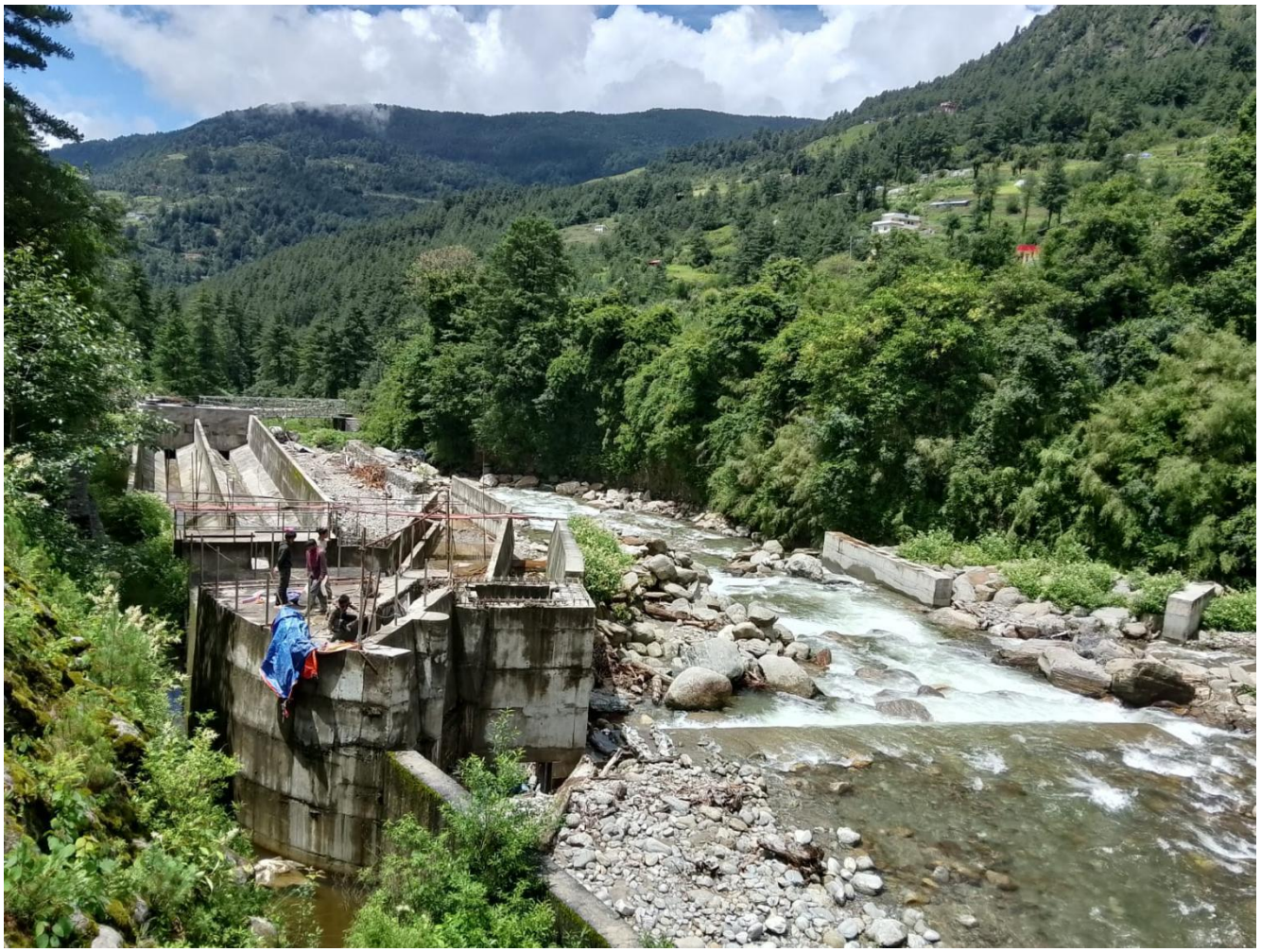
JUNBESI KHOLA HYDROPOWER PROJECT (5.2 MW)



PROGRESS REPORT

Magh 2082

Submitted By:
Dovan Hydropower Limited
New Baneshwor, Kathmandu

Submitted To:
Sanima Bank Limited
Naxal, Kathmandu

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

1 PROJECT INTRODUCTION

Junbesi Khola Hydropower Project (hereinafter also referred to as "JKHP" or the "Project") is a Run-of-River (RoR) type hydropower project with an installed capacity of 5.2 MW. The Project is located in Solududhkunda Municipality, Solukhumbu District, Koshi Province of Nepal. Geographically, the Project area is located between longitudes 86º32'40" E to 86º34'29" E and latitudes 27º33'15" N to 27º35'08" N. Geologically, the catchment area is located in the Lesser Himalaya Zone of Nepal. The Project utilizes the flow of Junbesi Khola. However, Dovan Hydro Hydropower (P) Ltd. (DHPL) has planned provision of additional flow from Menjum Khola during dry period. Almost all of the headworks components, water conveyance system and powerhouse of the Project are located along the left bank of Junbesi Khola. The headworks and the powerhouse sites are located at an elevation of about 2655 m amsl and 2433.98 m amsl (turbine axis level) respectively.

Junbesi Khola Hydropower Project (JKHP) was identified and is being implemented by Dovan Hydropower (P) Ltd. (hereinafter referred to as the "Developer" or, DHPL). The Project is a simple run-of-river type project with a design discharge of 2.99 m^3/s (45% exceedance) and a gross head of 221.02 m. The Project comprises a diversion weir with under sluice, two side intake orifices, gravel trap, spillway, gravel flushing canal, settling basin, sediment flushing canal, headrace pipe, surge pipe, penstock pipe, surface powerhouse, and tailrace culvert. The powerhouse is located in Najing village, along the left bank of Junbesi Khola, which is about 1.0 km upstream from the confluence of Junbesi Khola and Dudhkunda River and headworks is located in Junbesi village, about 20 m upstream from the confluence of Junbesi Khola and Menjum Khola.

The designed weir is a boulder lined free flow type with a crest length of 18 m. It consists of one cut-off wall at upstream and four cut-off walls at downstream of the main weir including key boulders at the end of boulder riprap. A gated controlled undersluice has been designed for safe passage of the 20 years flood. The opening size of undersluice is 2 m (B) x 1.5 m (H) and invert level is 2652.5 m amsl. Two intake orifices (2 m x 1 m) of side intake have been designed to divert the required discharge for power plant operation. The invert level of the intake orifice is 2654 m amsl.

The side intake diverts the discharge into the single chambered (5.84 m x 4.6 m x 5 m) gravel trap which is designed to settle particles having size greater than 5 mm. After gravel trap, design flow is conveyed through 10 m long (4.6 m wide and 1 m clear height) approach culvert into double chambered hopper type surface settling basin of 62 m length including inlet transition (inlet transition 14.93 m and settling zone 47.07 m). The cross sectional size of settling basin is 4.2 m x 4.5 m (B x H), which is designed to settle particles size larger than 0.2 mm. Two outlet gates and one sediment flushing arrangement at each bay have been designed for smooth operation of settling basin. Then after; the plant flow will be conveyed to water conveyance system through conveyance tank with average length of 7.01 m. The conveyance tank comprises an emergency spillway of length 9.89 m, spillway cannel and fine trash rack. The crest level of the spillway is 2654.33 m amsl. The steel headrace pipe of 2984.8 m long, 1550 mm to 1450 mm diameter, 8 mm thick conveys the flow to powerhouse through penstock pipe. The penstock pipe is 446 m long and 1450 mm diameter steel pipe having thickness varies from 8 mm to 28 mm up to bifurcation. Likewise, 120 m long surface inclined surge pipe alignment diameter of 2 m (8 mm thick) has been designed to protect the surface penstock and headrace pipes from the water hammer effect during the sudden change in the flow pattern. The estimated upsurge and down surge levels are 2668.15 m amsl and 2639.95 m amsl. The surface powerhouse of size is 25.51 m (L) x 16.70 m (B) x 15.18 m (H) from floor level accommodates two units of horizontal axis Pelton turbines. After the power generation, the design flow will

finally be discharged back to Junbesi River through about 32 m long rectangular box duct tailrace culvert.

Further, the generated electric power will be evacuated through a 6 km long 33 kV transmission line from switchyard of JKHP to switchyard of Upper Solu Hydropower Project (18 MW). Then after, about 12 km long 132 kV single circuit transmission line has been constructed on the basis of cost sharing between three neighbouring projects Junbesi Khola Hydropower Project (5.2 MW), Upper Solu Hydropower Project (18 MW) and Middle Solu Hydropower Project (9 MW) to NEA's substation at Tingla. NEA's Tingla Sub-station has been completed and charged to 132 kV double circuit transmission line. Similarly, the entire transmission line under Solu corridor from Tingla sub-station, as mentioned above, to Mirchaiya has also been completed and charged successfully.

The project area can be accessed from Kathmandu via various options. One option is by roadway following Kathmandu-Dhulikhel-Khurkot-Ghurmi-Okhaldhunga-Salleri-Phaplu- to the project site (both powerhouse and headworks). Total road length from Kathmandu to Phaplu as above mentioned route is about 300 km and the road stretch between Phaplu and project area (up to headworks) is about 9 km. The road is black topped except some gravelled stretches between Khurkot to Ghurmi and Sisneri hill (Tingla) to Salleri. The road stretches between Phaplu and the project area is mostly stone paved earthen road.

Another option is by airway from Kathmandu to Phaplu (about 30 min flight) and travel to project site. Furthermore, Ghurmi is also accessible from Katari, which is about 45 km gravelled road. Phaplu and Salleri are the nearest market areas from the project area.

2 INSTITUTIONAL ARRANGEMENT

The institutions that are being involved for the development of the Project are as follow:

- The Developer: *Dovan Hydropower Limited.*
- Lead Bank (Consortium of Nepalese Bank): *Sanima Bank Limited*
- The Engineer/Consultant: *Sanima Hydro and Engineering Pvt. Ltd. (SHEPL)*
- The Contractor (Civil Construction Works): *Shree Gurkha-Koshi JV*
- The Contractor (Hydro-mechanical Works): *Nephydelin Pvt. Ltd. and B.R.S.D. Engineering Pvt. Ltd.*
- The Contractor (Electromechanical Works): *Mecamidi HPP India Private Limited*
- The Contractor (Transmission Line Works): *Benco Construction and Infra P L*
- The Contractor (Interconnection works): *GEPPERT*

2.1 Project Key Dates

The following are the contractual key dates for Junbesi Khola Hydropower Project.

Table 1: Project key dates.

Events	Date
PPA Signed	Chaitra 2069
Initial RCOD of Project	End of Shrawan 2074
Revised RCOD of Project	Chaitra 10, 2078
Targeted COD	**30 Chaitra, 2082**

Facility Agreement (Financial Closing)	Completed
Civil Contractor mobilization to the site	Jestha 17, 2073
HM Contractor (SBCPL) mobilization to site	Ashadh, 2078
HM Contractor (BRSD) mobilization to site	Bhadra, 2081
EM Contractor mobilization to site	Bhadra, 2081

3 RESOURCES MOBILIZATION

3.1 The Developer

Technical and managerial team of the Developer has been working for the Project at Kathmandu office. The Developer has also been deployed its staff at site office Junbesi for site management and construction supervision.

3.2 Civil Contractor

The main civil Contractor, Shree Gurkha-Koshi JV completed almost all the civil work of Project site. Only boulder riprap work at headworks is balance till date. The Main civil Contractor has now de-mobilized its working manpower from the site.

3.3 HM Contractor

Nephydelin Private Limited is one of the HM contractor selected for the procurement, design and fabrication of HM works (Gates, stop logs, trash racks, expansions etc) and B.R.S.D Engineering Pvt. Ltd is another contractor who have been awarded the contract for the erection of HM works at site. HM contractor has already been completed all the Pipe erection and testing work at site.

3.4 EM Contractor/Supplier

Main EM contractor (Mecamidi) and sub-contractor (for erection of EM equipment) has mobilized and completed all the erection and testing work.

3.5 TL Contractor

Benco Construction and Infra P L, the transmission line (TL) contractor, has been assigned the execution of the 33kV transmission line from the powerhouse switchyard to the interconnecting switchyard at Beni. The contractor has also been competed the 33 KV transmission line work. Now Testing work is going on.

4 PRESENT STATUS OF THE PROJECT AT SITE

4.1 Access Road

The project access road is operational with frequent maintenance such as debris clearance, gravelling, soling etc.

4.2 Work Progress

4.2.1 Headworks

The Headworks of the project includes several key structures: a diversion weir with an undersluice, upstream and downstream cut-off walls, flood protection walls, two side intake orifices, a gravel trap, spillway, gravel flushing canal, settling basin, conveyance tank, and sediment flushing canal. Almost all the major civil structures at the Headworks have been completed including settling basin and conveyance tank (refer Figure 1). Only boulder riprap in diversion weir and right bank protection work remains at headworks which will temporarily be done for the power operation. The complete boulder lining work and riprap will be done in this dry season parallel.

Based on the actual progress achived at site, it is concluded that about 95% physical work progress have been achieved in headworks area.

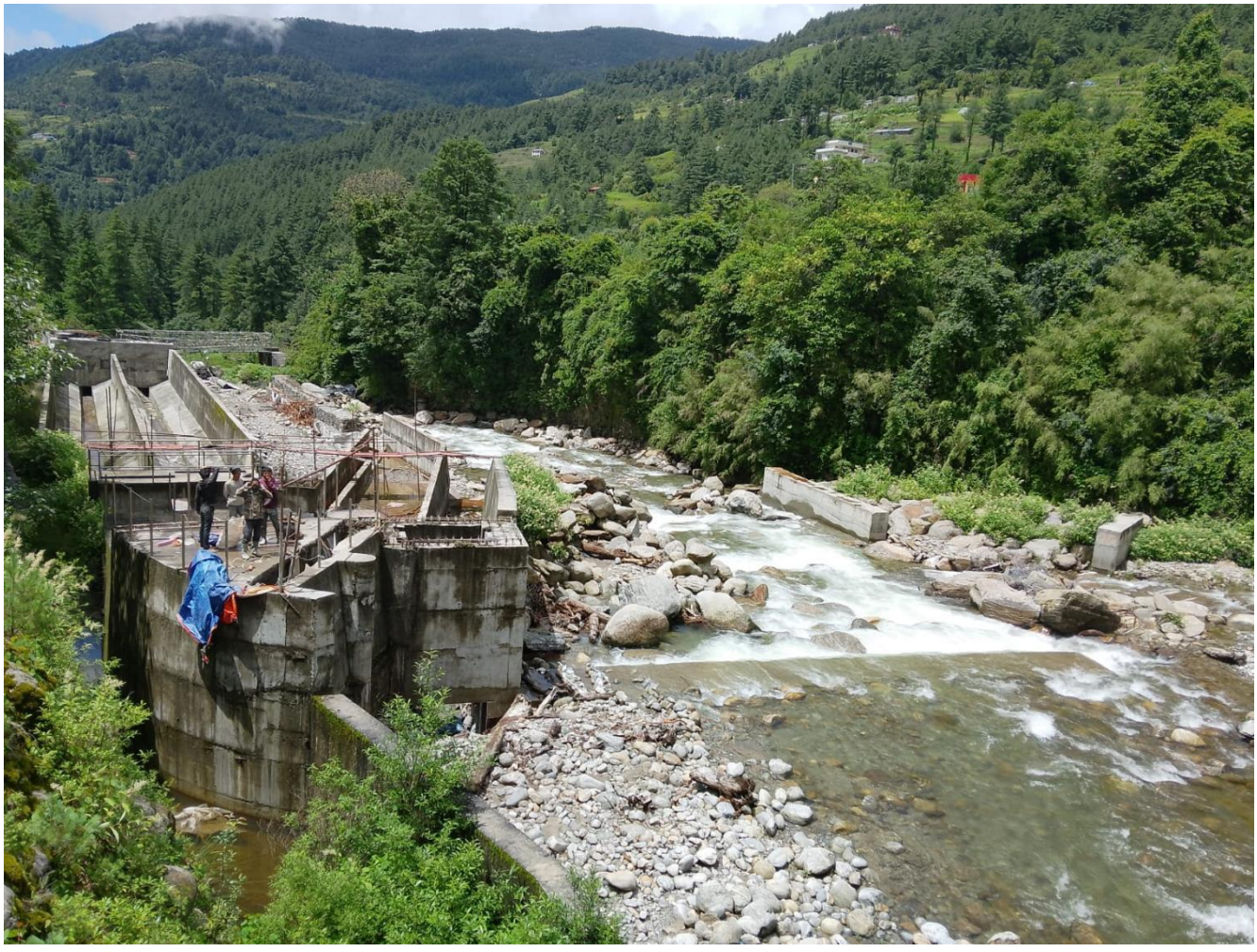


Figure 1:A view of headworks, showing weir, intake, gravel trap, settling basin, Viewing D/S.

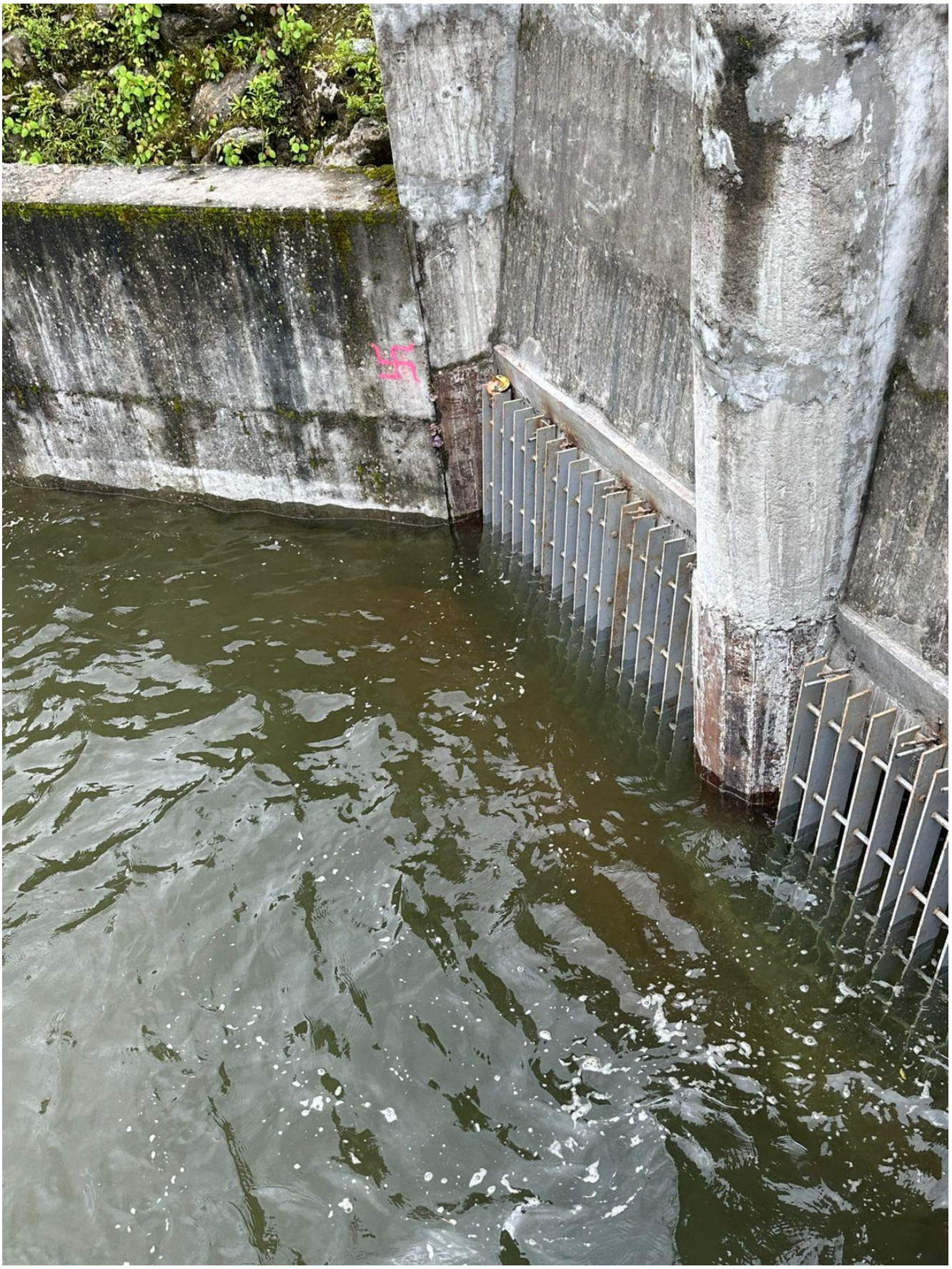


Figure 2:A view of Intake, during water filling.

4.2.2 Water Way

4.2.2.1 Headrace Pipe Alignment

As per the design, there are 36 numbers of anchor blocks excluding the Tee bend, 170 saddle supports, 2 road crossings, and 10 Kholsi crossings along the headrace pipe alignment. However, one anchor block, name 36' of size 3*2.5*3 (L*B*H) has been added as per the site requirement. Out of these numbers, all the anchor blocks, saddle supports, road crossings and all the Kholsi crossing have been fully completed including pipe installation along with backfilling. Firther, 146 numbers of saddle supports and 24 nos of Stone masonry pipe support structure have been fully completed along the headrace pipe alignment.

Furthermore, 860 m backfilling work at buried stretches along headrace pipe alignment in different locations up to chainage 2+995 and 120 m surge pipe alignment has also been completed.

Overall, 100% work progress has been achieved at the headrace pipe alignment.

4.2.2.2 Surge Tank/Surge Pipe

As per the design the surge pipe alignment is about 120 m which is supported by two anchor blocks (37 and 38). All the work along the surge pipe alignment has been completed along with foundation excavation, pipe installation, concrete work and backfilling.

It has been observed that 100 percentage of civil work have been completed.

4.2.2.3 Penstock Alignment

As per the design there are 7 anchor block including Tee and bifurcation, 2 road crossing and 35 saddle support along penstock alignment. Out of which, all the anchor blocks, saddle supports, road crossing has been completed along with the installation of pipe.

It has been observed that about 100% work progress have been achieved along penstock pipe alignment.

Figure 3: View of penstock after completion of erection, viewing U/S from Wyee Block.

4.2.3 Powerhouse, Control room and Tailrace

The civil structure of powerhouse structure, including concrete, door window and the CGI partition wall has been fully completed along with the installation of embedded machine parts.

Moreover, the civil construction of control building and powerhouse switchyard has been fully completed.

Overall, it is observed that 100 percentage physical work progress have been achieved in powerhouse area.

Figure 4: General view of Powerhouse along with control building and switchyard.

4.3 HM, EM & TL Works

4.3.1 HM Works

As per the design there is (2995+120+472) 3587 m of headrace pipe, surge pipe and penstock pipe upto powerhouse. All the pipes including branch after wyee block have been completed, along with Dye penetration test and ultrasonic test in the welded joints. However, painting on the pipe is still not completed.

Further, Fabrication and transportation of gates, stoplogs, expansion joints has been done after re-designing as per the site. At this stage only minimum required gates for plant operation has been installed at site and the rest full phase erection of the gate/stoplog frame and gate panel will be done parallely along with the plant operation.

In summary, about 99% of the HM works have been successfully completed to date.

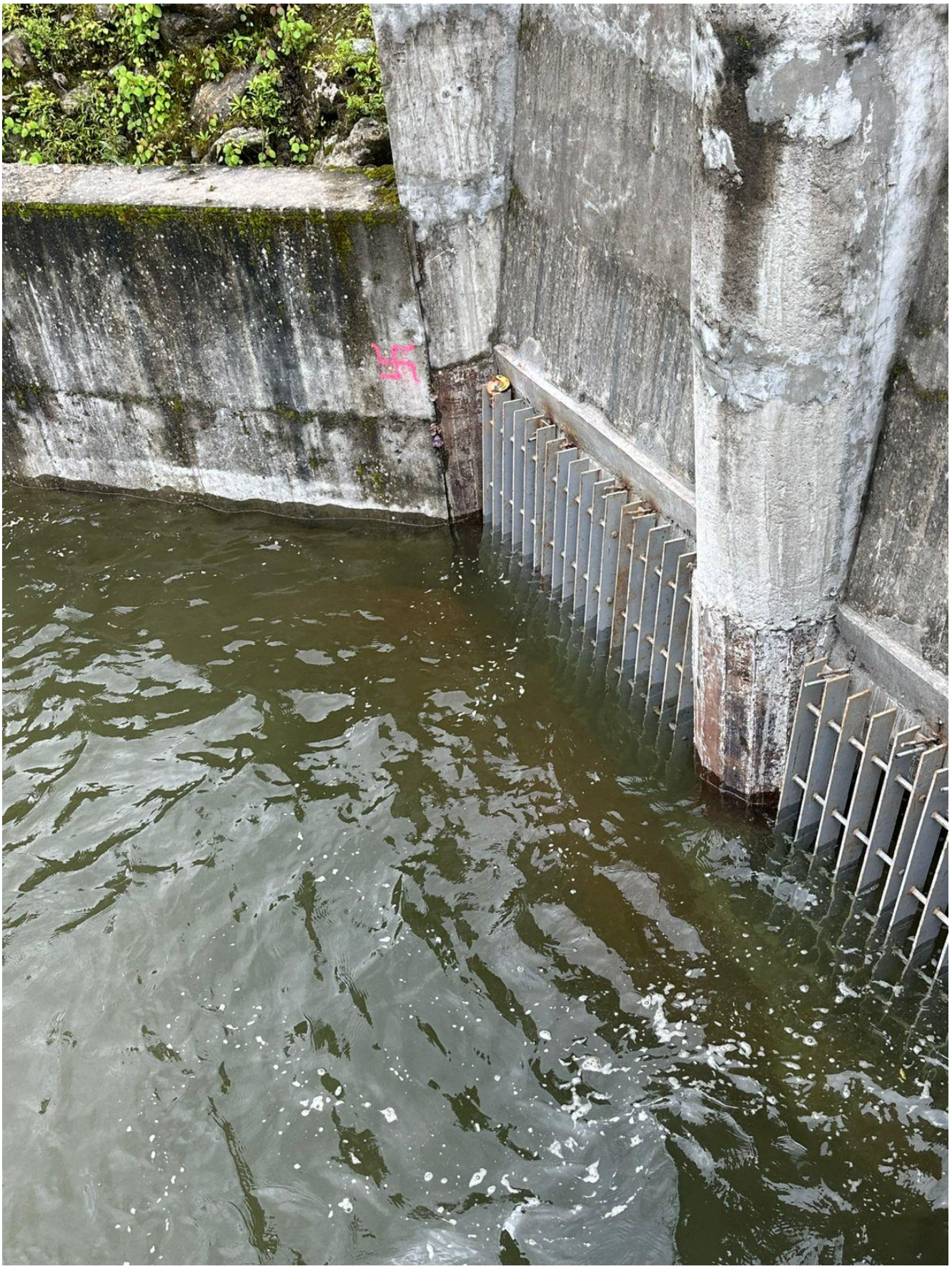


Figure 5:HM work progress ongoing Gravel flushing Gate frame installation work at site.

4.3.2 EM Works

Erection of all Electromechanical (EM) equipment have been successfully completed inside powerhouse and control room. Pre commissioning work in presence of Developer's, Contractor's and Sub-contractor's representative has also been completed. Overall, 100% progress of EM works have been completed till date.

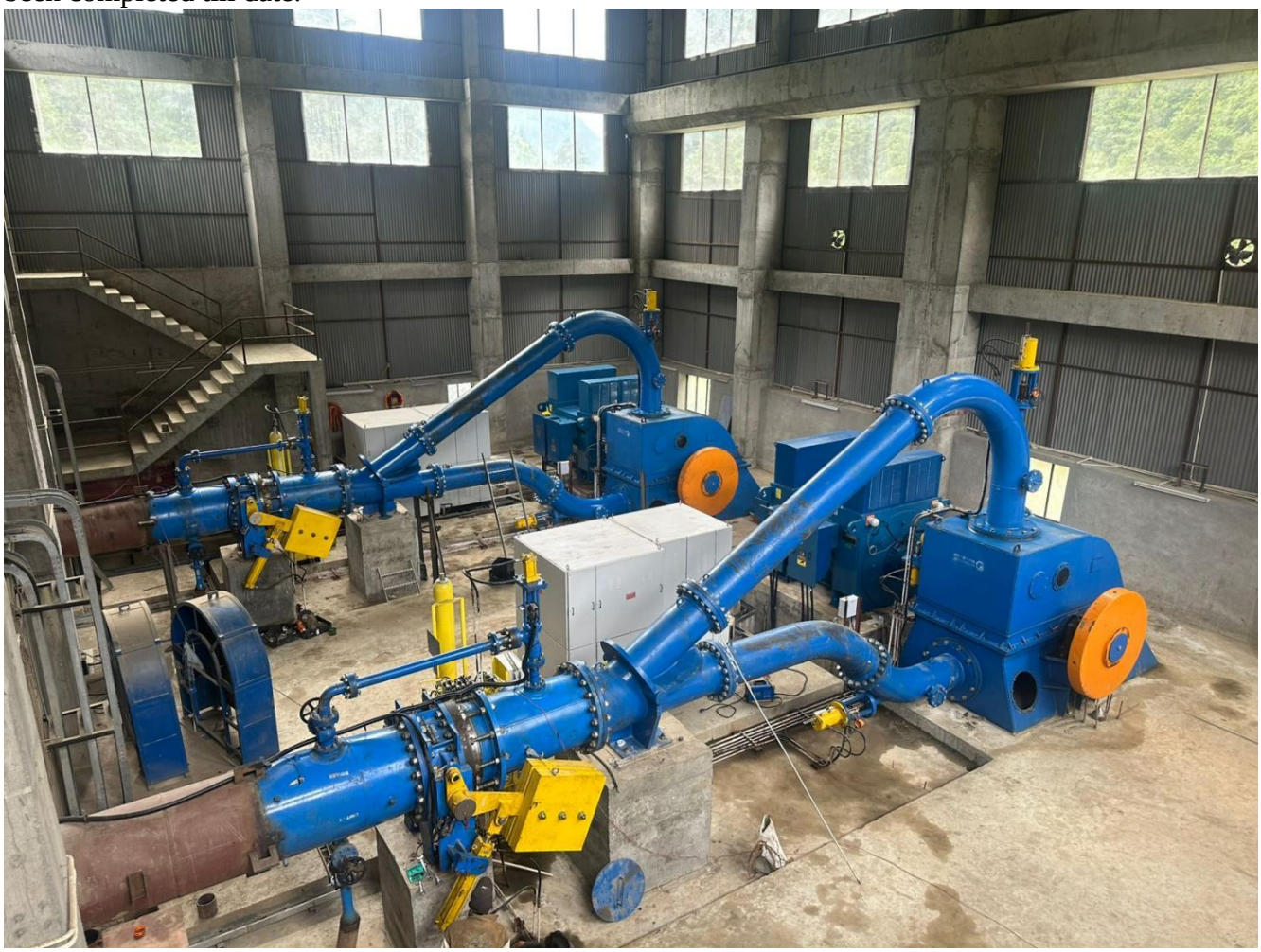


Figure 6:Completion of all erection activities of EM equipment inside powerhouse.

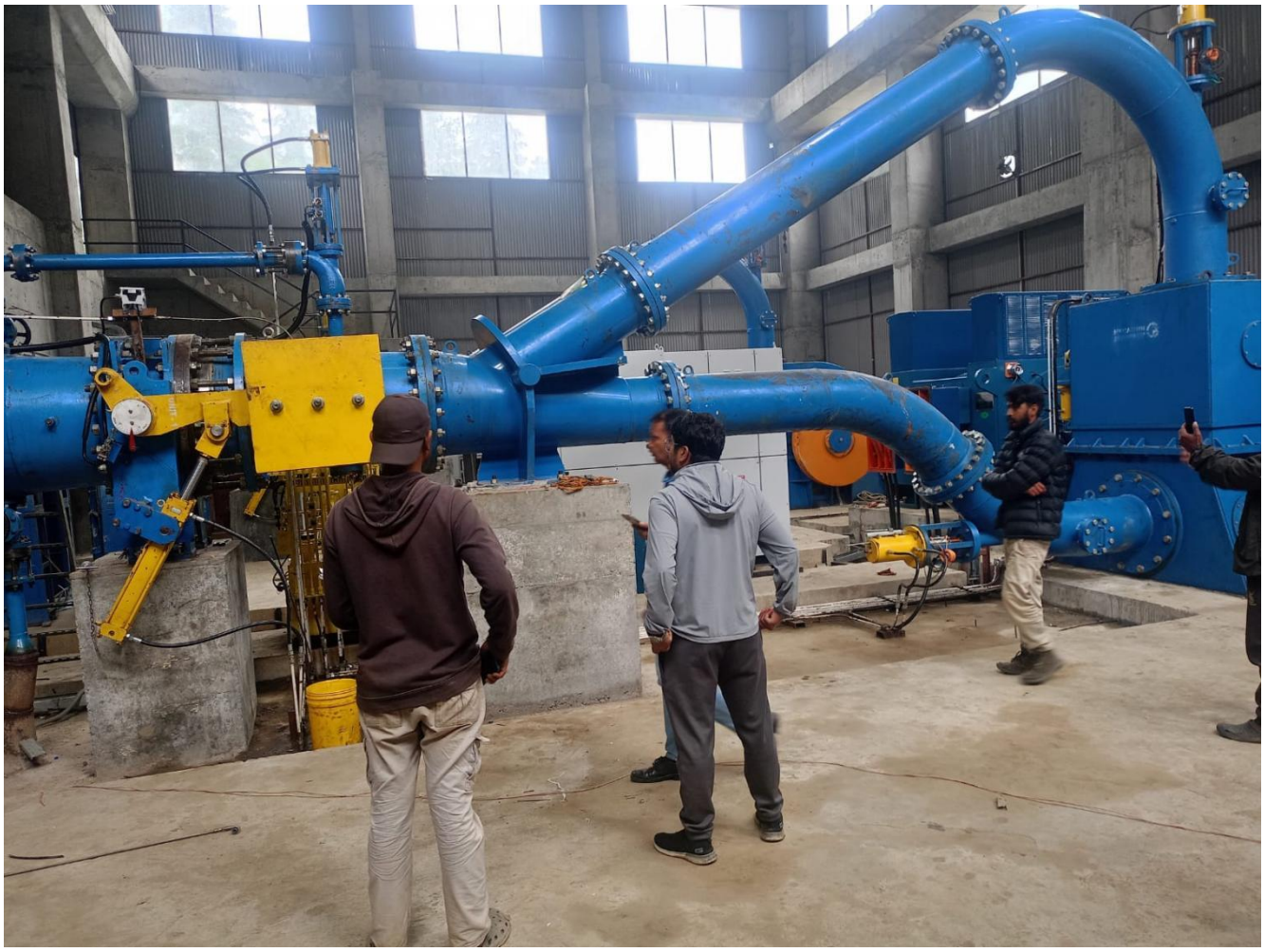


Figure 7:Photo captured during the testing of the Project.

4.3.3 Switchyard Connection Bay and TL Works

Construction of the powerhouse switchyard and the pole erection with arm channel and conductor straining of about 6 km long, 33 kV single circuit TL work is completed. Now the testing work is going on .

Similarly, the construction of about 12 km long 132 kV single circuit transmission line from the switchyard of USHP (18 MW) to NEA's Tingla substation has been completed and is under operation. The 12 km long 132 kV TL as mentioned above has been constructed by sharing the cost based on project capacity among three neighboring projects, Junbesi Khola Hydropower Project (5.2 MW), Upper Solu Hydropower Project (18 MW) and Middle Solu Hydropower Project (9 MW) which was led by USHP.

Moreover, the connection bay of the JKHP at the USHP switchyard is proposed along the left bank of Dudh Kunda River, about 300 m U/S side of the USHP switchyard. All the TL equipment for the connection switchyard have been successful installed. Moreover, the 300m long 132 kV TL from connecting bay to Beni Substation hs also been completed with pole erection, channel fitting and conductor straining.

For the connection of the conductor at Beni hydropower's switchyard, shutdown of Beni hydropower plant is necessary and the same process is going on.

Overall, about 100 % TL work has been completed till date.

Figure 8: Completed Interconnecting switchyard at 300 m U/S from Beni Powerhouse.

Figure 9: Interconnecting switchyard ready for Charging.

4.4 Overall Project Status

Table 2: Overall status of the Project in comparison with Contract BoQ and BoQ-Revision 03.

S.N.	Project Components	Progress Till Date
1	**Civil Works**	**99%**
1.1	***Headworks***	***95%***
1.1.1	Diversion Weir	60%
1.1.2	Undersluice	100%
1.1.3	Intake and Gravel Trap	100%
1.1.4	Approach Culvert	100%
1.1.5	Spillway/ Spillway Channel	100%
1.1.6	Gravel Flushing Culvert	100%
1.1.7	Settling Basin and Sediment Flushing	100%
1.2	***Headrace Pipe Alignment***	***100%***
1.3	***Surge Pipe Alignment***	***100%***
1.4	***Penstock Pipe Alignment***	***100%***
1.5	***Powerhouse and Tailrace***	***100%***
1.5.1	Control Room	100%
1.1.6	Switchyard	100%
1.6	***Menjum Diversion***	**-**
2	**Hydro-Mechanical Works**	**99 %**
2.1	Manufacturing Supply and Delivery	99%
2.2	Pipe Procurement	100%
2.3	Pipes Supply and Delivery	100%
2.4	Installation and Testing	100%
3	**Electro-Mechanical Works**	**99%**
3.1	Design/ Drawing and Manufacturing	100%

S.N.	Project Components	Progress Till Date
3.2	Supply and Delivery at Site	100%
3.3	Installation and Testing	100%
3.4	Installation of Switchyard Equipment	100%
4	**Transmission Line Works**	100%
4.1	33 kV	100%
4.2	132 kV Tower from Beni to Tingla	100%
4.3	132 kV pole	100%
5	**Connection Bay Works**	**-**
5.1	Transportation of Equipment	100%
5.2	Construction Activities	100%
5.3	Installation of Switching Equipment	100%
6	**Permanent Camps/ Office/ Quarters**	10%
	Overall Physical Progress	**99.9%**

About 99.9 % physical work progress have been achieved till date.

5 SITE VISIT

A team from the Developer head office has visited the site during this working month of Magh 2082.

6 CONCLUSIONS

- Construction of all the Civil, HM, EM, TL work has been fully completed at site.
- Testing work is ongoing at site.
- The project has achieved over 99.99% based on overall physical progress.
- The COD of the project is set on 30th Chaitra, 2082.