# SYARPU SMALL HYDROPOWER PROJECT

# (3.3 MW)

# Bafikot-03, West Rukum

# **PROGRESS REPORT**



# FEBRUARY 2080 Submitted by

# UNITS ENGINEERING CONSULTANCY PVT. LTD.

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## **1.0 PROJECT OVERVIEW & INSTITUTIONAL ARRANGEMENT**

This monthly progress report covers a progress status of the project and work accomplished upto February 31<sup>st</sup>, 2024. It represents all the key information of the project activities that have been implemented so far in the project. In order to ensure the project was achieving its intended goals and objectives, the interventions were carried out with their corresponding outputs and indicators in this report.

Syarpu small Hydropower Project is a run-of-river project located in Bafikot-3 of west Rukum district and utilizes the water from Darne Khola or Syarpu Daha lake, the project has an installed capacity of 3.3 MW. The project comprises diversion weir with Tyrolean intake arrangements followed by settling basin, headrace pressure pipe, followed by penstock pipe and powerhouse, tailrace canal and switchyards. The generated power will be connected to 33 kV/11kV Musikot Sub-station. The company has to construct 6 km long 33 kV transmission lines from powerhouse to the Musikot substation in West Rukum district.

The project's Headworks site is accessible from Bafikot, lies about 6 km north of Musikot City, the major city in the west Rukum district. Geographically, the project is located between latitude 28°40'10" N to 28°41'25" N and longitude 82°28'24" E to 82°29'25" E.

#### Institutional arrangement

- > The Employer/Owner: Syarpu Power Company Ltd. (SPCL)
- > The Engineer/Consultant: Units Engineering Consultancy Pvt. Ltd. (UECPL)
- > The Contractor (Civil Construction): Sakura Power Sakura Builders JV
- > The Contractor (Hydro-Mechanical): Sakura Power Sakura Builders JV.
- > The Contractor (Generating Equipment): Troyer AG
- > The Contractor (Transmission line): Not finalized



Figure: Project Location Map

Source River:DescriptionSource River:Darne/SyarpuVDC:Bafikot Rural Metropolitan City (Rukum)District:West RukumZone:KarnaliDevelopment Region:WesternLocation of the Project $28^{\circ}$ 40' 10" to $28^{\circ}$ 41' 25" N $82^{\circ}$ 28' 24" to $82^{\circ}$ 29' 25" E2. Power Development:28^{\circ} 40' 10" to $28^{\circ}$ 41' 25" N $82^{\circ}$ 28' 24" to $82^{\circ}$ 29' 25" EType of Power Generation:Run-of-RiverTurbine Discharge:1.4 m <sup>3</sup> /secTotal Gross Head:280.2 mRated Net Head:269.27 mInstalled Capacity:3.3 MW3. Average Annual Energy:Total Energy:18.51 GWhDry Energy:14.13 GWhWet Energy:1.40 m <sup>3</sup> /secDesign Discharge:0.16 m <sup>3</sup> /secDesign Discharge:0.16 m <sup>3</sup> /secDesign Flood Discharge:1.42 m <sup>3</sup> /secG. Intake Structure::Type:Orifice Side IntakeNo. of Opening:2Crest Level:1211 maslWidth x High:1.7 m x 0.8 m (each)8. Approach Canal:5 m x 3.45 mType:6 mSize (B x D):5 m x 3.45 m9. Settling Basin::Type:Conventional, Single BaySize of Chamber (L x B x H)::<	1. General		I Hydropower Project (3.3MW)
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VDC:(Rukum)District:West RukumZone:KarnaliDevelopment Region:WesternLocation of the Project $\frac{28^{\circ} 40' 10" to 28^{\circ} 41' 25" N}{82^{\circ} 28' 28' 24" to 82^{\circ} 29' 25" E}$ <b>2. Power Development</b> :Run-of-RiverType of Power Generation:Run-of-RiverTurbine Discharge: $1.4 m^3/sec$ Total Gross Head: $280.2 m$ Rated Net Head: $269.27 m$ Installed Capacity: $3.3 MW$ <b>3. Average Annual Energy</b> : $18.51 GWh$ Dry Energy: $4.18 GWh$ Wet Energy: $14.33 GWh$ <b>4. Hydrology and Meteorology</b> : $1.40 m^3/sec$ Riparian Release: $0.16 m^3/sec$ Design Discharge (at 55% POE): $1.40 m^3/sec$ Riparian Release: $0.16 m^3/sec$ Design Flood Discharge: $1.42 m^3/sec$ <b>6. Intake Structure</b> :1211 maslWidth x High: $1.7 m x 0.8 m (each)$ <b>8. Approach Canal</b> ::Type:Box CanalLength:5 m x 3.45 m <b>9. Settling Basin</b> :Type:Conventional, Single BaySize of Chamber (L x B x H): $22 m x 4 m x 3.5 m$ Particle Size to be Removed: $\ge 0.2 mm$	Source River	:	Darne/Syarpu
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4. Hydrology and MeteorologyImage: Simple schargeImage: Simpl	Dry Energy	:	4.18 GWh
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Riparian Release: $0.16 \text{ m}^3/\text{sec}$ Design Flood Discharge: $1.42 \text{ m}^3/\text{sec}$ <b>6. Intake Structure</b> : $1.42 \text{ m}^3/\text{sec}$ Type:Orifice Side IntakeNo. of Opening:2Crest Level: $1211 \text{ masl}$ Width x High: $1.7 \text{ m x } 0.8 \text{ m } (\text{each})$ <b>8. Approach Canal</b> :Box CanalType:Box CanalLength: $5 \text{ m x } 3.45 \text{ m}$ <b>9. Settling Basin</b> :Conventional, Single BaySize of Chamber (L x B x H): $22 \text{ m x } 4 \text{ m x } 3.5 \text{ m}$ Particle Size to be Removed: $\geq 0.2 \text{ mm}$	Mean Annual Discharge	:	3.36 m <sup>3</sup> /sec
Design Flood Discharge: $1.42 \text{ m}^3/\text{sec}$ 6. Intake Structure::Type:Orifice Side IntakeNo. of Opening:2Crest Level:1211 maslWidth x High: $1.7 \text{ m x } 0.8 \text{ m (each)}$ 8. Approach Canal:.Type:Box CanalLength:6 mSize (B x D):5 m x 3.45 m9. Settling Basin:Conventional, Single BaySize of Chamber (L x B x H):22 m x 4 m x 3.5 mParticle Size to be Removed: $\ge 0.2 \text{ mm}$	Design Discharge (at 55% POE)	:	1.40 m <sup>3</sup> /sec
6. Intake StructureImage: Construct of the structureType:Orifice Side IntakeNo. of Opening:2Crest Level:1211 maslWidth x High:1.7 m x 0.8 m (each)8. Approach CanalImage: Construction of the structureType:Box CanalLength:6 mSize (B x D):5 m x 3.45 m9. Settling BasinImage: Conventional, Single BayType:Conventional, Single BaySize of Chamber (L x B x H):22 m x 4 m x 3.5 mParticle Size to be Removed: $\ge 0.2 mm$	Riparian Release	:	0.16 m <sup>3</sup> /sec
Type:Orifice Side IntakeNo. of Opening:2Crest Level:1211 maslWidth x High:1.7 m x 0.8 m (each)8. Approach Canal.Type:Box CanalLength:6 mSize (B x D):5 m x 3.45 m9. Settling Basin.Type:Conventional, Single BaySize of Chamber (L x B x H):22 m x 4 m x 3.5 mParticle Size to be Removed: $\ge 0.2$ mm	Design Flood Discharge	:	1.42 m <sup>3</sup> /sec
No. of Opening:2Crest Level:1211 maslWidth x High:1.7 m x 0.8 m (each) <b>8. Approach Canal</b> :1.7 m x 0.8 m (each)Type:Box CanalLength:6 mSize (B x D):5 m x 3.45 m <b>9. Settling Basin</b> :Type:Conventional, Single BaySize of Chamber (L x B x H):22 m x 4 m x 3.5 mParticle Size to be Removed: $\geq 0.2$ mm	6. Intake Structure		
Crest Level:1211 maslWidth x High: $1.7 \text{ m x } 0.8 \text{ m } (\text{each})$ <b>8. Approach Canal</b> : $1.7 \text{ m x } 0.8 \text{ m } (\text{each})$ Type:Box CanalLength:6 mSize (B x D): $5 \text{ m x } 3.45 \text{ m}$ <b>9. Settling Basin</b> :Conventional, Single BayType:Conventional, Single BaySize of Chamber (L x B x H): $22 \text{ m x } 4 \text{ m x } 3.5 \text{ m}$ Particle Size to be Removed: $\ge 0.2 \text{ mm}$	Туре	:	Orifice Side Intake
Width x High: $1.7 \text{ m x } 0.8 \text{ m (each)}$ 8. Approach Canal:Box CanalType: $Box Canal$ Length: $6 \text{ m}$ Size (B x D): $5 \text{ m x } 3.45 \text{ m}$ 9. Settling Basin:TypeType:Conventional, Single BaySize of Chamber (L x B x H): $22 \text{ m x } 4 \text{ m x } 3.5 \text{ m}$ Particle Size to be Removed: $\geq 0.2 \text{ mm}$	No. of Opening	:	2
8. Approach CanalImage: Second stateType:Box CanalLength:6 mSize (B x D):5 m x 3.45 m9. Settling BasinImage: Second stateType:Conventional, Single BaySize of Chamber (L x B x H):22 m x 4 m x 3.5 mParticle Size to be Removed: $\ge 0.2$ mm	Crest Level	:	1211 masl
Type:Box CanalLength: $6 \text{ m}$ Size (B x D): $5 \text{ m x 3.45 m}$ <b>9. Settling Basin</b> :Type:Conventional, Single BaySize of Chamber (L x B x H): $22 \text{ m x 4 m x 3.5 m}$ Particle Size to be Removed: $\ge 0.2 \text{ mm}$	Width x High	:	1.7 m x 0.8 m (each)
Image: Length: $6 \text{ m}$ Size (B x D): $5 \text{ m x } 3.45 \text{ m}$ <b>9. Settling Basin</b> ::Type:Conventional, Single BaySize of Chamber (L x B x H): $22 \text{ m x } 4 \text{ m x } 3.5 \text{ m}$ Particle Size to be Removed: $\ge 0.2 \text{ mm}$	8. Approach Canal		
Length: $6 \text{ m}$ Size (B x D): $5 \text{ m x } 3.45 \text{ m}$ <b>9. Settling Basin</b> ::Type:Conventional, Single BaySize of Chamber (L x B x H): $22 \text{ m x } 4 \text{ m x } 3.5 \text{ m}$ Particle Size to be Removed: $\ge 0.2 \text{ mm}$	Туре	:	Box Canal
9. Settling Basin:Type:Size of Chamber (L x B x H):Particle Size to be Removed: $\geq 0.2 \text{ mm}$		:	6 m
Type:Conventional, Single BaySize of Chamber (L x B x H): $22 \text{ m x 4 m x 3.5 m}$ Particle Size to be Removed: $\ge 0.2 \text{ mm}$	Size (B x D)	:	5 m x 3.45 m
Size of Chamber (L x B x H): $22 m x 4 m x 3.5 m$ Particle Size to be Removed: $\ge 0.2 mm$	9. Settling Basin		
Particle Size to be Removed: $\geq 0.2 \text{ mm}$	Туре	:	Conventional, Single Bay
	Size of Chamber (L x B x H)	:	22 m x 4 m x 3.5 m
No. of Flushing Channel : 1	Particle Size to be Removed	:	≥ 0.2 mm
	No. of Flushing Channel	:	1

# Salient Features of Syarpu small Hydropower Project (3.3MW)

Trapping Efficiency	:	90%
10. Headrace Pipe/Penstock pipe		
<u> </u>		
Туре	:	Pressurized MS Circular
Size	:	0.9 m, 0.8 m
Length	:	1921.66m
Thickness	:	6mm to 14 mm
12. Powerhouse		
Туре	:	Surface
Size (L x B)	:	22.95 m x 13.6 m
Number of Units	:	2
<b>13. Type of Turbine</b>	:	Horizontal Pelton
Rated Capacity	:	2 x 1.685 MW
Turbine Axis Level	:	931.50 masl
Efficiency	:	91.00 %
14. Tailrace Canal		
Туре	:	RCC Rectangular
Size (B x D)	:	1.50 m x 0.95 m
Length	:	55 m
Tailrace water Level	:	929.60 masl
15. Generator		
Туре	:	Brushless, synchronous, 3 phase
Specification	:	1905 kVA, 6.6 kV, 50 Hz x 2 Nos.
16. Transmission Line		
Specification	:	33 KV single circuit line to Musikot Sub-station or Loop in Loop out to NEA transmission line.
Length	:	6 km
17. Financial Indicators	:	
Total cost of Project	:	NPR. 561,042,838.42
Construction Period	:	19 Months
IRR	:	16.26
B/C	:	1.54
Remaining Construction Period	:	19 Months
ROE	:	23.23
NPV	:	260.54 million NRs.

# 2.0 RESOURCES AT SITE 2.1 MANPOWER FROM CLIENT

#### Table: Human Resources of Client

S.N.	Description	Nos.
2	CEO	1
3	Civil Engineer (Site based)	1
4	Finance Manager	1
5	Receptionist	1
6	Driver	1
	Total:	5

## **2.2 MANPOWER FROM CONSULTANT**

#### Table: Human Resources at site from consultant

S.N.	Description	Nos.
1	Resident Engineer	1
2	Civil Engineer	1
3	Mechanical Engineer	1
4	Civil Supervisor	2
5	Cook	1
	Total:	6

# **2.3 MANPOWER FROM CIVIL CONTRACTOR'S**

Table: Manpower from Civil Contractor side

SN.	Description	Nos.
1	Civil Technician	7
	Project Manager	1
	Civil Engineer	2
	Civil Overseer	3
	Supervisor	1
2	Civil Workers	13
	Skilled labor	4
	Unskilled labor	8
	Cook	1
3	Store Incharge	1
4	Accountant	1
5	Mechanical	0
6	Electrician	0
7	Driver	3
	Excavator operator	2

	Tipper Driver	1
8	Helper	3
9	Cook	1
	Others	0
	Total:	29

#### 2.4 MANPOWER FROM HYDRO MECHANICAL CONTRACTOR

Not mobilized yet.

# 2.5 EQUIPMENT MOBILZED BY CIVIL CONTRACTOR

S.N.	Equipment	Nos.	S.N	Equipment Name	Nos.
1	Excavator	2	2	Backhoe	0
3	Dump Truck	1	4	Monkey Jumper	1
5	Diesel Generator	2	6	Water Pump	2
7	Welding Machine	1	8	Concrete Mixture	3
9	Wheel Barrow	10	10	Rod Cutter	2
11	Total Station	1	12	Level Machine	1

Tables Equipment mobilized by Civil Contractor

# 2.5 EQUIPMENT MOBILZED BY HYDROMECHANICAL CONTRACTOR

Not mobilized yet.

# **2.6 CONSTRUCTION MATERIAL STORED BY CIVIL CONTRACTOR AT SITE**

S.N.	Materials	Received	Consumed	In Stock
1	Cement (bag)	990	0	0
2	Sand (m <sup>3</sup> )	32	0	0
3	Aggregate (m <sup>3</sup> )	50	0	0
4	Rebar (ton)	0	0	0
5	Diesel (litres)	3000	600	2400

# Tables Construction material stared by Civil Contract

# **3.0 CIVIL CONSTRUCTION WORK PROGRESS**

#### **3.1 HEADWORKS**

Excavation work in headworks is on progress. About 90% of excavation work is completed. Final Level of 1211.72masl for settling basin is achieved. Component wise detail is as follows.

#### **3.1.1 DIVERSION WEIR**

80% of work of weir is already constructed and remaining is not Started yet.

## **3.1.2 INTAKE & GRAVEL TRAP**

Site clearance and excavation work of intake is completed. Hydraulics structure work has not been started yet.

## **3.1.3 SETTLING BASIN**

Site clearance and excavation work of settling basin is completed. Hydraulics structure work has not been started yet.

#### **3.1.4 HEADPOND WORKS**

Site clearance and excavation work of headpond is completed. Hydraulics structure work has not been started yet.

#### **3.1.5 SPILLWAY WORKS**

Site clearance and excavation work of spillway is completed about 40%. Hydraulics structure work has not been started yet.



During excavation work of settling basin.



Excavation work of Settling basin, Intake.



Excavation work of Spillway.

## 3.2 HEADRACE AND PENSTOCK ALIGNMENT

Civil works on Headrace alignment is in progress. Excavation works, is on-going on Headrace alignment. Component wise detail progress is as follows:

# **3.2.1 EARTHWORK**

The excavation works at headrace alignment is completed for track opening. About 1440m of alignment excavation for track opening is completed. About 40% total excavation of alignment work is completed.



During excavation works for track opening.



During excavation works for track opening.



Excavation works for track opening at AB5.



Excavation works for track opening at AB8.



Excavation works for track opening at AB9.



Excavation works for track opening at AB15.

**3.2.2 ANCHOR BLOCKS** Not started yet.

#### **3.2.3 SADDLE SUPPORTS**

Not started yet.

# **3.3 POWERHOUSE, TAILRACE & PROTECTION WORKS. 3.3.1 POWERHOUSE**

Powerhouse land area acquisition is completed in the presence of NAAPI department employee, local people, client, consultant and contractor. Site Clearance at powerhouse area is completed. Excavation of powerhouse is completed with 929.295 masl for machine foundation. Laying of earthing plate (Earth Mat) is competed in powerhouse section (except service bay and control room).



Powerhouse land area clarifying at presence of local people



During excavation of machine foundation at level 929.295.



During laying of Earth Mat in powerhouse.



During laying of Earth Mat in powerhouse.



# **3.3.2 TAILRACE & PROTECTION WORKS**

Not started yet.

#### **4.0 HYDROMECHANICAL PROGRESS**

Details of Hydromechanical works are pointed out below:

- Joint inspection of pipes at JCO was done between Client, Contractor and Consultant.
- Hydrostatic pressure test, sand blasting as well as prime coating(50µmm) is completed.
- Transportation of pipes from JCO to Nepal Bordar to Bhairahawa is completed(except Fabrication of 16meter pipe is remaining).
- About 291.720MT of ordered pipe 267.596MT of pipe is received at site.



Testing of Pipe in JCO



Hydrostatic pressure testing of Pipe in JCO



During joint inspection carried out by Client, Consultant and Contractor.



Pictures of pipes received at site in the yard



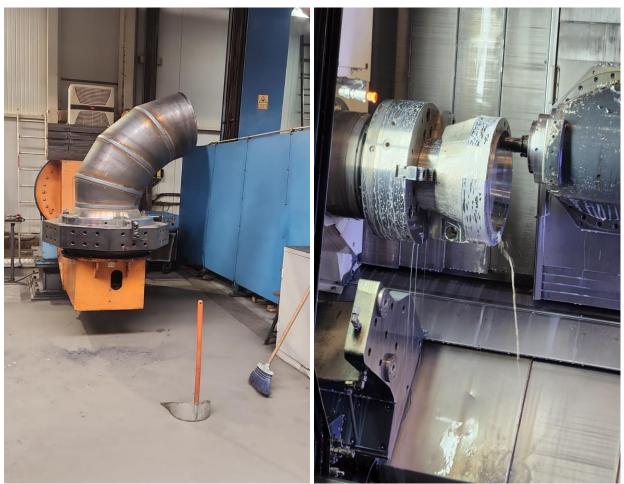
Pictures of pipes in the yard

# **5.0 ELECTROMECHANICAL WORK PROGRESS**

Fabrication of Electromechanical materials has been started as per given letter of notice. Laying of earth plate is ongoing at site.



Fabrication of EM materials



During fabrication of EM materials



During fabrication of EM materials

#### **6.0 TRANSMISSION LINE WORK PROGRESS**

The project has to construct 6 km long 33 kVA transmission line from powerhouse to musikot sub-station. Transmission line design is completed whereas tendering process is ongoing.

#### 7.0 ISSUES & RECOMMENDATION

While implementing project schedule, some issues arise which affected the working schedule and listed below with their recommendation.

- Civil works should start soon with appropriate schedule for commissioning of hydropower. Contractor is instructed formally to add manpower as soon as possible to avoid project delay.
- Transmission line work isn't finalized until now & it's recommended to finalize better option as soon as possible to avoid delay is project commissioning time.

#### **8.0 PROGRESS MONITORING**

In this heading, work schedule and its achievement are compared so that planner has a clear idea about the progress achieved, delayed or expedited. The major components are compared rather than individual items of works.

#### **8.1 UPCOMING MONTH SCHEDULE**

Civil works will primarily focus on Powerhouse & Alignment which are listed below.

- It is planned to complete excavation of AB9-AB11 waterway upto pipe bottom level(PBL).
- Transportation of pipes to site will be completed.
- PCC and rebar works of intake and settling basin will be completed.
- Concreting of saddle support will be carried out.
- Protection works for waterways will be carried out.
- 20nos. of labor will be implemented at site for protection works.

#### ANNEXES



Protection works of access road for extra widening.





During silanyas puja at powerhouse



During silanyas puja at powerhouse

# THE END