

## **SILLAHALLA PUMPED STORAGE HYDRO-ELECTRIC PROJECT STAGE-I**

### **1. INTRODUCTION**

The proposed Sillahalla Pumped Storage Project (PSP) area is located in the Nilgiris District of the southern Indian state of Tamil Nadu. The upper reservoir is planned in Udhagamandalam & Kundah taluk and lower reservoir is planned in Kundah taluk of the Nilgiris district. The Upper dam is located on Sillahalla stream which is a tributary of Kundah River. The Sillahalla River joins Kundah River about 1.4 km upstream of Kundah Palam dam of existing Kundah Power House – I project. The installed capacity of existing Kundah Power House – I is 60MW and the inflows of Sillahalla, Kanarhalla and other small tributaries are stored in Kundah Palam dam. The water stored in Kundah Palam dam is discharged to Kundah Power house-II (5\*35MW) through tunnel and 5 nos. penstocks and let into Pegumbahallah dam across Kundah river. The Kundah River ultimately joins Bhavani River near Pillur in Coimbatore.

The locations of the proposed dams are indicated in Table 1.1 below.

<b>S. No.</b>	<b>Dam</b>	<b>Latitude</b>	<b>Longitude</b>
1	Sillahalla Upper dam	11°18'53.72"	76°38'56.34"
2	Sillahalla Lower dam	11°16'25.81"	76°40'13.00"

### **2. PROJECT DESCRIPTION**

The proposed pumped storage scheme envisages the construction of the following components:

- Construction of concrete gravity upper dam of 82 m height and 327 m length across Sillahalla River.
- 1 no. Power intake with trash rack having mechanical raking arrangement and gate shaft.
- 1 no. 2862 m long, 9 m dia. Circular concrete lined head race tunnel.
- 1 no. 70 m high, 20 m dia. circular concrete lined HRT surge shaft.
- 2 nos. 533 m long, 6.5 m dia. Inclined circular steel lined pressure shaft.
- 4 nos. 55 m long, 4.75 m dia. circular steel lined Penstocks.
- An underground powerhouse cavern of size of 160m X 24m X 55m to house 4 no. Francis reversible pump turbine generating units of 250 MW capacity each.
- 1 no. Transformer cavern 130m X 18m X 22.5m to house 4 nos. generator transformers.
- 4 nos. of draft tube tunnels of 5 m dia and 81 m length.
- 1 no. TRT surge chamber of size 85m X 10m X 88m.

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- 1 no. 1567 m long, 9.75 m dia. circular concrete lined tail race tunnel to carry the water from powerhouse to lower reservoir.
- 1 no. of Tail Race outlet with 1 no gate shaft and trash rack having mechanical raking arrangement.
- Construction of concrete gravity lower dam of 112 m height and 470 m length across Kundah River.
- 1 no. Main Access Tunnel (MAT) D- shaped of 1240 m long 8m width & 8m height.
- 3 nos. construction adit's – 1 no. adit 1 to HRT, 1 no. adit 2 to HRT surge shaft, 1 no. adit 3 to butterfly valve.

### 3. Installed Capacity and Power Generation

The details are summarized below:

<b>Installed Capacity (MW)</b>	1000
<b>No of units</b>	4
<b>Unit Size (MW)</b>	250
<b>Head (min) (m)</b>	
<b>Rated Head (m)</b>	
<b>Head (max) (m)</b>	420
<b>Hours of Peaking Operation</b>	6
<b>Annual Energy Generation (GWh)</b>	6000
<b>Annual Pumping Energy (GWh)</b>	7000
<b>Cycle Efficiency</b>	85.7 %

### 4. Estimates of the Cost

The preliminary cost estimate of the project has been prepared as per guidelines of CEA/CWC. The project cost is estimated at Feb, 2019 price levels. The breakdown of the cost estimate is given below:

Item	Estimated Cost (Rs. Lacs)		
	Option-I (4 Fixed)	Option-II (2Fixed+2 Variable)	Option-III (3Fixed+1 Variable)
Civil Works	195550.42	196096.78	196062.18
Electro-mechanical Works	217600.00	224469.00	221200.00
<b>Total</b>	<b>413150.42</b>	<b>420565.78</b>	<b>417262.18</b>

### 5. Financial Aspects

The economic & financial evaluation is carried out for 3 options (cost) for Sillahalla pumped storage project. The design energy generation of 2080.5 GWh is proposed to be completed

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in a period of 66 months. The tariff has been worked out considering a debt-equity ratio of 70:30 & annual interest rate on loan at 10%. The breakdown of tariff is given below:

	<b>Option-I ( 4 fixed)</b>	<b>Option –II (2 fixed + 2 Variable)</b>	<b>Option-III (3 fixed + 1 Variable)</b>
LEVELIZED TARIFF	Rs. 5.50	Rs. 5.57	Rs. 5.54
FIRST YEAR TARIFF	Rs. 6.11	Rs. 6.20	Rs. 6.16