

LOWER BARUN KHOLA HYDROELECTRIC PROJECT

SALIENT FEATURES

SN	FEATURES	CHARACTERISTICS
GENERAL		
1	Name of Project	Lower Barun Khola Hydroelectric Project
2	Type of the Scheme	Run of River
3	Gross Head	853 m
4	Catchment Area KM2	449.3 (intake)
5	Net head	835.853 (@ Q= 18.44 m3/s)
6	Annual average flow	24.367 m3/s
7	Design Discharge	18.44 m3/s
8	Installed Capacity	132 MW

PROJECT LOCATION

1	Latitude	27041'29' N to 27043'19' N
2	Longitude	87018'10" E to 87022'05" E
3	Project Area	Bhot Khola Rural Municipality, Sankhuwasabha, Province 1

TECHNICAL INFORMATION

1	Headworks and Intake Structure Weir	
	Location	Saldim-Barun Confluence
	Type	Boulder in-filled concrete, overflow type
	Crest Length	20 m
	River Bed level at Weir Location	1995.044 m
	Weir crest Level	2000.535 m
	Stilling basin type, length & level	Type IV, 16 m, 1994.406 m

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2	Intake	
	Type	orifice-sluice-trashrack-orifice intake
	Outer Upper Orifice nr & size (WxH)	4 nr, 3.6 m x 1.75 m (WxD)
	Outer Lower Orifice nr & size (WxH)	6 nr, 3.6 m x 1.75 m (WxD)
	Inner trashrack nr, size (HxW) & bars	4 nr, 3.6 m x 2.8 m (WxH) 20 mm x 50 mm (txb)
	Inner Orifice nr & size (WxH)	4 nr, 2.70 m x 1.75 m (WxD)
	Invert Level	1997.544
3	Undersluice	
	Sluice	1:50 slope, Qf (m3/s)= 151.653
	Flushing gate	2 nr, 3 m x 3 m (WxH)
4	Gravel Trap	
	Type	Surface
	Settling Criteria	90% >=2mm @ flushing interval of 6 hr
	Number of Basin	2
	Number of Sub-Basins	1
	Gravel Trap Size incld freeboard of 0.5 m	13 m x 9.5 m x 5.66 m (LxWxD)
	Spillway Length (m) & hot	10.294 m, 0.5 m for Q: 50% of 27.66 m3/s
	Size of Flushing Canal	1 m x 1 m (WxH) @ 1:25
5	Settling Basin	
	Type	Conventional
	Settling Criteria	90% >=0.15mm @ flushing interval of 8hr
	Number of Basins	2
	Number of Basins	2
	Inlet Transition Length	19.500 m
	Settling Basins Size	120 m x 15 m x 5.932 m (L x W x D)
	Bed Slopes	1:120
	Spillway Length & overtopping height	24, 0.717 for Q: 66.67% of 27.66 m3/s
	Size of Flushing canal	1 m x 1 m @ 1:25
	Orifice Slot nr x basin, dimensions & invert level	4 x 2, 2.5 m x 1.5 m (W x D) & 1997.5 m
	Trashrack nr, size (WXH) & bars @ Orifice	4nr, 5 m X 2.31 m (W x D) 20 mm X 20 mm (t x b)
	Trashrack nr, size (WXH) & bars @ forebay	10 m X 5.13 m (W x D) 10 mm X 20 mm (t x b)

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7	Box Culvert	
	Gravel Trap to Settling Basin	1 number
	Length	85 m
	Height	1.250 m
	Width	2.250 m
	Water level at the outlet	1998.163 m
8	Headrace Tunnel	
	Shape	Modified horseshoe shaped
	Type & % of lining	Concrete; 100%
	Total Length	4527 m (Excluding Adits)
	Dimensions	3.5 m x 3.5 m (W x D)
9	Surge Shaft	
	Type	Circular Steel, non-spilling, restricted orifice
	Diameter (m)	10.000
	Height (m)	27.980
	Undamped Upsurge (m)	14.418
	Undamped Down surge	14.418
	Water level in upsurge (masl)	2008.414
	Water level in down surge (masl)	Water level in downsurge (masl)
	Crown level of surge shaft (masl)	2011.000
	Invert level of surge shaft (masl)	1975.315
	Orifice	2m high, 3.5m diameter
	Connecting pipe	5m high, 3.5m diameter
	Tunnel invert level @ surge shaft (masl)	1971.815
10	Penstock	
	Type	Inclined Shaft
	Material	High Yield Fe 540
	Length (m)	1348.000
	Diameters (m)	2.6, 2.4, 2.2, 2, 1.414
	Thicknesses (mm)	16 mm - 60 mm
11	Powerhouse	
	Location	Bhot Khola Rural Municipality
	Type	Underground
	Dimension	80.0m x12.00m x 14.00m (L x W x D)
	Access Tunnel	770m, 4.2m x 4.2m (W x D)
12	Tailrace Tunnel	
	Normal Water Level (m)	1144.401
	Type	Inverted D-Shaped Tunnel
	Size (B)	4.6
	Size (D)	4.6
	Length m	505.750

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13	Turbine	
	Type	Pelton
	Axis of Rotation	Vertical
	Number of Units	6.000
	Axis level	1145.435
14	Generator	
	Number of Units	6
	Power Factor	0.850
	Speed (rpm)	600
	Efficiency	97.00%
15	Transformer	3-Phase
	Number of Units	6
	Type	3-Phase, ONAN Cooled
	Efficiency	99.00%
	Rating	26.6(27.7) MVA, 11kV/220kV
16	Transmission Line	
	Transmission Voltage (kV): Cal =175.614 KV	220
	Length (km)	20
	Number of Circuit	2
	Connection Point	Sitalpati Substation
17	Power and Energy	
	Installed Capacity (MW)	132
	Dry Outage including transmission losses	4.00%
	Wet Outage including transmission losses	4.00%
	Used Months	English
	Energy Estimates based on Daily Average Flows	Q release of 10%
	Dry Season Saleable Energy (GWh)	232.886 (~30.78%)
	Wet Season Saleable Energy (GWh)	523.65 (~69.22%)
	Total Annual Saleable Energy (GWh)	756.532
	Overall Efficiency (incl. transformer)	86.43%
18	Financial Indicators	
	Project Life (years)	30
	Construction Period (years)	5
	Construction Year	2020
	Used Currency	RS
	Project Cost w/o financing	NRs 20128.729 million

SN	FEATURES	CHARACTERISTICS
	Project Cost w/ financing w/o WC	NRs 26125.077 million
	Equity to Capitalized Loan Ratio	30:70
	Interest Rate on Loan	12.00%
	Payback Period (years)	12
	Min. Debt Service Coverage Ratio (DSCR)	1.472
	Internal Rate of Return (IRR)	15.23%
	Financial Internal Rate of Return (FIRR)	17.29%
	Net present Value at 12% Discount Rate	NRs. 5349.011 million
	Dry Tariff (Rs/kW)	8.400
	Wet Tariff (Rs/kW)	4.800
	Benefit Cost Ratio	1.199
	Cost Per MW	NRs 197.917 million

CURRENT STATUS OF THE PROJECT

- Survey License: acquired for 132MW
- Feasibility level of study and design: completed
- Topographical Survey completed
- Hydrological calculation: completed, continuing
- Sediment sampling and lab tests: completed, continuing
- Geological investigation, mapping and study: completed
- ERT: completed
- Sub surface investigation: Drilling on going at site (completed)
- Project layout and hydraulic calculations: completed
- EIA Study: Report submitted to DoED
- Preconstruction activities: Land , access road and others
- PPA : On going
- Financial Closure: On going

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DEVELOPMENT MODALITY

1	Development modality	Foreign investment expected.
2	Role of Foreign Partner	To be decided during negotiation
3	Role of Local Developer	To be decided during negotiation
4	Development Period (Tentative)	
	a. Pre-Construction Period	Oct 2020 – Dec 2021
	b. Financial Closure	Jun 2020
	c. Construction Period	Jul 2021- Dec 2024
	d. Concession Period	Dec 2024

INDICATIVE FINANCIALS

1	Total Project Cost (excluding IDC & FC)	NRs 26125.077 million
2	Internal Rate of Return	15.23%
3	Return on equity	17.29%
4	Construction time(incl. infrastructure works)	5 years

CONTACT DETAILS

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