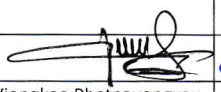
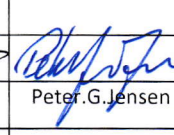
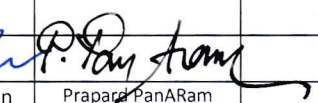
NAM NGIEP 1
POWER COMPANY

## Nam Ngiep 1 Hydropower Project

# Environmental Management Monthly Monitoring Report

June 2016

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | |  |  |  | |
| A | 23 May 2016 | Viengkeo Phetnavongxay | Peter.G.Jensen | Prapard PanARam | |
| REV | DATE | AUTHOR | CHECKED | APPROVED | MODIFICATION DETAILS |

| Accessibility | |
|---|---|
| ☑ | Public |
| ☐ | Internal |
| ☐ | Confidential |

**Document No.**

**NNP1-C-J0904-RP-018-A**

NAM NGIEP 1 POWER COMPANY

## Nam Ngiep 1 Hydropower Project

# Environmental Management Monthly Monitoring Report

June 2016

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| A | 23 May 2016 | Viengkeo Phetnavongxay | Peter.G.Jensen | Prapard PanARam | |
| REV | DATE | AUTHOR | CHECKED | APPROVED | MODIFICATION DETAILS |

| Accessibility | |
|---|---|
| ☑ | Public |
| ☐ | Internal |
| ☐ | Confidential |

**Document No.**

**NNP1-C-J0904-RP-018-A**

## TABLE OF CONTENTS

**BBREVIATIONS / ACRONYMS**

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

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

# EXECUTIVE SUMMARY

In June 2016, a total of eight (8) SS-ESMMPs were reviewed by NNP1PC-EMO. Out of these, four (4) SS-ESMMPs were approved with comments, one (1) was closed and three (3) were under review. A total of 24 construction areas and camps including temporary camps at Houay Soup Resettlement Areas, and the 230 kV Transmission Line were inspected. Based on these site inspections, a total of eight (08) Observations of Non-Compliances (ONCs) were issued in June 2016, it is decreased by 15 ONCs compared to May 2016. However, with a carry-over from May 2016, a total of twenty eight (28) ONCs and one (1) NCR were active during June 2016. Out of these, sixteen (16) ONCs and one (1) NCR were resolved, ten (10) ONCs were not resolved exceeding the deadlines[1] and a total of twelve (12) ONCs are carried over into July 2016.

A technical evaluation for the selection of contractor to construct a small laboratory at the Owners' Site Office and Village was resumed again in June after the submission of additional information. The purchase of laboratory equipment is being finalised for management approval. The Purchase Order is expected to be issued in July 2016. Meanwhile there are several options by which to provide a temporary room or rooms in which a laboratory can be accommodated and operated after delivery of equipment to Site.

Effluents monitoring results carried out in June 2016 showed that all construction camps had significantly higher concentrations of total coliforms than the Effluent Standard. The Total Suspended Solids (TSS) exceeded the effluent standards at the CVC Plant, RCC plant, Re-regulation Dam and Main Dam for the first sampling mission on 08 June 2016. Another ONC was issued in June 2016 requiring the Contractor to provide regular maintenance of the sediment ponds and update the submitted SS-ESMMP to cover the operation of the RCC Plant by 20 July 2016. A joint visit between a Thai external expert who visited the site in 2015, Owner (TD and EMO) and the Contractor was carried out in all the camps during 29-30 June 2016 to assess the status of the improvements of Waste Water Treatment System (WWTS) at selected camps and recommend improvements in the remaining camps.

Result of surface water monitoring indicated that the faecal coliforms and total coliforms are ranged between 2,300–160,000 MPN/100 ml in all stations at Nam Ngiep upstream, within and downstream of the Project Construction Area, it is exceeding the Standard, but was not caused by project activities.

There were no Environmental Monitoring Unit (EMU) visits scheduled in June 2016.

The construction of the NNP1 Project landfill was progressed at the Spoil Disposal Area No. 6. Key achievements included completing the drilling of a deep well for water supply and three (03) groundwater monitoring boreholes, a field office, a guard house and lining of solid waste pits and anaerobic ponds. A Contractor was also selected to construct a Houay Soup landfill. The first

[1] Contractors are progressing slowly on the corrective actions implementation.

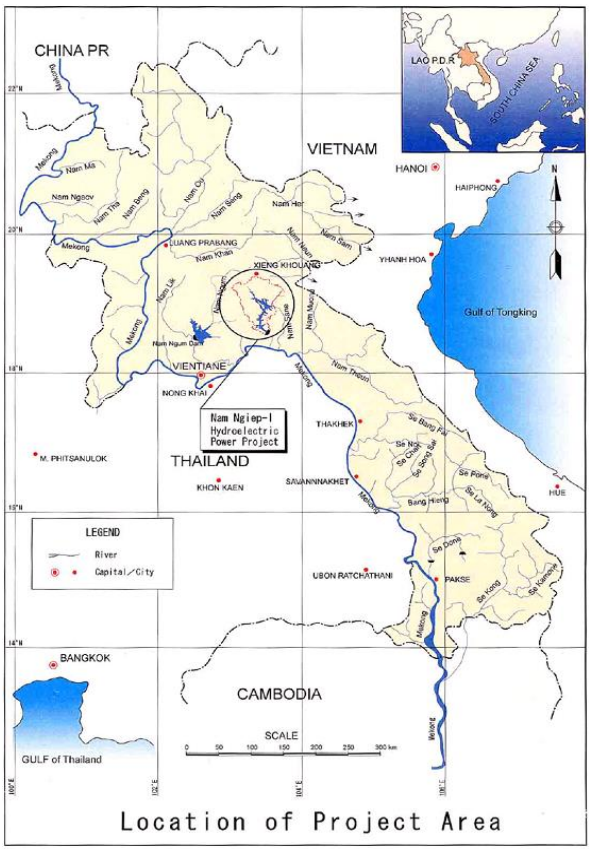
draft of the DWP & SS-ESMMP for the Construction of Houay Soup Landfill was received on 17 June 2016 and is under review.

The development of NNP1 Watershed Management Plan (WMP) continues and the progress in June focussing on verification of current data analysis and the development of activity package for thematic area of land use, biodiversity, fishery, water resource, soil erosion and sedimentation, and livelihood through the technical workshop with one integrated team: NNP1, Watershed and Reservoir Protection Committee (WRPC), Watershed and Reservoir Protection Office (WRPO), Xaysomboun District ISP, and the consultants of Biodiversity and Fishery.

# 1 INTRODUCTION

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

*Figure 1-1: Location Map*




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

This Environmental Monthly Monitoring Report (EMMR) provides a summary of environmental monitoring activities and mitigation actions in February 2016. The EMMR was prepared by the Project's Environmental Management Office (EMO). It has been internally reviewed and cleared by EMO senior technical staff and management prior to submitting the report to the Government of Lao PDR (GoL) related agencies.

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

# 2 WORK PROGRESS OF PRINCIPAL CONTRACTORS

Construction Works for the Project are being carried out through four separate main construction contracts under the supervision of the Technical Division of NNP1PC. The four contracts are the Civil Works, the Electrical and Mechanical Works, the Hydraulic Metal or Hydro-mechanical Works and the 230kV Transmission Line Works. Actual overall cumulative work progress until the end of June 2016 was 42.2% [1] (compared to planned progress of 46.1%),

based on achieved Interim Milestone Payments for all Contracts excluding the value of Advance Payments, varied works and other adjustments allowed under each Contract. In terms of the value of actual work done the percentage is slightly understated since work completed, but not paid, is not included.

The overall construction schedule and progress curve (by achieved Milestone Payments) are shown in Figure 2-1 and Figure 2-2 respectively.

*Figure 2-1: Overall Construction Schedule*

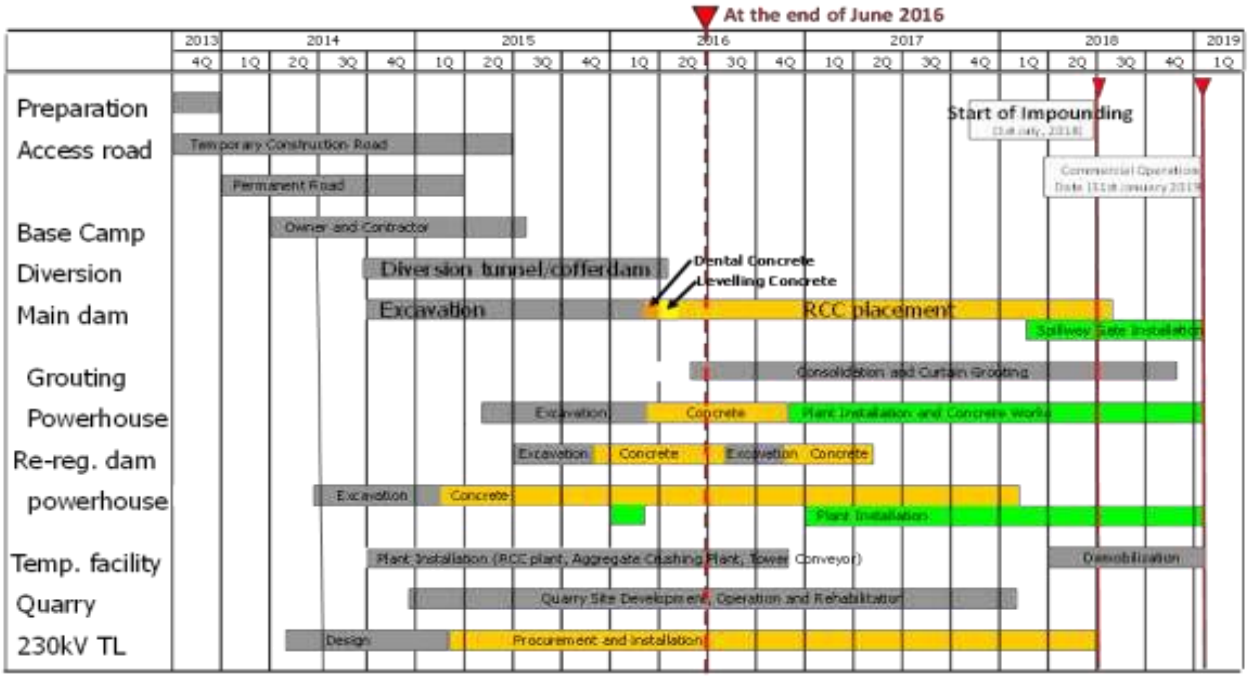
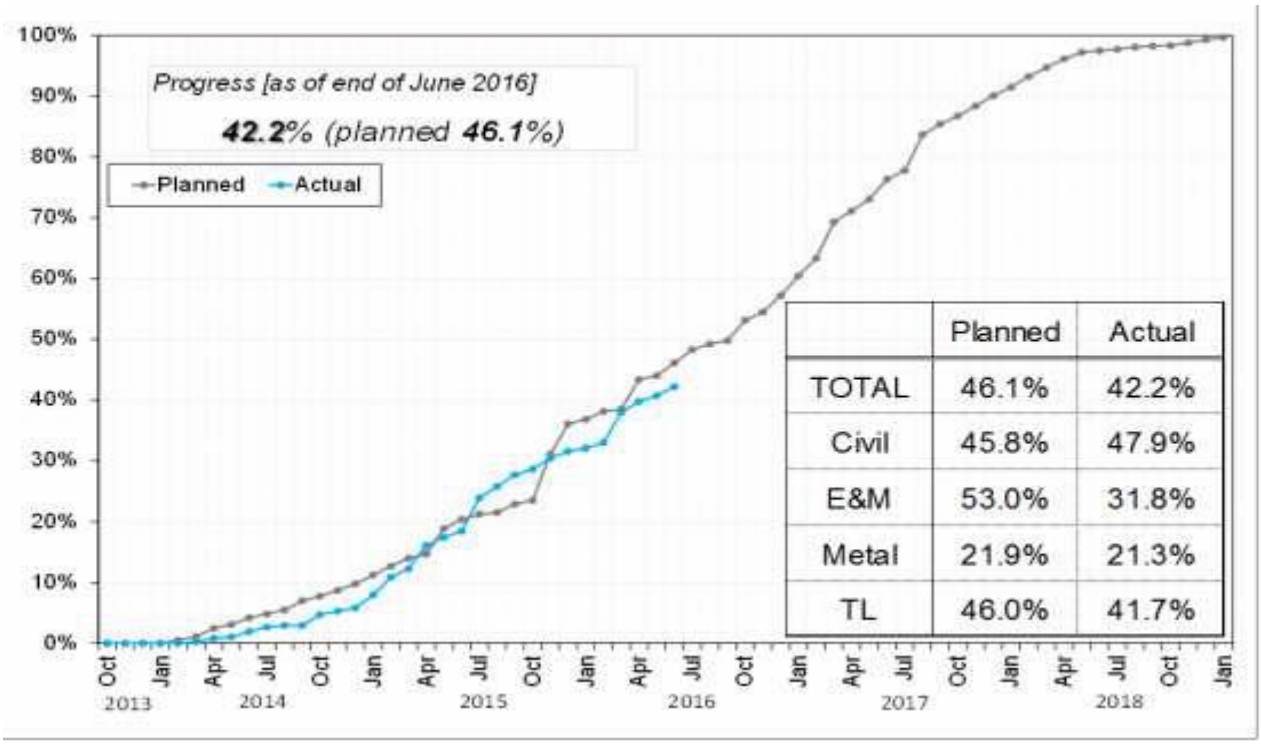



*Figure 2-2: Progress Curve (All Construction Works)*



## 2.1 Civil Work

The Civil Works Contract was executed between Obayashi Corporation and the Nam Ngiep 1 Power Company on 30 September 2013 and the NTP was issued on 03 October 2014. Excavation works of the main dam, the diversion tunnel and the re-regulation dam were commenced in October 2014 and completed in February 2016, following which the concreting works were commenced.

The cumulative actual work progress of the Civil Works until the end of June 2016 was 47.9% (compared to planned progress of 45.8%) calculated in the same manner as described above for the value of achieved Interim Milestone Payments excluding advance payment.

### 2.1.1 Main dam and power house

After starting the main dam excavation works in October 2014 on the left bank, the works

were about one month advanced when diversion of the Nam Ngiep River was achieved at the end of October 2015. However, excavated volumes were 20% greater than expected and part of this additional work is necessary to construct a 'shear key' structure due to the weak layers of rock encountered in the dam foundation. Following the efforts on Site, the additional excavation work was completed at the end of February 2016. The cost of the additional excavation and RCC concrete placement necessitated expenditure of contingency amounts provided exactly for such eventualities. The dental concreting works were commenced in March 2016, and conventional RCC levelling concrete placement for the main dam in the 'shear key' structure up to El. 170.5 m was completed at the beginning of May. Consolidation grouting at the main dam area was commenced on 10 May 2016 and RCC concrete placement for the main dam body was commenced on 21 May 2016. Consolidation grouting covers the whole footprint of the main dam and RCC concrete placement and consolidation grouting are implemented in parallel, section by section. The progress of RCC concrete placement is shown in Table 2-1 below.

Table. 2-1: Progress of Main Dam RCC Works at 30 June 2016

| Total Anticipated Volume ($m^3$) | Completed ($m^3$) | Progress (%) |
|---|---|---|
| 2,310,000 | 126,398 | 5.47 |
| 16,420 | 4,392 | 26.7 |

The consolidation drilling and grouting for the main dam started in May 2016 and is ongoing. The progress is 26.7 % by achievement of total drilled length at the end of June 2016 as a proportion of the total expected drilling.

Powerhouse excavation works was completed in January 2016 and levelling concreting works was started in coordination with installation of the grounding system accordingly. Progress of the concreting works is proceeding well and is shown in Table 2-2 below

*Table 2-2: Progress of Main Powerhouse Structural Concrete Works to 30 June 2016.*

| Total Anticipated Volume ($m^3$) | Completed ($m^3$) | Progress (%) |
|---|---|---|
| 32,600 | 5,487 | 16.8 |

### 2.1.2 Re-regulation dam and powerhouse

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

Structural concrete works were commenced in March 2015, in coordination with installation of the grounding system. The progress of structural concrete works is shown in Table 2-3 below

*Table 2-3: Progress of Re-regulation Dam Structural Concrete Works to 31 March 2016*

| | Concrete Volume ($m^3$) Placed by the End of June 2016 | | | | | | |
|---|---|---|---|---|---|---|---|
| Structure | Intake | Powerhouse | Tailrace | Retaining Wall | Spillway | Left Bank RCC Structure | Overal |
| Anticipated Quantity | 26,549 | | | 508 | 23,500 | 13,200 | 63,757 |
| Completed Quantity | 11,536 | 10,465 | 1,681 | 312 | 3,758 | 13,228 | 40,980 |
| Progress | **89%** | | | **61%** | **16%** | **100%** | **64%** |

The concrete volume placed already for both powerhouse and dam is 40,980$m^3$ being 64% of the revised total estimate of 63,757 $m^3$ for all structures. The powerhouse concreting has advanced well and secondary concrete embedment for the draft tube liner was completed at the end of April 2016. The left bank structure was re-designed as roller compacted concrete (RCC) and was completed on 18 March 2016. Following installation of guide frames for re-regulation waterway gate and stop log and re-regulation intake gate in April 2016, secondary concrete embedment of the guide frames was completed in May 2016 and structural concrete works for the retaining wall to support the substation yard was commenced in June 2016.

The Dyke (saddle dam) embankment works on the right bank near the Houay Soup Resettlement Area were also started in November 2015 and was completed on 30 April 2016.

### 2.1.3 Temporary work facility

#### 2.1.3.1 DIVERSION TUNNEL INLET AND OUTLET

The diversion tunnel works which is over 600 m in length and 10 m in diameter were commenced in October 2014 by drill and blast techniques and completed in late September 2015. The river diversion took place on 31 October 2015 together with construction of earth-fill cofferdams upstream and downstream.

#### 2.1.3.2 SECONDARY UPSTREAM COFFERDAM

The concrete placement works in both conventional and roller compacted concrete (CVC and RCC respectively) for the secondary upstream cofferdam were started in November 2015 and completed ahead of construction schedule in the middle of February 2016. The grout curtain works were completed on 02 April 2016.

#### 2.1.3.3 TEMPORARY BRIDGE

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

#### 2.1.3.4 PLANT YARDS

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

Foundation work and installation of equipment were completed at all the plant yards and the belt conveyor system from the RCC plant to the main dam was completed in early April 2016.

#### 2.1.3.5 QUARRY

After removal of overburden the excavation of raw materials for aggregate crushing were started in July 2015. The nature and type of the rock being exploited is acceptable though unsuitable soil layers are removed to spoil disposal areas, and good quarry management continues.

#### 2.1.3.6 DISPOSAL AREAS

The disposal area on the right bank has been available for operation since January 2015, as was the adjacent waste disposal area. The Disposal Area No.9 along Road P1 near the entrance of Road T5 started operation in April 2015. Unsuitable material from the quarry continues to be hauled to Disposal area No.6 and Disposal Area No.9 is being developed by the E&M Contractor as stated above.

## 2.2 Electrical and Mechanical Works

The EMWC was executed between Hitachi-Mitsubishi Hydro Corporation and NNP1PC on 13 June 2014 and the NTP was issued on 03 October 2014. The cumulative work progress of the Electrical and Mechanical Works until the end of June 2016 was 31.8% (compared to planned progress of 53.0%). This delay is due to the change of schedule of delivery of stator material for Unit 1 of the main powerhouse and receipt of runner material of re-regulation powerhouse at the Electrical and Mechanical Works Contractor's factory from April 2016 to August 2016 and from June 2016 to July 2016 respectively. However, the stator of Unit 1 of the main powerhouse and the runner of the re-regulation powerhouse will be shipped from the factory to the Site on schedule by coordination of the manufacturing schedule in the factory. Accordingly, it has no impact on the overall construction schedule.

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

a) The following documents were submitted:

- For the main power station, construction drawing of water level measuring equipment, schematic diagram of connection with external equipment of 22 kV station service cubicle, capacity calculation for water spray fire extinguishing system for main transformer, assembly drawing for electrical overhead traveling crane, sequence diagram of electrical overhead traveling crane, and shop inspection and test procedures for spiral case, stay ring, and draft tube for hydro- turbine parts.
- For the re-regulation power station, construction drawing of water level measuring equipment, diagram of connection with external equipment of 11 kV station service cubicle, assembly drawing for electrical overhead traveling crane, sequence diagram of generator circuit breaker, disconnector, surge absorber, 115 kV gas circuit breaker, capacity calculation of oil cooler, mechanical strength calculation of switchgear at 115kV substation, and CT& VT calculation for 115 kV switchgear.

b) The installation work of embedded piping for the main powerhouse commenced on 17 February 2016 and continued in coordination with concrete casting work. The status of embedded pipe installation is shown in Figure 2-3.

c) The grounding works for the main powerhouse and re-regulation power house are under way in coordination with concrete casting work.

*Figure 2-3: Embedded piping installation (Main powerhouse)*

## 2.3 Hydro-Mechanical Works

The HMWC was executed between IHI Infrastructure Systems (IIS) and NNP1PC on 18 April 2014 and the NTP was issued to the Contractor on 03 October 2014. The cumulative work progress of the Hydraulic Metal Works until the end of June 2016 was 21.3% (compared to planned progress of 21.9%). The main activities carried out during this month are described below:

a) Main dam

- Witnessed inspection result confirming painting quality of penstock pipe P36, Line 2 was approved by Owner's Engineer on 4-June-2016.
- Witnessed inspection result confirming painting quality of penstock pipe P36, Line 1 and P35, Line 2 was approved by Owner's Engineer on 11 June 2016
- Witnessed inspection result confirming painting quality of penstock pipe P39, P40, P41, Line 1 and 2, including P35 Line 1 was approved by Owner's Engineer on 13 June 2016.
- Site Inspection and Setting out of Bench marks for Installation of Steel penstock pipe lower part, Line 1 & 2 was conducted and completed on 29 June 2016.
- Latest progress of penstock pipes fabrication at IHI field shop as of the end of June 2016 is shown ***in Table 2-4*** below

*Table. 2-4: Progress of the penstock pipe fabrication at the IHI field shop as at the end of June 2016*

| Item No. | Work Activity | Fabrication Progress (%) | Remarks |
|---|---|---|---|
| 1.1 | Assembly & Welding | 16.3% | |
| 1.1 | Painting | 11.68 % | |
| 1.1 | Delivery to Main Dam Laydown Area | 0.0 % | IHI planned schedule is to start delivery of lower penstock pipes to main dam on 06 July 2016 |
| 1.1 | Site Erection at Main Dam | 0.0 % | IHI planned schedule is to start penstock pipe erection work in second week of July 2016 |

b) Re-regulation dam

- Witnessed dimensional and visual inspection results for Intake Gate Leaf (before welding) was approved by the Owner's Engineer on 15 June 2016.
- Witnessed dimensional and visual inspection results for Re-regulation Gate Leaf (before welding) was approved by the Owner's Engineer on 23 June 2016.
- Witnessed dimensional and visual inspection results for Intake Trash Rack (Left Bank) was approved by the Owner's Engineer on 29 June 2016.
- Witnessed dimensional and visual inspection results for Intake Gate Leaf (before painting) was approved by the Owner's Engineer on 30 June 2016.
- Installation of the re-regulation intake gate guide frames (embedded and removable guide) was completed and was handover to the Civil Contractor on 30 April 2016 for secondary concreting.
- Latest progress of steel gate installation for each work item at the end of June 2016 is shown ***in Table 2-5*** below.

*Table. 2-5: progress of steel gate installation for each work item at the end of May 2016*

| Item No. | Work Item Description | Site Installation Progress (%) | Remarks |
|---|---|---|---|
| 2.1 | Re-regulation Waterway Gate | 50 % | Gate leaf installation is ongoing |
| 2.2 | Re-regulation Waterway Stop Log | 20 % | IHI plan to carry-out dry test in the first week of July 2016. |
| 2.3.1 | Re-regulation Intake Gate | 50 % | Gate leaf installation is ongoing. |
| 2.3.2 | Re-regulation Intake Trash Rack | 70 % | Installation of Trash Rack is ongoing |

| | | | |
|---|---|---|---|
| 2.4 | Re-regulation Draft Gate | 20 % | Upper removable guide frame will be installed in the last week of July 2016. Setting and dry test will be carried out in October 2016. |

## 2.4 230kV Transmission Line Works

The TLW Contract was executed between Loxley-Sri Consortium and NNP1PC on 11 July 2014 and the NTP was issued to the 230 kV TL Contractor on 03 October 2014. The cumulative work progress of the Transmission Line Works until the end of June 2016 was 62.67% (compared to planned progress of 64.0%). The difference is chiefly as a result of delay to commencement of construction works by approximately 7 months while awaiting compensation matters to be resolved by NNP1PC. The Contractor agreed to accelerate its Works and is about a month behind target to get back onto the original schedule for tower foundation excavation by May 2016, within 8 months from starting. During the rainy season and with further delays due to compensation virtually full access to most sections of alignment was achieved in 2015 following resolution of remaining environmental and social matters. In the last month there has been little progress with tower erection due to late confirmation of steel orders due to design review, and tower excavation also slowed down as stub angles became unavailable until factory production could be rescheduled after delayed design submission and approval and steel deliveries were received.

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

a) All the line route survey works from the main power station to Nabong Substation have been substantially completed and the final alignment of the 230 kV Transmission Line route is now confirmed. The route survey for the final change of alignment, a straight-line offset of the TL over a 2.8 km distance from Tower 31 to Tower 38 to avoid encroachment into the protected forest is finished, while the revision plan and profile design of this section is approved by the Owner's Engineer.

b) Plan and profile drawings, re-adjustment of tower spotting and soil tests for the entire route is complete in the approved section (PI 14 – PI 24) other than the section near to a private plantation area (Tower 54 to Tower 86) and between T31 and T38 are completed.

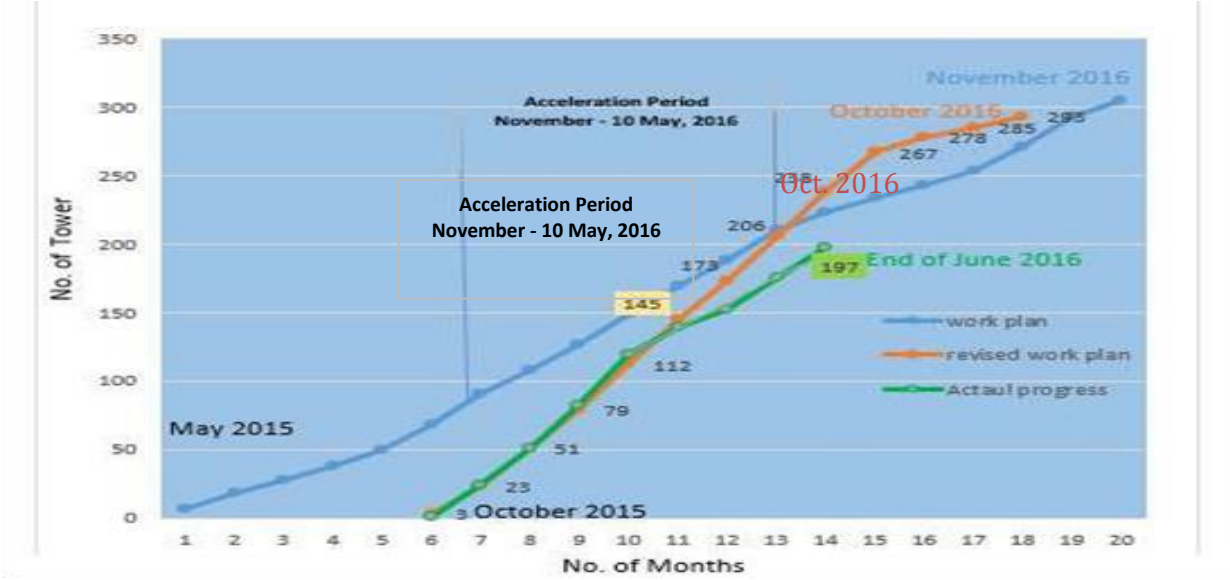
c) Preparation and revision of the design documents have been progressed including:

- Basic design of the 230 kV transmission line was approved by the Department of Energy Management in accordance with LEPTS on 22 January 2015, while the approval certificate of the 230 kV transmission line route had already been issued and provided to NNP1 by DEPP for reference.
- Adjustment of tower design and calculation according to approved basic design;
- Remaining sections of revised plan and profile drawings;
- Fabrication drawings of Tower type LDC are not submitted yet, while foundation design for all Tower types have already been approved.
- The construction progress by the end of June 2016 is completion of 197 out of an expected total of 293 tower foundations, tower erection of 117 towers and the checking and tightening of bolts and nuts for 98 towers. The progress in July 2016 is on the revised schedule (refer to the Figure 2-2).

d) The bush clearance works were started in May 2015 and progress was made between Tower 54 and Tower 38, while others sections (PI 18 – PI 22) were started in September 2015 after the compensation works has been completed. Almost 62 km out of a total of approximately 120 km for 139 No. towers has been finished by the end of March, 2016, while the access road has been prepared almost 80 km and work continues in the sections between PI 1 and PI 18, PI 22 and PI 24 currently.

In respect of the delay to commencement of most works the Contractor is studying its programme to ensure that sufficient resources are committed as the works progress to ensure that completion is achieved in good time. Onset of daily rains has made access to all areas difficult but the Contractor follows its revised acceleration schedule, after the progress for the construction of tower foundations slowed after April, 2016 (See Figure 2-4 below)

*Figure 2-4 Cumulative Work Progress of Tower Installation (Plan and Actual)*




# 3 ENVIRONMENTAL MANAGEMENT MONITORING

## 3.1 Compliance Management

### 3.1.1 Site Specific Environmental and Social Management and Monitoring Plans

In June 2016, NNP1PC-EMO received four (4) SS-ESMMPs and had four (4) SS-ESMMPs which were carried over from May. Out of eight (8) SS-ESMMPs, four (4) SS-ESMMPs were reviewed and approved with comments, one (1) was closing and three (3) were under reviews as listed below.

Table 3-1 SS-ESMMPs reviewed in June 2016

| Title | Date Received | Status | Comments |
|---|---|---|---|
| **SS-ESMMP for the Improvement of the Internal Road in 2UR (Upper Reservoir)** | 18 March 2016 (1st revision) and 10 May 2016 (2nd revision) | Closing | After carrying out an assessment on the work progresses, it was concluded that |

| | | | |
|---|---|---|---|
| | | | the construction activities were completed. Thus, this SS-ESMMP will be closed. |
| **SS-ESMMP for the Construction of the Main Road on HSRA** | 31 March 2016 (1st revision) and 13 May 2016 (2nd revision) | Approved with comments on 24 June 2016 | Additional maps and drawings on erosion and sediment controls, workers' camp and vegetation clearance in A3 format are needed. |
| **SS-ESMMP for Dam Monitoring System at Main Dam** | 25 May 2016 (1st revision) | Approved with comments on 10 June 2016 | Provide more information for *SP06 Hazardous material management*, *SP 16 Project personal health program*, *SP 17 Emergency preparedness* and appendix of camp site layout, detail design of sanitary facilities. |
| **SS-ESMMP for the Construction of NNP1 Project Solid Waste Landfill** | 30 March 2016 (1st revision) and 26 May 2016 (2nd revision) | Approved with comments on 15 June 2016 | Minor revision is needed for typos errors. |
| **SS-ESMMP for the Construction of HM's sub-contractor labour camp#2 (LILAMA10)** | 1 Feb 2016 (1st revision) and 06 June 2016 (2nd revision) | Approved on 22 June 2016 With comments | Revise the Waste Water Treatment System (WWTS) to ensure effective handling of a maximum of 250 people by 2017. Improvement includes revising the piping system, WWTS (black water and grey water tanks and, wetland ponds. |
| **SS-ESMMP for the Construction of Houay Soup Landfill** | 17 June 2016 (1st revision) | Under review | Not applicable |
| **SS-ESMMP for Dam Monitoring System at Main Dam** | 30 June 2016 (2nd revision) | Under review | Not applicable |
| **SS-ESMMP for construction of Main Dam Body** | 15 May 2016 (1st revision) and 10 June 2016 (2nd revision) | Under review | Not applicable |

### 3.1.2 Compliance Report

In June 2016, a total of 24 construction areas and camps including temporary camps at Houay Soup Resettlement Areas (HSRA) and the 230 kV transmission line were inspected through follow-up site inspections and joint bi-weekly inspections with the Contractors (

| Site ID | Issues | Reporting | Actions |
|---|---|---|---|
| RT Camp | Grey water seepage from existing sediment/retention ponds (ON_OC-0028).<br>1st inspection date: 17 Feb 2015<br>Latest follow up: 7 June 2016<br>Water seepage testing results from January 2015 to present indicated a fluctuation of total coliforms from 450 MPN/100ml to more than 160,000 MPN/100ml. | 1 ONC (pending) | The site is being decommissioned. A draft Decommissioning Plan is being reviewed by the EMO. This pending issue on the WWTS is thus voided. EMO will monitor the decommissioning activities and ensure that the septic tank and the grey water treatment ponds are treated |
| Song Da 5 Camp No.2 | The WWTS construction was not consistent with the proposed design (ON_OC-0085).<br>1st inspection date: 02 June 2015<br>Latest follow up: 7 June 2016 | 1 ONC (pending) | A joint WWTS assessment between a Thai external experts, Owner (TD & EMO), Contractor (Obayashi Corporation) was undertaken during 29-30 June 2016. Agreed actions will be discussed in late July with the new OC and TD management. |
| V&K Camp | Inadequate capacity of waste water treatment ponds to handle the operation of the V&K camp (ON_OC-0087).<br><br>1st inspection date: 02 June 2015<br>Latest follow up: 07 June 2016 | 1 ONC (pending) | The existing wetland ponds are not proper sealed with concrete; this resulted in seepage of grey water at the first wetland pond where treatment process has just started. A joint WWTS assessment between a Thai external experts, Owner (TD & EMO), Contractor (Obayashi Corporation) was undertaken during 29-30 June; agreed actions will be discussed in late July with the new OC management. |
| VCC Worker Camp | Temporary worker camp's facilities were not appropriately constructed as per the approved SS-ESMMP including waste management (the toilet septic tank, grey water retention pond, waste disposal pit) and project personnel health (clean water supply, ON_VCC-0001).<br>1st inspection date: 05 May 2016<br>Latest follow up: 14 June 2016 | 1 ONCs (pending) | During the joint environmental and safety patrol on 22 June 2016, it was observed that minor improvement including repairing the septic tank and providing enough ground water supply was undertaken but not completed.<br>A 2nd extension to 6 July was granted for completing the improvement. Otherwise, this issue will be preceded to NCR level 1. |

| | | | |
|---|---|---|---|
| SECC Camp | Wood offcut, plastic sheets, scrap metal and garbage were scattered around the bathing area and recycling centre (ON_SECC-0026).<br>1st inspection date: 05 May 2016<br>Latest follow up: 31 May 2016 | 1 ONC (pending) | The Contractor has partly implemented waste collection, segregation and disposal. However, the completed corrective action is needed as per the EMO's recommendation. The first extension was given to 5 June 2016. The second extension was given until upcoming inspection on 13 July 2016. The NCR will be preceded if the corrective action is not completed. |
| HM Worker camp (LALIMA Camp 10 | The Contractor has commenced the construction of the WWTS without submitting revised detailed designs and updated SS-ESMMP responding to the Owner's comments (ON_HM-0004).<br><br>1st inspection date: 25 May 2016<br>Latest follow up: 22 June 2016 | 1 ONC (pending) | As per the Owner's requirements, the Contractor temporarily withheld the construction of the WWTS until a discussion with the Owner is made to agree on the final designs. The Owner reviewed and approved the 2nd revision of the SS-ESMMP with comments. The Contractor thus resumed the construction of the remaining WWTS as per the approved SS-ESMMP. |
| RCC plant yard | ON_OC-0216:<br>The results of the discharged turbid water were constantly high as below:<br>- 21/05/2016: 1,554 NTU<br>- 23/05/2016: 2,693 NTU<br>- 24/05/2016: 5,950 NTU<br>- 26/05/2016: 2,782 NTU<br>The Owner (EMO and TD) and OC representatives conducted a joint site inspection and followed up on the issue on 25/05/2016 and it was found that the sediment was still not cleaned-up from the sediment ponds<br>1st inspection date: 25 May 2016<br>Latest follow up: 28 June 2016<br><br>ONC_OC-0218:<br>The contractor has some continuous simple corrective actions to improve the turbid water quality generated from the RCC material washing area. So far, no proper sedimentation device facilities was installed to improve the turbid water quality generated from this site.<br><br>1st inspection date: 28 June 2016 | 2 ONCs (pending) | It was observed during the site inspection carried out on 28 June 2016 that there were inadequate/insufficient actions implemented as per the Owner's requirements in ON_OC-0216 including: i) regularly clean-up the sediment from the sediment ponds when it is half full; ii) repair the last sediment pond to solve the leakage of turbid water and iii) clean-up all the drainage canals around the site to remove the sediment and dispose this at the Spoil Disposal Area#6.<br>Corrective action implementation deadline: 03 June 2016. |

| | | | |
|---|---|---|---|
| | Latest follow up: not applicable | | |
| Borrow pit for HSRA Irrigation Canal | A borrow pit was operated about 10 m from Houay Soup Noi (a small stream) for irrigation construction without environmental protection measures as per the approved SS-ESMMP dated 11 May 2016 (ON_VSP-0001).<br><br>1st inspection date: 25 May 2016<br>Latest follow up: 22 June 2016 | 1 ONC (pending) | During the joint environmental and safety patrol on 22 June 2016, it was observed that the agreed corrective action was not implemented as per the Owner's requirement including installing erosion and sediment control system, no submission of a revised version of the SS-ESMMP as per the EMO's comments for the proposed SSE-SMMP for construction of irrigation canal dated 11 May 2016. A discussion will be arranged with the Contractor to close the issue otherwise a NCR level 1 will be issued. |
| HM worker camp | During a joint bi-weekly site inspection, two oil drums were stored in the steel tray but without roofing in open area. There was also an evidence of oil spills into the ground approximately 5 litres (ON_HM-0006).<br><br>1st inspection date: 22 June 2016<br>Latest follow up: Not applicable | 1 ONC (new) | The Contractor is required to clean up of the oil spills/contaminated soil and remove fuel drums to an appropriate location/designated hazardous storage area that have proper roofing and bund by 22 June 2016 (immediately). |
| Songda5 workshop (at spoil disposal area No.2) | No designated location was assigned for the heavy machine maintenance. This was conducted at the open parking area without provision of any spill response kits. Oily clothes from maintenance activities were disposed on the bare ground. This has a potential risk of hydrocarbon and hydrocarbon contaminated waste being washed by rain water (ON_OC-0217).<br><br>1st inspection date: 28 June 2016<br>Latest follow up: Not applicable | 1 ONC (new) | The Contractor is required to: i) conduct heavy machine maintenance activities in the designated area with proper surface, bunds, oil trap and oil spill response devices; ii) clean-up of oily clothes/rags and store in the hazardous waste storage area (by 8 July 2017). |
| Main dam | There was an evidence of sediment removed from the turbid water treatment plant's sediment ponds being disposed of at the Nam Ngiep River bank. The Contractor has been warned for proper management of sediment sludge (ON_OC-0219).<br><br>1st inspection date: 28 June 2016<br>Latest follow up: Not applicable | 1 ONC (new) | The Contractor is required to: i) stop the disposal of the sediment at this area (Nam Ngiep River bank) and ii) the sediment cake needs to be disposed at the only approved area, i.e. spoil disposal area No. 6 by 28 June 2016 (immediately). |

Figure 3-1 and **Error! Reference source not found.**). A total of eight (08) Observations of Non-Compliances (ONCs) were issued in June, a decrease from fifteen (15) ONCs in May 2016. With

a carry-over from May 2016, a total of twenty eight (28) ONCs and one (1) NCR were active in June 2016. Out of these, sixteen (16) ONCs and one (1) NCR were resolved, ten (10) ONCs were not resolved exceeding the deadlines[2] and a total of twelve (12) ONCs will be carried over into July 2016. NNP1PC will follow up with the Contractors to resolve the remaining issues in July 2016.

The carryover ONCs from June into July 2016 are summarized in Table 3-2 below

*Table 3-2 Results of environmental compliance inspections in June 2016*

| Site ID | Issues | Reporting | Actions |
|---|---|---|---|
| RT Camp | Grey water seepage from existing sediment/retention ponds (ON_OC-0028).<br>1st inspection date: 17 Feb 2015<br>Latest follow up: 7 June 2016<br>Water seepage testing results from January 2015 to present indicated a fluctuation of total coliforms from 450 MPN/100ml to more than 160,000 MPN/100ml. | 1 ONC (pending) | The site is being decommissioned. A draft Decommissioning Plan is being reviewed by the EMO. This pending issue on the WWTS is thus voided. EMO will monitor the decommissioning activities and ensure that the septic tank and the grey water treatment ponds are treated |
| Song Da 5 Camp No.2 | The WWTS construction was not consistent with the proposed design (ON_OC-0085).<br>1st inspection date: 02 June 2015<br>Latest follow up: 7 June 2016 | 1 ONC (pending) | A joint WWTS assessment between a Thai external experts, Owner (TD & EMO), Contractor (Obayashi Corporation) was undertaken during 29-30 June 2016. Agreed actions will be discussed in late July with the new OC and TD management. |
| V&K Camp | Inadequate capacity of waste water treatment ponds to handle the operation of the V&K camp (ON_OC-0087).<br><br>1st inspection date: 02 June 2015<br>Latest follow up: 07 June 2016 | 1 ONC (pending) | The existing wetland ponds are not proper sealed with concrete; this resulted in seepage of grey water at the first wetland pond where treatment process has just started. A joint WWTS assessment between a Thai external experts, Owner (TD & EMO), Contractor (Obayashi Corporation) was undertaken during 29-30 June; agreed actions will be discussed in late July with the new OC management. |

[2] They are progressing slowly on the corrective actions implementation.

| | | | |
|---|---|---|---|
| VCC Worker Camp | Temporary worker camp's facilities were not appropriately constructed as per the approved SS-ESMMP including waste management (the toilet septic tank, grey water retention pond, waste disposal pit) and project personnel health (clean water supply, ON_VCC-0001).<br>1st inspection date: 05 May 2016<br>Latest follow up: 14 June 2016 | 1 ONCs (pending) | During the joint environmental and safety patrol on 22 June 2016, it was observed that minor improvement including repairing the septic tank and providing enough ground water supply was undertaken but not completed.<br>A 2nd extension to 6 July was granted for completing the improvement. Otherwise, this issue will be preceded to NCR level 1. |
| SECC Camp | Wood offcut, plastic sheets, scrap metal and garbage were scattered around the bathing area and recycling centre (ON_SECC-0026).<br>1st inspection date: 05 May 2016<br>Latest follow up: 31 May 2016 | 2 ONC (pending) | The Contractor has partly implemented waste collection, segregation and disposal. However, the completed corrective action is needed as per the EMO's recommendation. The first extension was given to 5 June 2016. The second extension was given until upcoming inspection on 13 July 2016. The NCR will be preceded if the corrective action is not completed. |
| HM Worker camp (LALIMA Camp 10 | The Contractor has commenced the construction of the WWTS without submitting revised detailed designs and updated SS-ESMMP responding to the Owner's comments (ON_HM-0004).<br><br>1st inspection date: 25 May 2016<br>Latest follow up: 22 June 2016 | 1 ONC (pending) | As per the Owner's requirements, the Contractor temporarily withheld the construction of the WWTS until a discussion with the Owner is made to agree on the final designs. The Owner reviewed and approved the 2nd revision of the SS-ESMMP with comments. The Contractor thus resumed the construction of the remaining WWTS as per the approved SS-ESMMP. |
| RCC plant yard | ON_OC-0216:<br>The results of the discharged turbid water were constantly high as below:<br>- 21/05/2016: 1,554 NTU<br>- 23/05/2016: 2,693 NTU<br>- 24/05/2016: 5,950 NTU<br>- 26/05/2016: 2,782 NTU<br>The Owner (EMO and TD) and OC representatives conducted a joint site inspection and followed up on the issue on 25/05/2016 and it was found that the sediment was still not cleaned-up from the sediment ponds<br>1st inspection date: 25 May 2016<br>Latest follow up: 28 June 2016 | 2 ONCs (pending) | It was observed during the site inspection carried out on 28 June 2016 that there were inadequate/insufficient actions implemented as per the Owner's requirements in ON_OC-0216 including: i) regularly clean-up the sediment from the sediment ponds when it is half full; ii) repair the last sediment pond to solve the leakage of turbid water and iii) clean-up all the drainage canals around the site to remove the sediment and dispose this at the Spoil Disposal Area#6.<br>Corrective action implementation deadline: 03 June 2016. |

| | | | |
|---|---|---|---|
| | ONC_OC-0218:<br>The contractor has some continuous simple corrective actions to improve the turbid water quality generated from the RCC material washing area. So far, no proper sedimentation device facilities was installed to improve the turbid water quality generated from this site.<br><br>1st inspection date: 28 June 2016<br>Latest follow up: not applicable | | |
| Borrow pit for HSRA Irrigation Canal | A borrow pit was operated about 10 m from Houay Soup Noi (a small stream) for irrigation construction without environmental protection measures as per the approved SS-ESMMP dated 11 May 2016 (ON_VSP-0001).<br><br>1st inspection date: 25 May 2016<br>Latest follow up: 22 June 2016 | 1 ONC (pending) | During the joint environmental and safety patrol on 22 June 2016, it was observed that the agreed corrective action was not implemented as per the Owner's requirement including installing erosion and sediment control system, no submission of a revised version of the SS-ESMMP as per the EMO's comments for the proposed SSE-SMMP for construction of irrigation canal dated 11 May 2016. A discussion will be arranged with the Contractor to close the issue otherwise a NCR level 1 will be issued. |
| HM worker camp | During a joint bi-weekly site inspection, two oil drums were stored in the steel tray but without roofing in open area. There was also an evidence of oil spills into the ground approximately 5 litres (ON_HM-0006).<br><br>1st inspection date: 22 June 2016<br>Latest follow up: Not applicable | 1 ONC (new) | The Contractor is required to clean up of the oil spills/contaminated soil and remove fuel drums to an appropriate location/designated hazardous storage area that have proper roofing and bund by 22 June 2016 (immediately). |
| Songda5 workshop (at spoil disposal area No.2) | No designated location was assigned for the heavy machine maintenance. This was conducted at the open parking area without provision of any spill response kits. Oily clothes from maintenance activities were disposed on the bare ground. This has a potential risk of hydrocarbon and hydrocarbon contaminated waste being washed by rain water (ON_OC-0217).<br><br>1st inspection date: 28 June 2016<br>Latest follow up: Not applicable | 1 ONC (new) | The Contractor is required to: i) conduct heavy machine maintenance activities in the designated area with proper surface, bunds, oil trap and oil spill response devices; ii) clean-up of oily clothes/rags and store in the hazardous waste storage area (by 8 July 2017). |

| | | | |
|---|---|---|---|
| Main dam | There was an evidence of sediment removed from the turbid water treatment plant's sediment ponds being disposed of at the Nam Ngiep River bank. The Contractor has been warned for proper management of sediment sludge (ON_OC-0219).<br><br>1st inspection date: 28 June 2016<br>Latest follow up: Not applicable | 1 ONC (new) | The Contractor is required to: i) stop the disposal of the sediment at this area (Nam Ngiep River bank) and ii) the sediment cake needs to be disposed at the only approved area, i.e. spoil disposal area No. 6 by 28 June 2016 (immediately). |

*Figure 3-1: Dam and Common Facilities Construction Area*

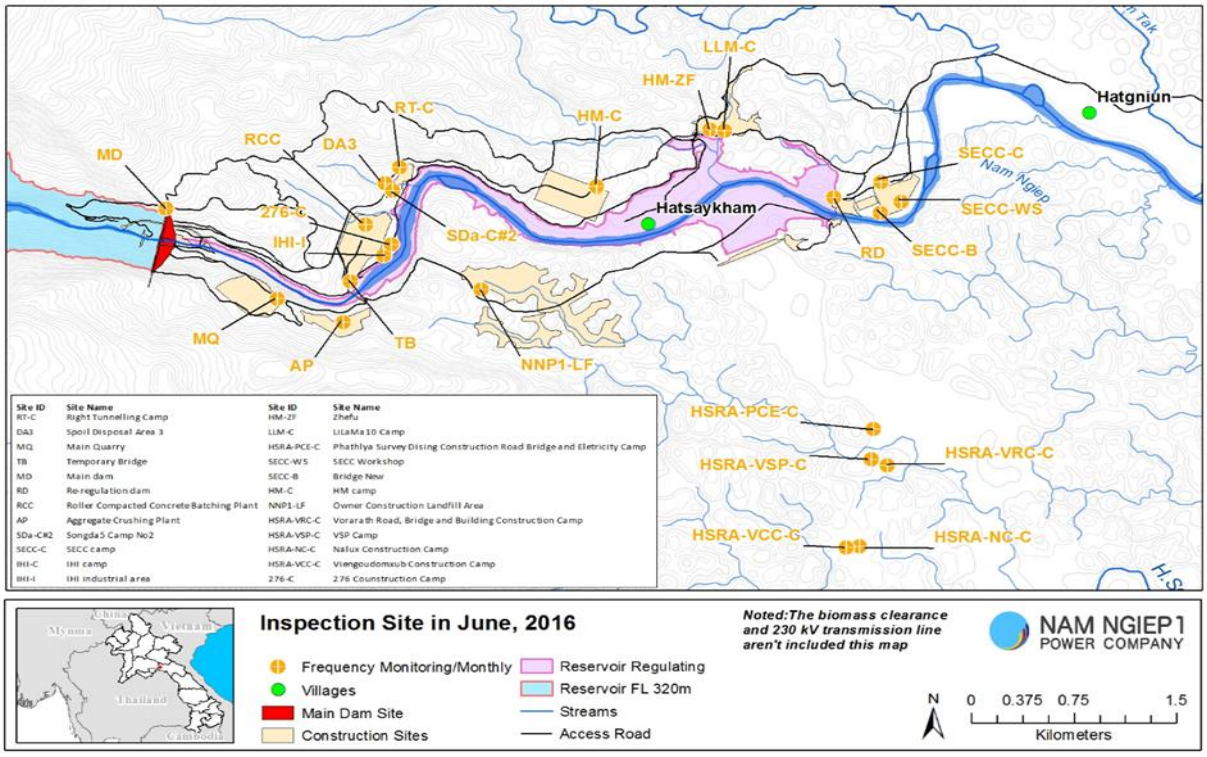
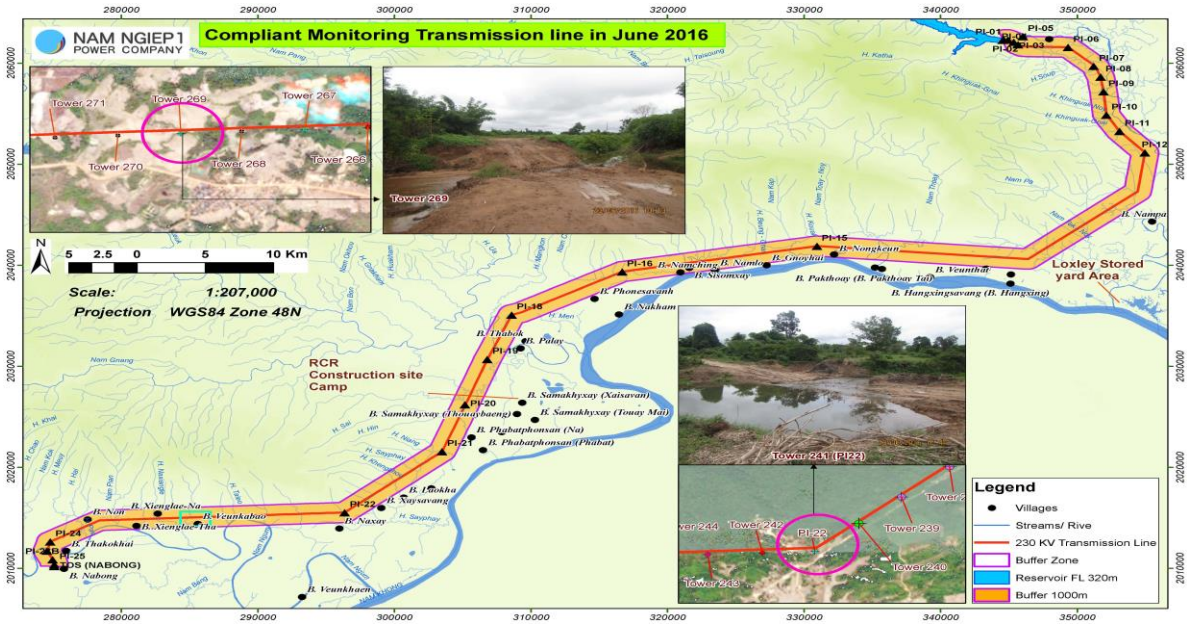



*Figure 3-2: 230 kV Transmission Line Construction Monitoring*

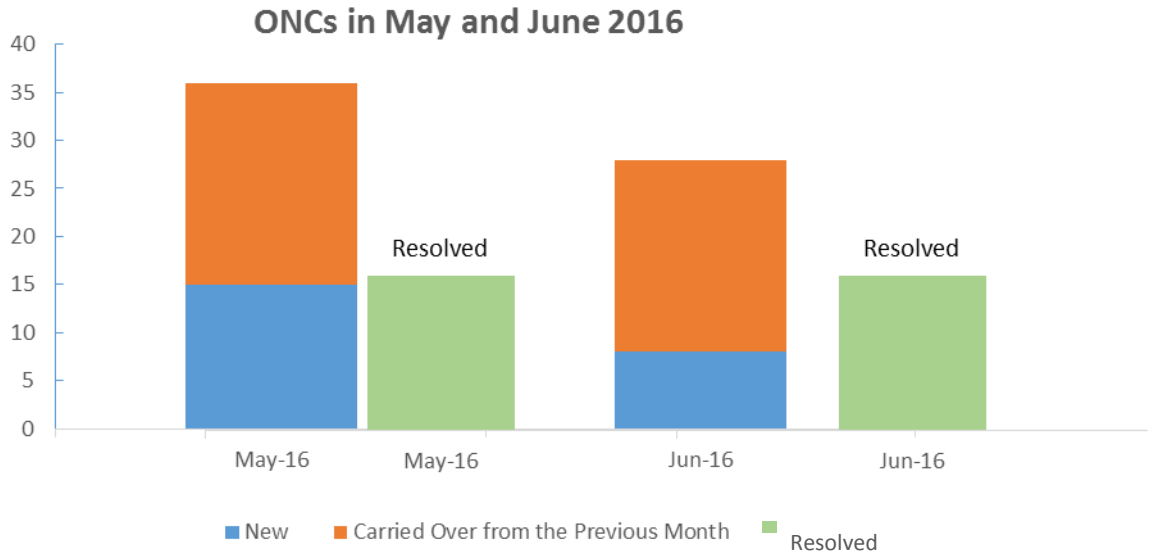



The number and status of observations of non-compliances (ONCs) and non-compliance reports (NCRs) are summarized in Table 3-3.

*Table 3-3: Summary of ONCs and NCRs*

| Reporting Period (1-30 June 2016) | ONC | NCR-1 | NCR-2 | NCR-3 |
|---|---|---|---|---|
| **Carried over from May 2016** | 20 | 1 | 0 | 0 |
| **New issues this month** | 8 | 0 | 0 | 0 |
| **Resolved this month** | 16 | 1 | 0 | 0 |
| **Carried forward into July 2016** | 12 | 0 | 0 | 0 |
| **Unresolved exceeding deadline** | 10 | 0 | 0 | 0 |

*Figure 3-3: Observations of non-compliance (ONCs) this month compared with previous month*



### 3.1.3 Monitoring by the Environmental Monitoring Unit of the Government

No Environmental Monitoring Unit (EMU) visits were scheduled in April 2016.

## 3.2 Environmental Quality Monitoring

A technical evaluation to appoint a contractor to construct a small laboratory at the Owners' Site Office and Village was resumed with the submission of additional requested information. The purchase of the laboratory equipment with a supplier in Thailand is being finalised for management approval. The Purchase Order is expected to be issued in July 2016. Meanwhile there are several options by which to provide a temporary room in which a laboratory can be accommodated and operated after delivery of equipment to Site.

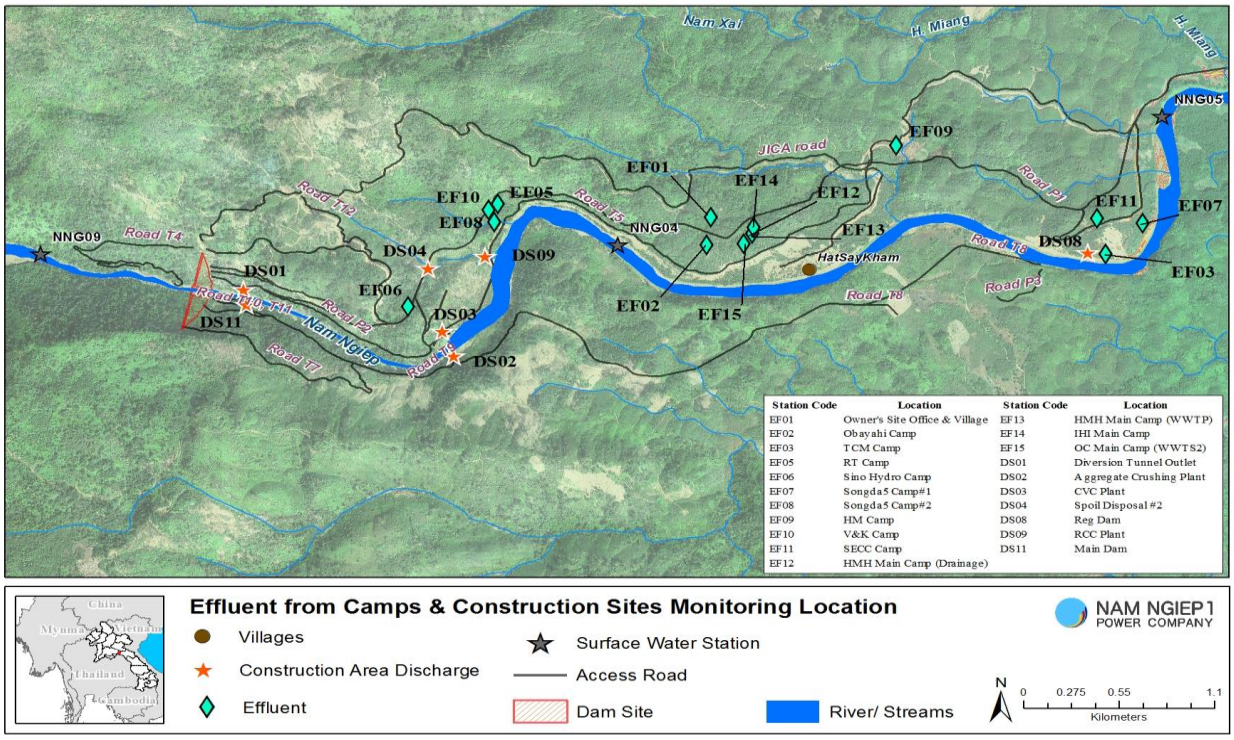
A technical evaluation to appoint a contractor to construct a small laboratory at the Owners' Site Office and Village was resumed with the submission of additional requested information. The purchase of the laboratory equipment with a supplier in Thailand is being finalised for management approval. The Purchase Order is expected to be issued in July 2016. Meanwhile there are several options by which to provide a temporary room in which a laboratory can be accommodated and operated after delivery of equipment to Site:

a) Effluent discharge from camps and construction sites;
b) Ambient surface water quality monitoring;
c) Ambient air quality monitoring (particulate matter of less than 10 microns);
d) Ambient noise and noise emission monitoring.

### 3.2.1 Effluent Discharge from Camps and Construction Sites

The monitoring of the effluents from the camps and construction sites is presented in Table 3-4 and the monitoring points and the related sites are displayed on the map in Figure 3-4.

*Figure 3-4: Map of Effluent Discharge Monitoring Locations*



All parameters were assessed with reference to the Effluent Standards specified in the Project's Concession Agreement Annex C, Appendix 2 Clause 1.13. During June 2016, all construction camps, except the Owner's Site Office and Village and the V&K Camp, had significantly higher concentrations of total coliforms than the effluent standards. The results of the monitoring are included in Annex 1 and the assessment of compliance and corrective actions are summarized in Table 3-4.

*Table 3-4: Compliance assessment of the effluent discharge from the camps and construction sites in June 2016*

| Site | Sampling ID | Non-Compliance | Corrective Actions |
|---|---|---|---|
| **Owner's Site Office and Village** | EF01 | The total coliform increased from 170 MPN/100ml in May 2016 to 160,000 MPN/100ml in June 2016, which exceeded the Effluent Standard. | A site engineer from the NNP1PC carried out a system check and repair of the leaked grey water was completed on 16 June. EMO will continue to monitor the effluent quality for any sign of improvements after the repair work was completed. |
| **OC Camp** | EF02 | Biochemical Oxygen Demand ($BOD_5$), Chemical Oxygen Demand (COD), Ammonia nitrogen ($NH_3$-N), and total coliforms exceeded the Standards (measured at 73.5, 146 and 34 mg/l and, more than 160,000 MPN/100 ml respectively). | A joint waste water treatment system (WWTS) between a Thai external specialist, the Owner (TD and EMO), and Contractor (OC) was undertaken during June 29-30 at all of the camps including OC camp. Additional details on specifications and drawings of the WWTS for this camp were requested for identifying corrective actions by mid-July 2016. |
| **TCM Camp** | EF03 | Total coliforms were higher than the Standard at 92,000 MPN/100 ml and TSS was 100 mg/l. | A joint waste water treatment system (WWTS) between a Thai external specialist, the Owner (TD and EMO), and Contractor (OC) was undertaken during June 29-30 at all of the camps including the TCM camp. Proposed corrective actions will be discussed in late July with the new management. |
| **Right Tunnelling (RT) Camp** | EF05 | The total coliforms significantly exceeded the Effluent Standards with a measured value of | This camp is being decommissioned in June 2016. A proposed site decommissioning plan which included the disposal of the grey |

| Site | Sampling ID | Non-Compliance | Corrective Actions |
|---|---|---|---|
| | | 160,000 MPN/100 ml and the TSS was 84.1 mg/l, higher than the Standards. | and black water from the septic tank was submitted to NNP1PC's EMO for review and approval. |
| **Sino Hydro Camp** | EF06 | TSS and total coliforms were higher than the Standards (measured at 62.3 mg/l and, more than 160,000 MPN/100 ml respectively). | A joint WWTS between a Thai external specialist, the Owner (TD and EMO), and Contractor (OC) was undertaken during June 29-30 at all of the camps including the Sino Hydro camp. Proposed corrective actions will be discussed in late July with the new management. |
| **Song Da 5 Camp No. 1** | EF07 | $BOD_5$, $NH_3$-N, and total coliforms did not comply with the Standards with recorded values of 54.6 mg/l, 11 mg/l, and more than 160,000 MPN/l respectively. | A joint WWTS between a Thai external specialist, the Owner (TD and EMO), and Contractor (OC) was undertaken during June 29-30 at all of the camps including the Song Da5 camp No.1. Proposed corrective actions will be discussed in late July with the new management. |
| **Song Da 5 Camp No. 2** | EF08 | $BOD_5$, and total coliforms did not comply with the Standards (measured values of 51.3 mg/l and, more than 160,000 MPN/100 ml respectively). | A joint WWTS between a Thai external specialist, the Owner (TD and EMO), and Contractor (OC) was undertaken during June 29-30 at all of the camps including the Song Da5 camp No.2. Proposed corrective actions will be discussed in late July with the new management. |
| **Hitachi-Mitsubishi Hydro (HM) Worker Camp No.1** | EF09 | Total coliforms were higher than the Standards at 92,000 MPN/100 ml. | A joint WWTS between a Thai external specialist, the Owner (TD and EMO), and Contractor (OC) was undertaken during June 29-30 at all of the camps including the HM Hydro workers' camp. Proposed corrective actions will be discussed in late July with the new management. |

| Site | Sampling ID | Non-Compliance | Corrective Actions |
|---|---|---|---|
| **V&K Camp** | EF10 | Total iron and total coliforms did not comply with the Standards (measured values of 2.19 mg/l and 4,900 MPN/100 ml respectively). | A joint WWTS between a Thai external specialist, the Owner (TD and EMO), and Contractor (OC) was undertaken during June 29-30 at all of the camps including the V&K camp. Proposed corrective actions will be discussed in late July with the new management. |
| **SECC Camp** | EF11 | TSS, total iron and total coliforms did not comply with the Standards (measured values of 55.3, 2.93 mg/l and 54,000 MPN/100 ml respectively). | A joint WWTS between a Thai external specialist, the Owner (TD and EMO), and Contractor (OC) was undertaken during June 29-30 at all of the camps including the SECC camp. Proposed corrective actions will be discussed in late July with the new management. |
| **HM Main Camp Drainage** | EF12 | Total coliform results was not complied with the standard as values recorded of 160,000 MPN/100 ml. | A joint WWTS between a Thai external specialist, the Owner (TD and EMO), and Contractor (OC) was undertaken during June 29-30 at all of the camps including the HM Hydro main camp. Proposed corrective actions will be discussed in late July with the new management. |
| **HMH Main Camp (WWTS)** | EF13 | COD and Total coliform results were not complied with the Standard as values recorded of 129 mg/l and 160,000 MPN/100 ml | See above comment (EF12). |
| **IHI Main Camp** | EF14 | $BOD_5$, COD, $NH_3$-N, and total coliforms exceeded the Standards (measured at 75.6, 223 and 21 mg/l and, more than 160,000 MPN/100 ml respectively) | See above comment (EF12). |

| Site | Sampling ID | Non-Compliance | Corrective Actions |
|---|---|---|---|
| **OC Camp (WWTS2)** | EF15 | Total coliforms were higher than the Standards at 92,000 MPN/100 ml | See above comments (EF02). |
| **Main Dam Construction Area** | DS11 | The TSS measured on 08/06/2016 exceeded the standard at 80.4 mg/l. The second measurement conducted on 23/06/2016 complied with the Standard. | The Contractor was advised to monitor the treatment of effluents using the Turbid Water Treatment Plant in early June leading to a compliant level in late June. |
| **Re-regulation Dam** | DS08 | The TSS measured on 08 June 2016 exceeded the Standard at 302 mg/l. | The Contractor was advised to monitor the treatment of effluents using the Turbid Water Treatment Plant in early June leading to a compliant level in late June |
| **Spoil Disposal Area No.2 (Song Da 5 Workshop)** | DS04 | The TSS result on 8 June 2016 was higher than the Standard with a recorded value of 225 mg/l compared to the Standards of less than 50 mg/l. The second result measured on 23 June 2016 was in compliant with the Standard. | EMO will continue to monitor the TSS level at this site and notify the Contractor for any results that are higher than the Standards. |
| **RCC Plant** | DS09 | The TSS results in June 2016 were higher than the Standard (<50 mg/l) with recorded values of 27,850 mg/l and 165 mg/l respectively. | Another ONC was issued on 25 June 2016. The Contractor was required to:<br>- Frequency adjust the sediment clean-up from the sedimentation ponds when observed that they are 60% full;<br>- Regularly remove dried sediment from the drying yards to keep space for incoming sediment cleaning-up from the ponds;<br>- Prepare/update the Site Specific Environmental and Social Management Plan (SS-ESMMP) for |

| Site | Sampling ID | Non-Compliance | Corrective Actions |
|---|---|---|---|
| | | | the operation stage of the RCC plant and submit to NNP1 for review and approval. Note: the mentioned SS-ESMP needs to fully address the areas of Sedimentation Control and Water Availability & Pollution control.<br><br>If these issues are still not fixed by this agreed timeline, a NCR level 1 will be issued. |
| **CVC Plant** | DS03 | The TSS result was 16,426 mg/l which was exceeded the standard (<50 mg/l). | The NNP1PC-EMO staff visited the area and found that the Contractor washed their trucks in that area. The Contractor was asked to use existing car/truck washing facilities. This issue will be followed up again in the next bi-weekly site inspection scheduled in early July 2016. |

At the time of sampling, no discharge was observed at the Obayashi Camp WWTS1 (EF02), Obayashi Camp WWTS2 (EF15), TCM Camp (EF03), Sino Hydro Camp (EF06), Song Da 5 Camp No.1 (EF07), Song Da 5 Camp No. 2 (EF08), SECC Camp (EF11), HMH Main Camp WWTP (EF13) and IHI Main Camp (EF14). Thus, the samples were collected from the final sediment pond at these camps. Also, no sampling was conducted in June 2016 at the Aggregate Crushing Plant (DS02) as there was no waste water discharged from the sediment ponds.

### 3.2.2 Surface (Ambient) Water Quality Monitoring

Surface water samples are collected and analysed twice a month[3] from nine stations in Nam Ngiep and four stations in the main tributaries including the lower Nam Chian, Nam Phouane, Nam Xao and Houay Soup (total 13 stations). The stations are indicated on the maps in

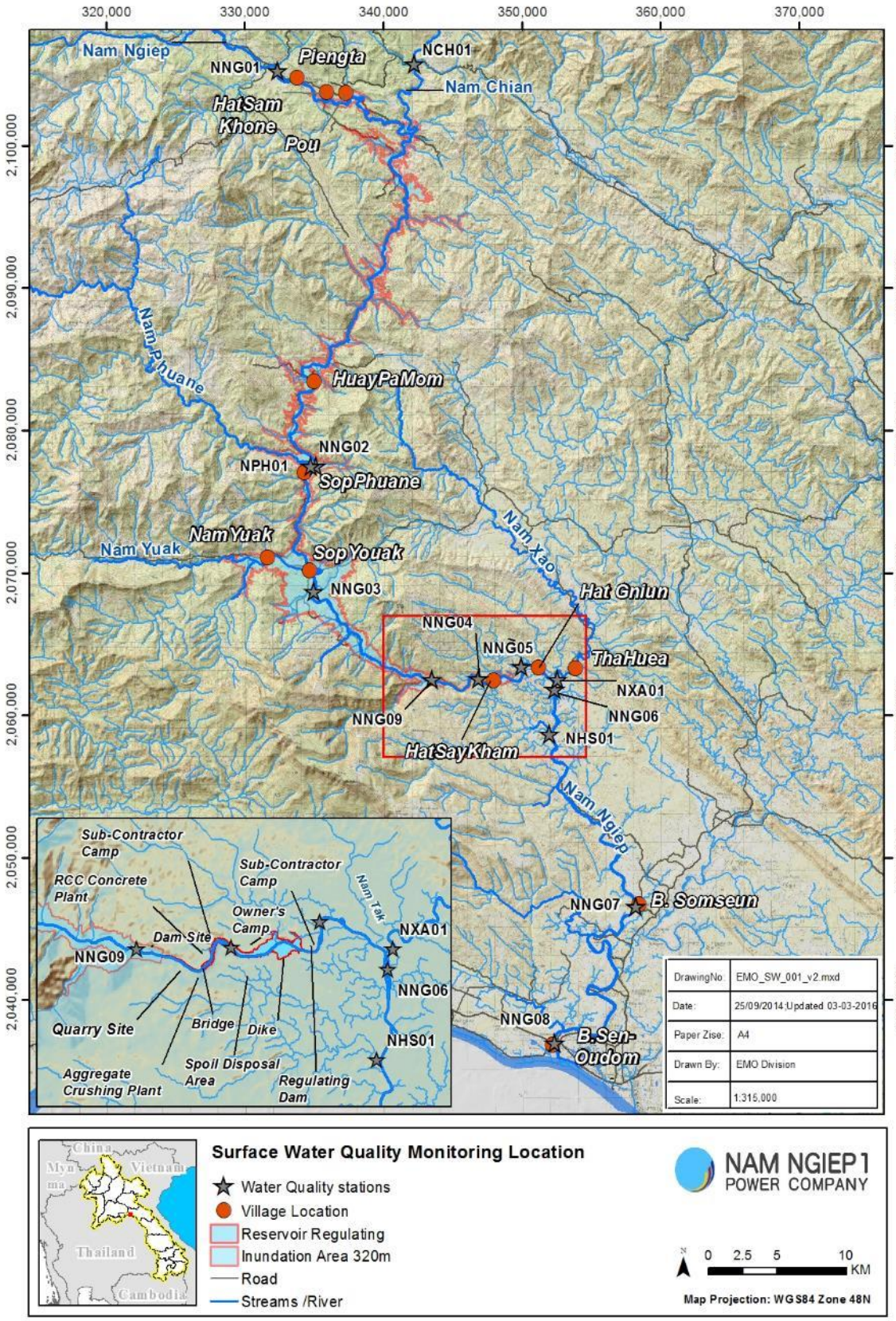
Figure 3-5 and

[3] Monthly for chemical parameters and fortnightly for physical parameters

Figure 3-6.

All ambient water quality data are routinely reported to the Ministry of Natural Resources and Environment (MONRE) through the monthly Environmental Management and Monitoring Reports (EMMR) and to the Asian Development Bank in Quarterly Reports.

***Figure 3-5: Surface Water Quality Monitoring Stations***




Key findings for surface water quality monitoring in March 2016 are shown in Table 3-5, Table 3-6, Table 3-7 and

Table 3-8.

**Nam Ngiep**

The Bio-Oxygen Demand (BOD) result at Nam Ngiep upstream Ban Phiengta (NNG01) was higher than the Surface Water Quality Standard with a value recorded at 2 mg/l. The COD results exceeded the Standard for the entire stations of Nam Ngiep River. The peak of COD recorded at Nam Ngiep Downstream of Nam Xao Confluent (NNG06) was 37.9 mg/l. In addition, the faecal coliforms and total coliforms exceeded the Standard for the stations of Nam Ngiep upstream, within and downstream of the Project Construction Area with a range recorded between 2,300 – 160,000 MPN/100 ml. The peak of faecal coliforms was at Nam Ngiep Downstream RT Camp (NNG04 – Within Construction Site), and the peak of total coliform was at Nam Ngiep Upstream Main Dam (NNG01 – Upstream Construction Site) and Nam Ngiep Downstream RT Camp (NNG04 – Within Construction Site).

The elevated levels of COD are considered unrelated to the Project activities

***Table 3-5: Results of the Physical and Chemical Parameters of Nam Ngiep Surface Water Quality Monitoring***

| | River Name | Nam Ngiep | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Zone | Upstream of Construction Sites | | | | Within Construction Site | Downstream of Construction Sites | | | |
| | Station Code | NNG01 | NNG02 | NNG03 | NNG09 | NNG04 | NNG05 | NNG06 | NNG07 | NNG08 |
| | Date | 06/06/2016 | 07/06/2016 | 07/06/2016 | 08/06/2016 | 08/06/2016 | 08/06/2016 | 08/06/2016 | 08/06/2016 | 08/06/2016 |
| **Parameters (Unit)** | **Guideline** | | | | | | | | | |
| pH | 5.0 – 9.0 | 7.21 | 7.05 | 7.1 | 7.25 | 7.22 | 7.24 | 7.28 | 7.11 | 7.19 |
| DO (%) | | 93.1 | 95.3 | 99.6 | 99.2 | 102.9 | 101.9 | 99.4 | 95.5 | 95.5 |
| DO (mg/L) | >6.0 | 7.3 | 7.26 | 7.57 | 8.13 | 8.38 | 8.22 | 7.98 | 7.55 | 7.8 |
| Conductivity (µs/cm) | | 102.7 | 99.6 | 89.9 | 50.8 | 44.3 | 41 | 43.1 | 52.9 | 55.7 |
| TDS (mg/l) | | 51 | 45 | 45 | 29 | 22.5 | 20.5 | 21.5 | 26 | 28 |
| Temperature (°C) | | 25.6 | 27.6 | 27.9 | 23.9 | 24.4 | 25 | 25.2 | 26.4 | 27.2 |
| Turbidity (NTU) | | 59.9 | 43.7 | 39.8 | 52.9 | 63.4 | 55.8 | 65.6 | 57.5 | 35.1 |
| TSS (mg/l) | | 106 | 74.5 | 70.2 | 113 | 150 | 167 | 229 | 184 | 90.9 |
| $BOD_5$ (mg/l) | <1.5 | 2 | ND[13] | ND[13] | 1.2 | 1.4 | 1.3 | 1.2 | ND[13] | ND[13] |
| COD (mg/l) | <5.0 | 13.1 | 13.3 | 9.2 | 28.2 | 30.6 | 31 | 37.9 | 13.5 | 16.9 |
| $NH_3$-N (mg/l) | <0.2 | ND[12] | ND[12] | ND[12] | ND[12] | ND[12] | ND[12] | ND[12] | ND[12] | ND[12] |
| $NO_3$-N (mg/l) | <5.0 | 0.08 | 0.08 | 0.08 | 0.08 | 0.09 | 0.09 | 0.09 | 0.09 | 0.08 |
| Total Kjeldahl Nitrogen (mg/l) | | ND[14] | ND[14] | ND[14] | ND[14] | ND[14] | ND[14] | ND[14] | ND[14] | ND[14] |
| Chloride (mg/l) | | ND[13] | ND[13] | ND[13] | ND[13] | ND[13] | ND[13] | ND[13] | ND[13] | ND[13] |
| Sulphate(mg/l) | <500 | 10.6 | 10.3 | 9.8 | ND[11] | ND[11] | 3.4 | ND[11] | 10.3 | 11.3 |
| Alkalinity (mg/l) | | 57.5 | 55.1 | 50.6 | 30.6 | 26.5 | 29.8 | 29.8 | 46.9 | 31 |
| Arsenic (mg/l) | <0.01 | ND[2] | ND[2] | ND[2] | ND[2] | ND[2] | ND[2] | ND[2] | ND[2] | ND[2] |
| Calcium (mg/l) | | 10.1 | 10.1 | 9.12 | 5.16 | 4.79 | 4.79 | 5.15 | 7.93 | 5.17 |
| Manganese (mg/L) | <1 | 0.174 | 0.103 | 0.104 | 0.112 | 0.113 | 0.125 | 0.192 | 0.152 | 0.065 |
| Mercury (mg/l) | <0.002 | ND[3] | 0.0004 | 0.0006 | 0.0004 | ND[3] | 0.0003 | ND[3] | 0.0021 | ND[3] |
| Magnesium (mg/l) | | 2.45 | 2.45 | 2.18 | 1.39 | 1.58 | 1.5 | 1.59 | 2.22 | 1.55 |
| Lead (mg/l) | <0.05 | ND[10] | ND[10] | ND[10] | ND[10] | ND[10] | ND[10] | ND[10] | ND[10] | ND[10] |
| Potassium (mg/l) | | 2.04 | 1.92 | 1.75 | 1.24 | 1.41 | 1.36 | 1.43 | 2.18 | 1.34 |
| Sodium (mg/l) | | 2.36 | 2.5 | 2.41 | 0.962 | 0.843 | 0.834 | 1.04 | 1.94 | 1.41 |
| Total Iron (mg/L) | | 4.99 | 2.78 | 2.78 | 3.89 | 4.59 | 5.14 | 6.56 | 5.85 | 3.24 |
| Total coliform (MPN/100ml) | <5,000 | 1,600 | 2,200 | 2,400 | 160,000 | 160,000 | 28,000 | 92,000 | 240 | 240 |
| Faecal coliform (MPN/100ml) | <1,000 | 1.8 | 490 | 2,400 | 7,900 | 13,000 | 46 | 2,300 | 240 | 240 |

| | | | | |
|---|---|---|---|---|
| ND[1] (<0.0005 mg/L) | ND[2] (<0.0003 mg/L) | ND[3] (<0.0002 mg/L) | ND[4] (<0.005 mg/L) | ND[5] (<0.003 mg/L) |
| ND[6] (<0.09 mg/L) | ND[7] (<0.07 mg/L) | ND[8] (<0.04 mg/L) | ND[9] (<0.02 mg/L) | ND[10] (<0.01 mg/L) |
| ND[11] (<0.3 mg/L) | ND[12] (<0.2 mg/L) | ND[13] (<1.0 mg/L) | ND[14] (<1.5 mg/L) | ND[15] (<4.0 mg/L) |
| ND[16] (<5.0 mg/L) | ND[17] (<2.7 mg/L) | | | |

**Table 3-6: Monitoring results of Nam Ngiep Surface Water Quality (Measured Fortnightly)**

| | River Name | Nam Ngiep | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Zone | Upstream of Construction Sites | | | | Within Construction Site | Downstream of Construction Sites | | | |
| | Station Code | NNG01 | NNG02 | NNG03 | NNG09 | NNG04 | NNG05 | NNG06 | NNG07 | NNG08 |
| | Date | 21/06/16 | 22/06/16 | 22/06/16 | 23/06/16 | 23/06/16 | 23/06/16 | 23/06/16 | 23/06/16 | 23/06/16 |
| **Parameters (Unit)** | **Guideline** | | | | | | | | | |
| pH | 5.0 – 9.0 | 7.19 | 7.37 | 7.73 | 7.28 | 7.19 | 7.62 | 7.68 | 7.12 | 7.25 |
| DO (%) | | 95.9 | 95.6 | 99.7 | 100.3 | 101.6 | 100.8 | 94.1 | 90.9 | 90.9 |
| DO (mg/L) | >6.0 | 7.44 | 7.02 | 7.54 | 7.45 | 7.67 | 7.57 | 7.11 | 6.86 | 6.81 |
| Conductivity (µs/cm) | | 116.5 | 95.2 | 100.7 | 74.6 | 75.9 | 100 | 160 | 75.1 | 69.8 |
| TDS (mg/l) | | 58 | 47 | 50 | 37 | 37.95 | 50 | 80 | 37 | 35 |
| Temperature (°C) | | 26 | 29.6 | 28 | 29.2 | 28.4 | 28.51 | 28.83 | 28.4 | 28.5 |
| Turbidity (NTU) | | 38.6 | 66 | 47 | 110 | 111 | 72.8 | 61.1 | 63.4 | 98.4 |

**Tributaries upstream the main dam: Nam Chiane (NCH01), Nam Phouan (NPH01)**

Nam Chiane (NCH01) is located about 66 km upstream of the NNP1 Project construction site. The COD exceeded the National Surface Water Quality Standard set at less than 5.0 mg/l with a recorded value of 16 mg/l.

Nam Phouan is located about 24 km upstream of NNP1 Project construction site. The COD slightly exceeded the National Surface Water Quality Standard set at less than 5.0 mg/l with a recorded value of 8.8 mg/l.

**Tributaries downstream the main dam: Nam Xao (NXA01), Nam Houay Soup (NHS01)**

Nam Xao has confluence with the Nam Ngiep downstream of the NNP1 Project construction site. The COD was found to exceed the National Surface Water Quality Standard (less than 5.0 mg/l) with a recorded value of 10.6 mg/l. In addition, faecal coliforms and total coliforms results exceeded the Standard with values recorded at 1,100 and 22,000 MPN/100 ml respectively.

Houay Soup Nyai has a confluence with the Nam Ngiep River downstream of NNP1 Project construction site. The COD was found to exceed the National Surface Water Quality Standard (less than 5.0 mg/l) with a recorded value of 15.3 mg/l. In addition, the results of faecal and total coliforms exceeded the Standard with values recorded at 17,000 and 22,000 MPN/100 ml respectively.

Table 3-7: Results of Physical and Chemical Parameters of Nam Chian, Nam Phouan, Nam Xao and Nam Houay Soup in March

| | Site Name | Nam Chain | Nam Phouan | Nam Xao | Nam Houaysoup |
|---|---|---|---|---|---|
| | Zone | Tributaries Upstream | | Tributaries Downstream | |
| | Station Code | NCH01 | NPH01 | NXA01 | NHS01 |
| | Date | 06/06/2016 | 07/06/2016 | 08/06/2016 | 08/06/2016 |
| **Parameters (Unit)** | **Guideline** | | | | |
| pH | 5.0 - 9.0 | 7.25 | 7.01 | 7.45 | 7.02 |
| DO (%) | | 100.9 | 103 | 90.7 | 87.5 |
| DO (mg/L) | >6.0 | 8.04 | 7.95 | 6.88 | 7.03 |
| Conductivity(µs/cm) | | 47.8 | 79.9 | 147 | 20.93 |
| TDS (mg/L) | | 24 | 40 | 73 | 11 |
| Temperature (°C) | | 24.5 | 26.8 | 27.4 | 25.2 |
| Turbidity (NTU) | | 45.6 | 10.11 | 16.2 | 8.03 |
| TSS (mg/l) | | 113 | 16.6 | 18.4 | 15.7 |
| $BOD_5$ (mg/l) | <1.5 | 1.3 | ND[13] | 1 | ND[13] |
| COD (mg/l) | <5.0 | 16 | 8.8 | 10.6 | 15.3 |
| $NH_3$-N (mg/l) | <0.2 | ND[12] | ND[12] | ND[12] | ND[12] |
| $NO_3$-N (mg/l) | <5.0 | 0.08 | 0.03 | 0.13 | 0.1 |
| Total Kjeldahl Nitrogen | | ND[14] | ND[14] | ND[14] | ND[14] |
| Chloride (mg/l) | | ND[13] | ND[13] | 7.3 | ND[13] |
| Sulphate(mg/l) | <500 | 11.6 | 9.5 | 12.1 | 22.1 |
| Alkalinity (mg/l) | | 28.6 | 43.7 | 64.5 | 14.3 |
| Arsenic (mg/l) | <0.01 | ND[2] | ND[2] | ND[2] | ND[2] |
| Calcium (mg/l) | | 4.52 | 7.03 | 12.5 | 2.41 |
| Manganese (mg/L) | <1 | 0.07 | 0.04 | 0.058 | 0.034 |
| Mercury (mg/l) | <0.002 | ND[3] | ND[3] | ND[3] | 0.0004 |
| Magnesium (mg/l) | | 1.15 | 1.19 | 3.28 | 0.634 |
| Lead (mg/l) | <0.05 | ND[10] | ND[10] | ND[10] | ND[10] |
| Potassium (mg/l) | | 2.37 | 1.38 | 1.48 | 0.613 |
| Sodium (mg/l) | | 2.21 | 2.08 | 4.31 | 0.224 |
| Total Iron (mg/L) | | 4.24 | 0.35 | 1.48 | 0.955 |
| Total coliform (MPN/100mL) | <5,000 | 400 | 3,300 | 22,000 | 22,000 |
| Fecal coliform (MPN/100mL) | <1,000 | 9 | 240 | 1,100 | 17,000 |

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

*Table 3-8: Physical Parameters Results of Surface Water Quality – Nam Chian, Nam Phouan, Nam Xao and Nam Houay Soup (fortnightly measured)*

| | Site Name | Nam Chain | Nam Phouan | Nam Xao | Nam Houaysoup |
|---|---|---|---|---|---|
| | Zone | Tributaries Upstream | | Tributaries Downstream | |
| | Station Code | NCH01 | NPH01 | NXA01 | NHS01 |
| | Date | 21/06/16 | 22/06/16 | 23/06/2016 | 23/06/2016 |
| **Parameters (Unit)** | **Guideline** | | | | |
| pH | 5.0 - 9.0 | 8 | 7.35 | 7.46 | 7.12 |
| DO (%) | | 102.3 | 107.5 | 81.9 | 85.9 |
| DO (mg/L) | >6.0 | 8.14 | 8.09 | 6.16 | 6.93 |
| Conductivity(µs/cm) | | 103.4 | 70.8 | 211 | 33 |
| TDS (mg/L) | | 51 | 35 | 105 | 16 |
| Temperature (°C) | | 24.4 | 28.2 | 29.81 | 24.24 |
| Turbidity (NTU) | | 1,028 | 6.89 | 20.1 | 10.65 |

| | Site Name | Nam Chain | Nam Phouan | Nam Xao | Nam Houaysoup |
|---|---|---|---|---|---|
| | Station Code | NCH01 | NPH01 | NXA01 | NHS01 |
| | Date | 14/03/16 | 15/03/16 | 16/03/16 | 16/03/16 |
| **Parameters (Unit)** | **Guideline** | | | | |
| pH | 5.0 - 9.0 | 7.3 | 7.83 | 7.86 | 8.28 |
| DO (%) | | 106.2 | 107.2 | 100.7 | 98.0 |
| DO (mg/l | >6.0 | 8.58 | 8.68 | 7.52 | 7.57 |
| Conductivity (µs/cm) | | 71.7 | 68.9 | 164.4 | 78 |
| TDS (mg/l) | | 35 | 34 | 82 | 39 |
| Temperature (°C) | | 23.9 | 24.4 | 29.2 | 27.2 |
| Turbidity (NTU) | | 23.1 | 2.59 | 2.63 | 6.45 |

### 3.2.3 Groundwater Quality Monitoring

In March 2016, NNP1PC sampled and analysed the groundwater quality in 4 boreholes. Three are community boreholes at Ban Hatsaykham and one is a private well at Ban Hat Gniun (see Figure 3-6).

The results are presented in Table 3-9. The water from the boreholes in Ban Hatsaykham is used by 42 households for drinking, bathing, washing and domestic use purposes. The water from the well in Ban Hat Gnuin is used by 6 households for bathing and washing purposes.

All groundwater quality data are routinely reported to the Social Management Office who regularly communicate the results to the key NNP1 Project Villages' authorities and the local health centres as part of the Project's health programme.

**Ban Hatsaykham**

All monitored parameters for two boreholes (GHSK01 and GHSK03) complied with the standards.

**Ban Hat Gnuin**

The faecal coliforms and E.coli bacteria contamination were 1,300 MPN/100 ml which exceeded the National Groundwater Standards. In addition, the pH level was measured at 6.34 which was slightly lower than the Standard range of between 6.50 and 9.20. The increment of faecal coliforms and E.coli bacteria were caused by the seepage of the contaminated underground water with pollutants. Other monitored parameters complied with the Standard.

*Figure 3-6: Groundwater Quality Monitoring Locations*

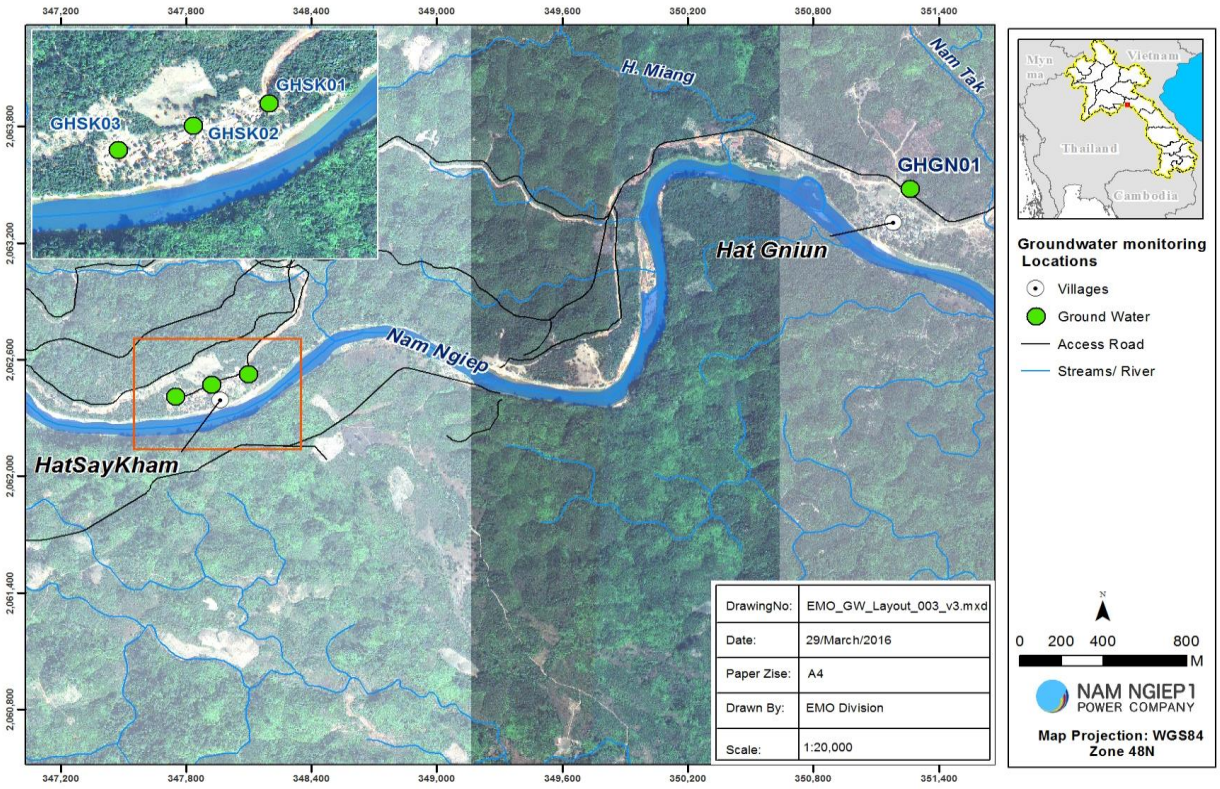



*Table 3-9: Groundwater Quality Monitoring Results*

| | Site Name | Ban Hatsaykham | | | Ban Hat Gniun | Houay Soup Resettlement Village |
|---|---|---|---|---|---|---|
| | Station Code | GHSK01 | GHSK02 | GHSK03 | GHGN01 | GHSP04 |
| | Date | 02/06/2016 | 02/06/2016 | 02/06/2016 | 02/06/2016 | 01/06/2016 |
| **Parameter (Unit)** | **Guideline** | | | | | |
| pH | 6.5-9.2 | 8.01 | Hand pump is broken | 6.75 | 6.34 | 6.08 |
| Sat. DO (%) | | 46.1 | | 53.7 | 44.5 | 63.1 |
| DO (mg/L) | | 3.59 | | 4.07 | 3.42 | 4.87 |
| Conductivity (µs/cm) | | 54.8 | | 33 | 37.8 | 82.2 |
| TDS (mg/L) | <1,200 | 27 | | 16 | 19 | 41.1 |
| Temperature (°C) | | 26.8 | | 26.36 | 27.6 | 27.1 |
| Turbidity (NTU) | <20 | 0.06 | | 0.19 | 35.9 | 0.13 |
| Nitrate (mg/l) | <45 | 0.7 | | 2.2 | 5.1 | 0.26 |
| Total Hardness (mg/l) | <500 | 36 | | 8.66 | 9.58 | 52.4 |
| Nitrite (mg/l) | | ND[7] | | ND[7] | ND[7] | ND[7] |
| Fluoride (mg/l) | <1.0 | 0.17 | | 0.09 | 0.12 | 0.18 |
| Arsenic (mg/l) | <0.05 | ND[2] | | ND[2] | ND[2] | ND[2] |
| Calcium (mg/l) | | 7.76 | | 1.78 | 1.35 | 10.1 |
| Manganese (mg/l) | <0.5 | ND[4] | | ND[4] | 0.048 | ND[4] |
| Magnesium (mg/l) | | 0.929 | | 0.436 | 0.779 | 1.34 |
| Cadmium (mg/l) | <0.01 | ND[5] | | ND[5] | ND[5] | ND[5] |
| Potassium (mg/l) | | 0.224 | | 0.432 | 2.34 | 0.188 |
| Sodium (mg/l) | | 0.567 | | 0.66 | 3.02 | 0.955 |
| Iron (mg/l) | | 0.024 | | 0.02 | 1.16 | ND[10] |
| Faecal coliform (MPN/100ml) | 0 | 0 | | 0 | 1,300 | 0 |
| Ecoli Bacteria (MPN/100ml) | 0 | 0 | | 0 | 1,300 | 0 |

| | | | | |
|---|---|---|---|---|
| ND[1] (<0.0005 mg/L) | ND[2] (<0.0003 mg/L) | ND[3] (<0.0002 mg/L) | ND[4] (<0.005 mg/L) | ND[5] (<0.003 mg/L) |
| ND[6] (<0.09 mg/L) | ND[7] (<0.07 mg/L) | ND[8] (<0.04 mg/L) | ND[9] (<0.02 mg/L) | ND[10] (<0.01 mg/L) |
| ND[11] (<0.3 mg/L) | ND[12] (<0.2 mg/L) | ND[13] (<1.0 mg/L) | ND[14] (<1.5 mg/L) | ND[15] (<4.0 mg/L) |
| ND[16] (<5.0 mg/L) | ND[17] (<2.7 mg/L) | | | |

### 3.2.4 Gravity Fed Water Supply (GFWS) Quality Monitoring

Water quality monitoring for GFWS system is conducted on a monthly basis with the aim to alert the users on potential impacts caused by bathing and washing. During June 2016, water samples were taken from water taps at Ban Hat Gnuin and Ban Thaheua.

Results of the assessment for GFWS of Ban Hat Gnuin and Ban Thaheua are shown in Table 3-10 and summarised as follows:

**Ban Thahuea (WTHH02):** All parameters complied with the National Drinking Water Standards.

**Ban Hat Gnuin (WHGN02):** All parameters complied with the National Drinking Water Standards except for faecal coliforms and E.coli which were found to be 6.9 MPN/100ml for both parameters.

Table 3-10: Results of the Gravity Fed Water Supply Quality Monitoring

| | Site Name | Ban Thaheua | Ban Hat Gnuin |
|---|---|---|---|
| | Station Code | WTHH02 | WHGN02 |
| | Date | 02/06/2016 | 02/06/2016 |
| Parameter (Unit) | Guideline | | |
| pH | 6.5-8.5 | 7.15 | 7.6 |
| Sat. DO (%) | | 89.5 | 95.3 |
| DO (mg/L) | | 6.75 | 7.14 |
| Conductivity (µs/cm) | <1,000 | 72.7 | 96.3 |
| TDS (mg/L) | <600 | 36 | 48 |
| Temperature (°C) | <35 | 28.6 | 28.1 |
| Turbidity (NTU) | <10 | 0.8 | 0.48 |
| Total Hardness (mg/l) | <300 | 47.9 | 58.8 |
| Nitrate (mg/l) | <50 | 0.22 | 0.28 |
| Fluoride (mg/l) | <1.5 | 0.14 | 0.3 |
| Nitrite (mg/l) | <3 | ND[7] | ND[7] |
| Arsenic (mg/l) | <0.05 | ND[2] | ND[2] |
| Manganese (mg/l) | <0.5 | ND[4] | ND[4] |
| Mercury (mg/l) | <0.001 | ND[3] | ND[3] |
| Magnesium (mg/l) | | 1.78 | 2.41 |
| Selenium (mg/l) | <0.01 | ND[1] | ND[1] |
| Cadmium (mg/l) | <0.003 | ND[5] | ND[5] |
| Lead (mg/l) | <0.01 | ND[10] | ND[10] |
| Iron (mg/l) | <1 | ND[10] | ND[10] |
| Faecal coliform (MPN/100ml) | 0 | 23 | 23 |
| Ecoli Bacteria (MPN/100mL) | 0 | 23 | 23 |

| | | | | |
|---|---|---|---|---|
| ND[1] (<0.0005 mg/L) | ND[2] (<0.0003 mg/L) | ND[3] (<0.0002 mg/L) | ND[4] (<0.005 mg/L) | ND[5] (<0.003 mg/L) |
| ND[6] (<0.09 mg/L) | ND[7] (<0.07 mg/L) | ND[8] (<0.04 mg/L) | ND[9] (<0.02 mg/L) | ND[10] (<0.01 mg/L) |
| ND[11] (<0.3 mg/L) | ND[12] (<0.2 mg/L) | ND[13] (<1.0 mg/L) | ND[14] (<1.5 mg/L) | ND[15] (<4.0 mg/L) |
| ND[16] (<5.0 mg/L) | ND[17] (<2.7 mg/L) | | | |

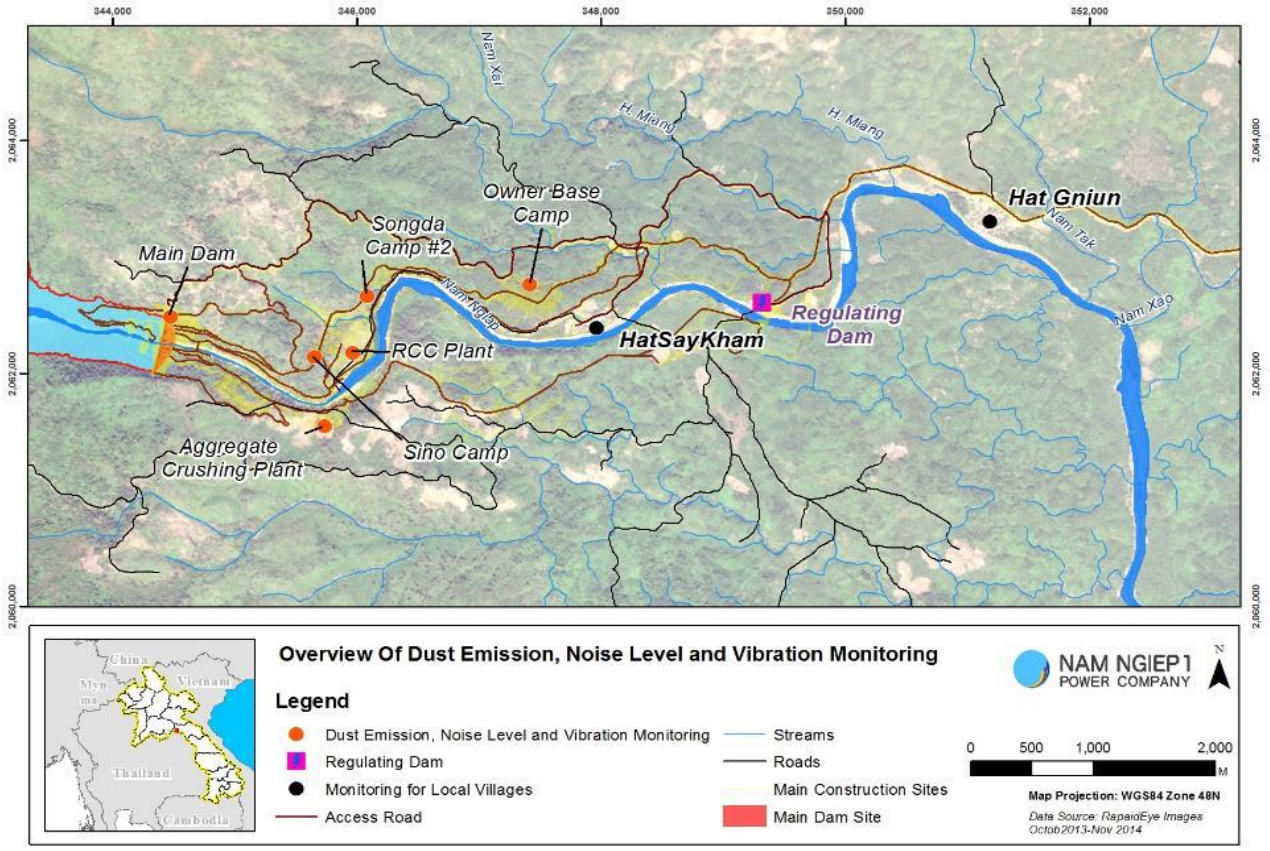
### 3.2.5 Dust Monitoring

Dust monitoring was conducted over a period of 72 consecutive hours in Ban Hat Gnuin and Ban Hatsaykham. In addition, dust monitoring was conducted for 24 consecutive hours at the

Aggregate Crushing Plant, RCC Plant, Sino Hydro Camp, Song Da 5 Camp No. 2 (to assess possible impact on workers' health) and Owner's Site Office and Village.

The monitoring points are indicated on the map in Figure 3-7. All average dust emission results during the monitored period complied with the National Standard. These results are presented in Annex B.

*Figure 3-7: Noise and Dust Emission Monitoring Locations*




### 3.2.6 Noise Monitoring

During June 2016, noise monitoring was conducted in Ban Hatsaykham and Ban Hat Gnuin for at least 72 consecutive hours in each village. Noise monitoring was also conducted at the Aggregate Crushing Plant, RCC Plant, Sino Hydro Camp, Song Da 5 Camp No. 2 (to assess possible impact on workers' health) and Owner's Site Office and Village (to monitor the ambient noise levels) for 24 of consecutive hours.

The recorded noise levels indicate full compliance with the National Standard for the period of 06:01-22:00 for all stations monitored, except Ban Hatsaykham [8 June 2016 – 64.42dB(A) compared to the standard of 55 dB(A)]. For the period of 22:01-06:00, slightly higher levels than the Standard were recorded at Ban Hat Gnuin and Ban Hatsaykham [between 46.34 – 52.83 dB(A) compared to the Standard of 45 dB(A)]; the RCC, Aggregate Crushing Plant, Sino Hydro Camp and the Main Dam [between 53.58 – 66.25 dB(A)] compared to the Standard of 50 dB(A)]. With reference to the investigation on this matter conducted in February 2016, the key causes of high noise levels are most likely the windy and rain conditions during the night time period.

Results of the noise monitoring for April 2016 are shown in Annex C.

## 3.3 Construction Site Waste Management

### 3.3.1 Solid Waste Management at the Construction Site

In June 2016, the construction of the NNP1 Project landfill was progressed at the Spoil Disposal Area No. 6. Key achievements included completing the drilling of a deep well for water supply and three (03) groundwater monitoring boreholes, a field office, a guard house and lining of solid waste pit and anaerobic ponds (see Photograph 1 and Photograph 2). On 15 June 2016, EMO approved a second revision of the SS-ESMMP for the construction of the NNP1 Project landfill with minor comments.

Photograph 1: Completed HDPE lining of the landfill pit

Photograph 2: Completed HDPE lining of treatment ponds

### 3.3.2 Hazardous Materials and Waste Management

During 14, 15 and 16 June 2016, joint hazardous materials and waste inventories were undertaken at the main construction sites and sub-contractors' camps including Loxley's stock yard (230 kV transmission line), Loxley sub-contractor's site office (RCR) and workshop in Thaphabat District (Bolikhamxay Province), TCM camp, Right Tunnelling workshop, V&K camp, CVC Plant, Sino Hydro fuel station located at their camp area, new Song Da5 workshop at Spoil Disposal Area No. 2, HM Hydro's workers' camp, IHI workers' camp and SECC workshop.

The types and amounts of hazardous materials stored at the different construction sites and camps are indicated in Table 3-11.

*Table 3-11 Hazardous material inventory*

| NO. | HAZARDOUSE WASTE TYPE | UNIT | DISPOSED | TOTAL |
|---|---|---|---|---|
| 1 | Used hydraulic and engine oil | Litre (L) | 0 | 2,750 |
| 2 | Used oil mixed with water | L | 0 | 600 |
| 3 | Empty used oil drum/container | Drum (20 L) | 6 | 40 |
| 4 | Empty used oil drum/container | Drum (200 L) | 5 | 21 |
| 5 | Empty contaminated bitumen drum/container | Drum (200 L) | 0 | 82 |
| 6 | Used oil filters | Piece | 0 | 88 |

| | | | | |
|---|---|---|---|---|
| 7 | Contaminated soil, sawdust and concrete | Bag | 0 | 30 |
| 8 | Contaminated textile and material | Bag | 0 | 7 |
| 9 | Used tire | Piece | 4 | 86 |
| 10 | Empty used chemical drum/container | Drum (200 L) | 0 | 45 |
| 11 | Car battery | Unit | 0 | 7 |
| 12 | Empty paint and spray cans | Can | 0 | 43 |
| 13 | Acid and caustic cleaners | Bottle | 0 | 285 |
| 14 | Clinical waste | Kg | 0 | 4 |
| 15 | Ink cartridge | Unit | 0 | 11 |
| 16 | Halogen/fluorescent bulbs | Unit | 0 | 8 |
| 17 | Empty used chemical drum/container | Drum (20 L) | 0 | 544 |
| 18 | Cement bag | Bag | 0 | 1,500 |

In addition, the amount of recycle waste was recorded at each NNP1 Project construction site and office including ESD office, Loxley office and Stock yard at Paksan, Sub-contractor site office (RCR) and workshop at Thaphabath District, Song da5 Camp No. 1, TCM camp, RT camp and workshop, V&K camp, Song da5 camp No. 2, Songda5's workshop at the spoil disposal area No. 2, RCC plant, Sino Hydro camp, SECC camp and each Contractor's camp at Houay Soup Resettlement Area (HSRA) as summarised in **Error! Reference source not found.**12 below

*Table 1- 12: Amounts of recycle waste sold*

| NO. | RECYCLE WASTE TYPE | UNIT | SOLD | TOTAL |
|---|---|---|---|---|
| 5 | Iron and metal scrap | Kg | 3,254 | 11,200 |
| 2 | Aluminium | Kg | 5 | 343.6 |
| 4 | Glass | Kg | 0 | 100 |
| 1 | Plastic bottles | Kg | 54 | 44.8 |
| 3 | Paper/cardboard | Kg | 0 | 29 |

The food waste generated from the Owner's Site Office and Village, camps of the Contractors and sub-contractors was collected by Hatsaykham villagers for use as animal feeds (pig and poultry). The amount collected in June 2016 is summarised in **Error! Reference source not found.**13 below

*Table 3-13: Amount of food waste collected by villagers*

| NO. | SITE LOCATION NAME | UNIT | TOTAL |
|---|---|---|---|
| 1 | SECC camp | Kg | 0* |
| 2 | Song da 5 camp No. 1 | Kg | 2,334 |
| 3 | TCM camp | Kg | 90 |
| 4 | IHI camp | Kg | 0* |
| 5 | IHI's 276 Sub-contractor | Kg | 2 |
| 6 | OC camp | Kg | 1,230 |
| 7 | OBC camp | Kg | 501 |
| 8 | Song da 5 camp No. 2 | Kg | 3,070 |
| **Total** | | | 7,227 |

*Very little amount of food waste was generated (less than a Kg) because of the number of workers are less than 20 people, so villagers did not take from this camp

## 3.4 Community Waste Management Support

### 3.4.1 Community Recycling Programme

Since July 2015 to present a total of 6,986.5 Kg of recyclables were received by the Community Recycle Bank. During June 2016, an increase of 302.9 kg of recycle waste was found comparing to May 2016 (see Table 3-124). By the end of June 2016, a total of 184 people (130 adults and 54 students) or 120 households held accounts at the Community Recycle Bank. The percentages of participation in the programme for each village are: Ban Hat Gniun- 80%, Ban Hatsaykham- 64% and Ban Thahuea- 64%. Only one new member from the same household participated in June 2016. Therefore, the participation percentage does not change significantly.

The types and amounts of waste recycled in March 2016 and in total are presented in Table 3-12.

*Table 3-12: Types and amounts of waste traded*

| Types of Waste | Unit | Amount Recycled In June 2016 | Accumulated Amount Recycled (July 2015 – June 2016) |
|---|---|---|---|
| **Recyclable waste** | | | |
| Glass | Kg | 16 | 2,022 |
| Scrap metal | Kg | 204 | 2,225.7 |
| Plastic bottle | Kg | 22 | 1,113.5 |
| Paper/cardboard | Kg | 33 | 1,116 |
| Aluminium cans | Kg | 27.9 | 509.3 |
| Tin cans | Kg | 0 | |
| Total | Kg | 302.9 | 6,986.5 |
| **Hazardous waste** | | | |
| Hydraulic oil containers | Kg | 0 | 11.5 |
| Used batteries | Am | 0 | 9 |

*Photograph 3: Buying recyclable waste at the waste bank*

*Photograph 4: Selling of recyclable waste to Khunmixay factory*

On 4 June 2016, recyclable waste was sold to Khunmixay Factory (authorised vendor) for further processing including 203 kg of plastic bottles, 108 kg of aluminium cans and 622 kg of scrap metals (see above). Recyclables will continue to be stockpiled at the Community Recycle Bank, the Owner's Site Office and Village and the Contractors/sub-contractors with the intention of arranging a routine collection by the Factory.

The waste management team is in the process of preparing "a Recycle Bank Handling-over Strategy" by involving key representatives from the Hat Gnuin village in the management process prior to handling over of the Community Recycle Bank.

### 3.4.2 Houay Soup Waste Management

In June 2016, a Contractor was selected to construct a Houay Soup landfill. The first draft of the DWP & SS-ESMMP for the Construction of Houay Soup Landfill was received on 17 June 2016 and is under review.

## 3.5 Watershed Management

### 3.5.1 Preparation of the Nam Ngiep 1 Watershed Management Plan

| Obligations | Status by June 2016 |
|---|---|
| **Prepare a draft Watershed Management Plan by 31 July 2016** | Continue with WMP development focussing on verification of current data analysis and development of activity package for thematic area of land use, biodiversity, fishery, water resource, soil erosion and sedimentation, and livelihood through the technical workshop with one integrated team (NNP1, WRPC-WRPO, Xaysomboun District ISP, Biodiversity and Fishery Consultants). |
| **Prepare draft Watershed Management Regulations by 31 July 2016** | There was discussion on initial content in drafting provincial watershed regulation based on the experiences in Xaysomboun and Bolikhamxay Province during the technical workshop in late June 2016. |
| **Final Watershed Management Plan by 31 October 2016** | - |
| **Final Watershed Management Regulations by 31 January 2017** | - |
| **Activities in June 2016** | Results |
| **Data and information collection and analysis for WMP development** | • NNP1 team together with Biodiversity and Fishery Consultants had further analysed and discussed the overall data/information focusing on the thematic area of Land Use, Biodiversity, Fishery, Water |

| Obligations | Status by June 2016 |
|---|---|
| | resource, Soil erosion and sedimentation, and Livelihood.<br>• The participatory planning through technical workshop with WRPC-WRPO and Xaysomboun District ISP team was commenced from 28-30 June 2016. The primary objectives are as follow:<br>○ To revisit and agree on the vision of the NNP1 WMP<br>○ To cross validate the current issues analysis that further link with the formulation of activity packages (goals, objectives, indicators and activities) for the concerned thematic area.<br>○ To discuss the initial content for drafting provincial watershed regulation based on experience of Xaysomboun and Bolikhamxay Province. |
| **Procurement of Consultants to support the WMP development** | • The national candidate has discussed and agreed with MONRE DFRM on the contract negotiation by the end of June 2016. The contract is expected to be effective from 11 July 2016 to 10 January 2017.<br>• NNP1 has shortlisted potential candidates for international consultant and completed the technical evaluation in the middle of June 2016. The strongest candidate will be invited for further interview and contract negotiation process in the first or second week of July 2016. The contract is expected to be effective afterward for the period of 4.5 months until submission of final NNP1 WMP on 31 October 2016 with possible extension based on the agreed term. |
| **WRPO activity** | • WRPO Bolikhamxay:<br>○ Continue with Land Use Planning activity in 2 villages at Bolikhan District (Ban Phonxay on 13-19 June 16 and Ban Thaheua on 20-26 Jun 16)<br>○ Conducted village consultation in Ban Phaday, Bolikhan District, the village that has administrative boundary within the eastern part of NNP1 watershed (Nam Xao sub-watershed), for the early awareness raising of protection and management of NNP1 watershed area. |

| Obligations | Status by June 2016 |
|---|---|
| | • WRPO Xaysomboun:<br>○ Focusing the activity on initial development of NNP1 Watershed Management Regulation and prepared the discussion notes for the technical workshop on 28-30 June 2016. |
| **Xaysomboun ISP** | • The draft of district ISP report has been submitted to Xaysomboun ISP Technical Committee in the middle of June 2016 for further compilation and finalization.<br>• The Committee agreed to share the draft during WMP technical workshop for some data verification/update and to provide reference for further WMP analysis and formulation of activity package under different WMP thematic area. The outcomes of discussion will be elaborated to further improve the final draft and MoNRE DEQP will do the final review afterward. |

### 3.5.2 Biodiversity Offset Management

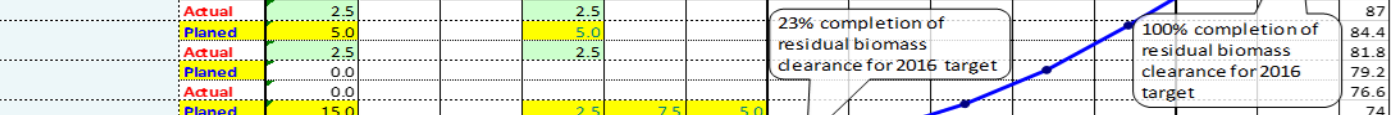
| Obligations | Status by June 2016 |
|---|---|
| **Final Biodiversity Offset Survey Report by 30 June 2016** | • The consultant has completed the final draft survey report on 29 June 2016. The draft was further submitted to ADB on 30 June 2016.<br>• Additional comment is expected from ADB, BAC, IAP and LTA |
| **Draft Offset Options Paper for the Biodiversity Offset Sites by 31 July 2016** | • Will be developed by ADB consultant. The deadline will be shifted. |
| **Consensus building and workshops among stakeholders for the offset site selection by 15 September 2016** | • The deadline will be shifted. |
| **Final Offset Options Paper for the Biodiversity Offset Sites by 31 October 2016** | • Depending on ADB consultant and the wet season survey. The deadline maybe shifted. |

### 3.5.3 Biomass Clearance

The overall progress of biomass clearance programme is demonstrated in Figure 3-8 below.

*Figure 3-8: Gantt Chart of Biomass Clearance Programme in 2016*

| | Task List / Steps of work | | Weight (%) | YEAR 2016 Q1 01 | 02 | 03 | Q2 04 | 05 | 06 | Q3 07 | 08 | 09 | Q4 10 | 11 | 12 | % S-Curve |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **Preparation of Biomass Clearance Operation** | Planed | 100.0 | 0.0 | | | | | | | | | | | | 100 |
| | | Actual | 0.0 | | | | | | | | | | | | | 97.4 |
| 1.1 | Development of EMP, Implementation Plan, and SS-ESMMP for biomass Clearance | Planed | 10.0 | 10.0 | | | | | | | | | | | | 94.8 |
| | | Actual | 10.0 | 10.0 | | | | | | | | | | | | 92.2 |
| 1.1.1 | Training on environmental protection measures, safety protocols, and compliance protocols | Planed | 2.5 | | | 2.5 | | | | | | | | | | 89.6 |
| | | Actual | 2.5 | | | 2.5 | | | | | | | | | | 87 |
| 1.2 | Procurement of equipments for biomass work | Planed | 5.0 | | | 5.0 | | | | | | | | | | 84.4 |
| | | Actual | 2.5 | | | 2.5 | | | | | | | | | | 81.8 |
| 2 | **UXO Search and Clearance** | Planed | 0.0 | | | | | | | | | | | | | 79.2 |
| | | Actual | 0.0 | | | | | | | | | | | | | 76.6 |
| 2.1 | Perform UXO work for 935 ha (6 blocks) of priority biomass clearance | Planed | 15.0 | | | 2.5 | 7.5 | 5.0 | | | | | | | | 74 |
| | | Actual | 10.5 | | | 2.5 | 3.0 | 1.0 | 4.0 | | | | | | | 71.4 |
| 2.2 | Perform UXO work for 554 ha (5 blocks) of priority biomass clearance | Planed | 12.5 | | | | 5.0 | 5.0 | 2.5 | | | | | | | 68.8 |
| | | Actual | 4.0 | | | | | | 4.0 | | | | | | | 66.2 |
| 2.3 | Perform UXO work for 423 ha (7 blocks) of priority biomass clearance | Planed | 10.0 | | | | | | | 1.0 | 1.0 | 1.0 | 2.0 | 2.5 | 2.5 | 63.6 |
| | | Actual | 0.0 | | | | | | | | | | | | | 61 |
| 3 | **Biomass Clearance** | Planed | 0.0 | | | | | | | | | | | | | 58.4 |
| | | Actual | 0.0 | | | | | | | | | | | | | 55.8 |
| 3.1 | Perform biomass clearance for 257 ha (block 4, 6 & 7) on lower and central reservoir | Planed | 6.5 | | 1.5 | 2.5 | 2.5 | | | | | | | | | 53.2 |
| | | Actual | 5.5 | | 1.5 | 2.0 | 1.0 | 1.0 | | | | | | | | 50.6 |
| 3.2 | Perform biomass clearance for 721 ha (block 1-3 & 5) on lower and central reservoir | Planed | 15.0 | | | 1.5 | 1.5 | 1.5 | 1.5 | 1.0 | 1.0 | 1.5 | 1.5 | 2.0 | 2.0 | 48 |
| | | Actual | 4.0 | | | 1.0 | 1.0 | 1.0 | 1.0 | | | | | | | 45.4 |
| 3.3 | Perform biomass clearance for 95 ha (block 8-9) on central reservoir | Planed | 8.0 | | | | | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 42.8 |
| | | Actual | 0.0 | | | | | | | | | | | | | 40.2 |
| 3.4 | Utilization of NTFP and waste biomass and rice plantation on cleared biomass area (project affected villagers) | Planed | 3.0 | 1.5 | | | 1.5 | | | | | | | | | 37.6 |
| | | Actual | 3.0 | 0.5 | 1.0 | | 1.5 | | | | | | | | | 35 |
| 4 | **Floating/Debris Removal** | Planed | 0.0 | | | | | | | | | | | | | 32.4 |
| | | Actual | 0.0 | | | | | | | | | | | | | 29.8 |
| 4.1 | Procurement of equipment and service for floating logs/debris removal | Planed | 1.0 | | | | | | | | | | | | 1.0 | 27.2 |
| | | Actual | 0.0 | | | | | | | | | | | | | 24.6 |
| 5 | **Monitoring and Reporting** | Planed | 0.0 | | | | | | | | | | | | | 22 |
| | | Actual | 0.0 | | | | | | | | | | | | | 19.4 |
| 5.1 | Field monitoring and inspection of biomass clearance and compliance to SS-ESMMP (weekly & Monthly) | Planed | 9.5 | | 1.0 | 1.0 | 1.0 | 1.0 | 0.5 | 0.5 | 0.5 | 0.5 | 1.5 | 1.0 | 1.0 | 16.8 |
| | | Actual | 4.5 | | 1.0 | 1.0 | 1.0 | 0.5 | 1.0 | | | | | | | 14.2 |
| 5.2 | Coordination or Ad-hoc meeting to discuss the progress, concerns and problem solving | Planed | 2.0 | | 0.5 | | | | 0.5 | | | 0.5 | | | 0.5 | 11.6 |
| | | Actual | 1.0 | | 0.5 | | 0.3 | 0.3 | | | | | | | | 9 |
| | **Total** | Planed | 100.0 | **11.5** | **3.0** | **15.0** | **19.0** | **13.5** | **6.0** | **3.5** | **3.5** | **4.5** | **6.0** | **6.5** | **8.0** | 6.4 |
| | | Actual | 47.5 | **10.5** | **4.0** | **11.5** | **7.8** | **3.8** | **10.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | 3.8 |
| | | Planned Progress | monthly | 11.5 | 3.0 | 15.0 | 19.0 | 13.5 | 6.0 | 3.5 | 3.5 | 4.5 | 6.0 | 6.5 | 8.0 | |
| | | | Cumulative | 11.5 | 14.5 | 29.5 | 48.5 | 62.0 | 68.0 | 71.5 | 75.0 | 79.5 | 85.5 | 92.0 | 100.0 | |
| | | Actual Progress | monthly | 10.5 | 4.0 | 11.5 | 7.8 | 3.8 | 10.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| | | | Cumulative | 10.5 | 14.5 | 26.0 | 33.8 | 37.5 | 47.5 | 47.5 | 47.5 | 47.5 | 47.5 | 47.5 | 47.5 | |
| | Budget Code EE1.04, EE1.05 | Approved | USD | 217,274 | 2,900 | 237,250 | 21,400 | 900 | 236,550 | 700 | 700 | 1,200 | 100,700 | 900 | 420,273 | |
| | | Actual Paid | USD | 216,366 | 1,383 | - 677 | 610 | 277 | 77 | | | | | | | |




The blue graph and yellow highlight represent the planned activity, the red graph and green highlight represent the actual progress.

| Activities in June 2016 | Results |
|---|---|
| **Labour recruitment** | • The labour for UXO and biomass clearance work were being contracted intermittently because of the rainy season. The daily labour was organized in weekly rotational schedule for commencing the work. |
| **Perform UXO work for 9 blocks of priority biomass clearance** | • The UXO work is being carried out in Block 1, 5 and 6 intermittently due to the rain. The UXO (Blue 3B) were found and demolished in Block 6.<br>• The road to Block 1 and 7-9 was inaccessible in the middle of June due to continuous rain therefore the UXO progress work has to be postponed.<br>• To date, the overall UXO search and clearance has been completed for around 131 ha out of 1, 073, and 44 ha of the total target area. The UXO work progress to date is showed in Figure 1-9 & 1-10. |
| **Perform biomass clearance of block 1-9 on lower and central reservoir** | • The biomass clearance (cut and burn) has been completed for around **96%** (237.38 ha) of the total target clearance in June 2016.<br>• The biomass cutting and burning have been completed around 30 ha in Block 1, 10 ha in Block 2, 132.29 ha in Block 4, 50.70 ha in Block 5, 10 ha in Block 6, and 4 ha in Block 8.<br>• The progress of biomass clearance in each Block during the reporting period are shown from **Error! Reference source not found.** to Figure 3-17.<br>• The progress of clearance in Block 1 and 7-9 has to be postponed due to postponement of UXO progress and inaccessible road. |
| **Utilization of NTFP, waste biomass and lesser value tree** | • NNP1 EMO Biomass Team and DAFO and DONRE of Hom District conducted the join inspection / inventory during 26 May to 3 June 2016 for the cut tree with diameter more than 20cm in Block 1, 4-5, and 8-9 was completed.<br>• The volume of tree with the diameter between 20cm-80cm were estimated to be more than 1,500 $m^3$. The report was prepared and submitted to Xaysomboun GoL for action before burning schedule in September 2016 at Block 1 and December 2016 at Block 4-5, and 8-9. |
| **Opportunity of short-term crop plantation on cleared biomass area (project affected villagers)** | • More than 120 household started integrated crop plantation (rice, maize, ginger, chili, cucumber, melon, etc.) in cleared biomass areas at Block 4-6. Pictures of crop plantation are showed in **Error! Reference source not found.**. |

*Figure 3-9: Map of Priority biomass clearance areas (updated in April 2016)*

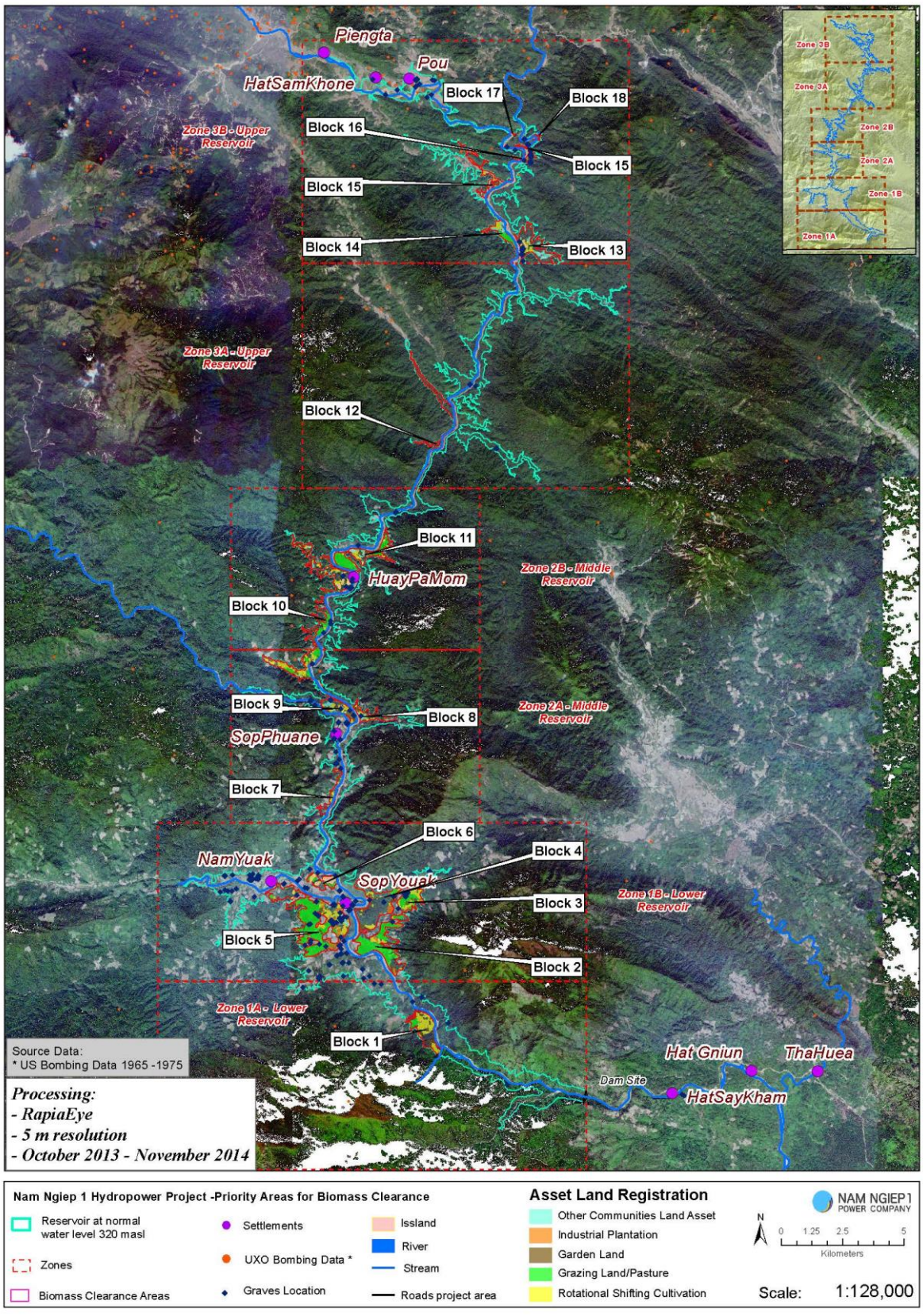


Table 3-13 2016 Priority area for biomass clearance areas and progress to date

| Priority area | Zone | Land Use Classification in Priority Biomass Clearance Area | | | | | | Total area (ha) | Status of clearance as of June 2016 (ha) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Rotational Shifting Cultivation | Garden Land | Industrial Plantation | Other Communities Land Asset | Maintained Vegetation (315-320 masl) | Forests | | | |
| Block 01 | 1 | 50.53 | 20.18 | 0.31 | 10.29 | 6.11 | 27.96 | **115.38** | 30 | **Cutting and Burning** |
| Block 02 | 1 | 10.79 | 5.68 | 7.86 | 108.82 | 7.30 | 25.47 | **165.92** | 10.4 | **Further cutting and final burning after crop harvesting - Nov - Dec 2016** |
| Block 03 | 1 | 24.44 | 9.20 | 5.82 | 32.84 | 8.51 | 8.06 | **88.86** | | **Not yet start** |
| Block 04 | 1 | 14.76 | 20.86 | 10.21 | 13.95 | 3.94 | 103.96 | **167.68** | 132.28 | **Further cutting and final burning after crop harvesting-Nov-Dec 2016** |
| Block 05 | 1 | 41.62 | 17.51 | 38.25 | 215.14 | 8.79 | 29.40 | **350.72** | 50.7 | **Cutting and Burning** |
| Block 06 | 1 | - | 2.15 | 0.56 | 11.90 | 0.00 | 32.09 | **46.71** | 10 | **Further cutting and final burning after crop harvesting - Nov - Dec 2016** |
| Block 07 | 2 | 5.51 | 9.38 | 0.25 | 0.18 | 3.39 | 24.32 | **43.03** | | **Not yet start** |
| Block 08 | 2 | 9.88 | 3.93 | - | 7.12 | 3.40 | 16.68 | **41.00** | 4 | **Cutting** |
| Block 09 | 2 | 15.95 | 19.73 | - | 7.63 | 1.38 | 9.44 | **54.13** | | **Not yet start** |
| **Total** | | **173.47** | **108.63** | **63.26** | **407.88** | **42.81** | **277.38** | **1,073.44** | **237.38** | |

*Figure 3-10: Map showing the progress UXO work in priority block 1 as June 2016*

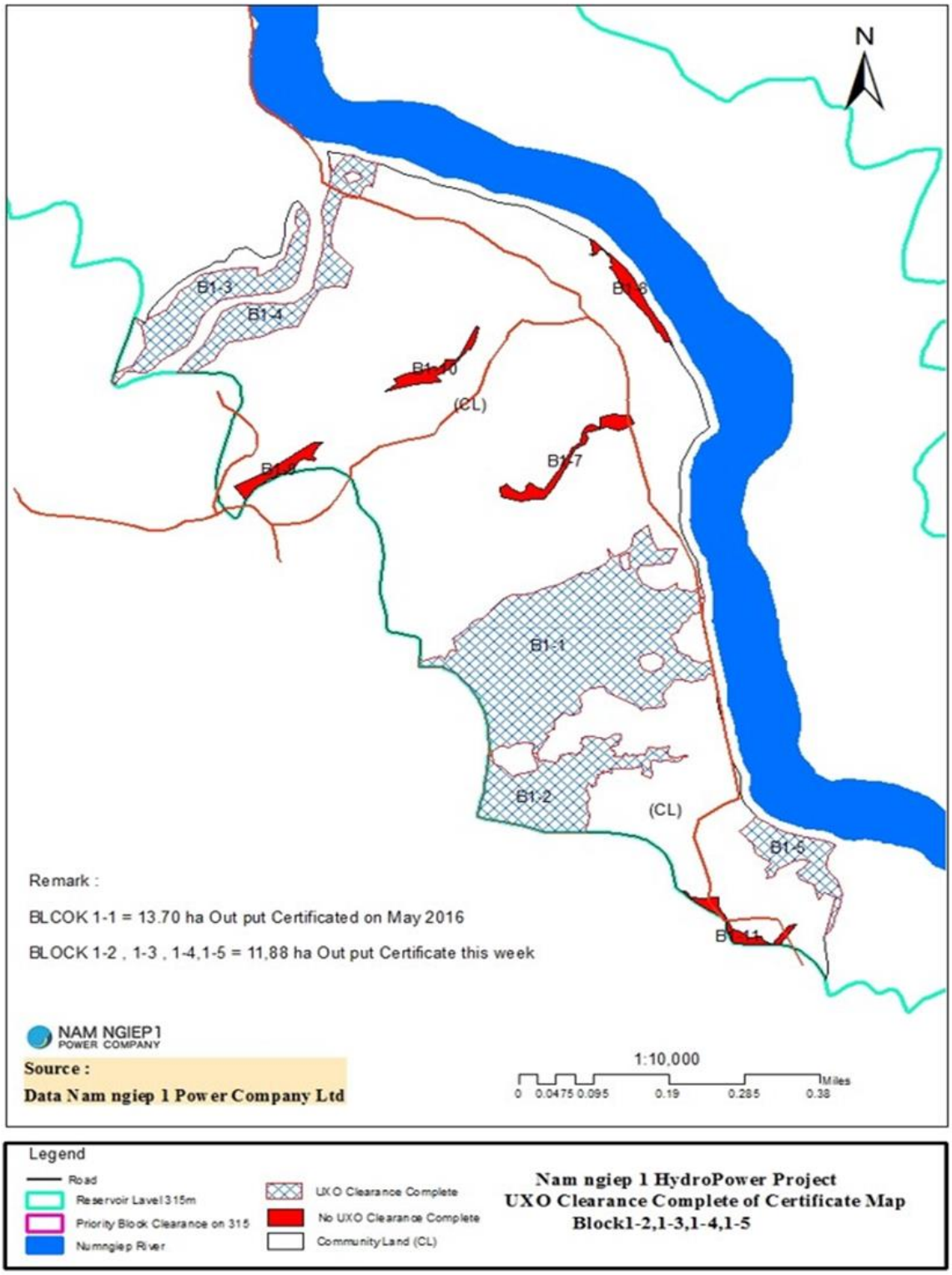


*Figure 3-11: Map showing the progress UXO work in priority Block 4*

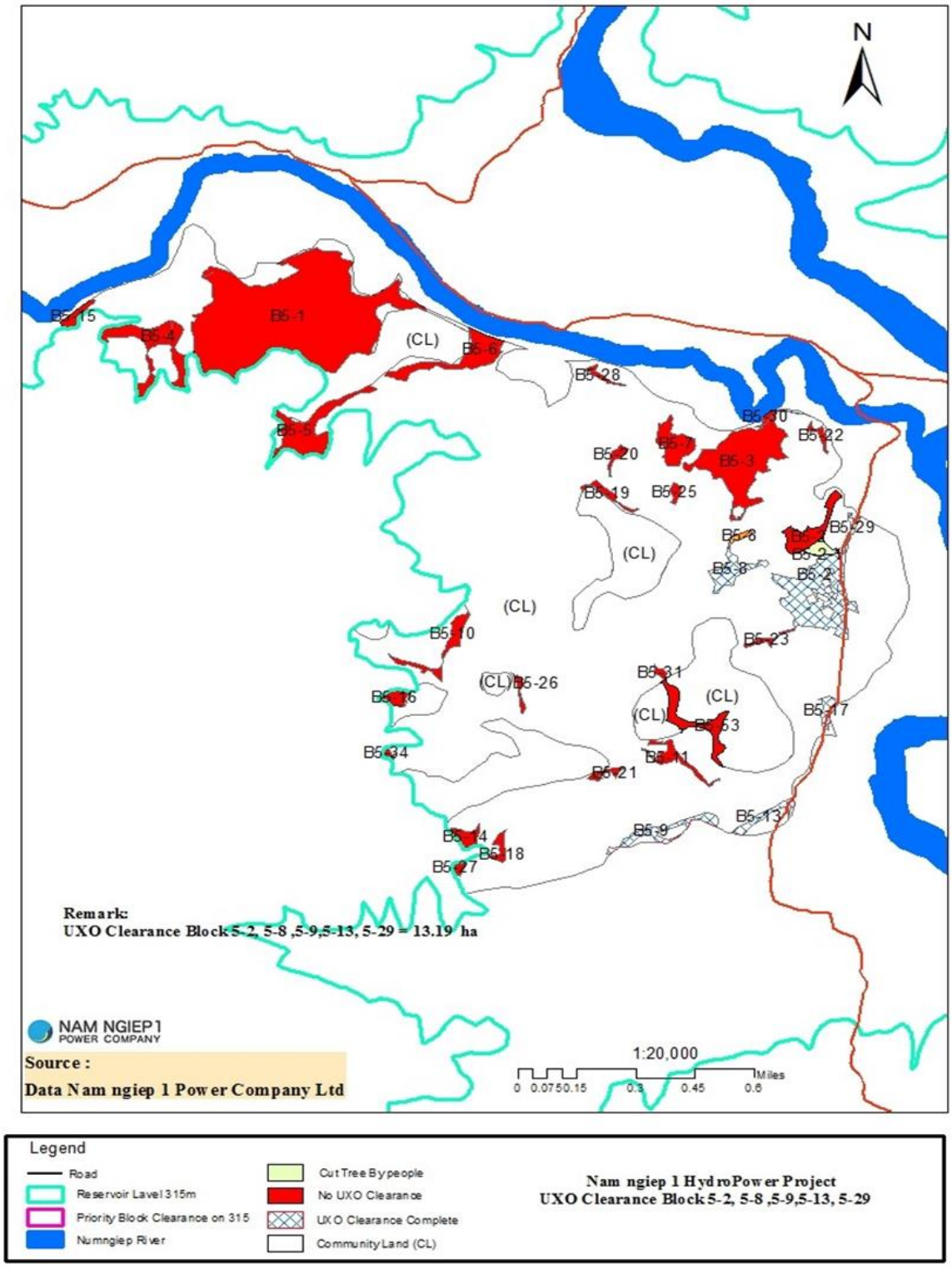
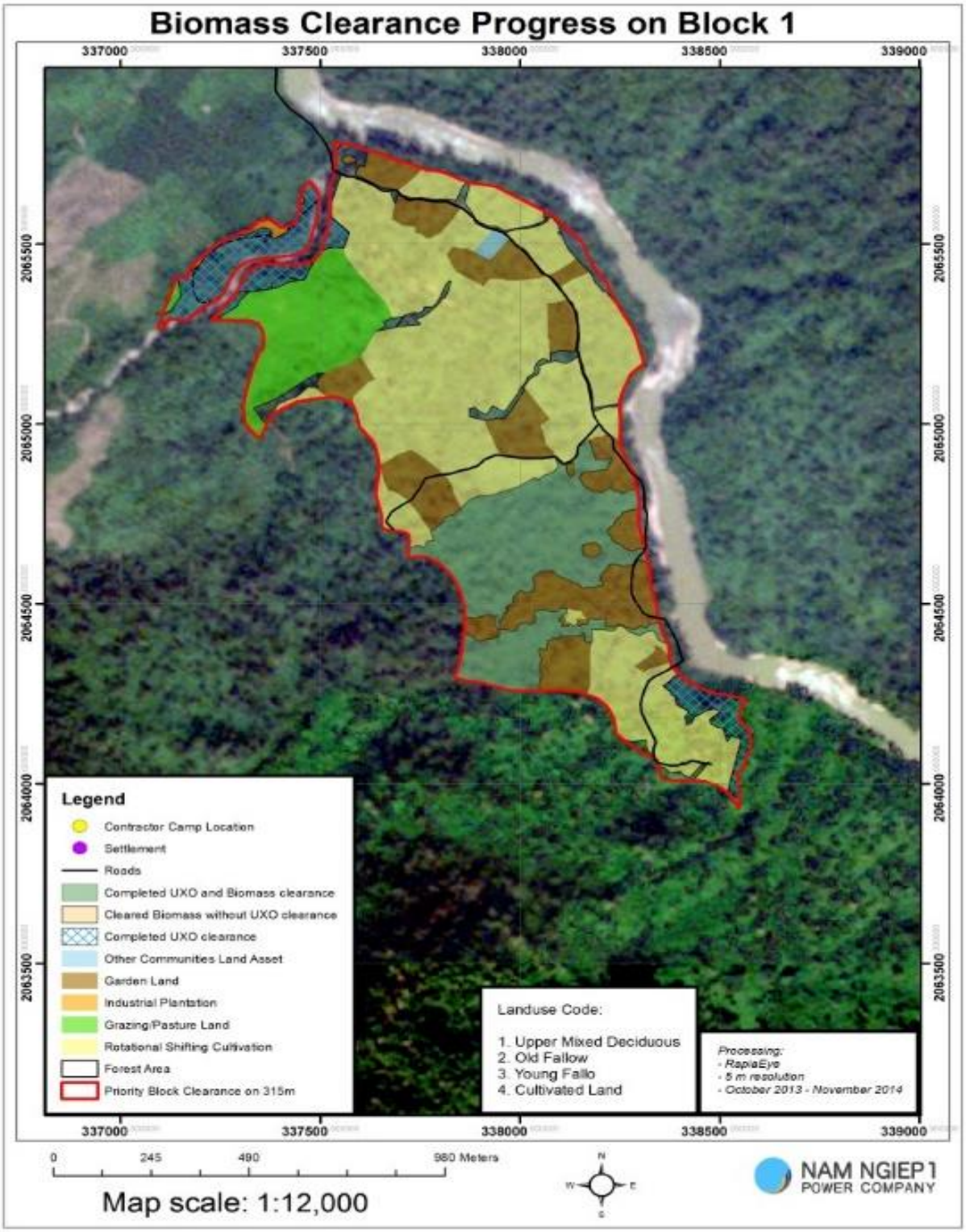
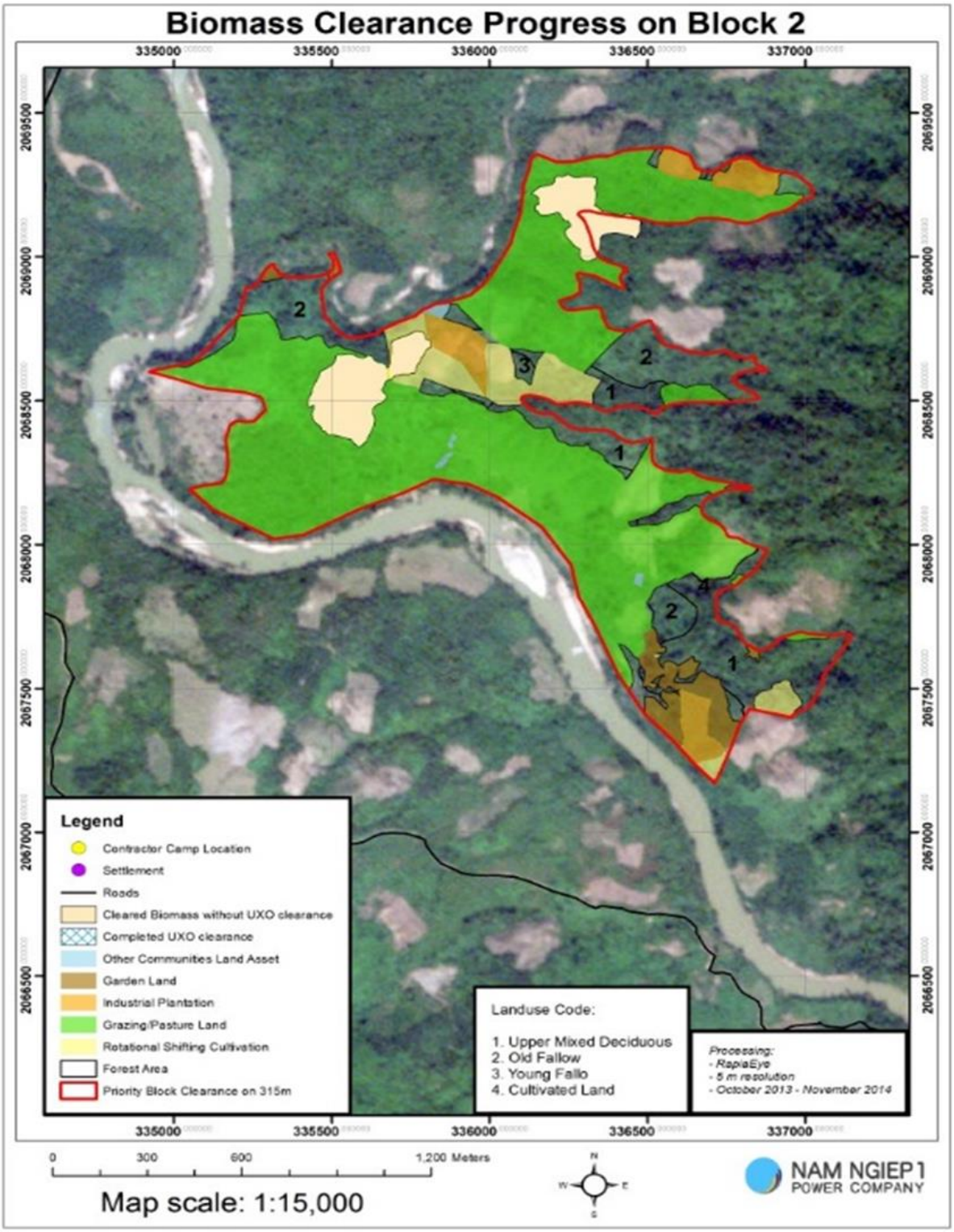


*Figure 3-12 Map showing the progress of biomass clearance in priority block 1*



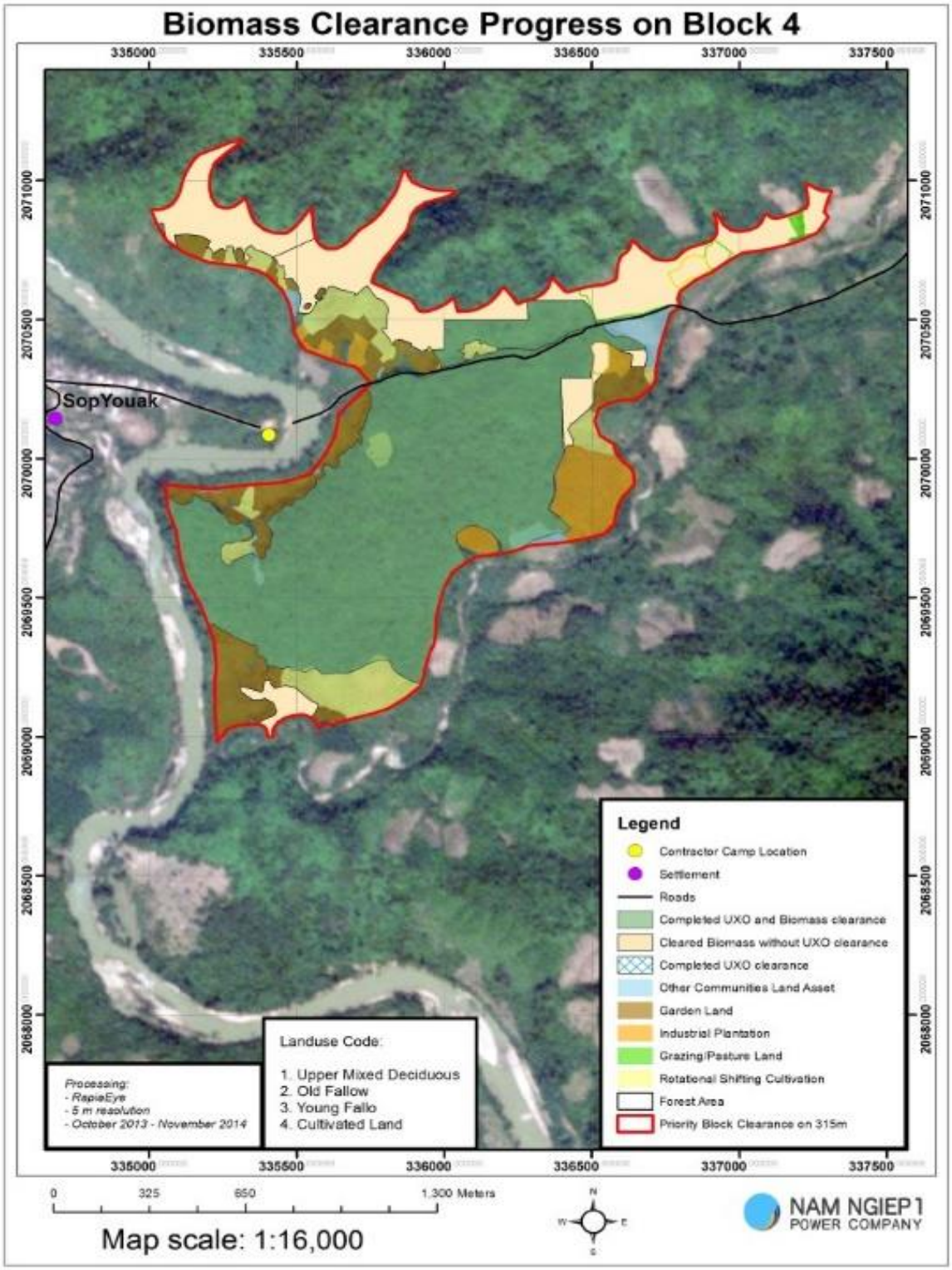

As of June 2016, the biomass cutting and burning in this block is around 30 ha out of target clearing of 115 ha. The road access to this block was damaged. Further biomass clearing and final burning will continue after wet season, i.e., in September 2016.

*Figure 3-13 Map showing the progress of biomass clearance in priority block 2*



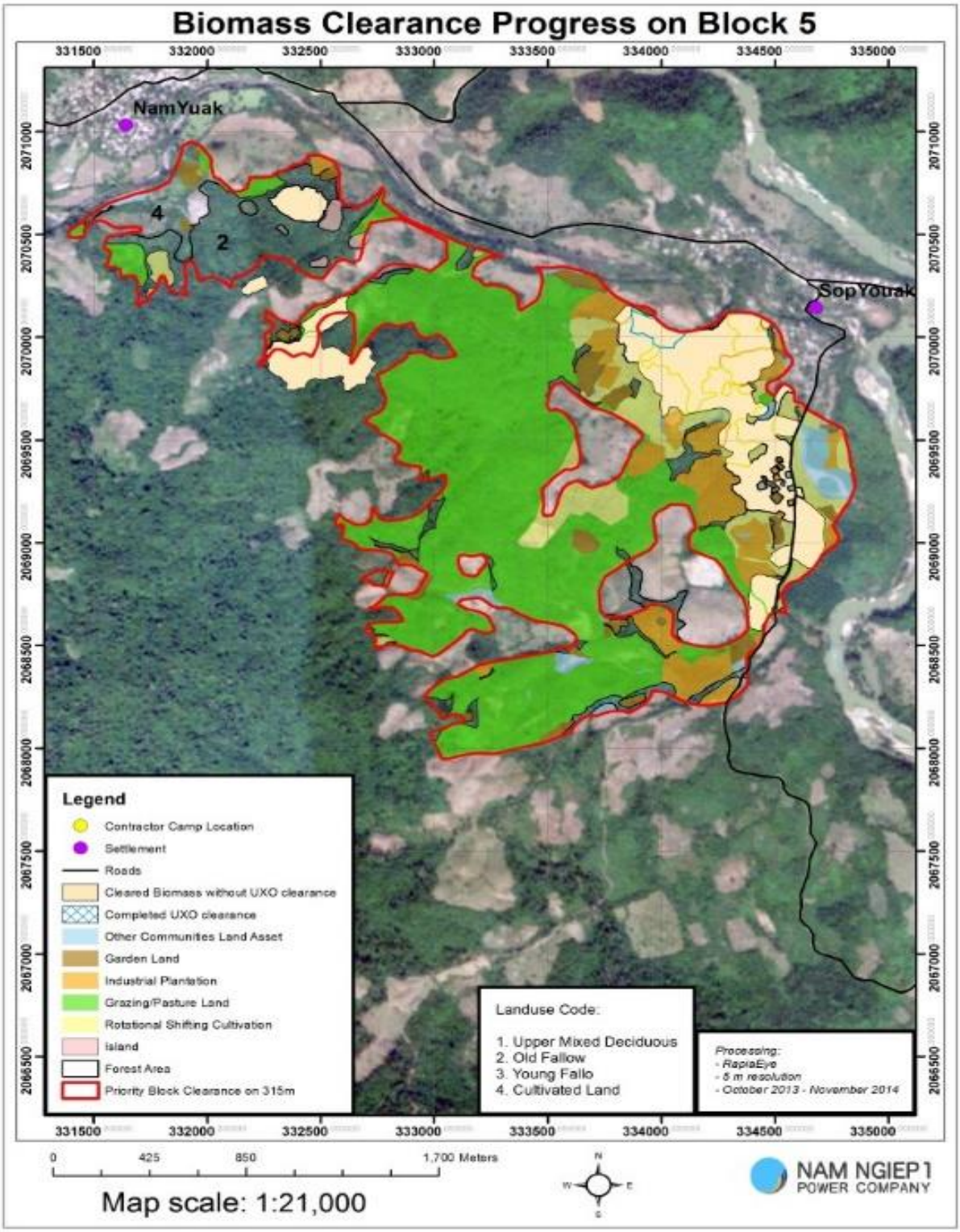

As of June 2016, the biomass cutting and burning in this block is around 10.4 ha out of target clearing of 165.92 ha. Further biomass clearing and final burning will continue after the crop harvesting season during November to December 2016.

*Figure 3-14 Map showing the progress of biomass clearance in priority block 4*



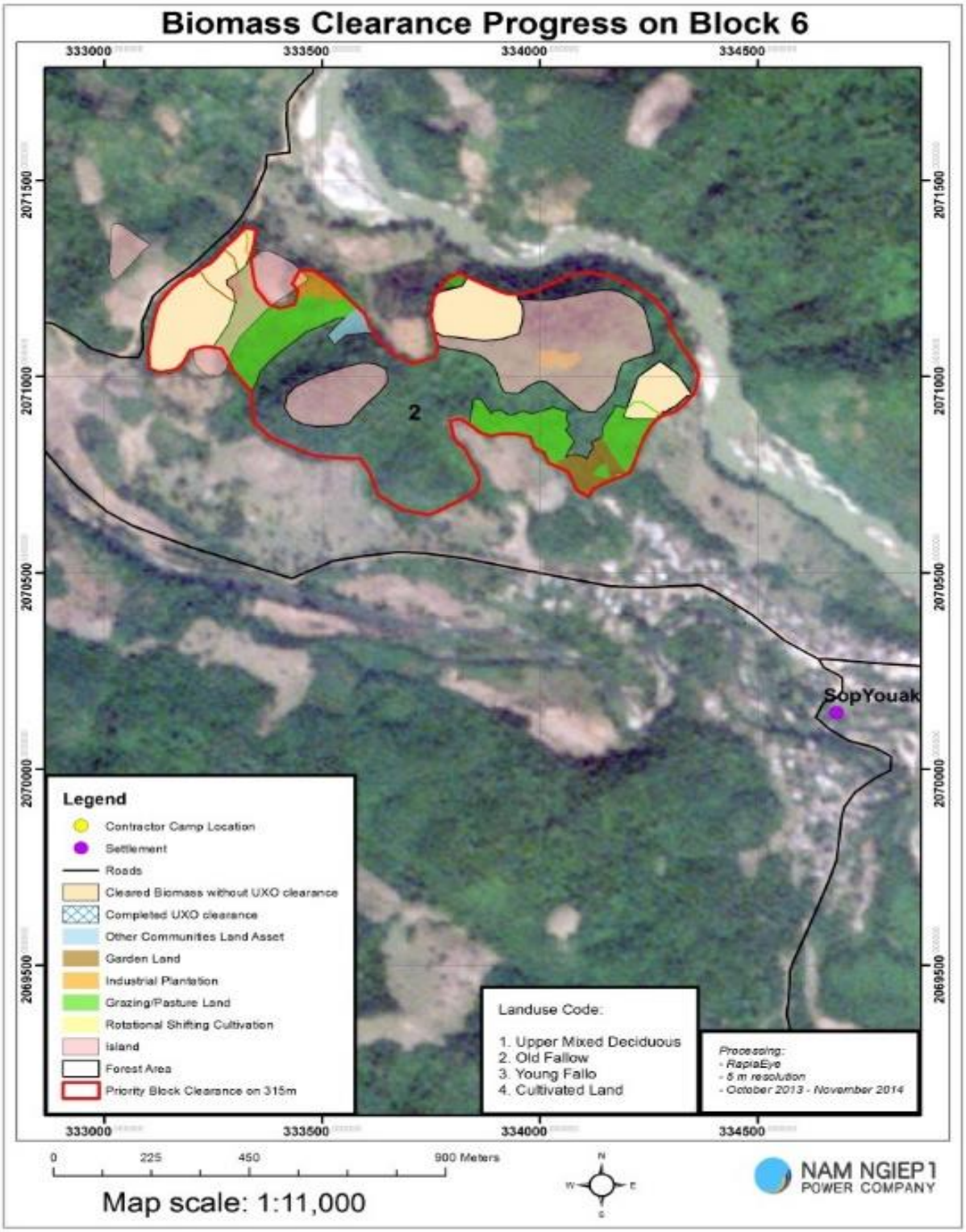

As of June 2016, the biomass cutting and burning in this block is around 132.28 ha out of target clearing of 167.68 ha. Further biomass clearing and final burning will continue after the crop harvesting season during November to December 2016

*Figure 3-15 Map showing the progress of biomass clearance in priority block 5*




As of June 2016, the biomass cutting and burning in this block is around 50.70 ha out of target clearing of 350.72 ha

*Figure 3-16 Map showing the progress of biomass clearance in priority block 6*




As of June 2016, the biomass cutting and burning in this block is around 10 ha out of target clearing of 46.71 ha. Further biomass clearing and final burning will continue after crop harvesting season during November-December 2016.

Figure 3-17 Biomass Clearance and UXO work Progress to date

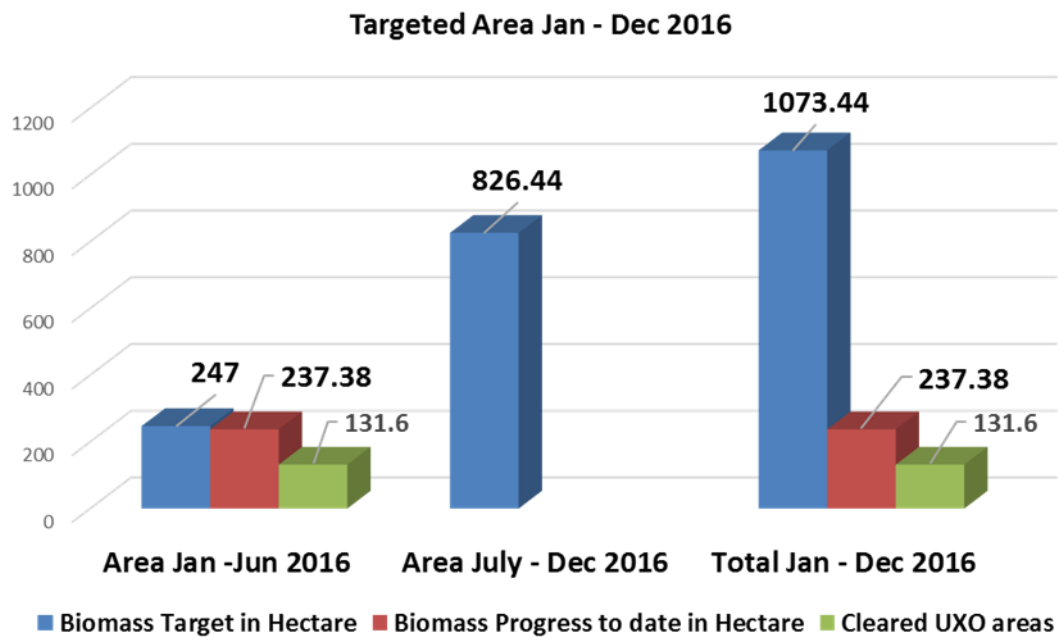



*Figure 3-18 Crop plantation on cleared biomass area Block 4-6 by affected villagers*

## 3.6 Other Obligations and Support Programmes

### 3.6.1 Environmental Protection Fund (EPF)

The sub-project proposal for the protection of Houy Ngoua Provincial Protected Area in Bolikhamxay province utilizing NNP1 fund has been approved by EPF technical committee and Board of Director. The grant agreement was signed in June 2016. There was no information for both Xaysomboun and Xiengkhuang sub-project proposals.

### 3.6.2 115 kV Transmission Line IEE Due Diligence Assessment

The IEE has been received and being reviewed by EMO. The initial finding was that the proposed alignment would pass through the Houy Ngoua Provincial Protected Area (PPA). Therefore, on 22 June 2016, the Bolikhamxay PoNRE sent a letter to the Contractor to revoke the first issued Environmental Compliance Certificate dated 11 March 2016. The

letter also instructed the Contractor to revise the IEE to avoid the PPA. A new ECC will be issued if the revised IEE is satisfactory to PoNRE.

### 3.6.3 Nabong Substation Upgrade Due Diligence Assessment

The due diligence report was sent to ADB in May 2016 and no comment received to date.

## 3.7 External Monitoring

### 3.7.1 Independent Monitoring Agency

First IMA mission was successfully completed in June and the debriefing was planned on 22 July 2016. The debriefing will highlight the training needs for EMU's and RMU's monitoring activities.

### 3.7.2 Biodiversity Advisory Committee

BAC has submitted to NNP1PC the 4$^{th}$ mission report on 14 June 2016. The report describes the findings from site visitation to the Nam Chouane-Nam Sang Watershed Biodiversity Offset Site together with IAP, NNP1, and PoNRE as well as the short visitation to Khoun Xe Nong Ma Provincial Protected Area (KXNM PPA) in Khammouane Province.

NNP1 has obtained a shortlist for potential candidate for the third BAC member including the recommended specialist by ADB. The evaluation based on the CV profile has been completed and is now entering the procurement process.

# ANNEXES

# ANNEX A: RESULTS OF EFFLUENT ANALYSES

## *Table A- 1: Results of Camp Effluent in June 2016*

| | Site Name | Owner Site Office and Village | Obayashi Camp WWT1 | Obayashi Camp WWT2 | TCM Camp | RT Camp | Sino Hydro Camp | V & K Camp |
|---|---|---|---|---|---|---|---|---|
| | Station Code | EF01 | EF02 | EF15 | EF03 | EF05 | EF06 | EF10 |
| | Date | 08/06/2016 | 09/06/2016 | 09/06/2016 | 09/06/2016 | 08/06/2016 | 09/06/2016 | 09/06/2016 |
| Parameters (Unit) | Guideline | | | | | | | |
| pH | 6.0 - 9.0 | 8.05 | 7.74 | 7.94 | 6.92 | 7.46 | 6.98 | 6.96 |
| Sat. DO (%) | - | 30.8 | 26.2 | 84.8 | 79 | 70.7 | 23.4 | 92.9 |
| DO (mg/L) | - | 2.33 | 1.94 | 6.31 | 5.9 | 5.49 | 1.69 | 6.8 |
| Conductivity (µs/cm) | - | 471 | 828 | 489 | 123.6 | 129 | 469 | 238 |
| TDS (mg/L) | - | 236 | 414 | 245 | 62 | 65 | 235 | 119 |
| Temperature (°C) | - | 27.96 | 29.2 | 29 | 29 | 26.8 | 30.7 | 29.9 |
| Turbidity (NTU) | - | 3.75 | 20.1 | 9.95 | 76.8 | 90.7 | 40.9 | 85.4 |
| TSS (mg/L) | <50 | ND[16] | 34.8 | 10.7 | 100 | 84.1 | 62.3 | 32.7 |
| BOD (mg/L) | <30 | 3.1 | 73.5 | 19 | 7.8 | 10 | 28.2 | 3.7 |
| COD (mg/L) | <125 | 20.7 | 146 | 72.3 | 38.6 | 22.8 | 80.3 | 17.7 |
| $NH_3$-N (mg/L) | <10.0 | 7 | 34 | 3 | ND[12] | ND[12] | 7 | 3 |
| Oil & Grease (mg/L) | <10.0 | ND[13] | 3 | 1 | ND[13] | ND[13] | 1 | ND[13] |
| Manganese (mg/L) | | 0.134 | ND[4] | ND[4] | 0.082 | 0.052 | 0.091 | 0.078 |
| Total Iron (mg/L) | <2 | ND[10] | 0.124 | ND[10] | 1.82 | 1.86 | 0.612 | 2.19 |
| Total coliform (MPN/100ml) | <400 | 160,000 | 160,000 | 92,000 | 92,000 | 160,000 | 160,000 | 4,900 |
| Faecal Coliform (MPN/100ml) | | 24,000 | 160,000 | 54,000 | 3,300 | 160,000 | 92,000 | 790 |
| Discharge Volume (m3/day) | | ***8.6*** | ***0*** | ***0*** | ***0*** | ***432*** | ***0*** | ***8.6*** |

## *Table A- 2: Results of Construction Area Discharge in June 2016*

| | Site Name | Songda5 Camp#1 | Songda5 Camp#2 | HMH worker Camp #1 | SECC Camp | HMH Main Camp | HMH Main Camp WWTP | IHI Camp |
|---|---|---|---|---|---|---|---|---|
| | Station Code | EF07 | EF08 | EF09 | EF11 | EF12 | EF13 | EF14 |
| | Date | 09/06/2016 | 09/06/2016 | 08/06/2016 | 09/06/2016 | 08/06/2016 | 09/06/2016 | 09/06/2016 |
| Parameters (Unit) | Guideline | | | | | | | |
| pH | 6.0 - 9.0 | 6.53 | 7.35 | 8.25 | 6.47 | 8.17 | 7.63 | 7.44 |
| Sat. DO (%) | - | 24.4 | 11.1 | 54.6 | 14.1 | 77 | 54.4 | 2.6 |
| DO (mg/L) | - | 1.86 | 0.8 | 4.02 | 1.07 | 6 | 4.07 | 0.19 |
| Conductivity (µs/cm) | - | 658 | 573 | 213 | 180.8 | 143 | 450 | 710 |
| TDS (mg/L) | - | 329 | 286 | 106 | 94 | 71 | 225 | 355 |
| Temperature (°C) | - | 28 | 30.5 | 29.61 | 28.3 | 26.65 | 28.9 | 29.1 |
| Turbidity (NTU) | - | 13.1 | 27.5 | 53.6 | 149 | 25.6 | 11.6 | 32.5 |
| TSS (mg/L) | <50 | 14.9 | 31.8 | 38.4 | 55.3 | 11.1 | 48.4 | 41.4 |
| BOD (mg/L) | <30 | 54.6 | 51.3 | 9.8 | 19.3 | 3.6 | 23.7 | 75.6 |
| COD (mg/L) | <125 | 114 | 94.4 | 33.3 | 56.2 | 8.4 | 129 | 223 |
| $NH_3$-N (mg/L) | <10.0 | 11 | 23 | ND[12] | 4 | ND[12] | 8 | 21 |
| Oil & Grease (mg/L) | <10.0 | 1 | 2 | ND[13] | ND[13] | ND[13] | 2 | 6 |
| Manganese (mg/L) | | 0.069 | 0.071 | ND[4] | 0.117 | ND[4] | 0.114 | 0.087 |
| Total Iron (mg/L) | <2 | 0.951 | 0.356 | 1.16 | 2.93 | 1.09 | 0.182 | 0.116 |
| Total coliform (MPN/100ml) | <400 | 160,000 | 160,000 | 92,000 | 54,000 | 160,000 | 160,000 | 160,000 |
| Faecal Coliform (MPN/100ml) | | 160,000 | 160,000 | 92,000 | 4,900 | 54,000 | 160,000 | 28,000 |
| Discharge Volume (m3/day) | | ***0*** | ***0*** | ***1.4*** | ***0*** | ***8.6*** | ***0*** | ***0*** |

# ANNEX B: AMBIENT AIR QUALITY DATA

*Table B- 1: 24 hour average dust concentrations measured in Ban Hat Gniun*

| Ban Hat Gnuin - 24 Hours Average Particulate Matter (PM10) Concentration | | | |
|---|---|---|---|
| Period | 00 to 24 Hours | 24 to 48 Hours | 48 to 72 Hours |
| Start Time | 16/06/2016 12:31 | 17/06/2016 12:31 | 18/06/2016 12:31 |
| End Time | 17/06/2016 12:31 | 18/06/2016 12:31 | 19/06/2016 12:31 |
| Average Data Record in 24h (mg/m3) | 0.03 | 0.03 | 0.02 |
| ***Guideline Average in 24h (mg/m3)*** | ***0.12*** | ***0.12*** | ***0.12*** |

*Figure B- 1: Dust Monitoring Results at Ban Hat Gnuin in June 2016*

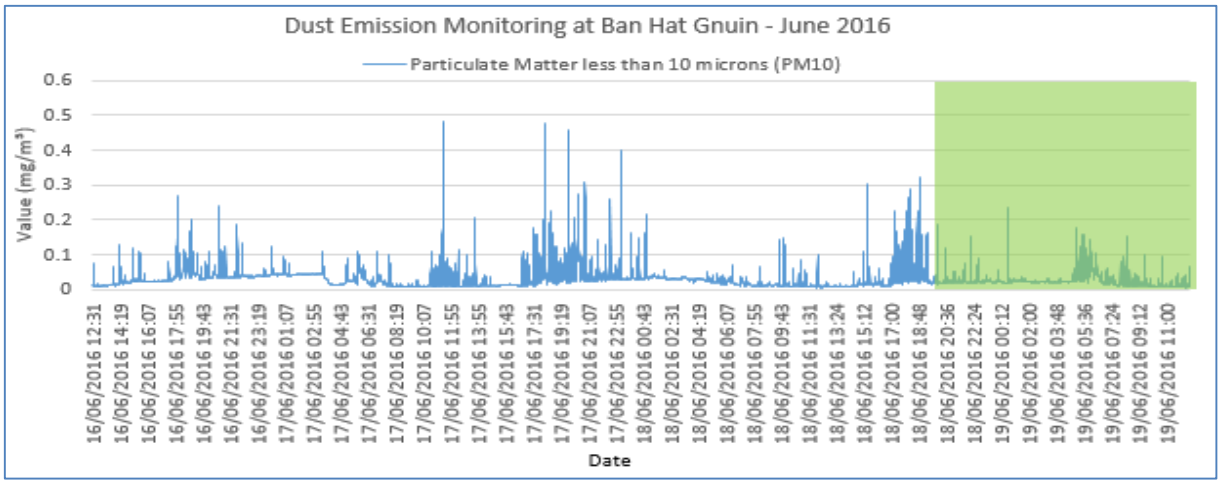



*Table B- 2: 24 hour average dust concentration measured in Ban Hatsaykham*

| Ban Hatsaykham - 24 Hours Average Particulate Matter (PM10) Concentration | | | |
|---|---|---|---|
| Period | 00 - 24 Hours | 24 - 48 Hours | 48 - 72 Hours |
| Start Time | 05/06/2016 12:56 | 06/06/2016 12:56 | 07/06/2016 12:56 |
| End Time | 06/06/2016 12:56 | 07/06/2016 12:56 | 08/06/2016 12:56 |
| Average Data Record in 24h (mg/m3) | 0.03 | 0.02 | 0.02 |
| ***Guideline Average in 24h (mg/m3)*** | ***0.12*** | ***0.12*** | ***0.12*** |

*Figure B- 2: Dust Monitoring Results at Ban Hatsaykham June 2016*

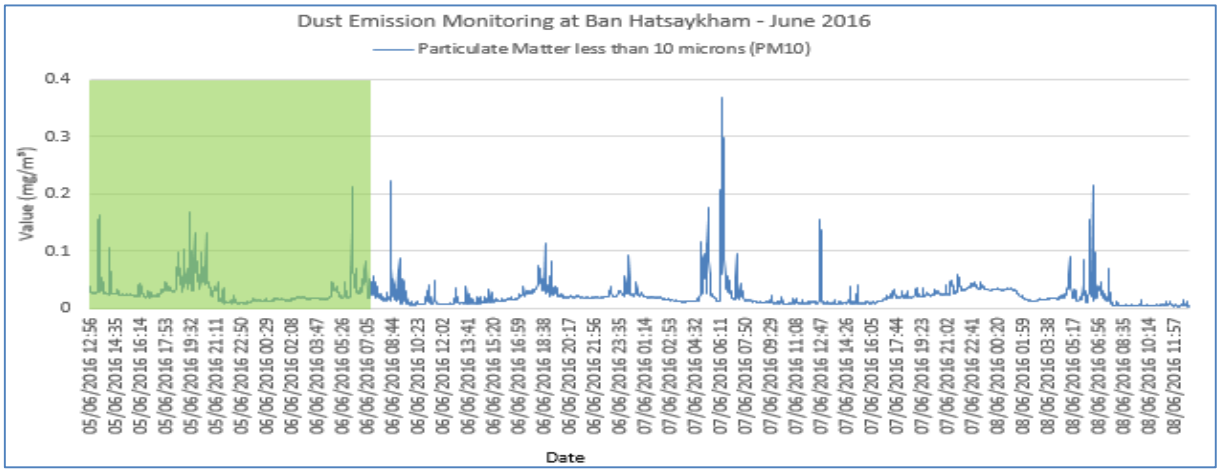


*Figure B- 3: Dust Monitoring Results at Aggregate Crushing Plant in June 2016*

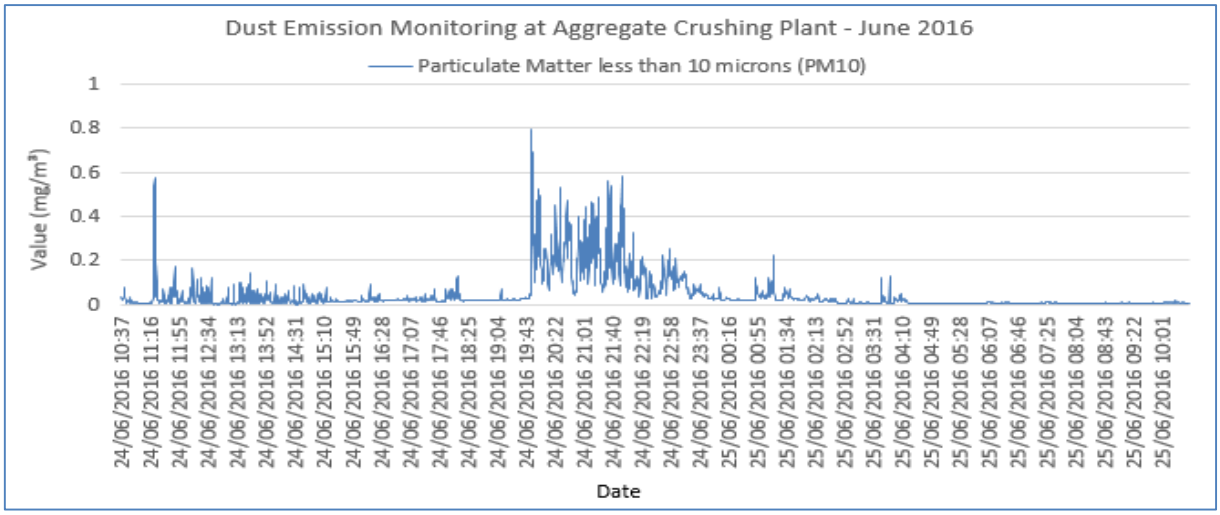



*Figure B- 4*: **Dust Monitoring Results at RCC Plant in June 2016**

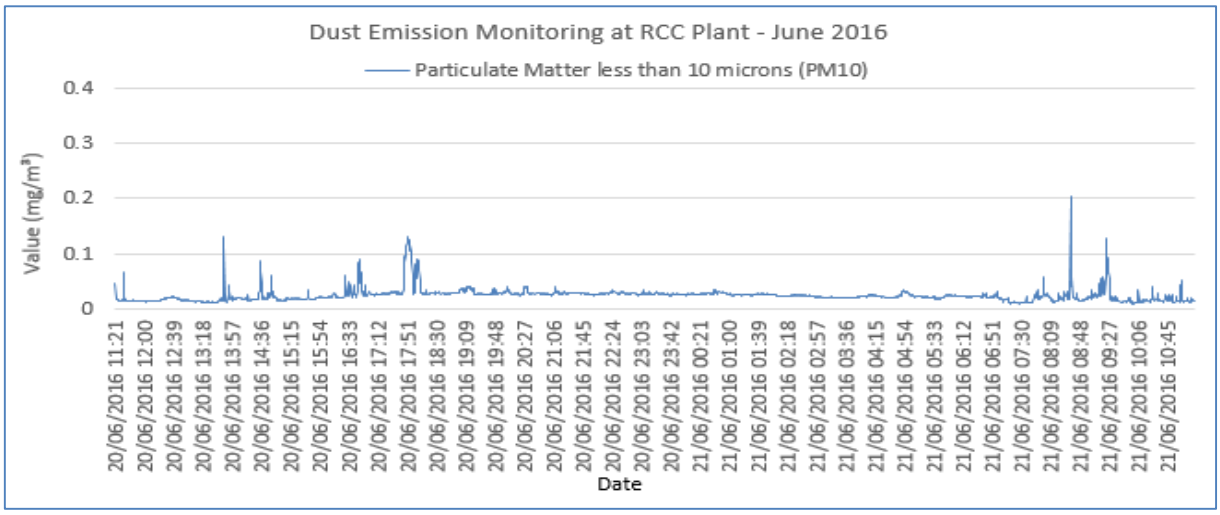



*Figure B- 5*: *Dust Monitoring Results at Songd Da 5 Camp#2 in June 2016*

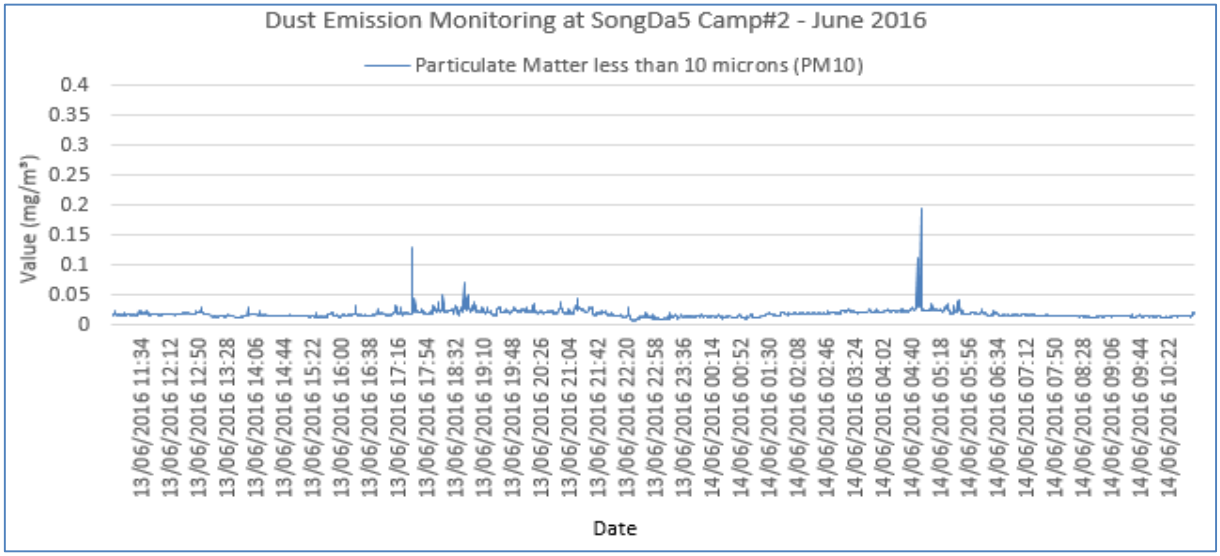


*Figure B- 6: Dust Monitoring Results at Sino Hydro Camp in June 2016*

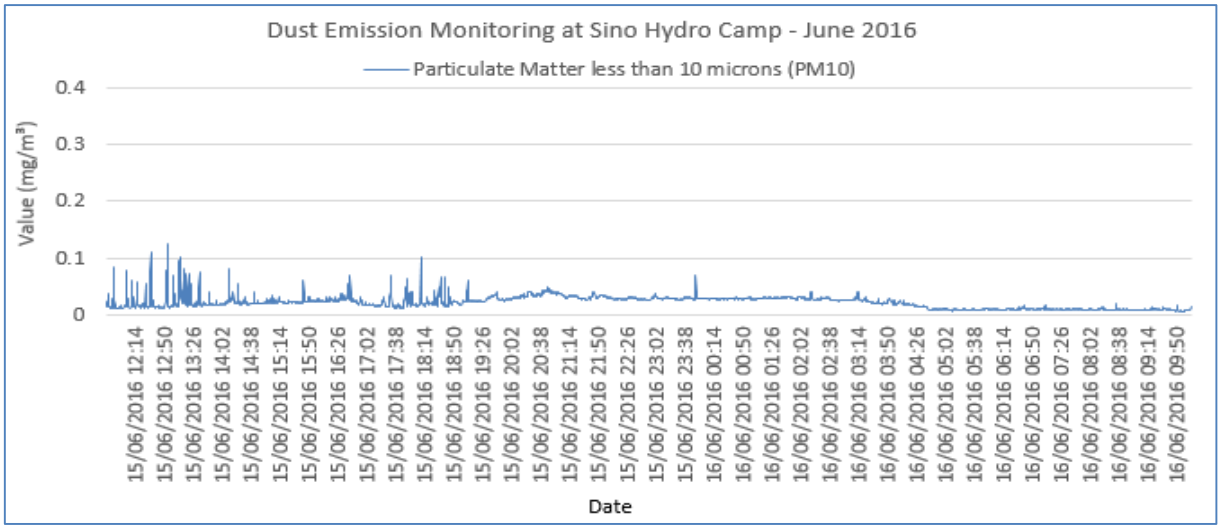



*Figure B- 7: Dust Monitoring Results at Owner's Site Office and Village in June 2016*

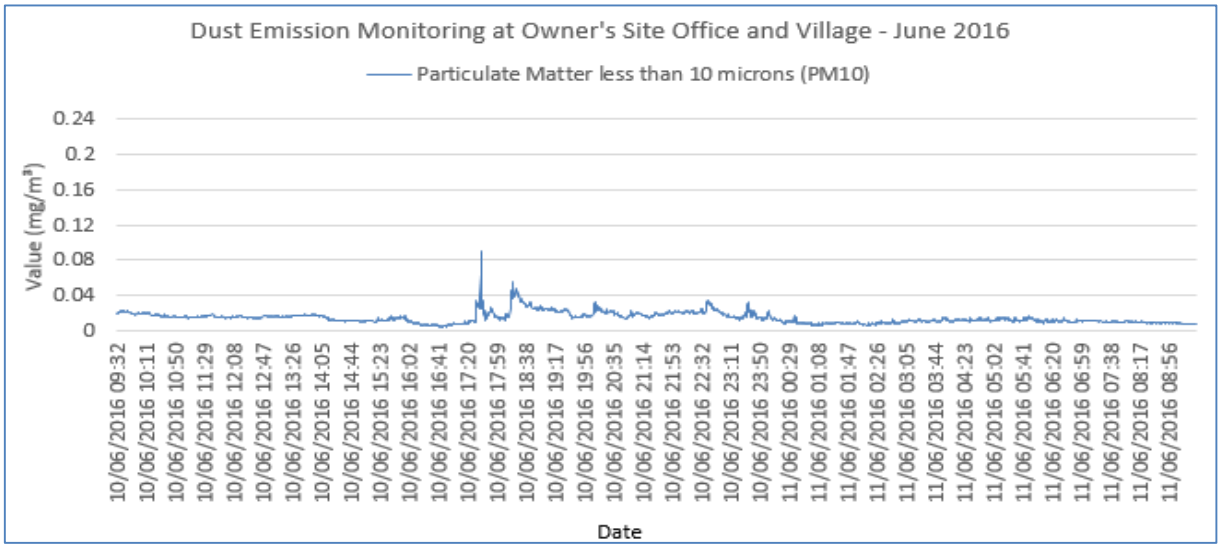
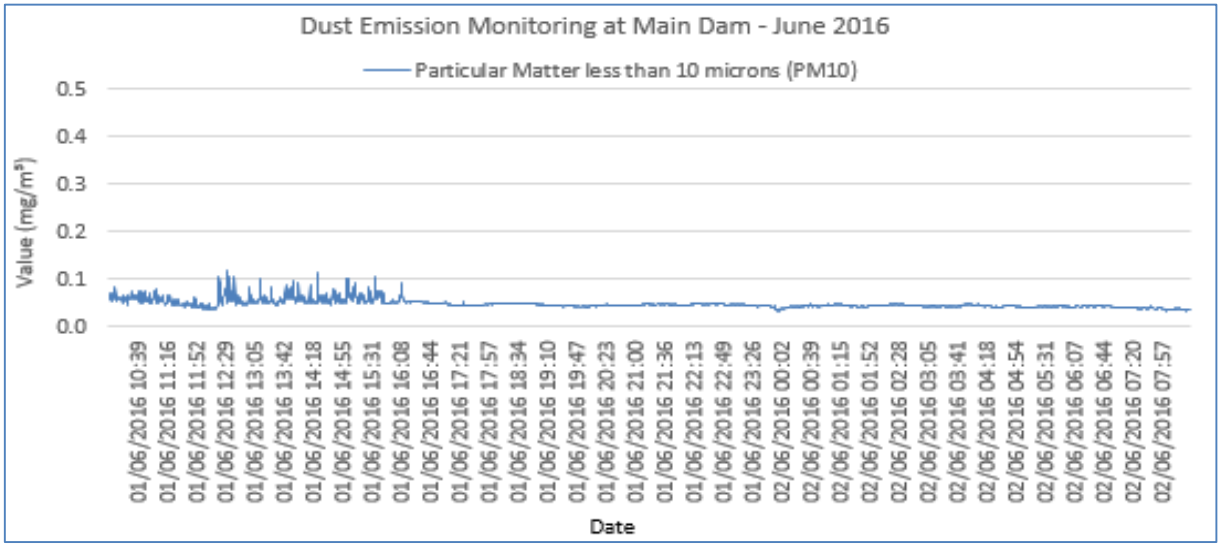



*Figure B- 8: Dust Monitoring Results at Main Dam in June 2016*



# ANNEX C: AMBIENT NOISE DATA

*Table C- 1: Average Results of Noise Monitoring at Ban Hat Gnuin in June 2016*

| Noise Level (dB) | 16-17/06/2016 | | | 17-18/06/2016 | | | 18-19/06/2016 | | | 19/06/2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| | 12:54-18:00 | 18:01 – 22:00 | 22:01 – 06:00 | 06:01 – 18:00 | 18:01 – 22:00 | 22:01 – 06:00 | 06:01 – 18:00 | 18:01 – 22:00 | 22:01 – 06:00 | 06:01 - 12:54 |
| Maximum Value Recorded | 66.3 | 75.9 | 86.8 | 78.4 | 68.1 | 73.7 | 77.6 | 66.8 | 65.9 | 80.2 |
| ***Guideline Max*** | ***115*** | ***115*** | ***115*** | ***115*** | ***115*** | ***115*** | ***115*** | ***115*** | ***115*** | ***115*** |
| Average Data Recorded | 47.71 | 50.62 | 50.32 | 54.25 | 51.08 | 47.79 | 50.40 | 49.73 | 46.34 | 47.18 |
| ***Guideline Averaged*** | ***55*** | ***55*** | ***45*** | ***55*** | ***55*** | ***45*** | ***55*** | ***55*** | ***45*** | ***55*** |

*Figure C- 1: Results of Noise Level Monitoring at Ban Gnuin in June2016*

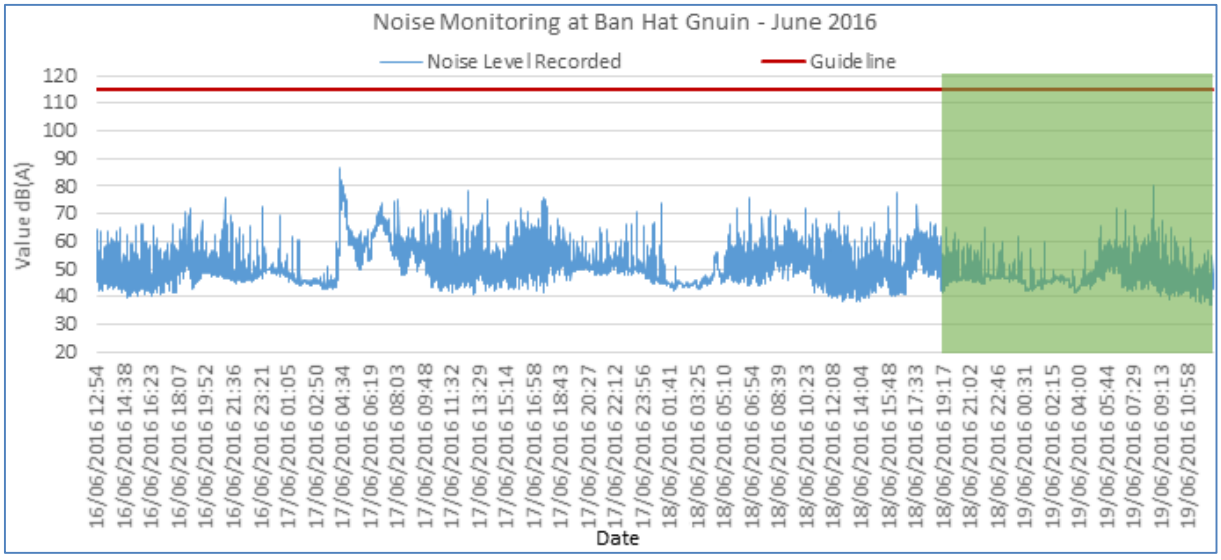



*Table C- 2: Noise Monitoring Average Results at Ban Hatsaykham in June 2016*

| Noise Level (dB) | 05-06/06/2016 | | | 06-07/06/2016 | | | 07-08/06/2016 | | | 08/06/2016 |
|---|---|---|---|---|---|---|---|---|---|---|
| | 13:04-18:00 | 18:01 – 22:00 | 22:01 – 06:00 | 06:01 – 18:00 | 18:01 – 22:00 | 22:01 – 06:00 | 06:01 – 18:00 | 18:01 – 22:00 | 22:01 – 06:00 | 06:01 - 12:14 |
| Maximum Value Recorded | 71.80 | 74.60 | 82.90 | 82.60 | 86.40 | 66.40 | 77.20 | 78.20 | 80.00 | 84.00 |
| ***Guideline Max*** | ***115*** | ***115*** | ***115*** | ***115*** | ***115*** | ***115*** | ***115*** | ***115*** | ***115*** | ***115*** |
| Average Data Recorded | 53.80 | 51.16 | 52.83 | 52.70 | 53.82 | 50.63 | 52.04 | 51.63 | 52.46 | 64.42 |
| ***Guideline Averaged*** | ***55*** | ***55*** | ***45*** | ***55*** | ***55*** | ***45*** | ***55*** | ***55*** | ***45*** | ***55*** |

**Figure C- 2: Results of Noise Level Monitoring at Ban Hatsaykham in June 2016**

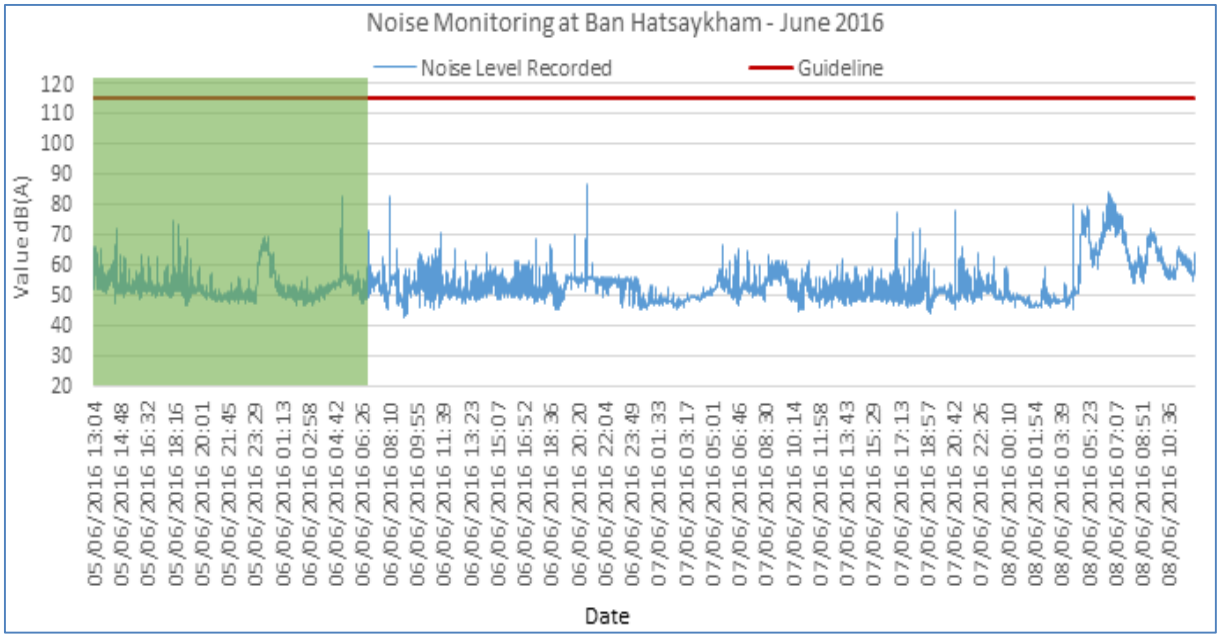



***Table C- 3* and *Table C- 4*: *Average Results of Noise Monitoring at Aggregate Crushing Plant and RCC Plant in June 2016***

***Aggregate Crushing Plant***

| Noise Level (dB) | 24-25/06/2016 | | 25/06/2016 |
|---|---|---|---|
| | 10:54 – 22:00 | 22:01 – 06:00 | 06:01-10:54 |
| Maximum Value Recorded | 85.5 | 82.7 | 66.5 |
| ***Guideline Max*** | ***115*** | ***115*** | ***115*** |
| Average Data Recorded | 67.16 | 66.25 | 48.70 |
| ***Guideline Averaged*** | ***70*** | ***50*** | ***70*** |

***RCC Plant***

| Noise Level (dB) | 20-21/06/2016 | | 21/06/2016 |
|---|---|---|---|
| | 10:14 – 22:00 | 22:01 – 06:00 | 06:01-10:14 |
| Maximum Value Recorded | 67.3 | 72.1 | 70.6 |
| ***Guideline Max*** | ***115*** | ***115*** | ***115*** |
| Average Data Recorded | 54.77 | 53.58 | 54.51 |
| ***Guideline Averaged*** | ***70*** | ***50*** | ***70*** |

***Figure C- 3*: *Results of Noise Level Monitoring at Aggregate Crushing Plant in June 2016***

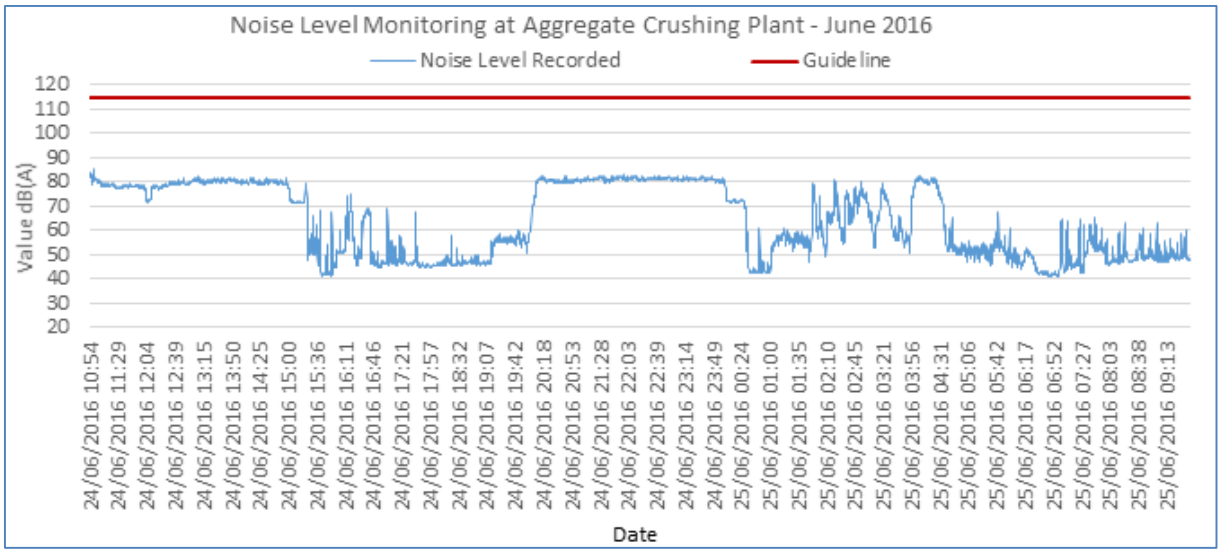


*Figure C- 4: Results of Noise Level Monitoring at RCC Plant in June 2016*

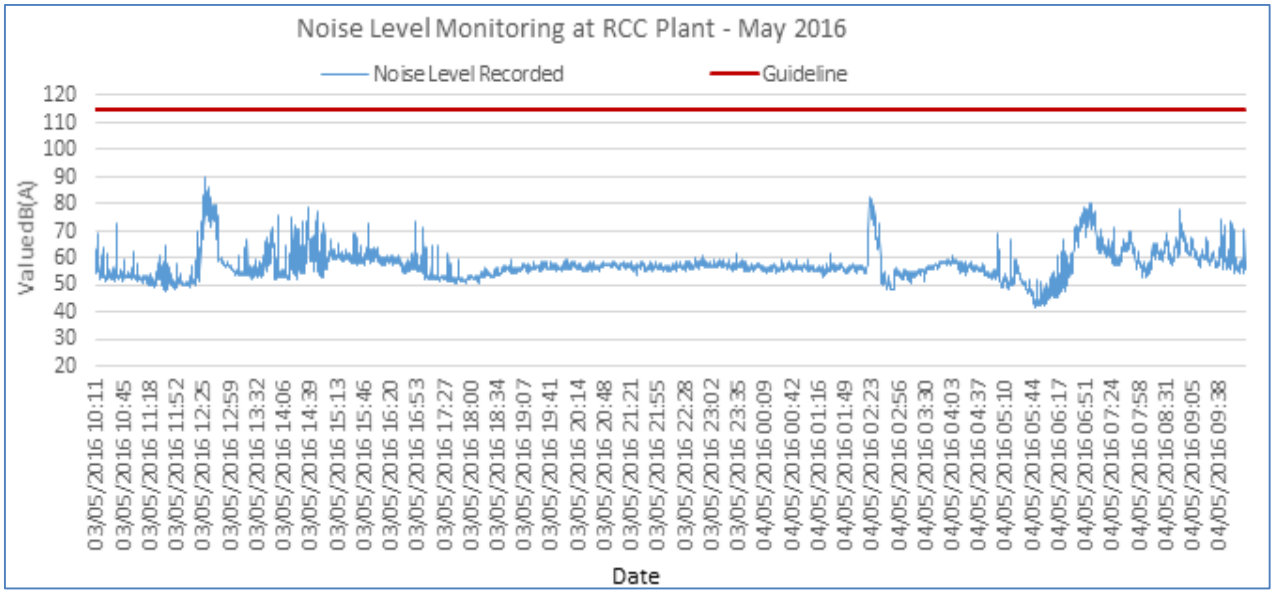



*Table C- 5* and *Table C- 6: Average Results of Noise Monitoring at Songda Camp#2 and Sino Hydro Camp in April 2016*

***Song Da 5 Camp No.2***

| Noise Level (dB) | 24-25/06/2016 | | 25/06/2016 |
|---|---|---|---|
| | 10:54 – 22:00 | 22:01 – 06:00 | 06:01-10:54 |
| Maximum Value Recorded | 85.5 | 82.7 | 66.5 |
| ***Guideline Max*** | ***115*** | ***115*** | ***115*** |
| Average Data Recorded | 67.16 | 66.25 | 48.70 |
| ***Guideline Averaged*** | ***70*** | ***50*** | ***70*** |

***Sino Hydro Camp***

| Noise Level (dB) | 20-21/06/2016 | | 21/06/2016 |
|---|---|---|---|
| | 10:14 – 22:00 | 22:01 – 06:00 | 06:01-10:14 |
| Maximum Value Recorded | 67.3 | 72.1 | 70.6 |
| ***Guideline Max*** | ***115*** | ***115*** | ***115*** |
| Average Data Recorded | 54.77 | 53.58 | 54.51 |
| ***Guideline Averaged*** | ***70*** | ***50*** | ***70*** |

*Figure C- 5: Results of Noise Level Monitoring at Song Da 5 Camp No.2 in June 2016*

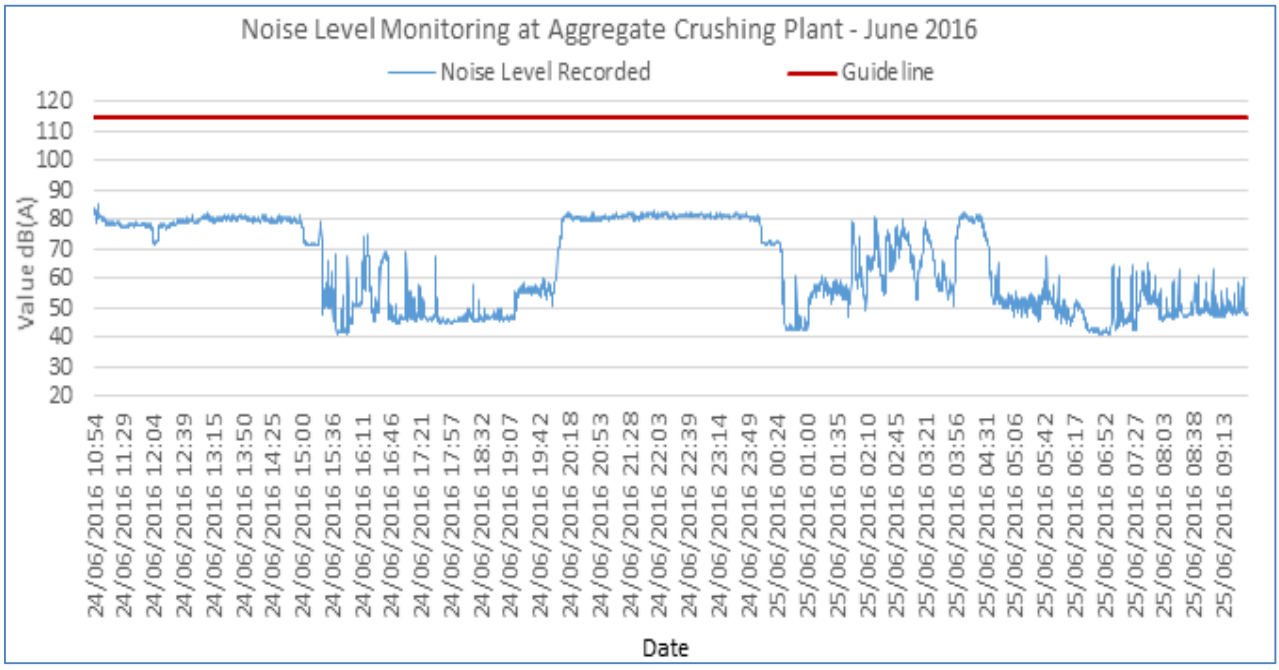


*Figure C- 6: Results of Noise Level Monitoring at Sino Hydro Camp in June 2016*

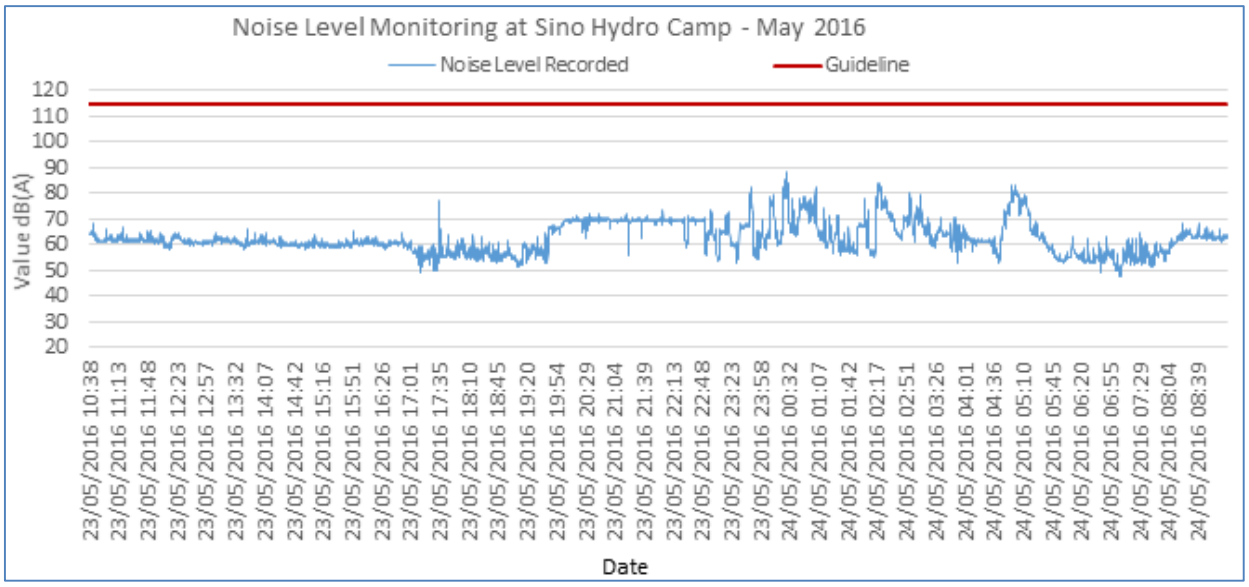



*Table C- 7* and *Table C- 8*: Average Results of Noise Monitoring at the Owner's Site Office and Village and, the Main Dam in June 2016

***Owner's Site Office and Village***

| Noise Level (dB) | 10-11/06/2016 | | 11/06/2016 |
|---|---|---|---|
| | 09:53 – 22:00 | 22:01 – 06:00 | 06:01-09:53 |
| Maximum Value Recorded | 63.2 | 85.8 | 53.9 |
| ***Guideline Max*** | ***115*** | ***115*** | ***115*** |
| Average Data Recorded | 46.51 | 56.62 | 46.78 |
| ***Guideline Averaged*** | ***70*** | ***50*** | ***70*** |

***Main Dam***

| Noise Level (dB) | 01-02/06/2016 | | 02/06/2016 |
|---|---|---|---|
| | 10:16 – 22:00 | 22:01 – 06:00 | 06:01-10:16 |
| Data Record Max | 73.7 | 79.2 | 58.4 |
| ***Guideline Max*** | ***115*** | ***115*** | ***115*** |
| Data Record Average | 53.12 | 53.77 | 52.32 |
| ***Guideline Averaged*** | ***70*** | ***50*** | ***70*** |

*Figure C- 7: Results of Noise Level Monitoring at Owner's Site Office and Village in June 2016*

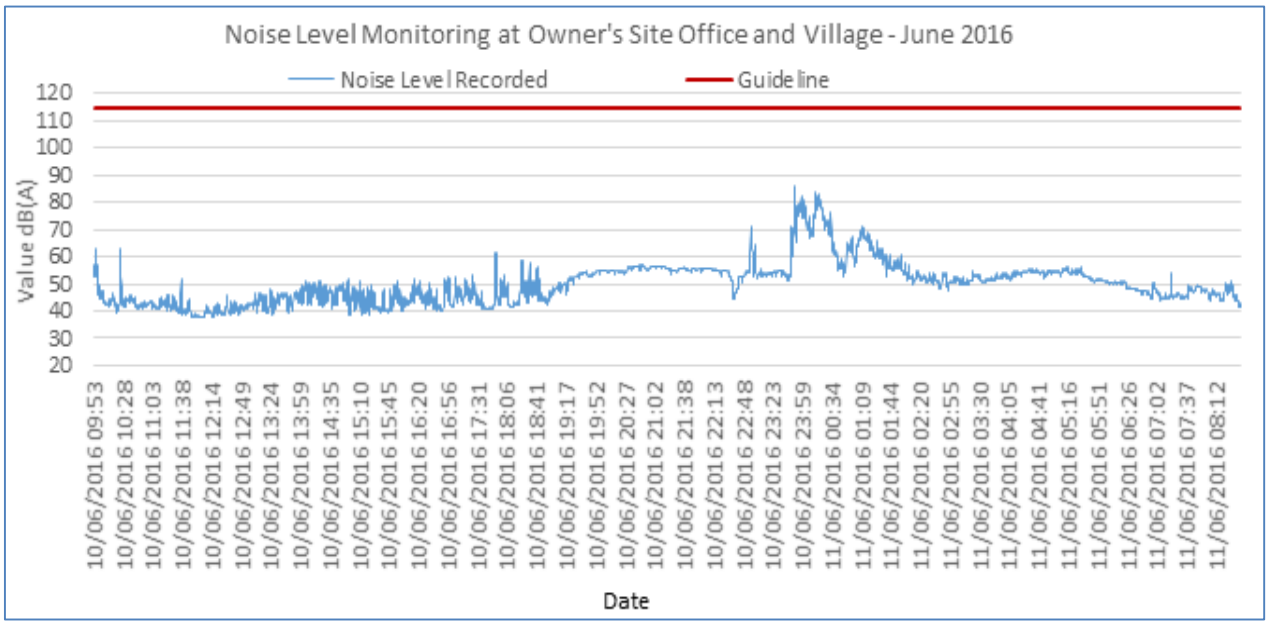


***Figure C- 8: Results of Noise Level Monitoring at Main Dam in June 2016***