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Upper Tamakoshi Hydropower Limited
Upper Tamakoshi Hydroelectric Project

Introduction & Present Status

Lamabagar, Dolakha
Headworks Site of Upper Tamakoshi Hydroelectric Project

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1. INTRODUCTION

1.1 General

Upper Tamakoshi Hydroelectric Project (UTKHEP) is the largest project so far in Nepal under implementation phase. It is the national priority project and its early commissioning is very important in order to cope with the ongoing electricity crisis in Nepal. It is located in Lamabagar VDC of Dolakha District, Janakpur Zone, Central Development Region of Nepal. It is located in the lower region of the Higher Himalayas, in the catchment of the Tamakoshi River. The Tamakoshi River is one of the major tributaries of the Sunkoshi River in the Koshi River Basin. The intake for the hydropower plant is located at Lamabagar Village, which lies at direct distances of about 6 km south of the border with China (Tibet) and 32 km north to northeast of the Dolakha District centre, Charikot.

The Project is a run-of-river hydropower development with limited storage capacity in the intake pond for daily peaking operation. The design discharge of the plant is 66 m^3/s. The plant, which is located in an underground powerhouse within the mountain ridge between Lamabagar and Gongar Khola, will utilise a maximum gross head of 822 m between elevations 1987 masl (Highest Regulated Water Level in the intake pond) and 1165 masl (the Pelton turbine runner elevation). Environmental Impact Assessment (EIA) reports concluded that the Project is an environmentally friendly project with few adverse impacts compared to most other comparable hydropower projects. Environmental Impact Assessment (EIA) reports for both Generation and Transmission Line has been approved by the Government of Nepal (GoN). Similarly, GoN has issued "Generation License for Construction" to the Company in December 06, 2010 for the construction of UTKHEP.

1.2 Establishment of the Company

Nepal Electricity Authority[1] (NEA) has established an autonomous company named 'Upper Tamakoshi Hydropower Limited' (UTKHPL) in March 2007 as an executing agency for the implementation of the Project. There are six full time and two invitee members in the Board of Directors (BoD) at present. Out of six full time members, four members from NEA, one from Employees' Provident Fund [2] (EPF) and one from Nepal Telecom [3] (NTC) are representing in the BoD. Similarly, representatives of Citizen Investment Trust[4] (CIT) and Rastriya Beema Sansthan[5] (RBS) are also in the BoD as invitee members.

The share structure of the Company is presented below:

Share Structure

Institution / Group	Percentage
Nepal Electricity Authority	41%
Nepal Telecom	6%
Citizent Investment Trust	2%
Rastriya Beema Sansthan	2%
General Public	15%
Dolakha Residents	10%
Contributors in EPF	24%
Company & NEA Staffs	
Staffs of debtor institutions (On the basis of debt proportion)	
TOTAL	100%

[1] www.nea.org.np;
[2] www.epfnepal.com.np
[3] www.ntc.net.np
[4] www.nlkosh.org.np
[5] www.beema.com.np

Formation of the BoD is as below:

Chairman - Managing Director, NEA
Member - Representative from EPF
Member ` - Managing Director, NTC
Member - Deputy Managing Director, Finance, NEA
Member - General Manager, Generation Business Group, NEA
Member - General Manager, Engineering Services Business Group, NEA
Invitee Member - Administrator, RBS
Invitee Member - Executive Director, CIT

1.3 Special Features of the Project

The special natural features observed in this project are:

- 300m high natural dam
- good geology in the Tunnel and Powerhouse sites
- Very good minimum flow in the river during dry season, low flood discharge during wet season.
- very low sediment in the Tamakoshi River at the Intake site
- Minimum environmental effect.

1.4 Project Features

The total length of the access road from Charikot is 68 km, which is categorized into three parts as follows:

(i) Charikot - Dolakha Section = 4.5 km
(ii) Dolakha – Singati Section = 35 km
(iii) Singati – Lamabagar Section = 28.5 km

A concrete dam with overflow weir will create an about 2.0 km long daily pondage at Full Supply Level (FSL) of 1985 Elevation (EL.). The intake is located on the right bank and it is integrated as part of the dam structure. Two parallel settling basins each about 225 m long with width of 26m each are provided immediately after intake structure. Headrace tunnel of length 7,900 m starts from the basins and ends at the beginning of the penstock shaft. Penstock including the vertical shaft and horizontal tunnel is about 741m long in total. An underground powerhouse with six pelton turbines is provided at 1165 El. The 2,895 m long tailrace tunnel is designed as free surface flow tunnel. 220 kV Transmission line of 47km long is required from Gongar to Khimti to connect UTKHEP power to Integrated Nepal Power System (INPS) via Khimti. Salient features of the project have been presented below in Page 7.

1.5 Project Cost

The project cost is estimated at NRs.35.29 Billion equivalent to US$441 Million (with exchange rate of 1US$= NRs. 80/-) based on the price level in March 2009. This cost is exclusive of Interest During Construction (IDC). Out of the total project cost, Rs 24.70 Billion will be loan and Rs 10.59 Billion will be equity, making it a 70 percent loan and 30 percent equity.

2. PRESENT STATUS

2.1 Financial Arrangement

The Council of Ministers, Government of Nepal (GoN) has decided to authorize Nepal's public entities namely Employees' Provident Fund (EPF), Nepal Telecom (NTC), Citizen Investment Trust (CIT) and Rastriya Beema Sansthan (RBS) for investing in the project and committed further to invest upto NRs 11.08 Billion in case of short-fall. These arrangements have secured the financial requirement of the Project. Loan agreement has been signed among NEA, EPF and UTKHPL on July 30, 2010 for loan amount of NRs. 10 Billion and debenture amounting to NRs.2 Billion for its Contributors. NTC, RBS and CIT are also share-holder of the Company. Share holder agreement has been signed among NEA, NTC, CIT and RBS on July 26, 2010. Separate loan agreements with CIT and RBS have been signed on December 7, 2010 while with that of NTC will be held very soon. The loan amount committed for the Project are shown below:

Loan Arrangement

Institution	**Amount**
EPF	NRs. 10 Billion
NTC	NRs. 6 Billion
CIT	NRs. 2 Billion
RBS	NRs. 2 Billion
GoN	upto NRs. 11.08 Billion
Total Loan Amount	**NRs. 31.08 Billion**

2.2 Consultancy Services for Construction Supervision

The Contract Agreement has been signed with the international consultant 'Joint Venture Norconsult AS-Lahmeyer International GmbH (JVNL)' for the consultancy services of construction supervision of the Project. The JVNL had carried out the Detailed Engineering Design and prepared Tender Documents of the Project under the previous contract. The consultancy services has commenced since January 2011.

2.3 Construction Contract Packages

The Project Construction has been divided into following four (4) contract packages:

Lot 1: Civil Works

Lot 2: Hydro-mechanical Works

Lot 3: Mechanical and Electrical Works

Lot 4: Transmission Line & Substation Works

A separate contract was made with Contractor 'Himal Hydro and General Construction Ltd.' for the construction of 760 m length of the tunnel out of 1,190 m total length of Main Access Tunnel to Powerhouse Cavern and the Contractor has completed the works under his scope in June 2010. Different contracts are made with different Nepalese contractors for the construction of smaller contract packages of access road, bridges and camp buildings etc. Some contracts are completed and some are ongoing.

2.3.1 Lot 1 - Civil Works

Lot 1-Civil Works comprise all major civil works of the Project including remaining works of the Access Road, but excluding construction of bridges. Contract Agreement was signed with the Contractor 'Sinohydro Corporation Limited' of China for the construction of Lot 1 - Civil Works of the Project on August 1, 2010 after the international competitive bidding. The Contractor has commenced preliminary works in September 2010.

2.3.2 Lot 2- Hydromechanical Works

Lot 2-Hydromechanical Works comprise design, delivery, installation, testing and commissioning of all hydraulic steelworks including all gates, trash racks, trash rack cleaners, crane at dam, equipment at Baise Khola brook intake, bulkheads in construction adits, steel lining in penstock shaft and penstock tunnel, manifold and distribution pipes. Bids for this Lot has already been invited to the prequalified contractors.

2.3.3 Lot 3 - Mechanical and Electrical Works

Lot 3 - Mechanical and Electrical Works comprise design, delivery, installation, testing and commissioning of (i) turbines, governors, inlet valves, main shut-off valve, powerhouse cranes; cooling water system, powerhouse drainage system, powerhouse elevator; and mechanical workshop equipment; and (ii) generators, transformers, 220 kV GIS switchgear, high voltage cables, 11 kV switchgear, low voltage AC supply, DC supply, lighting, and control, protection, monitoring and security systems, 11 kV overhead lines and electrical workshop equipment. Bids for this Lot has already been invited to the prequalified contractors.

2.3.4 Lot 4 -Transmission Line & Substation Works

Lot 4-Transmission Line & Substation Works comprise design, delivery, construction, erection, testing and commissioning of : the 47 km long double circuit 220 kV line from Gongar to Khimti power station; construction of new 220/132 kV Substation at Khimti for termination of both circuit of the line from Gongar and installation of 132kV/220 kV transformer for connection to the 132 kV network at Khimti Hydroelectric Project. Seven international contractors have been prequalified for the execution of this Lot and bids will be invited soon.

2.4 Power Purchase Agreement

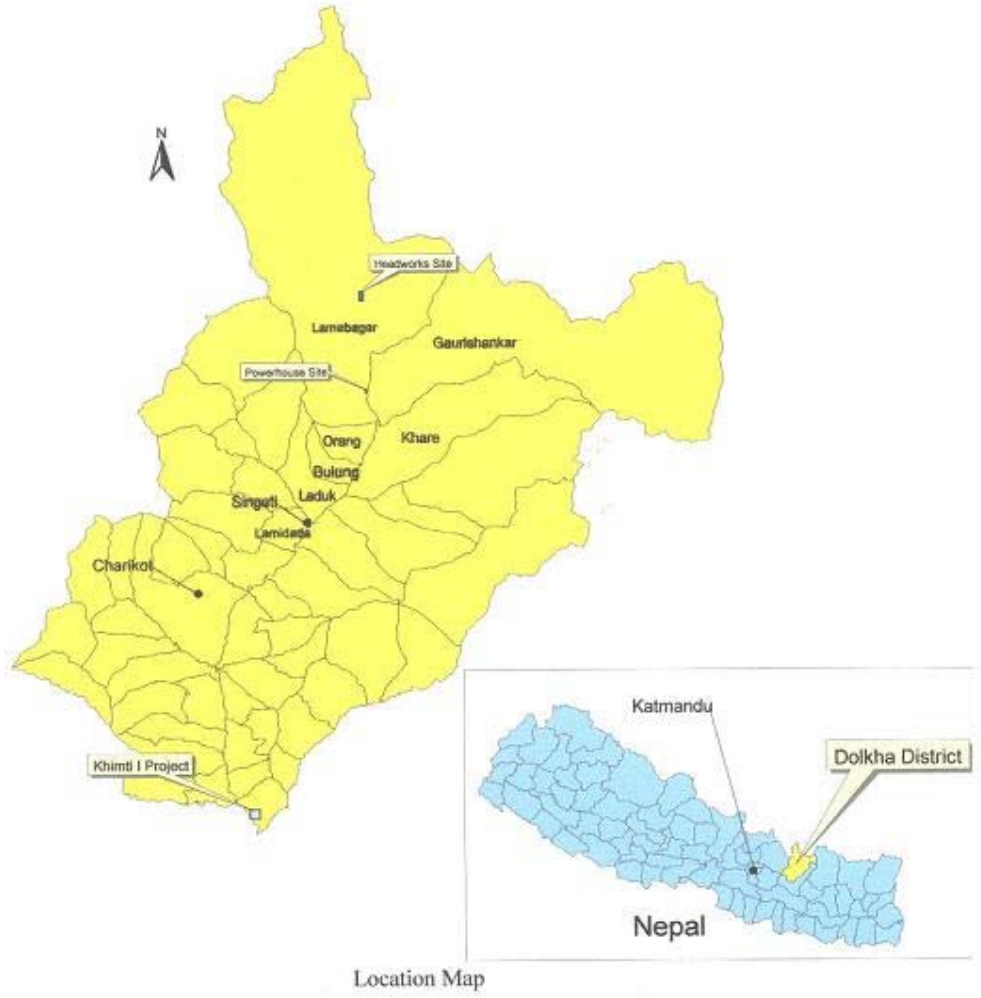
The draft Power Purchase Agreement (PPA) has been signed between NEA and UTKHPL. The final PPA will be signed very soon. As per the PPA draft, NEA will purchase yearly average rate of NRs.3.50 per unit (NRs 3.13 per unit during wet seasons and NRs 6.00 per unit dry seasons) in base year. This average rate will reach up to Rs 5.30 per unit after nine years of commercial operation date, i.e., after 14 years of base year.

3. SALIENT FEATURES OF THE PROJECT

Type of Development	=	Peaking Run-of-River (PRoR)
Location	=	Lamabagar VDC, Dolakha District, Janakpur Zone, Central Development Region
Headworks Location	=	Lamabagar, Lamabagar VDC
Powerhouse Location	=	Gongar Gaon, Lamabagar VDC
Maximum Output	=	456 MW
Annual Energy	=	2,281 GWh
Gross Head	=	822 m
Design Discharge	=	66.0 m^3 /sec
Hydrology		
Catchment Area	=	1,745 km^2
Min. Mean Monthly Flow	=	14.1 m^3/sec.
Mean Annual Flow	=	67.2 m^3/sec.
Design flood $Q_{1,000}$	=	885.0 m^3/sec
Diversion Dam	=	22 m x 60.0 m (H x L)
Live Storage	=	1.2 Million m^3
Settling Basins	=	2 Nos. L=225 m
Headrace Tunnel	=	7.9 km (Cross Sectional Area = 32.14 m^2)
Penstock (Vertical Shaft and Horizontal Tunnel)	=	714.0 m
Power House (Underground)	=	142.0m x 13.0m x 25.0 m (L x B x H)
Number of units	=	6
Tailrace Tunnel	=	2.9 km (Cross Sectional Area = 35.0 m^2)
Access Road from Charikot of Dolakha District	=	68.0 km
Transmission line	=	220 kVA Double Circuit, 47.0 km (Gongar to Khimti Substation)
Construction Cost	=	NRs.35.29 Billion equivalent to US$ 441 Million (Excluding Interest During Construction)
Construction Time Period	=	5 Years

4. PROJECT MAPS

4.1 Location Map



Location Map

4.2 Project Layout Map