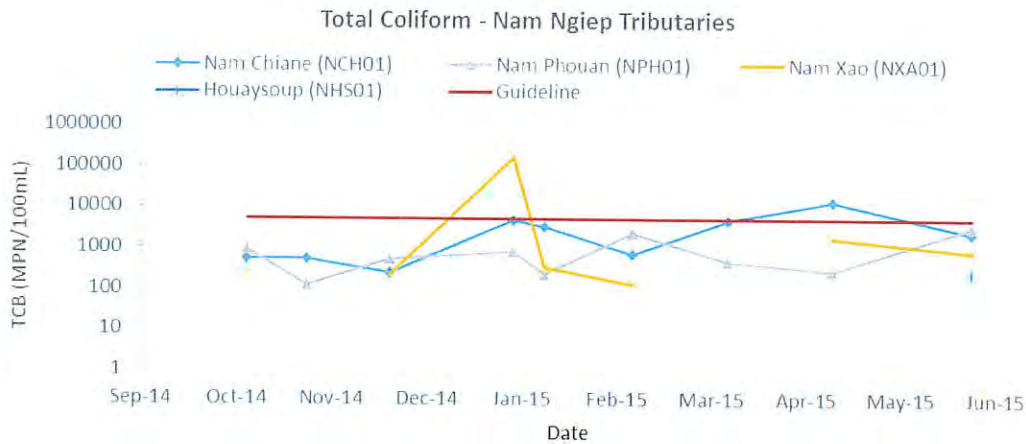




Key water quality parameters for the Nam Ngiep tributaries: Nam Chian, Nam Phouan, Nam Xao, Nam Houay Soup

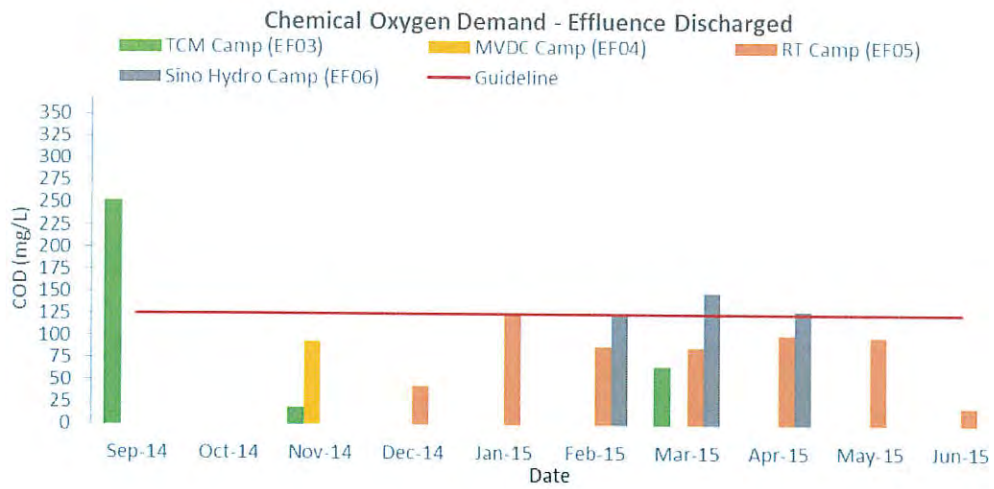
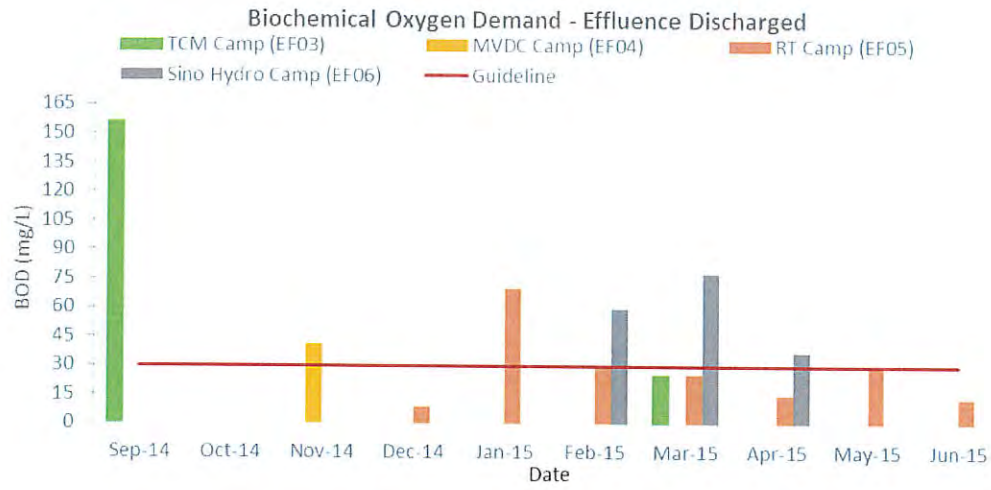


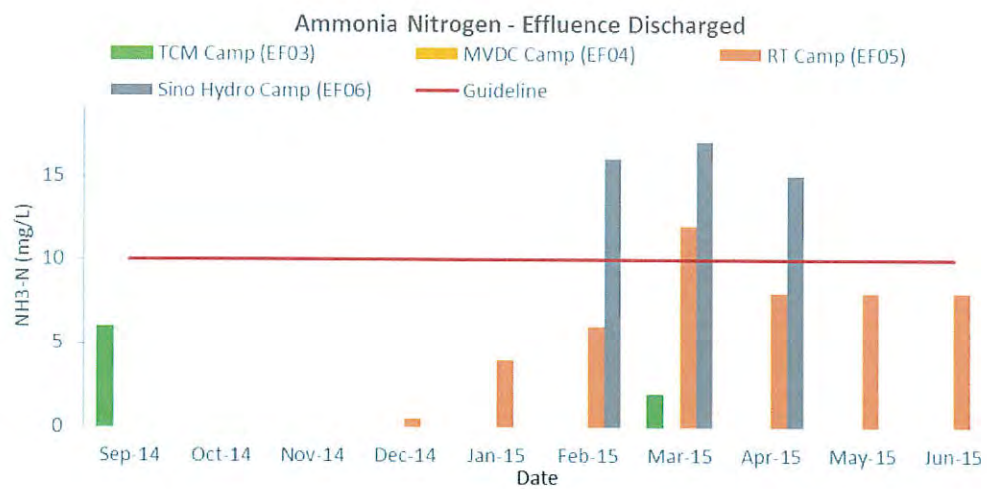
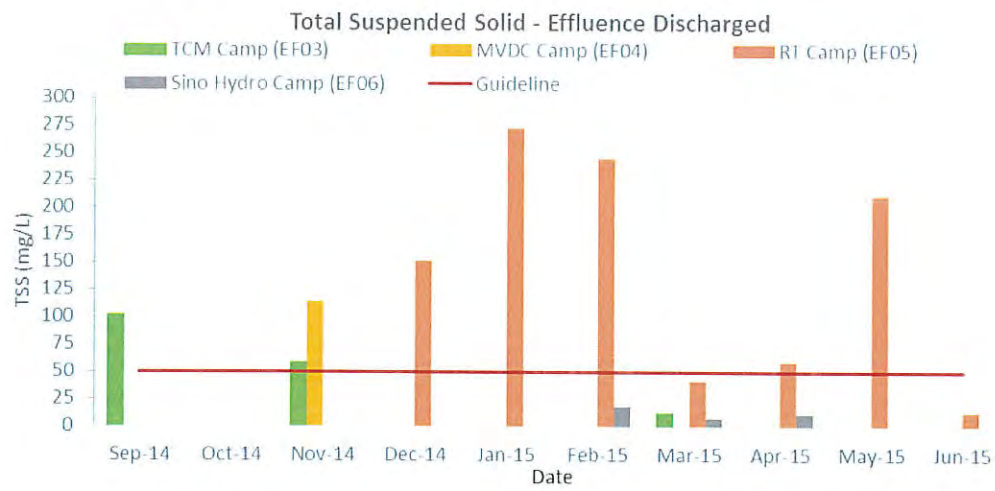


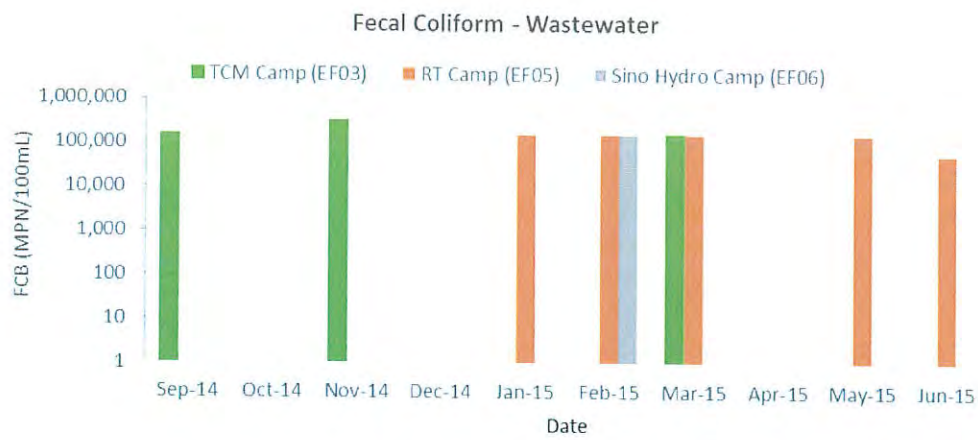
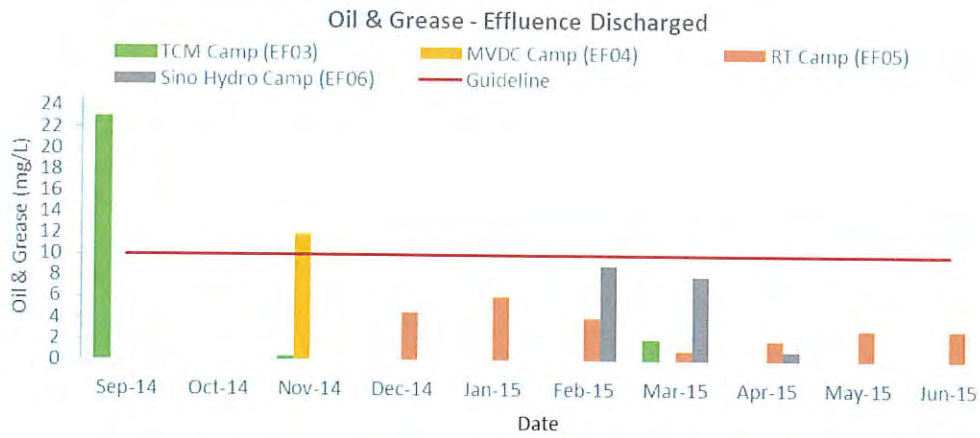


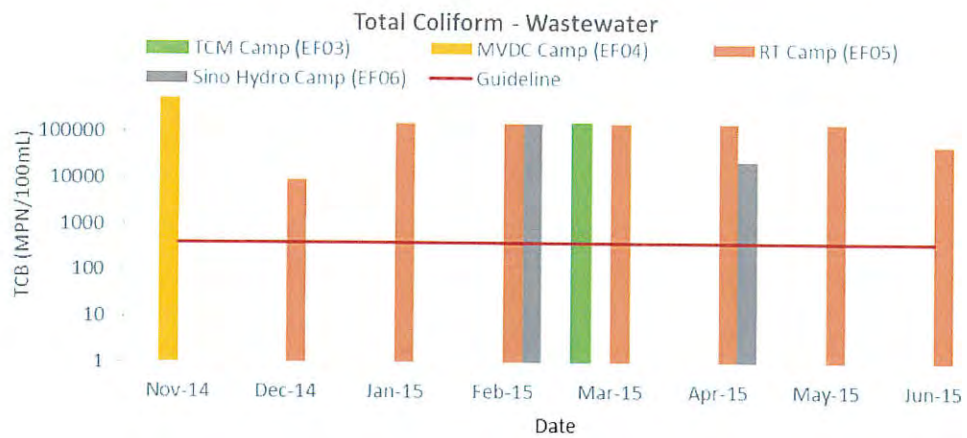
Camp Effluent Water Discharge Trends from September 2014 to June 2015

Camp effluent discharges were monitored from camps that had water discharge. When no discharge is observed, such as the case where effluent is being held in tanks, no monitoring is conducted. During the 2nd quarter (April to June 2015), two camps were discharging effluents: Right Tunnel (RT) and Sinohydro camps. The graphs below show effluent discharges from TCM Camp, MDVD Camp, RT Camp and Sino Hydro Camp since September 2014 to June 2015.

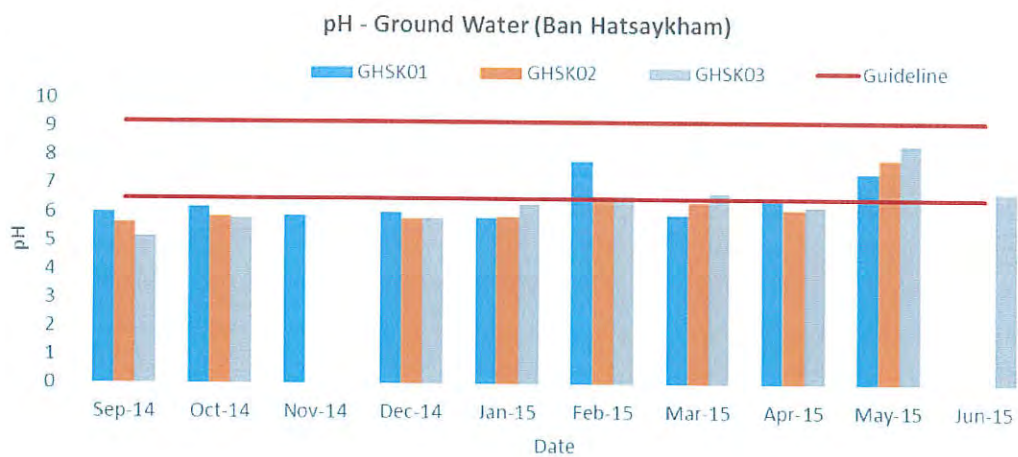


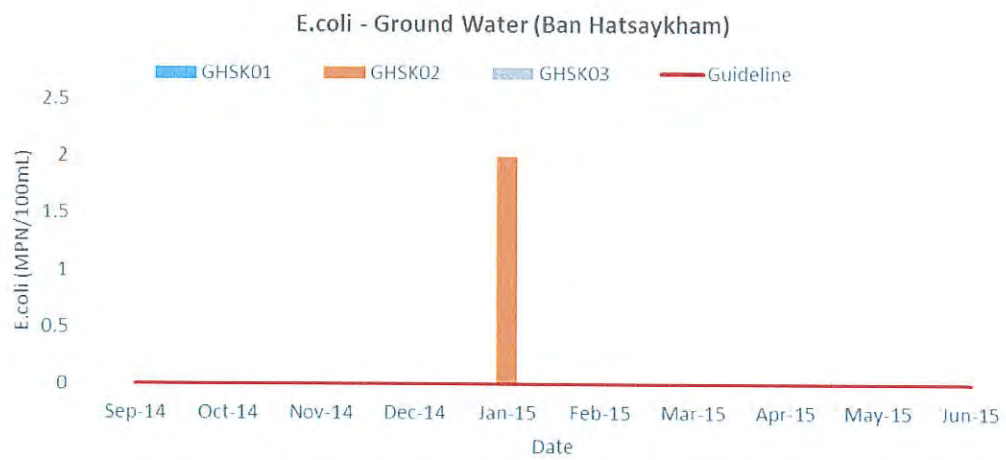
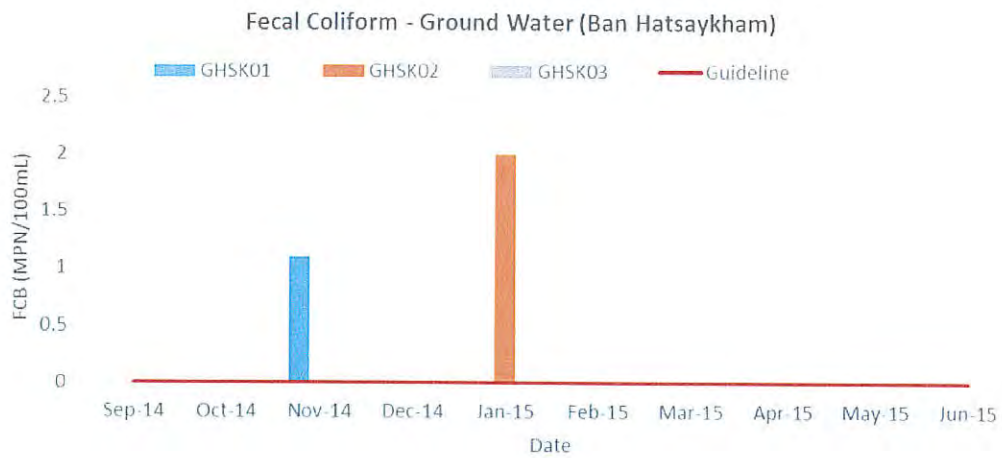






Groundwater trends at Ban Hatsaykham





Construction Area Discharge Water Quality

