

# MIDDLE KALIGANDAKI HYDROELECTRIC PROJECT

## SALIENT FEATURES

SN	FEATURES	CHARACTERISTICS
<b>GENERAL</b>		
1	Name of Project	Middle Kaligandaki Hydroelectric Project
2	Proponent	Hydro Support Pvt. Ltd
3	Type of the Scheme	Run of River
4	Gross Head	144 m
5	Catchment Area	3700 Km <sup>2</sup>
6	Net head	138.35 m
7	Annual average flow	65 m <sup>3</sup> /s
8	Design Discharge ( Q41)	44.98 m <sup>3</sup> /s
9	Design Flood Discharge at diversion site (100 years return period)	800 m <sup>3</sup> /s
10	Design Flood Discharge at powerhouse site (100 years return period)	1432 m <sup>3</sup> /s
11	Installed Capacity	53.539 MW

## PROJECT LOCATION

1	Latitude	280 28' 56" N to 280 31' 14" N
2	Longitude	830 38' 00" E to 830 40' 00" E
3	Project Area	Kaligandaki River, Tatopani Bazar, Myagdi, Gandaki Province

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<b>GEOLOGY</b>		
1	Geographical terrain	valley slopes
2	Altitude	Variation ranges from 1160 m a.m.s.l to 1320 m a.m.s.l.
3	Geology/Soil	Slate, phyllite, quartzite-phyllite with calc bands, dolomite, amphibolites and quartzite formations

### TECHNICAL INFORMATION

<b>1</b>	<b>Diversion Structure</b>	
	Type	Ogee weir Type free over flow with sluice bays
	Average river bed level	El. 1306.0 m
	Bridge deck level	El. 1316.5 m
	Width of diversion structure	96.0 m
	Highest flood level	El. 1315.85 m
	Full supply level	El. 1313.0 m
	Maximum tail water level	El. 1309.94 m
<b>2</b>	<b>Weir</b>	
	Crest elevation of overflow weir	El. 1313.25 m
	Width of weir	85 m
<b>3</b>	<b>Sluice Bay</b>	
	No. of sluice bays	2
	Width of each bay	4 m
	Thickness of pier	1.5 m
	Crest level of sluice bay	El. 1306.0 m
	Clear width of sluice bay	8 m
	Type and height of gate	Vertical gates, 3 m high
<b>4</b>	<b>Energy Dissipation System</b>	
	Length of stilling basin from toe of sloping glacis	25 m
	Total width of basin	96 m
	Cistern level	El. 1303.0 m
	End Sill Level	El. 1305.0 m
<b>5</b>	<b>Intake Structure</b>	
	Type	Side Intake
	Track rack size	3.4 m (W) x 5.5 m (H)
	Numbers of trash rack	6
	Intake diversion flow (incl. 20% flushing discharge)	53.98 m <sup>3</sup> /s
	Intake size	Two bays; each 4.0 m (W) x 5.0 m (H)

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	Invert level of intake	El. 1309.0 m
	Intake stop log	1 no. Vertical lift gate (4.0 m x 4.0 m)
	Intake service gate	2 nos. Vertical lift gate (4.0 m x 4.0 m)
<b>6</b>	<b>Feeder Channel</b>	
	Type	Rectangular
	Numbers	2
	Size	4 m wide, height varies from 5.0 m to 5.2 m
	Length	43.97 m & 28.96 m
<b>7</b>	<b>Desilting Basin</b>	
	Type	Hopper type
	Numbers of Chambers	2 nos.
	Size of particles to be removed	0.2 mm and above
	Dimension (L x B x H)	95 m x 12 m x 10.7 m
	Design discharge	53.98 m <sup>3</sup> /s
	Flow through velocity	0.29 m/s
<b>8</b>	<b>Silt Flushing Pipe</b>	
	Type	Circular
	Dia	1.5 m
	Total length	102 m
<b>9</b>	<b>Head Race Tunnel (Concrete Lined)</b>	
	Type & shape	Underground, horse-shoe shaped
	Dia	5.0 m
	Total length	4184 m
<b>10</b>	<b>Surge Shaft</b>	
	Type	Restricted orifice type
	Height	43 m
	Dia	12.5 m
	Orifice size	2.35 m dia, circular
	Top of surge shaft	El. 1328.0 m
	Maximum upsurge level	El. 1326.2 m
	Minimum down surge level	El. 1290.6 m
<b>11</b>	<b>Valve Chamber</b>	
	Type	Underground
	Number	1
	Size (L x W x H)	16 m x 10 m x 16 m
	Type of valve	Butterfly valve
	Diameter of valve	4.0 m

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<b>12</b>	<b>Pressure Shaft</b>	
	Type	Underground
	Nos.	One no. starting from surge shaft and bifurcating before Power House
	Diameter	4.0 m, circular shaped
	Liner thickness	10 mm to 16 mm
	Length	250.22 m
	Length of penstock after bifurcation	22.11 m each
	Branch penstock	Circular, 2.3 m diameter each
<b>13</b>	<b>Power House Complex</b>	
	Type	Underground
	Gross Head	144 m
	Rated Head	138.35 m
	Design discharge (Q41)	44.98 m <sup>3</sup> /s
	Normal Tail Water Level	El. 1169.0 m
	Centre line of penstock	El. 1163.75 m
	Service Bay Level	El. 1172.9 m
	Machine Hall Level	El. 1172.9 m
	Size of Powerhouse Cavern	67.1 m (L) x 18.0 m (W) x 36.65 m (H)
	Size of Transformer Cavern	59.5 m (L) x 15.0 m (W) x 26 m (H)
<b>14</b>	<b>Main Access Tunnel</b>	
	Nos.	1
	Size & Shape	7 m, D-shaped
	Length	133.36 m
<b>15</b>	<b>Bus duct Tunnel</b>	
	Nos.	2
	Size & Shape	4.25 m (W) x 6 m (H), D-shaped
	Length	40.0 m each
<b>16</b>	<b>Draft tube Tunnel</b>	
	Nos.	2
	Size & Shape	4.25 m, D-shaped
	Length	45.0 m each
<b>17</b>	<b>Escape Tunnel</b>	
	Nos.	1
	Size & Shape	4.0 m, D-shaped
	Length	40.0 m

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18	Tail race Tunnel	
	Type	D-shaped
	Length	149.25 m
	Size	5.0 m (W) x 4.66 m (H)
	Normal tail water level	El. 1169.0 m
19	Construction Adits	
	Nos.	8
	Size & Shape	5.0 m, D-shaped
	Length	Adit-1:114.0 m Adit-2:162.0 m Adit-3:106.0 m Adit-4: 93.18 m Adit-5:104.48 m Adit-6: 249.1 m Adit-7:113.93 m Adit-8: 71.33 m
20	Switchyard	
	Size	30 m x 40 m
	Voltage level	132 kVA
21	Turbine	
	Turbine Type	Vertical axis Francis
	Number	2
	Rated Capacity of each turbine	26.80 MW
22	Generator	
	Generator Type	Synchronous three phase
	Number	2 sets
	Rated Capacity	2 x 29777 kVA
	Power Factor	0.9 lagging
	Voltage	11 kV
	Frequency	50 Hz
	Excitation system	Brushless/ static
23	Transformer	
	Rated capacity	7 x 12.5 MVA, 11/132/v3, single phase
	Voltage ratio	11 kV/132 kV
24	Transmission Line	
	Voltage Level	132 kV Double Circuit
	Length	7.0 km
25	Power and Energy	
	Installed Capacity	53.539 MW
	Net Annual Energy after Losses and outage	310.656 GWH

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#### CURRENT STATUS OF THE PROJECT

1	Feasibility Study	Completed
2	Detailed Project Report	Completed
3	EIA/IEE	Completed
4	PPA and PPA Rate	Energy locked and queued for PPA
5	Generation license	Applied and in process
6	Land Acquisition	In Process

#### DEVELOPMENT MODALITY

1	Development modality	Develop the project by securing Foreign loans OR Develop as a joint venture with foreign equity capital investor.
2	Role of Foreign Partner	Investment (Equity and/or loan)
3	Role of Local Developer	Develop, construction and Financing of project
4	Development Period	
	a. Pre-Construction Period	May 2014 to Nov 2019
	b. Financial Closure	Up to Oct 2019
	c. Construction Period	Dec 2019 to Nov 2023
	d. Concession Period	30 years from RCOD

#### INDICATIVE FINANCIALS

1	Total Project Cost (excluding IDC & FC)	USD 95 Mn. 13.21%
2	Internal Rate of Return	18.57%
3	Return on equity	48 months
4	Construction time (incl. infrastructure works)	

#### CONTACT DETAILS

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