

## SALIENT FEATURES OF THE PROJECT

<b>General</b>		
Project name	:	Kinja Khola Hydropower Project
Type of scheme	:	RoR
Name of river	:	Kinja Khola
District/Province	:	Solukhumbu
Nearest town	:	Manthali
Project accessibility		
Black topped road	:	225 km from Kathmandu to Kenzaa Bazaar (Solukhumbu)
Earthen road	:	5 km from Kenzaa Bazaar to Powerhouse
<b>Project co-ordinate</b>		
Latitude	:	27° 33' 39" N to 27° 34' 44" N
Longitude	:	86° 25' 43" E to 86° 27' 51" E
<b>Hydrology</b>		
Catchment area at intake	:	17 sq. km.(including additional intakes)
Catchment area at powerhouse	:	25.25 sq. km.
Long term average flow at intake	:	1.13 m <sup>3</sup> /s
Design discharge	:	0.95 m <sup>3</sup> /s
Design flood at intake	:	78.17 m <sup>3</sup> /s (Return period: 100 years)
Design flood at powerhouse	:	98.85 m <sup>3</sup> /s (Return period: 100 years)
Environmental d/s release	:	0.032 m <sup>3</sup> /s (Including all intakes)
<b>Diversion Weir</b>		
Type	:	Boulder Riprap
Crest elevation	:	2465.00 masl
Length	:	11 m
Height from foundation	:	2.50 m
Spillway	:	Free overflow
Undersluice Opening (W × H)	:	1.2 × 1.2 m (1 no.)
Undersluice Sill Level	:	2460.70 masl
<b>Intake Structure/Gravel Trap</b>		

Type of Intake	:	Orifice Side Intake
<b>No. of Openings</b>		
No. of Openings	:	2
<b>Size of Intake (W × H)</b>		
Size of Intake (W × H)	:	0.8 m × 0.8 m each
<b>Intake Sill Level</b>		
Intake Sill Level	:	2463.2 masl
<b>Length of Gravel Trap</b>		
Length of Gravel Trap	:	5.00 m
<b>Width of Gravel Trap</b>		
Width of Gravel Trap	:	3.50 m
<b>Overall depth</b>		
Overall depth	:	2 m (Flow Depth)
<b>Particle size to be trapped</b>		
Particle size to be trapped	:	5 mm
<b>Flushing Canal</b>		
Flushing Canal	:	0.5 x 0.5 (B x H), 15 m Length
<b>Settling basin</b>		
<b>Type</b>		
Type	:	Conventional with intermittent flushing
<b>No. of bays</b>		
No. of bays	:	2
<b>Minimum size of particle trapped</b>		
Minimum size of particle trapped	:	0.20 mm
<b>Designed trapping efficiency</b>		
Designed trapping efficiency	:	90%
<b>Transition length</b>		
Transition length	:	10 m
<b>Uniform length (each bay)</b>		
Uniform length (each bay)	:	25 m
<b>Uniform width (each bay)</b>		
Uniform width (each bay)	:	3.00 m
<b>Average depth</b>		
Average depth	:	2.70 m
<b>Flushing scheme</b>		
Flushing scheme	:	Intermittent flushing
<b>Flushing channel</b>		
Flushing channel	:	0.6 m x 0.6 m
<b>Headpond</b>		
<b>Type</b>		
Type	:	Rectangular
<b>Length</b>		
Length	:	7.70 m
<b>Average Width</b>		
Average Width	:	6.0 m
<b>Height</b>		
Height	:	4.50 m
<b>Headrace Pipe</b>		
<b>Type</b>		
Type	:	High strength structural steel, Circular
<b>Length</b>		
Length	:	2800 m
<b>Diameter</b>		
Diameter	:	0.9 m(1400m) and 0.8 m(1400m)
<b>Shell thickness</b>		
Shell thickness	:	8-10mm
<b>No. Anchor Blocks</b>		
No. Anchor Blocks	:	25 Nos.

<b>Surge tank</b>		
Type	:	MS steel, cylindrical
<b>Diameter</b>		
Diameter	:	1.20 m
<b>Length</b>		
Length	:	85.00 m
<b>Maximum surge elevation</b>		
Maximum surge elevation	:	2474.00 masl
<b>Minimum surge elevation</b>		
Minimum surge elevation	:	2451.85 masl
<b>Normal Operation Level</b>		
Normal Operation Level	:	2459.50
<b>Penstock</b>		
<b>Material</b>		
Material	:	Mild steel
<b>Length</b>		
Length	:	1300 m
<b>Diameter</b>		
Diameter	:	0.70 m (1400m)
<b>Shell thickness</b>		
Shell thickness	:	8mm to 24mm
<b>Nos. of Anchor Blocks</b>		
Nos. of Anchor Blocks	:	16 Nos.
<b>Nos. of Saddle Supports</b>		
Nos. of Saddle Supports	:	150 Nos.
<b>Bifurcation Pipe</b>		
<b>Type</b>		
Type	:	Mild Steel (Circular)
<b>Internal Diameter</b>		
Internal Diameter	:	500 mm
<b>Length</b>		
Length	:	20 m (total length)
<b>Pipe Thickness</b>		
Pipe Thickness	:	10 mm
<b>Powerhouse</b>		
<b>Type</b>		
Type	:	Surface
<b>Length</b>		
Length	:	24.40 m
<b>Width</b>		
Width	:	13 m
<b>Height</b>		
Height	:	13.50 m
<b>Turbine Axis Level</b>		
Turbine Axis Level	:	1885.0 masl
<b>Tailrace</b>		
<b>Type</b>		
Type	:	Rectangular canal
<b>Length</b>		
Length	:	25 m

Width	:	1.2 m
Height	:	1.0 m
<b>Additional Headworks</b>		
Nos. of additional Head works	:	3

<b>Additional Headworks 01</b>		
Type of Intake	:	Side intake connected to bottom intake in Weir
Nos of Opening	:	1
Size of Intake (W x H)	:	0.50 m x 0.50 m
Intake Sill Level	:	2467.00 masl
Length of Gravel Trap	:	2.5 m
Width of Gravel Trap (Avg.)	:	2.50 m
Average Storage depth	:	0.80 m
Particle size to be trapped	:	>0.20 mm
Flushing Channel	:	0.15 m dia circular pipe, 5.50m length
Pipe Alignment	:	0.20 m dia pipe, 950 m length
<b>Additional Headworks 02</b>		
Type of Intake	:	Side intake connected to bottom intake in Weir
Nos of Opening	:	1
Size of Intake (W x H)	:	0.50 m x 0.50 m
Intake Sill Level	:	2468.00 masl
Length of Gravel Trap	:	2.50 m
Width of Gravel Trap (Avg.)	:	2.50 m
Average Storage depth	:	0.80 m
Particle size to be trapped	:	>0.20mm
Flushing Channel	:	0.15 m dia circular pipe, 7.00m length
Pipe Alignment	:	0.20 m dia pipe, 80 m length
<b>Additional Headworks 03</b>		
Type of Intake	:	Side intake connected to bottom intake in Weir
Nos of Opening	:	1

Size of Intake (W x H)	:	0.50 m x 0.50 m
Intake Sill Level	:	2468.00 masl
Length of Gravel Trap	:	3.50 m
Width of Gravel Trap (Avg.)	:	2.50 m
Average Storage depth	:	0.80 m
Particle size to be trapped	:	>0.20mm
Flushing Channel	:	0.15 m dia circular pipe, 5.50m length

Pipe Alignment	:	0.20 m dia pipe, 95 m length
<b>Turbine</b>		
Type	:	Horizontal Pelton
No. of units	:	2
Rated Output Capacity	:	2375 kW
Net Head	:	559.58 m
Discharge per Unit	:	0.475 m <sup>3</sup> /sec
Rated efficiency	:	91.00%
Turbine Axis Level	:	1885.00 masl
<b>Generator</b>		
Type	:	Synchronous, Three phase
Rated output capacity per unit	:	2715 kVA
Rated efficiency	:	97.00%
Power factor	:	0.85
Frequency	:	50 Hz
Generation voltage	:	6.6 kV
No. of Units	:	2
<b>Governor</b>		
Type	:	Electronic, PID flow adjustment
Adjustment for Speed Drop	:	Between 0-5%
<b>Transformer</b>		
No. of units	:	1

Type	:	Three Phase, Oil Immersed, Outdoor
Rated capacity	:	6.0 MVA
Voltage Ratio	:	6.6 kV/33 kV
Vector Group	:	YNd11
Frequency	:	50 Hz
Rated efficiency	:	99.00%
<b>Transmission line</b>		
Voltage level	:	33 KV single circuit line
Length	:	15 km approx.

Conductor Type	:	ASCR "Dog"
Evacuation substation	:	Garjyang Substation
<b>Power and energy</b>		
Gross head	:	580 m
Net head	:	559.58 m
Installed capacity	:	4.60 MW
Dry season energy	:	8.7 GWh
Wet season energy	:	18.8 GWh
Total energy	:	27.5 GWh
<b>Construction period</b>		
	:	24 months
<b>Project evaluation</b>		
Project cost without IDC	:	NRs 849,677,496
Project cost with IDC	:	NRs 914,677,496
Discount rate	:	11%
Internal rate of return (IRR)	:	14.35%
BC ratio	:	1.41
Return on equity (ROE)	:	18.55%
Net Present Value (NPV)	:	NRs 312,551,000.00
Payback period-Simple	:	5.60 yrs