MABILUNG ENERGY LIMITED

UPPER PILUWA KHOLA -3 HYDROELECTRIC PROJECT (4.95 MW)

Sankhuwasabha, Nepal

Progress Report For The Month Of Magh - 2081

Date: 15th Falgun, 2081

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 up to the month of Magh, 2081. 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 36 months. The total financial cost of the Project on the basis of rates as of January 2020 is estimated to be 937.37 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 Access Road

i. Access road is constructed to Headworks, alignment, surge tank and powerhouse.

3.1.2 Headworks

i. Construction of Headworks (Intake, Undersluice, Weir) Completed.
ii. Finishing and final protection work at headworks is on progress.
iii. Excavation for Sikhuwa headworks is completed.
iv. Water Filling and testing has started.

3.1.3 Gravel trap, Desander and fore bay

i. Construction of Gravel trap is concreted
ii. Water Filling and testing has started.

3.1.4 Waterway Alignment (Headrace)

i. Trench excavation, pipe installation, anchor block construction, backfilling and protection of 1250m out of 1400m headrace alignment is completed.
ii. Construction of Sikhuwa crossing (Syphon)and protection work completed.
iii. River protection work below sikhuwa is on progress.
iv. Protection work downstream of sikhuwa landslide is on progress.

3.1.5 Waterway Alignment (Penstock)

i. Excavation of Penstock Alignment is completed.
ii. Excavation, soling and PCC work for Lakhuwa crossing (syphon) is completed.
iii. Trench excavation, pipe installation, anchor block construction, backfilling and protection of 150 m out of 400m Penstock alignment is completed.
iv. Construction of Bifurcation and 5 Anchor Block out of 7 is completed.
v. Construction of saddle support is on progress.

3.1.6 Surge Tank

i. Excavation for surge tank foundation is completed.
ii. Construction of surge-tank civil structure is completed.

3.1.7 Power House (PH, Switchyard and Tail race)

i. Excavation for powerhouse, switchyard and tailrace is completed.
ii. Construction of Machine Bay Control room and Service Bay is completed.
iii. Block masonry work, Roofing, plastering work of powerhouse completed.
iv. Landscaping work around powerhouse hill side is completed.
v. Protection work at powerhouse river side is on progress.
vi. Construction of Transformer foundation and outgoing gantry for ODY of switchyard completed.

3.2 Hydro mechanical works

3.2.1 Gate and accessories

i. Installation of all gate frame is completed.
ii. Delivery of all gate leaves are accomplished.
iii. Installation of Bifurcation completed.
iv. Erection of all gate is completed
v. Installation of Hoisting system is on progress.
vi. Installation of course trash rack is completed.

3.2.2 Headrace alignment

i. Installation of 1250m of total 1400m is completed.
ii. Installation of 24 bends out of 28 is completed.
iii. Installation of bell-mouth is completed.

3.2.3 Penstock alignment

i. Installation of 200m out of 400m pipe is completed.
ii. Installation of 5 bends out of 7 and casing for road crossing is completed.

3.2.4 Surge Tank

iii. Installation Orifice, base plate and accessories for surge tank are completed.
iv. Installation of 12m out of 25m steel pipes (riser) for surge tank is completed.

3.3 Electromechanical Works

i. All EM equipment is delivered site.
ii. Erection, testing and commissioning of EoT crane is completed.

iii. Installation of Turbine, Generator, MIV is completed.

3.4 Transmission Line

i. All transmission pole, conductor and accessories are delivered to site.
ii. Contractor is mobilized to install transmission pole and accessories.
iii. Total 400 transmission poles out of 470 are installed at site.
iv. Delivery of ACSR conductor is accomplished.
v. Stringing of 10 km out of 14 km conductor is completed.

3.5 Receiving end substation

i. Casting of footing at receiving end substation bay is completed.
ii. Column casting is completed up to anchor bolt level.
iii. Filling up to concreting level is completed.
iv. Installation of Anchor bolts and angles in foundation for tower has completed.

4 PHOTOGRAPHS

Figure 1: Overall Headworks area.

Figure 2: Weir and undersluice downstream side.

Figure 3: Intake and undersluice.

Figure 4: Gravel Settling basin after completion.

Figure 5: Forebay structure after completion.

Figure 6: Settling basin after Water Filling.

Figure 7: Syphon after final protection.

Figure 8: Pipe Laying works at headrace alignment.

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Figure 10: Surge tank civil works on final stage of completing.

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Figure 13 : Machine Installation work.

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Figure 23: NDT test in pipe welding.

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Figure 25: Gate and hoisting installation work.

Figure 26: Gate installation work.

Figure 27: Water Filling after gate installation.

Figure 28: Trash rack installation at intake.

Figure 29: Transmission line construction.

Figure 30: Transmission line construction.

Figure 31: Permanent camp.

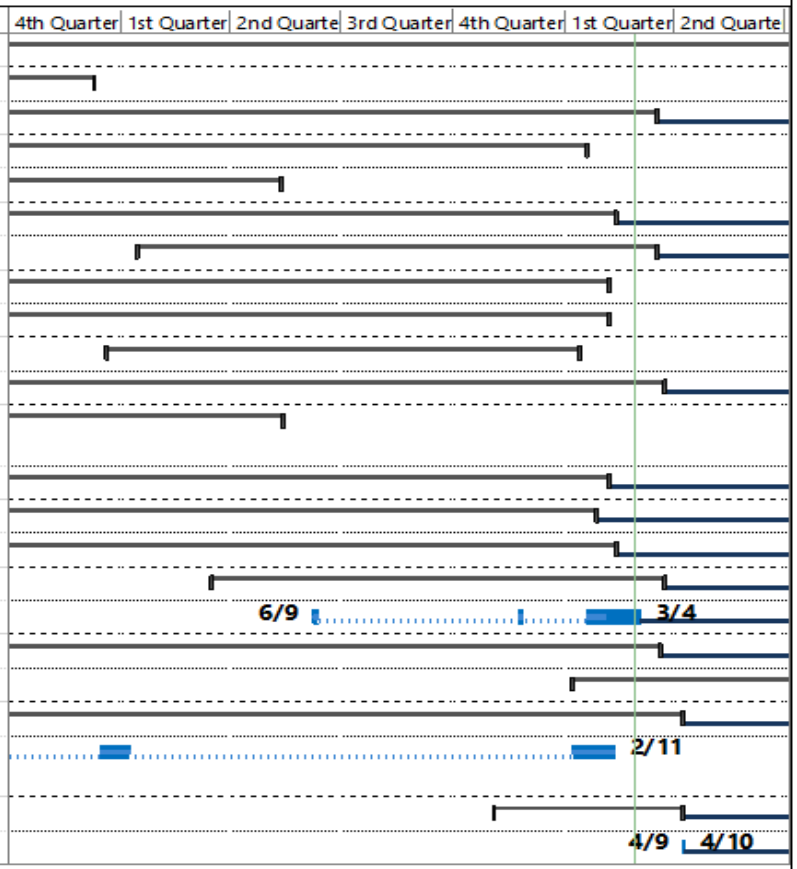
Figure 32: Substation foundation and superstructure installation work.

Figure 33: Site visit of technical consultant along with client team.

PROJECT SCHEDULE

UPPER PILUWA KHOLA 3 HYDROELECTRIC PROJECT (4.95MW)
SANKHUWASABHA, NEPAL
UPDATED PROJECT SCHEDULE

ID	Task Name	% Complete	Duration	Start	Finish
0	**UPK3HEP Project**	93%	1797.9 days	Mon 2/22/21	Fri 4/16/27
1	Infrastructures	100%	718 days	Tue 8/31/21	Mon 12/11/23
6	**Civil Works**	98%	1255.4 days	Mon 2/22/21	Wed 3/19/25
7	**Headworks Construction**	**100%**	**965.6 days**	**Fri 1/28/22**	**Mon 1/20/25**
142	**Settling Basin (Desander)**	100%	738.8 days	Fri 2/18/22	Mon 5/13/24
187	**Headrace alignment**	95%	988.75 days	Sun 1/23/22	Thu 2/13/25
194	**Penstock Alignment**	88%	366.5 days	Tue 1/16/24	Wed 3/19/25
200	**Powerhouse**	100%	1227.9 days	Mon 2/22/21	Fri 2/7/25
201	Civil Works	100%	1227.9 days	Mon 2/22/21	Fri 2/7/25
235	**Surge Tank**	**100%**	**346 days**	**Fri 12/22/23**	**Tue 1/14/25**
239	**Hydromechanical Works**	85%	864.85 days	Fri 6/24/22	Tue 3/25/25
240	**Fabrication, testing and supply of HM equipments**	**100%**	**614.5 days**	**Fri 6/24/22**	**Wed 5/15/24**
245	Headworks	81%	663 days	Sun 2/26/23	Fri 2/7/25
252	Settling Basin	84%	593 days	Sat 4/29/23	Tue 1/28/25
257	Headrace Pipe Installation	90%	667.2 days	Sun 2/26/23	Fri 2/14/25
263	Penstock Pipe Installation	66%	309.55 days	Sun 3/17/24	Tue 3/25/25
269	Surge Tank	50%	40 days	Sun 6/9/24	Tue 3/4/25
270	**Transmission line construction**	86%	1015 days	Sun 1/23/22	Fri 3/21/25
274	**Interconnection work at NEA Substatio**	**83%**	**592 days**	**Thu 1/9/25**	**Fri 4/16/27**
277	**Electro-Mechanical Works**	83%	1044.5 days	Tue 1/4/22	Wed 4/9/25
278	Fabrication, testing , Inspection and delivery of EM Equipments	100%	240 days	Tue 1/4/22	Tue 2/11/25
279	**Installation work**	**38%**	**111.5 days**	**Tue 11/5/24**	**Wed 4/9/25**
285	**COD**	0%	1 day	Wed 4/9/25	Thu 4/10/25



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