NAM NGIEP 1
POWER COMPANY

Nam Ngiep 1 Hydropower Project

Environmental Management Monthly Monitoring Report

July 2017

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BBREVIATIONS / ACRONYMS

AIP	Annual Implementation Plan
ADB	Asian Development Bank
BBS	Biodiversity Baseline Survey
BAC	Biodiversity Advisory Committee
BOF	Biodiversity Offset Framework
BOMC	Biodiversity Offset Management Committee
BOMP	Biodiversity Offset Management Plan
CA	Concession Agreement between the NNP1PC and GOL,
CAP	Corrective Action Plan
COD	Commercial Operation Date
CVC	Conventional Vibrated Concrete
CWC	Civil Works Contract
CTA	Common Terms Agreement
DEB	Department of Energy Business, MEM
DEPP	Department of Energy Policy and Planning, MEM
DEQP	Department of Environment and Quality Promotion, MONRE
DESIA	Department of Environmental and Social Impact Assessment, MONRE
DFRM	Department of Forest Resources Management, MONRE
DLA	Department of Land Administration, MONRE
DSRP	Dam Safety Review Panel
EC	Electrolytic Conductivity
ECOCD	EGAT Construction Obligation Commencement Date
EDL	Electricite du Laos
EDL PPA	Power Purchase Agreement between NNP1PC and EDL
EGAT	Electricity Generating Authority of Thailand
EGATi	EGAT International Company Limited
EIA	Environmental Impact Assessment
EMMR	Environmental Management and Monitoring Reports
EMO	Environmental Management Office of ESD within NNP1PC
EMU	Environmental Monitoring Unit
EMWC	Electrical-Mechanical Works Contract
EPF	Environmental Protection Fund
ERIC	Environmental Research Institute Chulalongkhorn University
ERM	Environmental Resource Management
ESD	Environmental and Social Division of NNP1PC

ESMMP	Environmental and Social Monitoring and Management Plan
FY	Fiscal Year
GOL	Government of Lao PDR
GIS	Geographic Information Systems
HH	Household
HMWC	Hydraulic Metal Works Contract
HR	Human Resources
IEE	Initial Environmental Examination
IMA	Independent Monitoring Agency
INRMP	Integrated Natural Resources Management Plan
ISP	Intergraded Spatial Planning
km	kilometre
kV	kilo-Volt
LEPTS	Lao Electric Power Technical Standard
LHSE	Lao Holding State Enterprise
LTA	Lender's Technical Advisor
M	million
m	metre
MAF	Ministry of Agriculture and Forestry
MEM	Ministry of Energy and Mines, Lao PDR
MOF	Ministry of Finance, Lao PDR
MOM	Minutes of Meeting
MONRE	Ministry of Natural Resource and Environment, Lao PDR
MOU	Memorandum of Understanding
NBCA	National Biodiversity Conservation Area
NCI	Non-Compliance Issue
NCR	Non-Compliance Report
NN2	Nam Ngum 2 Power Company Limited
NNP1PC	Nam Ngiep 1 Power Company Limited
NPF	National Protection Forest
NTFP	Non-Timber Forest Products
NT2	Nam Theun 2 Hydropower Project
OC	Obayashi Corporation
ONC	Observation of Non-Compliance
PAFO	Provincial Department of Agriculture and Forestry
PAP	Project Affected People
PD	Property Damage

PONRE	Provincial Department of Natural Resource and Environment, MONRE
PvPA	Provincial Protection Area
RCC	Roller Compacted Concrete
SIR	Site Inspection Report
SLBMP	Salvage Logging Biomass Management Plan
SOP	Standard Operating Procedure
SMO	Social Management Office of ESD within NNP1PC
SS-ESMMP	Site Specific Environmental and Social Monitoring and Management Plan
TD	Technical Division of NNP1PC
TOR	Terms of Reference
TSS	Total Suspended Solids
UAE	United Analysis and Engineering Consultant Company Ltd.
UXO	Unexploded Ordinance
WMF	Watershed Management Fund
WMP	Watershed Management Plan
WRPC	Watershed and Reservoir Protection Committee
WRPO	Watershed and Reservoir Protection Office
WWTS	Waste Water Treatment System

EXECUTIVE SUMMARY

During July 2017, the Environmental Management Office (EMO) of NNP1PC received a total of eight Site Specific Environmental and Social Management and Monitoring Plans (SS-ESMMP), two as-built drawings and two working drawings for improved waste water treatment systems (WWTS) at contractors' camps. With three SS-ESMMP carried over from previous months, there were 11 SS-ESMMP and four drawings for EMO review during the month of reporting. Out of these, seven SS-ESMMPs and two as-built drawings were cleared, four SS-ESMMPs and two as-built drawing are under review, additional information was requested from the contractors and theses documents will be carried over to August 2017.

The Provincial and Environmental Management Unit (EMU) of Bolikhan District and Bolikhamxay Province conducted a joint environmental monitoring and inspection mission to the main construction sites and camps, and issued their mission report on 27 July 2017. Based on the findings of the July 2017 mission, EMU issued a first warning notification letter to NNP1PC regarding the outstanding issues on 31 July 2017, namely, waste water treatment system at Song Da 5 Camp No. 2, sediment control system at the RCC and Aggregate Crushing Plants, and the Waste Water Treatment System at the Man Dam. The notification letter requires that all issues must be addressed before the next monthly inspection which is scheduled during 17-18 August 2017. NNP1PC is working with the contractor to address and resolved these issues of concerns. An official response with progress on implementation of corrective action will be submitted to the EMU in mid-August 2017.

NNP1PC-EMO carried out laboratory and field experiments using aluminium ammonium sulphate (alum) to treat turbid water at the Aggregate Crushing Plant's sediment pond during 04 to 07 July 2017. The results were presented and discussed with the contractor in a high-level meeting chaired by the Managing Director of NNP1PC on 07 July 2017. Based on the results of the laboratory and field experiments, the contractor undertook trial applications of alum at the sediment ponds of the Aggregate Crushing Plant and the RCC Plant on 12 July and 20 July 2017 respectively. This practice helped to improve the waste water quality at both sites. The optimum application amount and locations to achieve the Effluent Standard at both sites were being identified by the contractor in the period until 06 August 2017.

The final draft of Watershed Management Plan was completed on 24 July 2017 after series of discussion between NNP1PC and ADB. This document will be further discussed at the upcoming GOL technical workshop. NNP1 EMO is in the process of translating the document from English to Lao language and plans to discuss with GOL at the technical workshop which is planned to be held in the middle of September 2017.

The NNP1PC is in the final stage of contracting a consultant for development ofBiodiversity Offset Management Plan (BOMP) to work as the Company's in-house biodiversity specialist. .

Biomass clearance continued to progress with the stockpiling and burning of material but the work in July 2017 could only be carried out intermittently due to rain. The total progress of biomass clearance is around 981.21 ha, the verified area as fully completed remains at 32.37 ha.

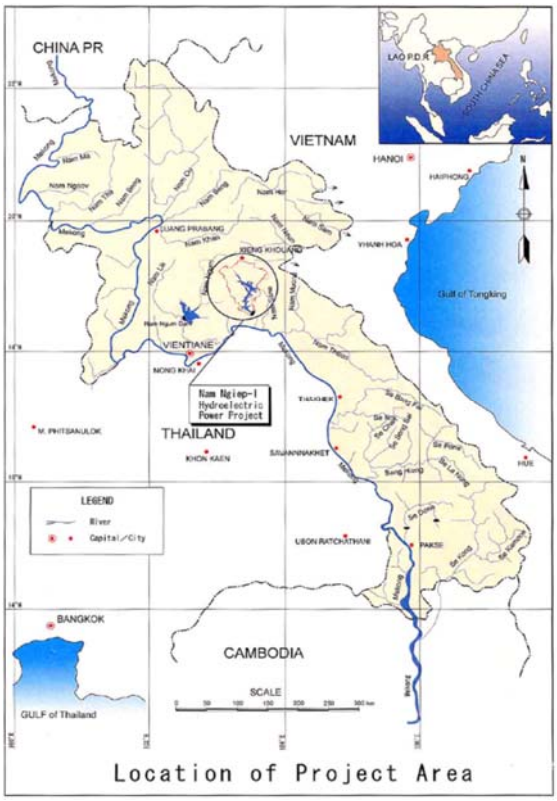
The fishery monitoring programme is ongoing and a database has been developed to support the future fish management programme as part of the Nam Ngiep 1 Watershed Management Plan. Two types of the survey were conducted during July 2017 including daily fish catch logbook monitoring and other aquatic animal and fish species verification survey. The gathered information continues to be entered into the database system. The data from daily fish catch logbook monitoring indicates that the daily fish catch in Nam Ngiep River was 2.1

kg/household/day in June 2017. The estimated total fish catch in June 2017 is 65,200 kg. Around 26% of the catch was sold, 66% was consumed fresh, 5% processed and approximately 3% was used for other purposes.

1. INTRODUCTION

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

Figure 1-1: Location Map



The project will consist of two dams. The main dam which is located 9.0 km upstream of Hat Gnuin Village in 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 January 2017. The EMMR was prepared by the Project's Environmental Management Office (EMO). It has been internally reviewed and cleared by EMO senior technical staff and management prior to submitting the report to the Government of Lao PDR (GoL) related agencies.

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

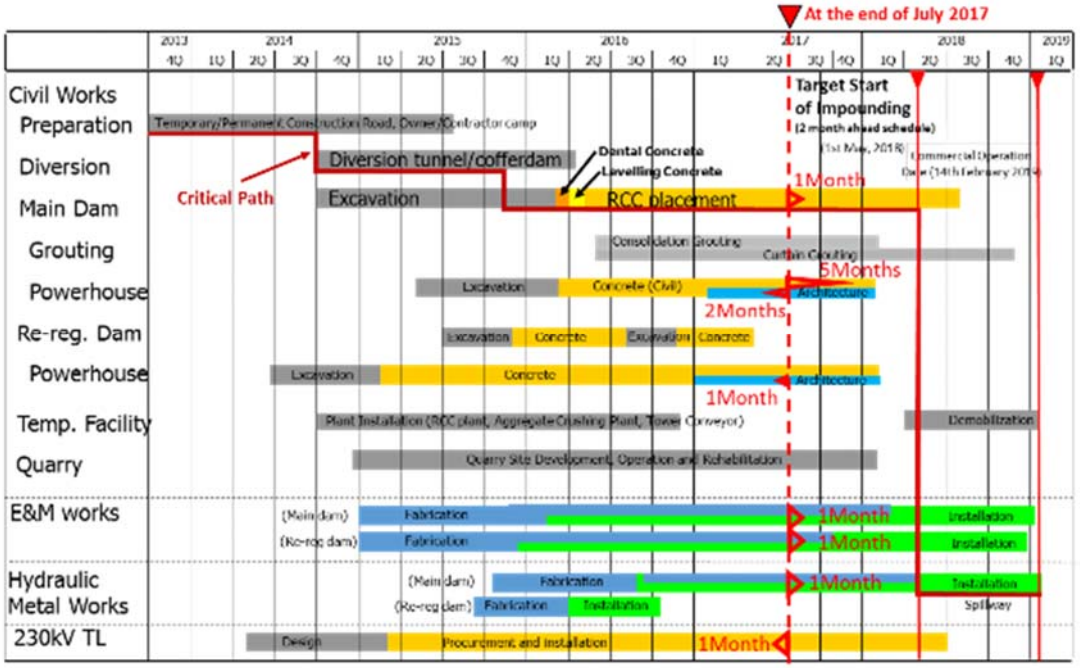
2. WORK PROGRESS OF PRINCIPAL CONTRACTORS

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 230 kV Transmission Line Works. Actual overall

cumulative work progress until the end of July 2017 was 77.6 %[1] (compared to planned progress of 78.2 %), based on achieved Interim Milestone Payments for all Contracts excluding the value of Advance Payments, varied works and other adjustments allowed under each Contract. In terms of the value of actual work done the percentage is understated since work completed, but not paid, is not included.

The overall construction schedule and progress curve (by achieved Milestone Payments) are shown in **Error! Reference source not found.**.

Figure 2-1: Overall Construction Schedule



2.1 Civil Work

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

[1] The progress to-date is calculated as (Cumulative Amount of Achieved Interim Milestone Payments) / (Total Agreed Original Price of Construction Contracts) and expressed as a percentage. These totals exclude varied works and other adjustments allowed under each Contract.

[2] The progress to-date is calculated as (Cumulative Value Achieved for Completed Work by Variation Order or Other Adjustment) / (Total Budget Contingency Amount)

were commenced in October 2014 and completed in February 2016, following which the concreting works were commenced.

The cumulative actual work progress of the Civil Works until the end of July 2017 was 80.6 % (compared to planned progress of 80.7 %) calculated in the same manner as described above for the value of achieved Interim Milestone Payments excluding advance payment.

2.1.1 Main dam and power house

After starting the main dam excavation works in October 2014 on the left bank, the works were about one month advanced when diversion of the Nam Ngiep River was achieved at the end of October 2015. However, excavated volumes were 20% greater than expected and part of this additional work is necessary to construct a 'shear key' structure due to the weak layers of rock encountered in the dam foundation. Following the efforts on Site, the additional excavation work was completed at the end of February 2016.

Figure 2-2: Main Dam and Powerhouse from Overhead Looking Upstream

The consolidation drilling and grouting for the main dam started in May 2016 and is ongoing. The progress is 90 % by achievement of total anticipated drilled length as of the end of July 2017 as a proportion of the total expected drilling

Table 2-1: Progress of consolidation and curtain drilling for grouting as of July 2017

Item	Description	Total Drilling (m)	Completed (m)	Progress (%)
Consolidation Grouting	Anticipated Quantity	17,769	16,133	90
Curtain Grouting	Original Design Quantity	27,945	11,506	41
	Anticipated Final Quantity	58,400	11,506	19

*The linear metres 'completed' are drilled and grouted.

Main powerhouse sub-structure excavation works were completed in January 2016 and levelling concrete works were started in coordination with installation of the grounding system. Overhead travelling crane runway beam was installed in December 2016. Progress of the powerhouse concreting works is still proceeding well and is shown in **Error! Reference source not found.** below

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

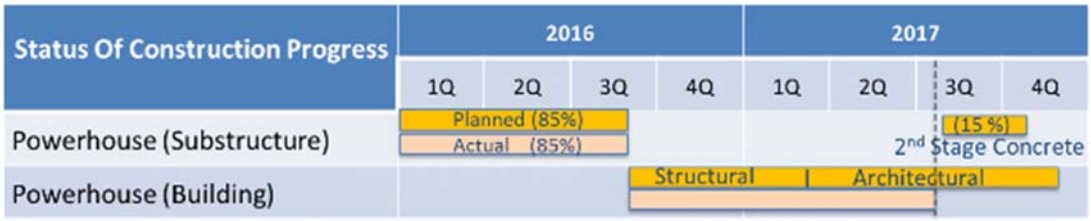
Location	Total Anticipated Volume (m^3)	Completed (m^3)	Progress (%)
Main Powerhouse	32,600	25,806	79
Penstock Embedment	10,257	7,870	76

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 **Error! Reference source not found.** below

Figure 2-3: Progress of Re-regulation Dam Powerhouse Works to 31 July 2017



Powerhouse Building Works	Concrete Second Phase	Painting Inside and Outside	Windows	Doors	Handrail
	(m^3)	(m^2)	(Unit)	(Unit)	(m)
Designed	3,496	6,135	27	18	460
Completed	2,095	5,024	26	3	215
Progress	60 %	82 %	96 %	17 %	47 %

The powerhouse concreting has advanced well and secondary concrete embedment for the draft tube liner was completed at the end of April 2016. The left bank structure was re-designed as roller compacted concrete (RCC) and was completed on 18 March 2016. Installation of the re-regulation waterway gate and stop log and re-regulation intake gate and structural concrete works for the retaining wall to support the substation yard were completed in October 2016. Building superstructure work continued for the powerhouse with the commencement of construction of concrete columns.

2.1.3 Temporary work facility

2.1.3.1 DIVERSION TUNNEL INLET AND OUTLET

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

2.1.3.2 SECONDARY UPSTREAM COFFERDAM

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

2.1.3.3 PLANT YARDS

These comprise the Aggregate Crushing Plant, the CVC Batching Plant and the RCC Batching Plant.
Foundation work and installation of equipment were completed at all the plant yards and the belt conveyor system from the RCC plant to the main dam was completed in early April 2016.

2.1.3.4 QUARRY

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

2.1.3.5 DISPOSAL AREAS

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

2.2 Electrical and Mechanical Works

The EMWC was executed between Hitachi-Mitsubishi Hydro Corporation and NNP1PC on 13 June 2014 and the NTP was issued on 03 October 2014. The cumulative work progress of the Electrical and Mechanical Works by value until the end of July 2017 was 75.1 % (compared to planned progress of 75.1 %).

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

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

2.3 Hydro-Mechanical Works

The HMWC was executed between IHI Infrastructure Systems (IIS) and NNP1PC on 18 April 2014 and the NTP was issued to the Contractor on 03 October 2014. The actual cumulative work progress of the Hydro-Mechanical Works until the end of July 2017 was 49 % (compared to planned progress of 51 %).
The latest progress of penstock pipe fabrication at IHI field shop and erection at main dam as of the end of July 2017 ***in Table*** 2-3 below

Table 2-3: Progress of the penstock pipe fabrication at the IHI field shop as at the end of July 2017

Item No.	Work Description	Work Progress (%)	Remarks
1.1	Assembly, Welding and Painting	96 %	Straight Pipes
1.1	Delivery to Main Dam Laydown Area	52 %	Straight Pipes
1.1	Site Erection at Main Dam	52 %	Inclined Part

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 July 2017 was 87.1 % (compared to planned progress of 96.0 %).

In respect of the delay to commencement of most works the Contractor is studying its programme to ensure that sufficient resources are committed as the works progress to ensure that completion is achieved in good time. Onset of daily rains has made access to all areas difficult but the Contractor follows its revised acceleration schedule, after the progress for the construction of tower foundations slowed after May, 2016 (See **Error! Reference source not found.**6 below)

Figure 2-6: Cumulative Work Progress of Tower Foundation (Original Planned and Actual)

Figure 2-7: Cumulative Works Progress of tower foundation (Revised Planned & Actual)

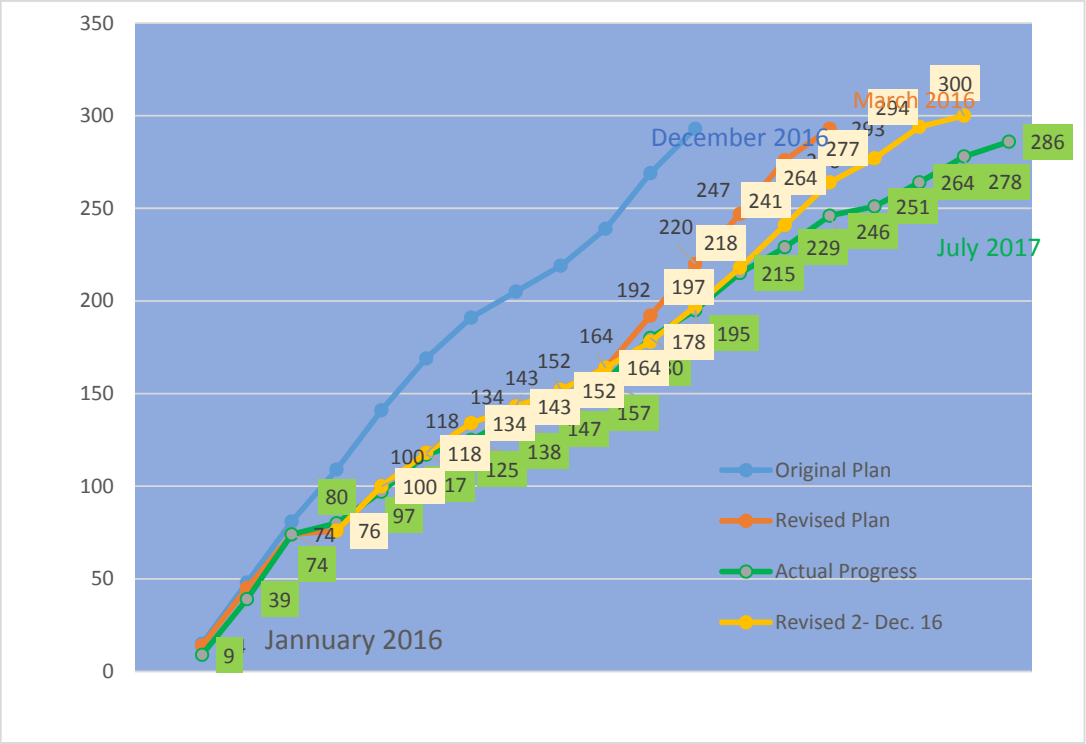
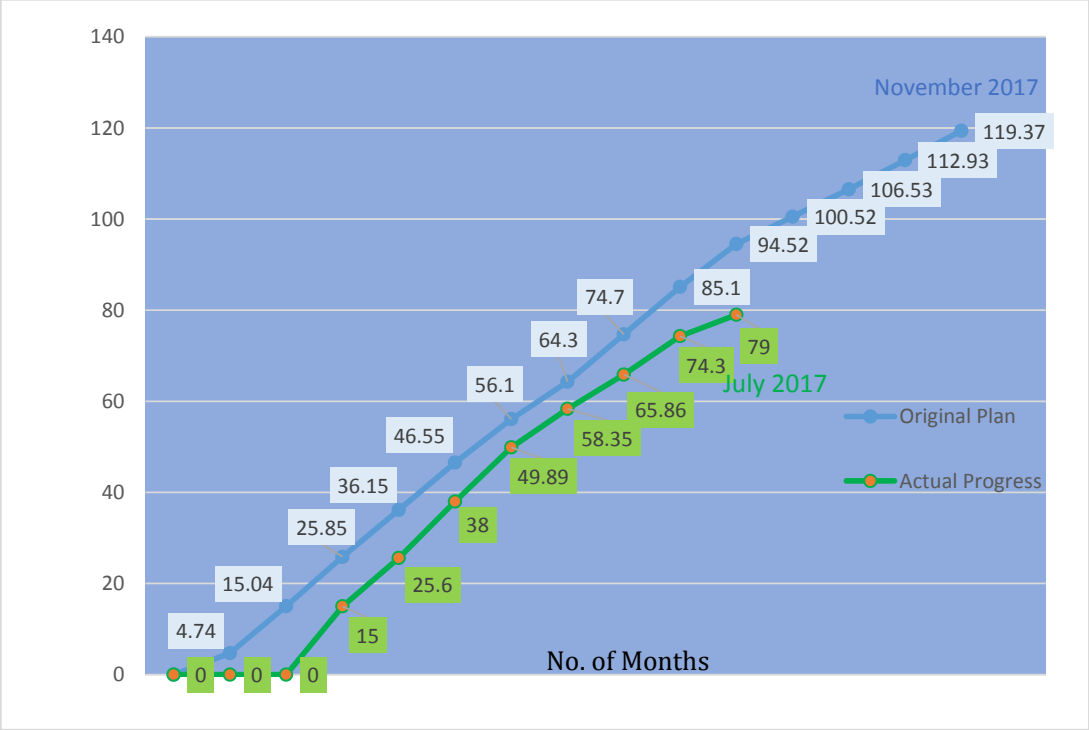


Figure 2-8: Revised Cumulative Works Progress of Tower Erection (Planned & Actual)



3. ENVIRONMENTAL MANAGEMENT MONITORING

3.1 Compliance Management

3.1.1 Site Specific Environmental and Social Management and Monitoring Plans

During July 2017, the Environmental Management Office (EMO) of NNP1PC received a total of eight Site Specific Environmental and Social Management and Monitoring Plans (SS-ESMMP), two as-built drawings and two working drawings for improved waste water treatment systems (WWTS) at contractors' camps. With three SS-ESMMP carried over from previous months, there were 11 SS-ESMMP and four drawings for EMO review during the month of reporting. Out of these, seven SS-ESMMP and two as-built drawings were cleared, four SS-ESMMP and two as built drawing are under review, and additional information was requested from the contractors. These documents will be carried over to August 2017.

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

Title	Date Received	Response Status	Comments
SS-ESMMP for Building Construction at the Main Powerhouse	22 February 2017 (4th submission)	Under Review	A revised drawing for the WWTS that includes a chlorine contact tank needs to be submitted.
SS-ESMMP for RCC Operation and Maintenance Work	08 March 2017 (4th submission)	Under Review	The document is to be revised to include new information from the drawing of the new sediment retention structure and ponds.
SS-ESMMP for 3.1 km Internal Road in HSRA	29 June 2017 (1st submission)	Cleared with no further comments on 07 July 2017	
As-built drawing of V&K Camp WWTS Improvement	04 July 2017 (2nd submission)	Under Review	
SS-ESMMP for Suspension Bridge Construction at 2UR	05 July 2017 (1st submission)	Cleared with no further comments on 07 July 2017	
SS-ESMMP for Construction of 5 Houses in 2UR Zone, Thathom District, Xaysomboun Province	05 July 2017 (1st submission)	Return for further improvement on 17 July 2017	Provided clearer construction procedures and key environmental mitigation measures.
	25 July 2017 (2nd submission)	Cleared with comments on 03 August 2017	

Title	Date Received	Response Status	Comments
SS-ESMMP for Filling Residential Land and Lift up 3 Houses at Ban Pou, Dismantling of One House at Ban Hatsamkhone, 2UR Zone	06 July 2017 (1st submission)	Cleared with no further comments on 17 July 2017	
SS-ESMMP for Installation Work of Stay Cone, Front Channel Liner and Hat Cover for Re-regulation Power Station	09 July 2017 (1st submission)	Cleared with no further comments on 11 July 2017	
SS-ESMMP for Construction of Domestic Water Supply	10 July 2017 (2nd submission)	Cleared with no further comments on 17 July 2017	
As built drawing of the Waste Water Treatment System Improvement at TCM & GFE Camp	18 July 2017 (3rd submission)	Under Review	The Contractor was required to re-submit an as-built drawing by incorporating comments for increasing the first wetland bund.
Working drawing of WWTS at ZHEFU Camp	19 July 2017 (2nd submission)	Cleared with comments on 27 July 2017	Information on waste water generation to be provided and revision of the piping system.
SS-ESMMP for Construction Road to the Right Bank of Re-Regulation Dam	23 July 2017 (1st submission)	Under review	A complete environmental and social assessment checklist, mitigation measures for vegetation clearance, slope and spoil disposal stabilisation to be provided.
SS-ESMMP for Construction of Market Building and Bus Station Building at HSRA	26 July 2017 (1st submission)	Under review	1. More information on the construction site conditions, environmental and social mitigation measures to be provided. 2. The environmental and social assessment for pre-construction are to be corrected;

Title	Date Received	Response Status	Comments
			3. A Preliminary Site Decommissioning Plan is to be submitted.
Working drawing of Kenber Camp's WWTS improvement	27 July 2017 (1st submission)	Cleared with comments on 28 July 2017	- Kenber proposed that the waste water be pumped from the 3rd wetland pond direct to a chlorine mixing tank by- passing the 4th pond; - If the effluent discharge is still non-compliant after this improvement, the contractor will consider an alternative method to treat the waste water by using "a batch treatment method".
SS-ESMMP for Supply and Installation of 22 kV Transmission Line and 0.4 kV Distribution Line for 63 Households at HSRA	28 July 2017 (1st submission)	Under review	

3.1.2 Compliance Report

The Observation of Non-Compliance (ONC) and Non-Compliance Report (NCR) are summarized in ***Table 3-2, Table 3-3*** and ***Figure 3-1*** below.

Table 3-2: Summary of ONC and NCR

Items	ONC	NCR-1	NCR-2	NCR-3
Carried Over from the Last Month (June 2017)	10	1	1	1
Newly Opened in this Month (July 2017)	5	2	1	0
Total in this Month (July 2017)	**15**	**3**	**2**	**1**
Resolved in this Month (July 2017)	5	0	0	0
Carried over into Next Month (August 2017)	10	3	2	1
Unsolved Exceeding Deadlines	**4**	**3**	**2**	**1**

Figure 3-1: Summary of ONC and NCR

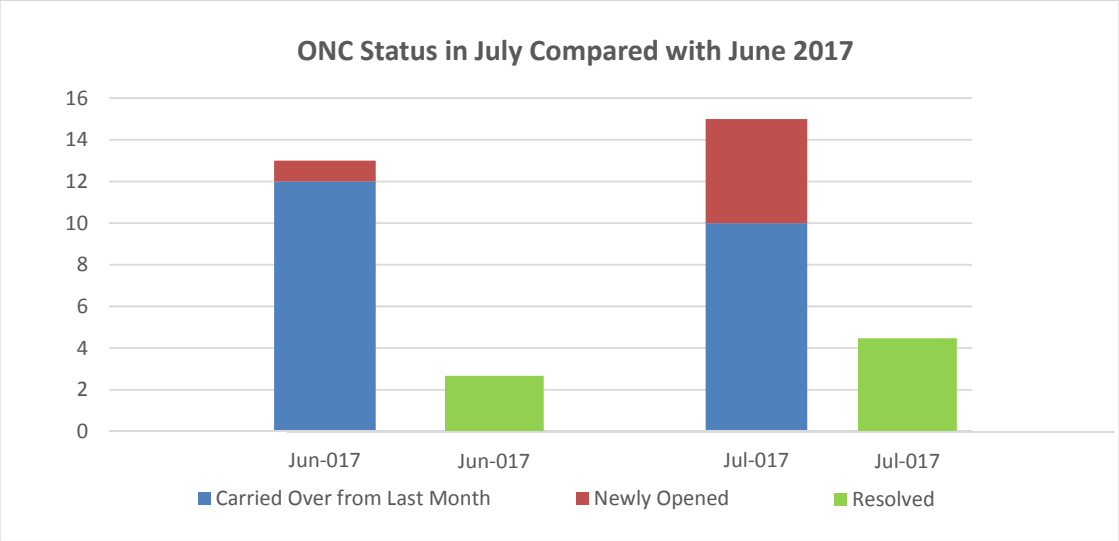


Table 3-3: Carried-Over ONC and NCR from July 2017 into August 2017

Site ID	Issues	Reporting	Actions
V&K Camp	Insufficient capacity of waste water treatment ponds to handle the operation of the V&K camp (ON_OC-0087). 1st inspection: 02 June 2015 Latest inspection: 25 July 2017	ONC (Closure Pending)	The as-built drawing was submitted on 04 July 2017 and is under review.
HM Hydro Subcontract Workers' Camp (LILAMA 10 Camp)	The construction of the Waste Water Treatment System (WWTS) was completed since the end of May 2017. However, the contractor has not yet responded to the NCR1 (NCR_HM-0001). 1st inspection: 28 September 2016 Latest inspection: 25 July 2017	NCR-1 (Closure Pending)	The submission of an official response has been delayed by the contractor. NNP1PC instructed the contractor to prepare an official response to the NCR document by the first week of August 2017.
RCC Plant	Non-compliant Waste Water Discharge from the RCC Plant's Sediment Ponds on 5 May 2017 (NCR_OC-0018). First inspection: 05 May 2017	NCR3 (Closure pending)	- The contractor submitted a response by letter Ref. No.: NNP1-PCL-03382 on the Non-Compliance Report Level 3 on 21 July 2017; - The corrective actions were undertaken at the site and the quality of effluent discharge has been observed to be improving compared to the last few

Site ID	Issues	Reporting	Actions
			months. It is still yet complied with the Effluent Standard; - All NNP1PC's recommendations were adequately incorporated into the operation and maintenance practices of the RCC plant's sedimentation control.
Re-Regulation Dam (Borrow Pit Area)	The Contractor started operating a borrow pit with inadequate environmental management practices as indicated below: - Topsoil was stockpiled at an area sensitive to erosion; - The slope of the cut had no berm and cut-off drains; - No information and management measures on the excavation of this borrow pit was included in the two approved SS-ESMMP for the Re-Regulating Dam (ON_OC-0232). First inspection: 30 August 2016 Latest inspection: 25 July 2017	ONC (Closure Pending)	The contractor did not revise and resubmit the proposed Site Closure Plan of P1 & P1A as recommended. However, some slope stabilisation work was implemented by the contractor. NNP1PC will follow up with the contractor to provide an official response to close the issue through issuing an official letter in August 2017.
Aggregate Crushing Plant	- Inadequate maintenance and implementation of agreed corrective actions on controlling the sediment pond at the Aggregate Plant below the Spoil Disposal Area No.7; - Improper monitoring and maintenance of the said sediment pond resulted in leakage of turbid water from the sediment pond into Nam Ngiep River. This is a serious non-compliance with CA Annex C and ESMMP-CP 2014 (NCR_OC-0013). First inspection: 08 November 2016 Latest inspection: 25 July 2017	NCR-2 (Closure Pending)	- The Detailed Work Plan (DWP) and Site Specific Environmental and Social Management and Monitoring Plan (SS-ESMMP) for Foundation Installation and Operation of Aggregate Crushing Plant (PLC-03348) was submitted on 05 July 2017 as a response to the NCR level 2; - This DWP & SS-ESMMP is under review by the NNP1PC-EMO. The review will be concluded after obtaining the trial testing results using alum by 06 August 2017. An official comment sheet will then be provided by 11 August 2017.

Site ID	Issues	Reporting	Actions
Kenber Camp	The WWTS maintenance was not implemented properly: - Waste water could not flow smoothly from the first to the third pond; - The pipeline connecting between the third to the last pond was blocked. This present a potential risk of waste water overflowing before being treated by chlorine (ON_OC-0260). First inspection: 23 May 2017 Latest inspection: 25 July 2017	ONC (Closure pending)	- The contractor submitted a second improvement drawing on 27 July 2017 in which the waste water from the 3rd wetland pond would be pumped directly to the chlorine dripping tank by passing the 4th wetland pond. If the effluent discharge is still non-compliant after this improvement, the contractor will consider an alternative option to treat waste water by using "a batch treatment method"; - The submitted drawing is under review and will conclude after the final inspection is completed in the next Joint Bi-weekly Inspection on 15 August 2017.
Biomass Clearance Zone	A broken tractor was parked near a UXO temporary workers' camp without a rain protection and oil spill protection tray. As a result, oil has leaked from the broken engine/hydraulic parts of the tractor onto the ground (ON_UCC-0002). First inspection 04 May 2017	ONC (Closure pending)	The case will be followed-up and closed (if compliance) by August 2017 during the Follow-up Joint Site Inspection with the contractor.
PK Camp	No proper hazardous material storage. Fuel drums were stored on the bare ground without spill protection facilities (ON_PK-0002). First inspection: 19 April 2017 Latest inspection date: 25 July 2017	ONC (Closure pending)	The construction of paddy field and clearance of irrigation pond were completed, the camp and facilities decommissioning has achieved 80%. NNP1PC-EMO will verify the site decommissioning activities by mid-August 2017.
Sand stockpile at a former Spoil	Some sections of the wooden silt fence were broken which allowed the transportation of	ONC (Closure pending)	The repaired wooden silt fences around the sand stockpile and sand bags were damaged again due to heavy rain. The contractor was

Site ID	Issues	Reporting	Actions
Disposal Area No. 8	sand from the stockpile area into the adjacent road side drainage (ON_OC-0257). First inspection: 09 May 2017 Latest inspection: 01 August 2017		advised to fix the fence and place more sandbags by 15 August 2017.
Main Dam Workshop (Spoil Disposal No:2)	Construction waste (contained in big plastic bags) and general waste were buried at site. The approximate quantity could not be ascertained because most of these were covered by spoil (NCR_OC-0021). First inspection: 04 July 2017 Latest inspection: 25 July 2017	NCR1 (New)	- Disposal of new spoil was stopped. New spoil generated is to be disposed of at the designated Spoil Disposal Area No. 6 as per proposed DWP & SS-ESMMP for Main Dam Body; - Waste disposal on site to be stopped including hazardous waste, construction and general waste. Waste shall be segregated and disposed of in accordance to waste management policy and ESMMP-CP of NNP1PC; - Collect and segregate the disposed wastes on the slope for proper disposal at the landfill, Spoil Disposal Area No. 6 or authorized vender; - The contractor is required to respond to the NCR by 28 July 2017, and the information will be provided in the next monthly report.
Main Dam' WWTS	Non-compliant pH values (either too low or too high) of the waste water being discharged from the Main Dam's waste water treatment plant (WWTP) during a number of previous weekly effluent monitoring (ON_OC-0262). First inspection: 11 July 2017 Latest inspection: 25 July 2017	ONC (New)	- Confirmation as to whether the plant is operational as well as delivery and use of the Sulphuric Acid, PAC and Polymer to treat the waste water is made according to the operation manual of the WWTP; - It must be ensured that waste water quality meets the Lao National Standards prior to discharging into Nam Ngiep. The turbid water generated at the Main Dam and Powerhouse excavation areas need to be

Site ID	Issues	Reporting	Actions
			treated such as by the Turbid Water Treatment Plant prior to releasing into Nam Ngiep by 25 July 2017.
Main Dam's WWTS No. 1	The turbid water was directly discharged from a sediment pond next to the Main Dam Powerhouse to the Nam Ngiep River via a 100-mm submerged black pipe (NCR_OC-0020). First inspection: 18 July 2017 Latest inspection: 25 July 2017	NCR2 (New)	- Stop direct discharge of the turbid water from the existing sediment pond within the Main Dam construction areas to downstream of Nam Ngiep if the waste water doesn't meet the required effluent discharging standards and without prior authorization from NNP1PC; - NNP1PC to be notified of any request for emergency discharge to ensure that the effluent is compliant with discharging standards; - Competent operators to be deployed with proper training and instructions to operate the Waste Water Treatment Plant with clear operational guidelines and procedures; - A key operator is to be assigned at the Waste Water Treatment Plant and closely supervise the site during the sediment pond cleaning; - The contractor is required to respond to the NCR by 01 August 2017.
Obayashi WWTS	Inadequate waste water treatment system (WWTS) management and maintenance: - The waste water was observed for the second time to overflow from all wetland ponds without a repair; - The reeds in the first wetland pond were almost dead because of a prolonged high waste water level;	ONC (New)	- Proper maintenance of the WWTS to be undertaken including replacement of dead reeds with healthy reeds; - The root cause of waste water overflowing from the first wetland pond to be discovered and resolve it immediately;

Site ID	Issues	Reporting	Actions
	- EMO requested the contractor to submit the As-Built Drawing for nearly a month, but there was no progress on this matter (ON_OC-0263). First inspection: 18 July 2017 Latest inspection: 25 July 2017		- As-Built-Design Drawing to be submitted to NNP1PC for record by 25 July 2017.
TCM & GFE Camps' WWTS	A potential inundation of the newly completed WWTS by rain and gravity flow of the waste water through the chlorination system (ON_OC-0264). First inspection: 18 July 2017 Latest inspection: 25 July 2017	ONC (New)	1. The bund of the first wetland pond is to be increased by at least 20 cm to prevent inundation by the rain water and waste water causing overflowing during peak water use; and 2. The submission date and version of the WWTS's as-built drawing is to be revised.
IHI Worker Camp and Fuel Storage	There was an evidence of continuous burning of non-hazardous waste (general waste, recycle waste and plastic) on site (ON_OC-0007). First inspection: 18 July 2017 Latest inspection: 25 July 2017	ONC (New)	- The contractor was advised that all domestic waste shall be segregated and disposed of at NNP1 Project Landfill; and - The corrective actions need to be completed by 28 July 2017. The status will be provided in the next monthly report.
LILAMA 10 Subcontractor	A mixture of wastes, including construction waste (wood off-cut, cement bags), recycle waste (glass, plastic bottles) and general waste (food waste, etc.), were disposed at the edge of spoil disposal No. 6 (NCR_HM-0003). First inspection: 21 July 2017 Latest inspection: 25 July 2017	NCR1 (New)	- The contractor (HM Hydro) has been instructed to take immediate action to collect, separate and dispose the waste properly; - The contractor has to implement proper waste management measures to prevent/mitigate as per the contractor's obligation provided in the 4th submission DWP and SS-ESMMP for HM Hydro Worker Camp (Ref: PRD10-399007 dated 10 May 2017).

Site ID	Issues	Reporting	Actions
			- The contractor is required to respond to the NCR by 05 August 2017.

Figure 3-2: Site Inspection Locations

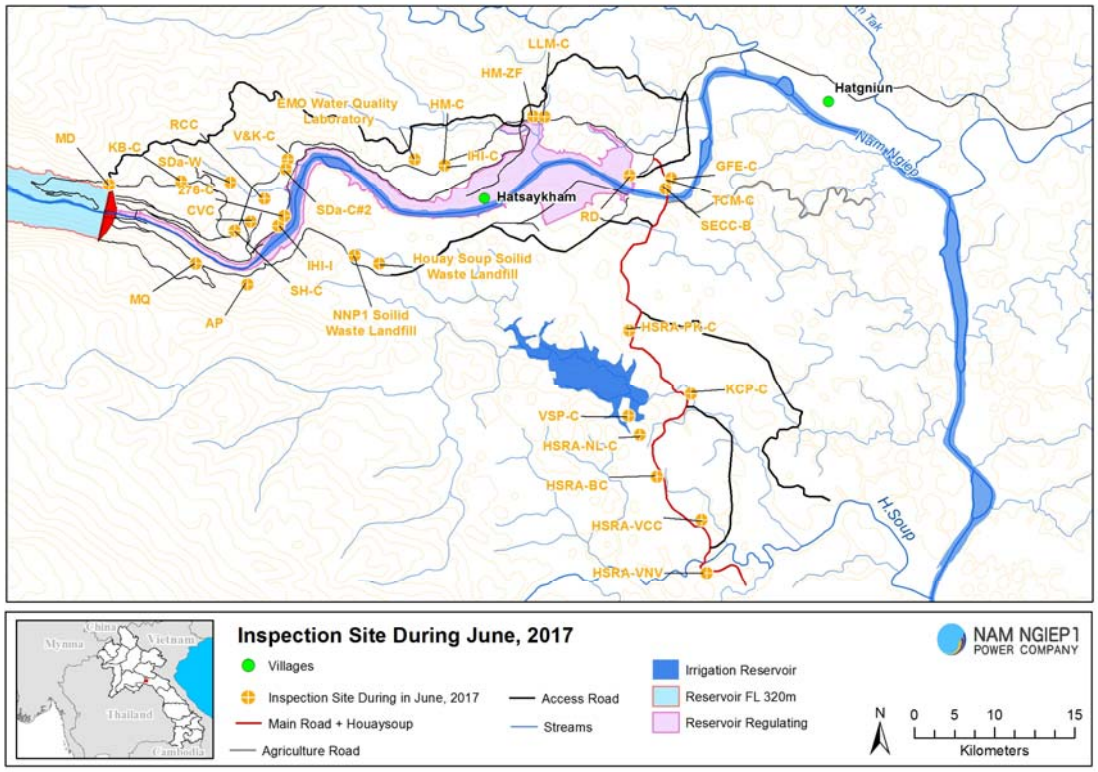
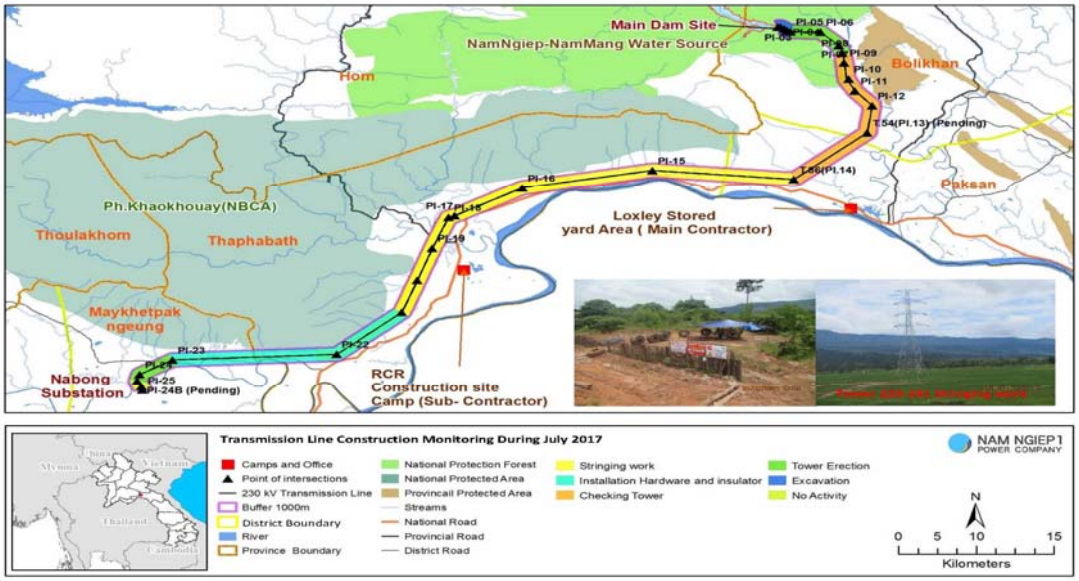


Figure 3-3: 230 kV Transmission Line Construction Monitoring



3.1.3 Environment Management Unit Monitoring

On 20 July 2017, the Environmental Management Unit (EMU) of Bolikhan District and Bolikhamxay Province conducted a joint environmental monitoring mission to the main construction sites and camps. After the wrap-up meeting on 26 July 2017, the EMU submitted their mission report to NNP1PC on 27 July 2017.

Based on the findings of the mission in July 2017, the EMU issued a first warning notification letter to NNP1PC on 31 July 2017. The letter required that all pending issues shall be resolved by the next monthly inspection which is scheduled during 17-18 August 2017. NNP1PC is working with the contractor to address and resolve these issues of concern. An official response with report on the progress of implementing actions addressing the points raised in the letter will be submitted to EMU by the middle of August 2017.

3.2 Environmental Quality Monitoring

The environmental quality monitoring programme consists of the following components:

a) Effluent discharge from camps and construction sites;
b) Ambient surface water quality monitoring;
c) Groundwater and community water supply;
d) Reservoir water quality monitoring;
e) Landfill leachate;
f) Ambient noise and noise emission monitoring.

The NNP1PC Environmental Laboratory in collaboration with the United Analysis and Engineering Consultant Company Limited (UAE) has completed a performance verification of its analyses for TSS and Biochemical Oxygen Demand (BOD_5) and took over these analysis in July 2017. Besides, the performance verifications of total coliform, faecal coliform and E. Coli bacteria analyses by NNP1PC Environmental Laboratory have started in the second half of July 2017. These will be taken over in August 2017 according to the water quality analysis service agreement between UAE Laboratory and NNP1PC.

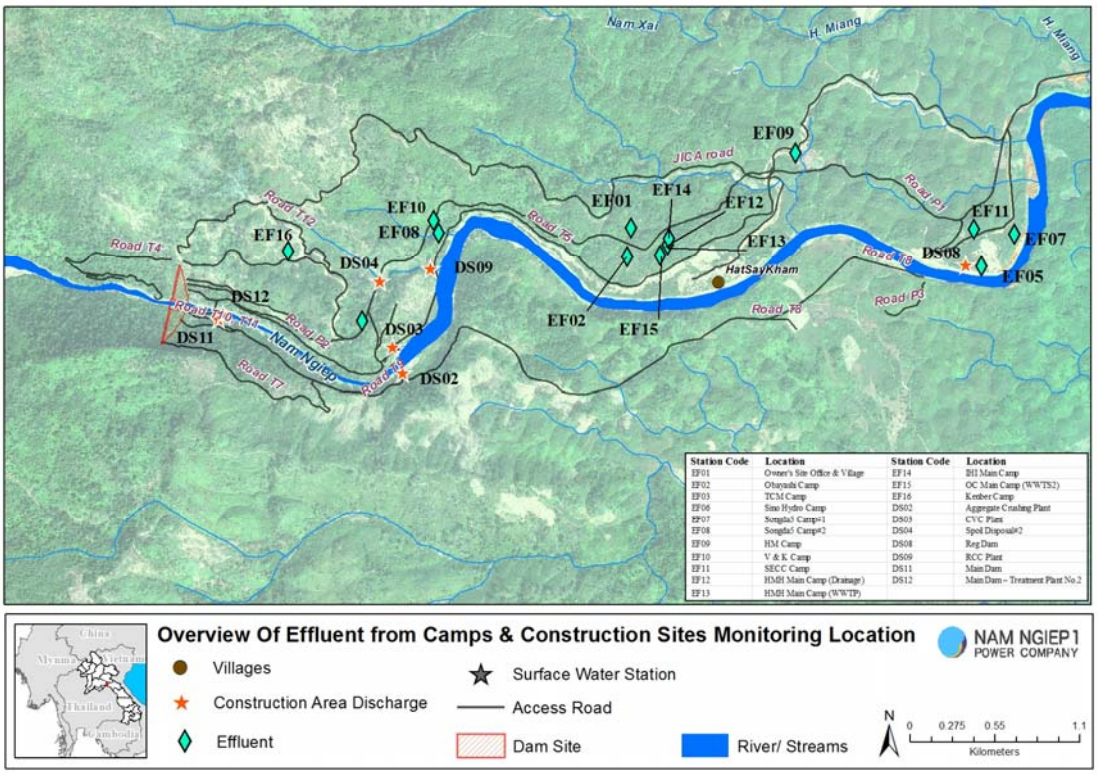
After the impounding of the re-regulation reservoir in May 2017, NNP1PC-EMO has undertaken weekly water quality monitoring for some parameters (pH, Dissolved Oxygen, Conductivity, Total Dissolved Solids (TDS), temperature, turbidity, BOD_5, TSS, faecal coliform and total coliform in the re-regulation reservoir. This complements the existing monitoring programme presented in the ESMMP-CP 2017 Volume III.

All environmental quality monitoring data are routinely reported to the Ministry of Natural Resources and Environment (MONRE) in the Monthly Environmental Management and Monitoring Reports (EMMR) and to ADB in the Quarterly Environment Monitoring Reports, which are also published on the Company's website.

3.2.1 Effluent Discharge from Camps and Construction Sites

Since July 2016, the frequency of effluent monitoring has increased from monthly to fortnightly at all the camps, and from fortnightly to weekly at the construction sites. During July 2017, all camp effluents regardless of the discharge condition were monitored. Results of effluent monitoring from the camps and construction sites are presented in *Error! Reference source not found.*, and the monitoring locations are displayed ***Figure 3-4*** below.

Figure 3-4: Map of Effluent Discharge Monitoring Locations



Detailed monitoring results are provided in ***Annex 1*** of this EMO section of the Report. The effluent monitoring results for July 2017 indicate that none of the camps monitored comply with the effluent standards. However, the amount of total and faecal coliforms has been significantly reduced at all the camps compared to the previous months and the non-compliances with effluent standards are believed to be a result of inadequate dosage of chlorine and maintenance of the completed systems. In order to further improve the operation and maintenance processes, NNP1PC-EMO conducted follow-up site inspections and shared the results of field observations with the contractors as well as discussed the adjustments of the system with them.

NNP1PC-EMO carried out laboratory and field experiments using aluminium ammonium sulphate (alum) to treat turbid water at the Aggregate Crushing Plant sediment pond during the period 04 to 07 July 2017. The results were presented and discussed with the contractor in a high-level meeting chaired by a Managing Director of NNP1PC on 07 July 2017. Based on the results of the laboratory and field experiments, the contractor undertook trial applications of alum at the sediment ponds of the Aggregate Crushing Plant and the RCC Plant on 12 July and 20 July 2017 respectively. These have further improved the waste water quality at both sites. Optimum application amount and locations to achieve the effluent standards at both sites are being identified by the contractor and will concluded on 06 August 2017.

Progress on implementation of the corrective actions for the non-compliant camps and key construction areas is summarized below.

Table 3-4: Assessment of the Effluent Discharge from the Camps and Construction Sites against the Effluent Discharge Standards

Site	Sampling ID	Non-Compliance with Applicable Effluent Standards	Corrective Actions
Owner's Site Office and Village	EF01	Minor non-compliances for total nitrogen and total coliform.	No corrective actions are needed. The number of total coliforms and total nitrogen reduced to compliant level in the last fortnight of July 2017.
Obayashi Camp (WWTP1)	EF02	Minor non-compliances for BOD_5, ammonia nitrogen (NH_3-N), total nitrogen and total coliforms	NNP1PC-EMO will continue to monitor the chlorination process and advice will be provided for further improvement.
Sino Hydro Camp	EF06	Non-compliances for BOD_5, ammonia nitrogen (NH_3-N), total nitrogen and total coliforms	As above.
Song Da 5 Camp No. 1	EF07	Minor non-compliances for BOD_5, ammonia nitrogen (NH_3-N), total nitrogen and total coliforms	As above.
Song Da 5 Camp No. 2	EF08	Non-compliance for total coliform, BOD_5, NH_3-N, total phosphorus, COD, and total nitrogen.	As above.
Zhefu Camp (Subcontractor of Hitachi-Mitsubishi Hydro)	EF09	Non-compliance of TSS, BOD_5, NH_3-N, total nitrogen and total coliforms	The Contractor submitted a working drawing for the installation of an additional 1 m^3 chlorine contact tank and a 1 m^3 chlorine monitoring tank according to the Owner's letter of instruction issued in November 2016.
V&K Camp	EF10	Minor non-compliance of BOD, total nitrogen and total coliforms	NNP1PC-EMO will continue to monitor the chlorination process and advise will be provided for further improvement.
H-MH Main Camp (WWTS)	EF13	Minor non-compliance for NH_3-N and total nitrogen.	As above.

Site	Sampling ID	Non-Compliance with Applicable Effluent Standards	Corrective Actions
IHI Main Camp	EF14	Significant non-compliance: NH_3-N, BOD_5, total nitrogen and total coliforms	As above.
Kenber Camp	EF16	Non-compliance for TSS, total coliforms, BOD_5, NH_3-N and total nitrogen	NNP1PC will continue to monitor chlorination process and provide feedback to the Contractor for adjusting and checking the system properly.
Main Dam Construction Area (Treatment Plant No.1)	DS11	Non-compliance for pH and TSS.	The Contractor was instructed to check the water quality before discharging and ensure that the treatment plant system operates properly. In the last week of July 2017, pH and TSS complied with the standards.
Main Dam Construction Area (Treatment Plant No.2)	DS12	Non-compliance for pH and TSS	The contractor was instructed to check the water quality before discharging and ensure that the treatment plant system operates properly.
Spoil Disposal Area No.2 (Song Da 5 Workshop)	DS04	All parameters monitored complied with the standard	No action is needed.
CVC Plant	DS03	No discharge during the missions	
RCC Plant (Discharged at lower ponds)	DS09	Minor non-compliance for pH and TSS	Refer to *Error! Reference source not found.* for corrective action.
RCC Plant (Discharged nearby IHI Workshop)	DS13	Minor non-compliance for pH	Refer to *Error! Reference source not found.* for corrective action.
Aggregate Crushing Plant	DS02	Significant non-compliance for TSS	See *Error! Reference source not found.* for corrective actions.

3.2.2 Ambient Surface Water Quality Monitoring

Surface water samples are collected and analysed twice a month[2] from nine stations in Nam Ngiep and four stations in the main tributaries including the lower Nam Chian, Nam

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

Phouane, Nam Xao and Houay Soup (total thirteen stations). From 24 May 2017, weekly water quality monitoring at the re-regulation reservoir and Nam Ngiep has been undertaken for physical parameters only for four stations namely: i) Nam Ngiep immediately upstream of the main dam (NNG09); ii) re-regulation reservoir upstream of Hatsaykham Village (NNG04/R6); iii) re-regulation reservoir located about 0.3 km upstream of the re-regulation dam (R7) and; iv) Nam Ngiep immediately downstream of the re-regulating dam (NNG05) as shown in ***Figure 3-5*** below

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

Key findings for surface and re-regulation reservoir water quality monitoring in July 2017 are shown in ***Table 3-5*** to ***Table 3-9*** below.

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

	River Name	Nam Ngiep									
	Zone	Location Refer to Construction Sites									
		Upstream				Within / Re-regulation Reservoir		Downstream			
	Station Code	NNG01	NNG02	NNG03	NNG09	NNG04/R6	R7	NNG05	NNG06	NNG07	NNG08
	Date	3/Jul/17	4/Jul/17	4/Jul/17	5/Jul/17	5/Jul/17	5/Jul/17	5/Jul/17	5/Jul/17	5/Jul/17	5/Jul/17
Parameters (Unit)	**Guideline**										
pH	5.0 - 9.0	7.3	7.77	7.81	8.35	8.23	8.2	N/A	N/A	N/A	N/A
Sat. DO (%)		95.8	92.7	91.6	111.6	107.3	104.7	109.5	105.5	107.9	86.3
DO (mg/l)	>6.0	7.82	7.42	7.27	8.94	8.56	8.5	8.81	8.43	8.63	6.95
Conductivity (µs/cm)		126	120	113	93	93	104	86	92	83	67
TDS (mg/l)		63	60	56	47	46	51	43	46	41	34
Temperature (°C)		25.1	25.2	25.07	24.58	24.29	24.42	25	24.5	25.5	26.03
Turbidity (NTU)		33.03	29.81	23.98	1,288	1,255	390	68	70.8	53.94	35.62
TSS (mg/l)		62	66.2	44.69	1021	480	194.89	136	132.72	71.25	72.33
BOD_5 (mg/l)	<1.5	ND[13]	ND[13]	ND[13]	1.3	1	1.02	ND[13]	ND[13]	ND[13]	ND[13]
COD (mg/l)	<5	6.2	6.5	5	39.7	17.9	9	9.1	10.7	10.7	9.7
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]	ND[12]
NO3-N (mg/l)	<5	0.07	0.06	0.06	0.08	0.08		0.02	0.15	nd	nd
Faecal coliform (MPN/100 ml)	<1,000	170	700	1,700	7,000	5,000	1,300	1,300	1,400	2,300	790
Total Coliform (MPN/100 ml)	<5,000	2,300	2,200	2,200	11,000	10,000	3,300	4,900	4,800	4,600	2300

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] (<0.00004 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)	ND[18] (<25.0 mg/L)	ND[19] (<0.00002 mg/L)	

Since Nam Ngiep surface water quality monitoring programme commenced in September 2014, EMO has frequently found elevated levels of COD and faecal coliform with concentrations exceeding the surface water quality standards.

Table 3-6: Results of Physical Parameters of Nam Ngiep Surface Water Quality Monitoring – Weekly and Fortnightly

	River Name	Nam Ngiep									
	Zone	Location Refer to Construction Sites									
		Upstream				Within / Re-regulation Reservoir		Downstream			
	Station Code	NNG01	NNG02	NNG03	NNG09	NNG04/R6	R7	NNG05	NNG06	NNG07	NNG08
	Date	17/Jul/17			18/Jul/17	18/Jul/17	18/Jul/17	18/Jul/17	18/Jul/17	18/Jul/17	18/Jul/17
Parameters (Unit)	**Guideline**										
pH	5.0 - 9.0	7.19	-	-	7.05	7.16	7.23	7.23	7.21	7.18	7.1
Sat. DO (%)		92.9	-	-	100.3	117.3	108.6	109.9	100.9	101.6	98.8
DO (mg/l)	>6.0	7.48	-	-	8.17	9.87	9.1	8.46	7.73	7.89	7.88
Conductivity (µs/cm)		71.2	-	-	49.3	80	81	46.6	40.5	42.4	43.8
TDS (mg/l)		35	-	-	25	40	41	23	20	21	22
Temperature (°C)		23.6	-	-	24	23.18	23.26	27.2	27.6	26.5	25.5
Turbidity (NTU)		3346	-	-	1692	1803	1323	1515	917	1287	1554
TSS (mg/l)		-	-	-	1278	1341	849	963	-	-	-
BOD_5 (mg/l)	<1.5	-	-	-	1.1	1.22	ND[13]	1.1	-	-	-
Faecal coliform (MPN/100 ml)	<1,000	-	-	-	700	5,400	5,400	920	-	-	-
Total Coliform (MPN/100 ml)	<5,000	-	N/A	-	1,100	5,400	5,400	1,600	-	-	-

	River Name	Nam Ngiep			
	Zone	Location Refer to Construction Sites			
		Upstream	Within / Re-regulation Reservoir		Downstream
	Station Code	NNG09	NNG04 / R6	R7	NNG05
	Date	13-Jul-17	13-Jul-17	13-Jul-17	13-Jul-17
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	7.42	7.45	7.39	7.37
Sat. DO (%)		101.7	100.3	99	102.1
DO (mg/l)	>6.0	8.21	8.18	7.94	7.83
Conductivity (µs/cm)		66.7	113	97	62.4
TDS (mg/l)		33	56	48	31
Temperature (°C)		24.6	24.52	24.66	
Turbidity (NTU)		59.1	59.8	66.7	68.7
TSS (mg/l)		263.6	174.86	144.79	158.2
BOD_5 (mg/l)	<1.5	2.42	ND[13]	1.4	ND[13]

	River Name	Nam Ngiep			
	Zone	Location Refer to Construction Sites			
		Upstream	Within/Re-regulation Reservoir		Downstream
	Station Code	NNG09	NNG04 / R6	R7	NNG05
	Date	26-Jul-17	26-Jul-17	26-Jul-17	26-Jul-17
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	7.13	7.07	6.91	7.09
Sat. DO (%)		102.2	104.2	92.4	103
DO (mg/l)	>6.0	8.11	8.32	7.48	8.13
Conductivity (µs/cm)		60.2	98	95	60
TDS (mg/l)		30	49	48	30
Temperature (°C)		25.2	24.71	24.85	25.7
Turbidity (NTU)		31.1	26.7	31.2	34.4
TSS (mg/l)		103.93	67.26	65.21	80.46
BOD_5 (mg/l)	<1.5	ND[13]	ND[13]	ND[13]	ND[13]
Faecal coliform (MPN/100 ml)	<1,000	7	14	6	6
Total Coliform (MPN/100 ml)	<5,000	140	48	24	15

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] (<0.00004 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)	ND[18] (<25.0 mg/L)	ND[19] (<0.00002 mg/L)	

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

Nam Chiane (NCH01) is located about 66 km upstream of the main dam. The COD and total coliform exceeded the Surface Water Quality Standard with values recorded as 5.4 mg/l and 7,900 MPN/100 ml respectively.

Nam Phouan is located about 24 km upstream of NNP1 Project construction site. The COD and faecal coliform exceeded the Surface Water Quality Standard with values recorded as 14.5 mg/l, and 3,500 MPN/100 ml respectively.

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

Nam Xao has a confluence with the Nam Ngiep downstream of the NNP1 Project construction site. The COD and total coliform exceeded the Surface Water Quality Standard with values recorded of 10.5 mg/l and 7,900 MPN/100 ml respectively.

Houay Soup Nyai has a confluence with the Nam Ngiep River downstream of NNP1 Project construction site. The COD exceeded the Surface Water Quality Standard with values recorded as 20.2 mg/l.

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

	River Name	Nam Chain	Nam Phouan	Nam Xao	Nam Houay Soup
	Zone	Location Refer to Construction Sites			
		Upstream Tributaries		Downstream Tributaries	
	Station Code	NCH01	NPH01	NXA01	NHS01
	Date	3/Jul/17	4/Jul/17	5/Jul/17	5/Jul/17
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	7.62	8.13	N/A	N/A
Sat. DO (%)		110.7	99.7	98.2	86.1
DO (mg/l)	>6.0	8.91	7.95	7.65	6.91
Conductivity (µs/cm)		52	95	104	20
TDS (mg/l)		26	48	52	10
Temperature (°C)		23.63	24.02	26.7	25.2
Turbidity (NTU)		18.54	25.68	60.7	11.6
TSS (mg/l)		45.4	90.56	74	5.59
BOD_5 (mg/l)	<1.5	ND[13]	1.01	ND[13]	1.05
COD (mg/l)	<5	5.4	14.5	10.3	20.2
NH_3-N (mg/l)	<0.2	ND[12]	ND[12]	ND[12]	ND[12]
NO3-N (mg/l)	<5	0.14	0.1	0.1	0.06
Faecal Coliform (MPN/100 ml)	<1,000	790	3,500	330	330
Total Coliform (MPN/100 ml)	<5,000	7,900	4,900	7,900	3,300

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] (<0.00004 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)	ND[18] (<25.0 mg/L)	ND[19] (<0.00002 mg/L)	

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

	River Name	Nam Chaine	Nam Phouane	Nam Xao	Nam Houay Soup
	Zone	Location Refer to Construction Sites			
		Upstream Tributaries		Downstream Tributaries	
	Station Code	NCH01	NPH01	NXA01	NHS01
	Date	17/Jul/17		18/Jul/17	18/Jul/17
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	7.34	N/A	7.15	6.03
Sat. DO (%)		100.8	N/A	91.6	91.5
DO (mg/l)	>6.0	8.12	N/A	6.88	6.95
Conductivity (µs/cm)		21.63	N/A	34.9	8.01
TDS (mg/l)		11	N/A	17	4
Temperature (°C)		23.3	N/A	28.4	27.9
Turbidity (NTU)		2,030	N/A	75	71.6

3.2.3 Groundwater Quality Monitoring

During July 2017, NNP1PC sampled and analysed the groundwater quality in six boreholes which were built by the Project for resettles at Houay Soup Resettlement Area (HSRA). It was found that all parameters monitored at these six boreholes complied with the relevant standards as shown below.

All groundwater quality data are routinely reported to the Social Management Office of NNP1PC who then communicates the results to the villagers and the local health centres as part of the Project's public health programme.

Figure 3-6: Groundwater Quality Monitoring Locations

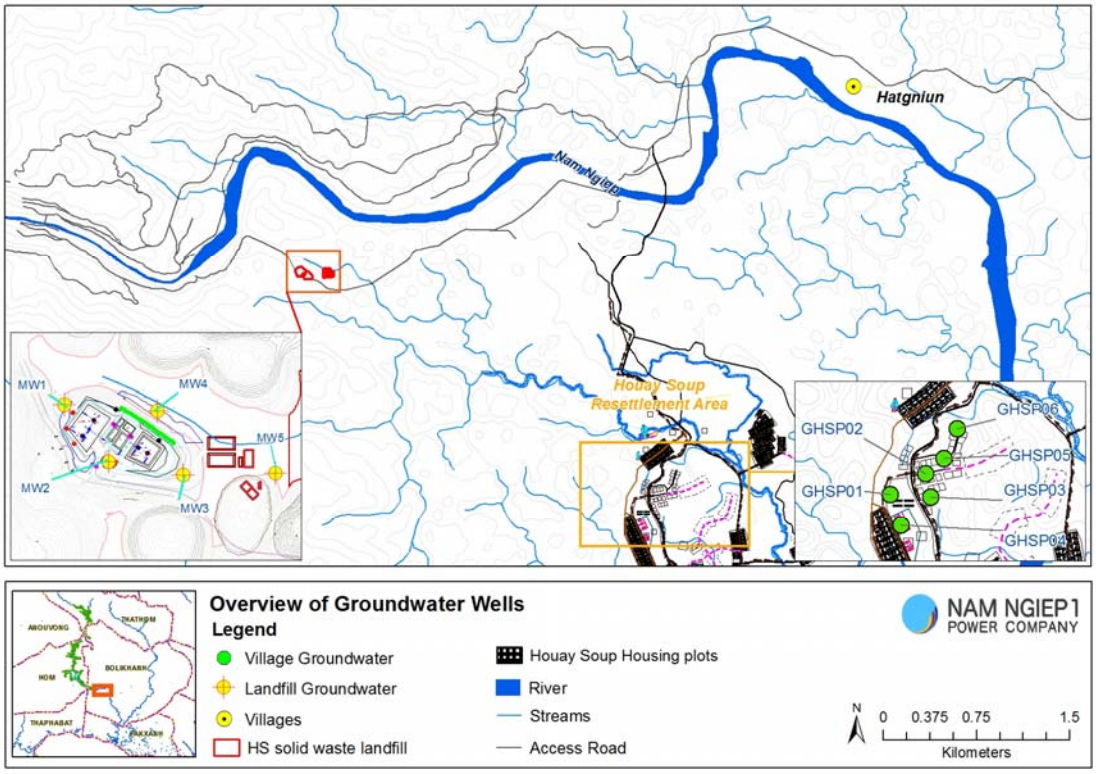


Table 3-9: Groundwater Quality Monitoring Results for Houay Soup Resettlement Area

Parameter (Unit)	Site Name	Houay Soup Resettlement Area (HSRA)					
	Station	GHSPO1	GHSPO2	GHSPO3	GHSPO4	GHSPO5	GHSPO6
	Date	17/Jul/17	17/Jul/17	17/Jul/17	17/Jul/17	17/Jul/17	17/Jul/17
	Guideline						
pH	6.5 - 9.2	7.05	6.86	7.07	6.8	7.08	7.2
Sat. DO (%)		76.3	86.1	81.7	66.4	77.9	83.5
DO (mg/l)		6.1	6.76	6.34	5.14	6.13	6.59
Conductivity (µS/cm)		413	230	404	204.4	331	335
TDS (mg/l)	1200	206	115	202	102	165	168
Temperature (°C)		24.7	25.7	26.2	26.3	25.5	25.3
Turbidity (NTU)	<20	1.36	0.69	0.78	0.89	0.75	0.74
Fecal coliform (MPN/100 ml)	0	0	0	0	0	0	0

E. Coli Bacteria (MPN/100 ml)	0	0	0	0	0	0	0

ND[1] (<0.0005 mg/L)	ND[2] (<0.0003 mg/L)	ND[3] (<0.0002 mg/L)	ND[4] (<0.005 mg/L)	ND[5] (<0.003 mg/L)
ND[6] (<0.09 mg/L)	ND[7] (<0.07 mg/L)	ND[8] (<0.00004 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)	ND[18] (<25.0 mg/L)	ND[19] (<0.00002 mg/L)	

3.2.4 Gravity Fed Water Supply (GFWS) Quality Monitoring

Water quality monitoring for GFWS systems is conducted on a monthly basis with the aim Water quality monitoring for GFWS systems is conducted on a monthly basis with the aim to alert the users in case of health risks when using the water for bathing or washing. During July 2017, water samples were taken from the taps at Thaheua and Hat Gniun Villages.

Results of the assessment for GFWS of both Thaheua and Hat Gniun Villages are shown and summarised as below:

Thahuea Village (WTHH02): All parameters complied with the National Drinking Water Standards except for faecal coliforms and E. Coli which were found to be 49 MPN/100 ml for both parameters.

Ban Hat Gnuin (WHGN2): All parameters complied with the National Drinking Water Standards except for faecal coliforms and E. Coli, which were found to be 79 MPN/100 ml for both parameters.

The presence of the E.Coli found in the GFWS system is a normal situation during rainy season where the surface water is likely to be contaminated by run-off from grazing land in the source area. The local villagers were informed about the results and encouraged to boil their drinking water.

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

	Site Name	**Thaheua Village**	**Hat Gnuin Village**
	Station Code	**WTHH02**	**WHGN02**
	Date	**17-Jul-17**	**17-Jul-17**
	Guideline		
pH	6.5-9.2	6.82	7.21
DO (%)		94.9	97.3
DO (mg/l)		7.32	7.48
Conductivity (µs/cm)		31.6	53.5
TDS (mg/l)	<1,200	16	27
Temperature (°C)		26.4	27
Turbidity (NTU)	<20	1.92	2.84
Faecal coliform (MPN/100 ml)	0	49	79
E. Coli Bacteria (MPN/100 ml)	0	49	79

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] (<0.00004 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)	ND[18] (<25.0 mg/L)	ND[19] (<0.00002 mg/L)	

3.2.5 Landfill Leachate Monitoring

During July 2017, water samples were taken from the NNP1 Project Landfill's final leachate pond (LL4) and discharged point (LL5), and from the Houay Soup Landfill's final leachate pond (LL6) and discharged point (LL7). The location of landfill leachate monitoring is

displayed below. The results indicate compliance with the relevant standards at discharge point from NNP1 Project and Houay Soup Landfills. Thus, an approximately 150 m^3 of the leachate in the last leachate pond (LL4) of NNP1 Project landfill was pumped out and used to water newly grown grasses on the slope of the landfill during 20-22 July 2017.

Figure 3-7: Landfill Leachate Monitoring Location

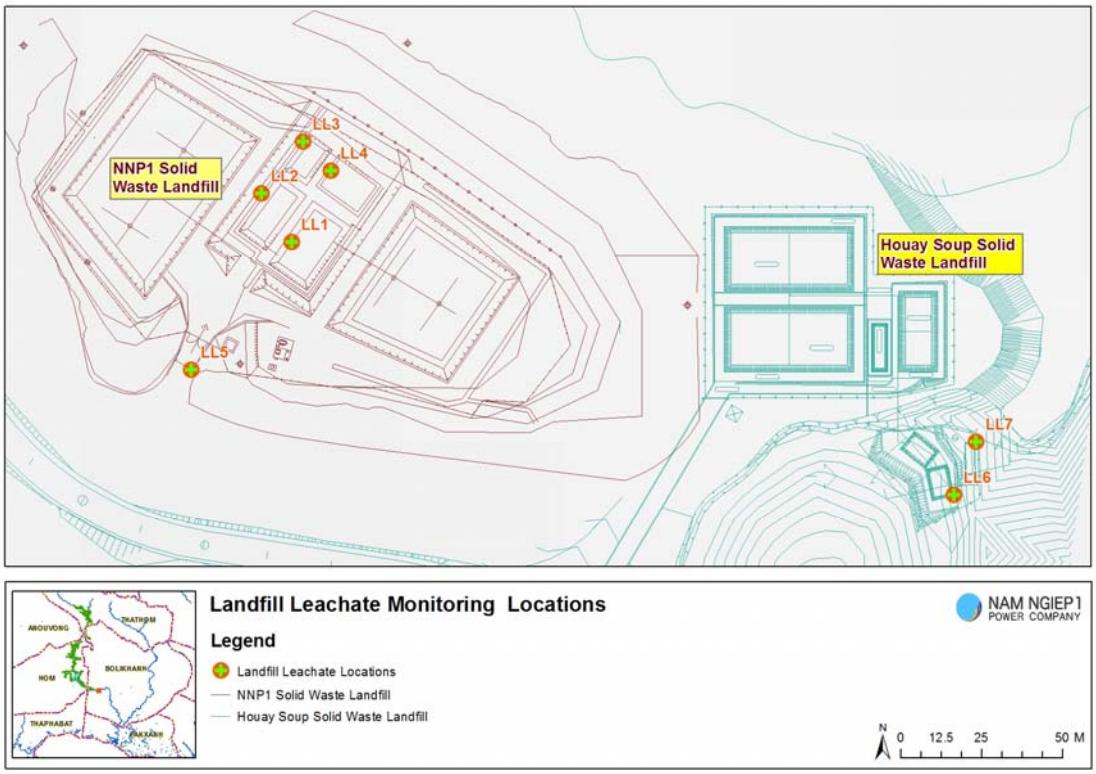


Table 3-11: Landfill Leachate Monitoring Results

	Site Name	NNP1 Landfill (Leachate Pond)	NNP1 Landfill Leachate Discharged	Houay Soup Landfill (Last Leachate Pond)	Houay Soup Landfill Leachate Discharged
	Station Code	LL4	LL5	LL6	LL7
	Date	19-Jul-17	12-Jul-17	12-Jul-17	12-Jul-17
Parameters (Unit)	**Guideline**				
pH	6.0 - 9.0	8.35	7.21	6.71	6.99
Sat. DO (%)		120.8	95.2	53.8	74.3
DO (mg/l)		8.65	7.28	7.15	5.65
Conductivity (µs/cm)		284	13.27	16.52	16.6
TDS (mg/l)		242	6	8.2	8.3
Temperature (°C)		30.8	27.5	27.7	27.6
Turbidity (NTU)		4.55	53.7	18.9	19.4
BOD_5 (mg/l)	<30	28.05	25.2	N/A	8.25
COD (mg/l)	<125	ND[18]	ND[18]	ND[18]	ND[18]
Total coliform (MPN/100 ml)	<400	350	330	N/A	170
Faecal Coliform (MPN/100 ml)		240	300	N/A	170

ND[1] (<0.0005 mg/L)	ND[2] (<0.0003 mg/L)	ND[3] (<0.0002 mg/L)	ND[4] (<0.005 mg/L)	ND[5] (<0.003 mg/L)
ND[6] (<0.09 mg/L)	ND[7] (<0.07 mg/L)	ND[8] (<0.00004 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)	ND[18] (<25.0 mg/L)	ND[19] (<0.00002 mg/L)	

3.2.6 Dust Monitoring

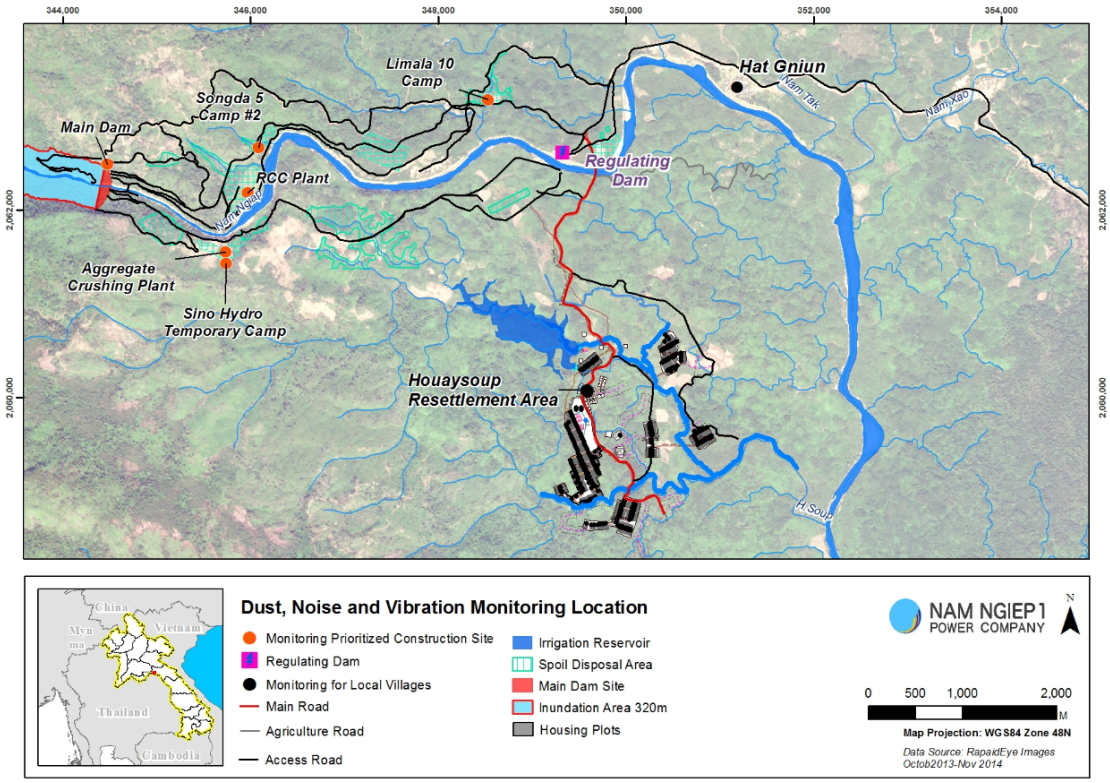
The monitoring points are indicated on the map in ***Figure 3-8***. Most of dust measurements complied with the National Standard, except at the Aggregate Crushing Plant, Sino Hydro Temporary Worker Camp and RCC Plant. Staff have been advised to wear dust masks while working in the areas at risk. The results are presented in ***Annex 2***.

3.2.7 Noise Monitoring

During July 2017, noise monitoring was conducted in Hat Gniun and Houay Soup Resettlement Area for at least 72 consecutive hours. Noise monitoring was also conducted at the Aggregate Crushing Plant, RCC Plant, Sino Hydro Temporary Worker Camp and Lilama10 Camp to assess possible impact on workers' health for 24 consecutive hours.

The noise monitoring location are described in *Error! Reference source not found.* below:

Figure 3-8: Noise and Dust Emission Monitoring Locations



The noise levels recorded at those monitoring stations indicated full compliance with the National Standard for the period of 06:01-22:00, except Hat Gniun Village. The noise levels during the period of 22:01-06:00 were slightly higher than the Standard at the Aggregate Crushing Plant, RCC Plant, Song Da 5 Camp No. 2, Lilama10 Camp and Sino Hydro Temporary Worker Camp [between 55.79 – 65.00 dB(A) compared to the Standard of 50 dB(A)], and at Houay Soup Resettlement Area during 27-28 July and 29-30 July 2017 [46.78 – 48.07 dB(A) compared to the Standard of 45 dB(A)]. In addition, the average noise levels recorded at Hat Gniun Village (8-11 July 2017) exceeded the National Standard except during the period of 06:01-18:00 on 11 July 2017. This slightly high noise level at Hat Gniun Village was caused by the rain events during the monitoring period.

3.3 PROJECT WASTE MANAGEMENT

3.3.1 Solid Waste Management

In July 2017, an approximately 150.5 m^3 of solid waste was disposed of at the NNP1 Project Landfill, a decrease of 25 m^3 compared to June 2017. As a result of continuous rain on site and stagnant water in the pit, the contractor could not perform waste compaction and soil cover as planned on a monthly basis. Regardless, NNP1PC conducted a daily waste bag checking at the camps before disposing at the NNP1PC Project landfill. Mixed waste at sources were found at Song Da 5 camp No.1 & 2, LILAMA10 Camp, ZHEFU Camp, V&K Camp, Kenber Camp, Sino-Hydro Camp and Sino-Hydro workshop at the main quarry. Following these findings, these contractors and subcontractors were instructed and trained on waste management on a weekly basis. An Observation of Non-Compliance (ONC) or Non-Compliance Report will be issued after the third notification of violations on the same issue is given.

A total of 17,326 kg of recyclable waste was sold to Khounmixay Processing Factory by the Contractors as shown in *Error! Reference source not found.*.

Table 3-12: Amounts of Recyclable Waste Sold

Source and Type of Recycled Waste		Unit	Sold	Cumulative Total by July 2017
Construction activity				
1	Scrap metal	kg	17,020	13,165
Sub-Total 1		**kg**	**17,020**	**13,165**
Operation camp				
2	Glass bottles	kg	112	543
3	Plastic bottles	kg	74	348
4	Paper/Cardboard	kg	24	202
5	Aluminium can	kg	132	123
Sub-Total 2		**kg**	**342**	**1,216**
Grand Total 1+2		**kg**	**17,362**	**14,381**

The food waste generated from the Owner's Site Office and Village (OSOV), selected camps of contractors and subcontractors continues to be collected by Hatsaykham Villagers for use as animal feed (pig and poultry). A total of 6,766 kg was collected in July 2017, a reduction of 2,168 kg in June 2017 as shown in *Error! Reference source not found.* below.

Table 3-13 Amounts of Food Waste Collected by Villagers

NO.	SITE NAME	UNIT	TOTAL
1	SongDa5 Camp No. 2	kg	2,861
2	SongDa5 Camp No. 1	kg	2,209
3	Obayashi Corporation Camp	kg	997
4	Owner's Village and Site Office (OSOV)	kg	437
5	LILAMA 10 Camp	kg	135
6	Kenber Camp	kg	127
Total		**kg**	**6,766**

3.3.2 Hazardous Materials and Waste Management

In July 2017, Monthly Joint Hazardous Materials and Waste Inventories were carried out at the main construction sites and subcontractors' camps. The result of the inventories is shown in *Error! Reference source not found.*.

Table 3-14: Results of Hazardous Material Inventory

No.	Hazardous Waste Type	Unit	Total in July 2017 (A)	Disposal by Selling (B)	Remainder (A - B)
1	Used hydraulic and engine oil	litre (l)	7,060	2,000	5,060
2	Used oil filters	No.	742	0	742
3	Empty paint and spray cans	can	648	170	478
4	Empty used chemical drum/container	Drum (20 litre)	1,036	0	1,036
5	Used tyre	No.	488	23	465
6	Ink cartridge	No.	357	0	357
7	Cement bag	bag	300	0	300
8	Acid and caustic cleaners	bottle	136	0	136
9	Empty used oil drum/container	drum (20 l)	116	4 (Reuse)	112
10	Empty used chemical drum/container	drum (200 l)	54	36	18
11	Empty used oil drum/container	drum (200 l)	59	3	56
12	Halogen/fluorescent bulbs	No.	35	0	35
13	Contaminated soil, sawdust and concrete	bag	52	0	52
14	Contaminated textile and material	Bag	27	0	27
15	Car battery	No.	13	0	13
16	Clinical waste	kg	16	0	16
17	Empty contaminated bitumen drum/container	drum (200 l)	0	0	0
18	Used oil mixed with water	liter (l)	0	0	0

There were two diesel oil spill incidents from V&K subcontractor that occurred on 27 and 29 July 2017 of about 80 litres each on the Road A (Sta. 15+000 km) and Road P1 (Sta. 1+400 km) respectively. No major environmental impacts were observed because the subcontractor immediately cleaned up the oil spills and removed around 10 m^3 of diesel contaminated soil for further disposal by V&K subcontractor (see ERROR! REFERENCE SOURCE NOT FOUND. **& 6**). The incident reports and corrective actions were submitted to NNP1PC for record on 29 July 2017.

Photograph 1: Diesel spill from the truck on Roads A and P1 (source: V&K)	*Photograph 2: Contaminated soil was removed from the Road P1 for further disposal (source: V&K)*
	

3.4 Community Waste Management

3.4.1 Community Recycling Programme

In July 2017, a total of 543 kg of recyclable waste was recorded, an increase of 131 kg compared to June 2017.

The types and amounts of waste recycled and remained in the Community Recycle Waste Bank in July 2017 are presented in *Error! Reference source not found.*.

Table 3-15: Types and amounts of waste traded

Types of Waste	Unit	Remaining in June 2017	Additions in July 2017	Sold	Remaining in July 2017
Scrap metal	kg	1,285	103	919	469
Glass bottles	kg	768	208	505	471
Paper/cardboard	kg	290	40	210	120
Aluminium cans	kg	15	45	57	3
Plastic bottles	kg	0	147	147	0
Total	**kg**	**2,358**	**543**	**1,383**	**1,063**

3.4.2 Houay Soup Resettlement Area Waste Management

NNP1PC is finalising the procurement process of hiring two contractors to work on the slope stabilisation and erosion control and operation of the Houay Soup Landfill which will be completed in August 2017.

Approximately 3.5 m^3 of solid waste from the local contractors and residents at HSRA was disposed of at the Houay Soup Landfill.

3.5 Watershed and Biodiversity Management

3.5.1 Preparation of the Nam Ngiep 1 Watershed Management Plan

Targets	Status by July 2017
Final NNP1 Watershed Management Plan by July 2017 1. **Stakeholder workshop arrangements by 15 August 2017**	• The improved final draft was completed on 24 July 2017 after series of discussion between NNP1 and ADB. • NNP1 EMO is in progress of translating the document to Lao language and plan to discuss the arrangement of technical workshop with GOL in September 2017.
Start of Public hearing process for the provincial watershed management regulations	• The improved draft provincial regulation was completed and submitted to ADB Consultant for review at the end of July 2017. • The draft provincial regulations will be discussed with GOL during WMP technical workshop planned in September 2017.

Activities in July 2017	Results
Preparation for NNP1 Watershed Management Plan	• NNP1PC had Internal discussions on the comments from ADB and completed the final draft version of the NNP1 Watershed Management Plan, which was submitted to ADB This document will be translated in to Lao language and will be discussed at the upcoming technical workshop with GOL in September 2017.
WRPO Activities	There was no activity carried out by WRPO during the reported period.
Xaysomboun Intergraded Spatial Planning (ISP)	• The Xaysomboun team is finalizing the ISP and preparing it for final review and approval by the provincial and district leaderships. NNP1 EMO Management followed up in the middle of July 2017 and noted that further revisions will be managed by MONRE DEQP including to elaborate the comments that were not addressed yet. NNP1 EMO plans to meet MONRE DEQP in early August 2017 to get confirmation of the steps and timeline to conclude the ISP finalization.

3.5.2 Biodiversity Offset Management

Targets	Status by July 2017
Recruitment of consultant for development of a Biodiversity Offset Management Plan (BOMP) for Nam Chouane-Nam Xang Biodiversity Offset Site (July 2017)	• The contract with the selected consultant is expected to be finalized in August 2017
Draft BOMP for Nam Chouane-Nam Xang Biodiversity Offset Site (December 2017)	• The preparation of the BOMP is planned to start in August 2017
Consensus building workshop on the BOMP	• Not relevant at this time
Final BOMP for Nam Chouane-Nam Xang Biodiversity Offset Site	• Not relevant at this time
Start of public hearing process for the provincial regulations on biodiversity offset management in the Nam Chouane-Nam Xang Biodiversity Offset Site	• *Not relevant at this time*

Activities in July 2017	Results

Activities pre-BOMP period of 01 October 2016 – 31 September 2017	• Discussions were held with BOMC Secretariat and GOL Consultant on patrolling program. Key areas have been discussed and agreed:
	  • The scope of work for patrolling team and detail patrolling program;
	  • The patrolling program will focus on reducing or minimizing the threat in the NC-NX offset site.
	  • The initial draft of training module for patrolling prepared by NNP1 EMO was discussed and will be further refined by the trainer.
	• The establishment of the patrolling team establishment started from 24 - 28 July 2017. The coordination mechanism with local coordination unit will be further discussed and agreed in August 2017.
	• The report of community relationship building activity including the pre- and post-questionnaire analysis has been shared by

	BOMC on 27 July 2017. NNP1 EMO is reviewing the report and proposed to have further discussion in August 2017.

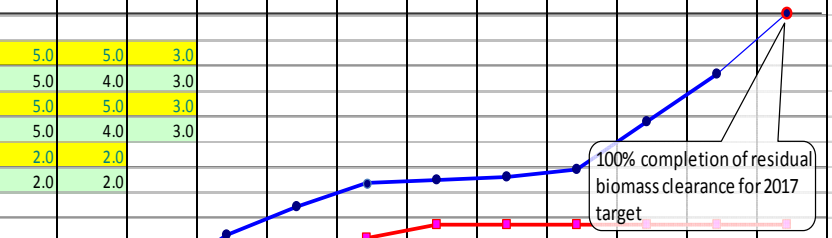
3.5.3 Biomass Clearance

Activities in July 2017	Results
Progress of biomass clearance	• The work in July 2017 could only be carried out intermittently due to rain and plantation season. • There are more than 151 logs stockpiled in Block 2. The report is being finalized at the end of the month. After the inspection and verification in the week of 31 July 2017 it was recorded that completed vegetation cutting is 11.87 ha, biomass burning in progress is 36.96 ha, the completed stockpiling is 32.91 ha and clearance 8.54 ha. • There are more than 146 logs stockpiled in Block 3. The report is being finalized at the end of the month. After the inspection and verification in the week of 31 July 2017 it was recorded that vegetation cutting in progress is 1.37 ha and completed stockpiling is 34.06 ha. • After the inspection and verification at Block 4 in the week of 31 July 2017 it was recorded that biomass burning in progress is 32.12 ha, completed stockpiling 54.53 ha, re-stockpiling 40.84 ha and completed clearance 10.33 ha. • After the inspection and verification at Block 5 in the week of 31 July 2017 it was recorded that vegetation cutting in progress is around 7.98 ha, biomass burning in progress is 48.01 ha, completed stockpiling 30.26 ha and completed clearance 5.62 ha. • The biomass clearance progress to date can be seen in ***Table 3-16***. The biomass clearance progress can be seen from the maps in ***Figure 3-10*** to ***Figure 3-28***.

The overall progress of biomass clearance programme is illustrated in the below figure.

Figure 3-9: Gantt Chart Showing Biomass Clearance Program as of 31 July 2017

	Task List / Steps of work		Weight (%)	YEAR 2017												% S-Curve
				Q1			Q2			Q3			Q4			
				01	02	03	04	05	06	07	08	09	10	11	12	
1	**UXO Search and Clearance**	Planed	100.0													100
		Actual	0.0													96
1.1	Perform UXO work for 549.20 ha (6 blocks) of priority biomass clearance on lower and central reservoir	Planed	13.0	5.0	5.0	3.0										93
		Actual	12.0	5.0	4.0	3.0										89
1.2	Perform UXO work for 334.03 ha (5 blocks) of priority biomass clearance on lower and central reservoir	Planed	13.0	5.0	5.0	3.0										86
		Actual	12.0	5.0	4.0	3.0										82
1.3	Perform UXO work for 84.58 ha (2 blocks) of priority biomass clearance on upper reservoir	Planed	4.0	2.0	2.0											79
		Actual	4.0	2.0	2.0											75
2	**Biomass Clearance**	Planed	0.0													71
		Actual	0.0													68
2.1	Perform biomass clearance for 593.61 ha (6 blocks) on lower and central reservoir	Planed	18.0	3.0	3.0	3.0	2.0	1.0					2.0	2.0	2.0	64
		Actual	10.0	3.0	2.0	1.0	1.0	1.0	1.0	1.0						61
2.2	Perform biomass clearance for 462.09 ha (5 blocks) on lower and central reservoir	Planed	18.0	3.0	3.0	3.0	2.0	1.0					2.0	2.0	2.0	57
		Actual	10.0	3.0	2.0	2.0	1.0	1.0	1.0							54
2.3	Perform biomass clearance for 212.66 ha (7 blocks) on central and upper reservoir	Planed	17.0	3.0	3.0	3.0	2.0	1.0					2.0	2.0	1.0	50
		Actual	13.0	3.0	2.0	3.0	1.0	2.0	1.0	1.0						46
3	**Preparation of Floating/Debris Removal**	Planed	0.0													43
		Actual	0.0													39
3.1	Procurement of service for floating logs/debris removal	Planed	5.0						2.5						2.5	36
		Actual	2.0						2.0							32
4	**Monitoring and Reporting**	Planed	0.0													29
		Actual	0.0													25
4.1	Field monitoring and inspection of biomass clearance and compliance to SS-ESMMP (weekly & Monthly)	Planed	10.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	1.0	1.0	1.0	21
		Actual	5.5	1.0	1.0	1.0	1.0	1.0	0.5							18
4.2	Coordination or Ad-hoc meeting to discuss the progress, concerns and problem solving	Planed	2.0		0.5				0.5			0.5			0.5	14
		Actual	0.5		0.5											11
	Total	Planed	100.0	**22.0**	**22.5**	**16.0**	**7.0**	**4.0**	**3.5**	**0.5**	**0.5**	**1.0**	**7.0**	**7.0**	**9.0**	7
		Actual	69.0	**22.0**	**17.5**	**13.0**	**4.0**	**5.0**	**5.5**	**2.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	4
	Planned Progress		0.0 monthly	22.0	22.5	16.0	7.0	4.0	3.5	0.5	0.5	1.0	7.0	7.0	9.0	
			Cumulative	22.0	44.5	60.5	67.5	71.5	75.0	75.5	76.0	77.0	84.0	91.0	100.0	
	Actual Progress		monthly	22.0	17.5	13.0	4.0	5.0	5.5	2.0	0.0	0.0	0.0	0.0	0.0	
			Cumulative	22.0	39.5	52.5	56.5	61.5	67.0	69.0	69.0	69.0	69.0	69.0	69.0	



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

Table 3-16: Biomass Clearance Progress in Each Priority Area as of 31 July 2017

Target area		Biomass clearance area progress in Ha as of 31 July 2017		Remark
Block	Total	Total Progress	Completed Clearance	
B1	109.24	54.06		Verified as 2 July 2017
B2	158.63	90.28	8.54	Verified as 2 Aug 2017
B3	80.35	35.43		Verified as 2 Aug 2017
B4	163.74	137.82	10.33	Verified as 2 Aug 2017
B5	340.14	122.08	5.62	Verified as 2 Aug 2017
B6	31.92	4.18		Verified as 2 Aug 2017
B7	39.65	2.03		Not yet start
B8	37.61	7.78		Not yet start
B9	52.75	1.26		Not yet start
B10	269.1	168.74		To be verified
B11	89.98	89.98		To be verified
B12	64.11	64.03		To be verified
B13	101.24	101.24		To be verified
B14	43.33	43.33		Verified as 2 Aug 2017
B15	43.73	43.73	7.88	Verified as 2 Aug 2017
B16	3.32	3.32		Verified as 2 Aug 2017
B17	7.96	7.96		Verified as 2 Aug 2017

B18	3.95	3.95		To be verified
Total	1,640.75	981.21	32.37	

Explanation notes

Completed clearance: - Complete burning residual logs/debris to ash and only stump remains

Verified / To be verified: - Verification by NNP1 and Biomass Contractor from field inspection plus areal drone record

Figure 3-10: Biomass clearance progress map of Block 1

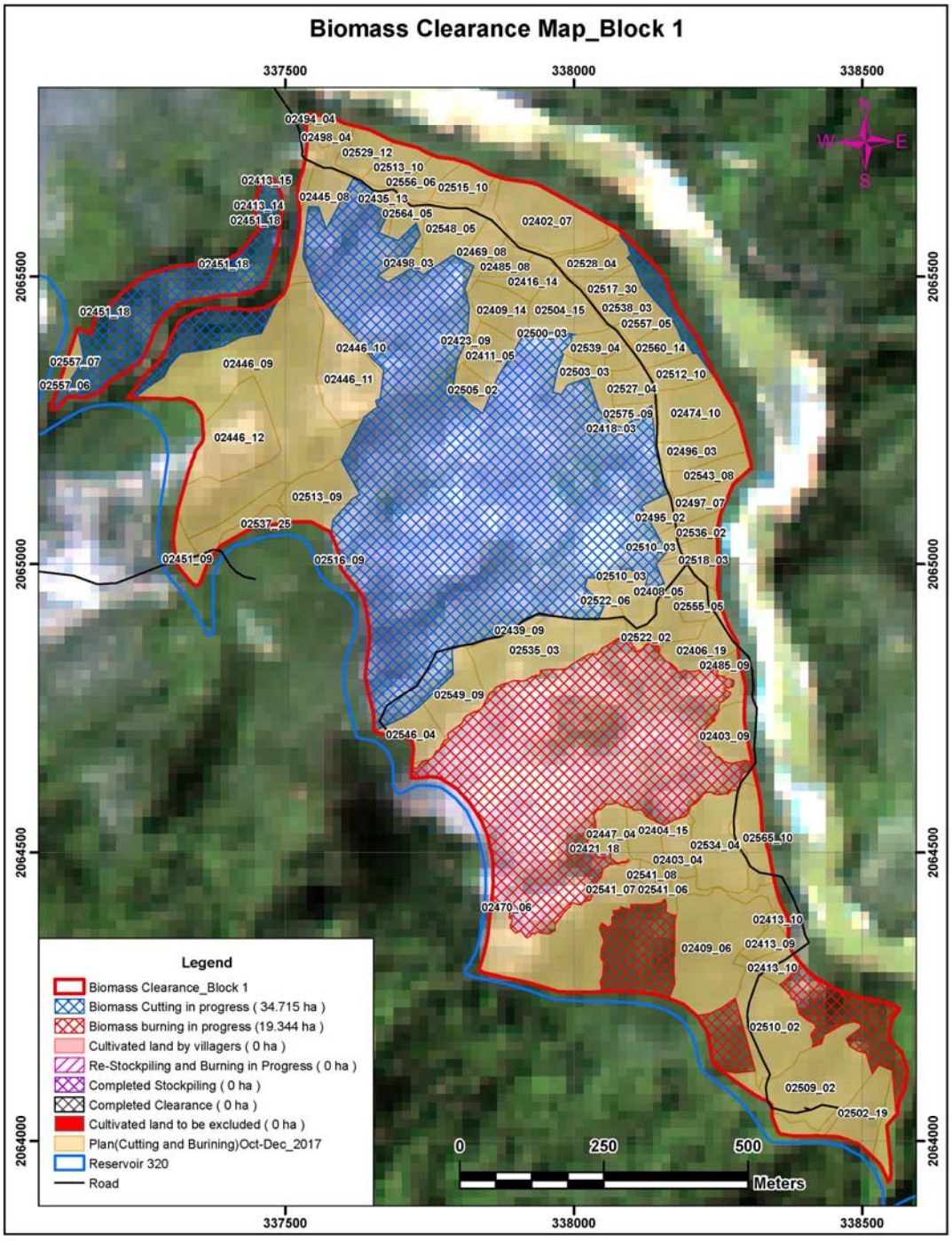


Figure 3-11: Biomass clearance progress map of Block 2

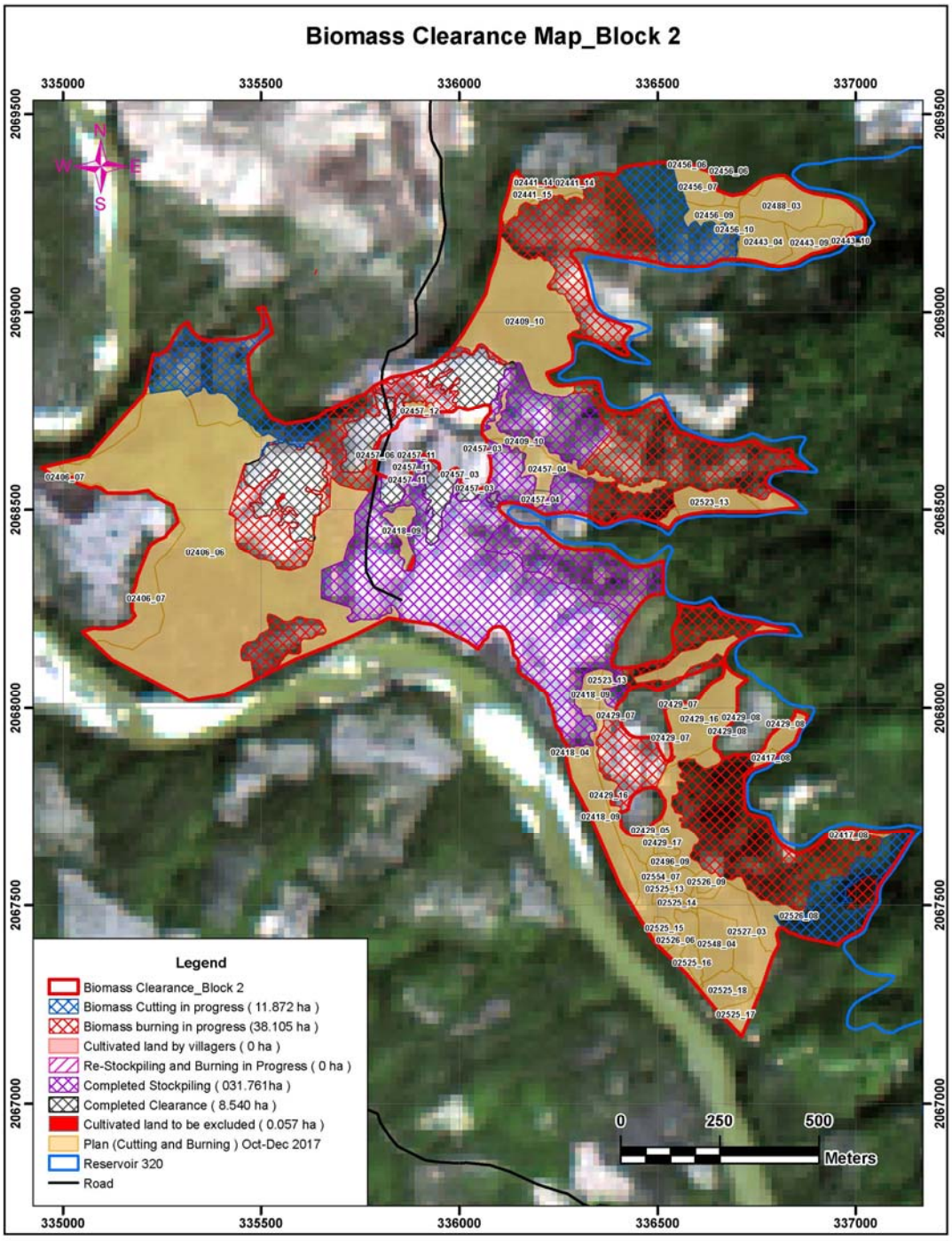


Figure 3-12: Biomass clearance progress map of Block 3

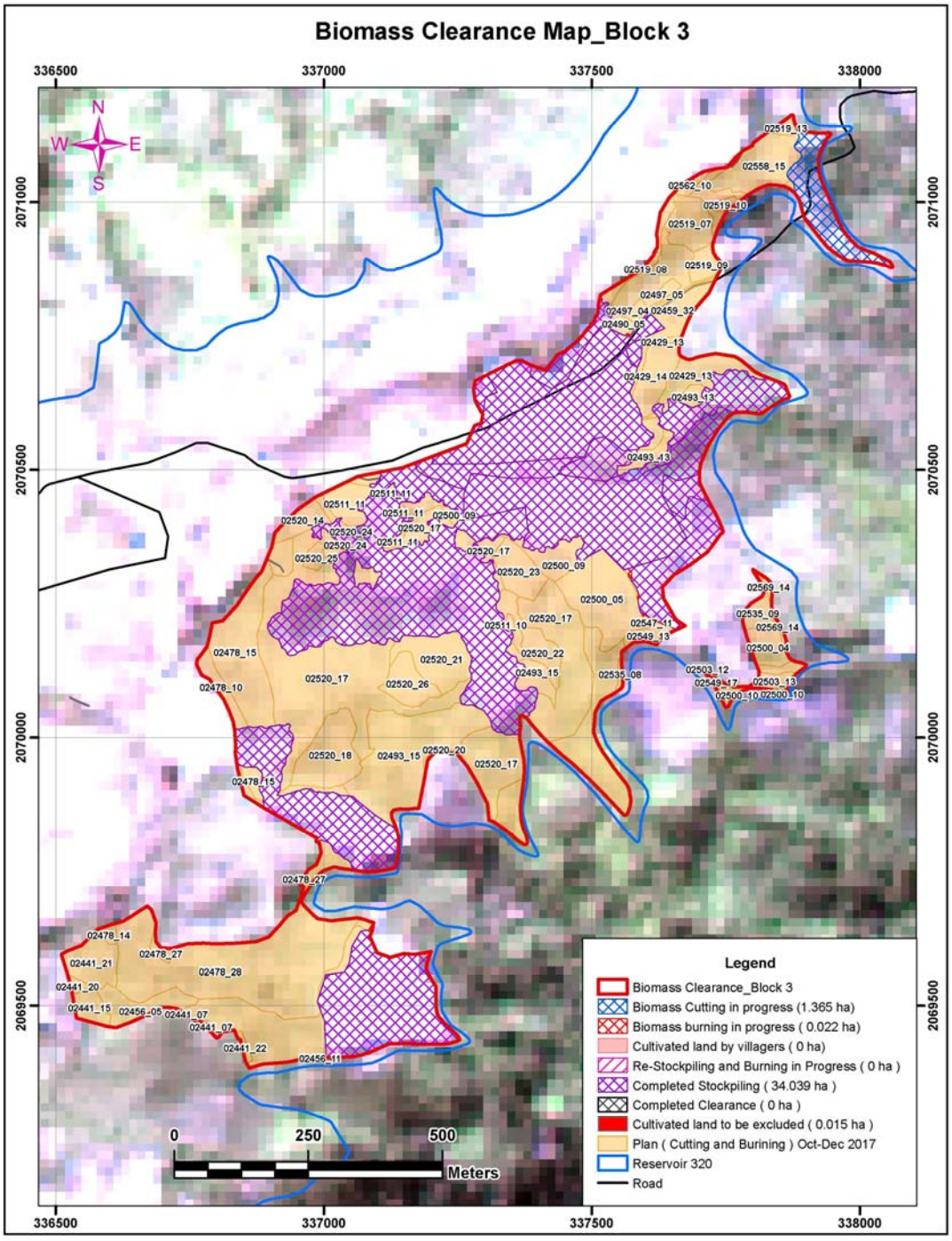


Figure 3-13: Biomass clearance progress map of Block 4

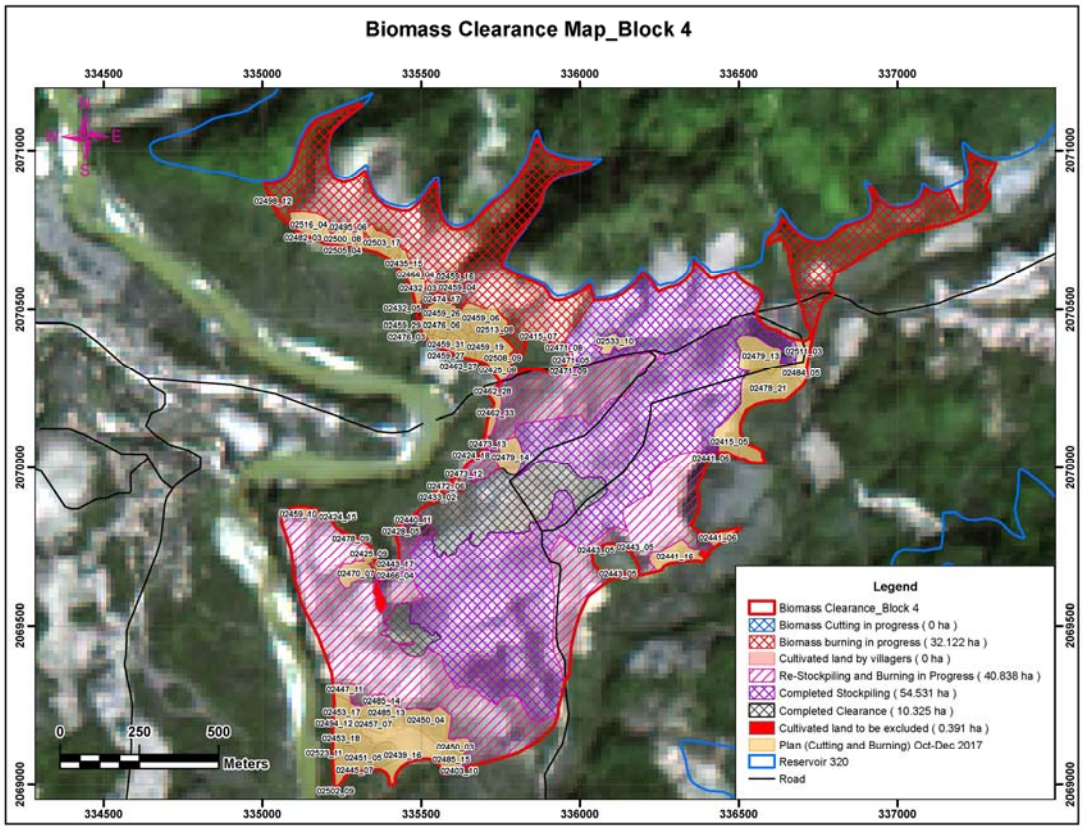


Figure 3-14: Biomass clearance progress map of Block 5

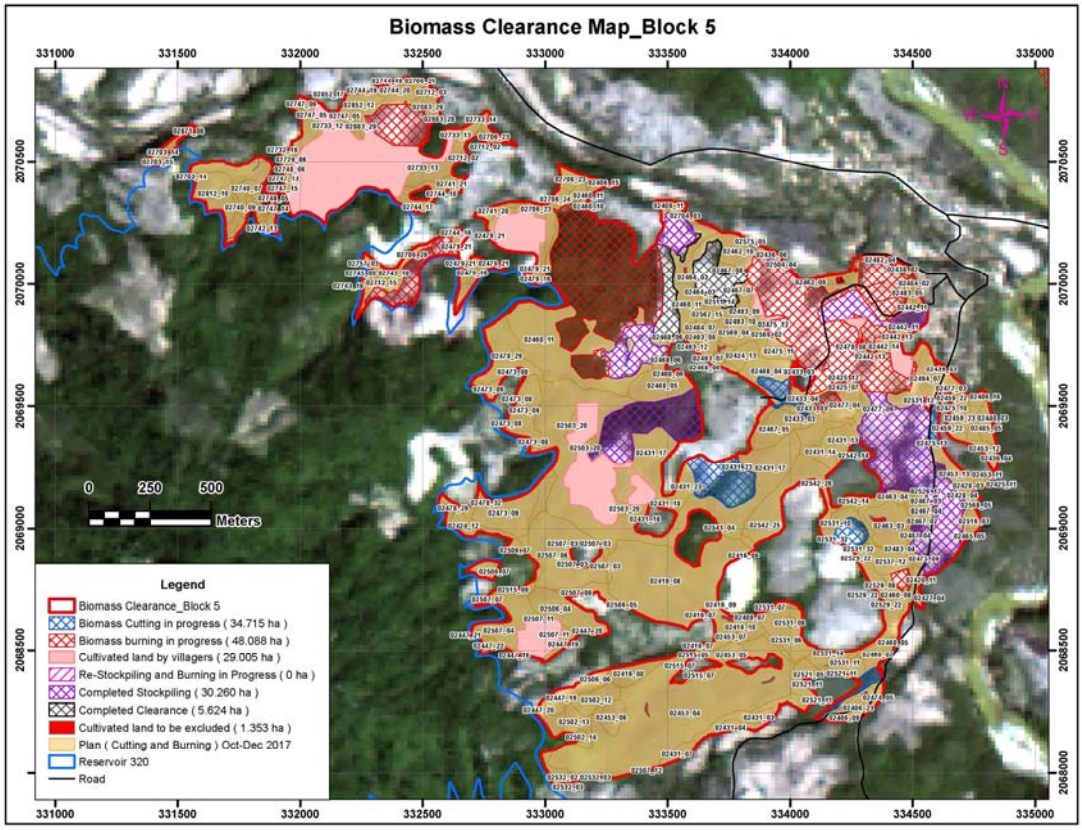


Figure 3-15: Biomass clearance progress map of Block 6

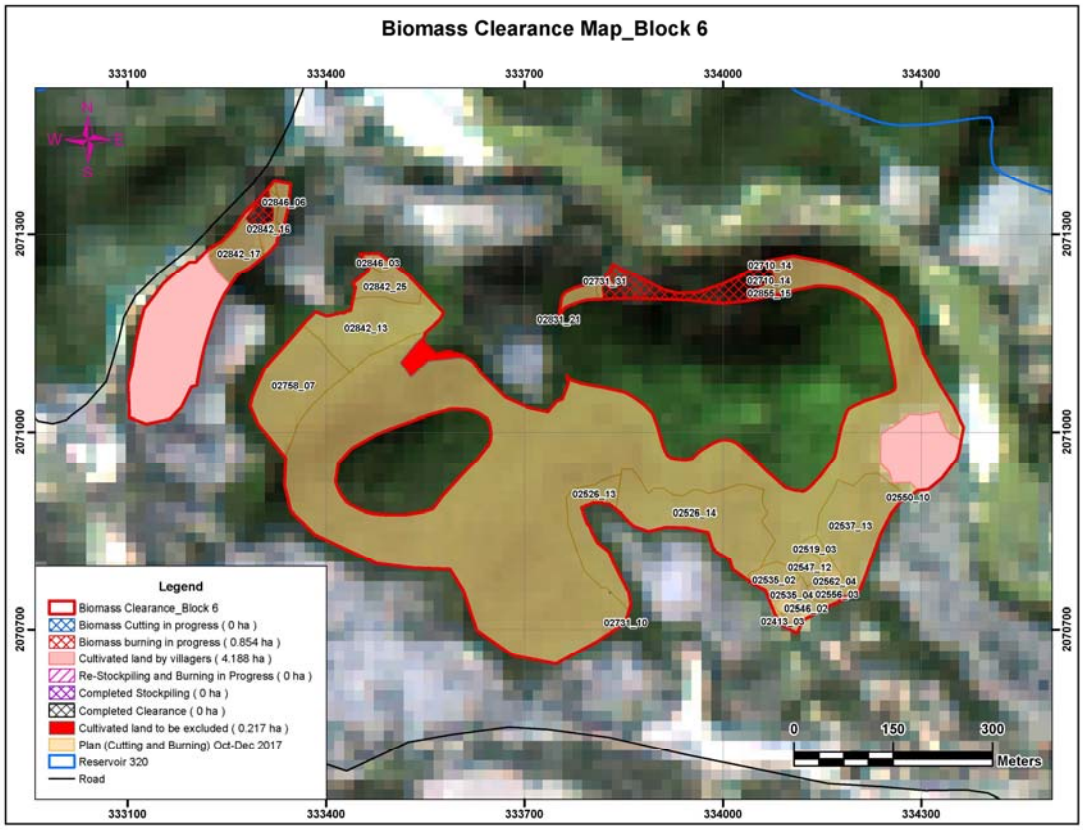


Figure 3-16: Biomass clearance progress map of Block 7

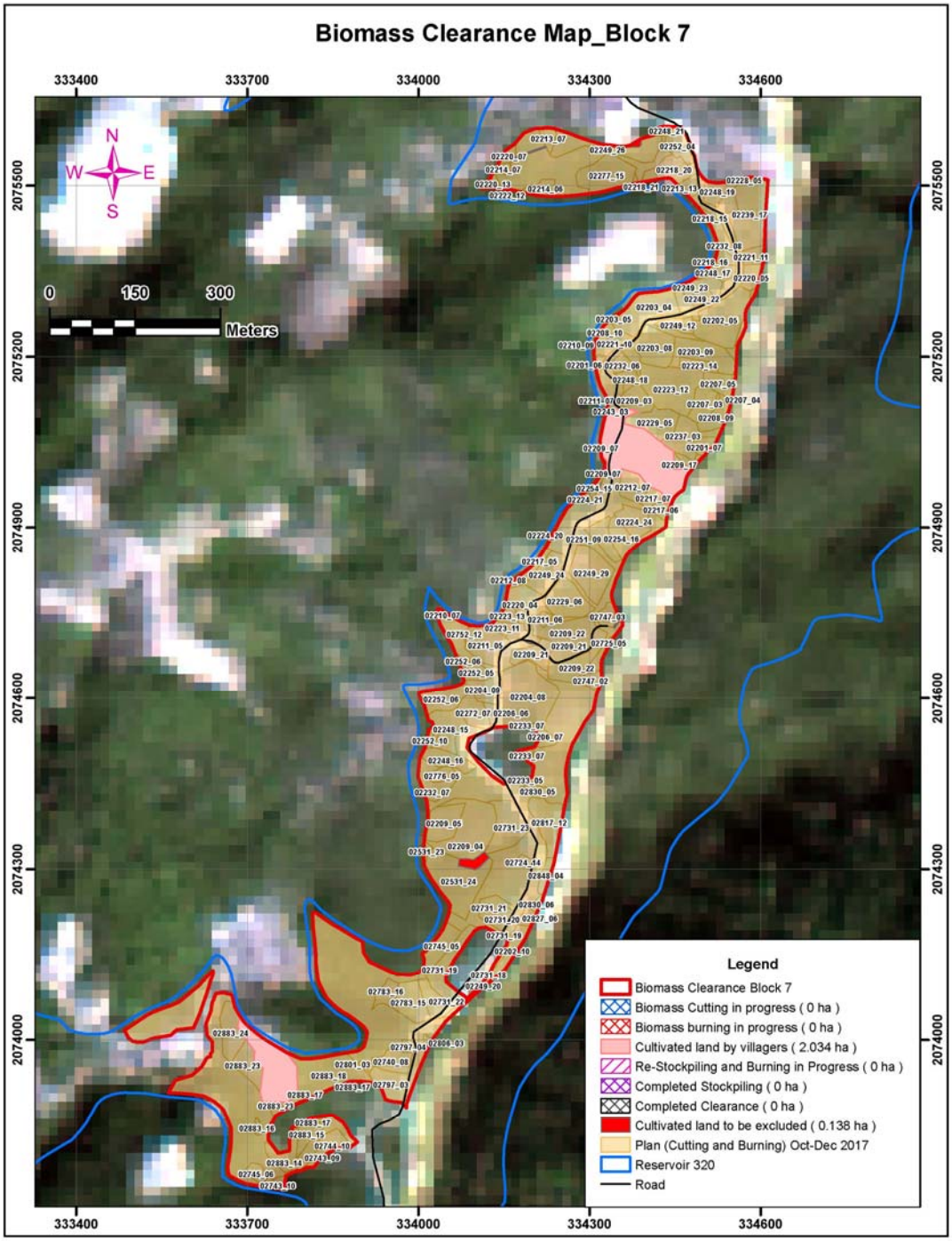


Figure 3-17: Biomass clearance progress map of Block 8

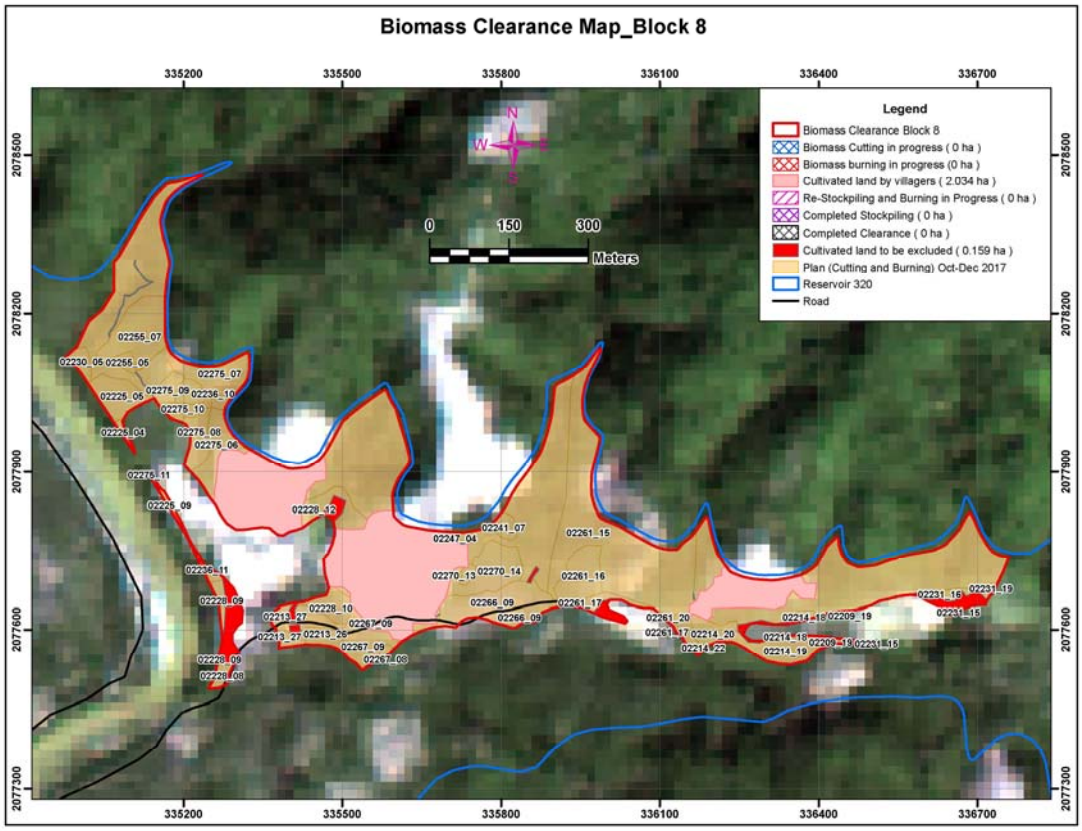


Figure 3-18: Biomass clearance progress map of Block 9

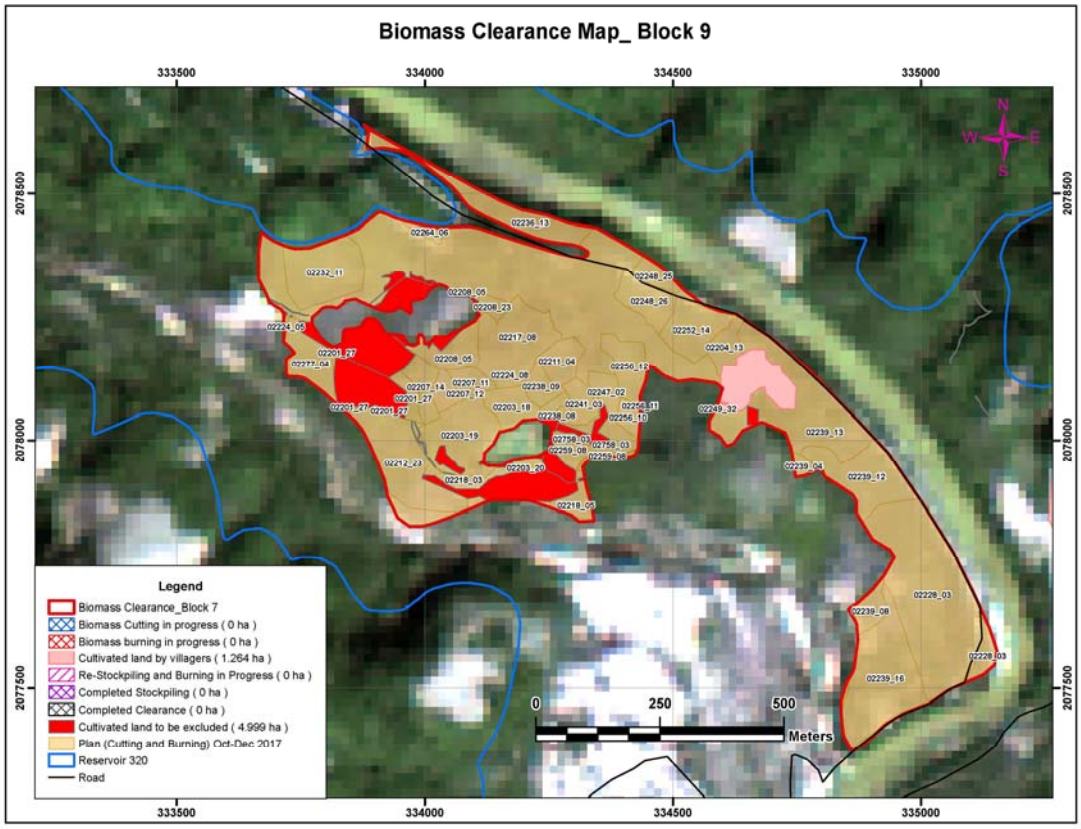


Figure 3-19: Biomass clearance progress map of Block 10

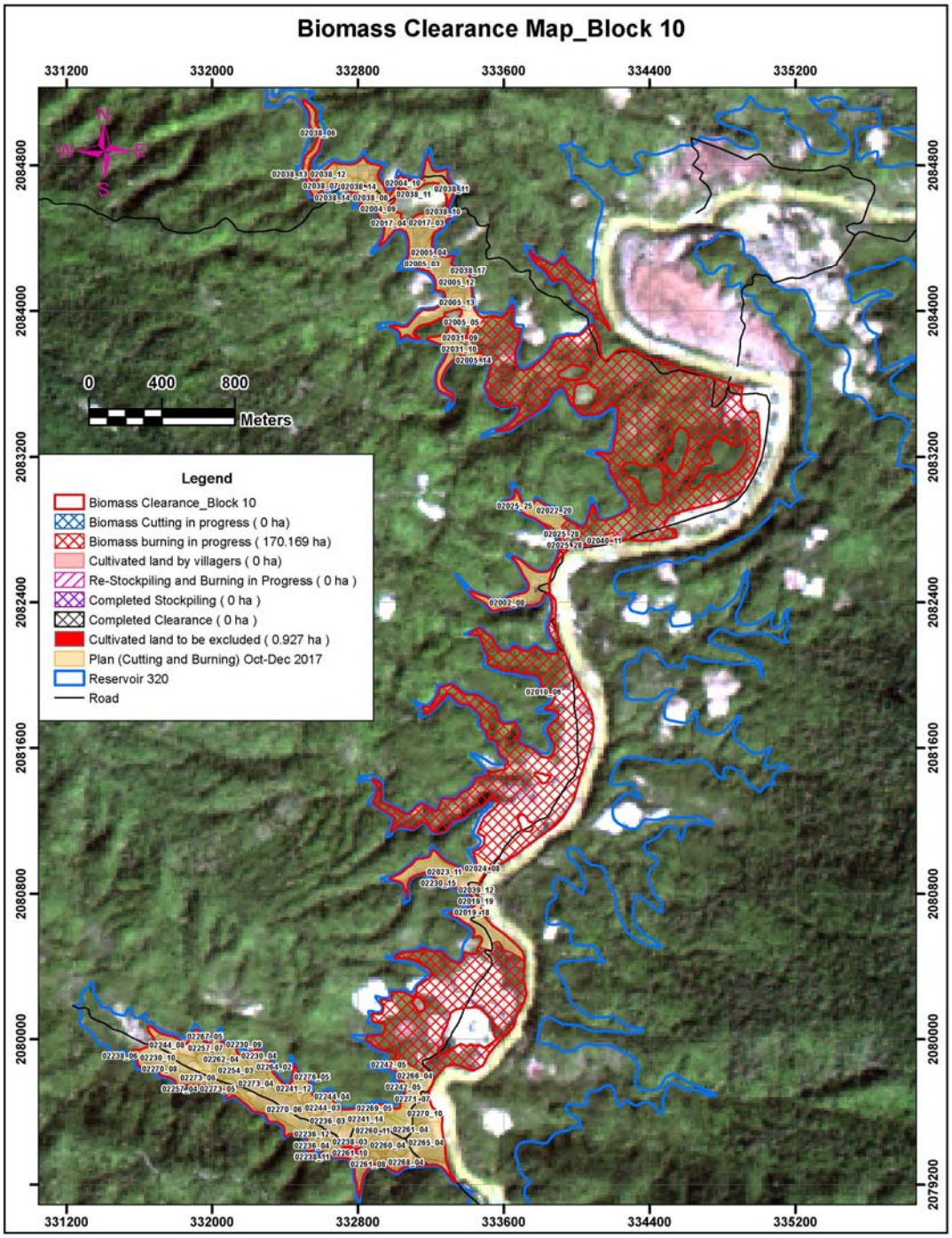


Figure 3-20: Biomass clearance progress map of Block 11

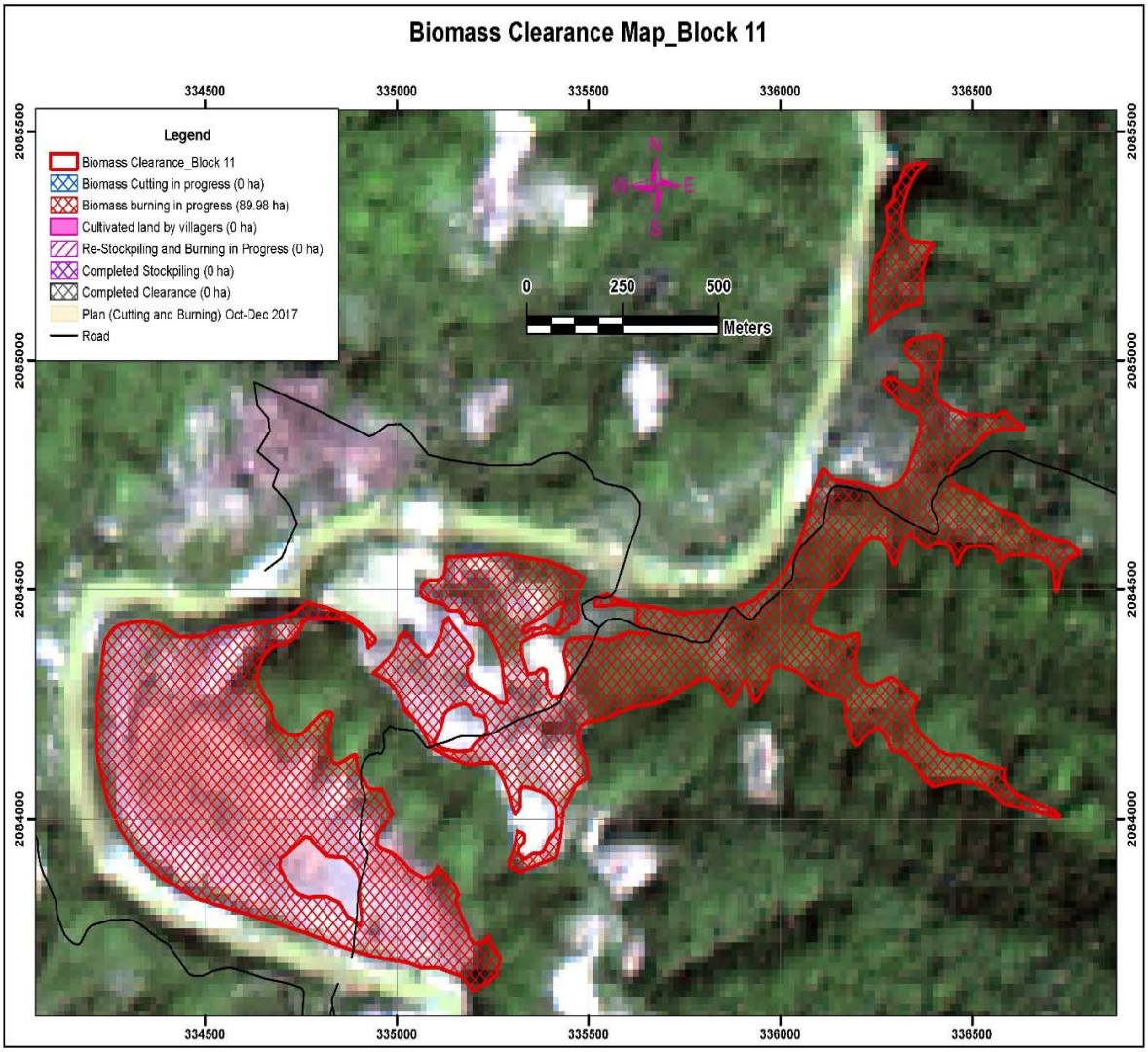


Figure 3-21: Biomass clearance progress map of Block 12

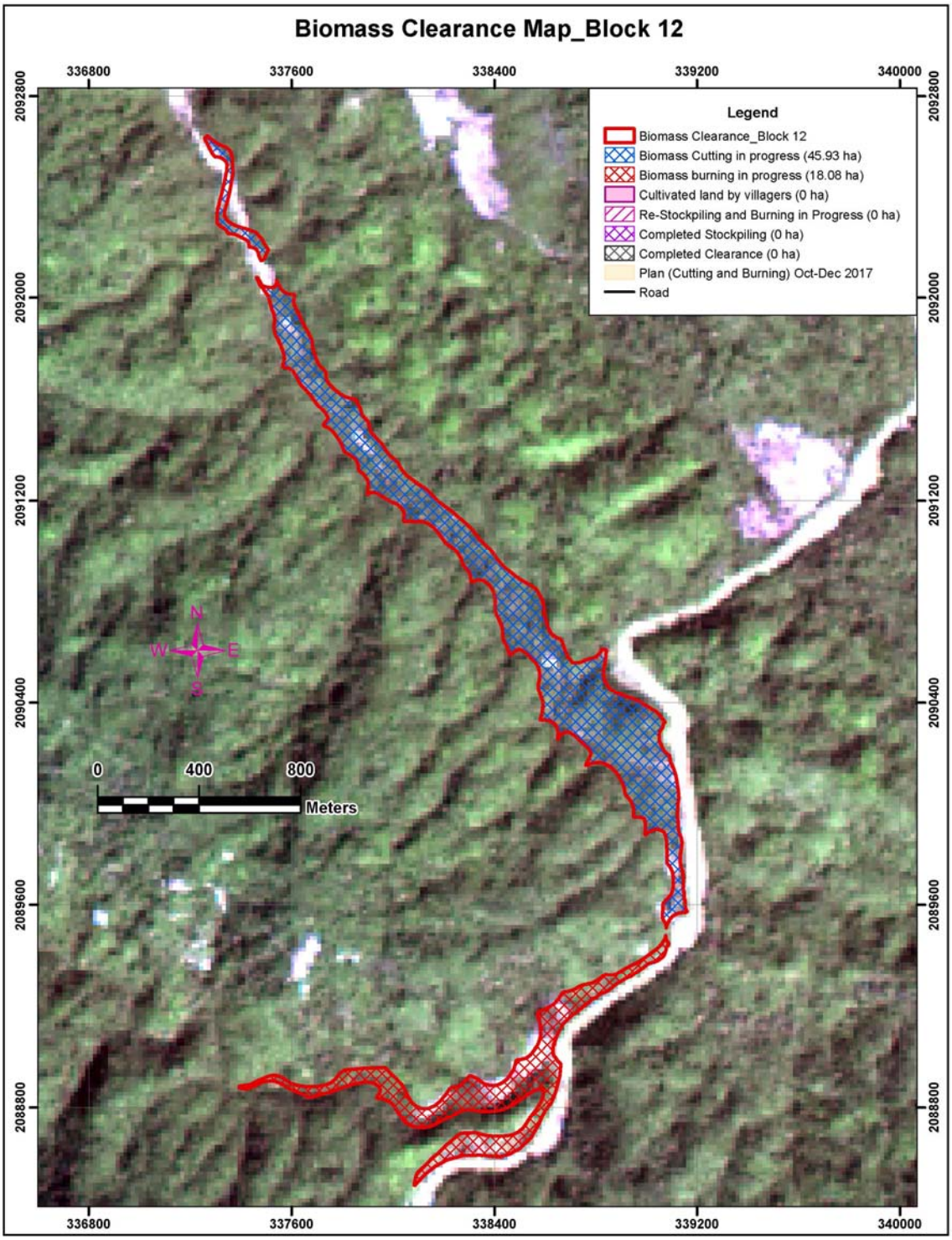


Figure 3-22: Biomass clearance progress map of Block 13

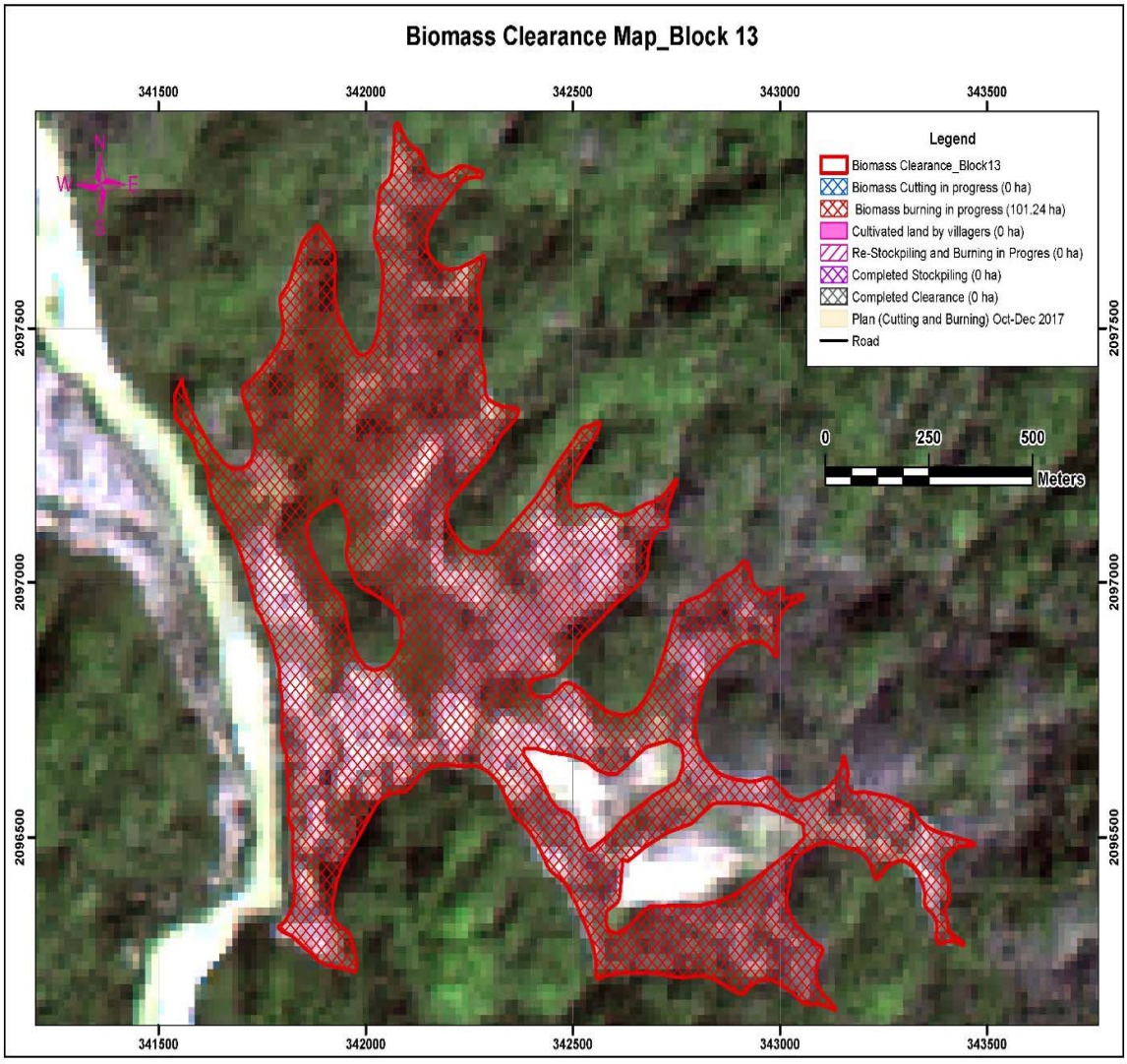


Figure 3-23: Biomass clearance progress map of Block 14

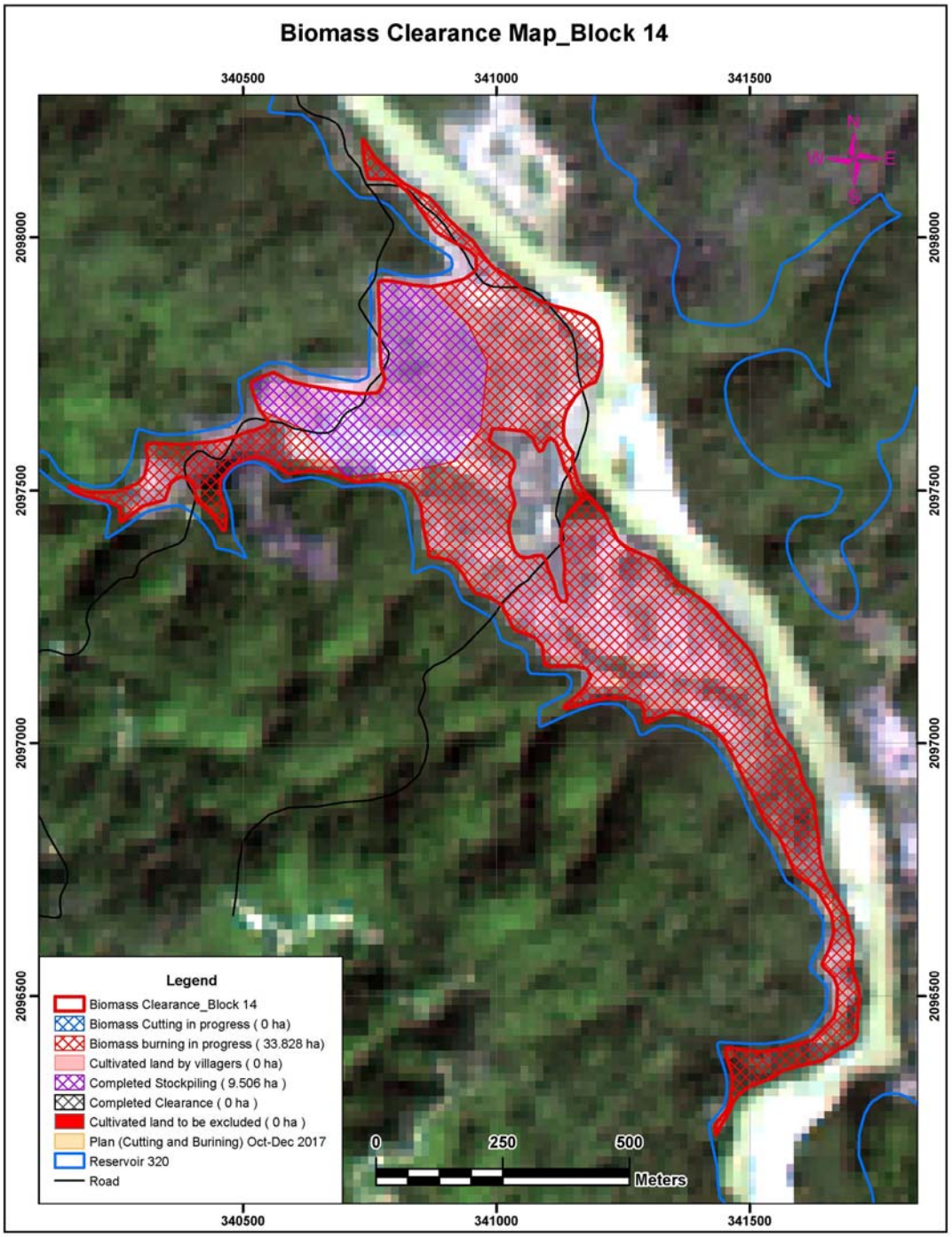


Figure 3-24: Biomass clearance progress map of Block 15-1

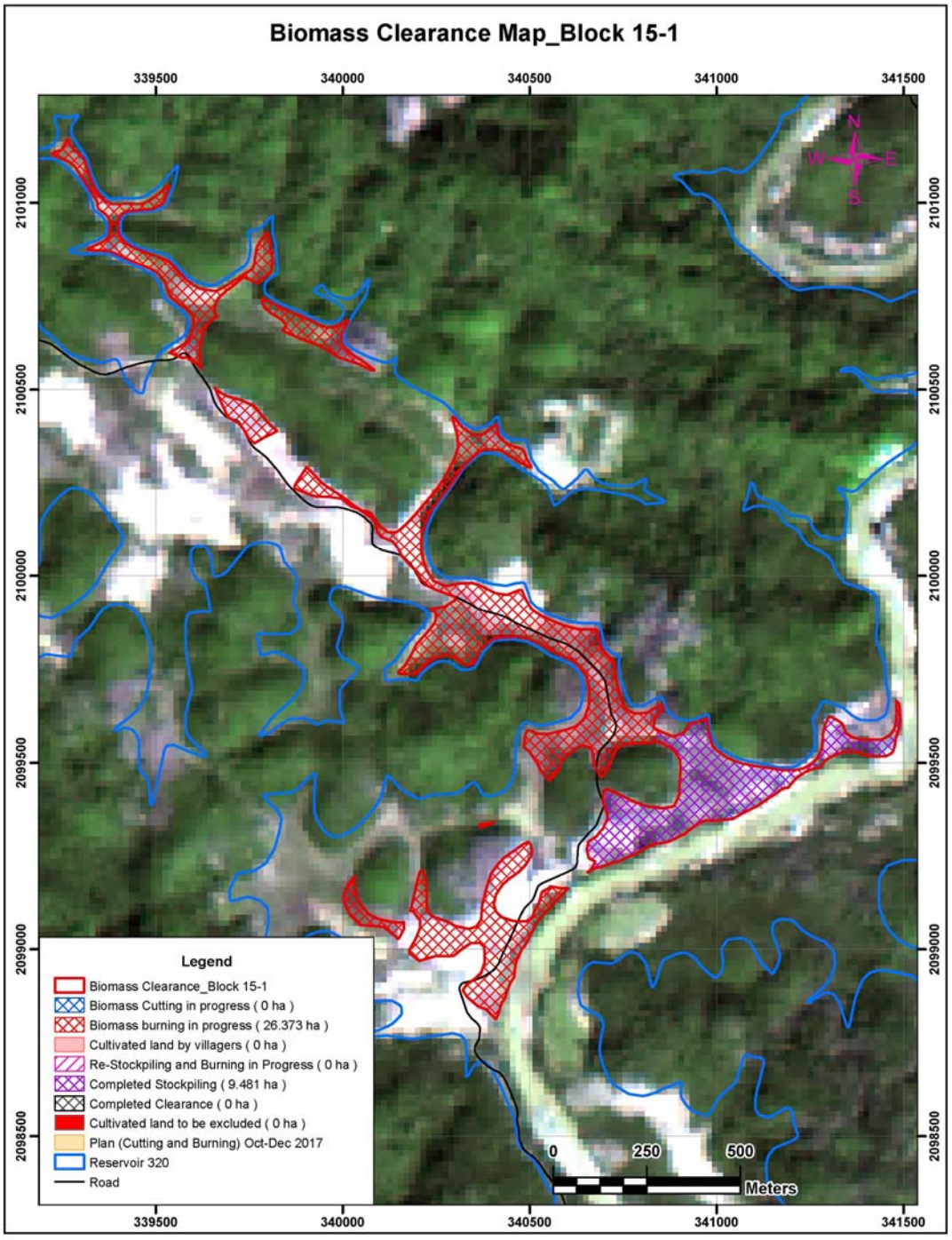


Figure 3-25: Biomass clearance progress map of Block 15-2

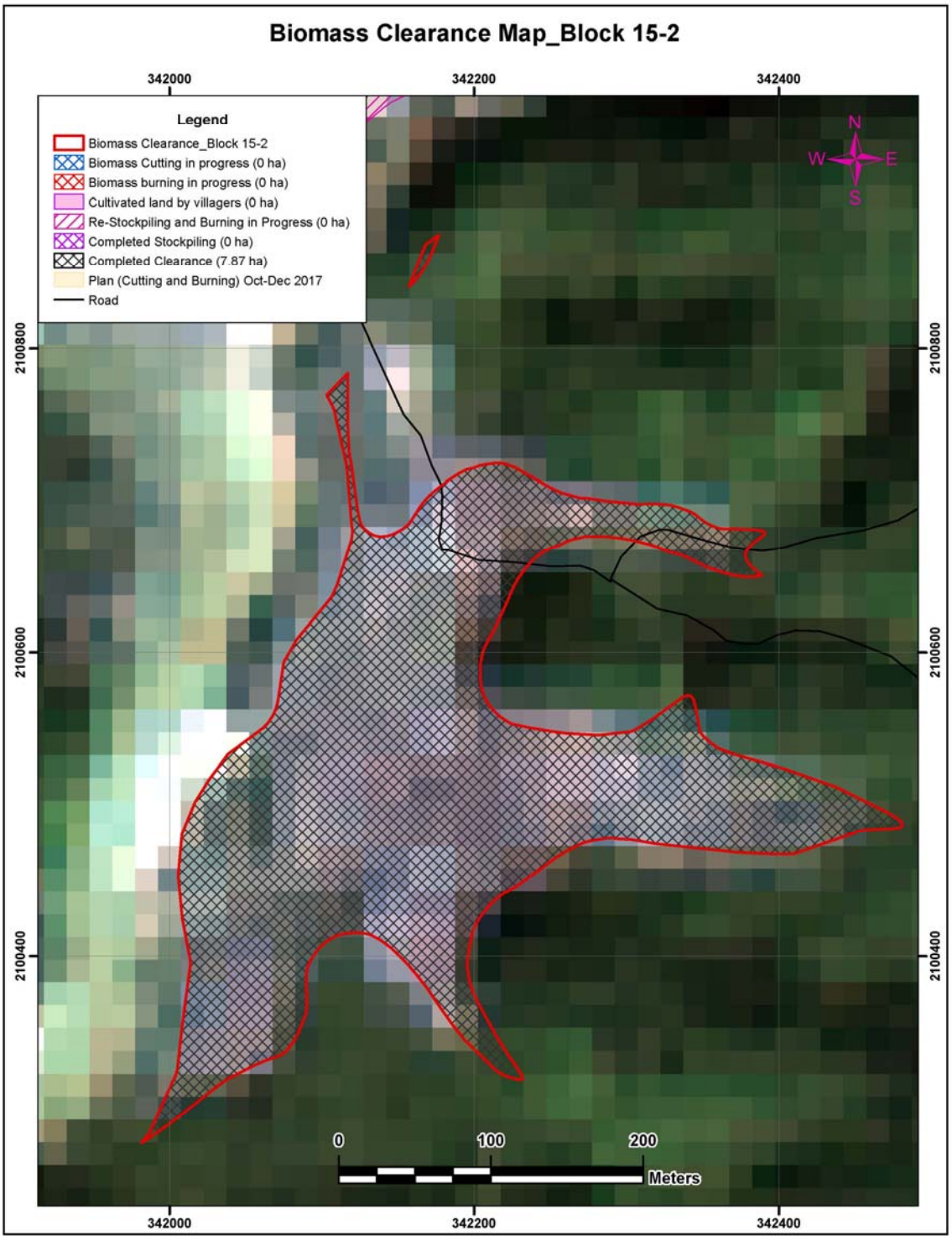


Figure 3-26: Biomass clearance progress map of Block 16

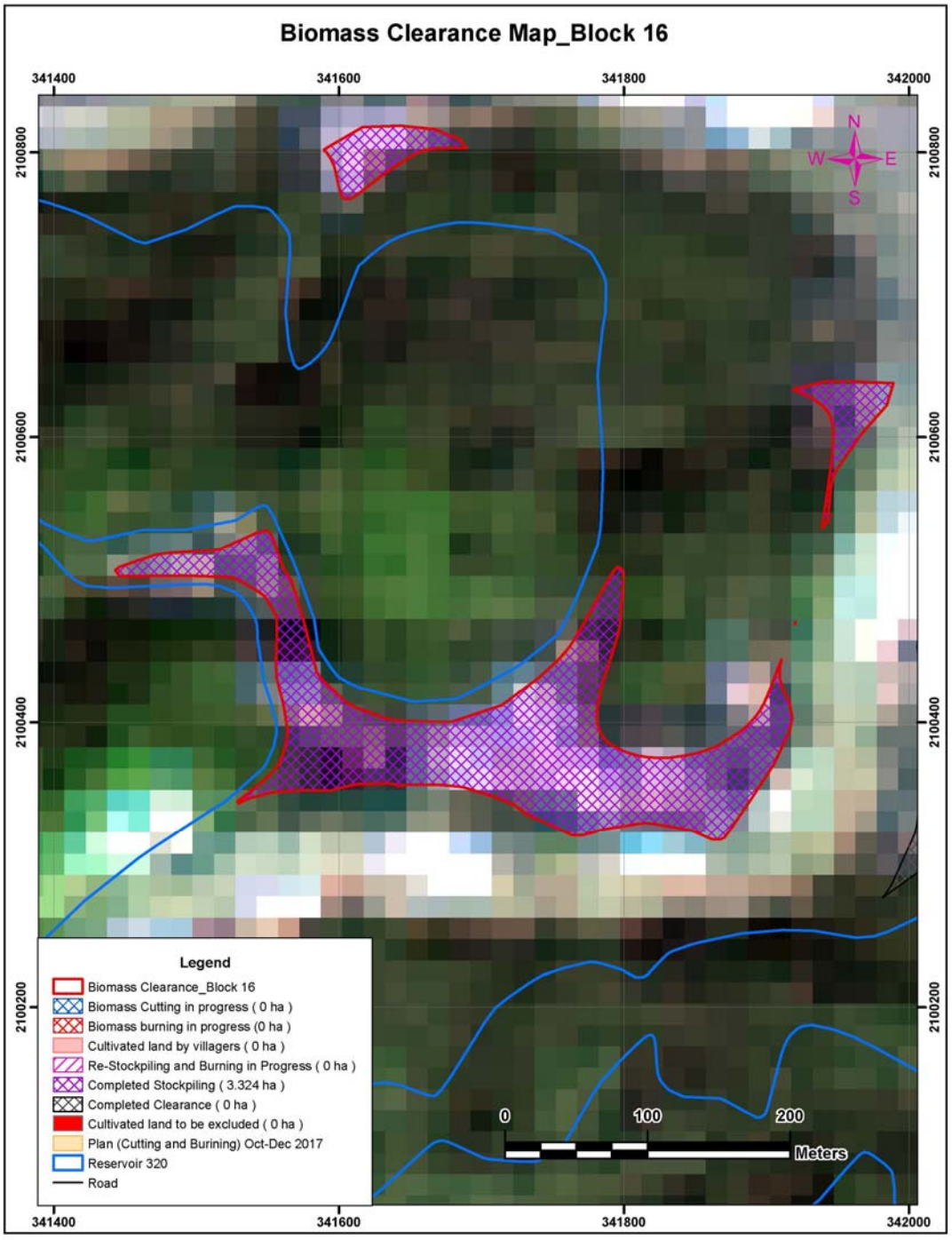


Figure 3-27: Biomass clearance progress map of Block 17

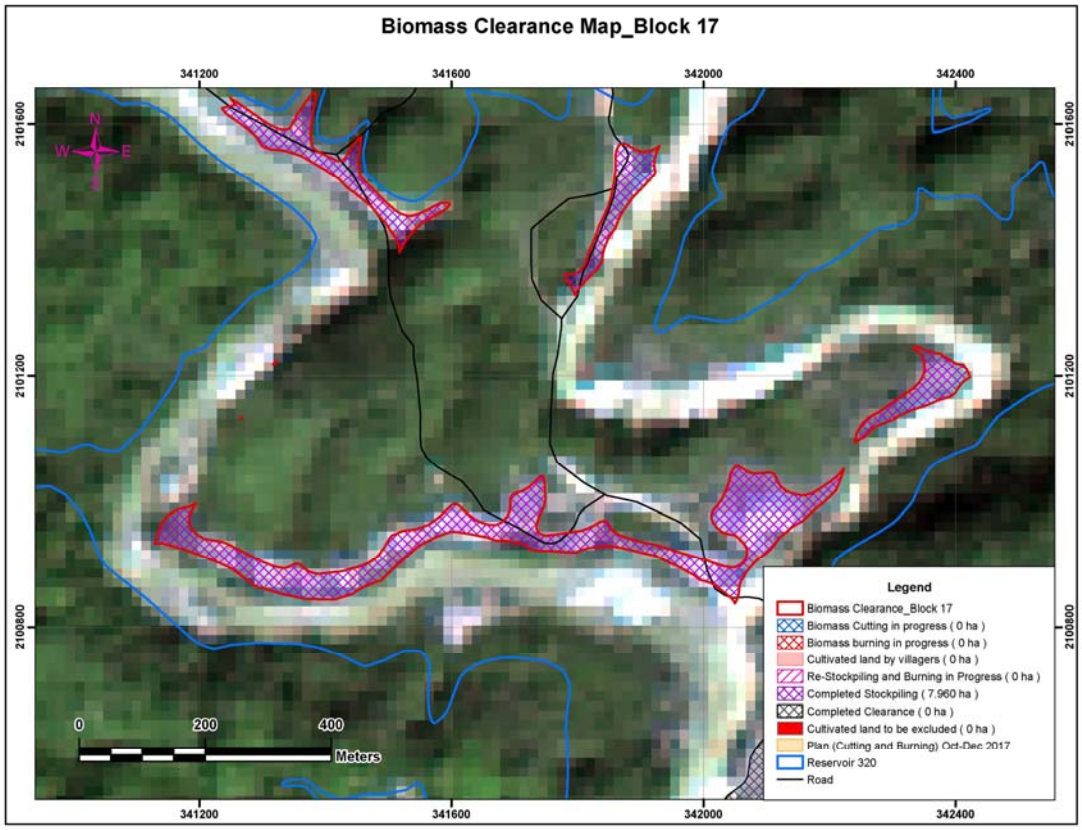
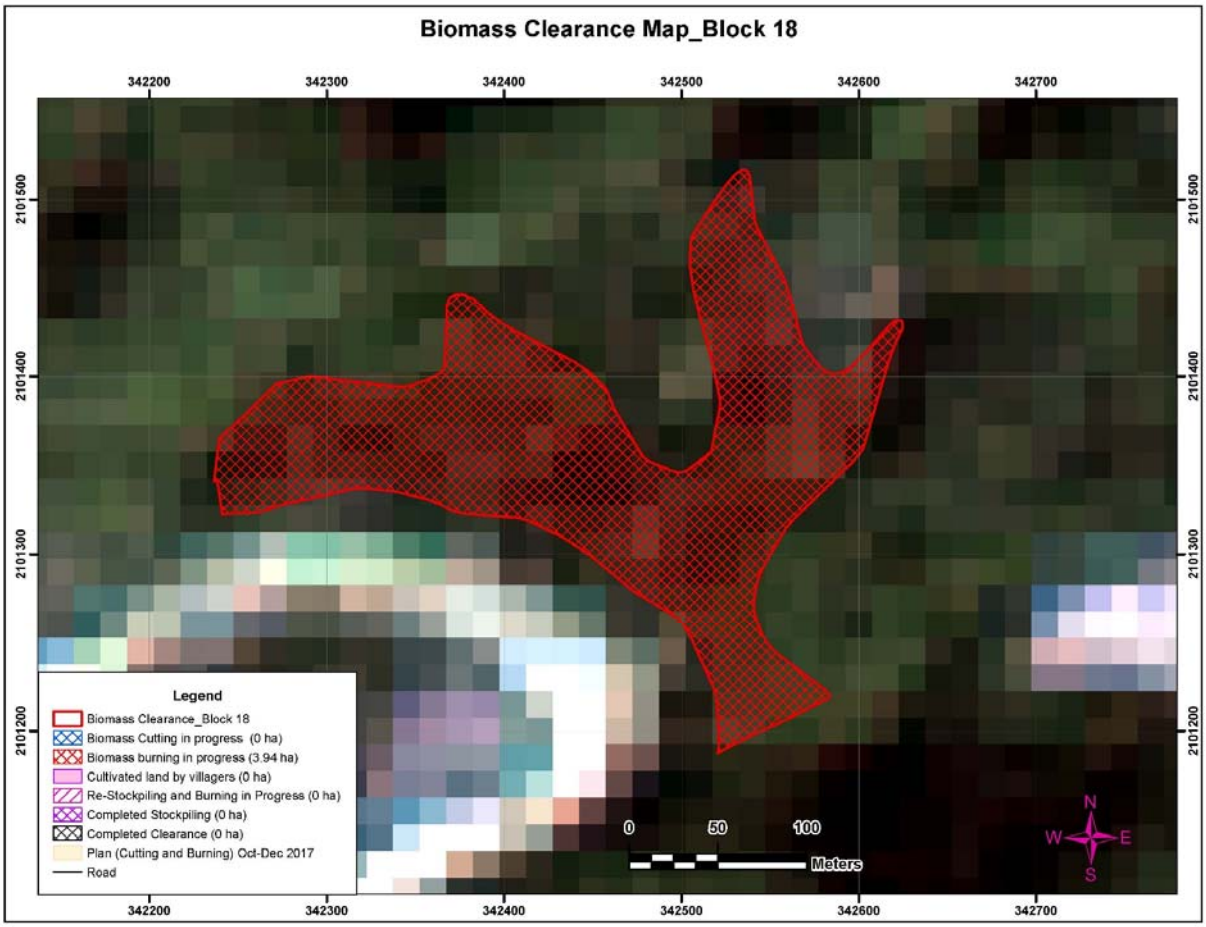


Figure 3-28: Biomass clearance progress map of Block 18



4. FISHERY MONITORING

The fishery monitoring programme is progressing, and a database has been developed to support the future fish management programme as part of the in Nam Ngiep 1 Watershed Management Plan. Two types of the survey were conducted during July 2017 including daily fish catch logbook monitoring and other aquatic animal and fish species verification survey. The gathered information is being put into the database.

The data from the daily fish catch logbook monitoring indicates that the mean daily fish catch in Nam Ngiep River was 2.1 kg/household/day in June2017. The estimated total fish catch in Nam Ngiep basin for June 2017 is 65,200 kg. Around 26% of the catch was sold, 66% was consumed fresh, 5% processed and approximately 3% was used for other purposes.

The overall progress of fish monitoring programme is illustrated in *Error! Reference source not found.* below.

Figure 4-1: Gantt Chart of Fish Monitoring Programme as of 31 July 2017

(a) S-Curve of fish catch monitoring programme

	Task List / Steps of work		Weight (%)	YEAR 2017												% S-Curve	Assigned to
				Q1			Q2			Q3			Q4				
				01	02	03	04	05	06	07	08	09	10	11	12		
1	**Daily catch logbook and Verification Survey**	Planed	-													100	
		Actual	-													97	
1.1	Daily catch logbook data collection on 108 HHs in 25 villages	Planed	24	2	2	2	2	2	2	2	2	2	2	2	2	94	NNP1 EMO Fish Monitoring Team
		Actual	14.0	1.5	2.0	3.0	2.0	1.5	2.0	2.0						91	
1.2	Daily catch logbook verification survey for Q2 2016 to Q1 2017 on 144 HHs	Planed	4	2		2										88	NNP1 EMO Fish Monitoring Team
		Actual	4	2		2										85	
1.3	GPS for Fishing location cover 25 villages	Planed	8				2	2	2	2						82	NNP1 EMO Fish Monitoring Team
		Actual	-													79	
1.4	Make the posters for fish species and fishing gear composition along Nam Ngiep River	Planed	2											2		76	NNP1 EMO Fish Monitoring Team
		Actual	-													74	
2	**Species Veification Survey**	Planed	-													71	
		Actual	-													68	
2.1	Survey design, interview form design, test and development	Planed	2		2											65	Consultant and NNP1 EMO Fish Monitoring Team
		Actual	2						2							62	
2.2	Data collection and validation on 108 HHs	Planed	8		2	3	3									59	NNP1 EMO Fish Monitoring Team
		Actual	8						6	2						56	
3	**Fish Migration and Spawning Survey**															53	
																50	
3.1	Survey design, interview form design, test and development	Planed	2	2												47	Consultant and NNP1 EMO Fish Monitoring Team
		Actual	2	2												44	
3.2	Data collection and validation on 88 experience fishers	Planed	12	6	6											41	NNP1 EMO Fish Monitoring Team
		Actual	12	2	7	3										38	
4	**Data management and report**															35	
																32	
4.1	Data input to database system	Planed	24	2	2	2	2	2	2	2	2	2	2	2	2	29	NNP1 EMO Fish Monitoring Team / NNP1 ESD Database Team
		Actual	13.5	1.0	2.0	2.0	1.5	3.0	2.0	2.0						26	
4.2	Annual Data analysis and draft annual report for 2016-2017	Planed	5							5						24	Consultant
		Actual	5						2	3						21	
4.3	Disemination/presentation the report for 2016-2017	Planed	5							5						18	Consultant
		Actual	5							5						15	
4.4	Final Annual Report for 2016-2017	Planed	4								4					12	Consultant
		Actual	-													9	
	Total	Planed	**100**													6	
		Actual	**66**													3	
		Planned Progress	monthly	14	14	9	9	6	6	16	8	4	4	6	4		
			Cumulative	14	28	37	46	52	58	74	82	86	90	96	100		
		Actual Progress	monthly	9	11	10	4	5	14	14	-	-	-	-	-		
			Cumulative	9	20	30	33	38	52	66	66	66	66	66	66		
	Budget Code EL4.03	Approved	USD	6,410	810	4,610	1,610	4,610	610	8,630	78	2,711	1,528	4,541	278		36,425
		Actual Paid	USD														-

The blue line and yellow highlights represent the planned activity, and the red line and green highlight represent the actual progress

(a) S-Curve gillnet sampling

Final- **24 August 2017**

	Task List / Steps of work		Weight (%)	YEAR 2017												% S-Curve	Assigned to
				Q1			Q2			Q3			Q4				
				01	02	03	04	05	06	07	08	09	10	11	12		
1	Conduct quarterly gillnet survey	Planed	52	-	3	5	5		10	3	10	3		10	3	100	NNP1 EMO Fish Monitoring Team
		Actual	13	-	2	-	3	8	-	-		-		-	-	95	
2	Survey report	Planed	30	-				6		6		6	-	6	6	90	NNP1 EMO Fish Monitoring Team
		Actual	6	-	-	-	-		6	-	-		-	-	-	85	
3	Data analysis	Planed	12	-	-		-	-		-	-		-		12	80	NNP1 EMO Fish Monitoring Team
		Actual	-	-	-	-	-	-	-	-	-	-	-	-	-	75	
4	Final report	Planed	12	-	-	-	-	-	-	-	-	-	-	-	12	70	NNP1 EMO Fish Monitoring Team
		Actual	-	-	-	-	-	-	-	-	-	-	-	-	-	65	
5		Planed	-	-	-	-	-	-	-	-	-	-	-	-		60	0
		Actual	-	-	-	-	-	-	-	-	-	-	-	-	-	55	
6		Planed	-	-	-	-	-	-	-	-	-	-	-	-		50	0
		Actual	-	-	-	-	-	-	-	-	-	-	-	-	-	45	
7		Planed	-	-	-	-	-	-	-	-	-	-	-	-	-	40	0
		Actual	-	-	-	-	-	-	-	-	-	-	-	-	-	35	
8		Planed	-	-	-	-	-	-	-	-	-	-	-	-	-	30	0
		Actual	-	-	-	-	-	-	-	-	-	-	-	-	-	25	
9		Planed	-	-	-	-	-	-	-	-	-	-	-	-	-	20	0
		Actual	-	-	-	-	-	-	-	-	-	-	-	-	-	15	
	Total	Planed	**106**													10	
		Actual	**19**													5	
		Planned Progress	monthly		5	5	5	6	10	9	10	9	-	16	33		
			Cumulative	-	3	8	13	19	29	38	48	57	57	73	106		
		Actual Progress	monthly	-	2	-	3	8	6	-	-	-	-	-	-		
			Cumulative	-	2	2	5	13	19	19	19	19	19	19	19		
	Budget Code EW1.02	Approved	USD		6,000	-	1,000	-	1,000	-	1,000	-	-	1,000	-		10,000
		Actual Paid	USD	-	-	-	-	-	-	-	-	-	-	-	-		-

*The blue line and yellow highlights represent the planned activity, and the red line and green highlight represent the actual progress

Activities in July 2017	Results
Daily Catch Logbook and Verification Survey	• Completed the daily catch logbook survey in 99 households out of the total target of 108 households, 3,708 forms were used in the survey, household of Zone 2LR resettled already. • A fishery database has been developed. • The daily household catch on average for Nam Ngiep in June 2017 is 2.1 kg/household/day. The median catch for all fishing zone is presented in Figure 1-12. • The estimated total catch for Nam Ngiep in June 2017 is approximately 65,200 kg as shown in *Error! Reference source not found.*.
Household Catch Assessment Survey	• Completed.
Village Community Interview	• On progress for data analysis and reporting by fishery consultant.
Fish Migration and Spawning survey	• Data was included in the annual report.
Gillnet Sampling Survey	• Completed data collection at 7 stations included some water quality measurement, setting and retrieving gillnet and fish size measurement. • Mission report was summited by Consultant on 11 July 2017.
Other related	• Draft Annual Fisheries Report 2016-2017 was submitted by Consultant on 12 July 2017. • Consultant presented the results of annual report on 27 July 2017.

Figure 4-2: *Median daily household catch by fishing zone and Nam Ngiep mean value for all fishing zones combined (Kg/HH/day)*

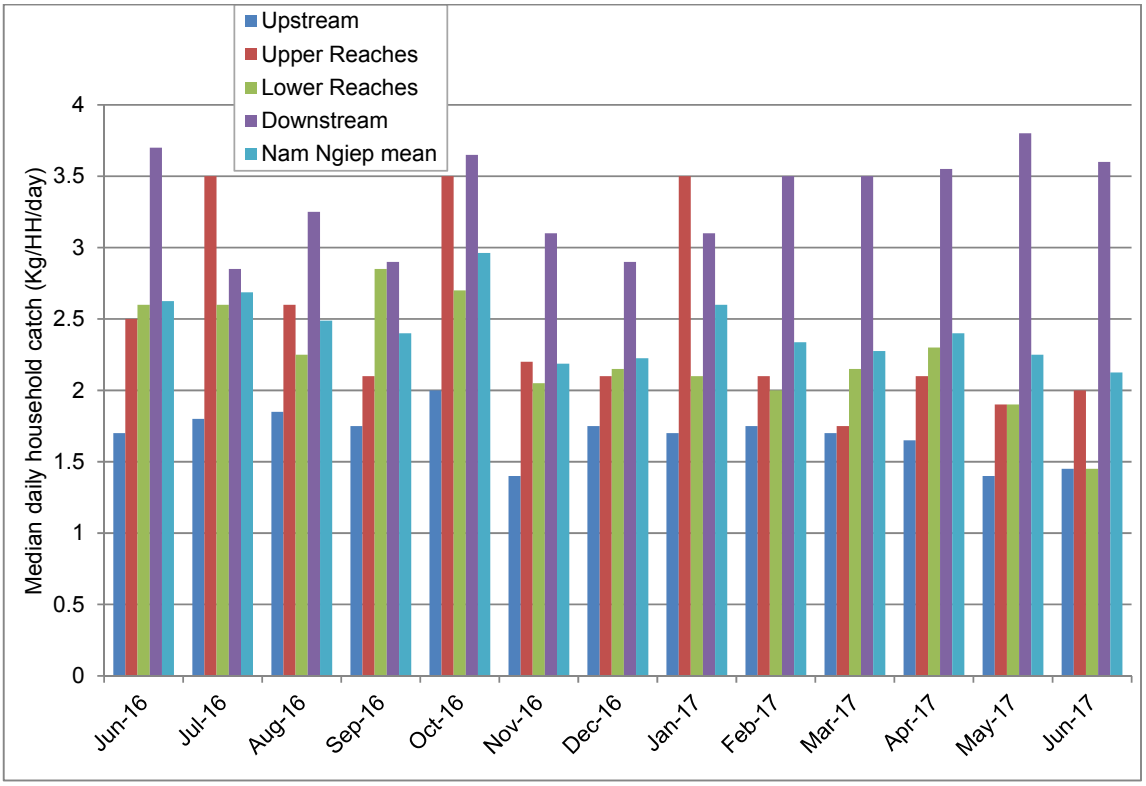
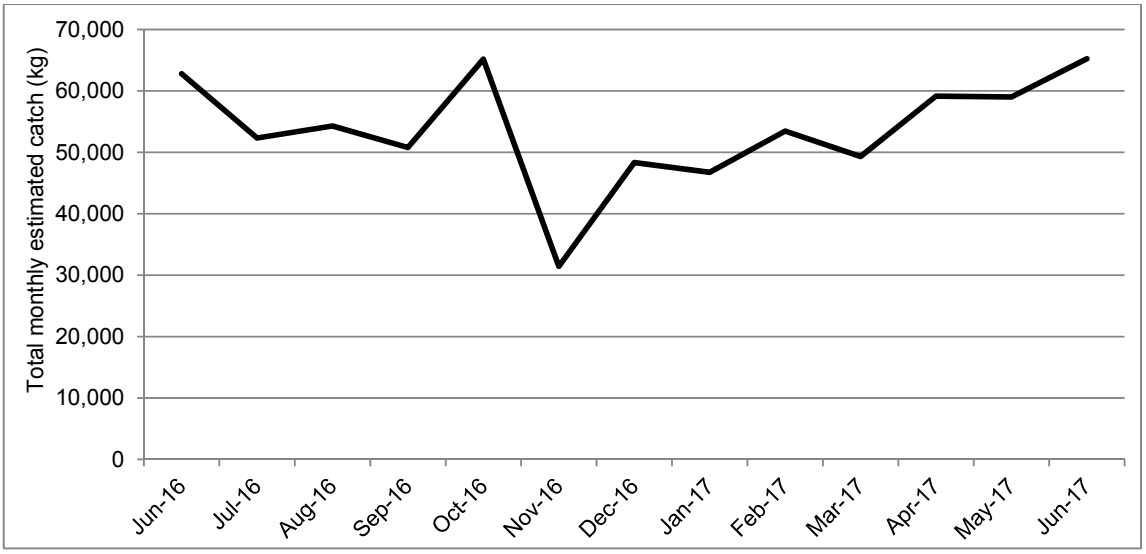


Figure 4-3: Total estimated fish catch for Nam Ngiep by month (Kg)



4.1 Other Support Programmes

4.1.1 Environmental Protection Fund (EPF)

The EMO team completed another round of review of the revised EPF sub-project proposal of Xaysomboun and Xieng Khuang on 23 March 2017 for further improvement. After a long

lag, the EPF team confirmed that the proposals of Xaysomboun and Xieng Khuang Province have been signed by Department of Forestry (DOF) of Ministry of Agriculture and Forestry (MOF) and are being further processed for approval of EPF Committee.

EPF informed at the end of July 2017 that the proposals of Xaysomboun and Xieng Khuang Province were not accepted by the EPF Committee. After further improvement, the EPF team requested another round of review from NNP1 and further discussion with NNP1 was scheduled in August 2017.

The Bolikhamxay sub-project implementation team have considered the comments from NNP1 EMO on the detail info / documentation on the progress report and provided clarification notes on relevant topics such as detailed activities and updated GIS maps of the Houay Ngoua PPA boundary and village land use of the 5 villages within the PPA. However, after several follow up until end of July 2017 there is still no update on the land use information of the 5 villages within the PPA.

4.1.2 115 kV Transmission Line IEE Due Diligence Assessment

The draft IEE that was concurrently reviewed by EDL was shared with NNP1PC on 21 June 2017, the EMO will start the review of the received draft IEE. The due diligence assessment (DDA) is initiated at the end of July based on the draft IEE. DDA will be submitted to the ADB by 15 August 2017.

4.2 External Monitoring

There was no external monitoring during the reported period.

4.2.1 Biodiversity Advisory Committee

There was no BAC activity during the reported period.

ANNEXES

ANNEX A: RESULTS OF EFFLUENT ANALYSES

Table A- 1: Results of Camp Effluents in July 2017 (first mission)

	Site Name	Owner's Site Office and Village		Obayashi Camp WWTS1		TCM Camp	
	Station Code	EF01		EF02		EF03	
	Date	07-Jul-17	19-Jul-17	07-Jul-17	19-Jul-17	07-Jul-17	19-Jul-17
Parameter (Unit)	Guideline in the CA						
pH	6.0-9.0	7	6.77	7	7.46	No Discharge	No Discharge
Sat. DO (%)		48.8	35	7.29	1.8		
DO (mg/l)		3.5	2.62	2.21	0.14		
Conductivity (µS/cm)		382	217.7	663	353		
TDS (mg/l)		192	108.8	331	176		
Temperature (°C)		27.58	28.6	28.72	29.1		
Turbidity (NTU)		1.69	1.03	15.59	10.41		
TSS (mg/l)	<50	ND[16]	ND[16]	15.25	17.31		
BOD_5 (mg/l)	<30	ND[13]	29.7	ND[13]	48.45		
COD (mg/l)	<125	ND[18]	ND[18]	71.8	41.1		
NH_3-N (mg/l)	<10	4	ND[12]	19	11		
Total Nitrogen (mg/l)	<10	14	8.98	26.7	16.1		
Total Phosphorus (mg/l)	<2.0	0.58	1.13	0.61	0.78		
Faecal Coliform (MPN/100ml)		490	13	0	3500		
Total Coliform (MPN/100ml)	<400	490	130	0	3500		
Oil & Grease (mg/l)	<10	ND[13]	N/A	ND[13]	N/A		

	Site Name	Sino Hydro Camp		Song Da 5 Camp No.1		Song Da 5 Camp No.2	
	Station Code	EF06		EF07		EF08	
	Date	07-Jul-17	19-Jul-17	07-Jul-17	19-Jul-17	07-Jul-17	19-Jul-17
Parameter (Unit)	Guideline in the CA						
pH	6.0-9.0	7	7.27	6	7.3	7.37	7.34
Sat. DO (%)		28.7	33.4	63.4	73.3	29	5.7
DO (mg/l)		2.11	2.53	4.55	5.44	2.27	0.43
Conductivity (µS/cm)		580	371	499	277	852	482
TDS (mg/l)		290	186	249	138.5	426	241
Temperature (°C)		28.05	28.1	28.33	29.1	27.4	27.8
Turbidity (NTU)		10.03	7.25	18.06	11.2	25	15.8
TSS (mg/l)	<50	12.25	9.47	15.75	14.62	29.42	23.85
BOD_5 (mg/l)	<30	19.6	61.35	ND[13]	30.45	8.4	80.1
COD (mg/l)	<125	50.3	31.8	49.7	31.6	182	77.6
NH_3-N (mg/l)	<10	22	18	14	12	42	36
Total Nitrogen (mg/l)	<10	29.7	23.7	19.4	16.1	58	44.9
Total Phosphorus (mg/l)	<2.0	1.09	1.61	1	0.87	0.73	2.46
Faecal Coliform (MPN/100 ml)		160,000	1700	14000	47	4.5	17000
Total Coliform (MPN/100 ml)	<400	160,000	2200	14000	47	4.5	17000
Oil & Grease (mg/l)	<10	1	N/A	ND[13]	N/A	3	N/A

	Site Name	Zhefu Camp		V & K Camp		HM Main Camp WWTP	
	Station Code	EF09		EF10		EF13	
	Date	07-Jul-17	19-Jul-17	07-Jul-17	19-Jul-17	07-Jul-17	19-Jul-17
Parameter (Unit)	Guideline in the CA						
pH	6.0-9.0	6.8	7.13	7.46	7.51	7	7.33
Sat. DO (%)		25.4	41.1	43.7	39.2	64.5	63.6
DO (mg/l)		1.88	3.07	3.33	2.95	5.03	4.81
Conductivity (µS/cm)		362	226	328	217.8	750	415

	Site Name	Zhefu Camp		V & K Camp		HM Main Camp WWTP	
	Station Code	EF09		EF10		EF13	
	Date	07-Jul-17	19-Jul-17	07-Jul-17	19-Jul-17	07-Jul-17	19-Jul-17
Parameter (Unit)	Guideline in the CA						
TDS (mg/l)		151	113	164	108.9	374	207.5
Temperature (°C)		28.53	29.2	28	28.6	27.38	28
Turbidity (NTU)		28.32	35.4	5.36	9.05	24.92	15.4
TSS (mg/l)	<50	50	74.12	8.63	14.68	11	11.76
BOD_5 (mg/l)	<30	24.5	50.4	19.4	40.8	ND[13]	28.2
COD (mg/l)	<125	72.6	53.5	ND[18]	ND[18]	67.2	72.2
NH_3-N (mg/l)	<10	18	16	9	4	17	10
Total Nitrogen (mg/l)	<10	32.6	21.6	11.2	4.85	22.4	11.8
Total Phosphorus (mg/l)	<2.0	1.11	1.34	0.48	0.29	1.03	0.76
Faecal Coliform (MPN/100ml)		160,000	3,500	2,400	700	0	130
Total Coliform (MPN/100ml)	<400	160,000	5,400	3,300	1,100	0	130
Oil & Grease (mg/l)	<10	1	N/A	1	N/A	1	N/A

	Site Name	IHI Camp		Kenber Camp	
	Station Code	EF14		EF16	
	Date	07-Jul-17	19-Jul-17	07-Jul-17	19-Jul-17
Parameter (Unit)	Guideline in the CA				
pH	6.0-9.0	7.13	7.39	7.73	7.37
Sat. DO (%)		9	48.8	64.6	1.3
DO (mg/l)		0.66	3.65	4.96	0.1
Conductivity (µS/cm)		463	296	461	325
TDS (mg/l)		231	148	230	163
Temperature (°C)		29	28.6	27.4	26.8
Turbidity (NTU)		6.61	6.72	6.62	39.2
TSS (mg/l)	<50	ND[16]	ND[16]	10.4	104.55
BOD_5 (mg/l)	<30	40.5	36.75	67.4	85.65

	Site Name	IHI Camp		Kenber Camp	
	Station Code	EF14		EF16	
	Date	07-Jul-17	19-Jul-17	07-Jul-17	19-Jul-17
Parameter (Unit)	Guideline in the CA				
COD (mg/l)	<125	63.4	25.8	108	124
NH_3-N (mg/l)	<10	14	ND[12]	24	20
Total Nitrogen (mg/l)	<10	21.7	11.7	25.2	22.2
Total Phosphorus (mg/l)	<2.0	0.59	0.85	0.61	1.02
Faecal Coliform (MPN/100 ml)		24,000	33	1,700	270
Total Coliform (MPN/100 ml)	<400	24,000	22	160,00	1,100
Oil & Grease (mg/l)	<10	2	N/A	ND[13]	N/A

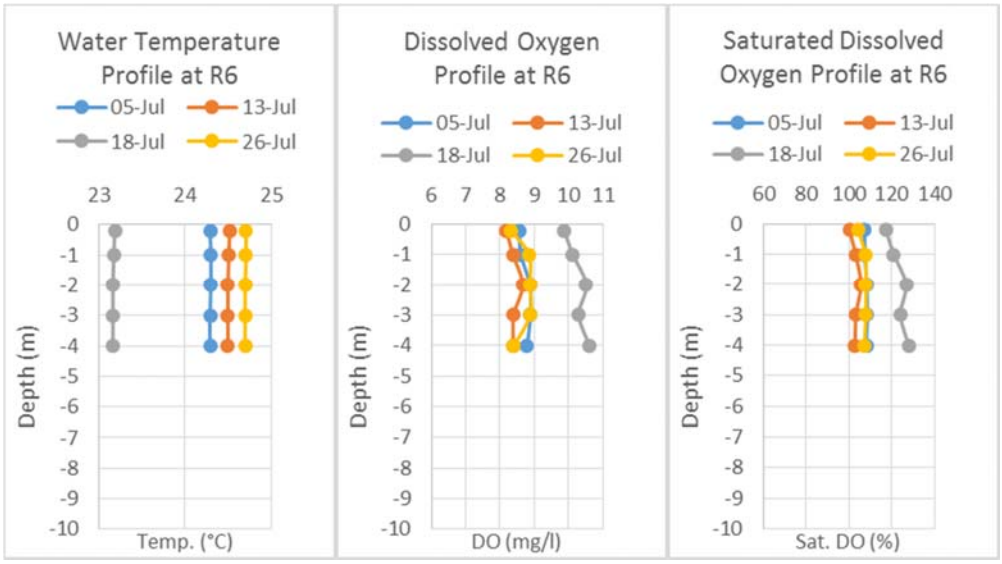
Table A- 2: Results of the Construction Area Discharge in July 2017

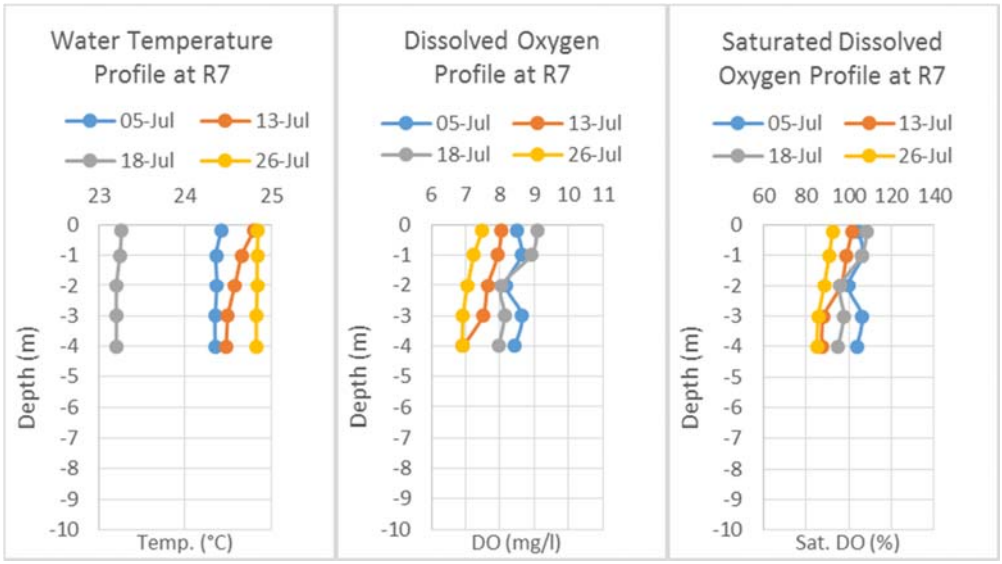
	Site Name	Aggregate Crushing Plant				Spoil Disposal No.2			
	Station Code	DS02				DS04			
	Date	6-Jul-17	12-Jul-17	20-Jul-17	26-Jul-17	6-Jul-17	12-Jul-17	20-Jul-17	26-Jul-17
Parameter (Unit)	Guideline								
pH	6.0 - 9.0	6.0	6.37	6.6	7.07	6.0	6.08	6.52	7.23
Sat. DO (%)		73.8	97.8	98.3	97.6	65.08	84.8	84.2	75.3
DO (mg/l)		5.47	7.3	7.38	7.5	5.08	6.53	6.59	5.86
Conductivity (µs/cm)		308	121.3	188	152.3	41	23	21.09	23.9
TDS (mg/l)		148	60	94	76	20	11	11	12
Temperature (°C)		30.17	28.9	28.3	27	25.81	26.9	26.1	26.1
Turbidity (NTU)		80,700	95.3	2,574	5,385	15.31	15.1	23.5	18.7
TSS (mg/l)	<50	46,470	174	1,477	3,282	13	36	45	34
Oil & Grease (mg/l)	<10	ND	N/A	N/A	N/A	ND	N/A	N/A	N/A

	Site Name	RCC Plant Discharged at lower ponds				RCC Plant Discharged nearby IHI Workshop			
	Station Code	DS09				DS13			
	Date	6-Jul-17	12-Jul-17	20-Jul-17	26-Jul-17	6-Jul-17	12-Jul-17	20-Jul-17	26-Jul-17
Parameter (Unit)	**Guideline**								
pH	6.0 - 9.0	7.00	8.01	9.24	6.89	7.00	7.66	7.15	7.2
Sat. DO (%)		81.1	97.5	96.9	92.6	79.7	98.8	98.4	99.1
DO (mg/l)		6.12	7.23	7.32	7.1	5.62	7.29	7.48	7.6
Conductivity (µs/cm)		242	208.1	178	165.3	156	125.8	69	125.2
TDS (mg/l)		121	104	89	82.65	78	63	34	63
Temperature (°C)		32.76	29.2	28	27.2	32.24	29.4	27.7	27.1
Turbidity (NTU)		99	750	64	25	94.5	47.3	26.4	1782
TSS (mg/l)	<50	191	482.66	132	237.69	113	52.4	46.49	841.17
Oil & Grease (mg/l)	<10	ND	N/A	N/A	N/A	ND	N/A	N/A	N/A

	Site Name	Main Dam's Treatment Plant No.1				Main Dam's Treatment Plant No.2			
	Station Code	DS11				DS12			
	Date	6-Jul-17	12-Jul-17	20-Jul-17	26-Jul-17	6-Jul-17	12-Jul-17	20-Jul-17	26-Jul-17
Parameter (Unit)	**Guideline**								
pH	6.0 - 9.0	3	2.86	10.52	8.88	11	4.82		11.17
Sat. DO (%)		82.3	98.7	99.3	98.6	58.5	94.9	No	98.1
DO (mg/l)		5.83	7.42	7.59	7.56	4.1	7.01	Discharge	7.51
Conductivity (µs/cm)		2633	1495	483	1056	353	181.4		552
TDS (mg/l)		1316	747	241	528	177	90		276
Temperature (°C)		30.92	28.3	27.3	27	32.21	29.5		27.2
Turbidity (NTU)		15.2	12.6	9.53	9.99	58.52	13.8		31.1
TSS (mg/l)	<50	29.6	40.83	59.78	38.81	222	20.45		159.39
Oil & Grease (mg/l)	<10	ND	N/A	N/A	N/A	ND	N/A		N/A

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





ANNEX B: AMBIENT DUST QUALITY

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

Hat Gnuin Village - 24 Hours Average Particulate Matter (PM10) Concentration			
Period	00 to 24 Hours	24 to 48 Hours	48 to 72 Hours
Start Time	08-July-17 18:00	09-July-17 18:01	10-July-17 18:01
End Time	09-July-17 18:00	10-July-17 18:00	11-July-17 18:00
Average Data Record in 24h (mg/m^3)	0.021	0.018	0.015
Guideline Average in 24h (mg/m^3)	***0.12***	***0.12***	***0.12***

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

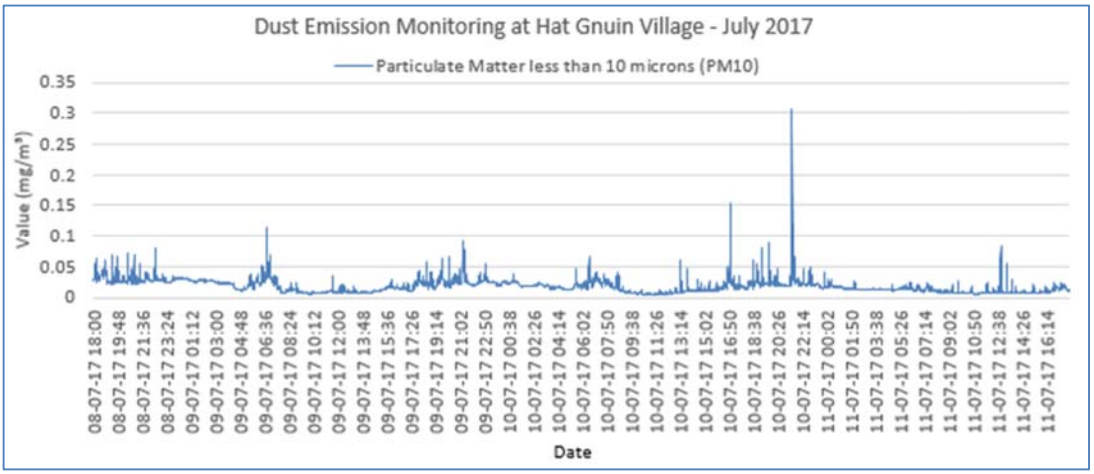


Table B- 2: 24-hour Average Dust Concentrations Measured in Houay Soup Resettlement Area

Houay Soup Resettlement Area - 24 Hours Average Particulate Matter (PM10) Concentration			
Period	00 to 24 Hours	24 to 48 Hours	48 to 72 Hours
Start Time	26-July-17 18:00	27-July-17 18:01	28-July-17 18:01
End Time	27-July-17 18:00	28-July-17 18:01	30-July-17 18:00
Average Data Record in 24h (mg/m^3)	0.015	0.013	0.016
Guideline Average in 24h (mg/m^3)	***0.12***	***0.12***	***0.12***

Figure B- 2: Dust Monitoring Results at Houay Soup Resettlement Village in July 2017

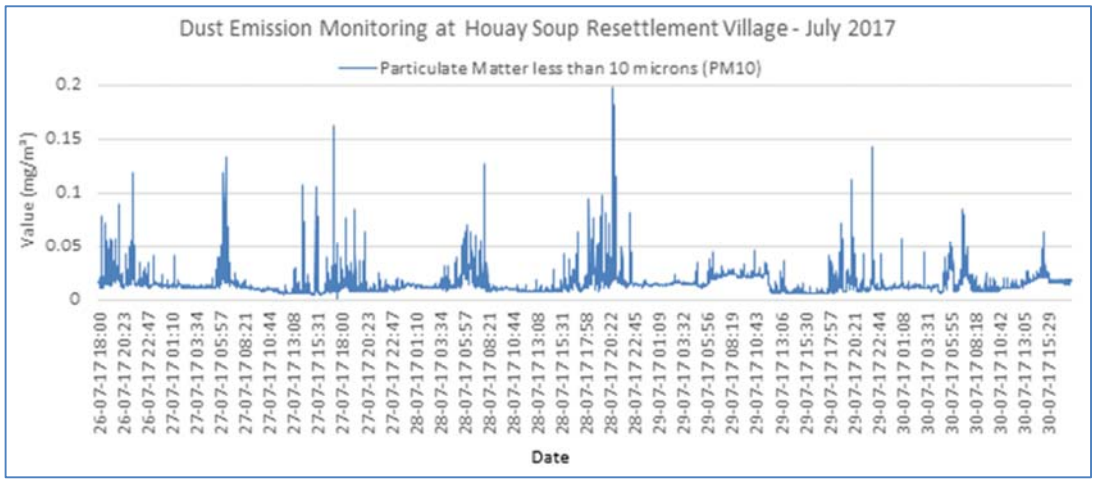


Figure B- 3: Dust Monitoring Results at the Aggregate Crushing Plant in July 2017

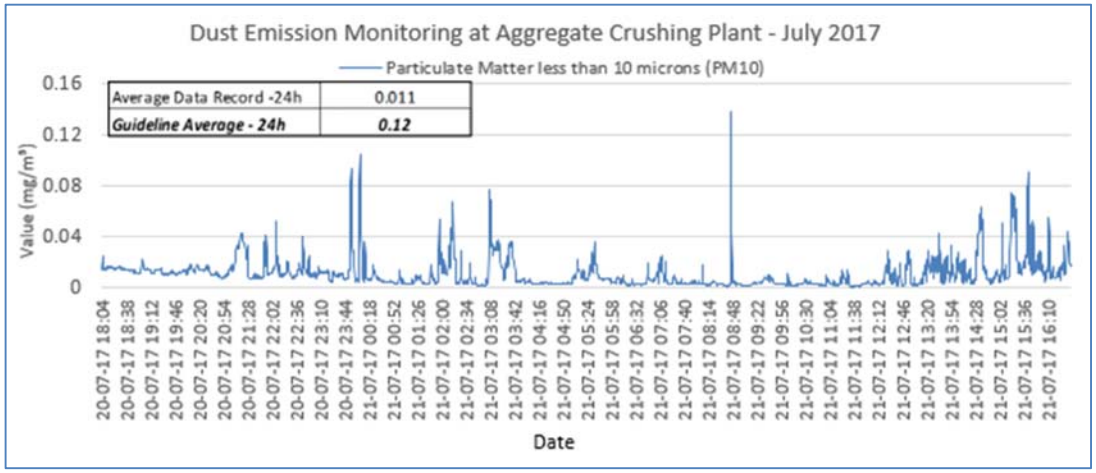


Figure B- 4: Dust Monitoring Results at the RCC Plant in July 2017

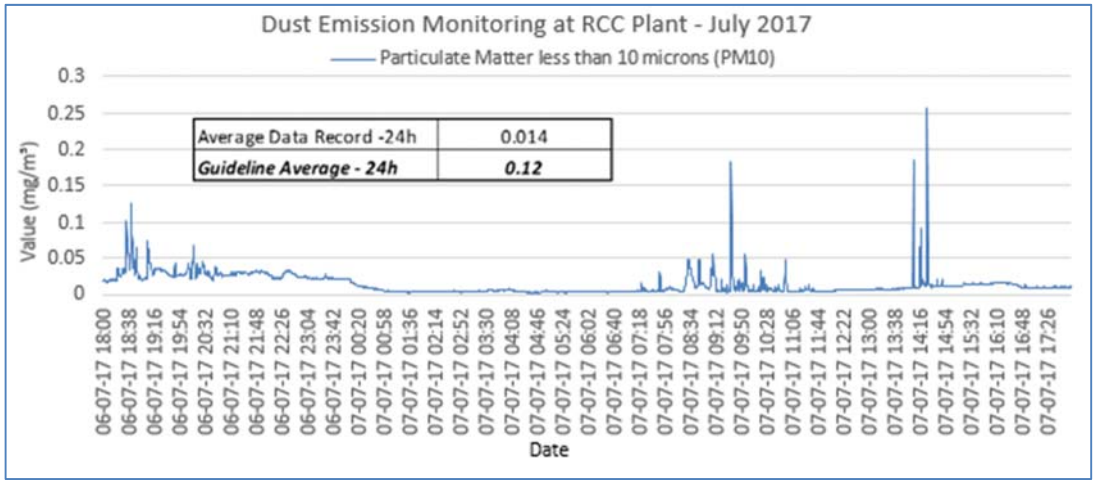


Figure B- 5: Dust Monitoring Results at the Sino Hydro Temporary Camp in July 2017

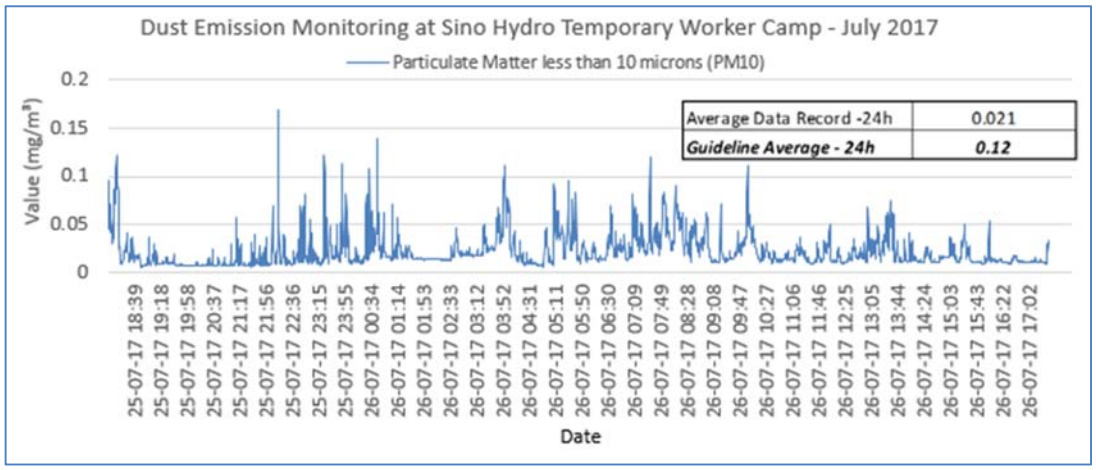


Figure B- 6: Dust Monitoring Results at the SongDa5 No.2 Camp in *July 2017*

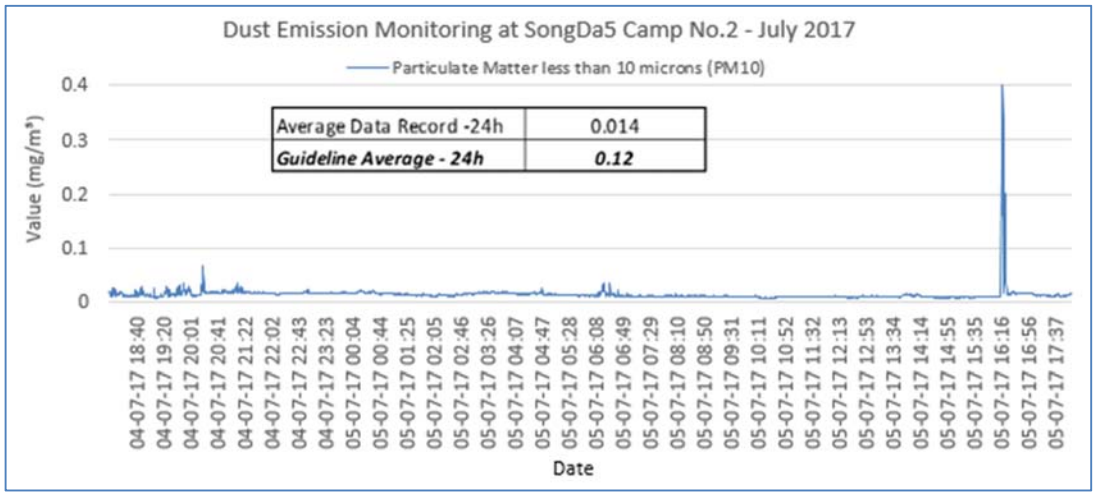


Figure B- 8: Dust Monitoring Results at Main Dam in July 2017

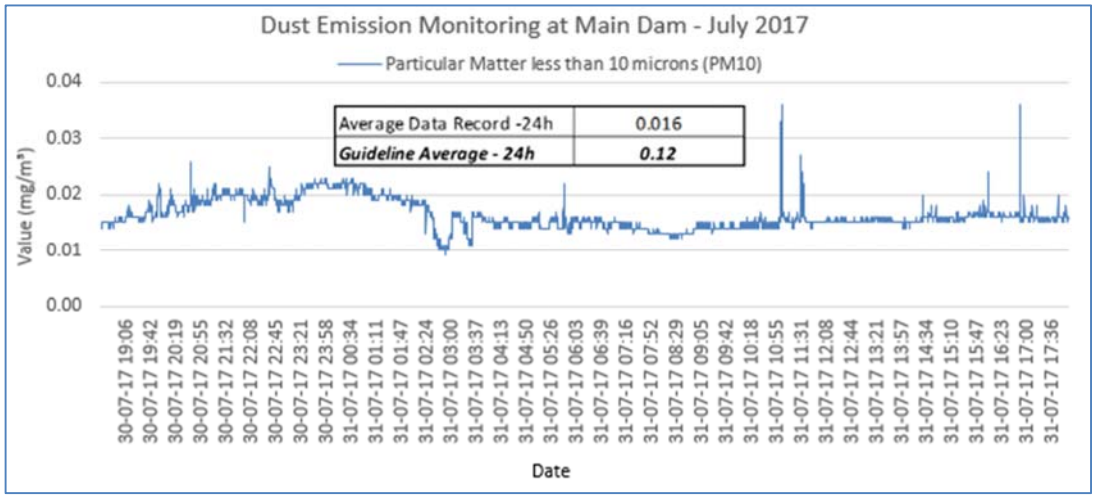
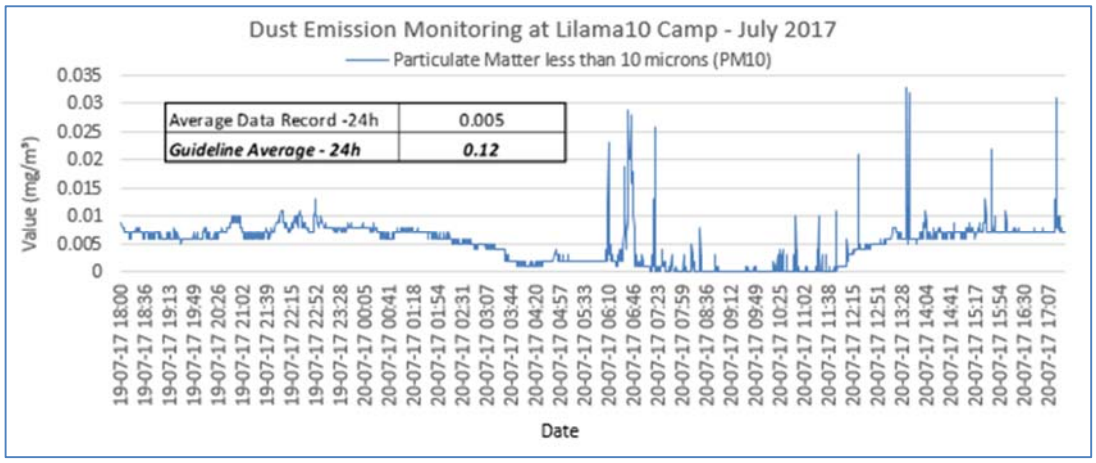


Figure B- 9: Dust Monitoring Results at the Lilama10 Camp in July 2017



ANNEX C: AMBIENT NOISE DATA

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

Noise Level (dB)	08-09/July/17			09-10/July/17			10-11/July/17		
	18:00-22:00	22:01 – 06:00	06:01 – 18:00	18:00-22:00	22:01 – 06:00	06:01 – 18:00	18:00-22:00	22:01 – 06:00	06:01 – 18:00
Maximum Value Recorded	65.20	80.40	74.10	61.40	66.10	74.10	67.80	77.90	81.80
Guideline Max	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***
Average Data Recorded	56.32	59.25	55.54	55.13	52.96	55.43	56.95	56.40	54.50
Guideline Averaged	***55***	***45***	***55***	***55***	***45***	***55***	***55***	***45***	***55***

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

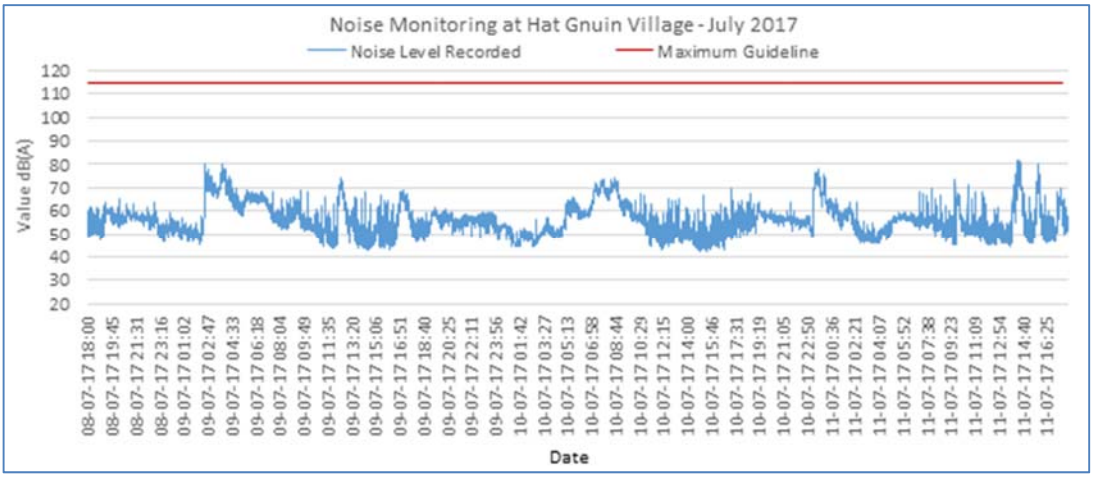


Table C- 2: Average Results of Noise Monitoring at Houay Soup Resettlement Area in July 2017

Noise Level (dB)	27-28/July/17			28-29/July/17			29-30/July/17		
	18:00-22:00	22:01 – 06:00	06:01 – 18:00	18:00-22:00	22:01 – 06:00	06:01 – 18:00	18:00-22:00	22:01 – 06:00	06:01 – 18:00
Maximum Value Recorded	63.60	68.00	88.20	63.40	61.90	86.40	73.70	60.90	77.40
Guideline Max	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***
Average Data Recorded	48.26	48.07	48.83	46.37	43.11	44.33	46.50	46.78	45.83
Guideline Averaged	***55***	***45***	***55***	***55***	***45***	***55***	***55***	***45***	***55***

Figure C- 2: Result of Noise Level Monitoring at Houay Soup Resettlement Village in July 2017

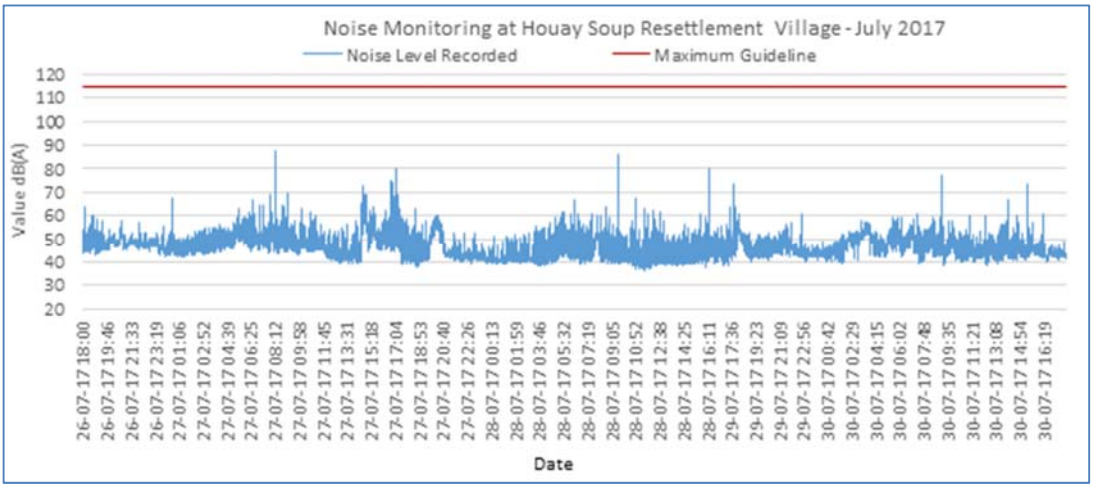


Table C- 2 and Table C-3: Average Results of Noise Monitoring at Aggregate Crushing Plant and RCC Plant in July 2017

Aggregate Crushing Plant

Noise Level (dB)	20-21/July/17		21/July/17
	18:05 – 22:00	22:01 – 06:00	06:01-18:00
Maximum Value Recorded	81.6	77.6	78
Guideline Max	***115***	***115***	***115***
Average Data Recorded	54.35	55.86	62.21
Guideline Averaged	***70***	***50***	***70***

RCC Plant

Noise Level (dB)	06-07/July/17		07/July/17
	18:00 – 22:00	22:01 – 06:00	06:01-18:00
Maximum Value Recorded	70.1	71.6	79.2
Guideline Max	***115***	***115***	***115***
Average Data Recorded	65.45	65.00	65.07
Guideline Averaged	***70***	***50***	***70***

Figure C- 3: Results of Noise Level Monitoring at the Aggregate Crushing Plant in July 2017

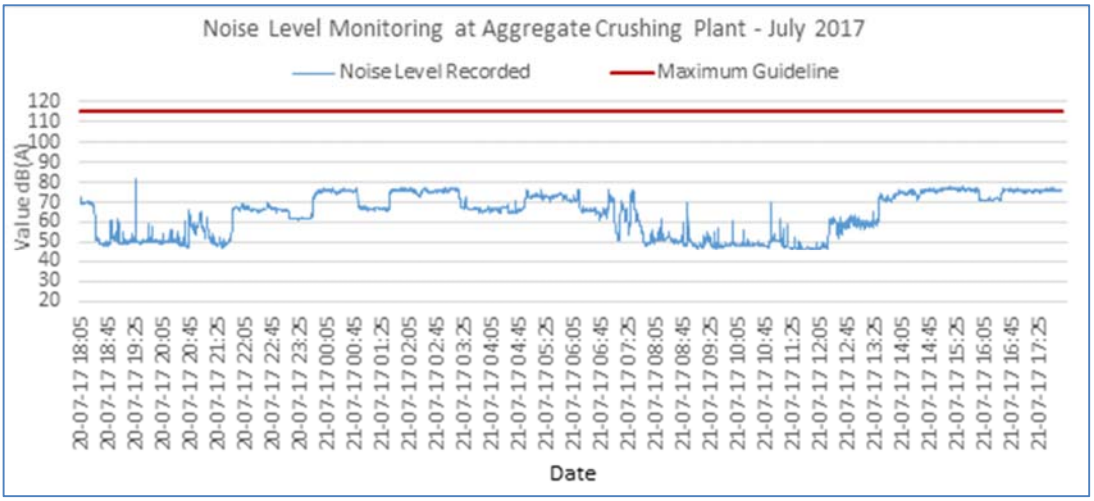


Figure C- 4: Results of Noise Level Monitoring at the RCC Plant in July 2017

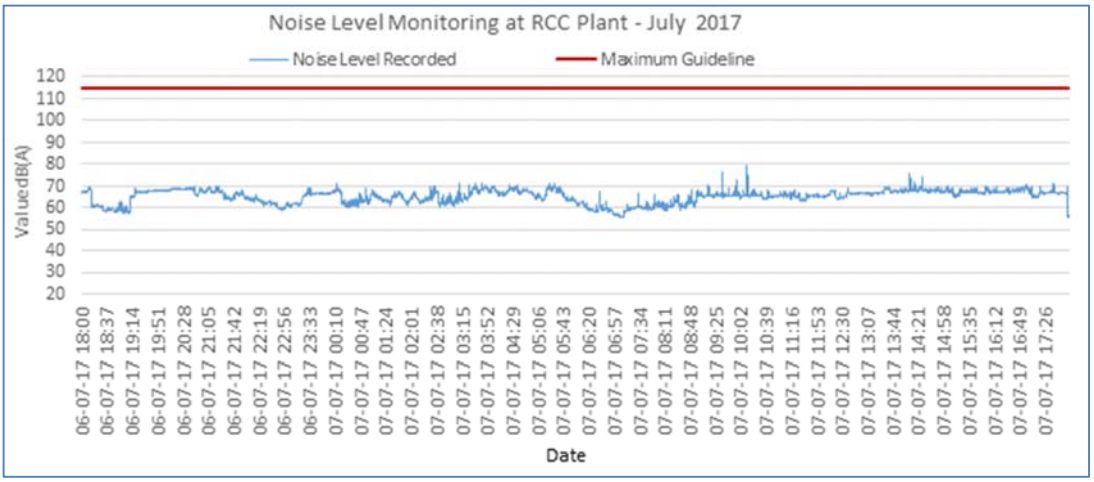


Table C- 5 and Table C- 6: ***Average Results of Noise Monitoring at SongDa Camp#2 and Sino Hydro Camp in Junely 2017***

Song Da 5 Camp No.2

Noise Level (dB)	04-05/July/17		05/July/17
	18:00 – 22:00	22:01 – 06:00	06:01-18:00
Maximum Value Recorded	63.8	60.9	86.6
Guideline Max	***115***	***115***	***115***
Average Data Recorded	57.20	57.21	55.17
Guideline Averaged	***70***	***50***	***70***

Sino Hydro Temporary Worker Camp

Noise Level (dB)	25-26/July/17		26/July/17
	18:00 – 22:00	22:01 – 06:00	06:01-17:50
Maximum Value Recorded	70.4	81.2	70.6
Guideline Max	***115***	***115***	***115***
Average Data Recorded	46.06	56.20	58.45
Guideline Averaged	***70***	***50***	***70***

Figure C- 5: Results of Noise Level Monitoring at SongDa5 Camp#2 in July 2017

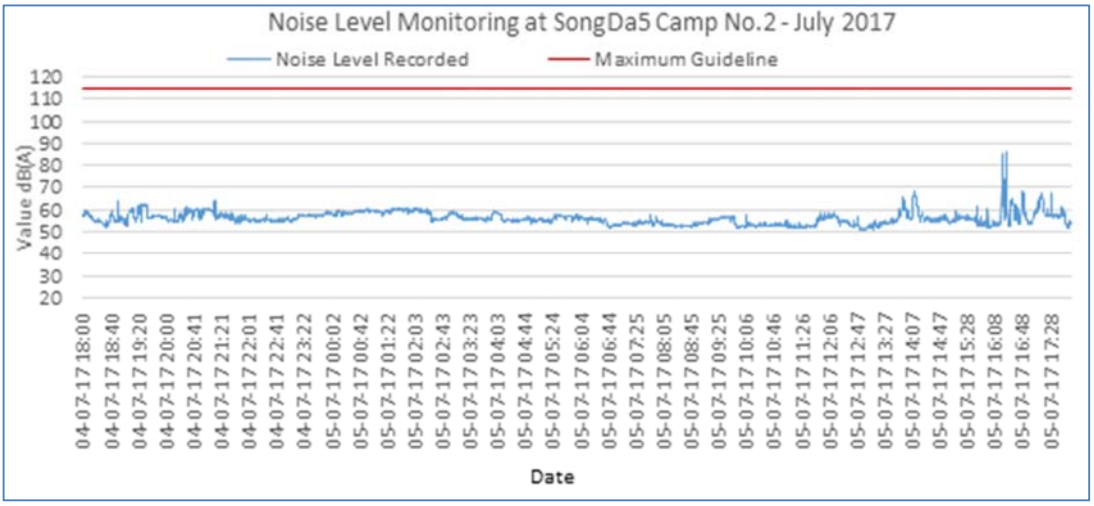


Figure C- 6: Results of Noise Level Monitoring at Sino Hydro Temporary Worker Camp in July 2017

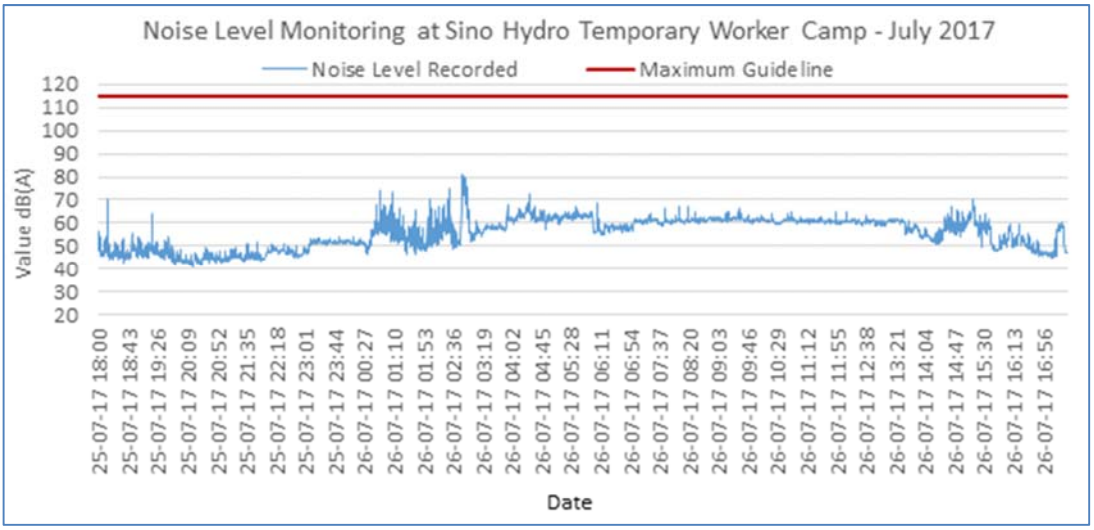


Table C- 7 and Table C- ***8: 10 Camp in July 2017*** ***Average Results of Noise Monitoring at Main Dam, and Lilama***

Main Dam

Noise Level (dB)	30-31/Jul/17		31/Jul/17
	18:30 – 22:00	22:01 – 06:00	06:01-18:00
Data Record Max	56.2	52.5	58.9
Guideline Max	***115***	***115***	***115***
Data Record Average	43.16	44.26	39.51
Guideline Averaged	***70***	***50***	***70***

Lilama 10 Camp

Noise Level (dB)	19-20/July/2017		20/July/2017
	18:00 – 22:00	22:01 – 06:00	06:01-17:41
Maximum Value Recorded	65.5	67.5	87.4
Guideline Max	***115***	***115***	***115***
Average Data Recorded	52.51	55.79	57.61
Guideline Averaged	***70***	***50***	***70***

Figure C-7: Results of Noise Level Monitoring at Main Dam in July 2017

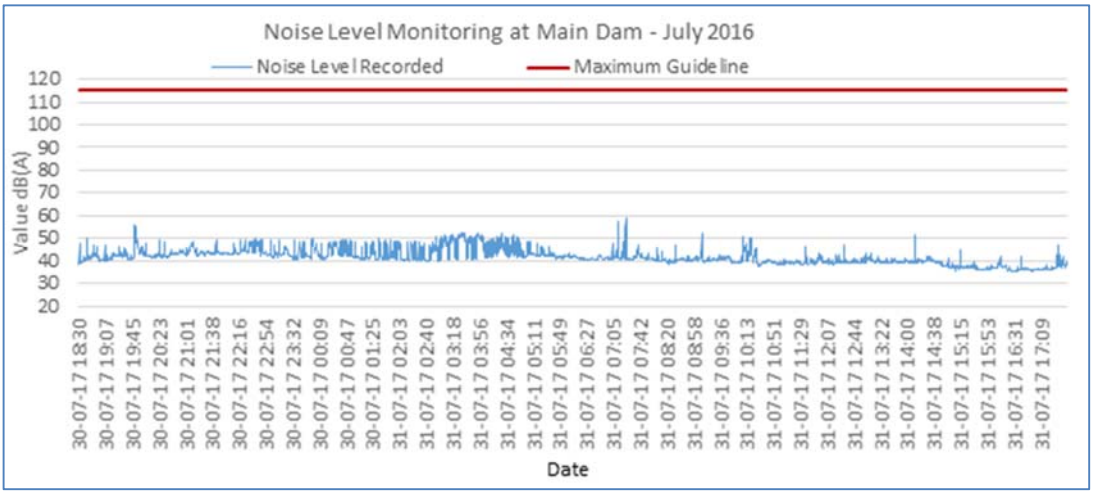


***Figure C- 8: Results of Noise Level Monitoring at Lilama10 Camp* in July 2017**