NAM NGIEP 1
POWER COMPANY

Nam Ngiep 1 Hydropower Project

Environmental Management Monthly Monitoring Report

August 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 August 2017, the Environmental Management Office (EMO) of NNP1PC received a total of 10 Site Specific Environmental and Social Management and Monitoring Plans (SS-ESMMP). With five SS-ESMMPs and one as-built drawing of Waste Water Treatment System carried over from previous months, there were 15 SS-ESMMP and one drawings for EMO review during the month of reporting. Out of these, eight SS-ESMMPs and one as-built drawings were cleared, two SS-ESMMPs returned for further improvement and five SS-ESMMPs are under review and will be carried over to next month.

On 25 August 2017, the Environmental Management Unit (EMU) of Bolikhan District and Bolikhamxay Province conducted a joint environmental monitoring and inspection mission at the main construction sites, camps and Houay Soup Resettlement Area (HSRA). The EMU submitted their mission report to NNP1PC on 28 July 2017. An official response with report on the progress of actions addressing the points raised in the letter will be submitted to EMU by the middle of September 2017.

The camp effluent monitoring results for August 2017 indicated that there were improvement of some key parameters moving closer to the Effluent Standards. For example, the concentration of faecal coliforms and total coliforms were significantly reduced to less than 35,000 MPN/100 ml in a few camps. For further improvement of the operation and maintenance process, NNP1PC conducted follow-up site inspections and shared the results of field observations with the contractors. A meeting was held on 25 August 2017 to discuss adjustments of the chlorine dosage, maintenance of wetland systems and installation of water agitation and mixing systems with the contractors. The adjustments are being implemented and the results will be monitored in September 2017.

The Contractor continued to apply the aluminium ammonia sulphate (alum) to further improve the discharge water quality at the Aggregate Crushing Plant and the RCC Plant. Significant improvements have been observed for turbidity and TSS although these were still slightly higher than the Standard. Field tests are ongoing to determine the optimum level of chemical dosage.

A contractor was recruited in mid-August 2017 for slope stabilisation and erosion control at the Houay Soup Landfill. A DWP and SS-ESMMP were submitted for NNP1PC review and approval on 24 August 2017, it was cleared with minor comments on 30 August 2017. The work will commence in the early September 2017 and is expected to be completed by the end of September 2017. The selection of a contractor to operate the landfill is being finalised.

The translation of the final draft of NNP1 Watershed Management Plan (WMP) is being finalized by NNP1PC EMO, and the full translated document is expected to be shared with NNP1 WRPC/WRPOs in early September 2017. The DFRM/MAF confirmed that a technical workshop to discuss NNP1 WMP and Provincial Regulations is tentatively scheduled on 26-27 September 2017.

A contract with the selected consultant for preparation of NNP1 Biodiversity Offset Management Plan (BOMP) was finalized at the end of August 2017. The contract settlement took longer than expected because of taxation issue. It is expected that the contract will be signed in early September 2017.

Biomass clearance continued to progress with the stockpiling and burning. The total progress of biomass clearance is around 990.47 ha, the verified area as fully completed remains at 34.07 ha for the reported month.

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 August 2017 including daily fish catch logbook monitoring and gillnet survey for the second round of 2017. 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 2.0 kg/household/day in July 2017. The estimated total fish catch in Nam Ngiep basin for July 2017 is 28,000 kg. Around 19 % of the catch was sold, 75% was consumed fresh, 3% 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).

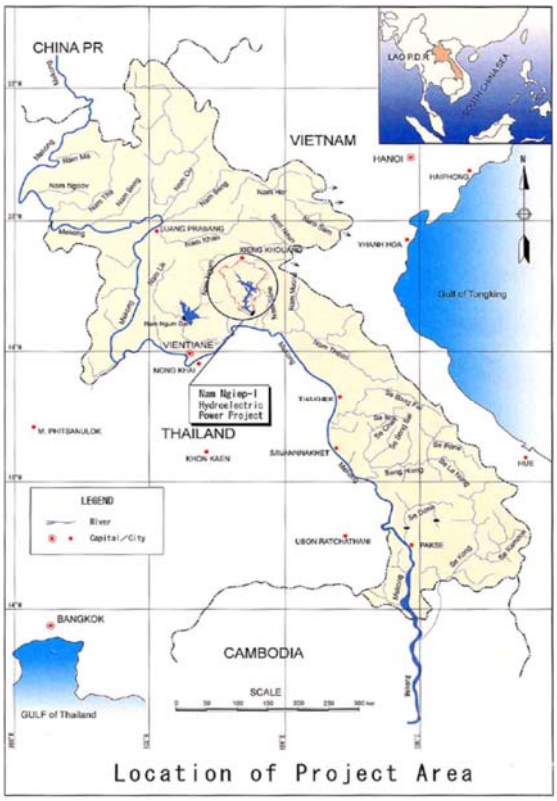


Figure 1-1: Location Map

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 publicly disclosed on the Project website in line with the ADB and GoL Public Disclosure Policies. Hard copies of the final reports will also be available upon requests at the Project's main office in Vientiane Capital and field office in Pakxan, Bolikhamxay Province.

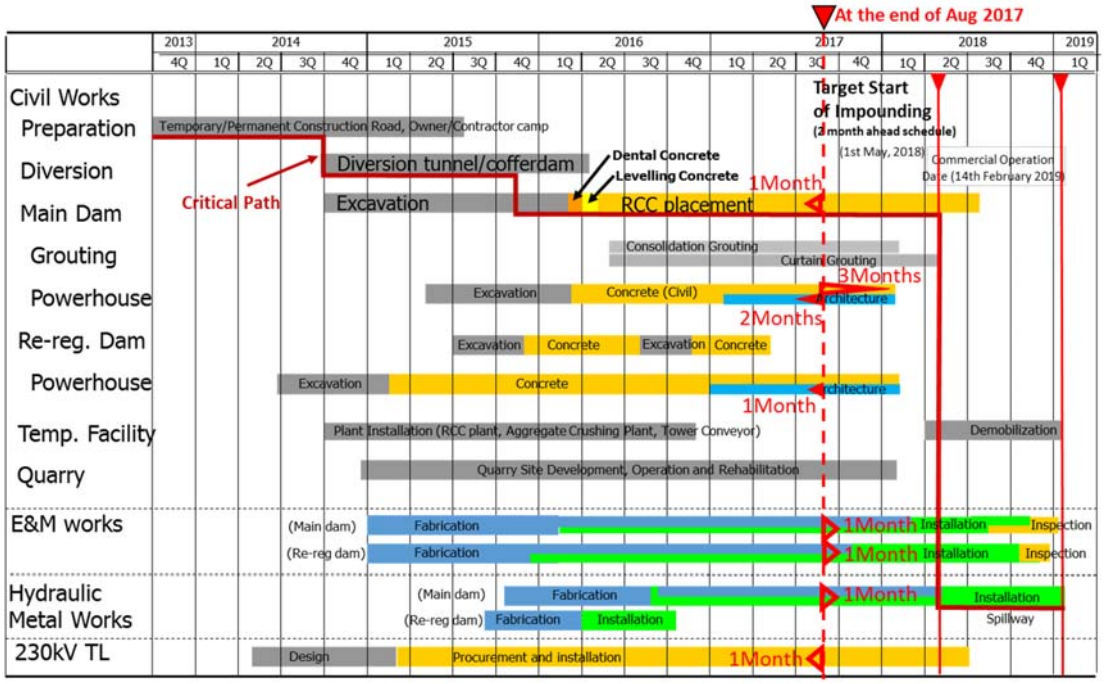
2. WORK PROGRESS OF PRINCIPAL CONTRACTORS

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 August 2017 was 78.9 %[1] (compared to planned progress of 83.6 %), 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 August 2017 was 82.2 % (compared to planned progress of 83.9 %) 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 91 % by achievement of total anticipated drilled length as of the end of August 2017 as a proportion of the total expected drilling

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

Item	Description	Total Drilling (m)	Completed (m)	Progress (%)
Consolidation Grouting	Anticipated Quantity	17,769	16,218	91
Curtain Grouting	Original Design Quantity	27,945	12,672	45
	Anticipated Final Quantity	58,400	12,672	21

*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! eference source not found.** below

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

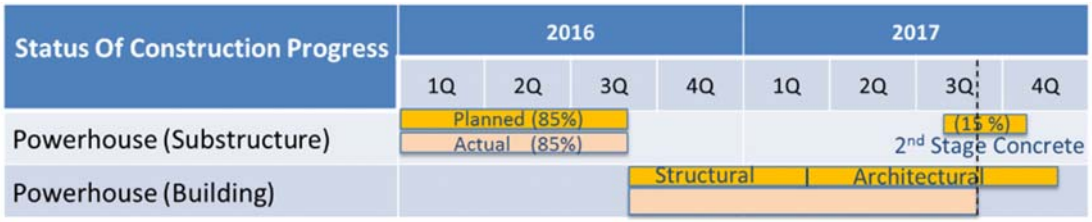
Location	Total Anticipated Volume (m^3)	Completed (m^3)	Progress (%)
Main Powerhouse	32,600	26,300	80
Penstock Embedment	10,257	8,079	78

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 August 2017



Powerhouse Building Works	Concrete Second Phase (m^3)	Painting Inside and Outside (m^2)	Doors (Unit)	Electrical Conduit and Wire (m)	Handrail (m)	Duct Work (m)	Fire Alarm System (Conduit) (m)
Designed	3,496	6,135	18	2,510	460	345	1,208
Completed	2,369	5,024	3	1,900	280	20	886
Progress	68 %	82 %	17 %	75 %	60 %	5 %	73%

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 at the end of August 2017 was 75.7 % (compared to planned progress of 88.2 %).

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

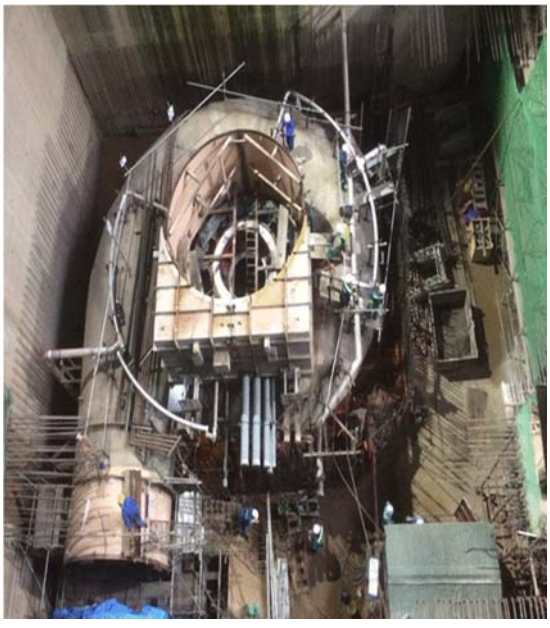


Figure 2-5: Preparation for Installation of Stay Cone at the re-regulation powerhouse

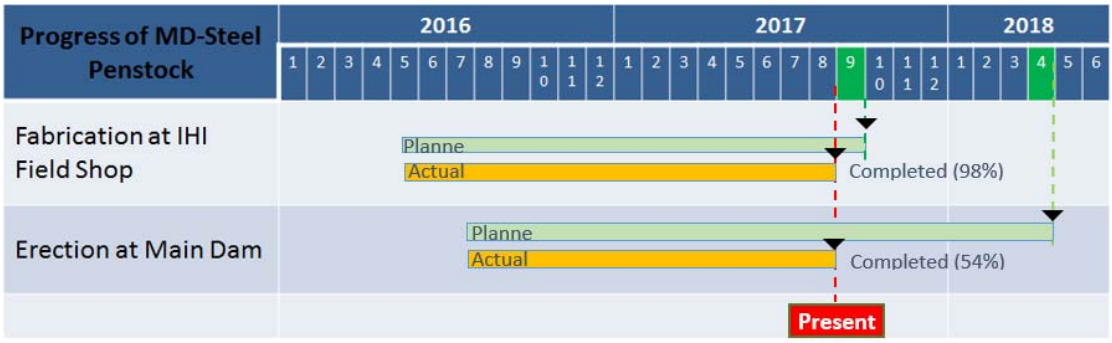
2.3 Hydro-Mechanical Works

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 Aug 2017 was 48.7 % (compared to planned progress of 54.3 %).

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 August 2017



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 August 2017 was 88.8% (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 August 2017, the Environmental Management Office (EMO) of NNP1PC received a total of 10 Site Specific Environmental and Social Management and Monitoring Plans (SS-ESMMP). With five SS-ESMMPs and one as-built drawing of Waste Water Treatment System carried over from previous months, there were 15 SS-ESMMP and one drawings for EMO review during the month of reporting. Out of these, eight SS-ESMMPs and one as-built drawings were cleared, two SS-ESMMPs returned for further improvement and five SS-ESMMP are under review. These documents will be carried over to September 2017.

Table 3-1: SS-ESMMP review status in August 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 Waste Water Treatment System (WWTS) that includes a chlorine contact tank and monitoring 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.
As-built drawing of V&K Camp WWTS Improvement	04 July 2017 (2nd submission)	No objection and No further comments on 10 August 2017	
SS-ESMMP for Construction Road to the Right Bank of Re-Regulation Dam	23 July 2017 (1st submission)	Returned with comments on 03 August 2017	Provide a complete environmental and social assessment checklist, mitigation measures for vegetation clearance, slope and spoil disposal stabilisation.
SS-ESMMP for Construction of 5 Houses in 2 UR Zone, Thathom District, Xaysomboun Province	25 July 2017 (2nd submission)	No objection with comments on 03 August 2017	Provide a complete construction procedure and revise irrelevant information about the previous construction works.
SS-ESMMP for Supply and Installation of 22 kV Transmission Line	28 July 2017 (1st submission)	No objection and No further comments on 03 August 2017	

Title	Date Received	Response Status	Comments
and 0.4 kV Distribution Line for 63 Households at HSRA			
SS-ESMMP for HM's Labor Camp No#1 (Zhefu Camp)	02 August 2017 (5th submission)	No objection with comments on 21 August 2017	No provision of information about inflow rate and treatment capacity. A clearance on the Detailed Work Program (DWP) shall be obtained from NNP1PC-TD.
SS-ESMMP for Installation of Inlet Valve & Servomotor for Main Power Station	02 August 2017 (1st submission)	No objection and No further comments on 09 August 2017	
SS-ESMMP for Construction of 03 Bus Stop Stations, 01 Market Building, 01 Waste Storage and 01 Toilet at 2UR Zone, Thathom District, Xaysomboun Province	03 August 2017 (1st Submission)	Returned with comments on 23 August 2017	More information on earth work, vegetation clearance, agreement on borrow pit operation in the private land, UXO clearance record as well as construction drawing and specifications need to be provided.
	24 August 2017 (1st submission)	Under review	Waiting for a signed agreement on borrow pit operation in the private land as well as UXO clearance confirmation.
SS-ESMMP for Urgent Aid Work for Resettlement Households at HSRA	07 August 2017 (1st submission)	No objection and No further comments on 15 August 2017	
SS-ESMMP for Construction of Market Building and Bus Station Building at HSRA	26 July 2017 (1st submission)	Returned with comments on 07 August 2017	More information on the construction site conditions, and environmental and social mitigation measures need to be provided.
SS-ESMMP for Construction of Market Building and Bus Station Building at HSRA	23 August 2017 (2nd submission)	No objection and No further comments on 24 August 2017	
SS-ESMMP for Construction of Outlet canal and	23 August 2017	No objection and No further	

Title	Date Received	Response Status	Comments
four sub canals at HSRA	(1st submission)	comments on 25 August 2017	
SS-ESMMP for Houay Soup Landfill Slope Protection	24 August 2017 (1st submission)	No objection with comments on 30 August 2017	Some information related to water supply, location of sourcing topsoil and local grass need to be provided during the kick off meeting.
SS-ESMMP for Construction of Irrigation Dam, 01 spillway & 01 Outlet Pipe Culvert at HSRA	31 August 2017 (3rd submission)	Under review	
SS-ESMMP for Construction of a Tractor Road 3.18 km at HSRA	31 August 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 (July 2017)	10	3	2	1
Newly Opened in this Month (August 2017)	4	0	0	0
Total in this Month (August 2017)	**14**	**3**	**2**	**1**
Resolved in this Month (August 2017)	7	1	0	1
Carried over into Next Month (September 2017)	7	2	2	0
Unsolved Exceeding Deadlines	**7**	**2**	**2**	**0**

Figure 3-1: Summary of ONC and NCR

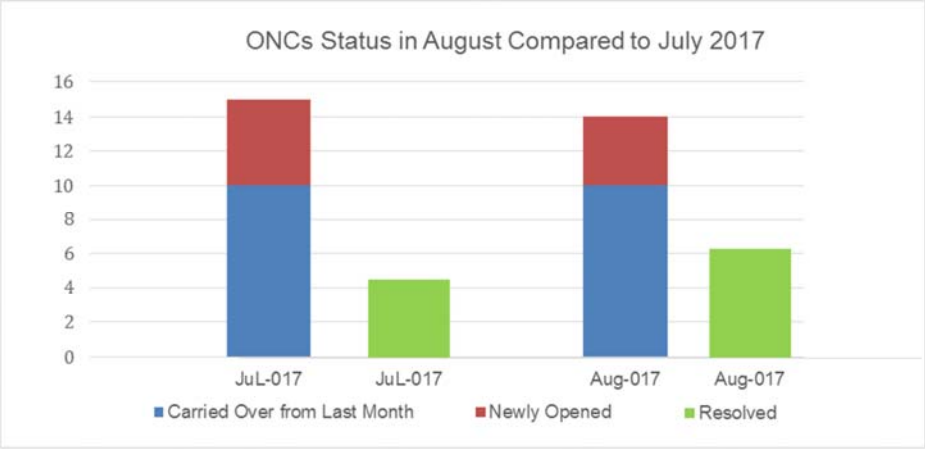


Table 3-3: Carried-Over ONC and NCR from August 2017 into September 2017

Site ID	Issues	Reporting	Actions
Re-Regulation Dam (Borrow Pit Area)	The Contractor started operating a borrow pit with inadequate environmental management practices as indicated below: - 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: 15 August 2017	ONC (Closure Pending)	Some slope stabilisation work and grass seeding was implemented by the contractor without approved Site Closure Plan. NNP1PC will discuss this issue with the contractor and will report in September Monthly Progress Meeting. An official letter to close this ONC will be issued if all required actions are completed.
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	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;

Site ID	Issues	Reporting	Actions
	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: 29 August 2017		- This DWP & SS-ESMMP is under review by the NNP1PC-EMO. The review will be concluded after obtaining trial testing results using alum as of 06 August 2017. An official comment sheet will then be provided by September 2017.
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: 29 August 2017	ONC (Closure pending)	- The system improvement was completed and the trend of bacterial discharge has been dramatically decreased from 16,000 MPN/100 ml in July 2017 to 1,700 MPN/100 ml in August 2017; - The system operation will be monitored until 26 September 2017 to ensure compliant effluent discharge and system stability, and the revised as built drawing remained to be concluded.
Main Dam Workshop (Spoil Disposal No. 2)	Construction waste (contained in big plastic bags) and general waste were buried at the 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: 29 August 2017	NCR1 (Closure pending)	- Disposal of new spoil was stopped. New spoil generated is to be disposed of at the designated Spoil Disposal Area No. 6; general waste, construction waste and hazardous waste shall be segregated and disposed of as per proposed DWP and SS-ESMMP for Main Dam Body. - The contractor is required to respond to the NCR by the end of September 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	NCR2 (Closure pending)	- Stop direct discharges of the turbid water from the existing sediment pond within the Main Dam construction areas to downstream of Nam Ngiep. The

Site ID	Issues	Reporting	Actions
	River via a 100-mm submerged black pipe (NCR_OC-0020). First inspection: 18 July 2017 Latest inspection: 29 August 2017		effluent discharge should meet the required effluent discharging standards and obtain prior authorization from NNP1PC; - A key operator shall be assigned at the Waste Water Treatment Plant for supervising the sediment pond cleaning-up and operation; - The contractor is required to respond to this NCR2 by the end of September 2017.
TCM & GFE Camps' WWTS	There is 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: 29 July 2017	ONC (Closure pending)	The first wetland pond embankment was raised up about 30 cm with concrete plaster wall to prevent the overflow of grey water. The contractor was required to submit a revised as-built drawing by 05 September 2017.
LILAMA10 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: 29 July 2017	NCR1 (Closure pending)	- The contractor (HM Hydro) has been instructed to take immediate action to collect, separate and dispose the waste properly; - The contractor is required to respond to this NCR by 07 September 2017.
Sino Hydro Workshop	Used tires placement along the edge of vehicle parking platform next to Sino Hydro workshop were exposed to rain. It has become a breeding ground of mosquitos that are transmitters of infectious diseases (ON_OC-0265). First inspection: 01 August 2017 Latest inspection: 29 July 2017	ONC (New)	- The contractor will consult with NNP1PC's Safety team for constructing a proper safety barrier made from used tires; - A long-term waste management plan specifying the options for disposal of used tires should be submitted to NNP1PC for review and monitoring by 26 September 2017 (first extension).

Site ID	Issues	Reporting	Actions
VSP Camp	VSP Contractor will finish the construction of Irrigation Dam and spillway by the middle of August 2017. In order to ensure that VSP's site demolition is done properly, the contractor was instructed to revise and resubmit the DWP & SS-ESMMP and the Site Decommissioning Plan by incorporating the EMO's Comments at least 07 days before applying for a final Inspection (ON_VSP-0006). First inspection: 08 August 2017 Latest inspection: 22 August 2017	ONC (New)	A revised DWP and SS-ESMMP and the Site Decommissioning Plan submitted on 31 August 2017 were under review by EMO.
SD Camp	During this Bi-Weekly Joint Site Inspection, it was observed that a fuel storage area for 20,000 litres diesel tank was not built in accordance to the contractor's SS-ESMMP SP06: Hazardous Material Management. These include no proper signage and fire extinguisher, shallow bund, no proper roof and no oil trap. As a result, stagnant rain water was observed inside the fuel storage area (ON_SD-0001). First inspection: 08 August 2017 Latest inspection: 22 August 2017	ONC (New)	The Contractor was recommended to improve the fuel storage area including the following: - Increase the existing bund to achieve a 120% capacity containment; - Install an oil trap and a control valve; - Replace the existing roof with a proper roofing material such as zinc roof to secure the storage area from the rain; - Fence off the fuel storage with caution signage and install a fire extinguisher.
Song Da5, Sino Hydro and Kenber Camps	NNP1PC-EMO continued to observe that recyclables, food waste and construction waste were mixed at the camps of Song Da 5, Sino Hydro and Kenber Camps. These were the third observation (ON_OC-0266). First inspection: 16 August 2017	ONC (New)	The Head Contractor (OC) should: - Provide a warning notification to the mentioned subcontractors for the repeated violations; - Carry out regular spot checking in these mentioned camps and

Site ID	Issues	Reporting	Actions
	Latest inspection: 30 August 2017		other camps to rectify the issue; and - Similar to the practices for safety non-compliance, a penalty for repeated environmental non-compliance due to carelessness and recklessness should be applied.

Figure 3-2: Site Inspection Locations

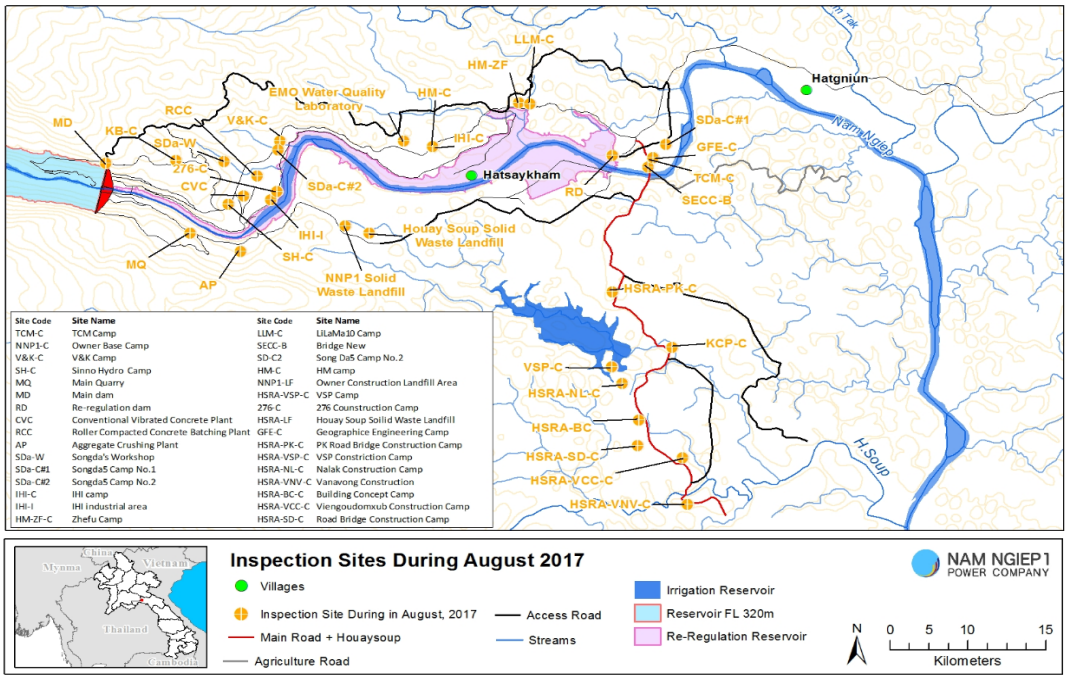
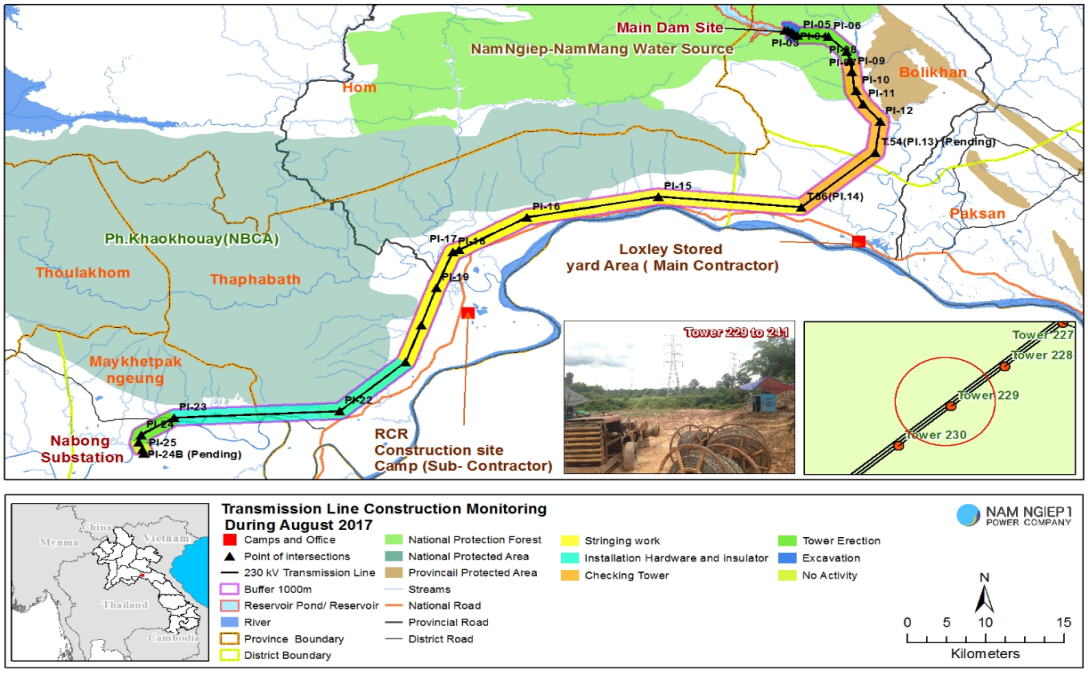


Figure 3-3: 230 kV Transmission Line Construction Monitoring



3.1.3 Environment Management Unit Monitoring

On 25 August 2017, the Environmental Management Unit (EMU) of Bolikhan District and Bolikhamxay Province conducted a joint environmental monitoring and inspection mission at the main construction sites, camps and Houay Soup Resettlement Area (HSRA). There was no wrap-up meeting due to a GOL's Annual Party Meeting. The EMU submitted their mission report to NNP1PC on 28 July 2017.

Inappropriate waste disposal was observed in the village area of Ban Thaheau. NNP1PC was requested to take part in the investigation and implement corrective actions as some of the waste was project construction waste;

Black waste water pipelines from the Main Dam power house areas were found to be submerged in the Nam Ngiep. However, the contractor could not confirm if these black pipes were used for pumping the fresh water for use from Nam Ngiep or discharging from the Powerhouse areas because of a submerged outlet.

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 September 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 has taken over the analyses of Total Suspended Solids (TSS), Biochemical Oxygen Demand (BOD5), faecal coliform, E. Coli bacteria and total coliform since beginning of August 2017 in accordance with the Company's agreement with UAE Laboratory.

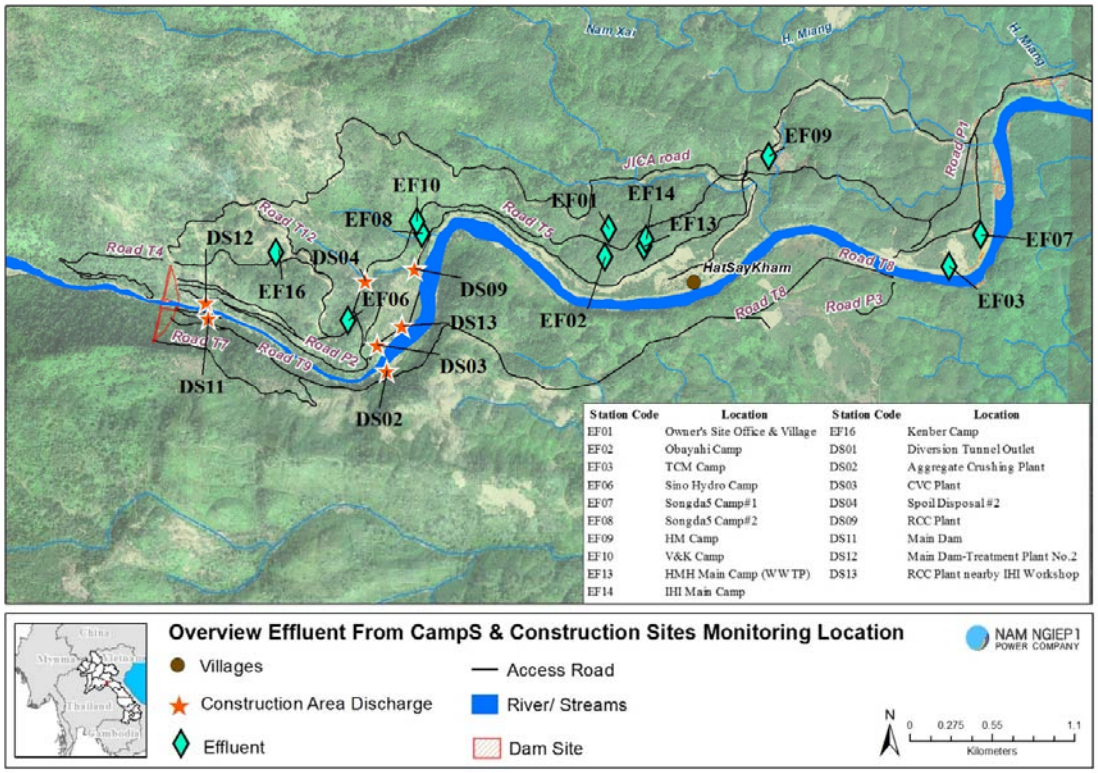
After the impounding of the re-regulation reservoir in May 2017, NNP1PC-EMO has undertaken weekly water quality monitoring for some parameters (pH, Dissolved Oxygen, Conductivity, Total Dissolved Solids (TDS), temperature, turbidity, BOD5, TSS, faecal coliform and total coliform in the re-regulation 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 key construction sites. During August 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 Report. The camp effluent monitoring results for August 2017 indicate further improvement of a few key parameters

which is close to meet the effluent standards. For example, the concentration of faecal coliforms and total coliforms were significantly reduced to less than 35,000 MPN/100 ml in few camps. In order to further improve the operation and maintenance processes, NNP1PC conducted follow-up site inspections and shared the results of field observations with contractors. A discussion on adjustments of chlorine dosage, wetland system maintenance and installation of water agitation and mixing systems was held on 25 August 2017 with contractor. These field adjustments are being implemented and will be monitored in September 2017.

Regarding the turbid water management at the Aggregate Crushing Plant and RCC Plant, the contractor continues with the application of aluminium ammonia sulphate to improve the turbid water quality. The turbidity and TSS result has significantly improved during the reported month although they are still slightly higher than the Standard. Field tests are ongoing to determine the optimum level of chemical dosage.

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 (OSOV)	EF01	Minor non-compliances for BOD_5, 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 August 2017.
Obayashi Corporation Camp	EF02	Minor non-compliances for BOD_5, COD, ammonia nitrogen (NH_3-N), total nitrogen and total coliforms.	NNP1PC organised a meeting on 25 August 2017 with the contractor to discuss the effluent quality results and additional improvement of the operation and maintenance procedures.
Sino Hydro Camp	EF06	Minor non-compliances for BOD_5, ammonia nitrogen (NH_3-N), total phosphorus, total nitrogen and total coliforms	As above.
Song Da5 Camp No. 1	EF07	Minor non-compliances for BOD_5, ammonia nitrogen (NH_3-N), total nitrogen, total phosphorus and total coliforms	As above.

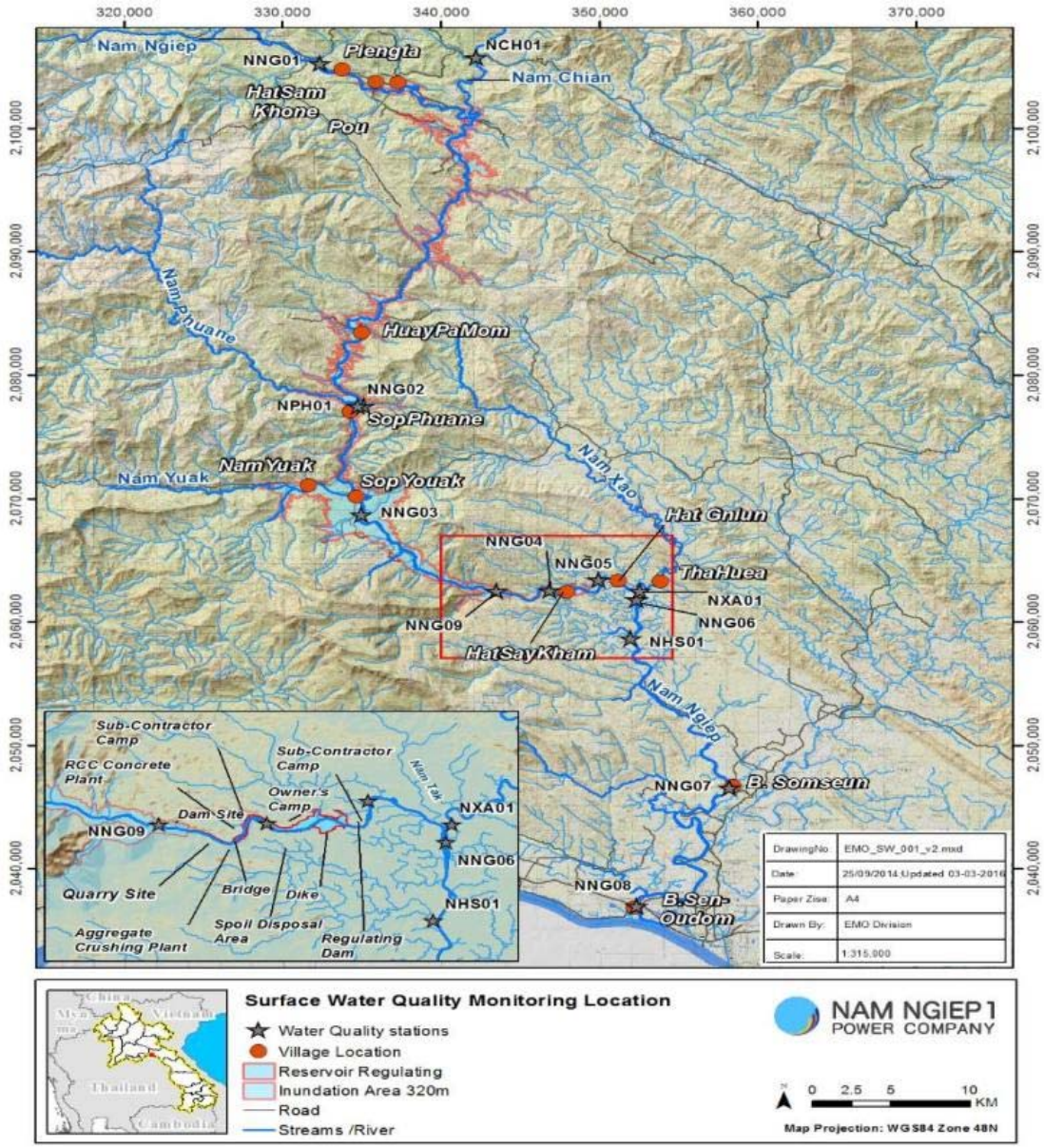
Site	Sampling ID	Non-Compliance with Applicable Effluent Standards	Corrective Actions
Song Da5 Camp No. 2	EF08	Minor non-compliance for BOD_5, NH_3-N, total nitrogen, total coliform and residual chlorine.	As above.
Zhefu Camp (Subcontractor of Hitachi-Mitsubishi Hydro)	EF09	Minor non-compliance of pH, TSS, BOD_5 and total nitrogen.	The installation of a chlorine contact tank and a monitoring tank were completed in late August 2017. NNP1PC-EMO will continue to monitor the chlorination process and advice the contractor for further improvement.
V&K Camp	EF10	Minor non-compliance of BOD_5 and total coliforms	NNP1PC organised a meeting on 25 August 2017 with the contractor to discuss the effluent quality results and additional improvement of the operation and maintenance procedures.
H-MH Main Camp (WWTS)	EF13	Minor non-compliance for COD, NH_3-N, total nitrogen and residual chlorine.	As above.
IHI Main Camp	EF14	Minor non-compliance for NH_3-N, BOD_5, total nitrogen, total coliforms and residual chlorine.	As above.
Kenber Camp	EF16	Non-compliance for pH, TSS, COD, BOD_5, NH_3-N and total coliform.	As above.
Main Dam Construction Area (Waste Water Treatment Plant No.1)	DS11	Minor non-compliance for pH and TSS.	The Contractor checked the treatment plant system as well as calibrating the sensors. The pH and TSS finally complied with the standards in the last week of August 2017.
Main Dam Construction Area (Waste Water Treatment Plant No.2)	DS12	Non-compliance for pH and TSS	As above.

Site	Sampling ID	Non-Compliance with Applicable Effluent Standards	Corrective Actions
Spoil Disposal Area No.2 (Song Da5 Workshop)	DS04	Minor non-compliance for pH and TSS	No action is needed. The low pH is common for the surface and ground water in this area.
CVC Plant	DS03	No discharge during the missions	
RCC Plant (discharge point at the weirs)	DS09	Minor non-compliance for TSS	A daily monitoring of the water quality was carried out jointly by NNP1PC and contractor to identify further improvement.
RCC Plant (Discharged nearby IHI Workshop)	DS13	Minor non-compliance for TSS	
Aggregate Crushing Plant	DS02	Significant non-compliance for pH and TSS	As above. In addition, the contractor added lime to adjust pH.

3.2.2 Ambient Surface Water Quality Monitoring

Surface water samples are collected and analysed twice a month from nine stations in Nam Ngiep and four stations in the main tributaries including the lower Nam Chian, Nam Phouane, Nam Xao and Houay Soup (total 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 August 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	1-Aug-17			2-Aug-17	2-Aug-17	2-Aug-17	2-Aug-17	2-Aug-17	2-Aug-17	2-Aug-17
Parameters (Unit)	**Guideline**										
pH	5.0 - 9.0	7.11	No sampling due to site inaccessibility	No sampling due to site inaccessibility	7.1	7.53	7.04	7.16	7.18	7.06	7.29
Sat. DO (%)		98.1			101.8	105.2	93.2	102.4	99.3	99.8	90.8
DO (mg/l)	>6.0	7.56			7.89	8.42	7.36	7.51	7.47	7.61	7.09
Conductivity (µs/cm)		82.3			65.9	78	107	62.8	61.6	64.4	44.8
TDS (mg/l)		41			33	39	57	31	30	32	22
Temperature (°C)		26.1			26.7	25.42	26.15	27.1	28.5	27.6	27.5
Turbidity (NTU)		32.4			33.1	57.8	34.16	19	20.2	22.5	19.1
TSS (mg/l)		70.47			123.38	110.55	48.17	39.36	46.8	44	40
BOD_5 (mg/l)	<1.5	<1			<1	<1	<1	<1	<1	<1	<1
COD (mg/l)	<5	5.8			7.3	6.7	<5.0	<5.0	<5.0	5	5.8
NH_3-N (mg/l)	<0.2	<0.2			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
NO3-N (mg/l)	<5	0.17			0.14	0.14	0.13	0.14	0.13	0.15	0.11
Faecal coliform (MPN/100 ml)	<1,000	1,600			3,500	1,600	920	1,600	1,600	1,600	1,600
Total Coliform (MPN/100 ml)	<5,000	1,600			3,500	1,600	1,600	920	1,600	1,600	1600
Secchi Disk (m)						0.2	0.28				

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	**NNG09**	**NNG04 / R6**	**R7**	**NNG05**
	Date	11-Aug-17	11-Aug-17	11-Aug-17	11-Aug-17
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	7.27	7.4	7.05	7.15
Sat. DO (%)		103.7	102	88	95.5
DO (mg/l)	>6.0	8.72	8.16	7.08	7.58
Conductivity (µs/cm)		83	84	188	160
TDS (mg/l)		41	42	94	80

	River Name	Nam Ngiep			
	Zone	Location Refer to Construction Sites			
		Upstream	Within / Re-regulation Reservoir		Downstream
	Station Code	NNG09	NNG04 / R6	R7	NNG05
	Date	11-Aug-17	11-Aug-17	11-Aug-17	11-Aug-17
Parameters (Unit)	**Guideline**				
Temperature (°C)		25.49	25.04	25.34	26.21
Turbidity (NTU)		56.46	48.97	46.45	45.3
TSS (mg/l)		165	84.71	62.84	65.59
BOD_5 (mg/l)	<1.5	<1	<1	<1	<1
Faecal coliform (MPN/100 ml)	<1,000	16,000	1,600	1,600	1,600
Total Coliform (MPN/100 ml)	<5,000	16,000	1,600	1,600	1,600
Secchi Disk (m)			0.1	0.15	

	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-Aug-17	17-Aug-17	17-Aug-17	17-Aug-17	17-Aug-17	17-Aug-17	17-Aug-17	17-Aug-17	17-Aug-17	17-Aug-17
Parameters (Unit)	**Guideline**										
pH	5.0 - 9.0	6.96	7.24	7.13	7.22	7.38	7.4	7.33	7.38	7.05	7.14
Sat. DO (%)		95.7	97.3	101.1	99.2	96.2	93.5	90.9	91.8	89.6	87.2
DO (mg/l)	>6.0	7.53	7.81	7.9	8.06	7.8	7.47	7.2	7.24	7.16	7.12
Conductivity (µs/cm)		79.9	69	66.7	188	94	109	138	136	96	114
TDS (mg/l)		40	35	33	94	47	55	69	68	48	57
Temperature (°C)		25.4	24.6	26	24.4	24.41	24.69	25	25.1	26.18	26.29
Turbidity (NTU)		1,267	30.2	24	52.98	42.28	56.31	84.57	68.93	77.48	38.55
TSS (mg/l)					121.85	81.52	74.57	124.68			
BOD_5 (mg/l)	<1.5				<1	<1	<1	<1			
Faecal coliform (MPN/100 ml)	<1,000				920	540	920	920			
Total Coliform (MPN/100 ml)	<5,000				1,600	1,600	1,600	1,600			
Secchi Disk (m)						0.2	0.15				

River Name	Nam Ngiep
Zone	Location Refer to Construction Sites

		Upstream	Within / Re-regulation Reservoir		Downstream
	Station Code	NNG09	NNG04/R6	R7	NNG05
	Date	24-Aug-17	24-Aug-17	24-Aug-17	24-Aug-17
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	7.65	7.61	7.64	7.02
Sat. DO (%)		105	99.5	96.3	100.5
DO (mg/l)	>6.0	7.89	7.73	7.28	7.65
Conductivity (µs/cm)		67.9	80.6	71.1	71.4
TDS (mg/l)		35	40	35	35
Temperature (°C)		26.23	26.61	27.94	27.4
Turbidity (NTU)		27.5	23.15	12.23	16.9
TSS (mg/l)		61.03	38.3	17.41	19.21
BOD_5 (mg/l)	<1.5	<1	<1	<1	<1
Faecal coliform (MPN/100 ml)	<1,000	130	430	790	240
Total Coliform (MPN/100 ml)	<5,000	790		1,100	580
Secchi Disk (m)			0.2	0.38	

	River Name	Nam Ngiep			
	Zone	Location Refer to Construction Sites			
		Upstream	Within / Re-regulation Reservoir		Downstream
	Station Code	NNG09	NNG04/ R6	R7	NNG05
	Date	30-Aug-17	30-Aug-17	30-Aug-17	30-Aug-17
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	7.32	7.54	7.63	7.56
Sat. DO (%)		114	120.9	117.7	113.5
DO (mg/l)	>6.0	9.19	9.77	9.46	9.09
Conductivity (µs/cm)		124	104	120	128
TDS (mg/l)		62	58	60	64
Temperature (°C)		24.67	24.67	25.14	25.9
Turbidity (NTU)		756	737	46.88	39.98
TSS (mg/l)		711.11	410	114.29	101.67
BOD_5 (mg/l)	<1.5	Pending	Pending	Pending	Pending
Faecal coliform (MPN/100 ml)	<1,000	Pending	Pending	Pending	Pending
Total Coliform (MPN/100 ml)	<5,000	Pending	Pending	Pending	Pending

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 BOD_5 slightly exceeded the Surface Water Quality Standard with values recorded as 6.5 mg/l and 2.12 mg/l respectively.

Nam Phouan is located about 24 km upstream of NNP1 Project construction site. During the monthly sampling, this site was not accessible due to the heavy rain, thus there was no sampling undertaken. All physical parameters in the fortnightly mission complied with the standard.

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 faecal coliform exceeded the Surface Water Quality Standard with values recorded at 7.5 mg/l and 1,600 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 at 10.9 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			
		Tributaries Upstream		Tributaries Downstream	
	Station Code	NCH01	NPH01	NXA01	NHS01
	Date	1-Aug-17		2-Aug-17	2-Aug-17
Parameters (Unit)	**Guideline**				
pH	5.0 - 9.0	7.32	No sampling due to site inaccessibility	7.02	6.8
Sat. DO (%)		99.9		95	84
DO (mg/l)	>6.0	7.69		7.15	6.37
Conductivity (µs/cm)		28		66.6	18.46
TDS (mg/l)		14		33	9
Temperature (°C)		26		28.5	21.8
Turbidity (NTU)		13.8		26.3	8.01
TSS (mg/l)		92.8		39.04	59.91
BOD_5 (mg/l)	<1.5	2.12		<1	<1
COD (mg/l)	<5	6.5		7.5	10.9
NH_3-N (mg/l)	<0.2	<0.2		<0.2	<0.2
NO_3-N (mg/l)	<5	0.17		0.09	0.07
Faecal coliform (MPN/100 ml)	<1,000	350		1,600	240
Total Coliform (MPN/100 ml)	<5,000	350		3,500	920

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 Chain	Nam Phouan	Nam Xao	Nam Houay Soup
	Zone	Location Refer to Construction Sites			
		Tributaries Upstream		Tributaries Downstream	
	Station Code	NCH01	NPH01	NXA01	NHS01
	Date	17-Aug-17	17-Aug-17	17-Aug-17	17-Aug-17
Parameters (Unit)	Guideline				
pH	5.0 - 9.0	7.13	6.82	7.42	7.39
Sat. DO (%)		100.8	101.8	89.4	88.9
DO (mg/l)	>6.0	7.98	8.26	7.03	7
Conductivity (µs/cm)		28	63	153	29
TDS (mg/l)		14	32	75	14
Temperature (°C)		24.7	23.9	25.6	25.7
Turbidity (NTU)		71.8	6.83	26.96	41.51

3.2.3 Groundwater Quality Monitoring

During August 2017, NNP1PC sampled and analysed the groundwater quality in six boreholes which were built by the Project for resettlers 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

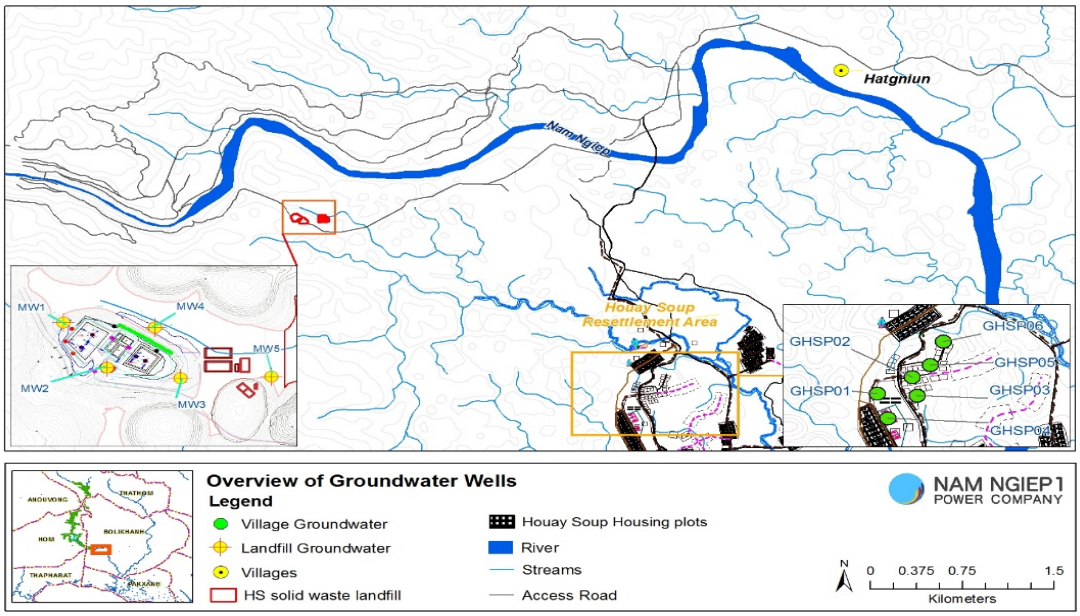


Table 3-9: Groundwater Quality Monitoring Results for Houay Soup Resettlement Area

Parameter (Unit)	Site Name	Houay Soup Resettlement Area (HSRA)					
	Station	GHSP01	GHSP02	GHSP03	GHSP04	GHSP05	GHSP06
	Date	04/Aug/17	04/Aug/17	04/Aug/17	04/Aug/17	04/Aug/17	04/Aug/17
pH	6.5 - 9.2	6.69	6.85	7.02	6.81	6.93	7.27
Sat. DO (%)		67.8	72.7	65.2	65.2	70.2	77.5
DO (mg/l)		5.32	5.61	4.92	4.98	5.48	5.97
Conductivity (µS/cm)		414	277	421	197	275	375
TDS (mg/l)		207	138	210	98	137	187
Temperature (°C)		25.9	26.8	28	27.9	26.2	26.8
Turbidity (NTU)		0.67	0.82	0.99	0.52	0.86	1.13
Fecal coliform (MPN/100 ml)		0	0	0	0	0	0
E.coli Bacteria (MPN/100 ml)		0	0	0	0	0	0

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 to alert the users in case of health risks when using the water for bathing or washing. During August 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 130 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	04-Aug-17	04-Aug-17
Parameter (Unit)	**Guideline**		
pH	6.5-9.2	7.2	7.13
DO (%)		98.7	95.6
DO (mg/l)		7.8	7.28
Conductivity (µs/cm)		35.5	47.8
TDS (mg/l)	<1,200	17	24
Temperature (°C)		25.7	27.6
Turbidity (NTU)	<20	1.84	1.32
Faecal coliform (MPN/100 ml)	0	49	130
E. Coli Bacteria (MPN/100 ml)	0	49	130

3.2.5 Landfill Leachate Monitoring

During August 2017, water samples were taken from the NNP1 Project Landfill's final leachate pond (LL4), and from the Houay Soup Landfill's final leachate pond (LL6). 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.

Figure 3-7: Landfill Leachate Monitoring Location

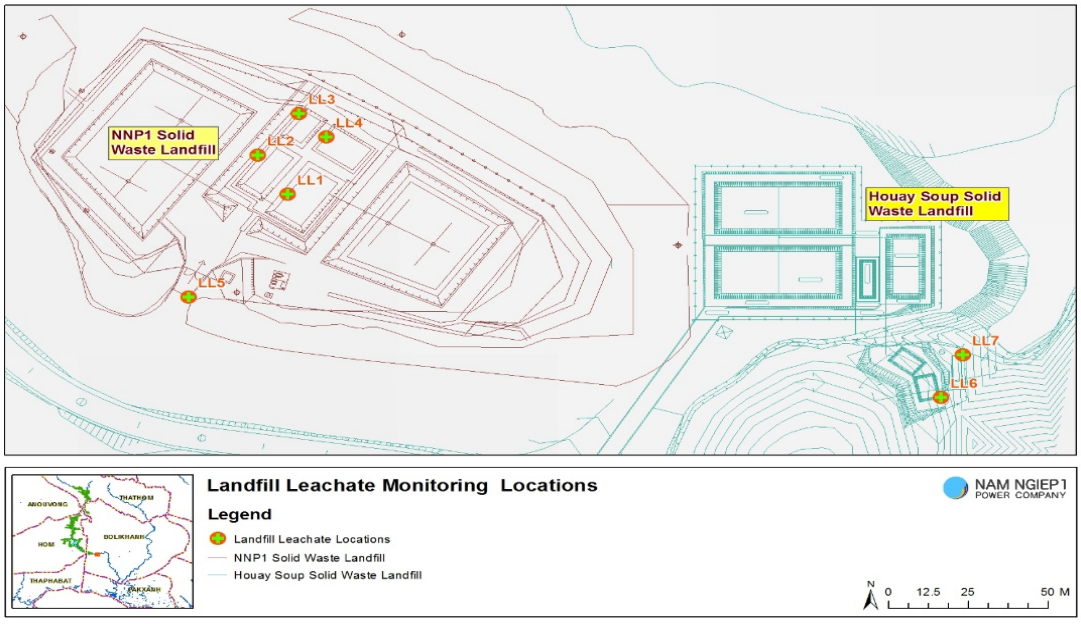


Table 3-11: Landfill Leachate Monitoring Results

	Site Name	NNP1 Landfill (Leachate Pond)	NNP1 Landfill Leachate Discharge	Houay Soup Landfill (Last Leachate Pond)	Houay Soup Landfill Leachate Discharge
	Station Code	LL4	LL5	LL6	LL7
	Date	18-Aug-17	18-Aug-17	18-Aug-17	18-Aug-17
Parameters (Unit)	**Guideline**				
pH	6.0 - 9.0	6.83		7.85	
Sat. DO (%)		113		102.6	
DO (mg/l)		7.79	No	6.83	No
Conductivity (µs/cm)		470	Discharge	13.6	Discharge
TDS (mg/l)		235		6	
Temperature (°C)		33.3		25.4	
Turbidity (NTU)		15.9		5.37	
BOD_5 (mg/l)	<30	28.2		27.6	
COD (mg/l)	<125	60.4		<25	
Faecal Coliform (MPN/100 ml		170		130	
Total coliform (MPN/100 ml))	<400	220		170	

3.2.6 Dust Monitoring

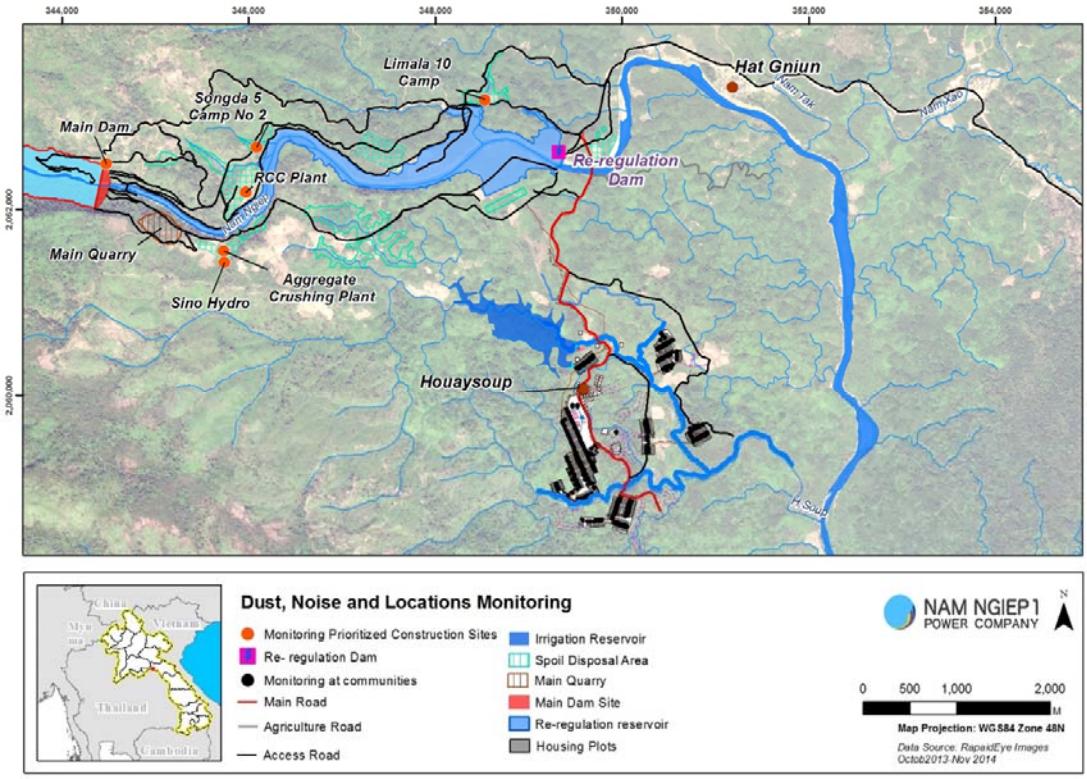
The monitoring points are indicated on the map in ***Figure 3-8***. Most of dust measurements complied with the National Standard. However, staff have been advised to wear dust masks while working in the areas at risk. The results are presented in ***Annex 2***.

3.2.7 Noise Monitoring

During August 2017, noise monitoring was conducted in Hat Gniun and Houay Soup Resettlement Area (HSRA) for at least 72 consecutive hours. Noise monitoring was also conducted at the Aggregate Crushing Plant, RCC Plant, Sino Hydro Temporary Worker Camp, Main Dam 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. The noise levels during the period of 22:01-06:00 were slightly higher than the Standard at the RCC Plant, Song Da 5 Camp No. 2, and Sino Hydro Temporary Worker Camp [between 51.50 – 63.31 dB(A) compared to the Standard of 50 dB(A)], and at Hat Gnuin Village and Houay Soup Resettlement Area [46.42 – 52.57 dB(A) compared to the Standard of 45 dB(A)].

3.3 PROJECT WASTE MANAGEMENT

3.3.1 Solid Waste Management

In August 2017, an approximately 186.9 m3 of solid waste was disposed of at the NNP1 Project Landfill, an increase of 36 m3 compared to July 2017. Mixed waste at sources were still found at Song Da 5 Camp No. 1 and 2, ZHEFU Camp, V&K Camp, Kenber Camp, Sino-Hydro Camp and Sino-Hydro workshop at the main quarry. Following these findings, the contractors and subcontractors were instructed and trained on waste management on a weekly basis. An Observation of Non-Compliance (Ref. No.: ONC-OC-0266 was issued to Song Da5, Sino Hydro and Kenber subcontractor after the third notification of violations.

A total of 3,462 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 August 2017
Construction activity				
1	Scrap metal	kg	2,532	26,048
Sub-Total 1		**kg**	**2,532**	**26,048**

Source and Type of Recycled Waste		Unit	Sold	Cumulative Total by August 2017
Operation camp				
2	Glass bottles	kg	240	454
3	Plastic bottles	kg	207	261.5
4	Paper/Cardboard	kg	449	125.5
5	Aluminium can	kg	34	126
Sub-Total 2		**kg**	**390**	**967**
Grand Total 1+2		**kg**	**3,462**	**27,015**

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 8,165 kg was collected in August 2017, a reduction of 1,399 kg in July 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	3,423
2	SongDa5 Camp No. 1	kg	2,626
3	Obayashi Corporation Camp	kg	1,250
4	Owner's Village and Site Office (OSOV)	kg	538
5	LILAMA 10 Camp	kg	160
6	Kenber Camp	kg	123
Total		**kg**	**8,165**

3.3.2 Hazardous Materials and Waste Management

In August 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 August 2017 (A)	Disposal by Selling (B)	Remainder (A - B)
1	Used hydraulic and engine oil	litre (l)	7,410	0	7,410
2	Used oil filters	No.	804	0	804
3	Empty paint and spray cans	can	521	0	521
4	Empty used chemical drum/container	Drum (20 litre)	1,924	0	1,924
5	Used tyre	No.	508	0	508
6	Ink cartridge	No.	378	0	378
7	Cement bag	bag	300	0	300
8	Acid and caustic cleaners	bottle	150	0	150

No.	Hazardous Waste Type	Unit	Total in August 2017 (A)	Disposal by Selling (B)	Remainder (A - B)
9	Empty used oil drum/container	drum (20 l)	156	7 (Reuse)	149
10	Empty used chemical drum/container	drum (200 l)	31	0	31
11	Empty used oil drum/container	drum (200 l)	81	10 (Reuse)	71
12	Halogen/fluorescent bulbs	No.	54	0	54
13	Contaminated soil, sawdust and concrete	kg	1,160	0	1,160
14	Contaminated textile and material	kg	217	0	217
15	Lithium-ion batteries	No.	6	0	6
16	Lead acid batteries	No.	20	0	20
17	Clinical waste	kg	53	52	1
18	Empty contaminated bitumen drum/container	drum (200 l)	0	0	0
19	Used oil mixed with water	liter (l)	0	0	0

A total of 12 m3 of contaminated soil of V&K subcontractor were transported and disposed of at the Spoil Disposal Area No.6.

3.4 Community Waste Management

3.4.1 Community Recycling Programme

In August 2017, a total of 462 kg of recyclable waste was recorded, a decrease of 81 kg compared to July 2017.

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

Table 3-15: Types and amounts of waste traded

Types of Waste	Unit	Remaining in July 2017	Additions in August 2017	Sold	Remaining in August 2017
Scrap metal	Kg	469	249	0	718
Glass bottles	Kg	471	106	315	262
Paper/cardboard	Kg	120	31	120	31
Aluminium cans	Kg	3	37	0	40
Plastic bottles	Kg	0	39	0	39
Total	**Kg**	**1,063**	**462**	**435**	**1,089**

3.4.2 Houay Soup Resettlement Area Waste Management

NNP1PC has signed a contract for slope stabilisation and erosion control at the Houay Soup Landfill in mid-August 2017. A DWP and SS-ESMMP for this work was submitted to NNP1PC for a review and approval on 24 August 2017 and cleared with minor comments on 30 August 2017. The work will commence in early September 2017 and is expected to be completed by end of September 2017. The selection of a contractor to operate the landfill is being finalised.

Approximately 2.1 m3 of solid waste from the local contractors and residents at HSRA was disposed of at the Houay Soup Landfill for the reported month.

3.5 Watershed and Biodiversity Management

3.5.1 Preparation of the Nam Ngiep 1 Watershed Management Plan

Targets	Status by August 2017
Stakeholder workshop arrangements by 15 August 2017	• NNP1 EMO is finalizing the translation to Lao language and the full translated document is expected to be shared with NNP1 WRPC/WRPOs in early September 2017. • The work shop is delayed due to internal issue of the government and will be conducted in September 2017.
Start of Public hearing process of provincial regulation for watershed management	• Watershed consultant has further improved the draft and it received positive feedback and acknowledgement from ADB on 3 August 2017. • The draft provincial regulations will be discussed with GOL during WMP technical workshop planned in September 2017.

Activities in August 2017	Results
Preparation for NNP1 Watershed Management Plan	• The translation to Lao language took longer than expected requiring extensive proofreading by NNP1 EMO. • NNP1 EMO had discussion with GOL (DFRM MAF) in the second and last week of August 2017 on the arrangement of technical workshop for NNP1 WMP. • The workshop is tentatively scheduled on 26-27 September 2017 with the expected participants including the representatives of NNP1PC, WRPC/WRPOs, and GOL line agencies at central and local levels.

WRPO Activities	• The official agreement to restructure NNP1 WRPC and WRPO is being discussed at central level between MAF and MONRE. • The current arrangement is that DFRM-WRPO (MAF), Bolikhamxay-WRPO (PAFO), and Xaysomboun-WRPO (PONRE) are the responsible agencies
Xaysomboun Intergraded Spatial Planning (ISP)	• There was short discussion between NNP1 EMO and MONRE DEQP on 7 August 2017. MONRE DEQP could not finalize the ISP yet because there are some information / data inputs needed from Xaysomboun ISP. MONRE DEQP will issue an official letter to follow up with Xaysomboun ISP. • The tentative schedule to finalize ISP was discussed between NNP1 EMO, MONRE DEQP and Xaysomboun ISP such as follow: o Distribute the improved final draft of ISP to the concerned sectors in Xaysomboun Province and MONRE DEQP for final comments by the week of 21-25 August 2017. o Workshop for discussion with the concerned sectors, NNP1, and MONRE DEQP on the final draft of ISP by the week of 4-8 September 2017. o Final revision on the final draft by the week of 11-15 September 2017. o Final meeting for the approval of XSB ISP by the week of 25-29 September 2017. • Unfortunately, the distribution of the final draft ISP to the concerned sectors in Xaysomboun Province was delayed. NNP1 EMO will continue to follow up and encourage MONRE DEQP and Xaysomboun ISP to finalize the ISP as discussed.

3.5.2 Biodiversity Offset Management

Targets	Status by August 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 was finalized at the end of August 2017. The contract settlement took longer than expected because of long negotiation of contract clauses, price, and taxation issue.

Draft BOMP for Nam Chouane-Nam Xang Biodiversity Offset Site (December 2017)	• The starting of preparation of the BOMP was delayed because the contract with BOMP Consultant was only finalized at the end of 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 August 2017	**Results**
Activities pre-BOMP period of 01 October 2016 – 31 September 2017	Patrolling activity at Nam Chouan Nam Xang Biodiversity Offset site: • Two meetings were held between NNP1 EMO and BOMC on 14 and 18 August 2017 with the main purpose to agree on 1) The final patrol training outline/modules, 2) Potential trainer identified needed to be further followed up and reach agreement, 3) Training date determination and 4) Proposed budget on related matter. • The training was started as planned on 24 August 2017. The topic of training includes: 1) the background of biodiversity and conservation which in support of local livelihood, 2) first aid actions and why these are needed when working in the field - steps and precaution to deal with injury occurred from broken arms/legs accidence, poisonous food from nature, poisonous insect/snake, 3) law enforcement/patrolling technique, and 4) SMART programme installation and exercise.

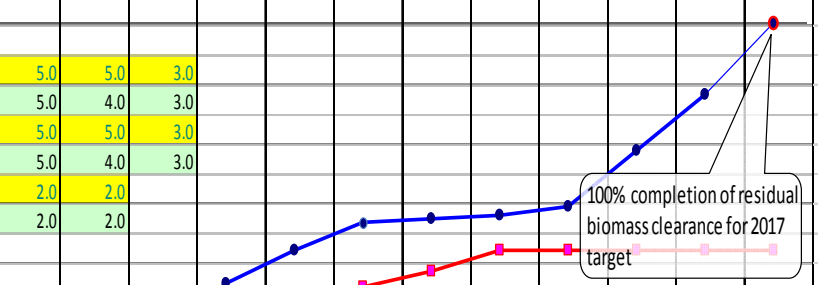
3.5.3 Biomass Clearance

Activities in August 2017	Results
Progress of biomass clearance	• During the reported period, the work including cutting down remaining trees, stockpiling and burning log/debris at **Block 2 to Block 5** and **Block 14 to Block 15** with limited capacity due to the rain. • **Block 2 and Block 3**: Contractor completed cutting down the remaining trees on 7 August 2017. There were 30 logs in Block 2 were piled for further utilize by government. The work has not been progress after 7 August 2017. • **Block 4 and Block 5**: Stockpiling log/debris using labourers and machineries continues in good progress until end of August 2017. It was recorded that stockpiling log/debris was completed around 95 ha in Block 4 and 31 ha in Block 5. The burning piles log/debris could only be carried intermittently due to the rain. An earth stove with roof was built in Block 4 for continuation with small burning progress. • **Block 14 and Block 15**: Stockpiling log/debris was completed around 13 ha in Block 14 and 14 ha in Block 15 by the end of Aug 2017. The burning piles log/debris could only be carried out intermittently due to the rain. The burning of piles log/debris is expected to be fully carried out from the middle of September 2017 onward. • A verification of additional completed biomass clearance area using ground check and aerial drone methods will be conducted in September 2017. • The biomass clearance progress to date can be seen in *Error! Reference source not found.*. It is noted that there was no significant progress during the reported month which is mainly due to rainy season. The biomass clearance progress in maps could be seen from *Error! Reference source not found.* to *Error! Reference source not found.*.

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 August 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	0.5	0.5					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	10.5	3.0	2.0	2.0	1.0	1.0	1.0		0.5					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	0.5	0.5					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	7.5	1.0	1.0	1.0	1.0	1.0	0.5	1.0	1.0					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	71.5	**22.0**	**17.5**	**13.0**	**4.0**	**5.0**	**5.5**	**2.0**	**2.5**	**0.0**	**0.0**	**0.0**	**0.0**	4
	Planned Progress	monthly	0.0	22.0	22.5	16.0	7.0	4.0	3.5	0.5	0.5	1.0	7.0	7.0	9.0	
		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	2.5	0.0	0.0	0.0	0.0	
		Cumulative		22.0	39.5	52.5	56.5	61.5	67.0	69.0	71.5	71.5	71.5	71.5	71.5	



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 biomass clearance area		Biomass clearance area progress in Ha as of 31 August 2017	
Block	**Total in Ha**	**Total biomass clearance in progress area in Ha**	**Completed biomass clearance area in Ha**
B1	109.24	54.43	
B2	158.63	90.34	8.54
B3	80.35	35.50	
B4	163.74	138.23	10.33
B5	340.14	122.63	5.62
B6	31.92	4.41	
B7	39.65	2.26	
B8	37.61	8.97	
B9	52.75	6.44	
B10	269.1	169.71	
B11	89.98	89.98	
B12	64.11	64.03	
B13	101.24	101.24	
B14	43.33	43.34	
B15	43.73	43.73	7.88
B16	3.32	3.32	

Target biomass clearance area		Biomass clearance area progress in Ha as of 31 August 2017	
Block	**Total in Ha**	**Total biomass clearance in progress area in Ha**	**Completed biomass clearance area in Ha**
B17	7.96	7.96	1.70
B18	3.95	3.95	
Total	**1,640.75**	**990.47**	**34.07**

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

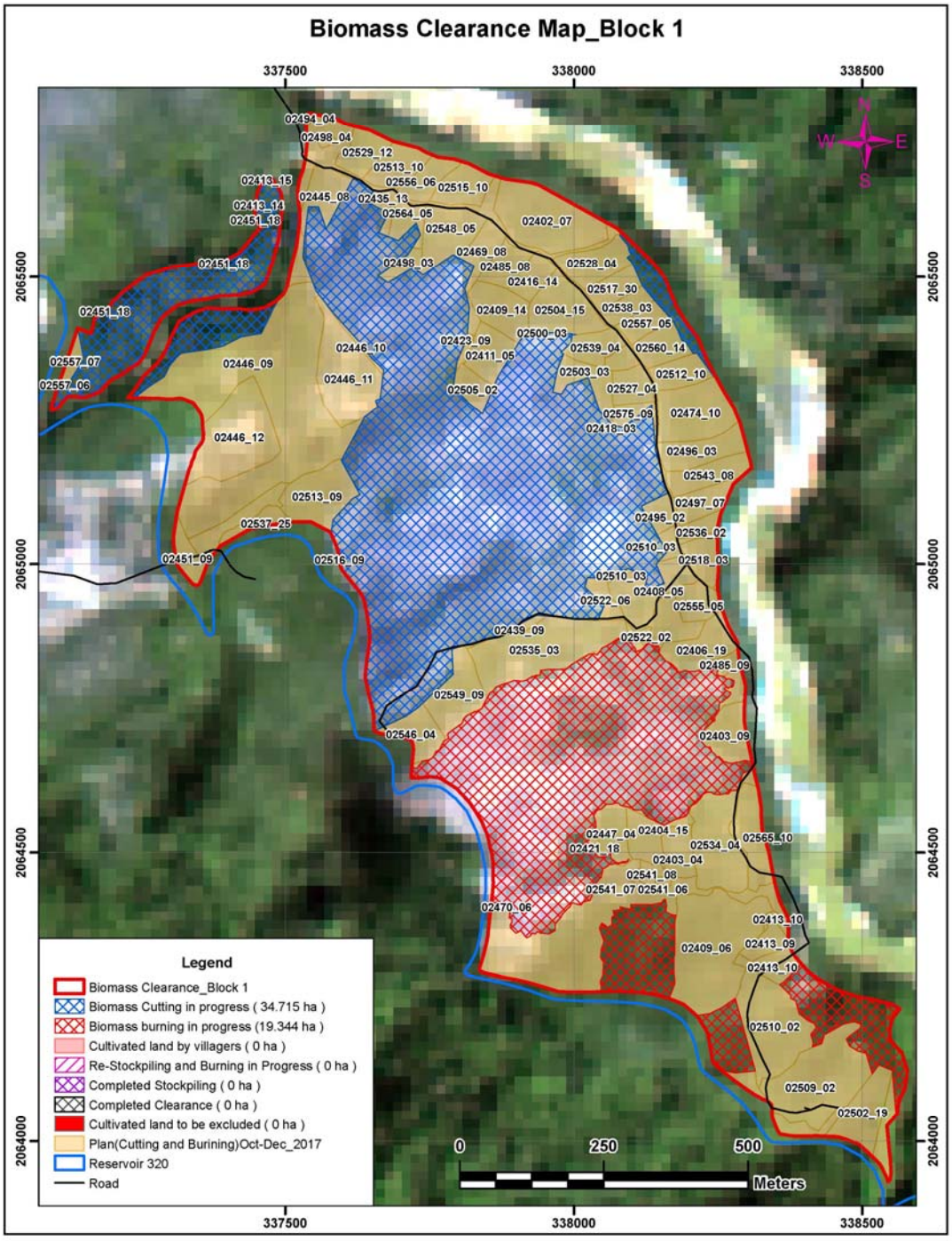


Figure 3-11: Biomass clearance progress map of Block 2

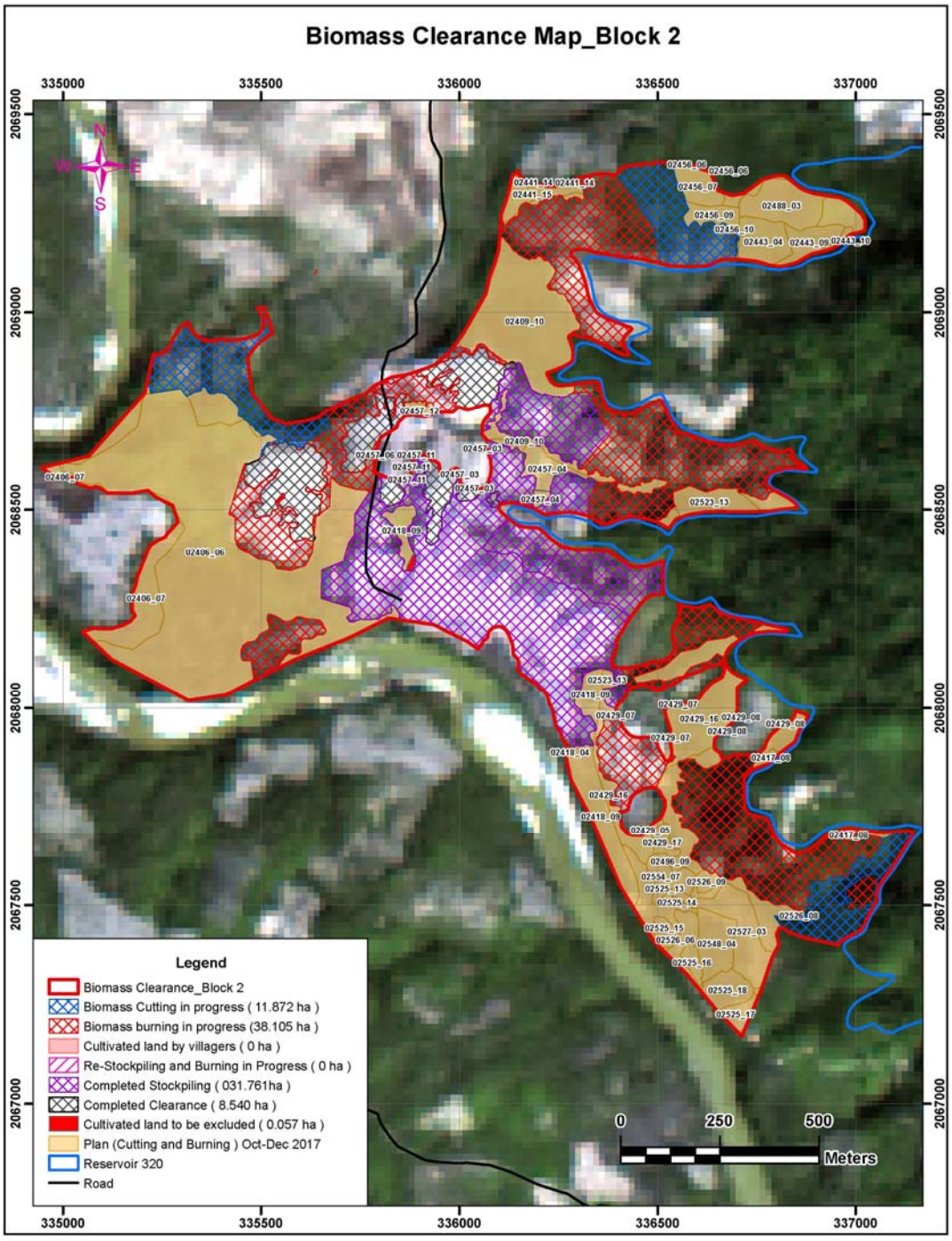


Figure 3-12: Biomass clearance progress map of Block 3

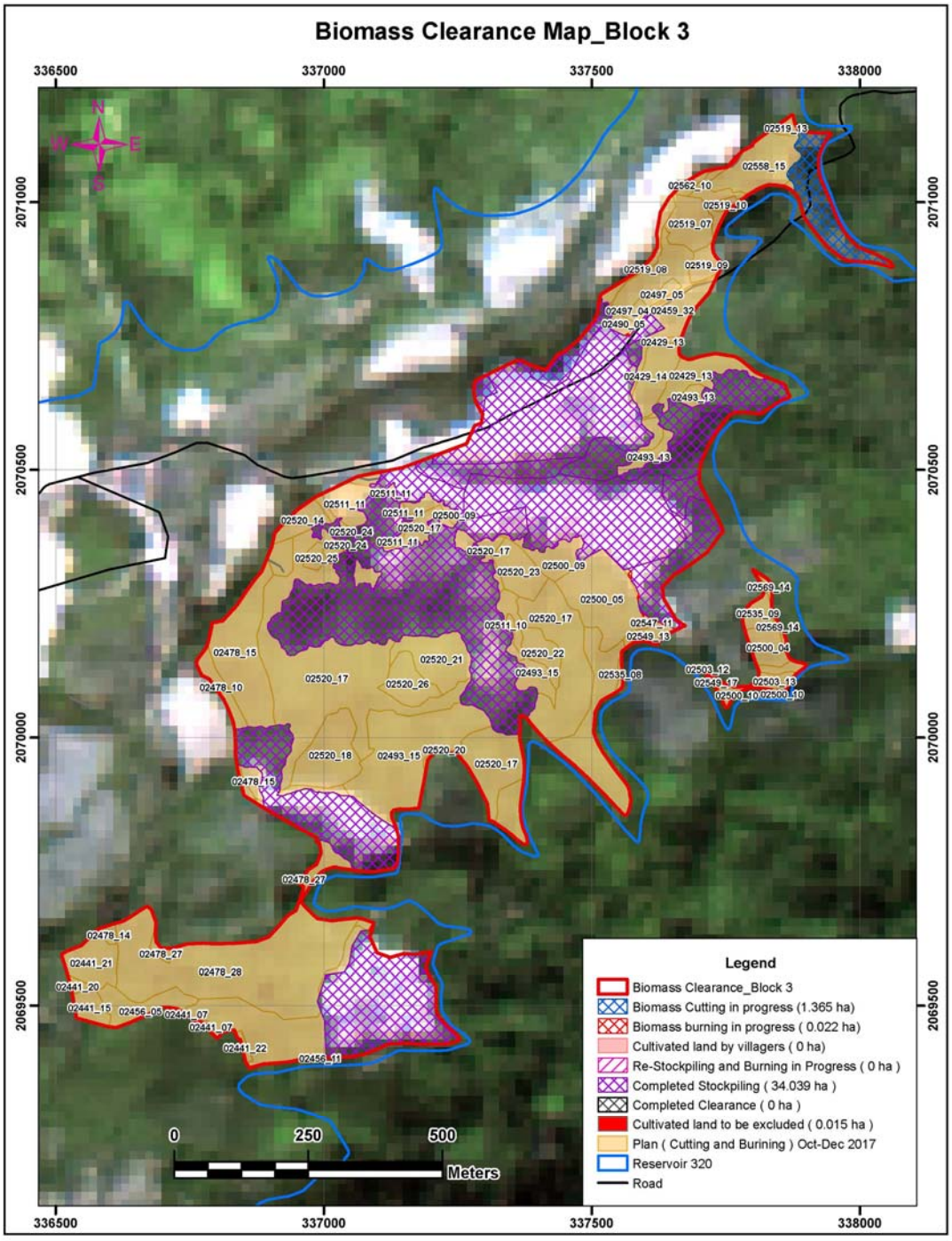


Figure 3-13: Biomass clearance progress map of Block 4

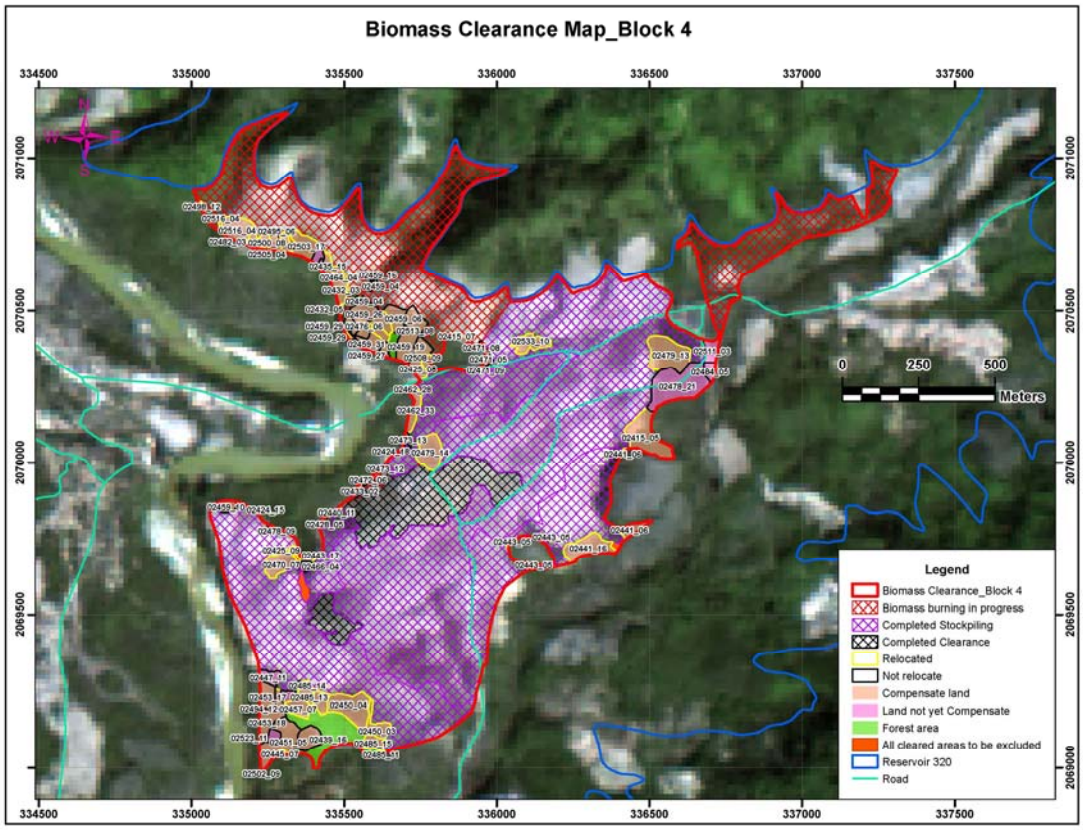


Figure 3-14: Biomass clearance progress map of Block 5

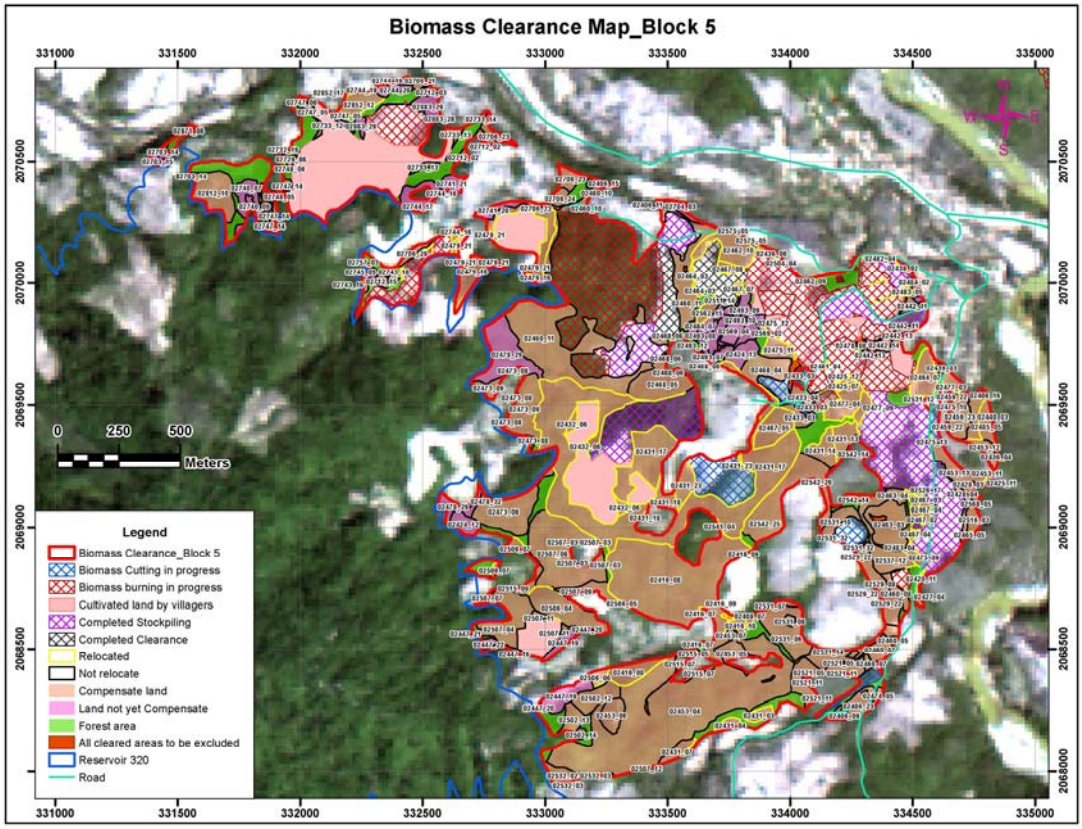


Figure 3-15: Biomass clearance progress map of Block 6

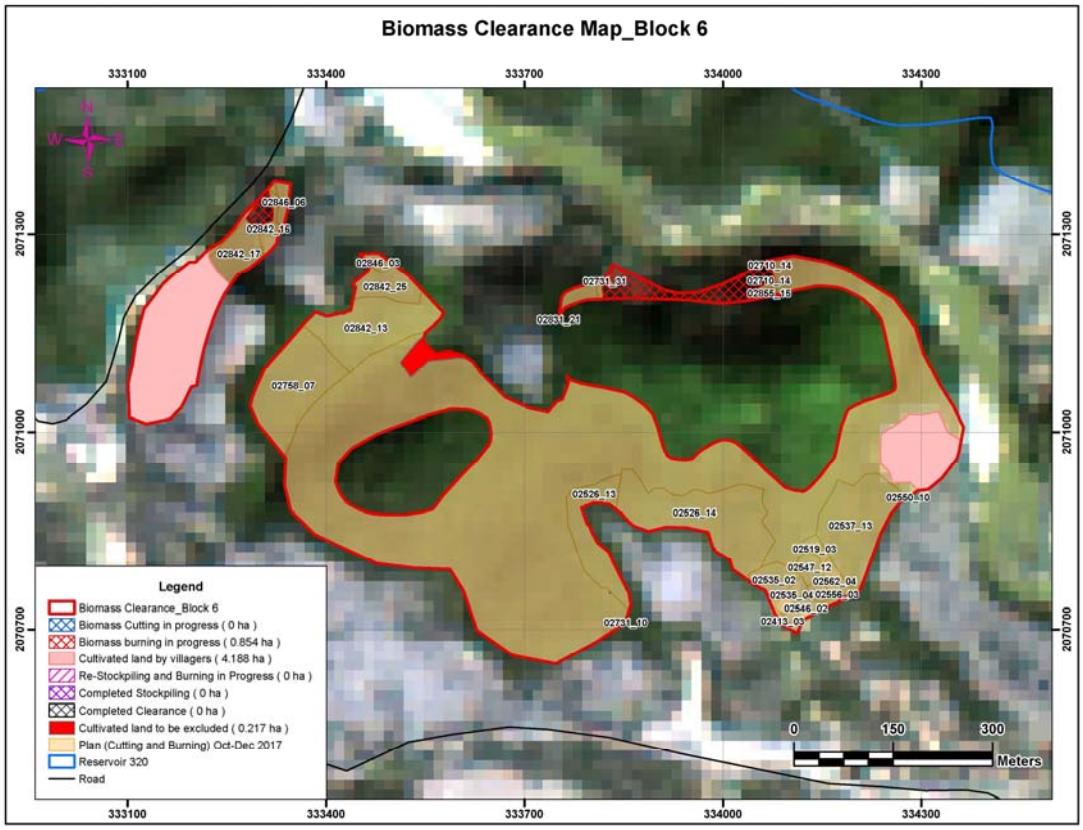


Figure 3-16: Biomass clearance progress map of Block 7

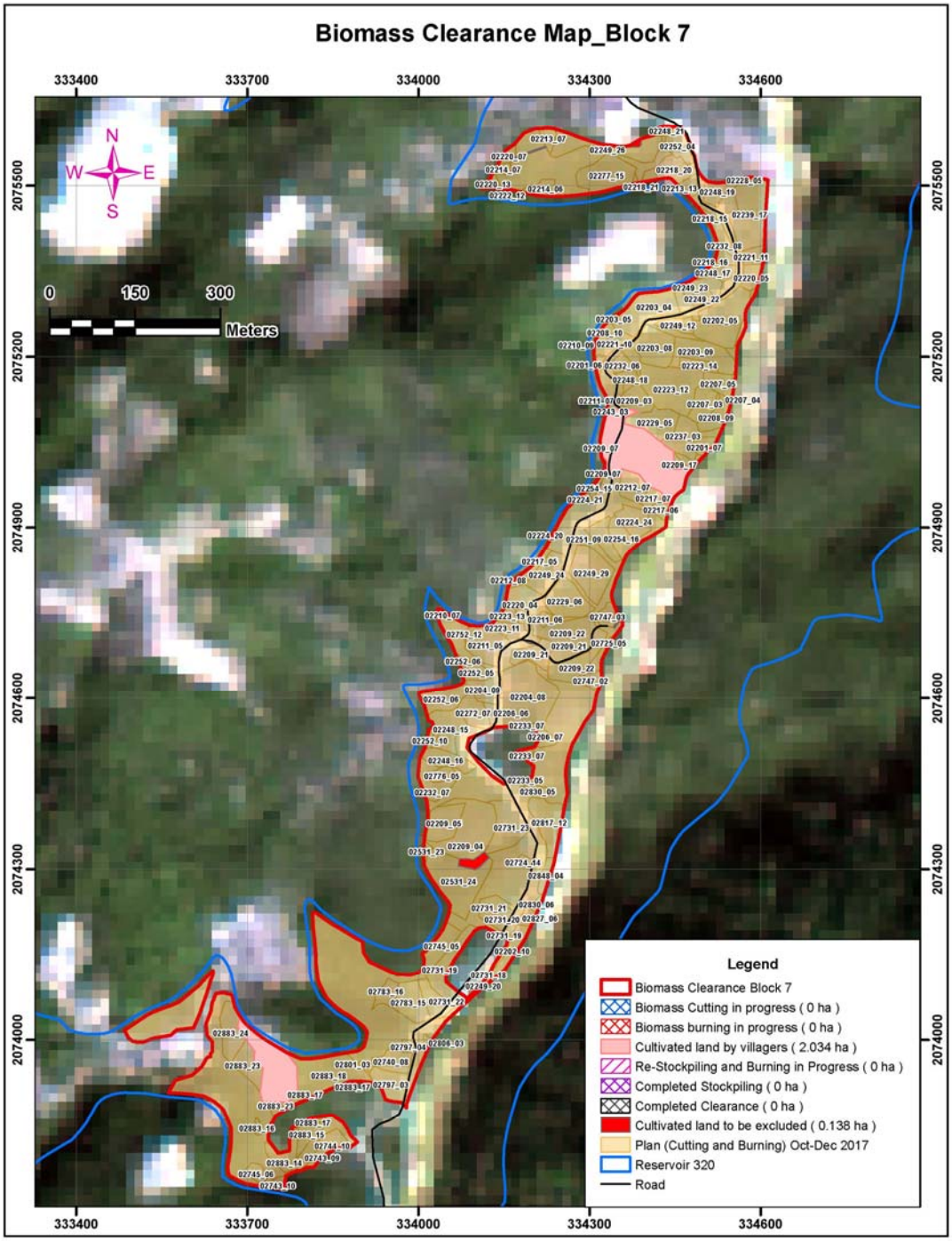


Figure 3-17: Biomass clearance progress map of Block 8

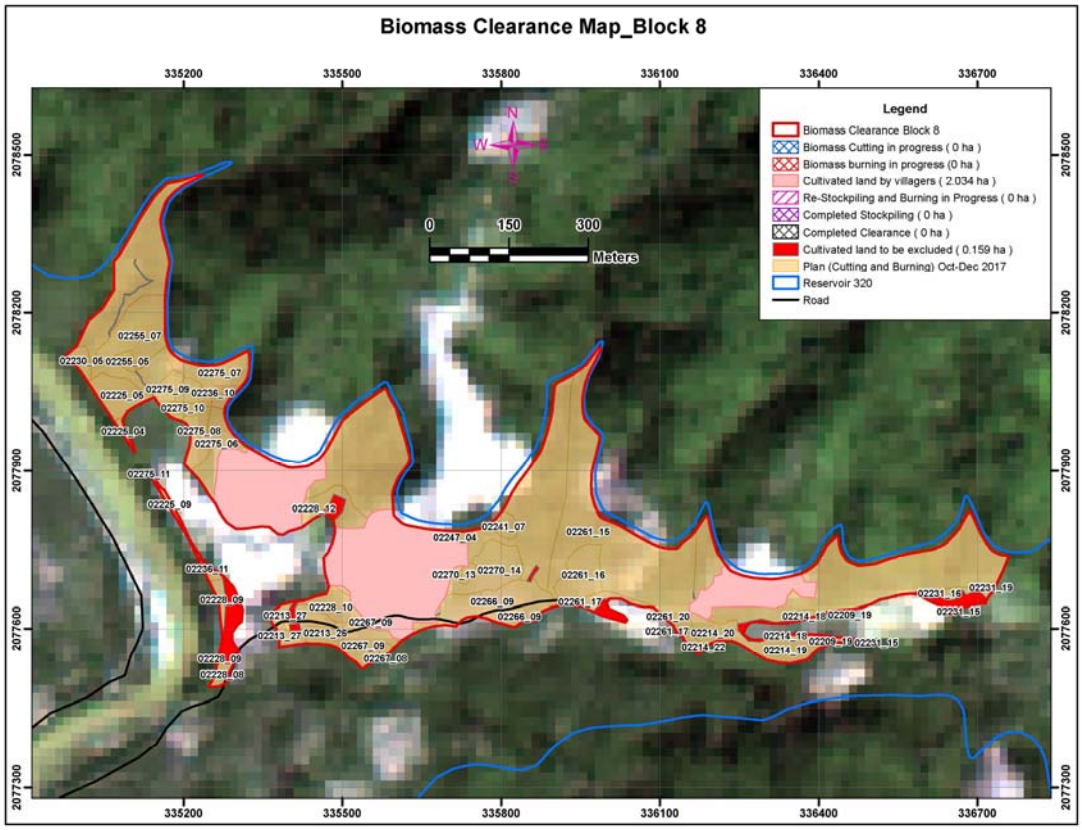


Figure 3-18: Biomass clearance progress map of Block 9

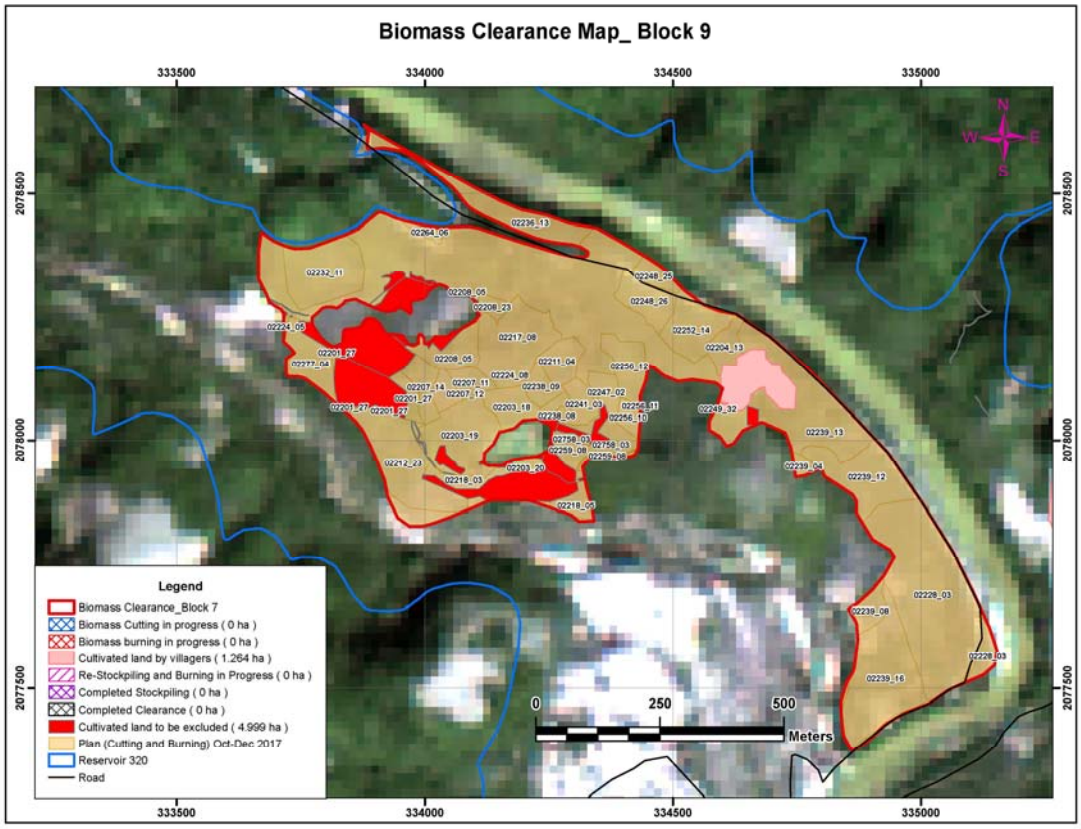


Figure 3-19: Biomass clearance progress map of Block 10

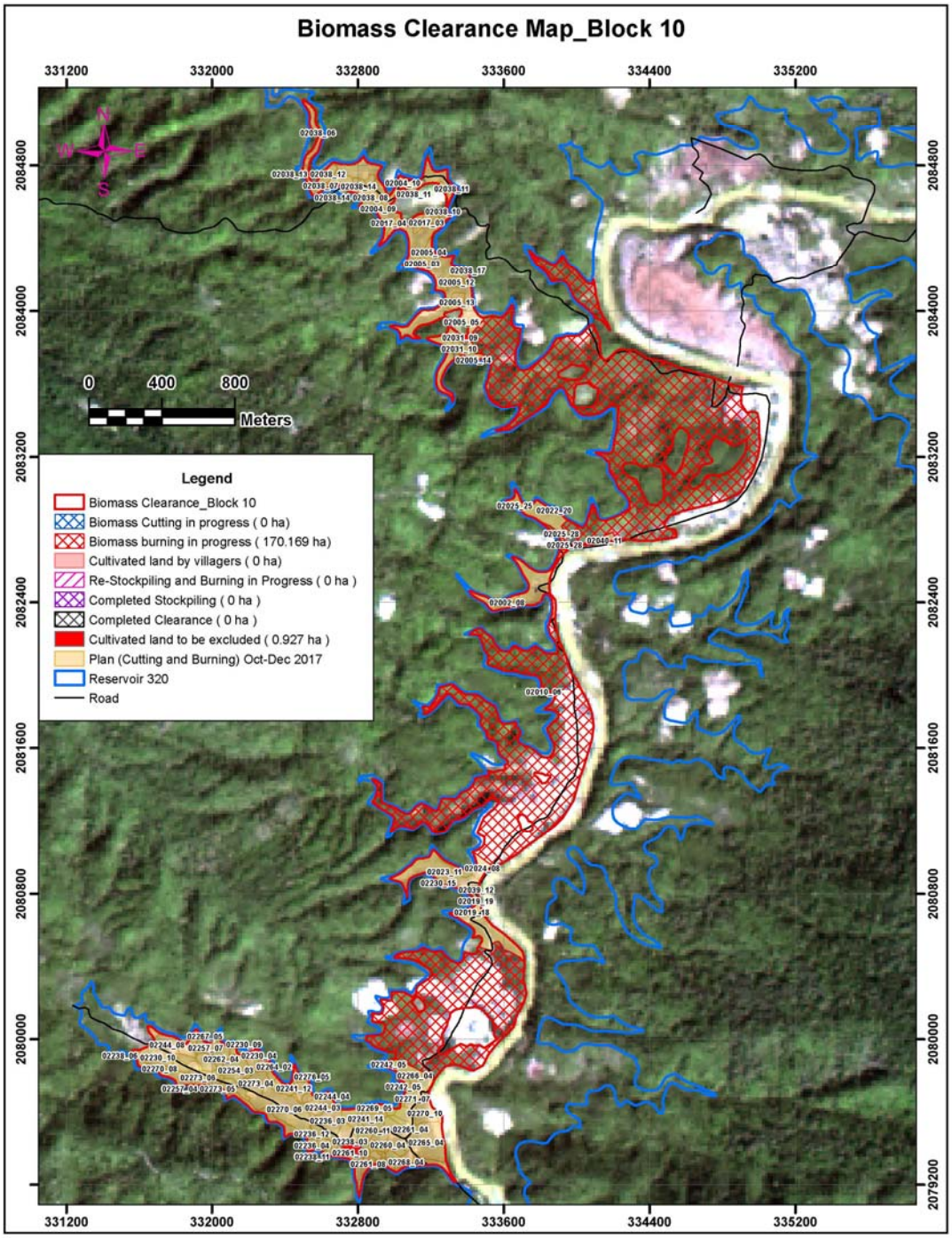


Figure 3-20: Biomass clearance progress map of Block 11

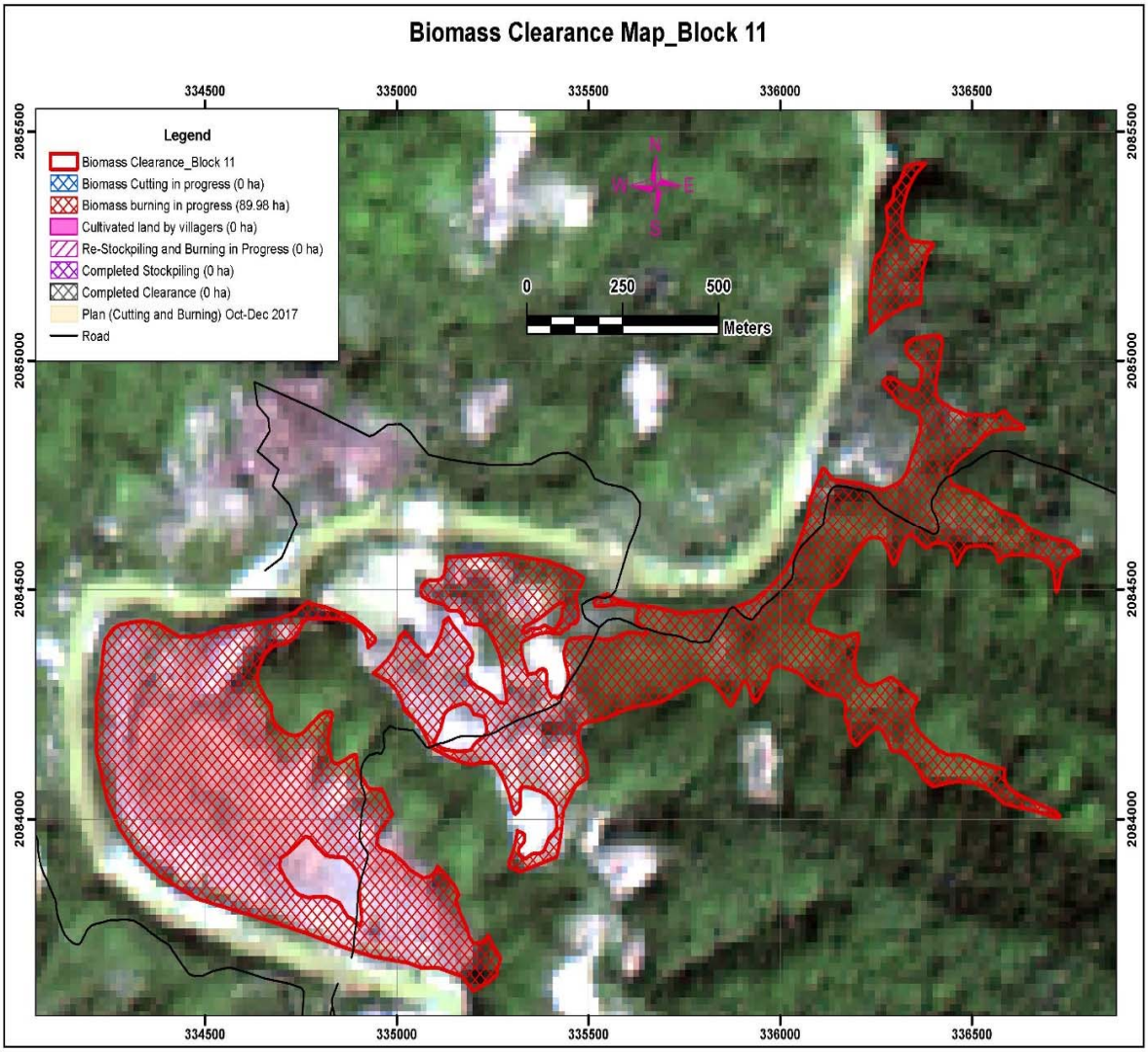


Figure 3-21: Biomass clearance progress map of Block 12

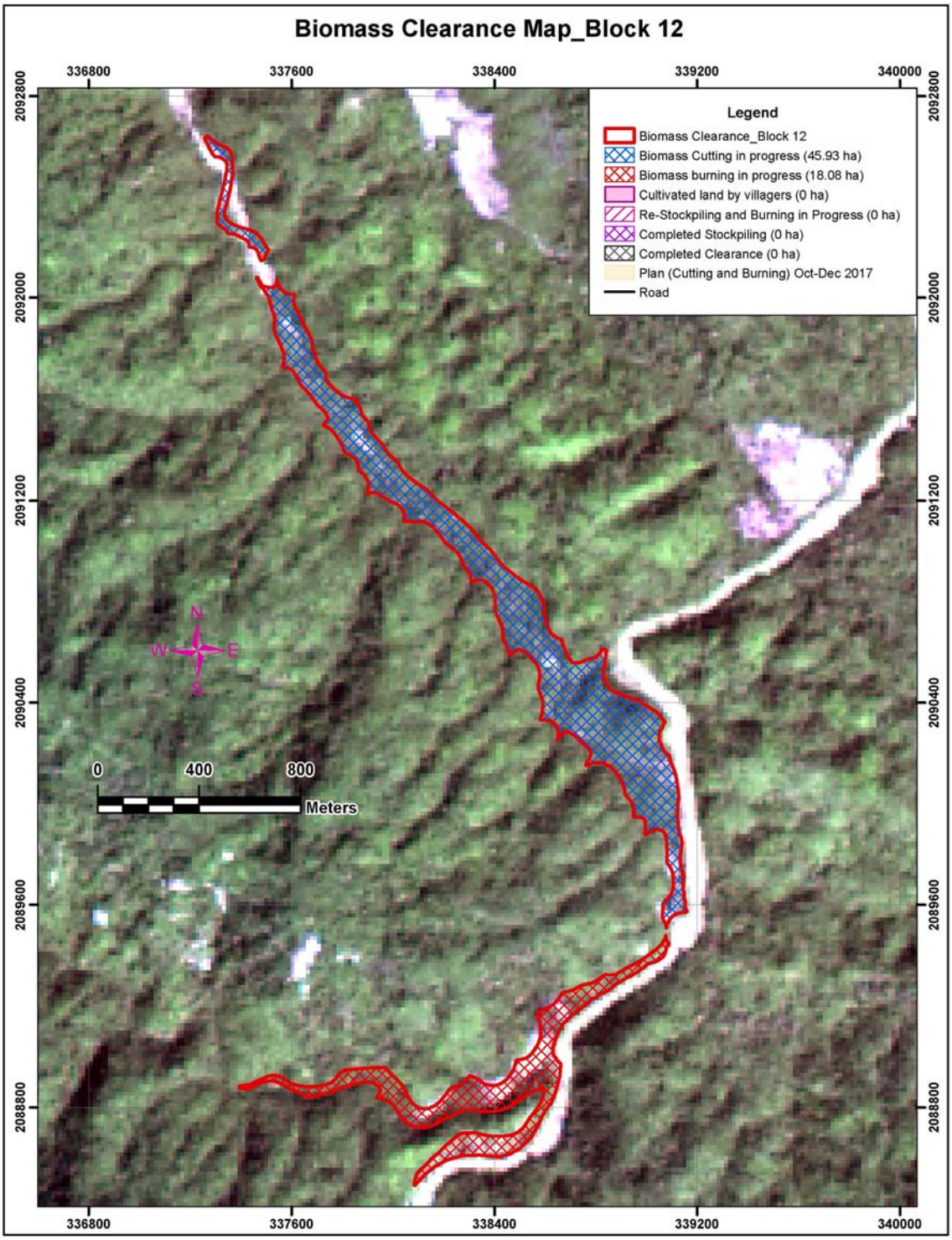


Figure 3-22: Biomass clearance progress map of Block 13

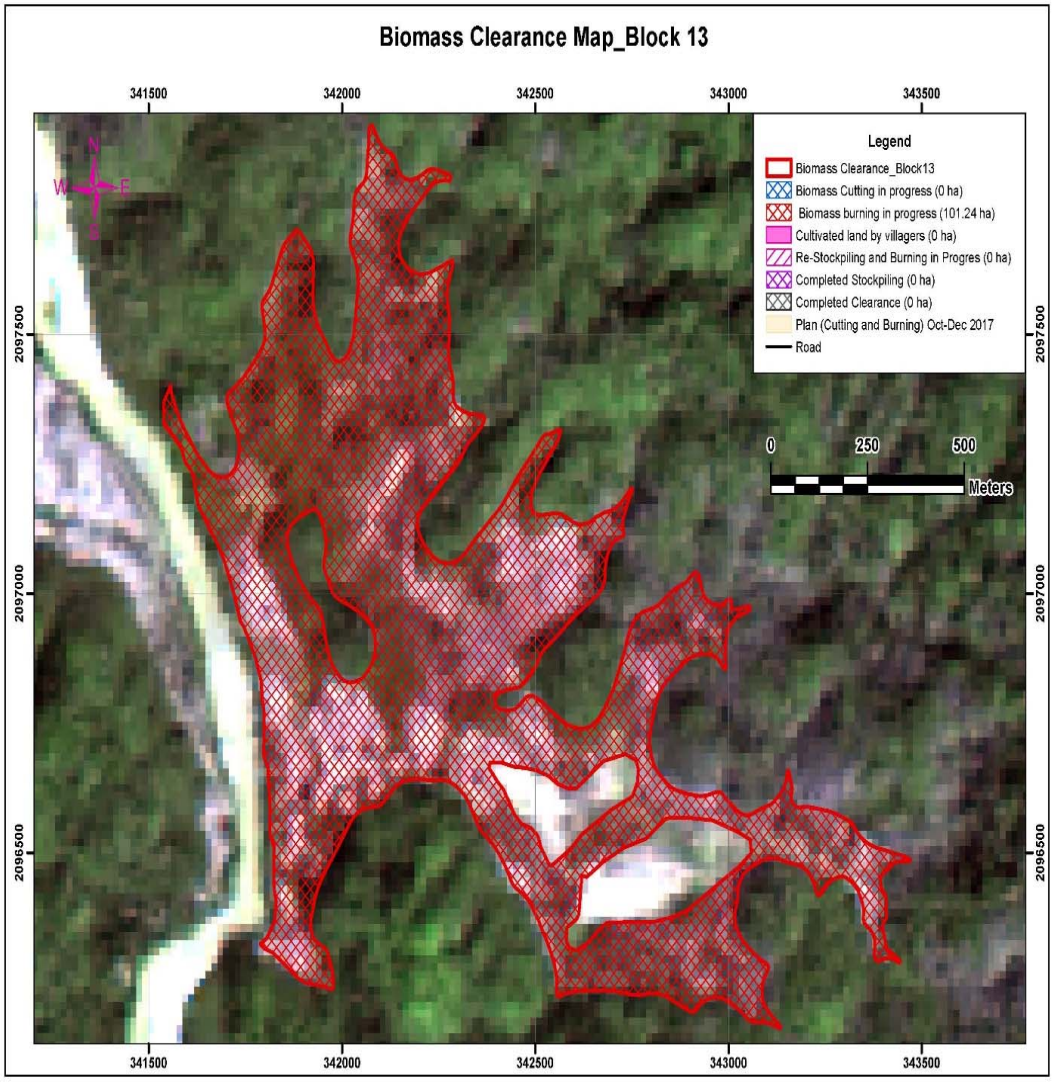


Figure 3-23: Biomass clearance progress map of Block 14

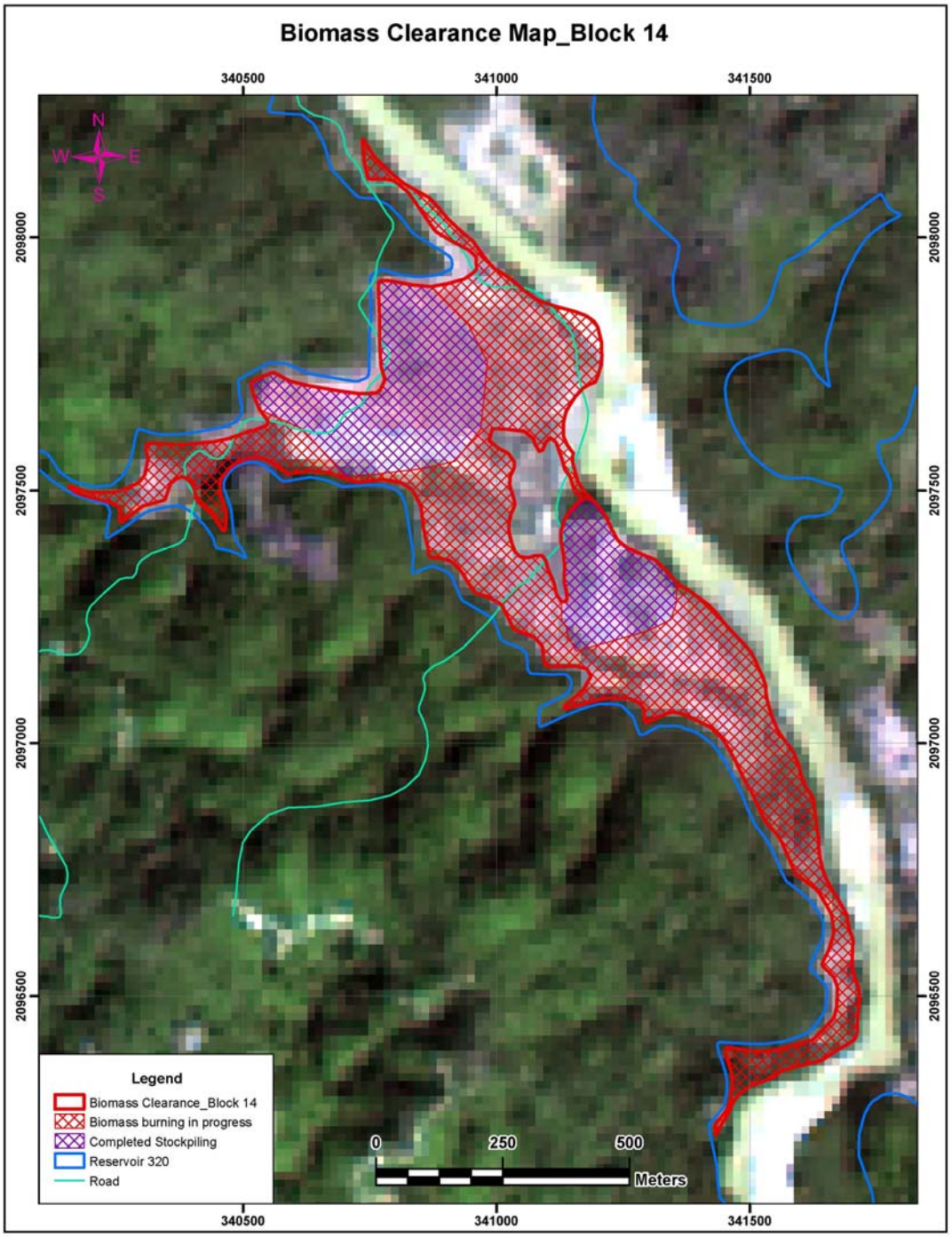


Figure 3-24: Biomass clearance progress map of Block 15-1

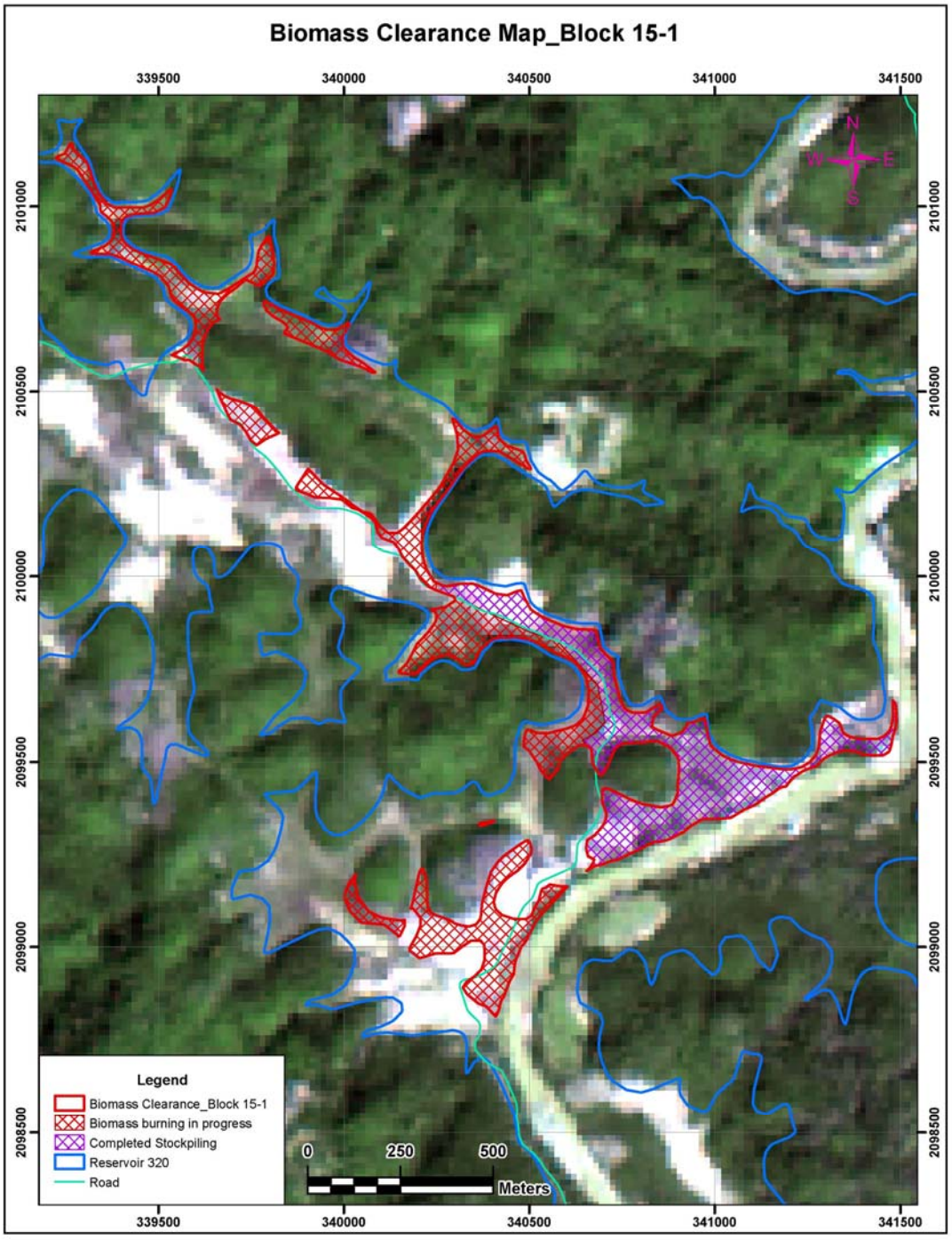


Figure 3-25: Biomass clearance progress map of Block 15-2

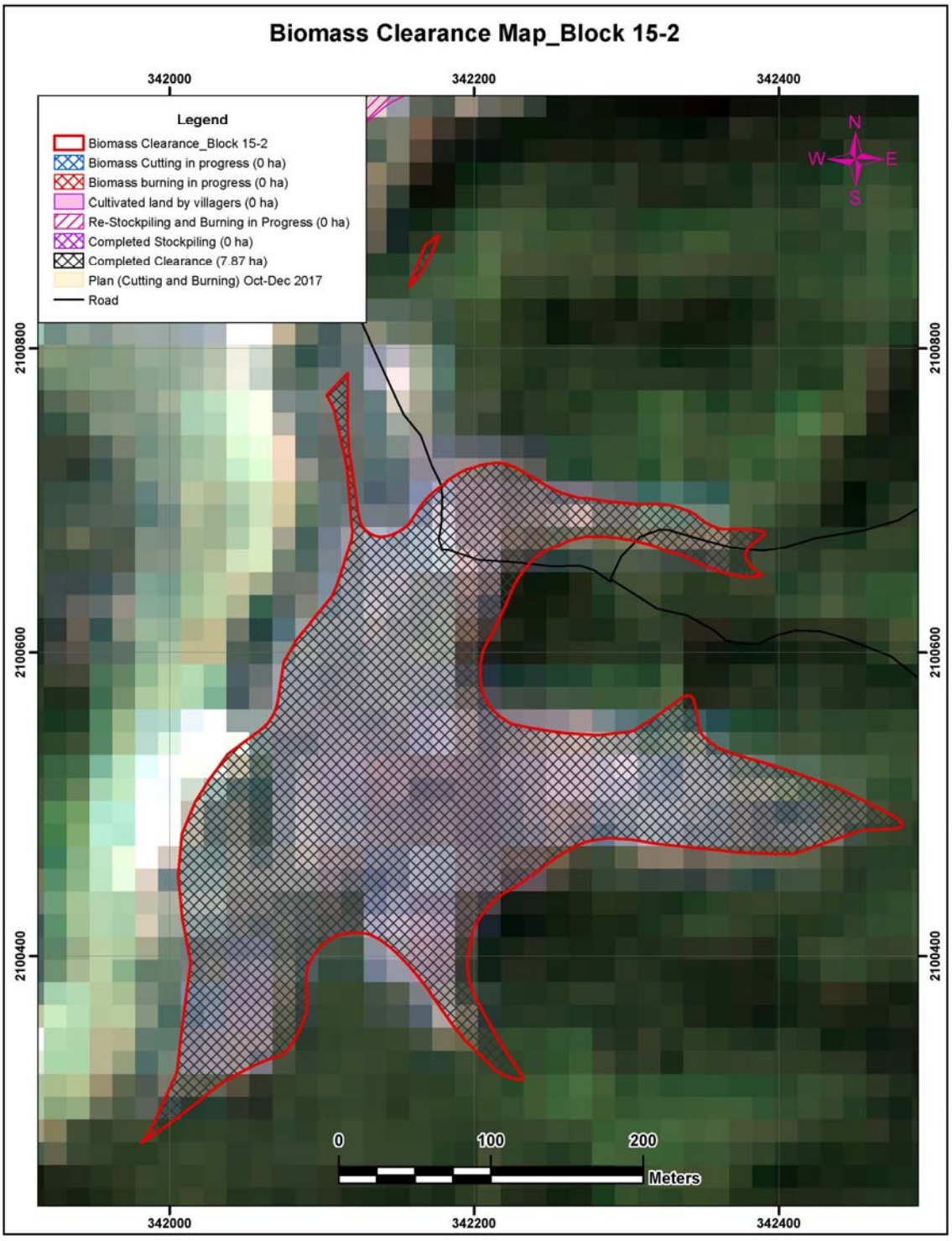


Figure 3-26: Biomass clearance progress map of Block 16

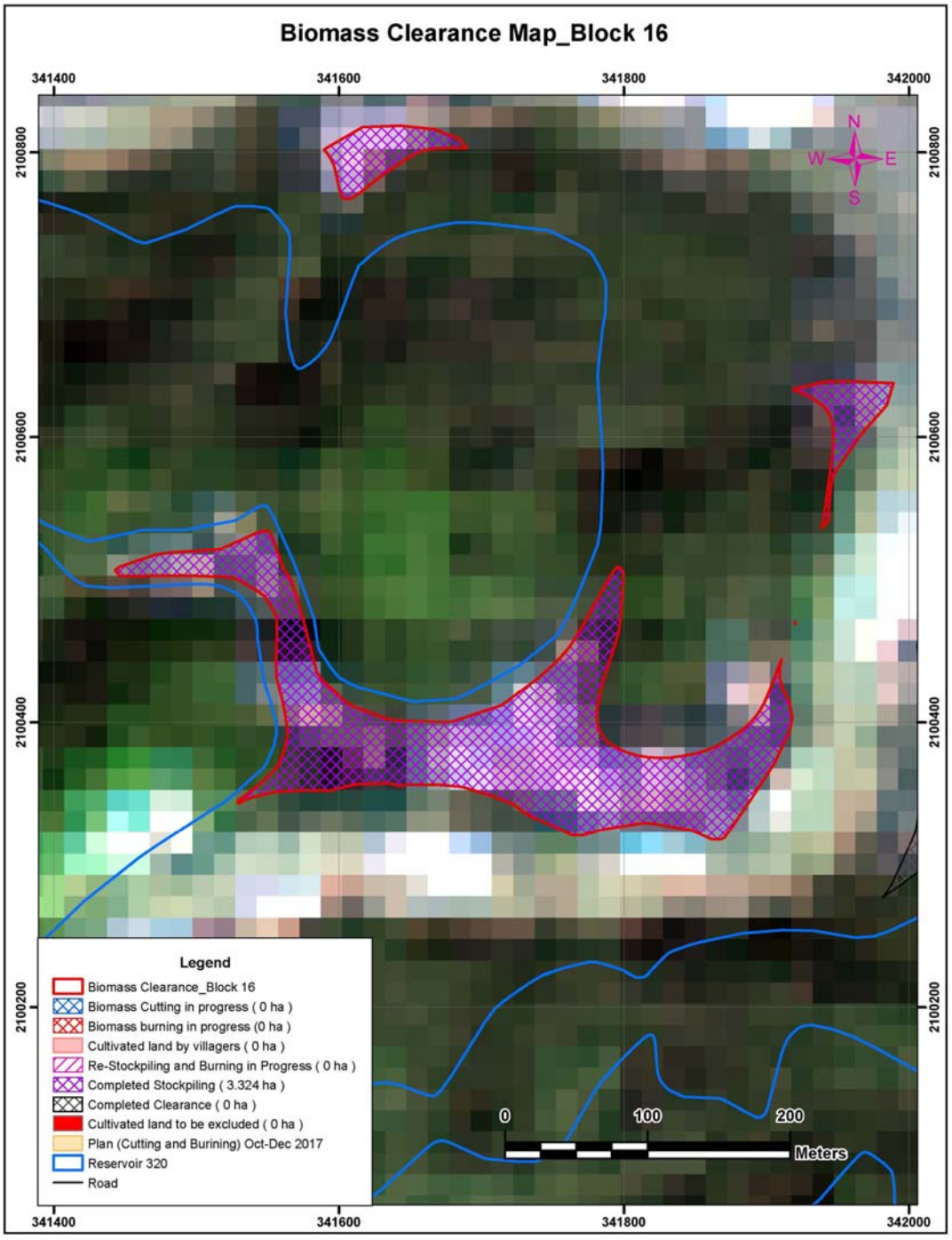


Figure 3-27: Biomass clearance progress map of Block 17

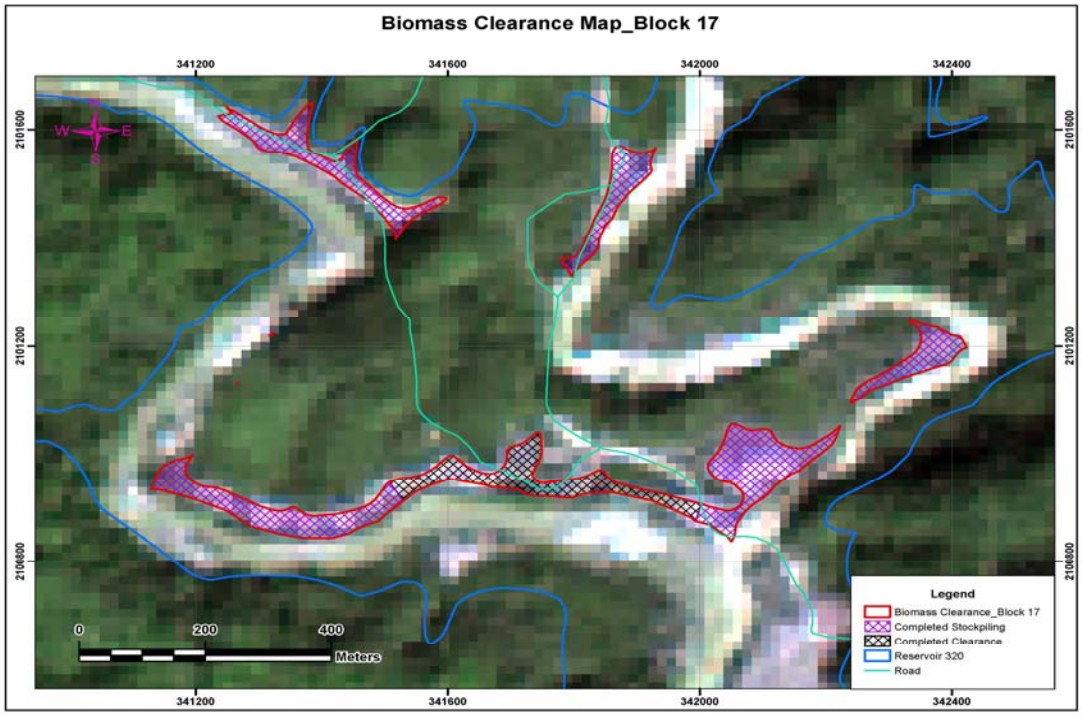
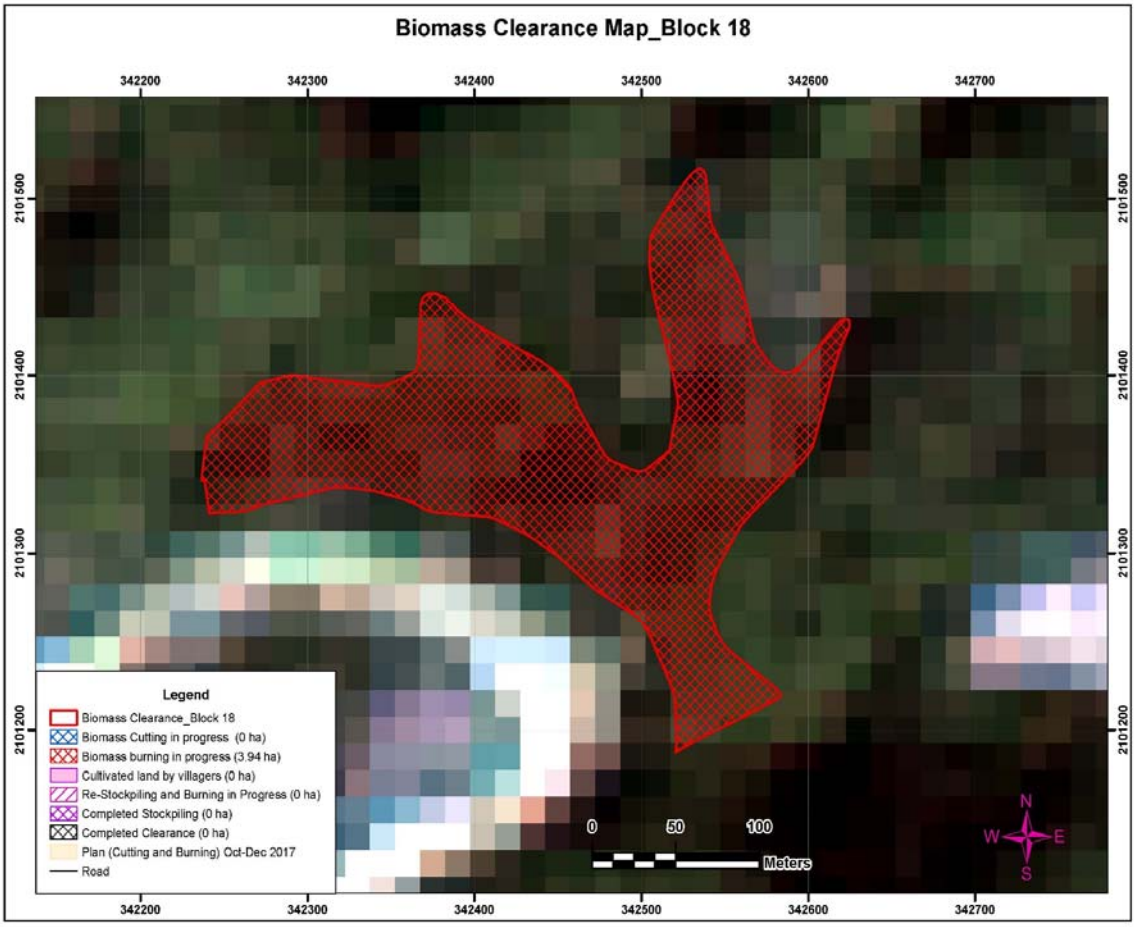


Figure 3-28: Biomass clearance progress map of Block 18



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 August 2017

(a) S-Curve of fish catch monitoring programme

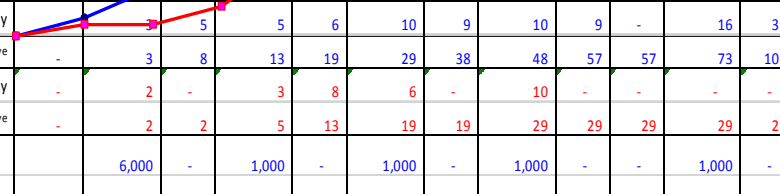
	Task List / Steps of work		Weight (%)	YEAR 2017												% S-Curve	Assigned to
				Q1			Q2			Q3			Q4				
				01	02	03	04	05	06	07	08	09	10	11	12		
1	**Daily catch logbook and Verification Survey**	Planed	-													100	
		Actual	-													97	
1.1	Daily catch logbook data collection on 108 HHs in 25 villages	Planed	24	2	2	2	2	2	2	2	2	2	2	2	2	94	NNP1 EMO Fish Monitoring Team
		Actual	15.5	1.5	2.0	3.0	2.0	1.5	2.0	2.0	1.5					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	8								8					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	15.0	1.0	2.0	2.0	1.5	3.0	2.0	2.0	1.5					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	4								4					9	
	Total	Planed	**100**													6	
		Actual	**81**													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	15	-	-	-	-		
			Cumulative	9	20	30	33	38	52	66	81	81	81	81	81		
	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- **27 September 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	23	-	2	-	3	8	-	-	10	-		-	-	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	**29**													5	
	Planned Progress	monthly		-	3	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	-	10	-	-	-	-		
		Cumulative		-	2	2	5	13	19	19	29	29	29	29	29		
	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 August 2017	Results
Daily Catch Logbook	• Completed the daily catch logbook survey in 84 households out of the total target of 99 households, 2,396 forms were used in the survey, some household of Zone 2LR resettled already. • Conduct fishing habitat survey at 18 villages along Nam Ngiep. • The daily household catch on average for Nam Ngiep in July 2017 is 2.0 kg/household/day. The median catch for all fishing zone. • The estimated total catch for Nam Ngiep in July 2017 is approximately 28,000 kg.
Household Catch Assessment Survey	• Completed.
Village Community Interview	• Report was submitted by Consultant on 17 August 2017.
Fish Migration and Spawning survey	• Data was included in the annual report.
Gillnet Sampling Survey	• Completed data collection at 7 stations for the second round included some water quality measurement, setting and retrieving gillnet and fish size measurement.

4.1 Other Support Programmes

4.1.1 Environmental Protection Fund (EPF)

The highlight from Bolikhamxay sub-project implementation as of August 2017:

- Completed installation of 12 boundary poles and 48 signs in Ban Sisavath;
- Completed installation of 12 boundary poles and 48 signs in Ban Vatthat;
- Collected 11 chainsaws, 6 wildlife hunting guns and 17 illegal fishing gears;
- Found illegal logging group in Ban Sisavath area which is under investigation of district forest office;
- NNP1-EMO is following up on sharing village land-uses of 5 villages in PPA;
- NNP1 EMO team had discussion with EPF on 7 Aug 2017 and it was noted:
- EPF board have approved the proposal from both Xiengkhouang and Xaysomboun Province on 4 August 2017.
- EPF will invite NNP1 for the next quarter monitoring for EPF Bolikhamxay including the site visit tentatively scheduled in September 2017;
- EPF is looking forward for the proposal from NNP1 on the use of EPF budget post COD. EPF also emphasized that the proposal to fund NNP1 Biodiversity Offset Program will still be subject of EPF Board approval;

A follow up with EPF on the project proposals of Xiengkhouang and Xaysomboun provinces confirmed that the MoU signing ceremony of Xiengkhouang and Xaysomboun EPF projects took place on 23 August 2017.

4.1.2 115 kV Transmission Line IEE Due Diligence Assessment

Based on the draft IEE submitted to the NNP1PC in June 2017, a due diligence assessment (DDA) was completed and a report was submitted to the ADB on 15 August 2017. In addition, a comment was sent to EDL for further consideration and improvement of the draft IEE. There was no feedback was received on the DDA report and comment.

4.2 External Monitoring

There was no external monitoring during the reported period.

4.2.1 Biodiversity Advisory Committee

The 6th BAC mission is scheduled in the first week of September 2017 with the main objective is for the discussion of Biodiversity Offset Option Paper (BOOP).

ANNEXES

ANNEX A: RESULTS OF EFFLUENT ANALYSES

Table A- 1: Results of Camp Effluents in August 2017

	Site Name	*Owner's Site Office and Village*		*Obayashi Camp*		*TCM Camp*	
	Station Code	*EF01*		*EF02*		*EF03*	
	Date	*14-Aug-17*	*23-Aug-17*	*14-Aug-17*	*23-Aug-17*	*14-Aug-17*	*23-Aug-17*
Parameter (Unit)	*Guideline in the CA*						
pH	*6.0-9.0*	*6.29*	*6.79*	*7.55*	*6.73*		
Sat. DO (%)		*70.7*	*67.2*	*32.2*	*11.8*		
DO (mg/l)		*5.25*	*4.69*	*2.32*	*0.08*		
Conductivity (µS/cm)		*373*	*371*	*640*	*622*		
TDS (mg/l)		*186*	*185*	*320*	*311*		
Temperature (°C)		*29.1*	*30.5*	*31.4*	*31.4*	*No*	*No*
Turbidity (NTU)		*0.81*	*0.88*	*12.9*	*23.1*	*water*	*water*
TSS (mg/l)	*<50*	*<5*	*<5*	*9.6*	*41.67*	*for*	*for*
BOD_5 (mg/l)	*<30*	*31.95*	*13.8*	*75*	*66.6*	*sampling*	*sampling*
COD (mg/l)	*<125*	*<25*	*<25*	*80.8*	*137*		
NH_3-N (mg/l)	*<10*	*3*	*4*	*20*	*17*		
Total Nitrogen (mg/l)	*<10*	*12.6*	*13*	*26*	*25.3*		
Total Phosphorus (mg/l)	*<2.0*	*0.95*	*1.42*	*1.3*	*1.49*		
Faecal Coliform (MPN/100 ml)		*49*	*49*	*2,400*	*24,000*		
Total Coliform (MPN/100 ml)	*<400*	*130*	*330*	*3,500*	*35,000*		
Oil & Grease (mg/l)	*<10*	*<1*	*-*	*1*	*-*		
Residual Chlorine (mg/l)	*<0.2*	*-*	*-*	*0*	*0*		
Chlorination Dosing Rate (ml/mn)		*-*	*-*	*90*	*205*		
Effluent Discharge Volume (L/mn)		*-*	*12*	*20*	*60*		

	Site Name	**Sino Hydro Camp**		**Song Da5 Camp No.1**		**Song Da5 Camp No.2**	
	Station Code	**EF06**		**EF07**		**EF08**	
	Date	**14-Aug-17**	**23-Aug-17**	**14-Aug-17**	**23-Aug-17**	**14-Aug-17**	**23-Aug-17**
Parameter (Unit)	**Guideline in the CA**						
pH	6.0-9.0	7.5	7.35	7.46	7.13	7.07	7.17
Sat. DO (%)		49.4	57.2	46	13	26.9	65.4
DO (mg/l)		3.52	4.08	3.19	0.91	1.94	4.54
Conductivity (µS/cm)		663	491	740	785	480	661
TDS (mg/l)		331	245	372	393	240	330
Temperature (°C)		31.1	31	30.92	30.1	30.7	32.4
Turbidity (NTU)		3.89	18.6	21.78	25.2	9.94	10.78
TSS (mg/l)	<50	7	18.12	13.25	20.28	8.99	20.17
BOD_5 (mg/l)	<30	54.9	40.65	80.25	51	58.65	60
COD (mg/l)	<125	42.4	56.4	91.9	77.8	95.2	90.3
NH_3-N (mg/l)	<10	32	30	24	27	17	15
Total Nitrogen (mg/l)	<10	35.3	38	31	35.4	23.2	19
Total Phosphorus (mg/l)	<2.0	2.06	2.19	1.74	2.05	1.28	1.15

	Site Name	Sino Hydro Camp		Song Da5 Camp No.1		Song Da5 Camp No.2	
	Station Code	EF06		EF07		EF08	
	Date	14-Aug-17	23-Aug-17	14-Aug-17	23-Aug-17	14-Aug-17	23-Aug-17
Parameter (Unit)	Guideline in the CA						
Faecal Coliform (MPN/100 ml)		1,400	24,000	1,600	1,600	0	1,600
Total Coliform (MPN/100 ml)	<400	3,400	24,000	17,000	9,200	0	9,200
Oil & Grease (mg/l)	<10	<1	-	1	-	2	-
Residual Chlorine (mg/l)	<0.2	0.08	0	0	0.09	0.55	0.01
Chlorination Dosing Rate (ml/mn)		20	70	16	9	80	20
Effluent Discharge Volume (l/mn)		10	12	12	20	20	30

	Site Name	Zhefu Camp		HM Main Camp	
	Station Code	EF09		EF13	
	Date	14-Aug-17	23-Aug-17	14-Aug-17	23-Aug-17
Parameter (Unit)	Guideline in the CA				
pH	6.0-9.0	8.28	10.66	7.32	7.25
Sat. DO (%)		93.4	187	32.7	24.7
DO (mg/l)		6.89	13.28	2.37	1.81
Conductivity (µS/cm)		308	336	590	825
TDS (mg/l)		155	157	295	412
Temperature (°C)		28.5	31.6	31	29.7
Turbidity (NTU)		10.59	11.5	23.8	1.07
TSS (mg/l)	<50	14.05	57.41	20.67	22.04
BOD_5 (mg/l)	<30	43.35	16.65	120	<1
COD (mg/l)	<125	95.2	116	182	132
NH_3-N (mg/l)	<10	10	<2	21	19
Total Nitrogen (mg/l)	<10	19.4	4.79	19.4	19.3
Total Phosphorus (mg/l)	<2.0	1.38	0.56	1.12	1.84
Faecal Coliform (MPN/100 ml)		350	0	0	0
Total Coliform (MPN/100 ml)	<400	350	0	0	0
Oil & Grease (mg/l)	<10	<1	-	<1	-
Residual Chlorine (mg/l)	<0.2	-	-	0	2.7
Chlorination Dosing Rate (ml/mn)		-	-	1,500 ml/2 m^3	1,500 ml/2 m^3
Effluent Discharge Volume (l/mn)		-	-	2000	2000

	Site Name	IHI Camp		Kenber Camp	
	Station Code	EF14		EF16	
	Date	14-Aug-17	23-Aug-17	14-Aug-17	23-Aug-17
Parameter (Unit)	Guideline in the CA				
pH	6.0-9.0	7.61	6.87	9.54	No sampling due to the site maintenance and improvement
Sat. DO (%)		61.6	14	245.4	
DO (mg/l)		4.35	0.9	17.55	
Conductivity (µS/cm)		598	735	241	
TDS (mg/l)		299	368	120	
Temperature (°C)		31.8	29.3	30.2	
Turbidity (NTU)		7.37	9.03	10.77	
TSS (mg/l)	<50	<5	14.21	124	
BOD_5 (mg/l)	<30	44.7	65.85	94.65	
COD (mg/l)	<125	43.6	102	203	
NH_3-N (mg/l)	<10	14	7	3	
Total Nitrogen (mg/l)	<10	14.6	7.42	9.05	
Total Phosphorus (mg/l)	<2.0	1.21	0.7	0.78	
Faecal Coliform (MPN/100 ml)		1100	580	790	
Total Coliform (MPN/100 ml)	<400	2,200	3,500	1,700	
Oil & Grease (mg/l)	<10	1	-	<1	
Residual Chlorine (mg/l)	<0.2	0.44	0.02	0	
Chlorination Dosing Rate (ml/mn)		5	12	-	
Effluent Discharge Volume (l/mn)		3	12	-	

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

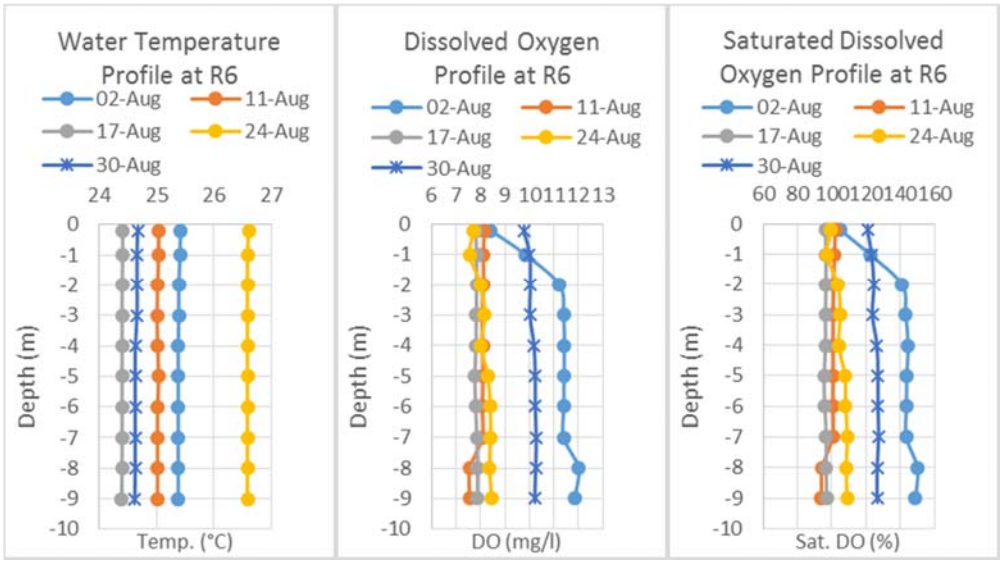
	Site Name	*Aggregate Crushing Plant*				*CVC Plant*			
	Station Code	*DS02*				*DS03*			
	Date	*9-Aug-17*	*16-Aug-17*	*22-Aug-17*	*30-Aug-17*	*9-Aug-17*	*16-Aug-17*	*22-Aug-17*	*30-Aug-17*
Parameter (Unit)	*Guideline*								
pH	*6.0 - 9.0*	*6.32*	*4.43*	*7.51*	*7.19*	*No Discharge*	*No Discharge*	*No Discharge*	*No Discharge*
Sat. DO (%)		*99.5*	*76.3*	*99.4*	*96*				
DO (mg/l)		*7.7*	*5.32*	*6.42*	*7.5*				
Conductivity (µs/cm)		*59.1*	*569*	*184.7*	*186*				
TDS (mg/l)		*30*	*284*	*92*	*93*				
Temperature (°C)		*26.9*	*27.9*	*35*	*26.5*				
Turbidity (NTU)		*1,723*	*20.93*	*6.73*	*52.7*				
TSS (mg/l)	*<50*	*514.48*	*27.92*	*8.24*	*97*				
Oil & Grease (mg/l)	*<10*		*1*						

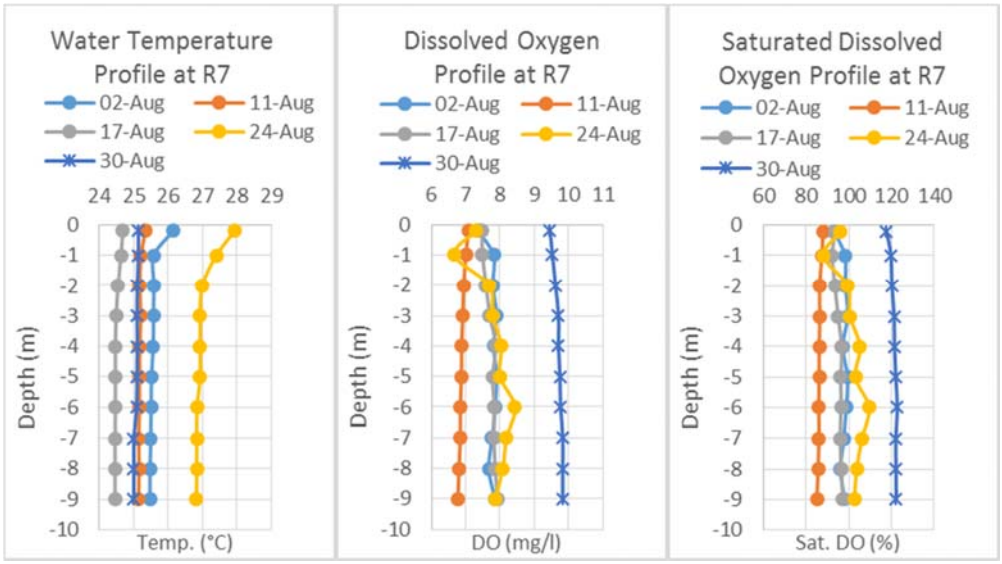
	Site Name	Spoil Disposal No.2			
	Station Code	DS04			
	Date	9-Aug-17	16-Aug-17	22-Aug-17	30-Aug-17
Parameter (Unit)	Guideline				
pH	6.0 - 9.0	6.45	6.06	5.89	6.66
Sat. DO (%)		70.8	75.5	56.2	72.1
DO (mg/l)		5.73	5.93	4.2	5.61
Conductivity (µs/cm)		19.19	60	21.36	25.2
TDS (mg/l)		10	30	10	12
Temperature (°C)		24.3	25.73	28.3	26.5
Turbidity (NTU)		22.32	13.23	8.46	53.7
TSS (mg/l)	<50	21	7	9	150
Oil & Grease (mg/l)	<10		<1		

	Site Name	RCC Plant Discharge at lower ponds				RCC Plant Discharge nearby IHI Workshop			
	Station Code	DS09				DS13			
	Date	9-Aug-17	16-Aug-17	22-Aug-17	30-Aug-17	9-Aug-17	16-Aug-17	22-Aug-17	30-Aug-17
Parameter (Unit)	Guideline								
pH	6.0 - 9.0	7.13	7.69	7.28	6.62	6.83	7.99	7.72	6.75
Sat. DO (%)		97.7	67.1	98.6	96.2	99	62.1	103.3	96.3
DO (mg/l)		7.35	5.18	6.75	7.33	7.5	4.73	6.89	7.3
Conductivity (µs/cm)		98.7	414	311	262	60.4	316	88.4	59.6
TDS (mg/l)		49	209	156	131	30	156	44	30
Temperature (°C)		27.9	26.07	33.6	27.8	28.1	27.4	35	27.6
Turbidity (NTU)		2,051	55.22	17.6	55.1	2,357	85.38	11.3	31.3
TSS (mg/l)	<50	974.23	77.96	33.75	187.14	1,333	108.7	10.71	55
Oil & Grease (mg/l)	<10		4				<1		

	Site Name	Main Dam's Waste Water Treatment Plant No.1				Main Dam's Waste Water Treatment Plant No.2			
	Station Code	DS11				DS12			
	Date	9-Aug-17	16-Aug-17	22-Aug-17	30-Aug-17	9-Aug-17	16-Aug-17	22-Aug-17	30-Aug-17
Parameter (Unit)	Guideline								
pH	6.0 - 9.0	2.82	7.7	7.68	6.46	No Discharge	11.64	No Discharge	6.99
Sat. DO (%)		99.6	66.1	98.3	98.1		66.6		97.8
DO (mg/l)		7.58	5.01	6.72	7.6		4.87		7.52
Conductivity (µs/cm)		1208	523	1099	391		1,900		67.6
TDS (mg/l)		604	260	550	195		950		34
Temperature (°C)		27.7	26.7	33.6	26.7		29.82		27.1
Turbidity (NTU)		11.32	19.9	5.67	2.66		25.96		19.9
TSS (mg/l)	<50	37.9	46.01	17.9	11.25		82.42		23.33
Oil & Grease (mg/l)	<10		<1				<1		

Table A- 3: *Temperature and Dissolved Oxygen Depth Profile Results of the Re-regulation Reservoir Monitoring in August 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	11-Aug-17 18:00	12-Aug-17 18:01	13-Aug-17 18:01
End Time	12-Aug-17 18:00	13-Aug-17 18:00	14-Aug-17 18:00
Average Data Record in 24h (mg/m^3)	0.018	0.023	0.030
Guideline Average in 24h (mg/m^3)	0.12	0.12	0.12

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

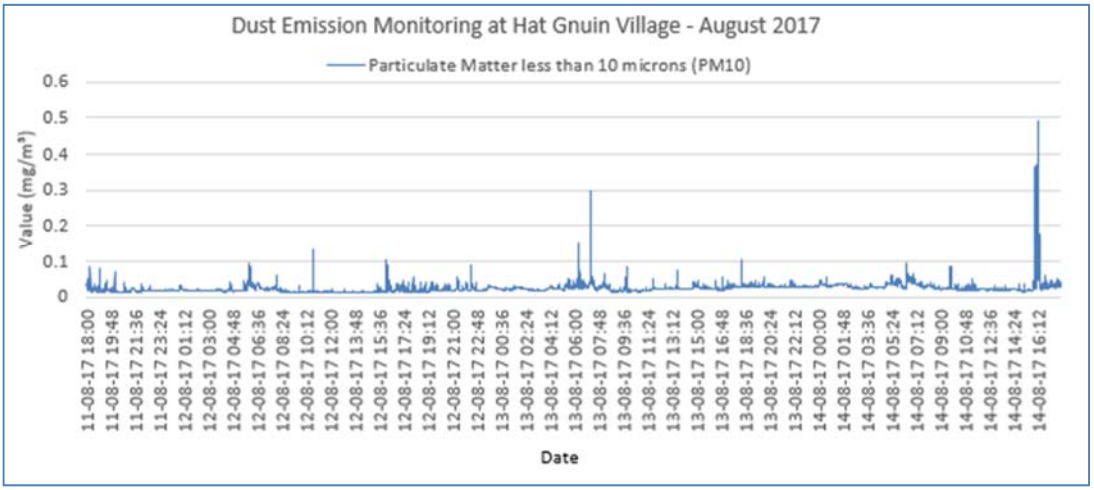


Table B- 2: 24-hour Average Dust Concentrations Measured in Houay Soup Resettlement Area

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-Aug-17 18:00	27-Aug-17 18:01	28-Aug-17 18:01
End Time	27-Aug-17 18:00	28-Aug-17 18:01	29-Aug-17 18:00
Average Data Record in 24h (mg/m^3)	0.020	0.028	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 August 2017

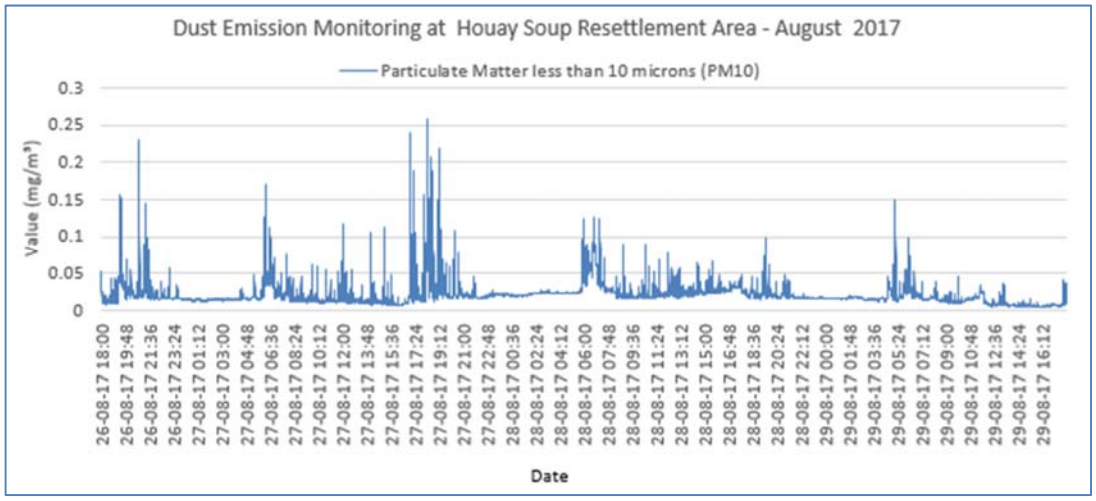


Figure B- 3: Dust Monitoring Results at the Aggregate Crushing Plant in August 2017

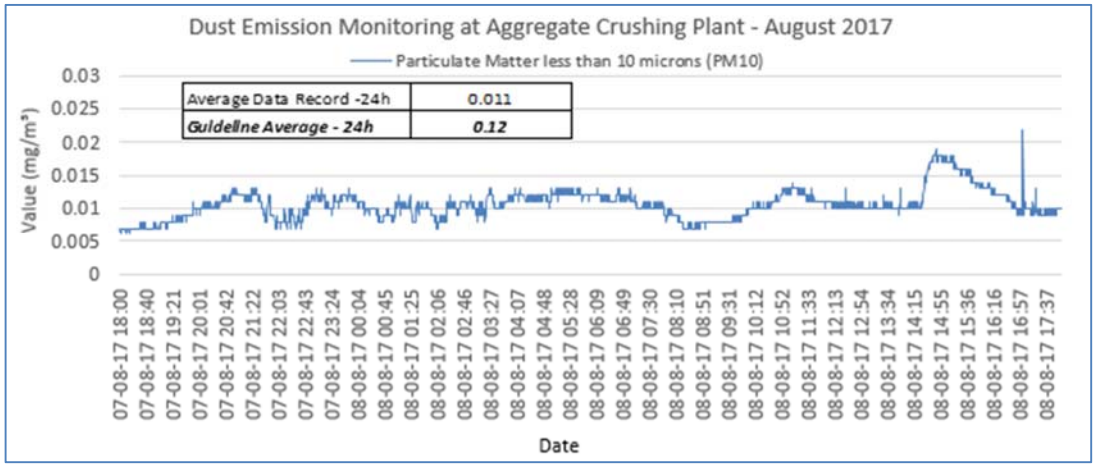


Figure B- 4: Dust Monitoring Results at the RCC Plant in August 2017

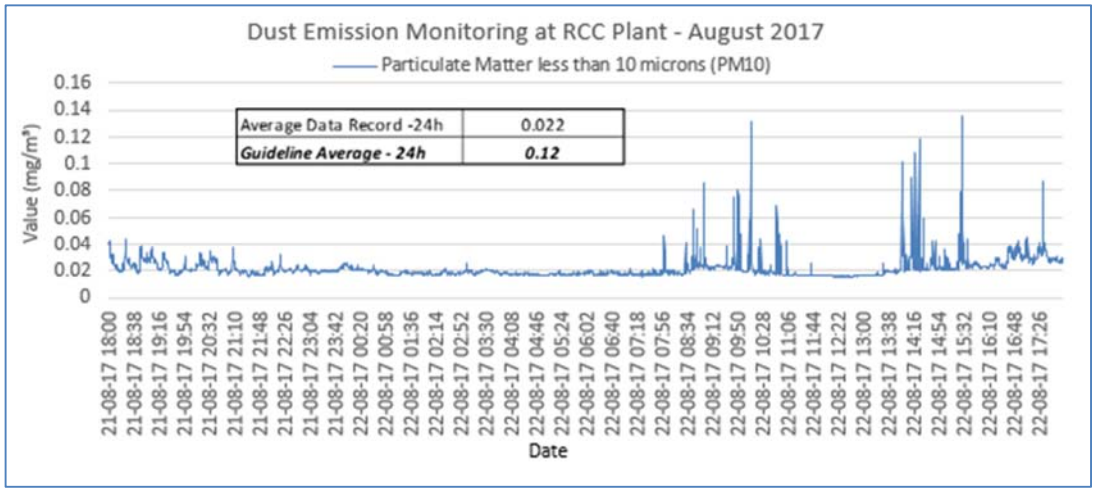


Figure B- 5: Dust Monitoring Results at the Sino Hydro Temporary Camp in August 2017

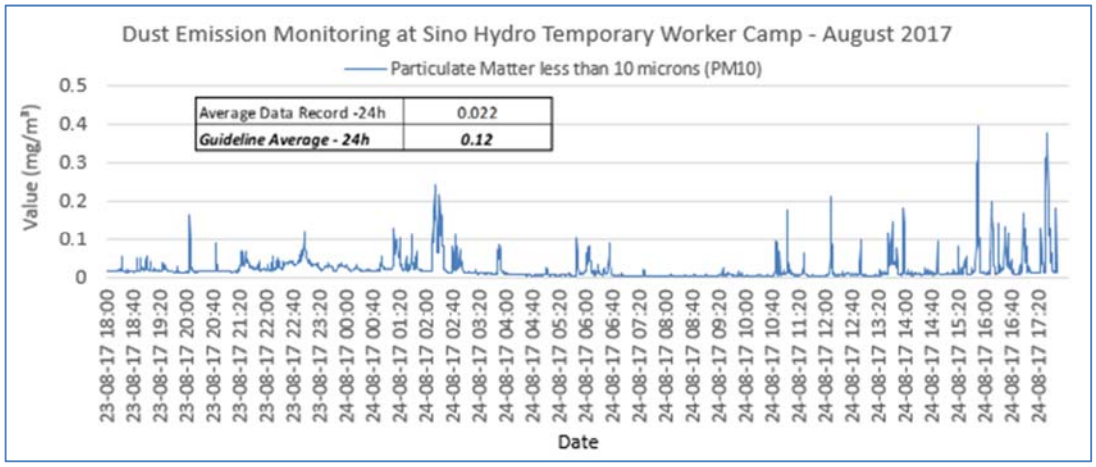


Figure B- 6: Dust Monitoring Results at the SongDa5 No.2 Camp in *August 2017*

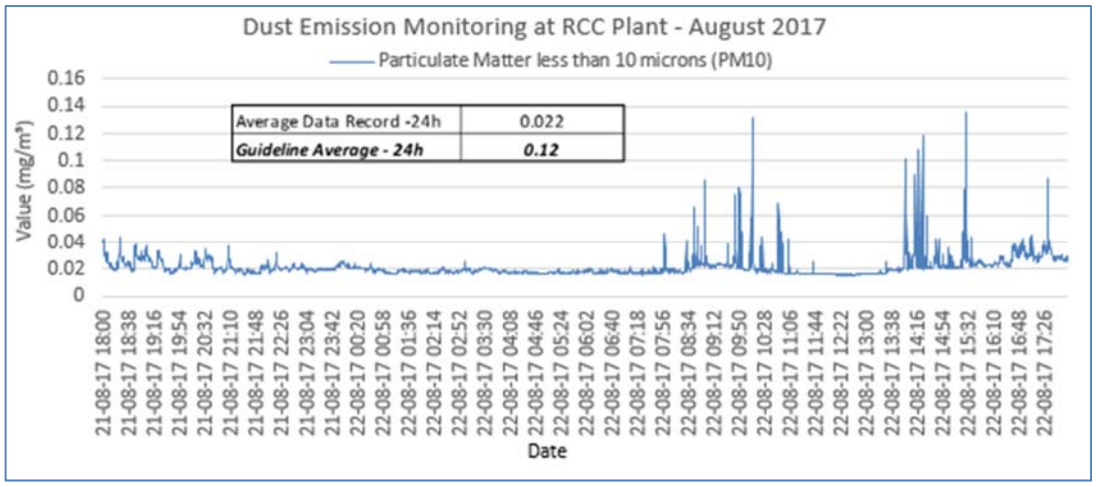


Figure B- 8: Dust Monitoring Results at Main Dam (Top View Left Bank) in August 2017

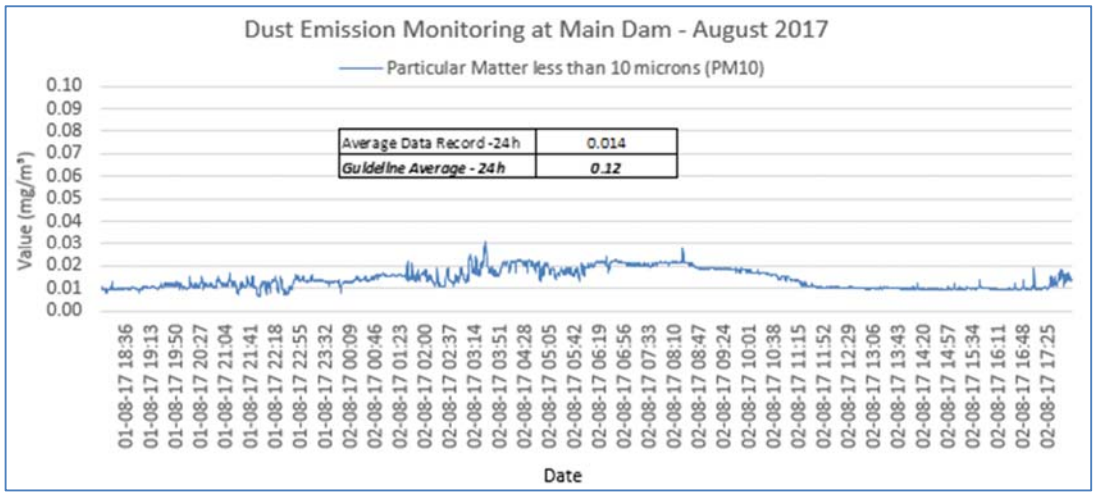
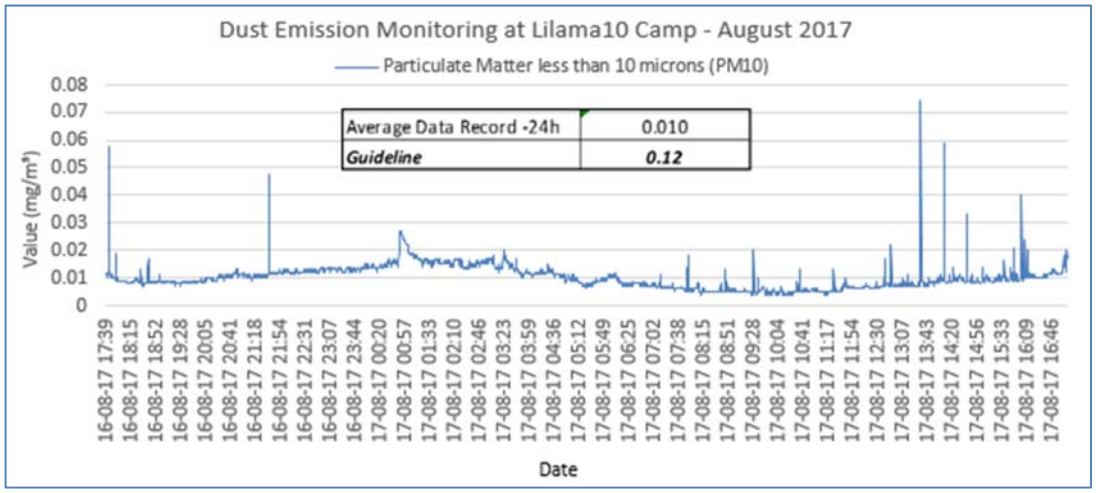


Figure B- 9: Dust Monitoring Results at the Lilama10 Camp in August 2017


Dust Emission Monitoring at Lilama10 Camp - August 2017
Particulate Matter less than 10 microns (PM10)
Average Data Record -24h
0.010
Guideline
0.12
Value (mg/m³)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
16-08-17 17:39
16-08-17 18:15
16-08-17 18:52
16-08-17 19:28
16-08-17 20:05
16-08-17 20:41
16-08-17 21:18
16-08-17 21:54
16-08-17 22:31
16-08-17 23:07
16-08-17 23:44
17-08-17 00:20
17-08-17 00:57
17-08-17 01:33
17-08-17 02:10
17-08-17 02:46
17-08-17 03:23
17-08-17 03:59
17-08-17 04:36
17-08-17 05:12
17-08-17 05:49
17-08-17 06:25
17-08-17 07:02
17-08-17 07:38
17-08-17 08:15
17-08-17 08:51
17-08-17 09:28
17-08-17 10:04
17-08-17 10:41
17-08-17 11:17
17-08-17 11:54
17-08-17 12:30
17-08-17 13:07
17-08-17 13:43
17-08-17 14:20
17-08-17 14:56
17-08-17 15:33
17-08-17 16:09
17-08-17 16:46
Date

ANNEX C: AMBIENT NOISE DATA

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

Noise Level (dB)	11-12/August/17			12-13/August/17			13-14/August/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	60.10	77.70	69.40	62.20	60.40	81.20	68.30	63.00	74.90
Guideline Max	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***
Average Data Recorded	49.16	49.64	46.18	53.69	51.73	48.49	52.74	52.57	48.86
Guideline Averaged	***55***	***45***	***55***	***55***	***45***	***55***	***55***	***45***	***55***

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

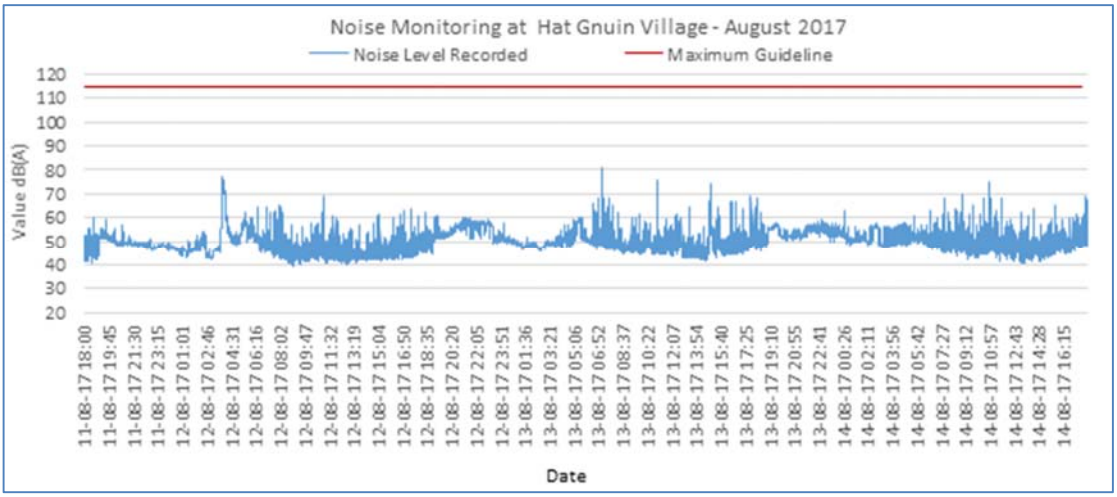


Table C- 2: Average Results of Noise Monitoring at Houay Soup Resettlement Area in August 2017

Noise Level (dB)	26-27/August/17			27-28/August/17			28-29/August/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	61.00	66.90	73.40	69.30	62.80	67.70	67.70	59.50	72.80
Guideline Max	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***	***115***
Average Data Recorded	47.08	48.97	47.82	51.09	46.42	46.46	49.92	43.77	47.42
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 August 2017

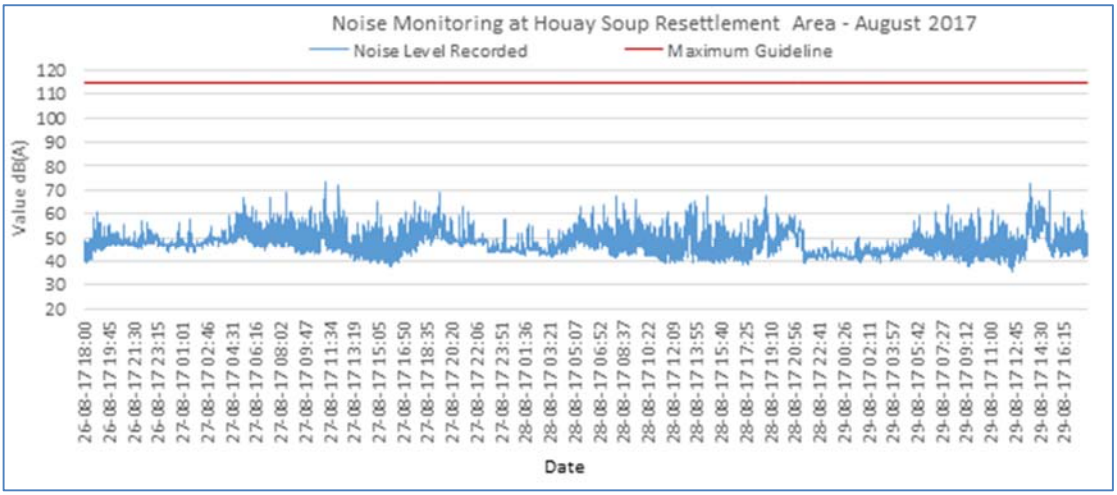


Table C- 2 and Table C-3: Average Results of Noise Monitoring at Aggregate Crushing Plant and RCC Plant in August 2017

Aggregate Crushing Plant

Noise Level (dB)	07-08/August/17		08/August/17
	18:00 – 22:00	22:01 – 06:00	06:01-18:00
Maximum Value Recorded	51	54.2	65.5
Guideline Max	***115***	***115***	***115***
Average Data Recorded	45.43	42.06	41.53
Guideline Averaged	***70***	***50***	***70***

RCC Plant

Noise Level (dB)	21-22/August/17		22/August/17
	18:00 – 22:00	22:01 – 06:00	06:01-17:59
Maximum Value Recorded	67.5	67.7	75.7
Guideline Max	***115***	***115***	***115***
Average Data Recorded	65.30	63.31	60.83
Guideline Averaged	***70***	***50***	***70***

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

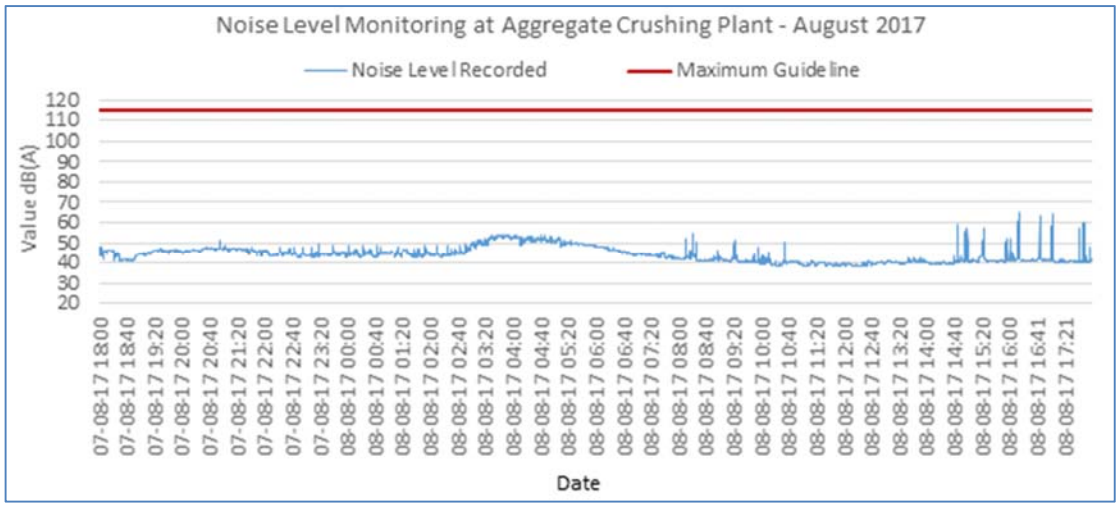


Figure C- 4: Results of Noise Level Monitoring at the RCC Plant in August 2017

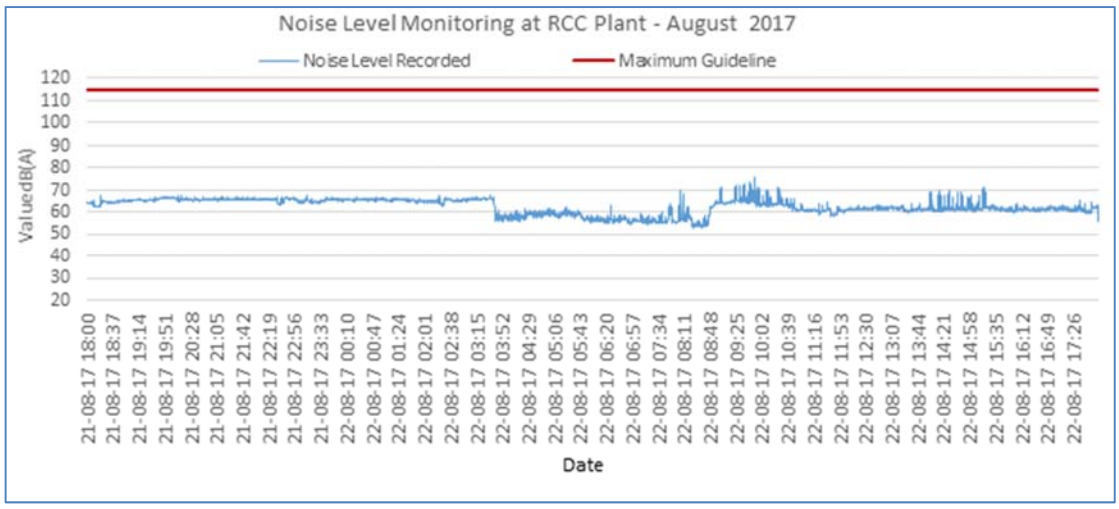


Table C- 5 and Table C- 6*: Average Results of Noise Monitoring at SongDa Camp#2 and Sino Hydro Camp in August 2017*

Song Da5 Camp No.2

Noise Level (dB)	03-04/August/17		04/August/17
	18:00 – 22:00	22:01 – 06:00	06:01-18:00
Maximum Value Recorded	90.5	62.4	78.4
Guideline Max	***115***	***115***	***115***
Average Data Recorded	50.07	51.50	51.48
Guideline Averaged	***70***	***50***	***70***

Sino Hydro Temporary Worker Camp

Noise Level (dB)	24-25/August/17		25/August/17
	18:00 – 22:00	22:01 – 06:00	06:01-17:59
Maximum Value Recorded	78.6	78.8	75.6
Guideline Max	***115***	***115***	***115***
Average Data Recorded	57.31	57.50	53.69
Guideline Averaged	***70***	***50***	***70***

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

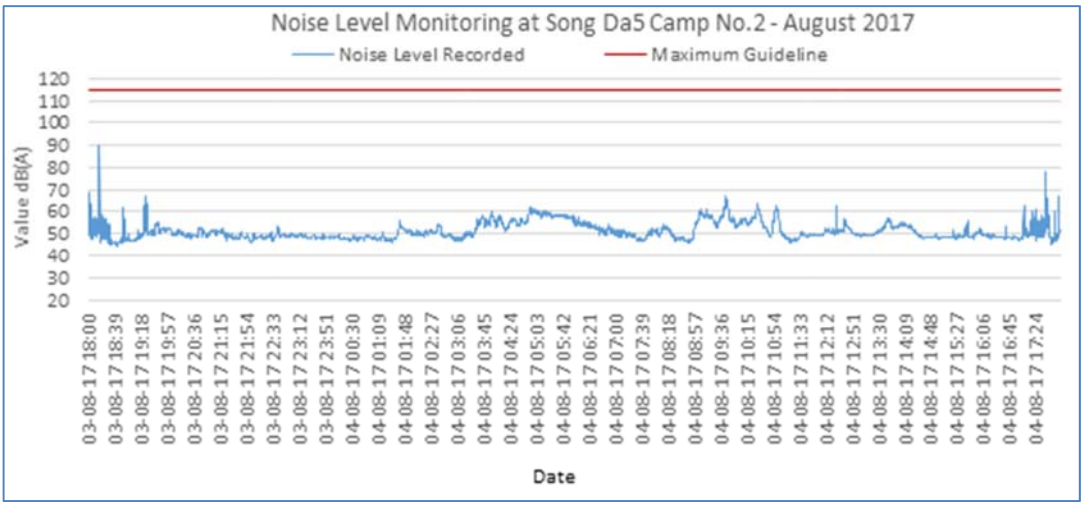


Figure C- 6: Results of Noise Level Monitoring at Sino Hydro Temporary Worker Camp in August 2017

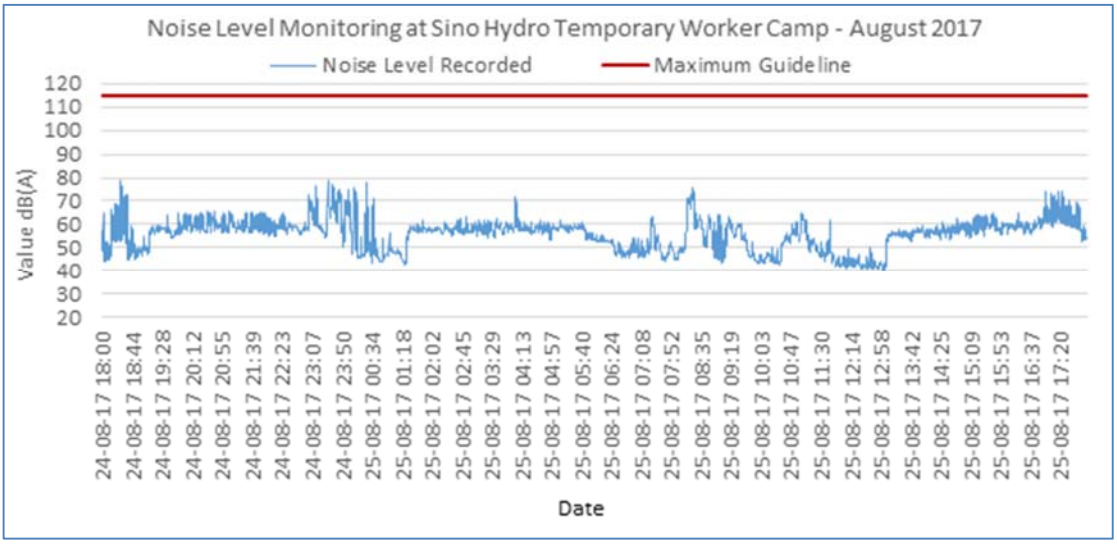


Table C- 7 and Table C- ***8: Average Results of Noise Monitoring at Main Dam, and Lilama 10 Camp in August 2017***

Main Dam

Noise Level (dB)	01-02/August/17		02/August/17
	18:00 – 22:00	22:01 – 06:00	06:01-18:00
Data Record Max	65	56.2	59.3
Guideline Max	***115***	***115***	***115***
Data Record Average	49.40	47.60	39.95
Guideline Averaged	***70***	***50***	***70***

Lilama 10 Camp

Noise Level (dB)	16-17/August/2017		17/August/2017
	18:00 – 22:00	22:01 – 06:00	06:01-17:59
Maximum Value Recorded	57.6	77.1	76.4
Guideline Max	***115***	***115***	***115***
Average Data Recorded	46.45	48.47	47.54
Guideline Averaged	***70***	***50***	***70***

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

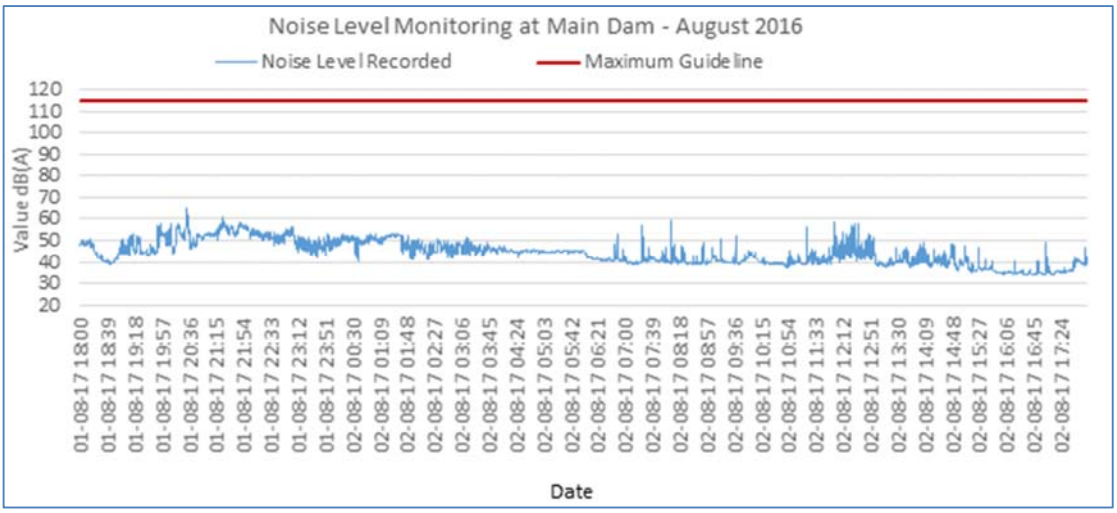


***Figure C- 8: Results of Noise Level Monitoring at Lilama10 Camp* in August 2017**