River is in final stage. The construction activities shall be started in the beginning of the fiscal year 2073/74.

iv. The various trainings have been conducted in the project area to develop the skills of local people on mechanical & plumbing works. Apart from this, BHP has supported the construction of infrastructures of two school buildings under community support program.

v. A contract agreement has been signed between the BHP and international consultants SMEC- Udaya JV for conducting Detailed Engineering Design & Environmental Study including Social Impact Study of the project and following activities have been completed under this contract.

   a. Submission of Inception Report,
   b. Installation of one automatic weather station and one automatic gauging station at project site,
   c. Preparation of master plan for Geo technical investigation, and
   d. Field survey for preparation of Topographical maps

Salient Features of the Project

Name of Project : Budhi Ganga Hydropower Project
District : Achham
Power House Site: Thapagaon Village (Hatikot VDC Ward No 4) (on Left Bank of River)
Dam Site : Budha Bagar (In between Babla VDC Ward No 3 and Kuskot VDC Ward No 5)
Latitude : 81° 14' 00" E - 81° 17' 50" E
Longitude : 29° 15' 30" N - 29° 18' 35" N
Name of the River: Budhi Ganga River
Type of Scheme : Run-of the River with Daily Pondage (6 hrs Peaking)
Installed Capacity: 20 MW

Accessibility

Nearest Market : Sanfe Bagar, Achham
Power House Site: Near Thanti Bazar of Ghugurkot VDC, approximately 5 km from Sanfe Bagar (Just down side of motorable road)
Dam Site : Near Budha Bagar of Babla VDC, approximately 13 km from Sanfe Bagar (Just down side of motor able road)

Powerhouse

Type : Surface (L = 30 m, W = 14 m, H = 26 m)
Installed Capacity: 20 MW (2 X 10 MW)
Gross Head : 90 m
Net Head : 83.2 m
Type of Turbine : Francis (Vertical Axis)

Hydrology

Design Discharge : 27.63 m^3/sec
95 % Dependable Flow : 7.34 m^3/sec
Compensation Flow : 0.96 m^3/sec

Pondage Reservoir

Storage required for 6 hours peaking 0.236 Million m^3
Minimum Operating Level 712 m
Full Supply Level 717 m
Pondage Fetch from Weir Site 3. 0 km
Pondage Surface Area : 8. 4 ha (0.084 Sq. km) (168 Ropani)

Intake Structure

Number of Intake Opening: 2
Number of Intake Tunnel : 2
Intake Tunnel Length : 57 m
Diameter of Intake Tunnel : 2.5 m

Head Race Tunnel

Type : Circular and Horseshoe
Length : 5.6 km
Diameter
Concrete Lined : 3.9 m
Shortcrete Lined : 5.1 m

Transmission

Voltage : 132 kV
Length of TL : 96 km
Sub-Station : Lamki, Kailali District
TL Route : Sanfe – Mangalsen – Punyapato – Guttu – Kuine – Malchana - Lamki (13 km west from Chisapani Bridge at Karnali between Kohalpur and Attariya)
Alternate Connection : At Dipayal Substation (Attariya–Dipayal 66 kV TL) (High Voltage Drop – 31 %)

Energy Generation

On Peak Firm Energy : 36.139 GWh
Off Peak Firm Energy : 44.58 GWh
Secondary Energy : 25.57 GWh
Average Energy : 106.28 GWh

Energy Benefit

Firm Peak Energy Benefit : US$ 2.72 million
Firm Off Peak Energy Benefit : US$ 1.97 million
Secondary Peak Energy Benefit : US$ 1.11 million

Cost and Economic Parameter

Description	Excluding TL	Including TL
Total Project Cost	42.07 million US$	50.64 million US$
Per kW Cost	2103 US$	2532 US$
Pay Back Period	5.12 Years	6.12 Years
B/C Ratio	1.43	1.20
IRR	16.09 %	13.77 %

Access Road

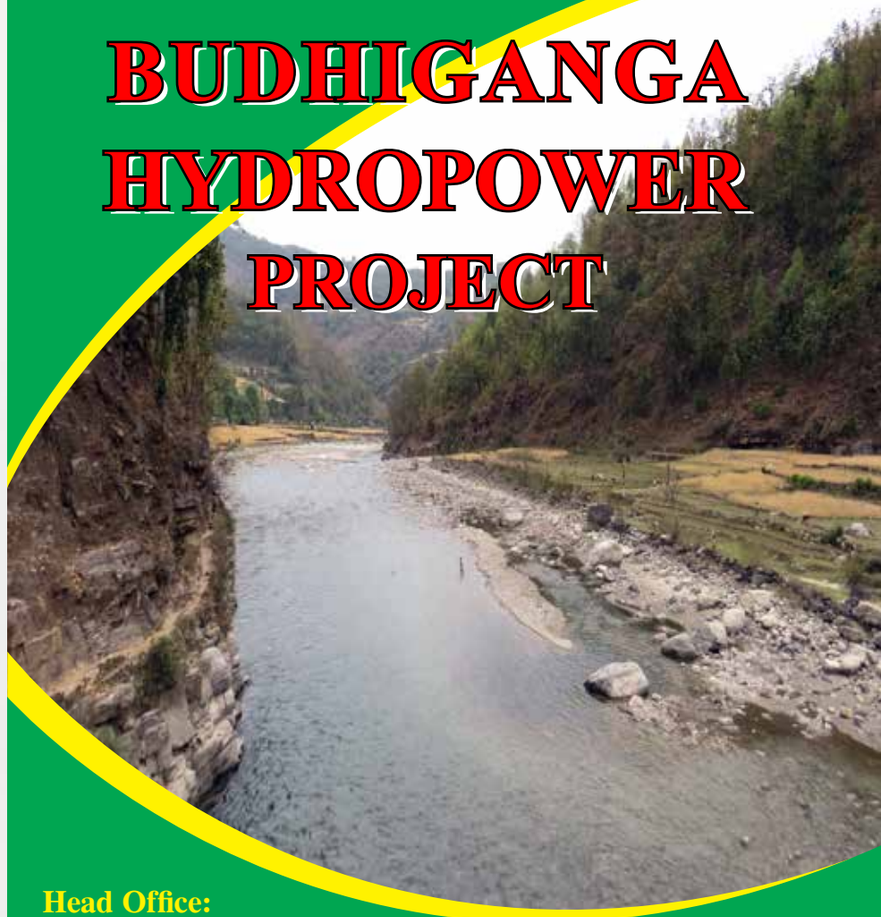
Head Works Site 0.650 km
Power House Site 1.980 km

Government of Nepal
Ministry of Energy
Department of Electricity Development

Budhi Ganga Hydropower Project

Kalikasthan, Kathmandu, Nepal

BUDHIGANGA HYDROPOWER PROJECT



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Site Office:
Ghughurkot VDC-2, Achham
Phone No.: 097-690553,
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1 BACKGROUND

Budhi Ganga Hydropower Project (BHP) located in Achham district of Nepal on the Budhi Ganga river, a major tributary to the Seti river was identified and selected under Screening and Ranking process carried out by the study team of Medium Hydropower Study Project and Nepal Electricity Authority (NEA) in 1996-1997 as a candidate project for medium term power supply in Nepal. The Feasibility Study and Environmental Impact Assessment of the Project was conducted by METCON Consultants Pvt. Ltd on behalf of Canadian International Water and Energy Consultants and NEA.

A loan agreement has already been concluded between the Government of Nepal and Saudi Fund for Development and Kuwait Fund for Arab Economic Development to develop the project in 2012. Presently, the Government of Nepal has established Budhi Ganga Hydropower Project under Government of Nepal, Ministry of Energy, Department of Electricity Development in order to implement this project utilizing the above loan assistances. Presently, BHP is conducting detailed engineering design and environmental study of the project. In the meantime, BHP is carrying out project preparatory activities like construction of camp facilities and access road as well as the land acquisition for the project implementation.

This project aims to supply the 20MW capacity reliable power to the Integrated Nepalese Power System (INPS). It is believed that the project brings the economic development of the Achham district as well as far western region of Nepal.

2 BHP STRATEGIC PLANNING

2.1 Vision

- "Building brighter and prosperous Nepal through the sustainable hydropower generation by harnessing the country's available water resources through the competent public sector"

2.2 Mission

- Capacity building of Public sector in hydropower development for sustainable economic growth of the country;
- Completion of the hydropower projects of desired quality within the stipulated time within the estimated cost;
- Supply of reliable energy in Integrated National Power System (INPS) by the early completion of the project;

2.3 Objectives

- Complete the 20 MW capacity Budhi Ganga hydropower project, located in Achham district of specified standards within 2020 by the estimated cost.
- Develop 132 kV transmission line from Budhi Ganga to Lamki (96 km) to evacuate the power developed; this line may also used to evacuate the power developed by the private sector in this region.
- Capacity building of the public sector in hydropower generation as well as in regulation and monitoring activities learning from this project and implement larger projects successively.
- To pave the way for economic activities and other development program in integrated manner with this project, achieving the regional balance in development of far western region.

2.4 Targets

- Completion of the preconstruction activities including detailed design and environmental study by 2017
- Completion of the main construction activities (Civil, electromechanical and hydro-mechanical works) of the project by 2020.
- Completion of the 96 km long 132 kV transmission line from Budhi Ganga to Lamki by 2020.
- Carrying out related studies for hydropower projects identified in Budhi ganga River in order to develop the hydropower project in the river holistically.

3 PROJECT FEATURES

3.1 General Features

The Budhi Ganga Hydropower Project is located mainly in three VDCs namely Babla, Kuskot and Hattikot VDC-4 of Achham district between 29° 15' 30" and 29° 18' 35" latitude north and between 81° 14' and 81° 17' 50" longitude east. The project site is about 13.5km from Sanfebagar which can be accessed by Sanfe-Martadi road on the right bank of Budhi Ganga which is well conditioned and have asphalt pavement. The Head-works has been proposed at the border of Kuskot VDC-5 and Babala VDC-3 near Budhabagar which is accessible by the foot trail of about 300 m down of the Safe-Martadi road. Most of the project components have been proposed on left bank of river in Kuskot and Hattikot VDCs. The Powerhouse site is accessible by the trail bridge near the Thanti bazar.

3.2 Project Layout

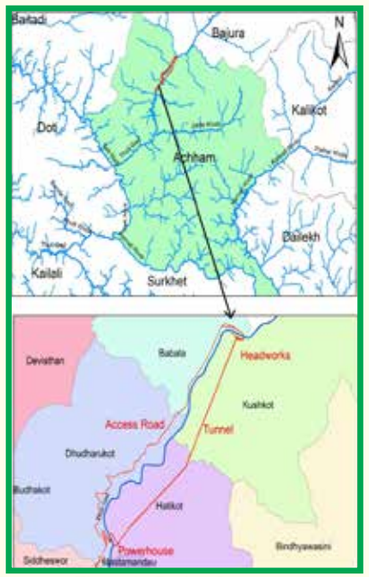

Figure 1 : Project Layout

3.3 Dam and Reservoir Area

The proposed dam is 54m length and 24m height. Two numbers of radial gates of 12.5m diameter is proposed for water regulation and storage at the dam. The water diverted from the intake is conveyed to the desander basin by 57m length intake tunnel.

About 8.46 ha of pondage area creates 0.236Mm^3 volume of water at 3 km upstream of the 25m height dam.

Figure 2 : Headworks (Damsite)

3.4 Desander

The optimum design discharge of 27.6m^3/sec is used for the design of the water conveyance system. Two parallel intake tunnels are designed to flow in desander basin. For this design discharge, to settle sediment on bed of desander basin and flush the settled particle, two desander basin of 57m length is designed.

3.5 Headrace Tunnel, Surge Tank and Penstock

The diverted water is conveyed through 5.6km length, 5.1m diameter shortcrete lined and 3.9m diameter concrete lined headrace tunnel up to the surge tank. For resistant of water hammer effect, 57.1m height and 7.5m diameter surge tank is proposed and then the flow will conveyed to power house through 3.5m diameter and 206 m long penstock pipe.

3.6 Powerhouse and Tailrace

Surface Powerhouse having dimension of 30x14x26 m^3 is proposed consisting of 2 units of Francis turbine of 10/10 MW of capacity connecting with generator on Hattikot VDC-4. After production of electricity water will be conveyed through 83m of tailrace to Budhi Ganga River again.

3.7 Transmission Line and Substation

The power generated of 20 MW capacity of electricity is evacuated to the Lamki Substation, Kailali through about 96 km 132 kV transmission line.

Figure 3: Powerhouse area (Hattikot VDC-4)

3.8 Access Road

The project area is located about 5 km north from the Sanfe Bazar, Achham district. Around 1.98km of access road is proposed to reach the powerhouse site from the Thanti point of the Achham-Bajura Road and about 650m length of access road is proposed to reach the dam site from the Achham-Bajura Road near Budhabagar.

4 FINANCIAL ASPECT

On the basis of feasibility study carried out the total cost of the project is estimated as 50.64 million US$ including transmission line. The project parameters such as B/C ratio at 10% discount rate is 1.2, IRR 13.70% and Payback period 6.12 year based on the price level of 1997.

The loan agreement has been concluded between Government of Nepal and Saudi Fund for development for 30 million US$ on 18 June 2014. And the loan agreement has been concluded between Government of Nepal and Kuwait fund for Arab economic development for 18 million US$ on 4 July 2012. The remaining fund will be managed by Government of Nepal to develop the project.

5 PRESENT STATUS OF THE PROJECT

i. Land of area 112,465 sq.km. located in Babala - 3, Kuskot- 5, Ghugurkot-2 and Hattikot-4 required for project components including camp facilities has been acquired as per Land Acquition Act, 2034. Among the acquired land area, ownership of the 68,989.5 sq. m. land has been transferred to the name of Budhi Ganga Hydropower Project from respective entitled land holders by compensating land values fixed by competent authority.

ii. The track opening works of the Access Road to Power House (Ch. 0+765) was completed in the previous fiscal year through the users committee. Presently, upgrading of this section is underway and has been targeted to be completed in the first quarter of fiscal year 2073/74.

iii. The Bidding process of the remaining section of Access road to Power House, Surge Tank and Dam site along with bridge across Budhi Ganga