

SALIENT FEATURES (AS PER UFSR)

General	
Name of the Project	Balephi Khola Hydroelectric Project
Project Location/Boundary	27°56' 26" N and 27°58' 59" N 85°47' 05" E and 85°48' 20" E
Type of Project	Run-of-River
Rural Municipality	Jugal Rural Municipality
District	Sindhupalchowk
Province	Bagmati
Name of the River	Balephi River
Hydrology	
Catchment Area at Headworks	303.26 km ² (After deducting Nyasim catchment)
Riparian Release	0.528 m ³ /s
Design Flood at Intake (1 in 100 years)	1282 m ³ /s
Design Flood at Powerhouse (1 in 100 years)	1437 m ³ /s
Power Development	
Design Discharge	17.49 m ³ /s (Q ₄₀)
Gross Head	269.10 m
Rated Net Head	261.24 m
Installed Capacity	40.00 MW
Average Annual Energy after Outage	231.25 GWh (100%)
Dry Energy	35.22 GWh (15.23%)
Wet Energy	196.036 GWh (84.77%)
Diversion Weir	
Type of Weir	Gravity Overflow
Size of Weir (L x H)	30 m x 12 m
Crest level	1540.00 m
Normal Water Level	1540.00 m
High Flood Level	1546.00 m
Undersluice	
Type	Radial Gated
Number of bays	2
Size (W x H)	4 m x 7 m
Undersluice Crest Level	EL. 1528 m
Intake	
Type	Side Intake, Orifice Type
Invert Level	El. 1535 m
Nos. of Opening	2 nos.
Size (W x H)	4 m x 3 m
Gravel Trap	
Type	Surface
Particle Size	≥5 mm (94%)
Length	20 m
Section (W x H)	7 m x 11 m
Size of Flushing Tunnel (W x H)	1.5 m x 1.5 m

Settling Basin	
Type	Underground Single Bay
Particle size to be settled (Efficiency)	≥0.20 mm (93%)
Number of Basin	2 nos.
Dimension (L x B x H)	95.0 m x 12.0 m x 11.5 m
Flushing System	Sand Flushing Tunnel
Headrace Tunnel	
Shape	Inverted D-shaped
Finished Size (W x H)	3.6 m x 3.6 m (for shotcrete-lined section) 3.3 m x 3.3 m (for concrete-lined section)
HRT Length	4782.00 m
Adit Tunnels	
To Desander	520 m
To HRT Starting	163.36 m
Adit-1	396 m
Adit-2	676 m
Main Access Tunnel	491 m
To Trifurcation	135.90 m
Surge Aeration Tunnel	84.35 m
Surge Arrangement	
Type	Inverted D-Shaped
Size	11.00 m diameter, 39.90 m height
Static Level	EL. 1540.00 m
Water level in upsurge	EL. 1549.85 m
Water level in down surge	EL. 1524.91 m
Penstock Shaft and Tunnel	
Diameter (Internal)	2.5 m
Length (Pre-bifurcation)	358.0 m
Thickness and Grade	10 mm to 36 mm (E350)
Powerhouse	
Type	Underground
Dimension (L x B x H)	47.25 m x 15.20 m x 31.10 m
Tailrace	
Type	Free-Flow Tunnel
Size (W x H)	3.5 m x 4.0 m
Length	417 m
Tailwater Level	1270.90 m
Turbine	
Type	Francis, Vertical Axis
Number of Units	3 Nos.
Rated Capacity	13.745 MW (Each Unit) + 10% COL
Turbine Axis Level	EL. 1268.40 m
Rated Discharge	5.83 m³/s (Each Unit)
Efficiency	92 %
Generator	

Type	3-phase, Synchronous generator with PMG and Brushless Excitation	
Rated Output	15.686 MVA	
Rated Voltage	11 kV	
Frequency	50 Hz	
No. of Units	2 nos.	
Rated Speed	750 rpm	
Efficiency	97.00%	
Transformer		
Type	Step-up Power	
Rated Capacity	17 MVA	
Voltage Ratio	132 / 11 kV	
No. of Unit	3 + 1 Spare	
Vector Group	YNd11	
Frequency	50 Hz	
Efficiency	99 %	
Switchyard		
Type	GIS underground Cavern	
Transmission Line		
Voltage Level	132 kV, Single Circuit	
Length	5 Km	
Connection Point	132/33/11 kV Pangtang Substation	
Financial Parameters		
	UFSR	DDS
Project Cost before IDC	NPR 8,104.00 million	NPR 8,172.81 million
Project Cost after IDC	NPR 8,895.72 million	NPR 8,969.66 million
Cost Per MW	NPR 22.27 crore	NPR 22.42 crore
NPV	NPR 1,693.6 million	NPR 1,197.19 million
IRR	12.51%	11.81%
EIRR	16.53%	15.26%
Loan Payment Period	12 years	12 years
Payback period	7.24 years	8.69 years
Benefit-Cost Ratio	1.24	1.14
Interest Rate	10%	10%
Construction Period		
Period	3 Years	

ANNEX-II: SITE VISIT PHOTOGRAPHS



Figure 7-13: Inspection of bridge location at Adit Tunnel-1 Area



Figure 7-14: Location of the Main Access Tunnel near Powerhouse area



Figure 7-15 Access Road to the project area (downstream view)



Figure 7-16 Adit location



Figure 7-17 Road condition near Powerhouse



Figure 7-18: AWLR station installed just upstream of Balephi-Nyasim Confluence