UPPER PILUWA KHOLA -3 HYDROELECTRIC PROJECT (4.95 MW)

Sankhuwasabha, Nepal

Monthly Progress Report –Baishak 2079

Date: 2nd Jestha, 2079

Submitted by:

Mabilung Energy Limited.
Lalitpur-10, Nepal

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SALIENT FEATURES

1. Project Details

Project Name	:	Upper Piluwa Khola 3 Hydroelectric Project
Location	:	Madi & Chainpur Municipalities, Sankhuwasabha
Geographical Coordinates	:	Latitude: 27° 17' 42''N and 27° 18' 04''N Longitude: 87° 24' 22''E and 87° 25' 30''E
Type of Scheme	:	Run off River
Installed Capacity	:	4.95 MW
Gross Head	:	128 m
Rated Design Head	:	116.7 m

2. Hydrology

Catchment Area		:	83.70 km^2
Mean Annual Precipitation		:	1500 mm
100 years Design Flood (HW)		:	259 m^3/s
Design Discharge	- Piluwa Khola	:	4.11 m^3/s
	- Sikhuwa Khola	:	0.91 m^3/s
Mean Annual Discharge- Piluwa Khol		:	6.0 m^3/s
	- Sikhuwa Khola	:	1.34 m^3/s
Riparian Release	- Piluwa Khola	:	96 lps
	- Sikhuwa Khola	:	21 lps

3. Headworks

Diversion Structure	:	Concrete overflow weir with undersluice
Length of Weir	:	25.0 m
Weir crest Elevation	:	EL 1162 masl
Height of Weir	:	7.0 m from bed level at weir
Undersluice	:	3 m x 1.75 m – 2 nos
Sill Level	:	1157 masl
Intake Type	:	Side Intake
Size of Opening (B x H)	:	3.0 m x 1.2 m - 2 nos
Sill Level	:	1160.40 masl

4. Gravel Trap

Type	:	Rectangular RCC
Particle Size to be settled	:	5 mm
Size of Gravel Trap	:	8.0 m x 3.3 m (L x B)

5. Approach Canal

Type	:	RCC Rectangular
Size	:	2.2 m x 2.2 m (B x H)

6. Desander

Type	:	Dufour, double bay
Particle Size to be settled	:	0.20 mm

Size of Desander	:	Each bay of 45 m x 6.4 m (L x B)

7. Sikhuwa Diversion Scheme

Type	:	Concrete overflow weir
Intake	:	Side intake of 1.5 m x 0.7 m, 2 nos
Gravel Trap	:	2 m deep, 5.0 m long and 1.5 m wide
Transfer Pipe	:	0.9 m diameter MS Pipe, 170 m long

8. Headrace Pipe

Total Length	:	1398 m
Type	:	MS-Pipe Buried and exposed section
Diameter of Pipe	:	1.60 m dia with varied thickness 6 mm

9. Surge tank

Type	:	Restricted orifice
Size	:	4 m diameter 23 m height

10. Penstock Pipe

Total Length	:	395 m
Type	:	MS-Pipe Buried and exposed section
Diameter of Pipe	:	1.40 m dia with varied thickness 8 mm to 10 mm

11. Powerhouse

Type	:	Surface
Dimension (l x b x h)	:	23 m x 8.5 m X 11.40 m
PH Floor Level	:	EL. 1033.10 m
Turbine centerline Level	:	EL. 1033.50 m

12. Tailrace

Type	:	2.0 m wide, 1.6 m high and 25.0 m long, RCC Box canal
Tailrace Water Level	:	EL 1034.0 m
Minimum Tail water level	:	EL 1033.57 m

13. Turbine

Type	:	2 Nos. Horizontal Francis
Rated Discharge for each Turbine	:	2.51 m^3/s
Rated Output for each Unit	:	2.592 MW
Rated Efficiency	:	90%

14. Generators

Type	:	2 Nos. Synchronous brushless, 3Ø AC
Rated Voltage	:	6.6 kV
Power Factor	:	0.85
Layout	:	Horizontal
Synchronous speed	:	1000 rpm
Rated Efficiency	:	96.0 %
Rated Output	:	2930 kVA

Rated Frequency	:	50 Hz
15. Power Transformer		
Type	:	1 No. 3 phase, 50 Hz Step up Transformer
Rated Efficiency	:	99%
Rate Capacity	:	6000 kVA
Voltage Ratio	:	33kV/6.6kV
16. Transmission & Interconnection		
Transmission line	:	Powerhouse Baneshwor substation, 14.0 km
Type of Circuit	:	Single Circuit 33 kV
Line Conductor	:	ACSR "dog"
Pole Type	:	Steel Tubular (11 and 13 m height)
17. Power and Energy		
Installed Capacity	:	4.95 MW
Contract Energy after Outage & Loss	:	28.41 GWh
Wet Saleable Energy	:	23.51 GWh
Dry Saleable Energy	:	4.90 GWh
18. Construction Period	**:**	**2.0 Years**
19. Financial Indicators		
Total Project Cost	:	893.37 MNRs. (With IDC)
B/C	:	1.27
IRR	:	15.23 %
RoE	:	18.16 %

1 GENERAL

The progress report has been prepared for updating about the construction and administrative progress of the Upper Piluwa Khola 3 Hydroelectric Project (UPK3HEP).

This report includes the tasks completed till the month of Baishakh, 2079. This report mainly focuses on the head office status, site office, site visit, design & construction of Project components.

2 PROJECT OVERVIEW

Upper Piluwa Khola-3 Hydroelectric Project is located along the Piluwa Khola between confluence area with Sikhuwa Khola and confluence area with Lakhuwa Khola. The project area lies in Madi and Chainpur Municipalities of Sankhuwasabha District, Province 1 in eastern Nepal, while waterway and powerhouse lies only on Madi Municipality. Chainpur is nearest market place from the project area. Project area is accessible by about 13 km road from Chainpur with a fair weather road. Present updated geographical boundary of project lies between latitude of 27° 17' 42"N and 27° 18' 04"N and longitude of 87° 24' 22"E and 87° 25' 30"E. The elevation at the proposed intake site is 1162 masl. The Project, optimized at an installed capacity of 4.95 MW, is a run-of-the-river type project with gross head of 128 m and design discharge of 5.02 m3/s. Net annual marketable energy to be generated from the Project is 28.41 GWh, out of which 4 .90 GWh is dry season energy (Poush to Baiskah).

The Piluwa Khola is a tributary of Arun River. The basin lies in the eastern part of the Sankhuwasabha district. Elevation of the catchment ranges from 1160 m to 3525 m. The main stream flows from East to West direction. Catchment area at the intake site covers 83.70 km2 out of which 15.18 km2 is covered by Sikhuwa catchment and catchment at powerhouse is 98.50 km2. Design flood at the proposed headworks has been taken 259 m3/s (Q100-year). The riparian release for environmental requirement is considered as 0.096 m3/s for Piluwa Khola and 0.021 m3/s for Sikhuwa Khola which corresponds to 10% of the driest month's flow of the river.

Geologically, the project area lies in Himal Group of Higher Himalayan Crystalline. Present study only covers the rock type and structures found within project area. Bed rocks are partially exposed at steep slopes and cut bank and road cut sections. Most of the surface within project area is covered with soils.

A diversion weir on Sikhuwa diverts discharge of 0.91 m3/s from Sikhuwa Khola to approach canal from Piluwa Khola diversion works. A spilling weir at Piluwa Khola with two under sluices and two side intake openings will divert the design discharge of 5.02 m3/s to intake structure located at left bank of the river. The diversion structure is design for flood discharge of 259 m3/s.

Headworks structure including side intake, gravel trap, approach canal and desander with fore bay are located on left bank of Piluwa Khola. The Headrace pipe from forebay to surge tank is aligned along left bank of Piluwa Khola. After 1360 m length ofheadrace pipe surge tank is located at left bank hillslope. After surge tank penstock pipe is proposed to be aligned on left bank of Piluwa Khola and the penstock line is designed to cross Lakhuwa Khola to reach Powerhouse. Powerhouse is located at left bank of Piluwa Khola near the confluence Piluwa Khola with Lakhuwa Khola. Powerhouse is dimensioned to accommodate two Francis turbine of horizontal configuration. The switchyard is located just upstream of powerhouse on left bank of Piluwa Khola. About 14 km long 33 kV transmission line connected to Baneshwar substation evacuated the Power generated from UP3HP.

The construction period of the Project has been taken to be 24 months. The total financial cost of the Project on the basis of rates as of January 2020 is estimated to be 893.37 MNRs. with IDC. The Project shall be financed from debt and equity ratio of 70:30 from financing institutions. Financial analysis has been undertaken with 11.75% interest rate on the long term loan yielding 15.23% IRR, 18.16% RoE, and B/C ratio of 1.27.

3 COMPLETED TASK

Some of the tasks that has been completed till this month are as follows:

- Excavation for foundation of all headworks structures completed.
- Earthwork in filling around desander area completed.
- Concreting on all cutoffs of undersluice, guide wall, divide wall and intake completed.
- Backfilling at slab level of undersluice structures completed.
- RCOD extension for one year received from NEA

4 TASK IN PROGRESS

The tasks that are progress are as follows:

- Bay allocation process at Baneshwor substation.
- Site clearance & filling work at desander area.
- Tree cutting permission from forest department is on progress.
- construction of the headwork components.
- Excavation of project road from powerhouse to surge tank is on progress.

- Excavation for powerhouse structures is on progress.

5 FURTHER WORK PLAN

The future work plan are as follows:

- Contract agreement to HM supplier to supply, fabricate and install pipe, gate, and accessories.
- IEE and Construction license of transmission line.
- Concreting of base slab for undersluice, intake and gravel trap.
- Concreting works of guide wall shear wall up to HFL (High Flood Level).
- Road widening for waterway alignment from 0+000 to 500m chainage.

6 CONSTRUCTION WORKS

6.1 Civil Works

6.1.1 Head works

i. Design review and construction drawings is finalized.
ii. Site Clearance is completed.
iii. First stage river diversion completed.
iv. Excavation work for undersluice, intake, divide wall and upstream guide wall has completed.
v. Concreting on all cutoffs of undersluice, divide wall, guide wall and intake completed.
vi. Concreting on Guide wall base slab and a lift of shear wall completed.
vii. Backfilling up to slab level of undersluice and upstream area completed.
viii. Base preparation, bar placing and formworks installation work on undersluice upstream bay is completed.
ix. Concreting on base slabin undersluice upstream, bay will be completed soon.

6.1.2 Gravel trap, Desander and fore bay

i. Site clearance completed.
ii. Earthwork in filling and compaction using roller in desander area is completed.
iii. Excavation for gravel trap and approach canal is completed.

6.1.3 Waterway Alignment

i. Project road from headworks to surge tank completed.

ii. Total 1000m road road Widening from Surge tank back to 0+500m is completed.

6.1.4 Power House (Forebay, PH and Tail race)

i. Layout for powerhouse are has finalized.

ii. Site clearance completed.

iii. Excavation work for powerhouse foundation is in progress.

6.2 Hydro mechanical works

i. Design review is completed.

ii. Contract document for fabrication, supply, installation of trashrack, gates, stoplogs and steel pipe is prepared.

iii. First stage embedded parts for gate frame are delivered to site.

6.3 Electromechanical Works

i. Contract agreement to design, fabrication, supply, installation and commissioning of electromechanical components is accomplished.

ii. Layout of powerhouse and switchyard is finalized.

iii. All powerhouse drawings are issued by electromechanical supplier and approved by employer.

6.4 Transmission Line

i. ToR of IEE for transmission line is finalized.

ii. Bay allocation for rare substation at baneshwor substation is in final stage.

iii. Detailed design report (DPR) of transmission line completed.

iv. Presentation of ToR of IEE is presented to DoED officials.

7 PHOTOGRAPHS

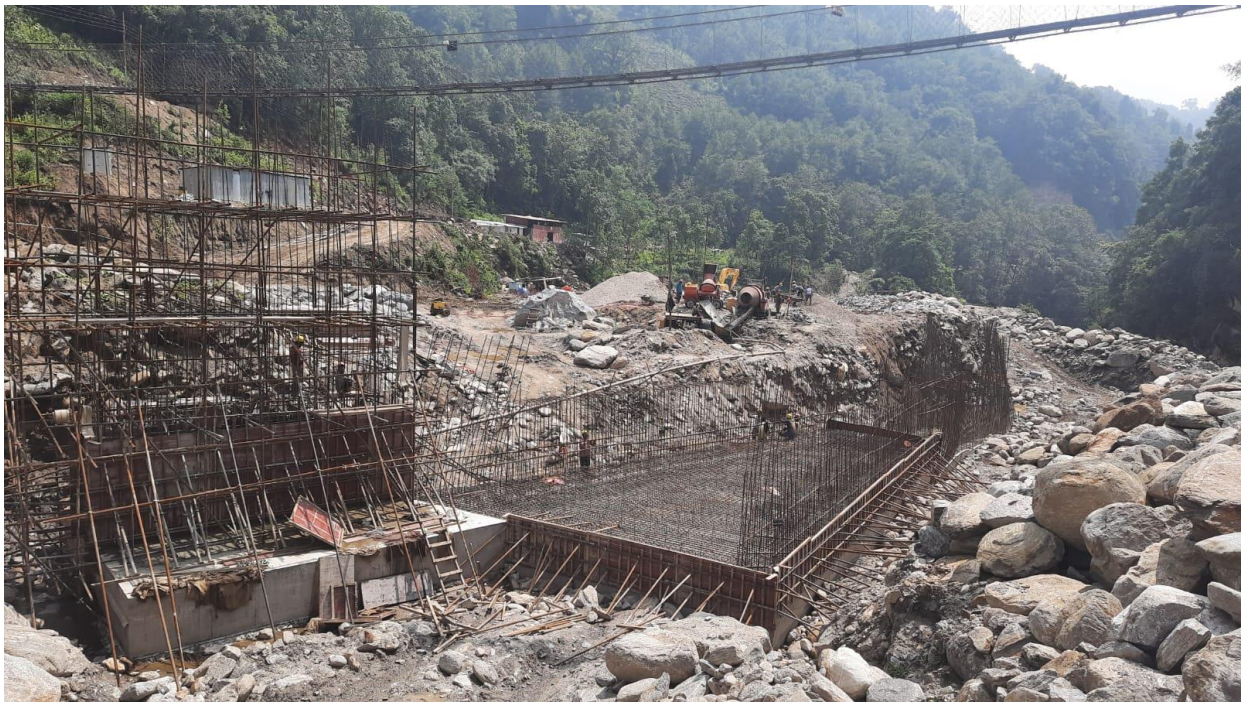

Figure 1: Undersluice, guidewall and intake construction works.

Figure 2: Slab and shear wall concreting on guide wall

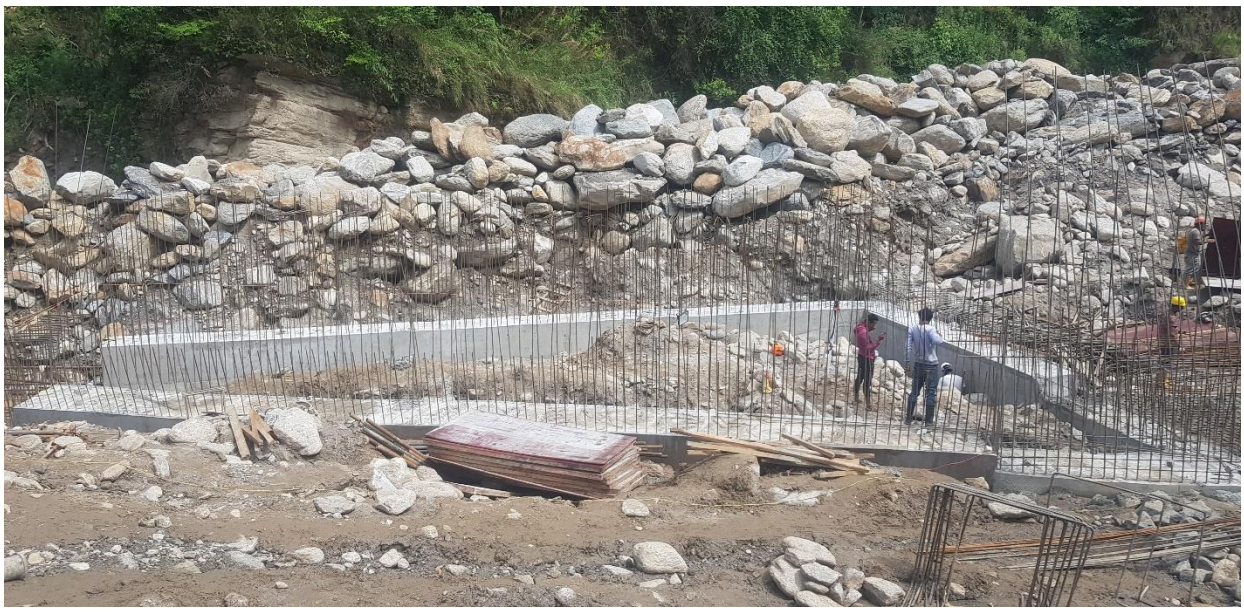

Figure 3: Cutoff Concreting work undersluice upstream bay.

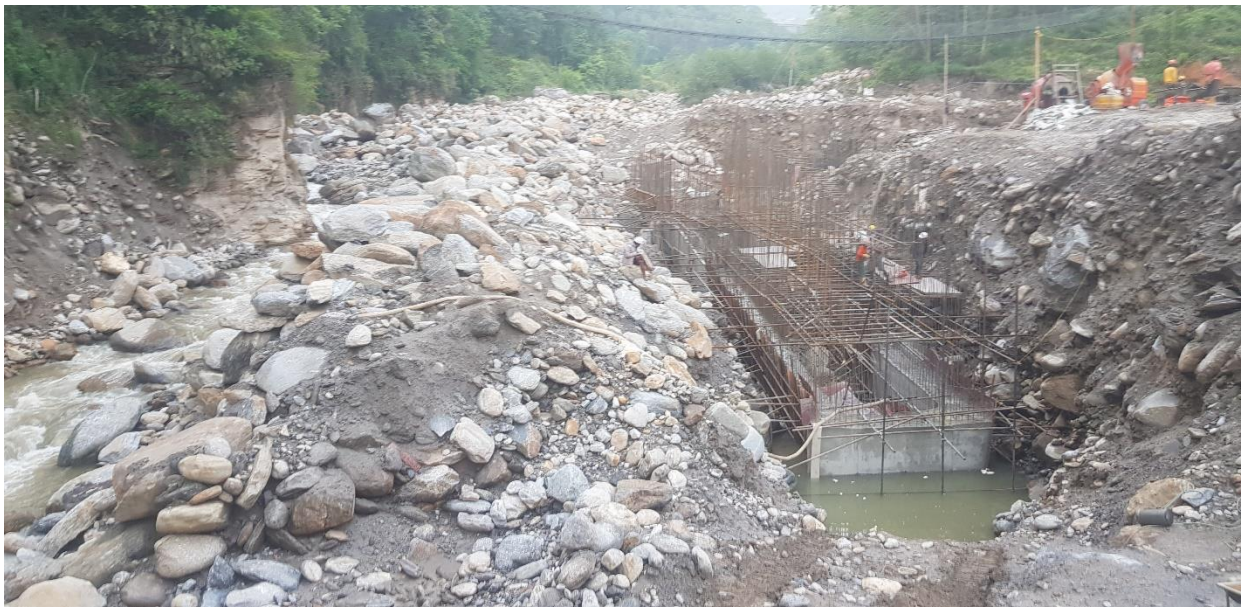

Figure 4: Cutoff Concreting work undersluice downstream.

Figure 5: Backfilling work below undersluice slab.

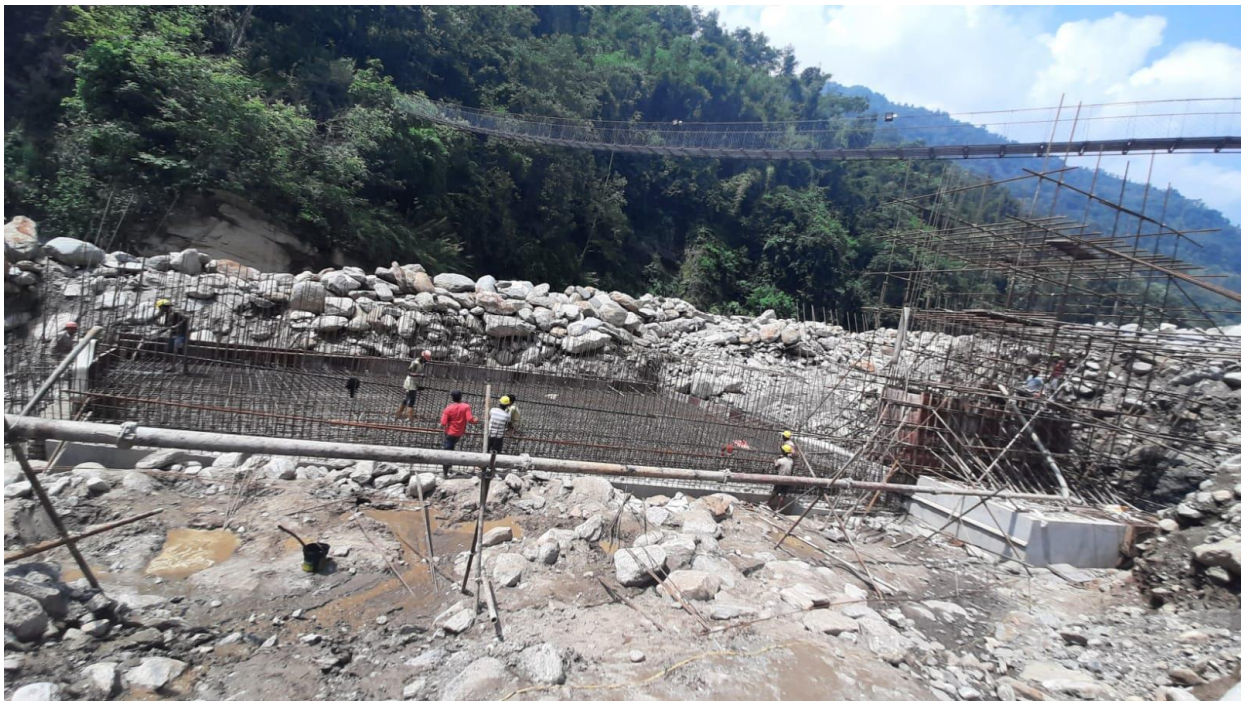

Figure 6: Bar placing and formworks installation works on undersluice bay bottom slab.

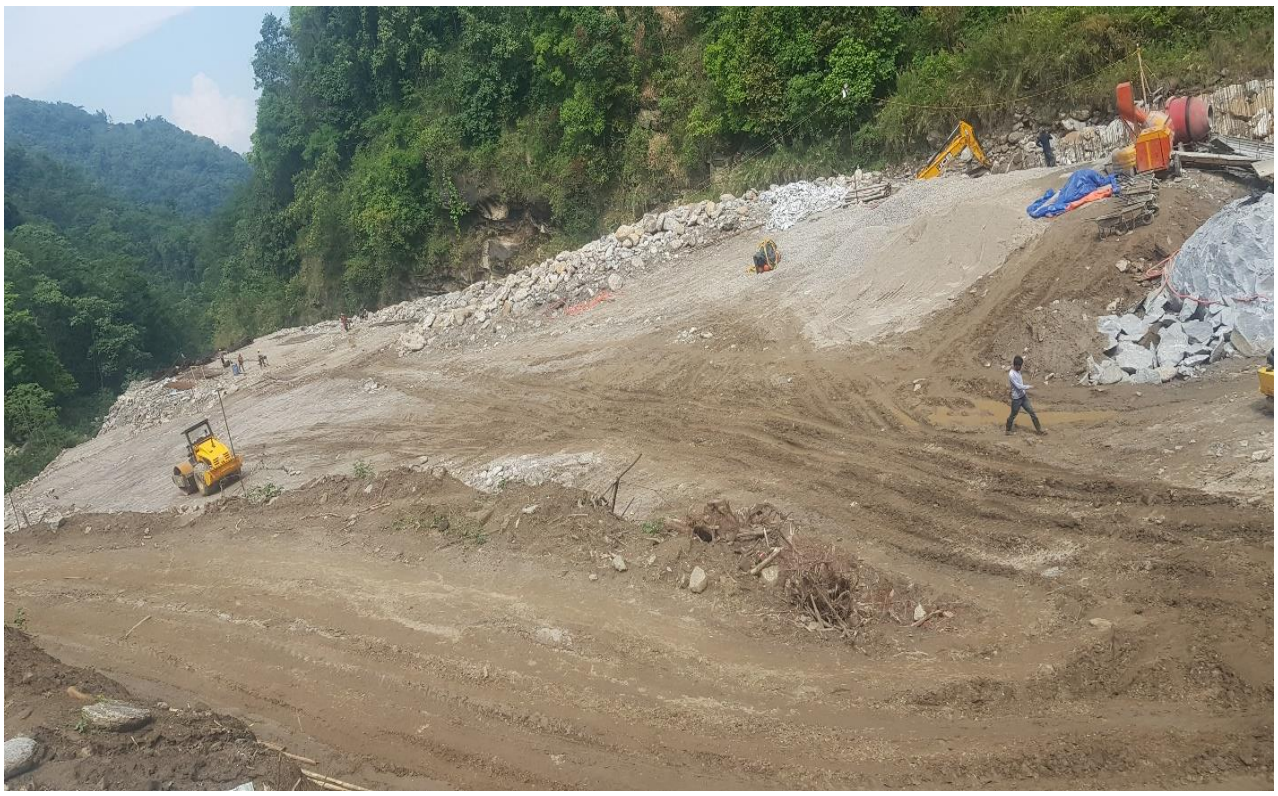

Figure 7: Gravel trap and desander inlet base preparation

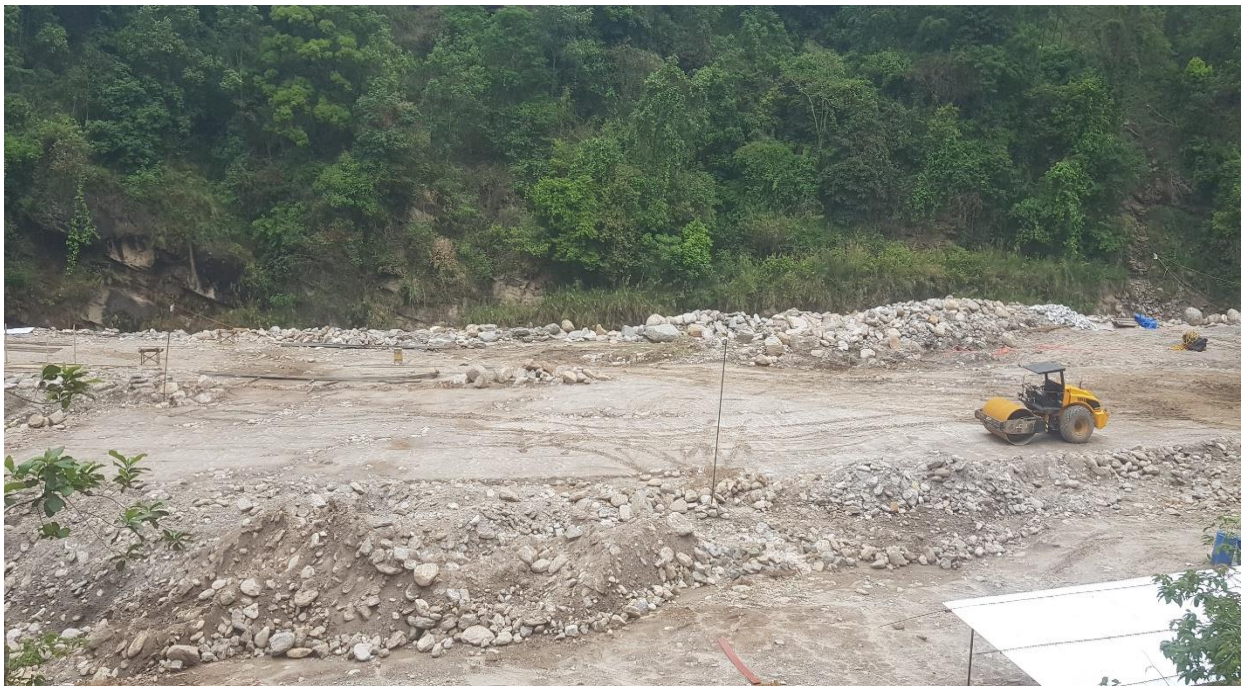

Figure 8: Earthwork in filling and compaction using roller around desander area.

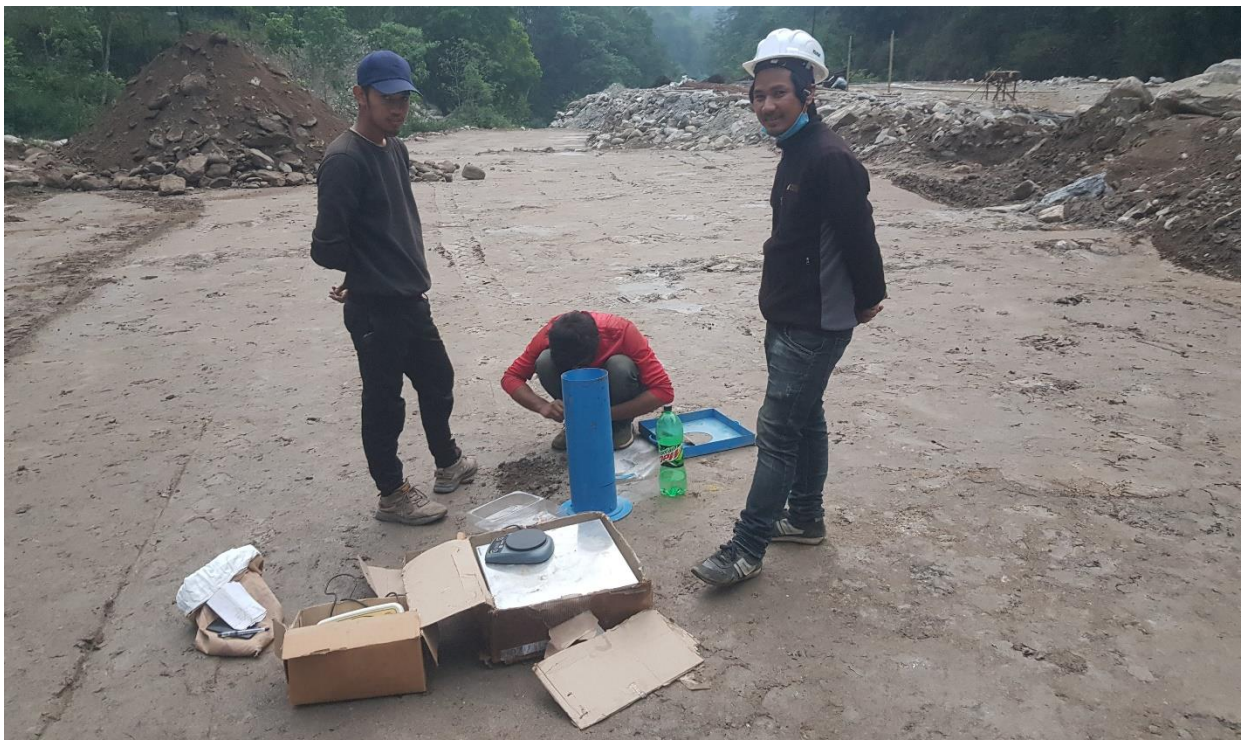

Figure 9: Compaction Testing In desander area.

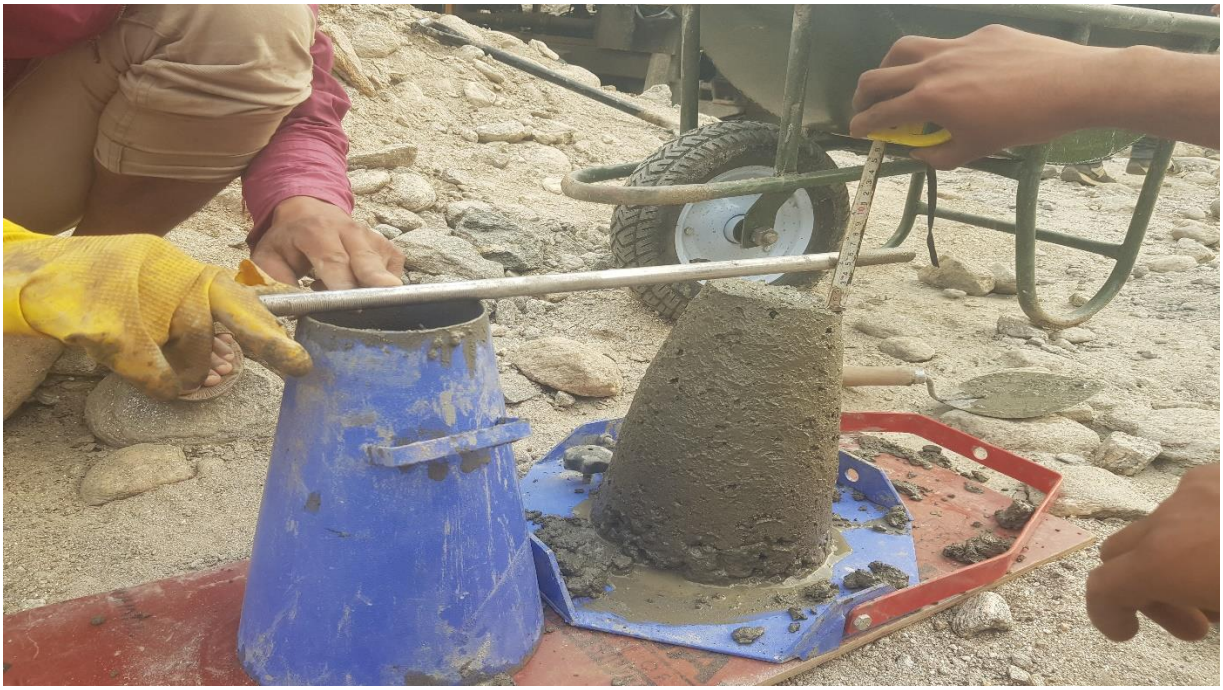

Figure 10: In- site quality control of concrete work.

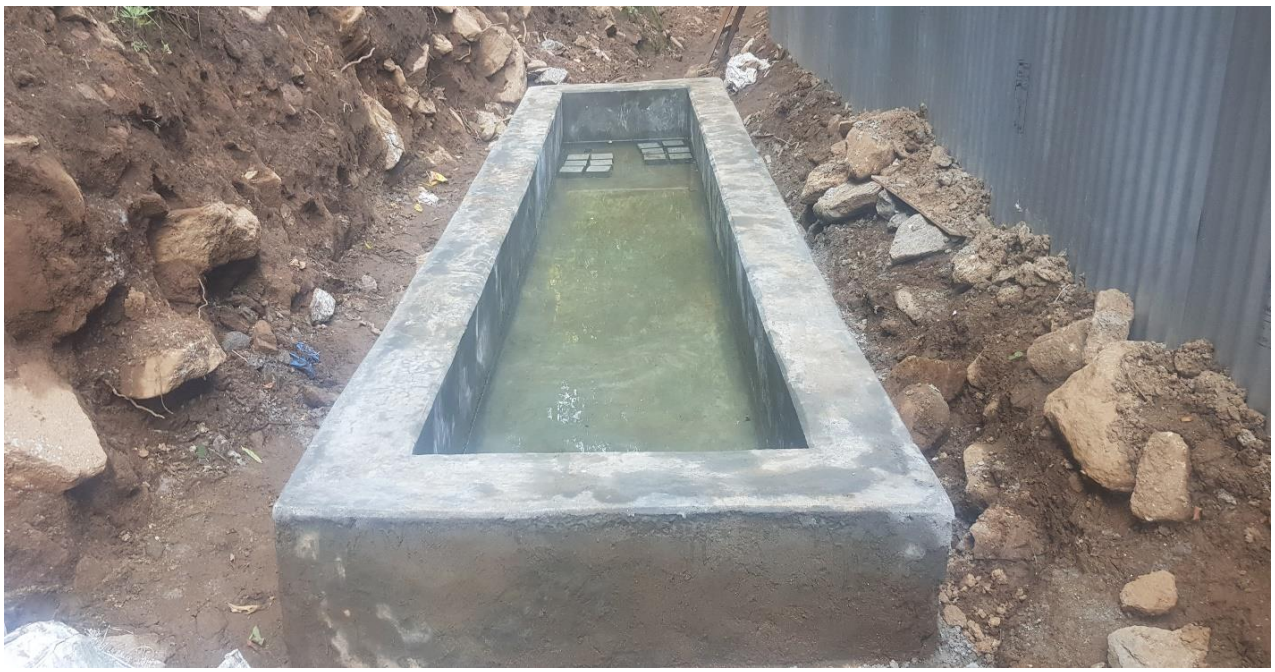

Figure 11: Cube curing pond at concrete lab.

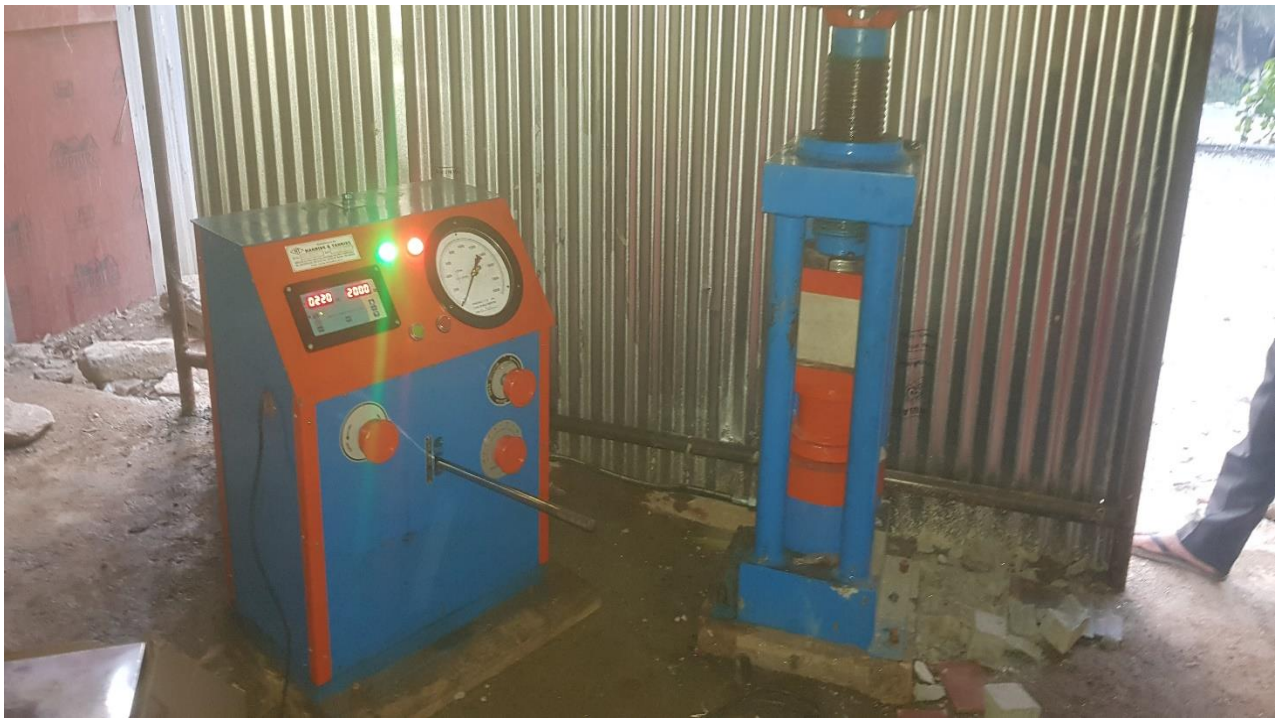

Figure 12: Cube testing at concrete Lab

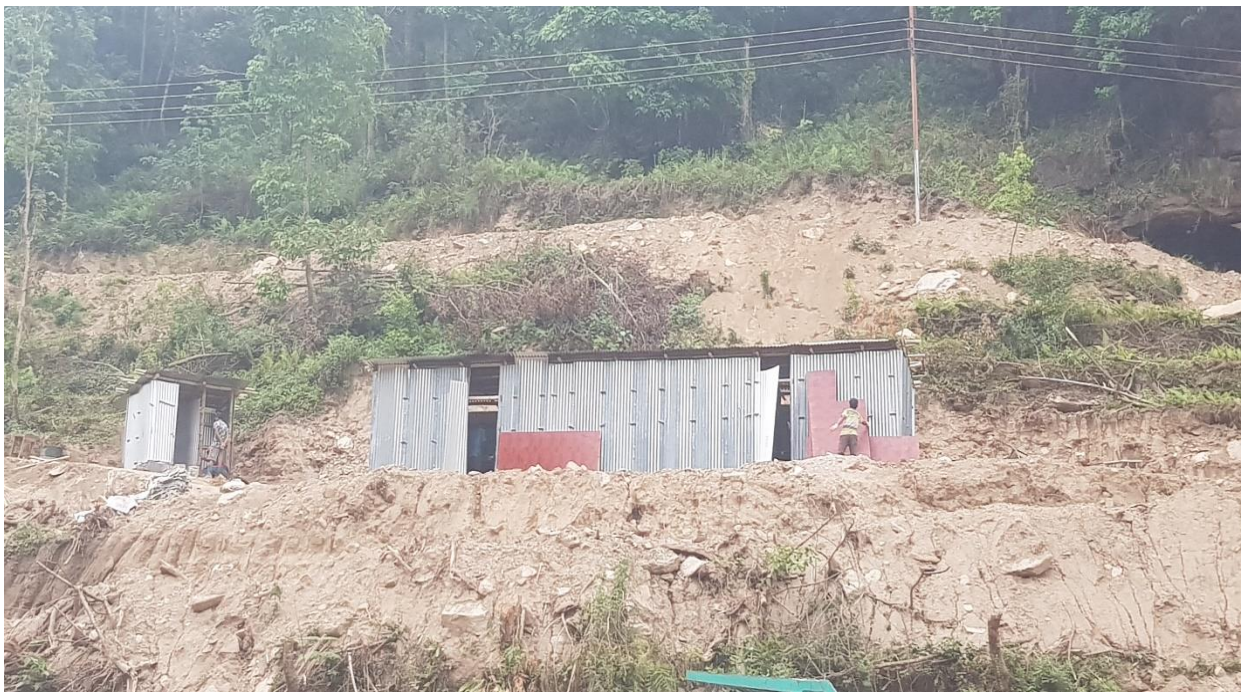

Figure 13: Labour camp headworks

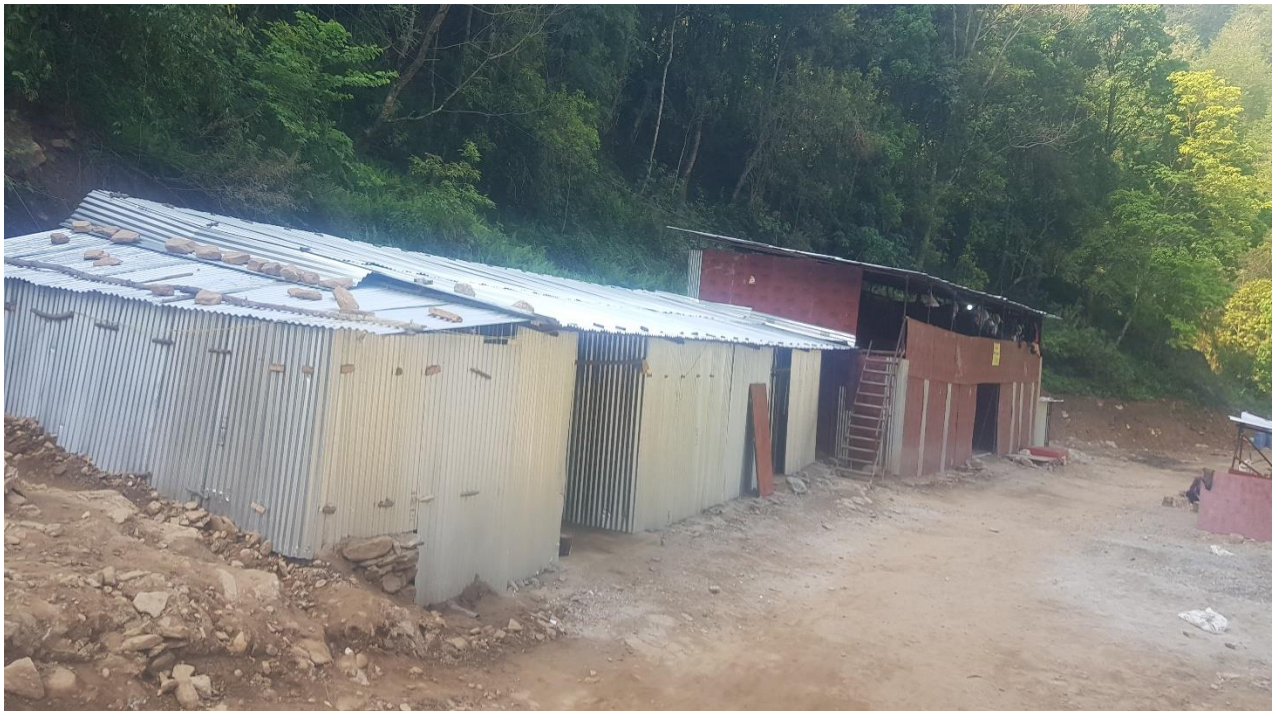

Figure 14: Labour camp and store at headworks

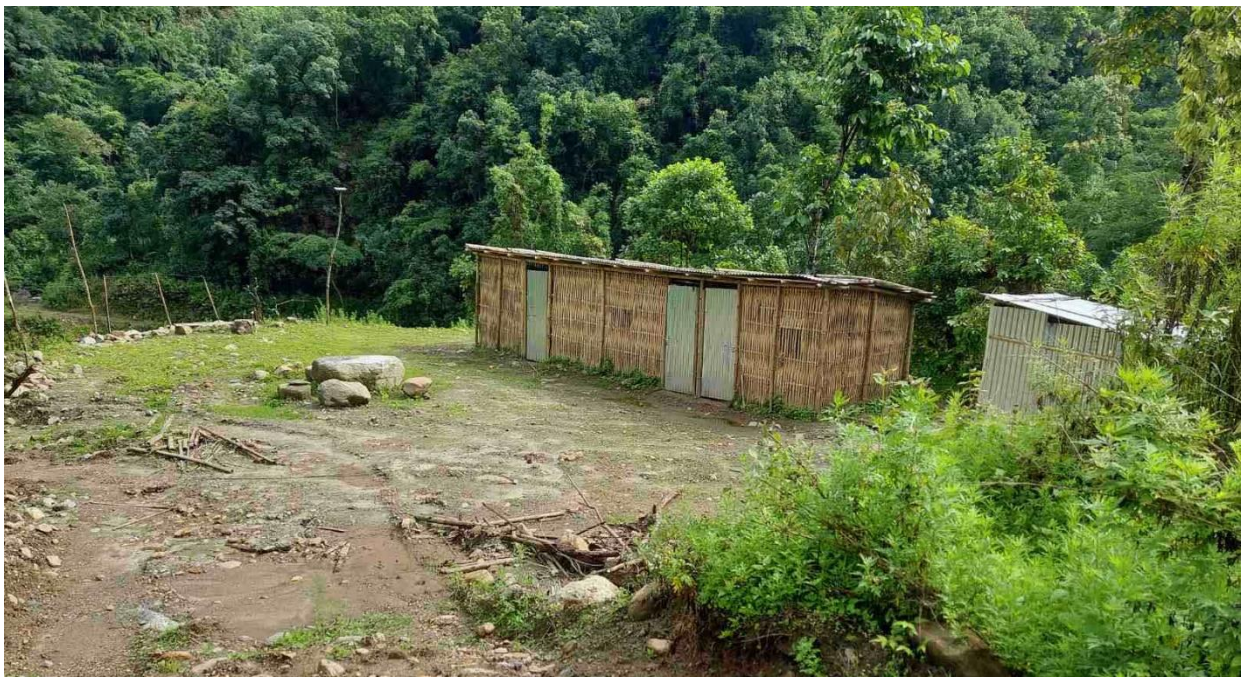

Figure 15: Labour camp at powerhouse

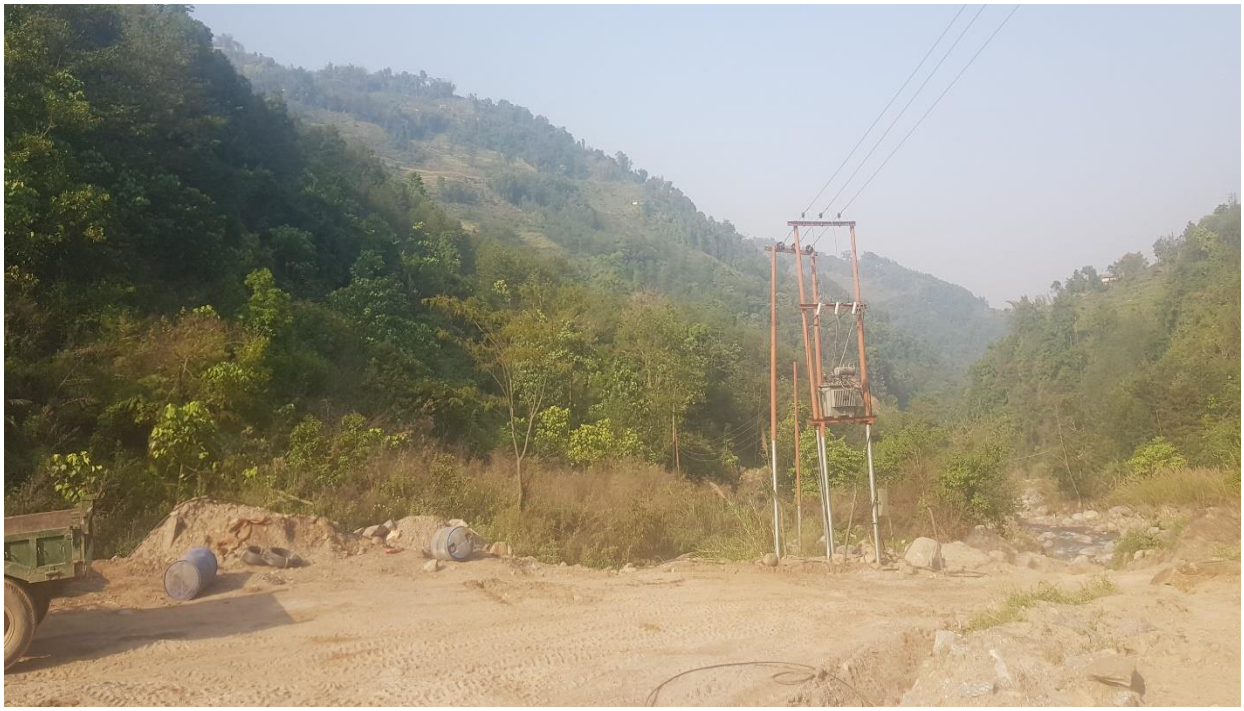

Figure 16: Transformer for construction power

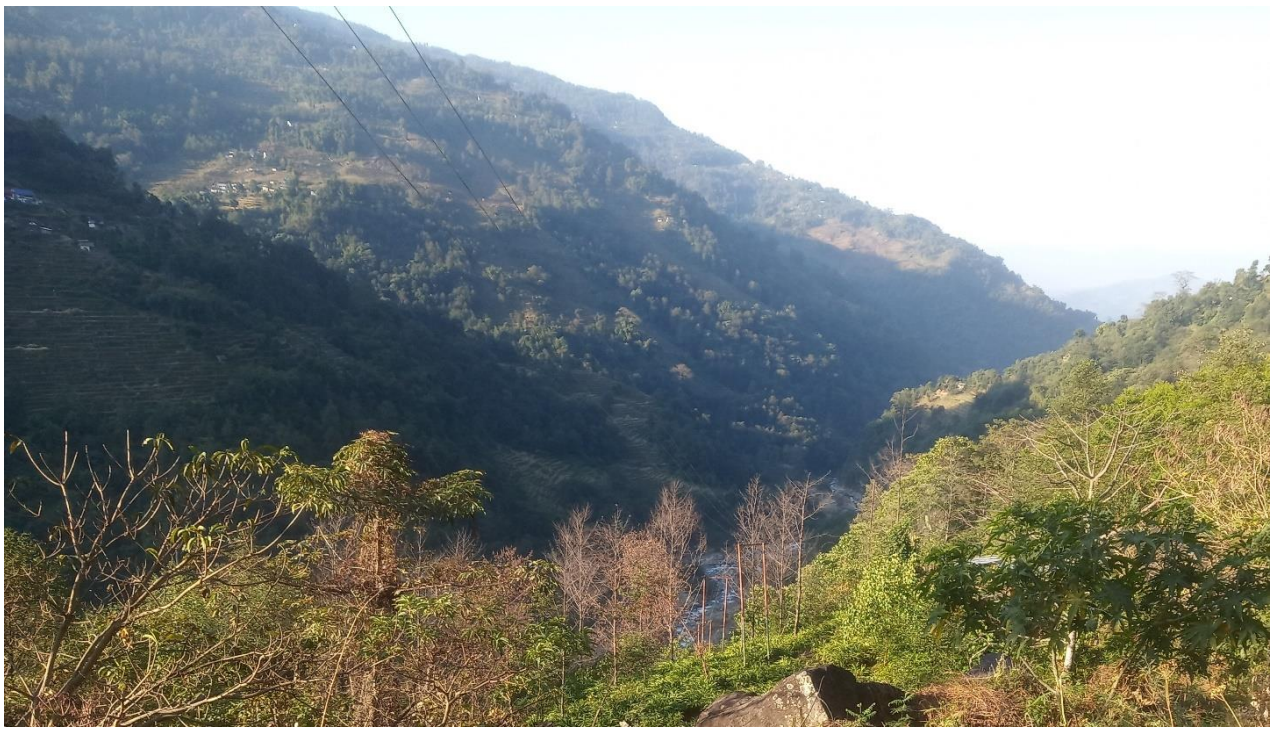

Figure 17: 11 KV Transmission Line for construction power

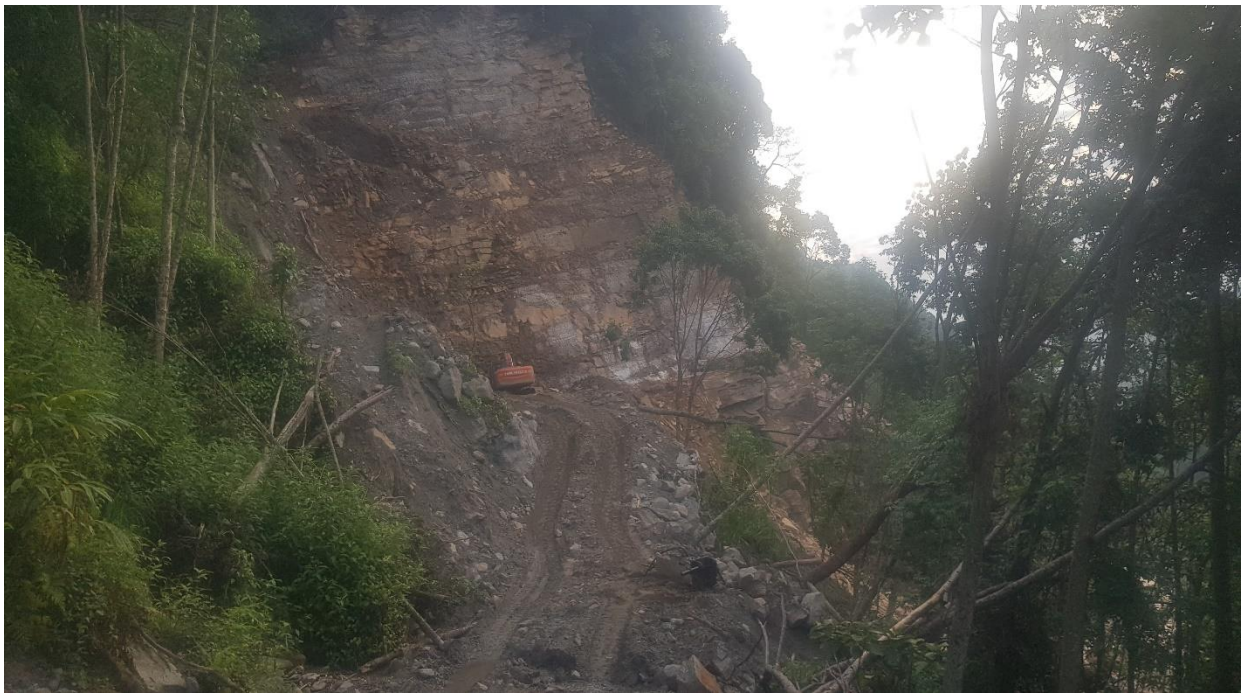

Figure 18: Track opening work and road widening for waterway at rocky area

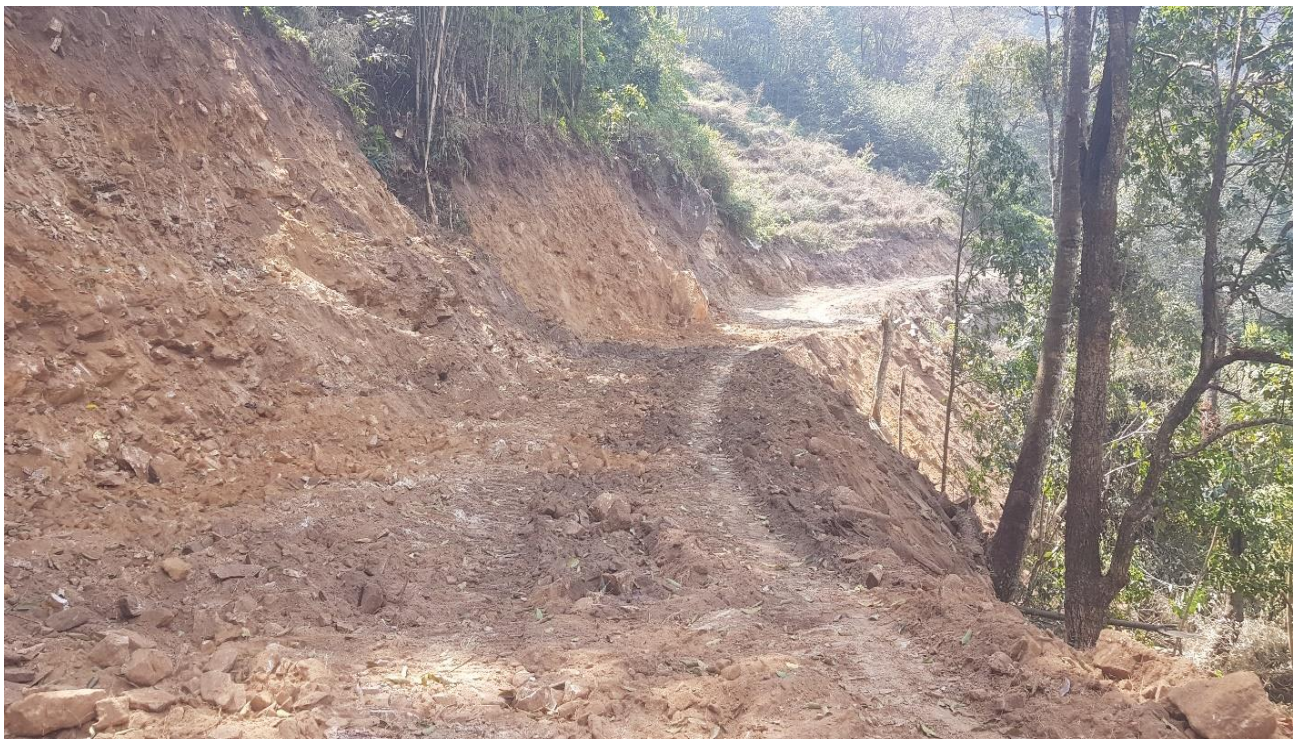

Figure 19:Road Widening for pipeline alignment.

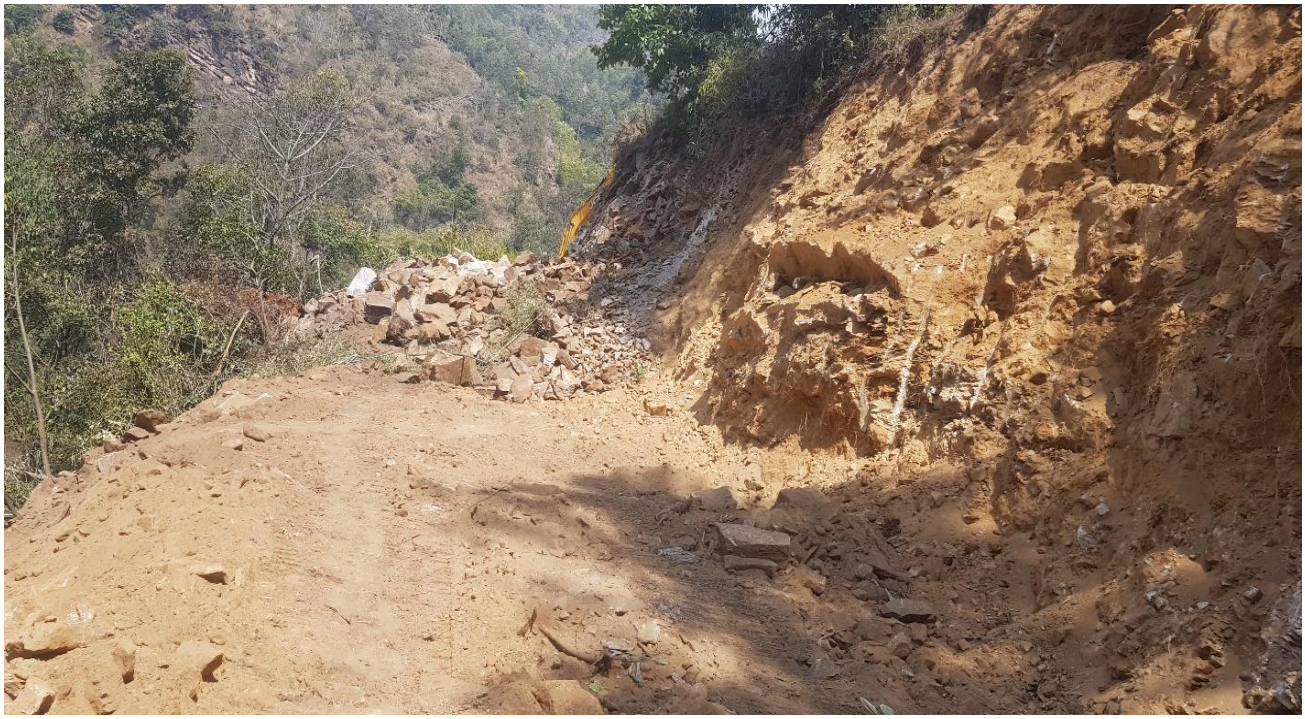

Figure 20:Road Widening for pipeline alignment.

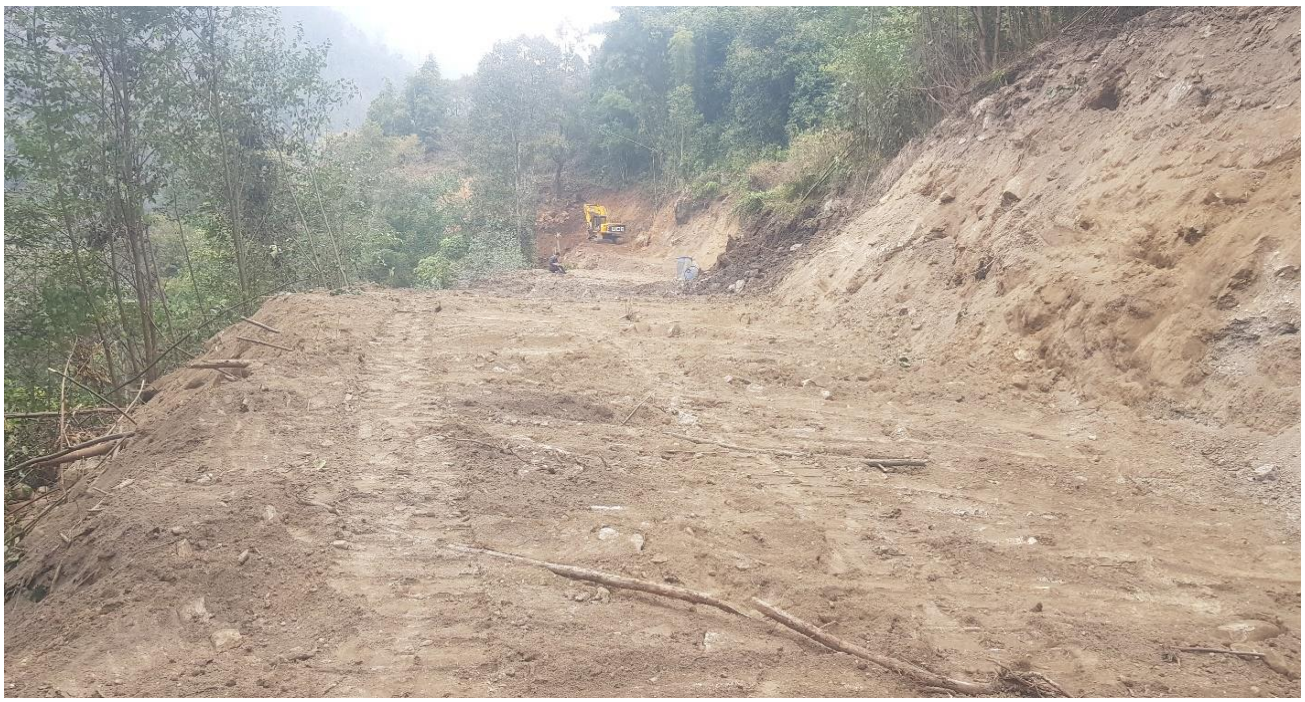

Figure 21: Road widening forPipeline alignment.

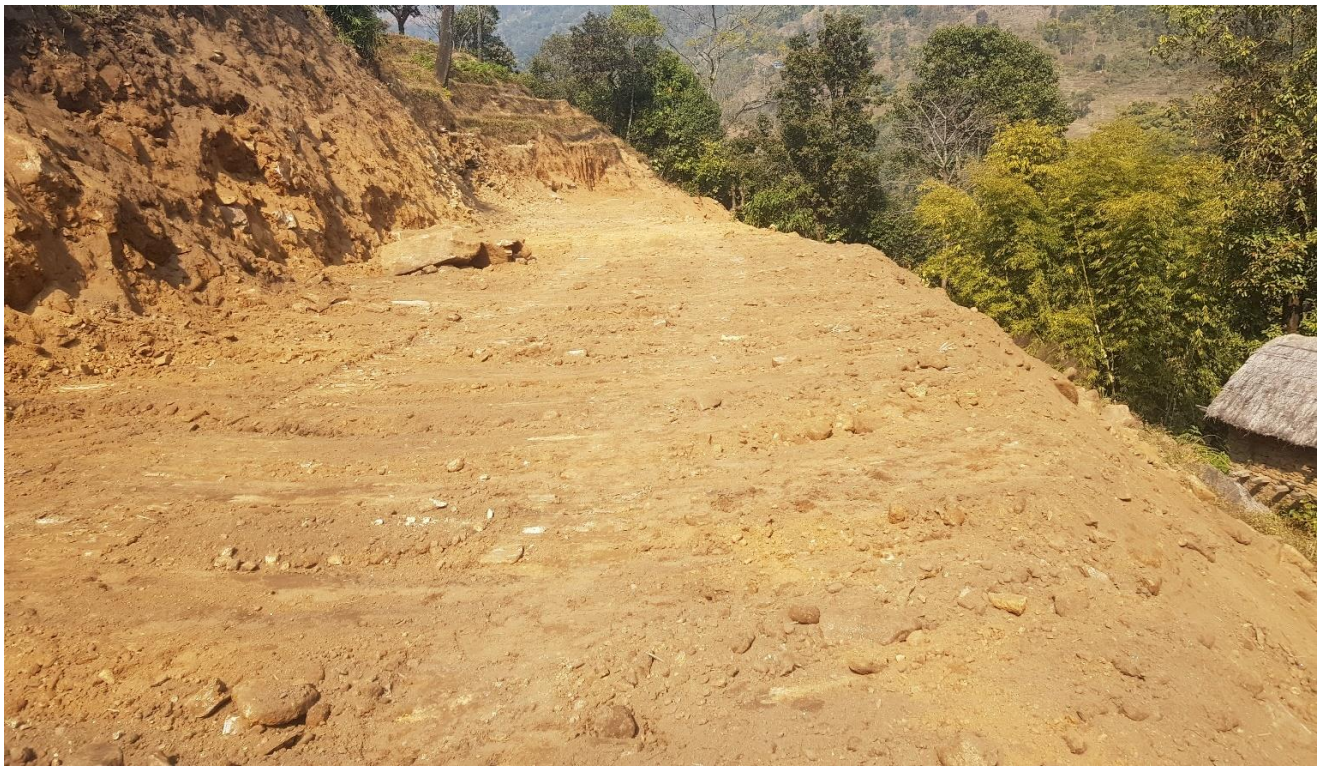

Figure 22: Road Widening for Headrace Pipeline Alignment

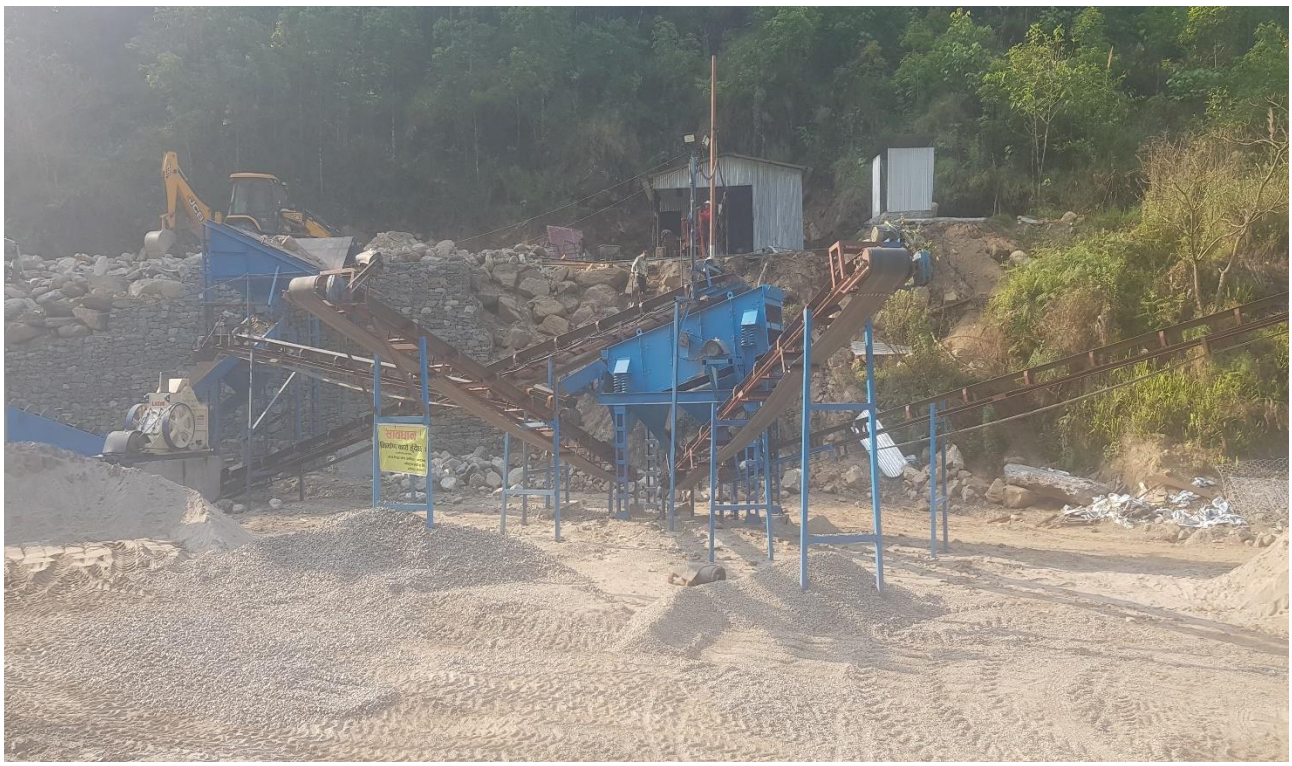

Figure 23: Crusher Plant in operation.

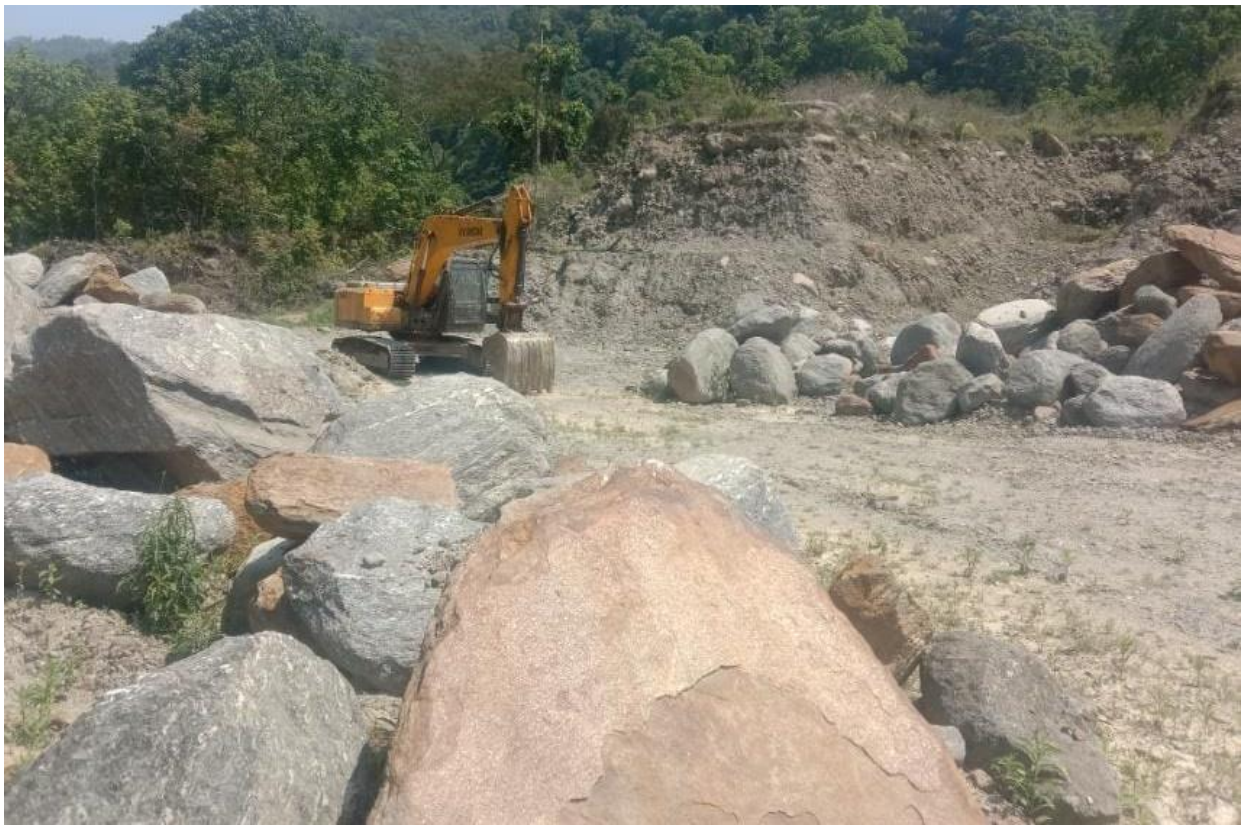

Figure 24: Excavation for Powerhouse Structures.

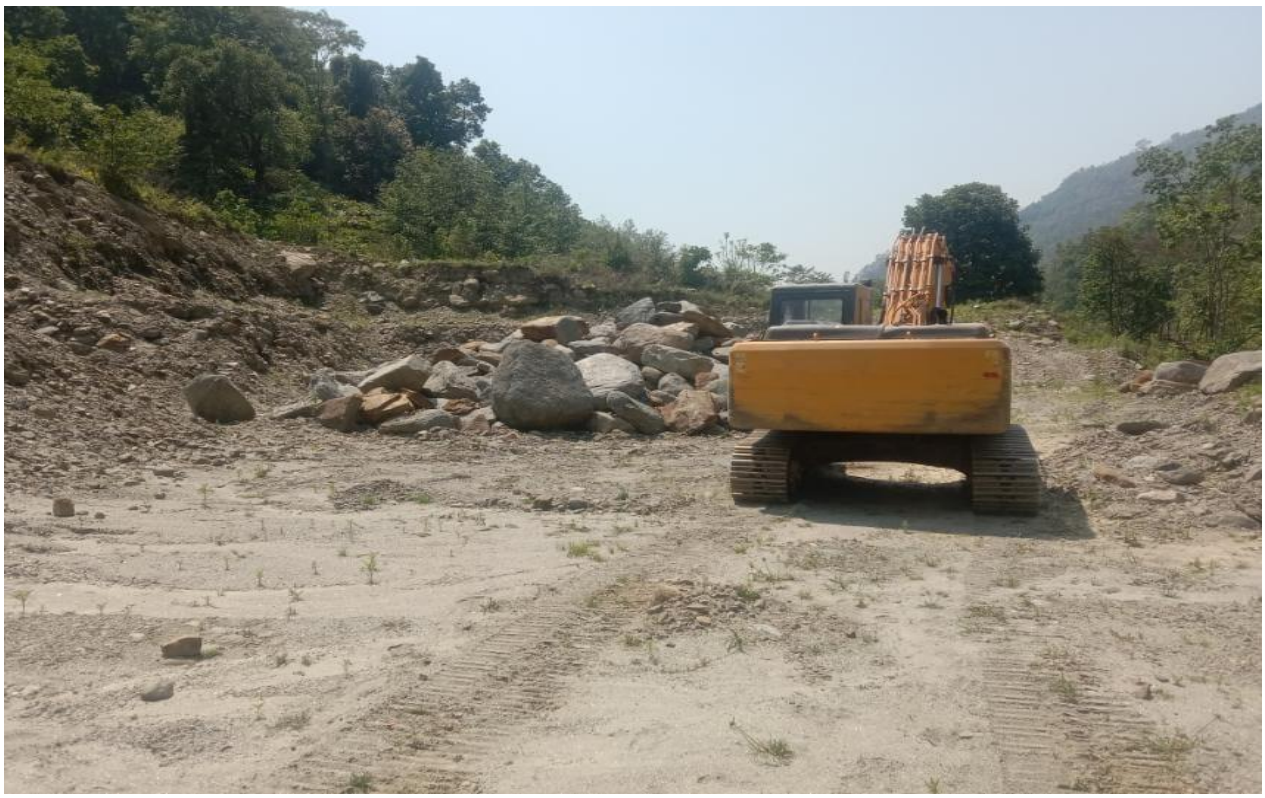

Figure 25: Excavation for Powerhouse Structures

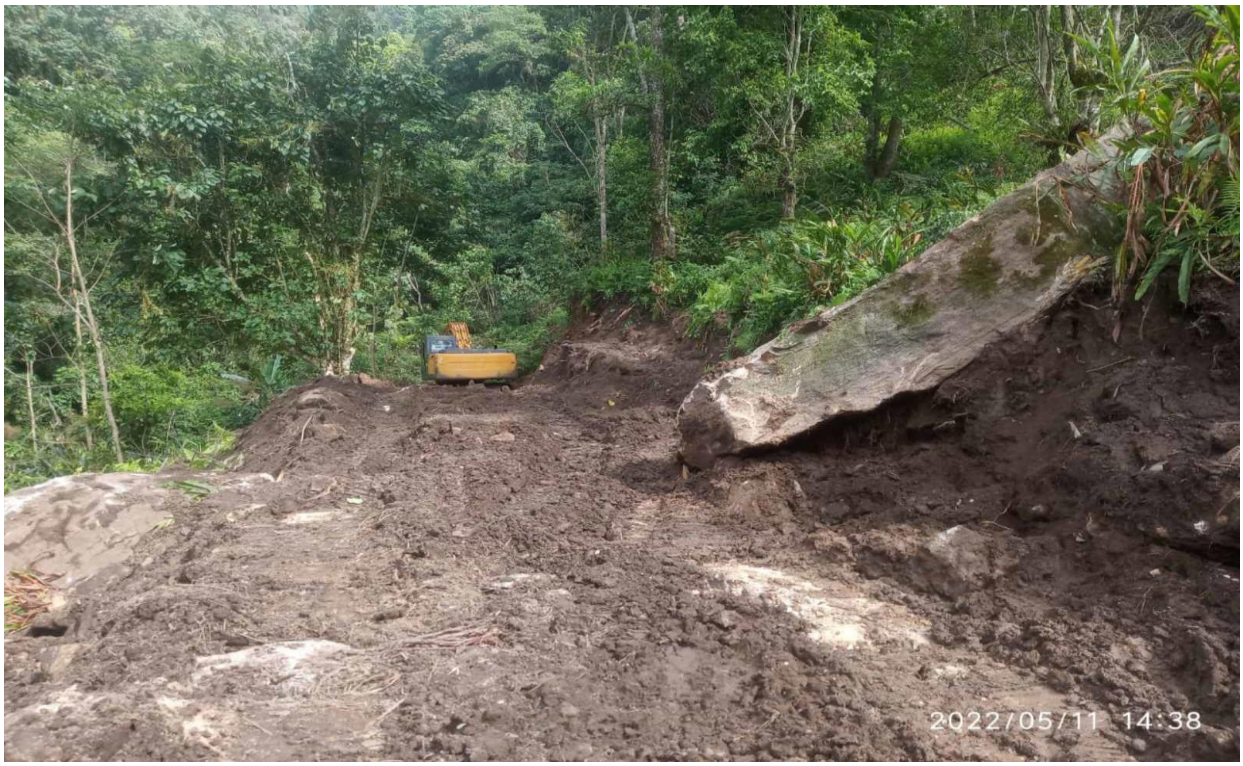

Figure 26: Excess road from powerhouse to surge tank

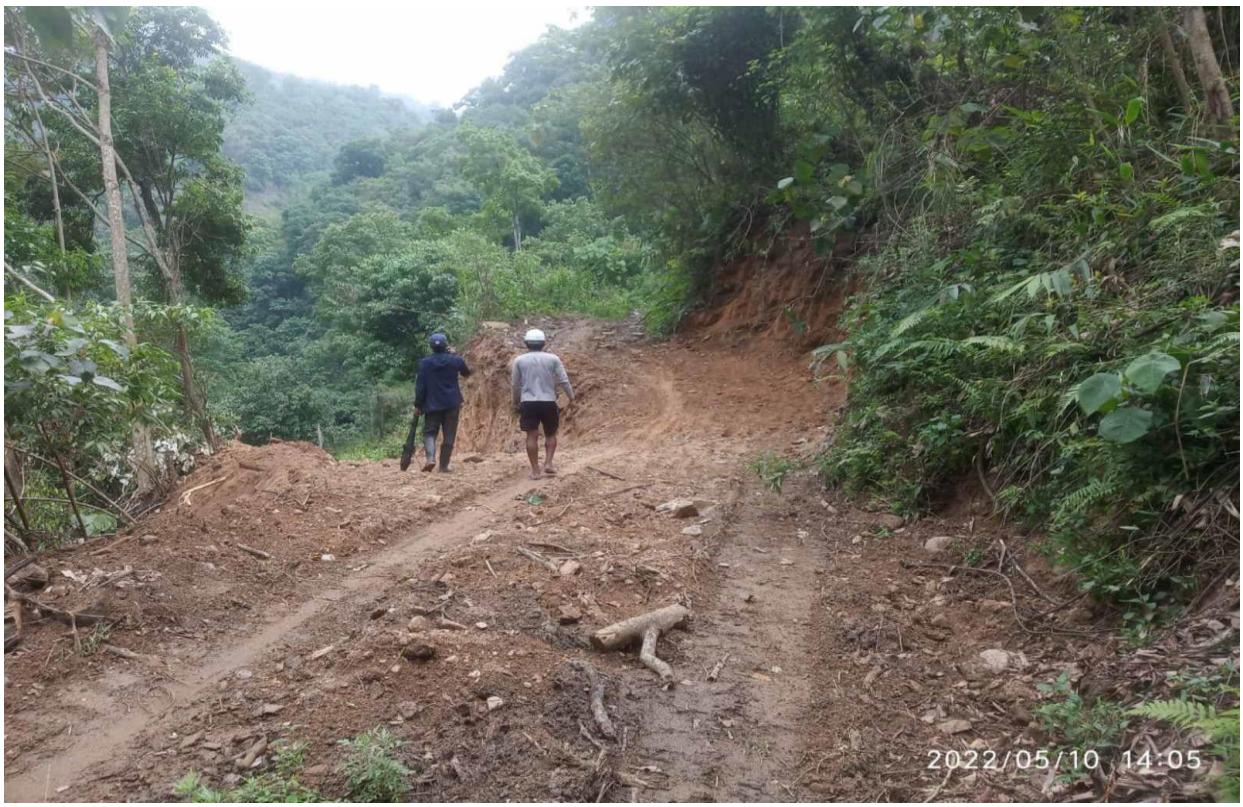

Figure 27: Excess road from powerhouse to surge tank