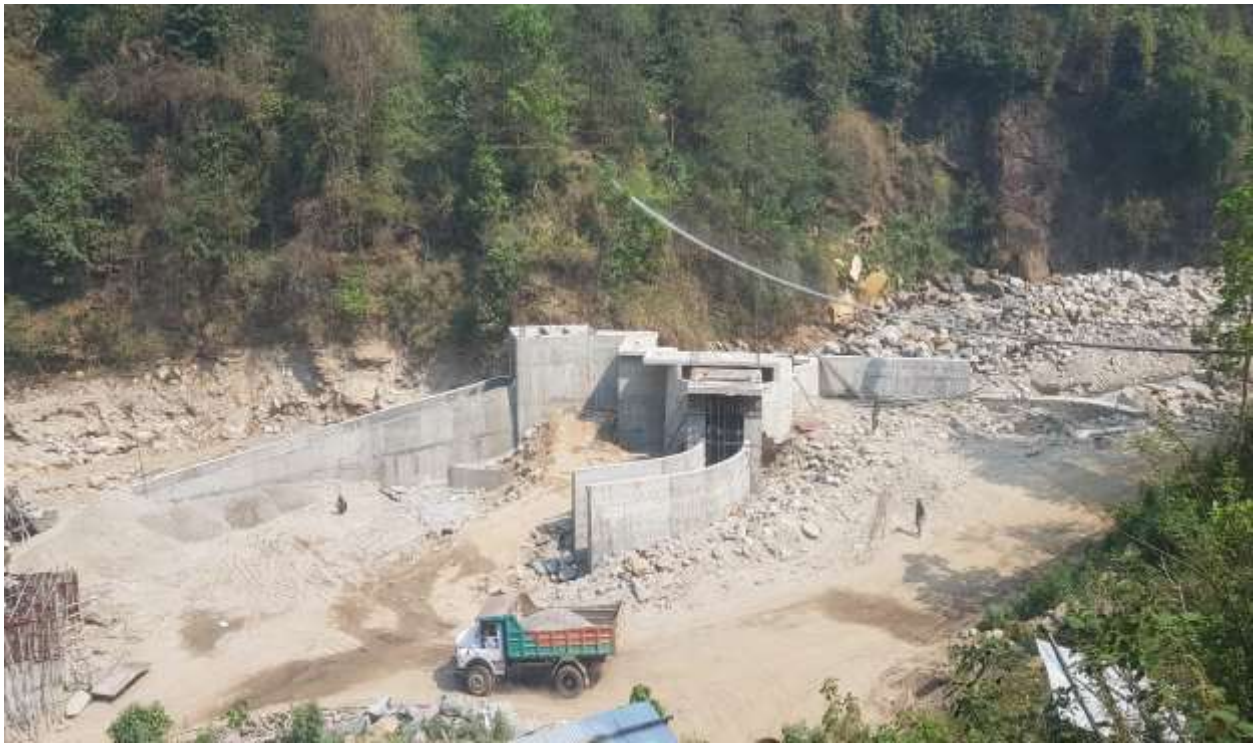
UPPER PILUWA KHOLA -3 HYDROELECTRIC PROJECT (4.95 MW)

Sankhuwasabha, Nepal

Progress Report For The Month Of Baishakh 2079

Date: 8th Jestha , 2080



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 Khola		:	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	:	1.366-1.566 m dia with thickness 8 mm

9. Surge tank

Type	:	Restricted orifice
Size	:	4 m diameter 25 m height

10. Penstock Pipe

Total Length	:	395 m
Type	:	MS-Pipe Buried and exposed section

Diameter of Pipe	:	1.120 to 1.378 m dia with varied thickness 8 mm to 14 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	:	2.578 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	:	2910 kVA
Rated Frequency	:	50 Hz

15. Power Transformer

Type	:	1 No. 3 phase, 50 Hz Step up Transformer
Rated Efficiency	:	99%

Rate Capacity	:	6500 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 until the month of Poush, 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 is 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. Bedrocks 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 of headrace 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 CONSTRUCTION WORKS

3.1 Civil Works

3.1.1 Head works

i. Second stage river diversion is accomplished.

ii. Excavation and rebar installation for all cutoff is completed.

iii. Concreting on base slab of all cutoffs completed.

iv. Casting of shear wall of cutoff is on progress.

3.1.2 Gravel trap, Desander and fore bay

i. Construction of inlet transition and three settling blocks is completed.

ii. Rebar installation of fourth panel of settling basin completed.

3.1.3 Waterway Alignment

i. Project road from headworks to surge tank completed.

ii. Total 800m of trench excavation for laying pipe and bends is completed.

iii. Total 500 m backfilling at installed pipe trench is completed.

3.1.4 Power House (PH, Switchyard and Tail race)

i. Excavation of power is completed.

ii. Excavation for protection wall is at verge of completion.

3.2 Hydro mechanical works

i. Total 750m headrace pipe and 15 bends at headrace alignment is installed.

ii. Installation of sand flushing duct is completed.

3.3 Electromechanical Works

i. Generator is arrived at Nepal boarder and stored at warehouse in Biratnagar.

ii. Earthing materials, drainage pipes and diesel generator is transported to site.

iii. Inspection of transformer and turbines along with NEA officials is completed.

3.4 Transmission Line

i. All transmission poles are delivered to site.

ii. Contractor is mobilized to install transmission pole and accessories.

iii. Total 100 transmission poles are installed at site.

3.5 Receiving end substation

i. Rebar installation at bay of receiving substation is completed.

ii. Casting of footing at receiving end substation bay is completed.

4 PHOTOGRAPHS

Figure 4.1: Headworks after final lift concrete.

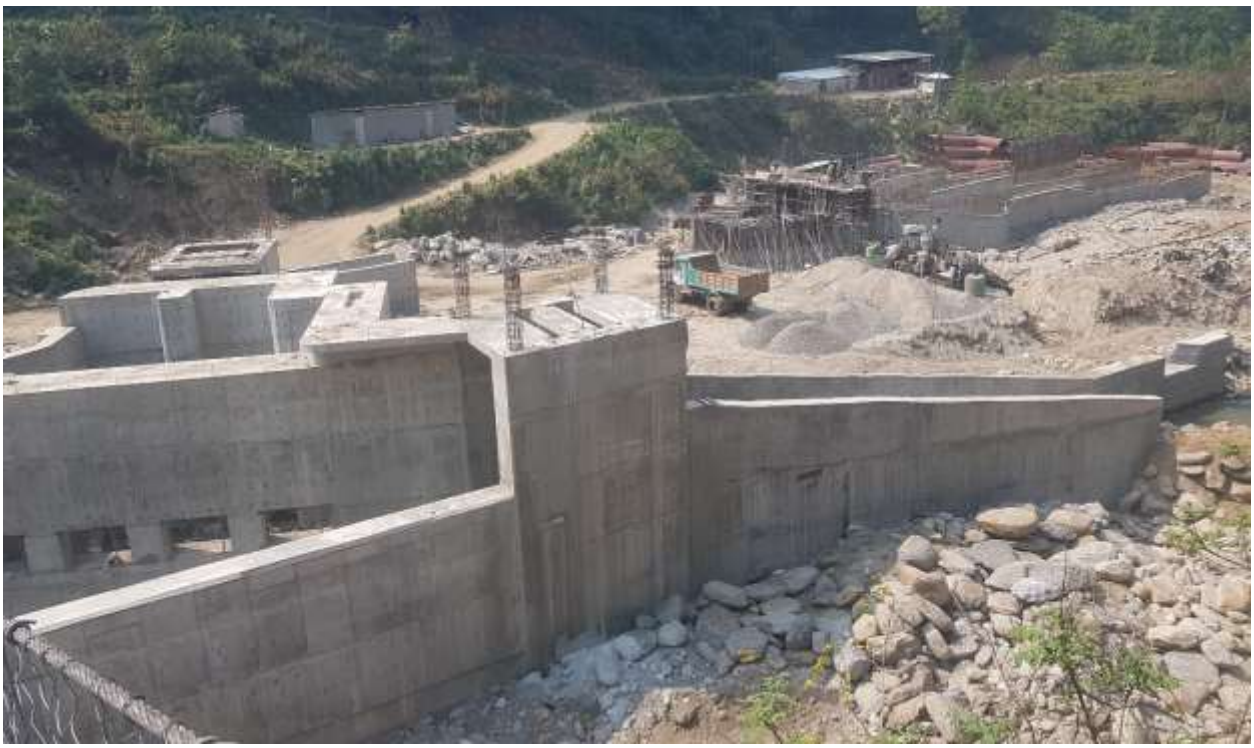


Figure 4.2: Intake sluice and undersluice structure.

Figure 4.3: Intake sluice and intake structure.

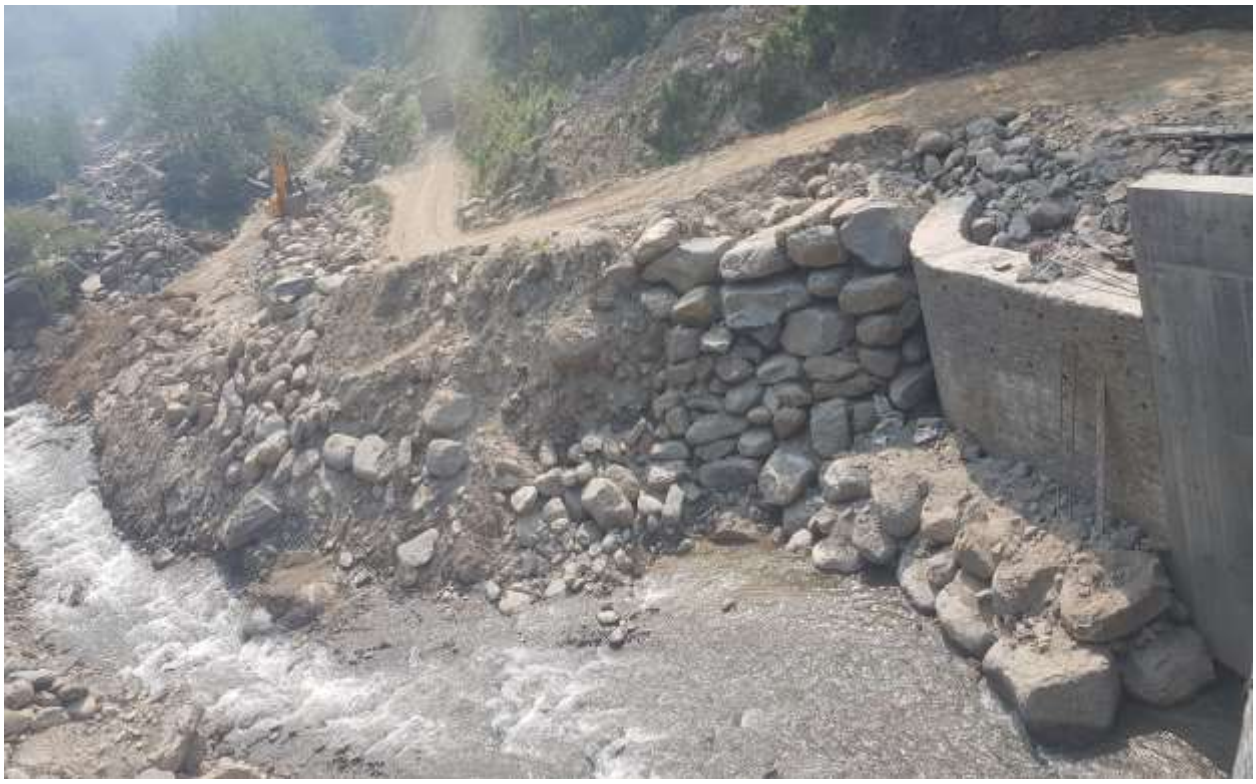


Figure 4.4: Upstream protection.

Figure 4.5: Weir Upstream Cutoff

Figure 4.6: Weir Central Cutoff

Figure 4.7: Weir downstream cutoff.

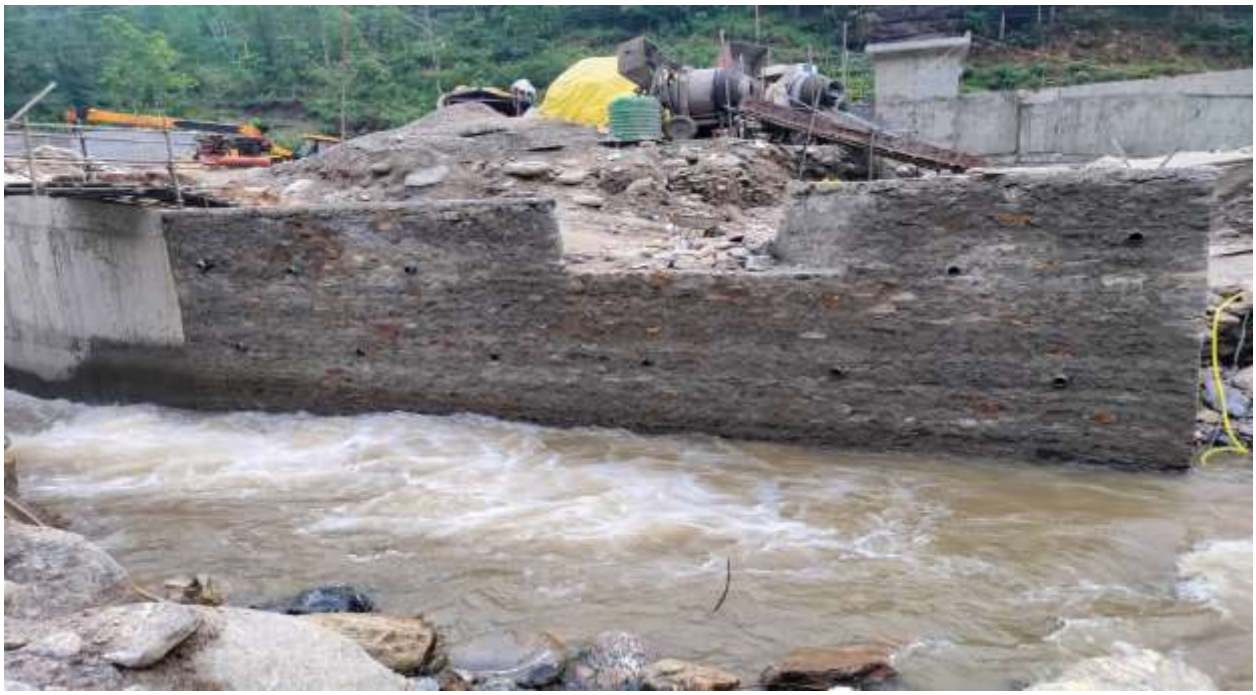


Figure 4.8: Left side downstream protection work.

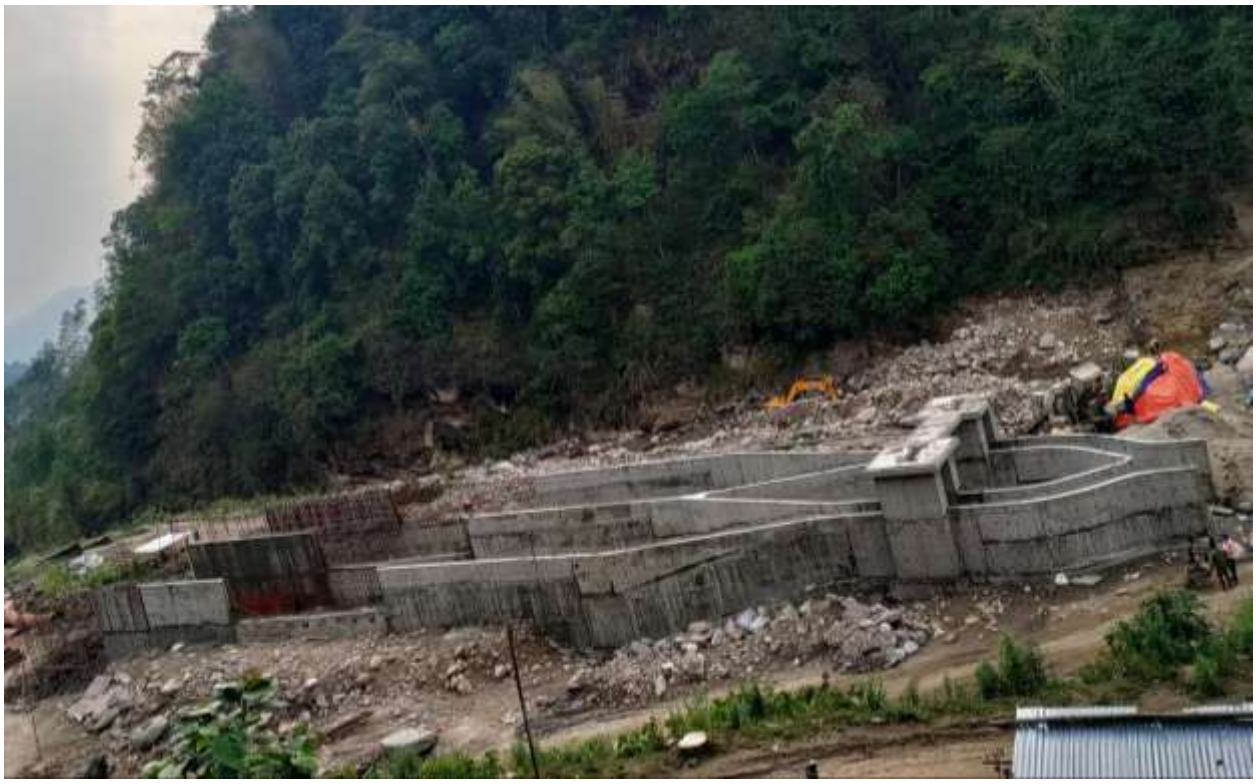


Figure 4.9: Settling basin overall structure.

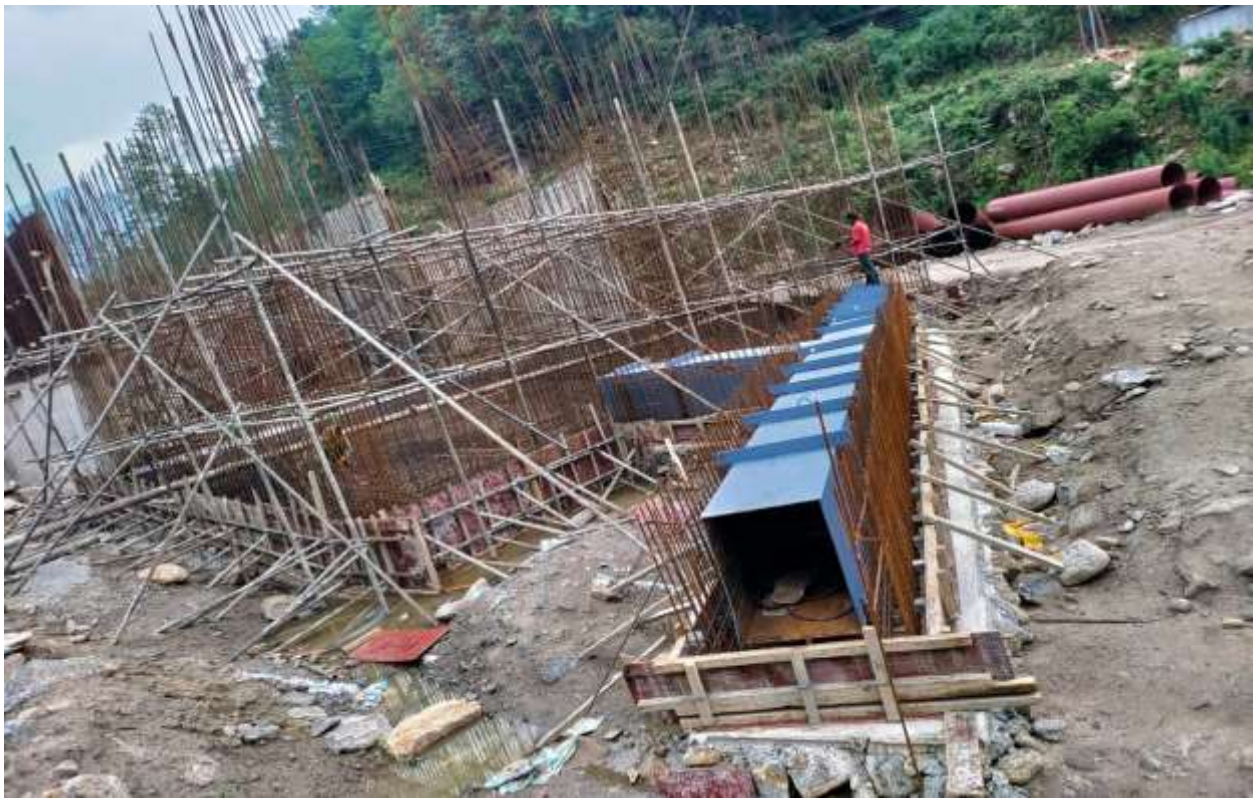


Figure 4.10: settling basing head pond section.

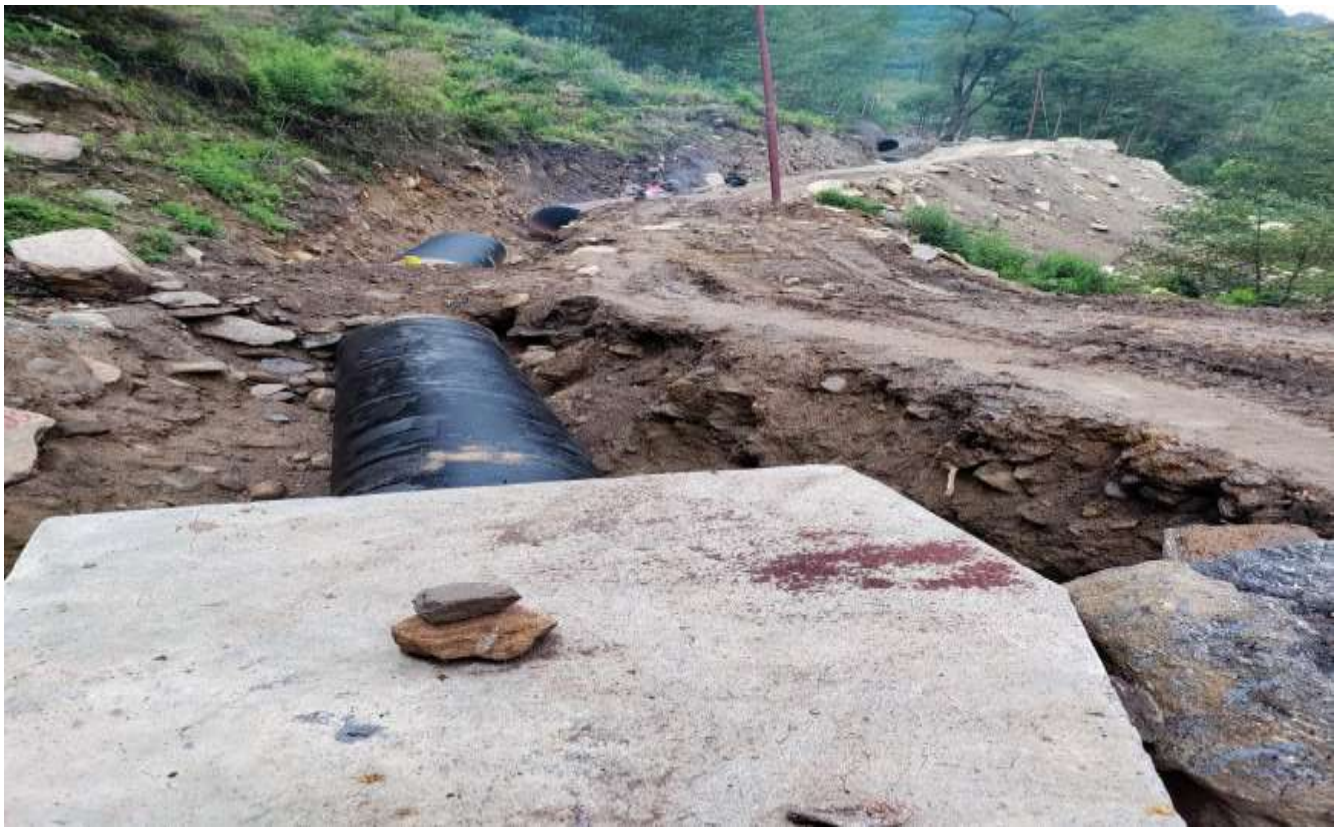


Figure 4.11: Headrace pipe installation work.

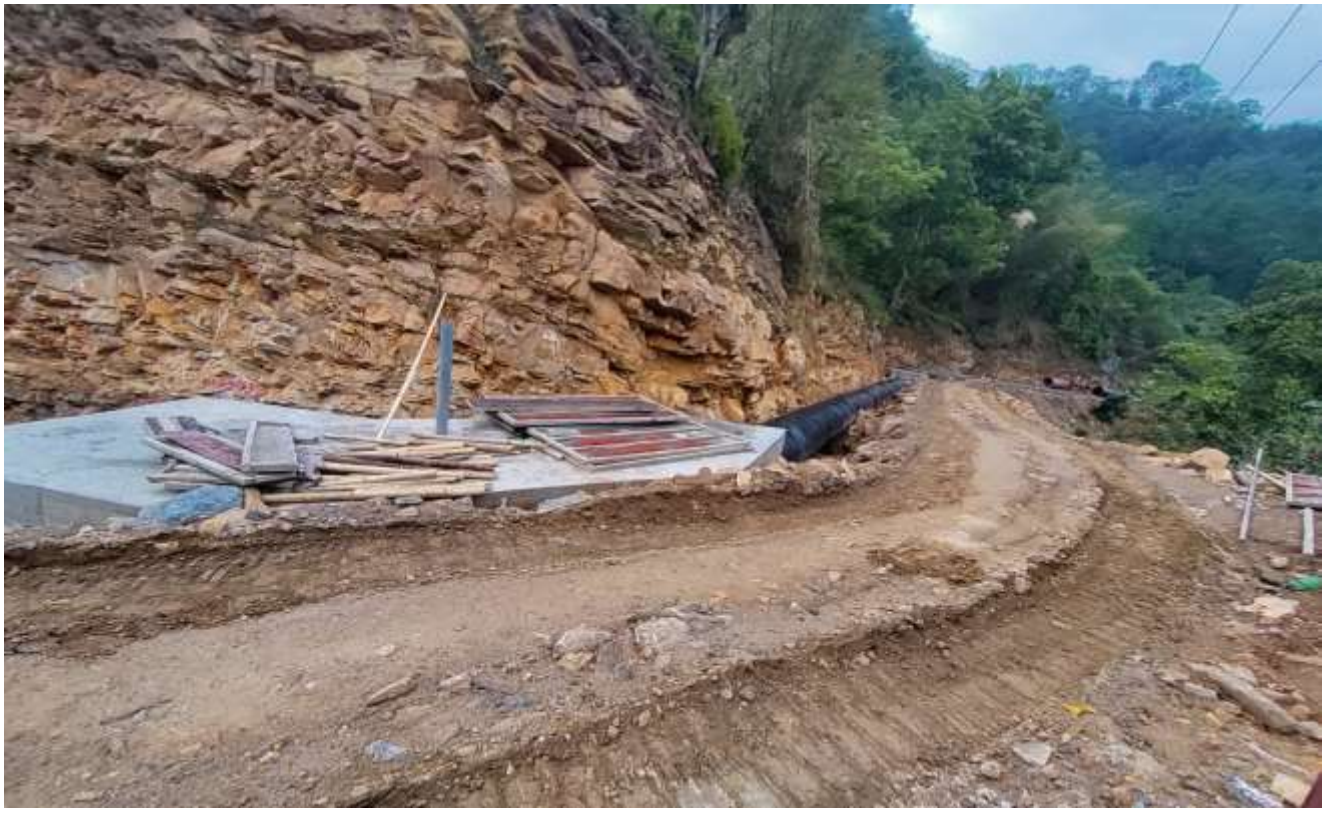


Figure 4.12: Anchor block construction and Headrace pipe installation.

Figure 4.13: Backfilling after testing pipe.

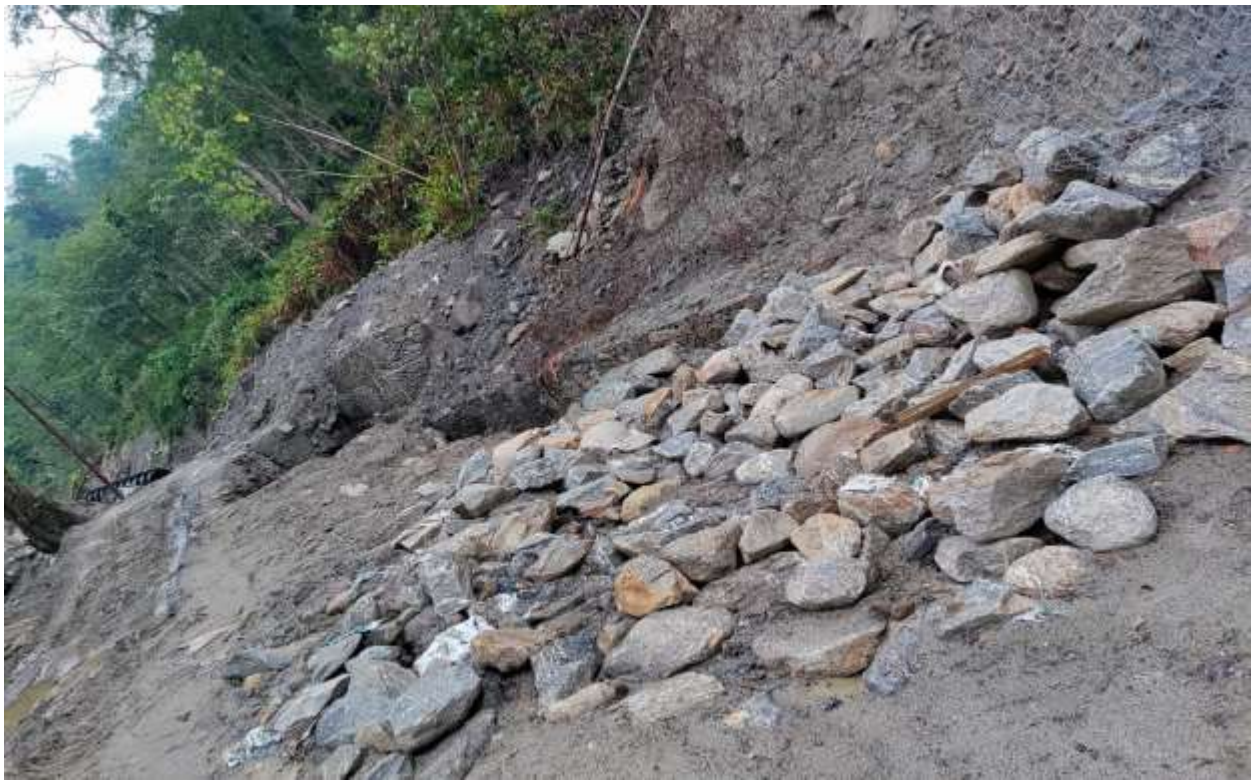


Figure 4.14: Upstream protection and backfilling at headrace alignment.

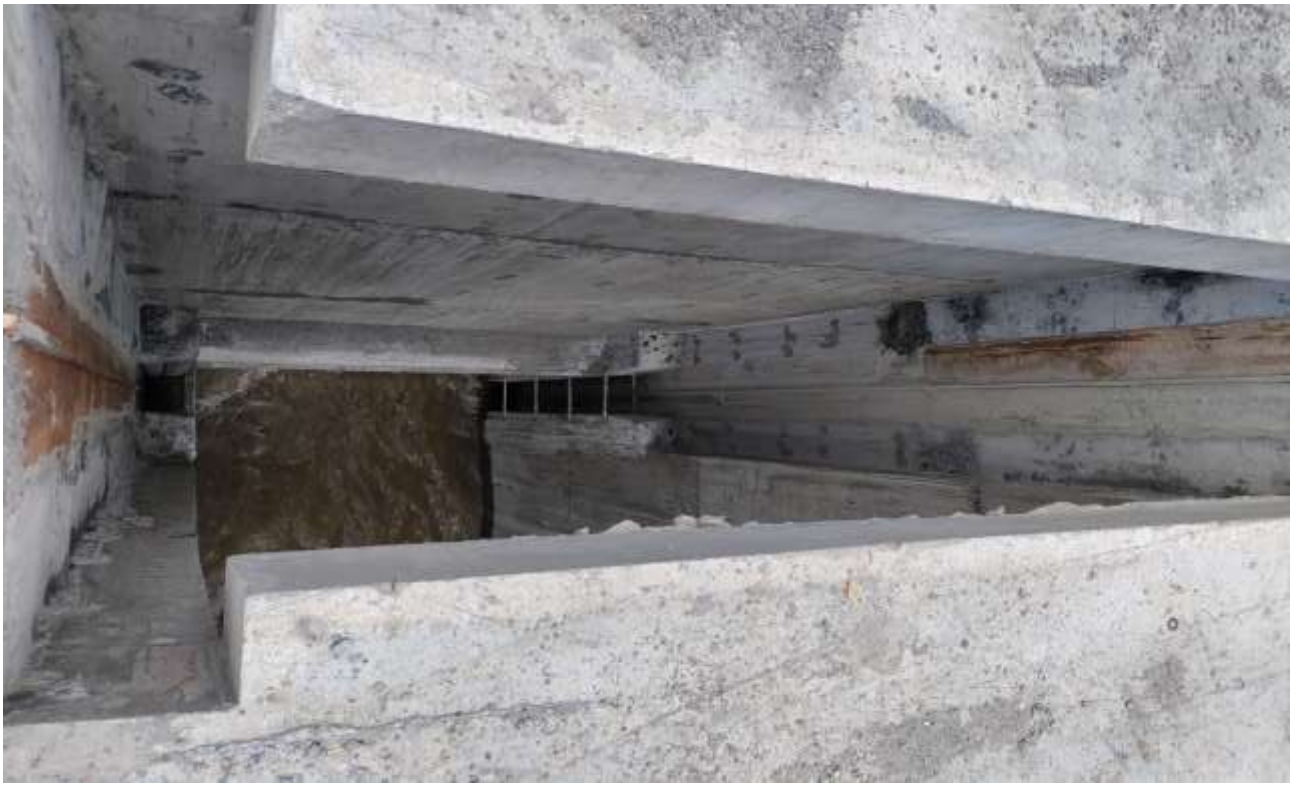


Figure 4.15: Gate frame installation and second stage concreting.

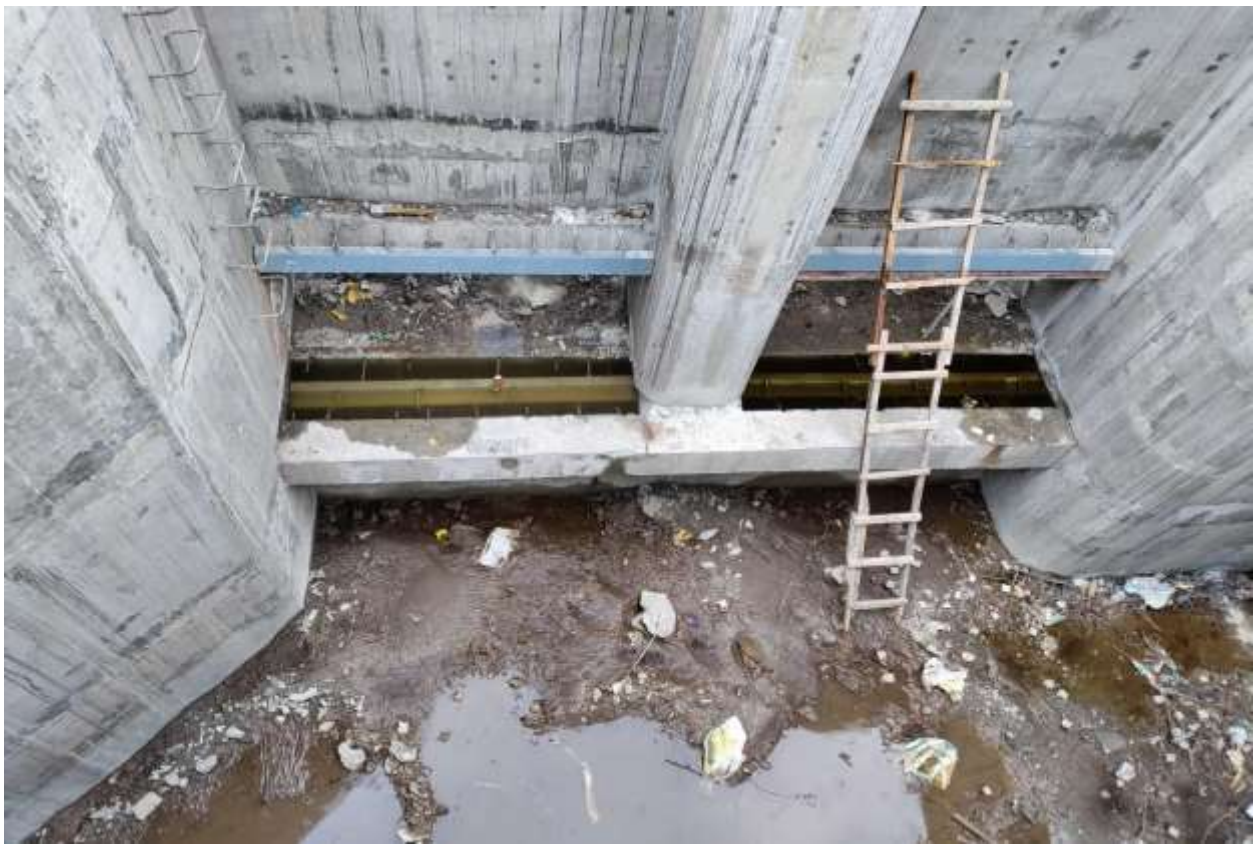


Figure 4.16 : Trash-rack frame installation.

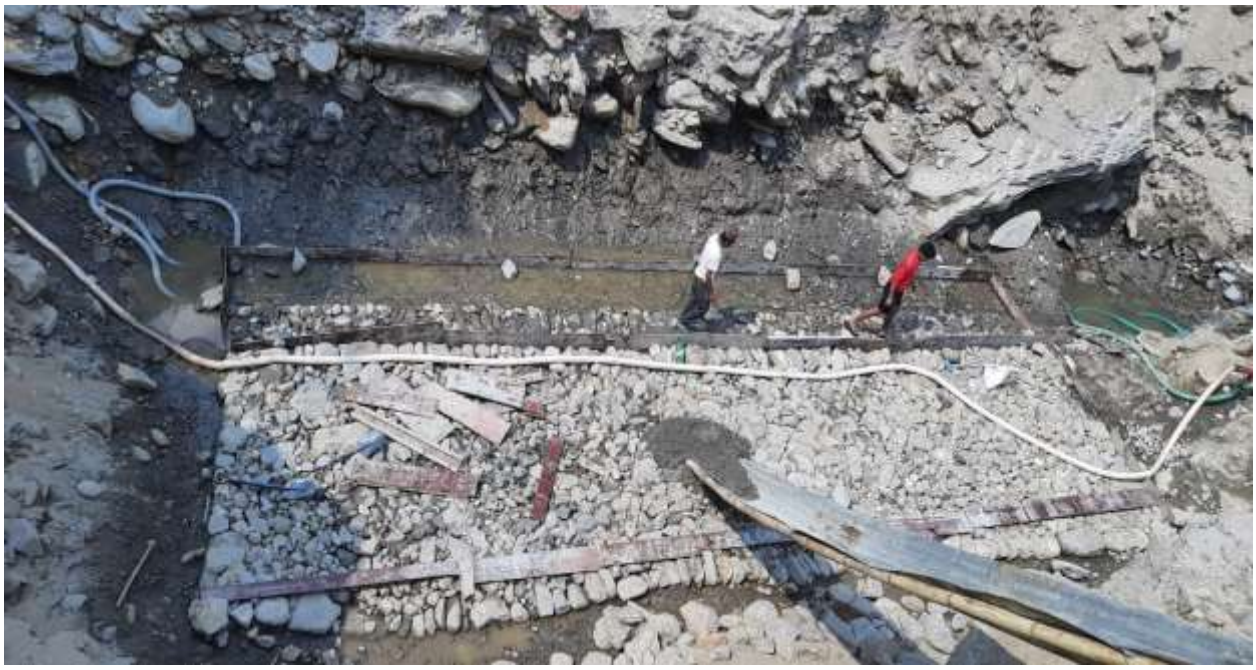


Figure 4.17: Soling and PCC for powerhouse protection wall.

Figure 4.18 : Excavation for powerhouse protection work.

Figure 4.19 : Transformer inspection work .

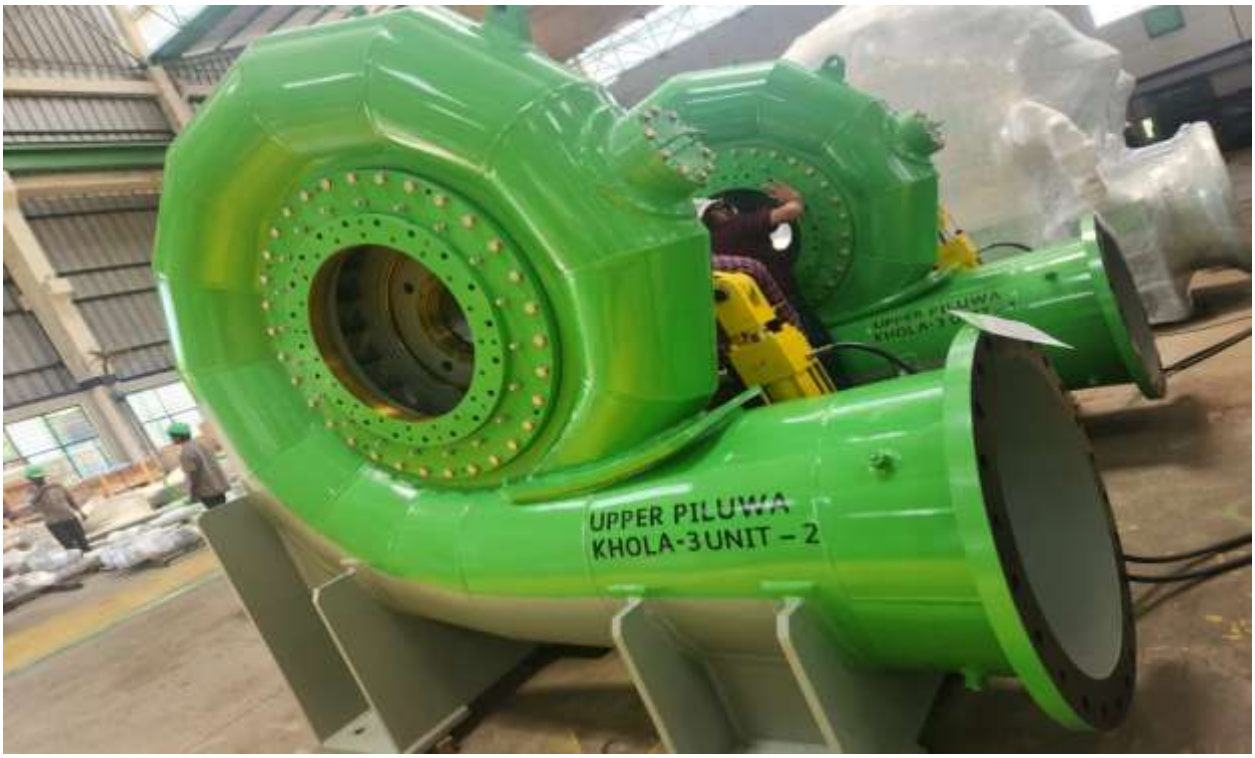
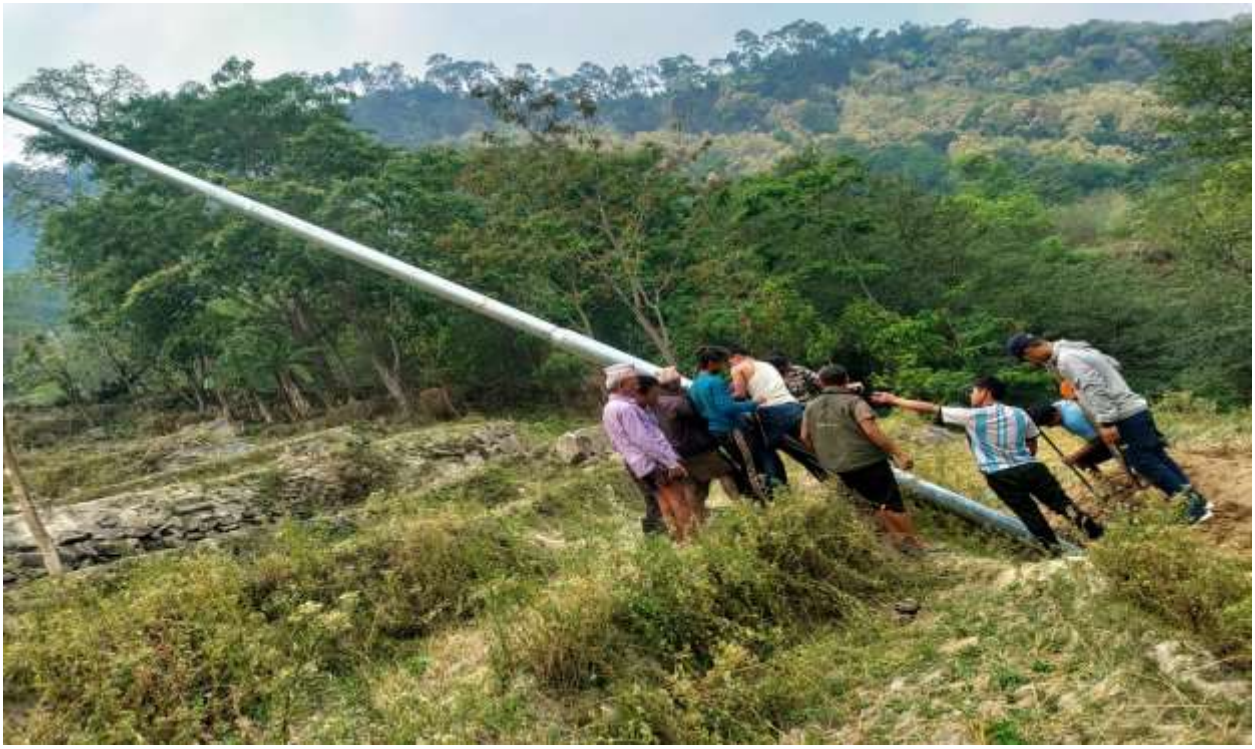


Figure 4.20 : Inspection of turbine.



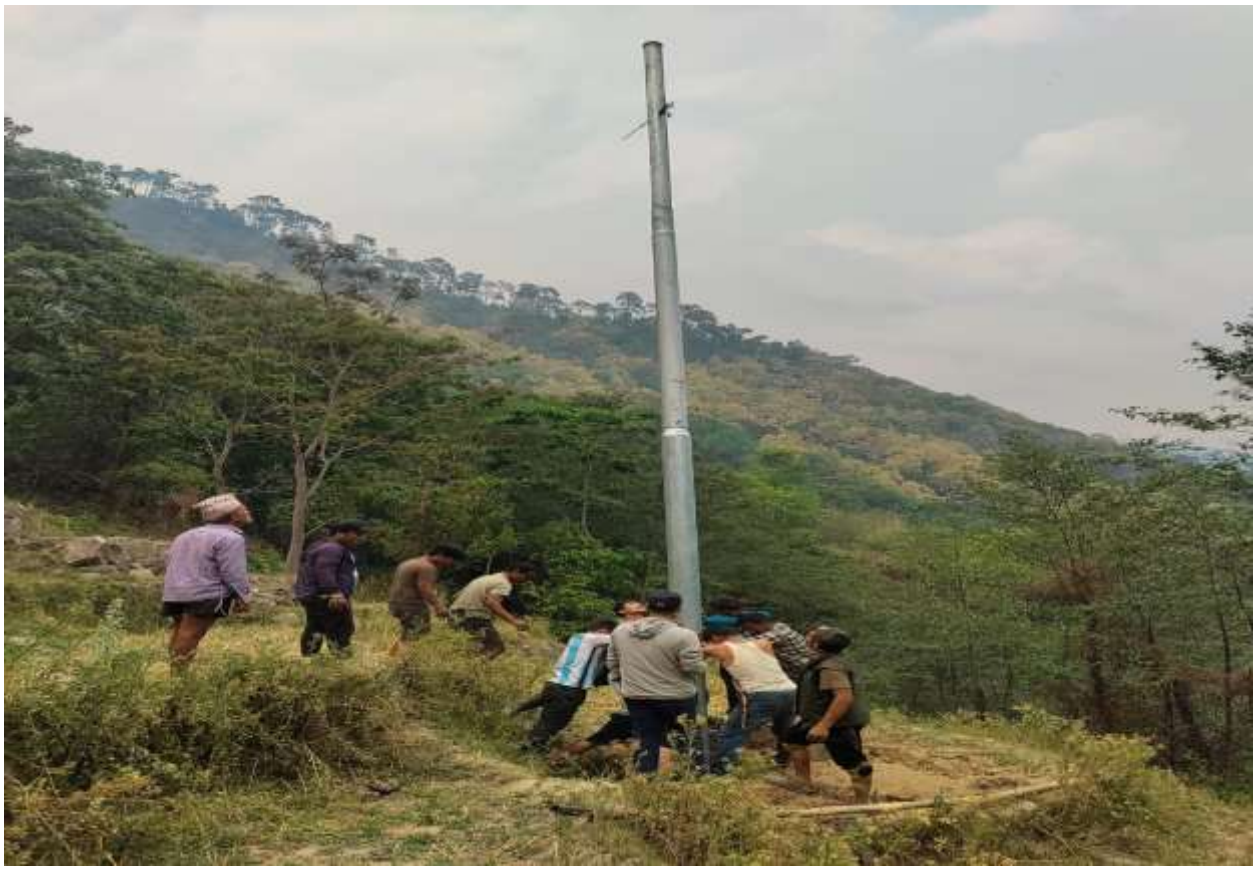


Figure 4.21 : Pole erection for transmission line.

Figure 4.22 : Bay construction at NEA substation.

UPPER PILUWA KHOLA 3 HYDROELECTRIC PROJECT (4.95MW)

SANKHUWASABHA, NEPAL

UPDATED PROJECT SCHEDULE

ID	Task Name	% Complete	Duration	Finish
0	**UPK3HEP Project**	60%	849 days	Sat 3/2/24
1	Infrastructures	96%	567 days	Thu 5/25/23
6	**Civil Works**	61%	558 days	Thu 10/19/23
7	**Headworks Construction**	**77%**	**488.75 days**	**Wed 8/16/23**
146	**Settling Basin (Desander)**	80%	393 days	Fri 6/2/23
191	**Headrace alignment**	83%	440.5 days	Sat 6/24/23
197	**Penstock Alignment**	0%	90 days	Tue 8/15/23
202	**Powerhouse**	25%	351 days	Thu 10/19/23
248	**Surge Tank**	**0%**	**32 days**	**Sun 6/18/23**
252	**Hydromechanical Works**	55%	352 days	Sat 8/26/23
253	**Fabrication, testing and supply of HM equipments**	**100%**	**296 days**	**Sat 7/1/23**
258	Headworks	50%	153.5 days	Sat 7/29/23
265	Settling Basin	26%	76.5 days	Fri 7/14/23
270	Headrace Pipe Installation	61%	155.55 days	Mon 7/31/23
276	Penstock Pipe Installation	0%	69 days	Sat 8/26/23
282	Surge Tank	0%	40 days	Fri 7/28/23
283	**Transmission line construction**	48%	496 days	Fri 8/18/23
284	Delivery of pole and acessories	100%	60 days	Wed 5/17/23
285	Pole Erection	30%	90 days	Wed 7/19/23
286	Conductor installation	0%	30 days	Fri 8/18/23
287	**Electro-Mechanical Works**	49%	709 days	Fri 3/1/24
288	Fabrication, testing , Inspection and delivery of EM Equipments	80%	240 days	Tue 7/25/23
289	**Installation work**	**0%**	**182 days**	**Fri 3/1/24**
290	EOT Crane	0%	15 days	Sat 9/16/23
291	EM Mechanical	0%	60 days	Sun 12/17/23
292	EM Electrical	0%	45 days	Wed 1/31/24
293	Testing	0%	15 days	Thu 2/15/24
294	Trial Generation	0%	15 days	Fri 3/1/24
295	**COD**	0%	1 day	Sat 3/2/24