

## Justification for locating the Project in Forest Area

### **MP 30 Gandhi Sagar Off Stream Pumped Storage Project:**

Pumped Storage Project (PSP) is a type of hydroelectric energy storage. Pumped Storage Project (PSP) plays an important role for load balancing of electricity grids. It is a configuration of two water reservoirs at different elevations that can generate power (discharge) as water moves down through a turbine; this draws power as it pumps water (recharge) to the upper reservoir. PSH capabilities can be characterized as open loop—where there is an ongoing hydrologic connection to a natural body of water—or closed loop, where the reservoirs are not connected to an outside body of water.

Pumped-storage hydroelectricity allows energy from intermittent sources (such as solar, wind) and other renewables, or excess electricity from continuous base-load sources (such as coal or nuclear) to be saved for periods of higher demand. The reservoirs used with pumped storage are quite small when compared to conventional hydroelectric dams of similar power capacity, and generating periods are often less to meet the peak power requirement/power on demand. Pumped storage is the largest-capacity form of grid energy storage available in the country.

Considering the PSP scheme, the main requirement of PSP is the specialist nature of the site required, needing both geographical height and water availability. Suitable sites are therefore likely to be in hilly or mountainous regions which are invariably with forest cover and water source in proximity.

The optimized lay out of project has minimal impact on the environment and requires unavoidable minimum Forestland. As the Dam/Embankment can be planned only on the hill top which is forestland these necessarily require the diversion of forest land. However, only the unavoidable minimum forestland and site-specific Project components have been envisaged. Locations of all the components have been fixed after detailed survey and investigations and after proper examination of available alternatives.

Accordingly, MP 30 Gandhi Sagar Off Stream Pumped Storage Project envisages construction of Upper reservoir (proposed) to be located on the hill top along with Intake Structure, Penstock, Power House, Tail Race Outlet and Tail Race Channel and the Gandhi Sagar reservoir (Existing) is under operation with a live storage capacity of 258.47 TMC and shall be utilized as MP 30 Gandhi Sagar Off Stream Pumped Storage Project Lower reservoir. The various alternatives considered for optimal Project layout is highlighted below:

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Following alternatives of project layout have been studied based on the topographical and geological parameters:

Alternative – 1: Layout with Surface Power House and other components of this scheme are Upper reservoir, Intake structure, Penstock / Pressure Shaft, Tail Race Outlet and Tail Race Channel.

Alternative -2: Layout with underground Power House and other components of this scheme are Upper reservoir, Intake structure, Pressure Shaft, Tail Race Tunnel, Tail Race Outlet and Tail Race Channel.

#### **Alternative-1**

This Alternative layout is proposed with surface power house. The surface power house involves little deeper excavation since the Off-Stream Pumped Storage Project is placed much below the Minimum Draw Down Level of lower reservoir because of technical requirement during pumping operations. However, necessary slope protection measures are proposed to be provided for the cut slopes as it involves deeper excavation. Construction time for completion of this Alternative is estimated to 36 months excluding Pre-construction activities.

#### **Alternative-2**

This Alternative layout is proposed with underground power house. The underground power house requires Adit tunnels viz., Main Access Tunnel to Power house Service bay and Transformer hall, Adit to Power house cavern top, Adit to Transformer cavern top, Bus duct tunnels etc. The total length of all adits are worked out to about more than 2000m. Though construction work can be carried out for underground structures all through the season, the time required to complete the activity is more and expensive also. Excavation of these tunnels will take longer duration to reach the power house and start works at power house.

The total construction time for the project is estimated to 54 months which is more compared to Alternative – 1 and total cost of the project is also more comparing to Alternative - 1. The construction duration of the scheme is very important which will impact the overall financial viability of the project adversely.

Due to the above reasons, Alternative -1 layout has been selected.

All these changes in the layout and capacity have improved the cycle efficiency of the plant which is the most dominant criteria in case of pumped storage projects and impacts the viability of the project directly.

In view of the above, only minimum unavoidable Reserve forest area is proposed for implementation of the project to generate the much needed green power to benefit the State and Country.

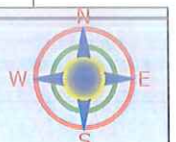
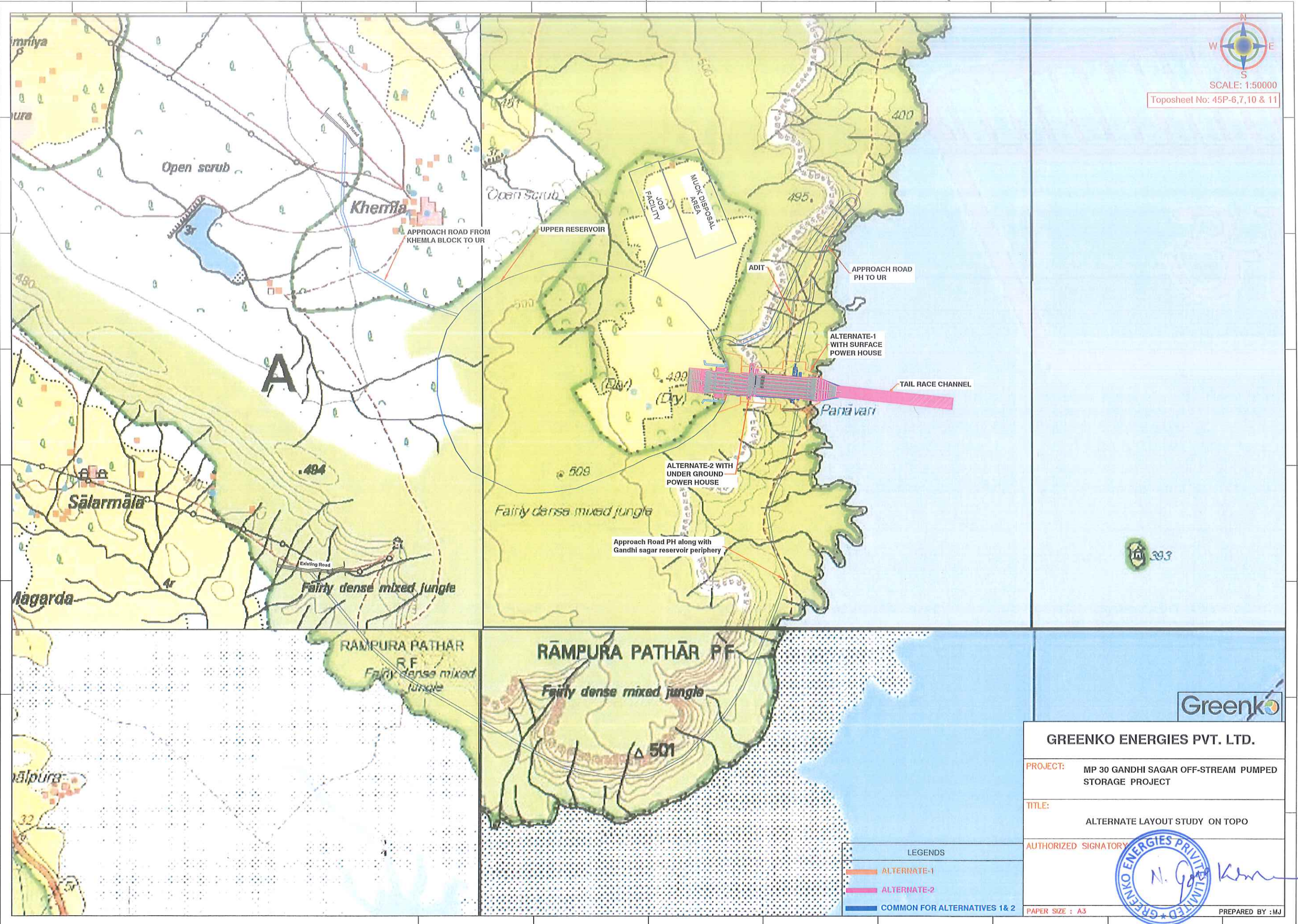
The comparative layout showing the alternatives is enclosed at Annexure

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# MP 30 GANDHI SAGAR OFF-STREAM PUMPED STORAGE PROJECT (1440 MW)



SCALE: 1:50000

Toposheet No: 45P-6,7,10 & 11

Greenko

GREENKO ENERGIES PVT. LTD.

PROJECT: MP 30 GANDHI SAGAR OFF-STREAM PUMPED STORAGE PROJECT

TITLE: ALTERNATE LAYOUT STUDY ON TOPO

AUTHORIZED SIGNATORY

N. G. K.

LEGENDS

ALTERNATE-1  
ALTERNATE-2  
COMMON FOR ALTERNATIVES 1 & 2

PAPER SIZE : A3

PREPARED BY : MJ