Full title of the Project	:	Construction of Shahpur (1800 MW) Pumped Storage Project by M/s Greenko Energies Private Limited, in Hanumanthkhera, Mungawali villages, G.P-Subhdhara; Baint Village, G.P-Bichi; Sahjanpur Villages, G.P-Kasba Nonera; Kaloni, Shahpur Villages, G.P-Mundiyar; Tehsil-Shahbad; Baran District, Rajasthan.
Proposal no	:	**FP/RJ/HYD/121439/2021**
Date of Proposal	:	03-02-2021
Diversion Area	:	407.8227 Ha

COMPARATIVE STATEMENT OF ALTERNATIVE

Three alternative layouts for this scheme were studied.

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

Alternative -2: Layout with underground Powerhouse in the same alignment of Alternative – 1 and other components of this scheme are Upper reservoir, Intake structure, Penstock / Pressure Shaft, Tail Race Tunnel, Tail Race Outlet, Tail Race Channel and Lower reservoir.

Alternative -3: Layout with underground Powerhouse located nearer to the north east corner of upper reservoir and other components of this scheme are Upper reservoir, Intake structure, Penstock / Pressure Shaft, downstream Surge Chamber, Tail Race Tunnel, Tail Race Outlet, Tail Race Channel and Lower reservoir.

Alternative -1

The Alternative – 1 layout is proposed with surface powerhouse. The surface powerhouse involves little deeper excavation since the 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 around 36 months excluding pre-construction works.

Alternative - 2

The Alternative – 2 layout is proposed in the same alignment of Alternative -1 layout with underground power house. The underground powerhouse requires Adit tunnels viz, Main Access Tunnel to Powerhouse Service bay and Transformer hall, Adit to Powerhouse 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 powerhouse and start works at powerhouse and involves generation of large muck quantities which will be difficult for dumping as it requires larger muck disposal areas.

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

Alternative - 3

The Alternative – 3 layout is located nearer to the north east corner of upper reservoir with underground power house. The underground powerhouse requires Adit tunnels viz., Main Access Tunnel to Powerhouse Service Bay and Transformer Hall, Adit to Powerhouse cavern top, Adit to Transformer cavern top, Bus duct tunnels etc. also, it involves construction of downstream Surge Chamber and long Tail Race Tunnel which need adit tunnels also for executing this component. This alternative is not considered due to the following reasons:

1. High Cost of the project
2. More construction Time
3. Involves more acquisition of land
4. With respect to Geological point of view, it may not be suitable to have underground cavern structures as the area is completely comprised with Semri Series Shale rock interbedding with thin sandstone beds

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

Proposed Scheme will involve construction of Rock fill embankments of average height of around 26 m in upper reservoir of Shahpur PSP. Similarly, the scheme involves construction of Rock fill embankments of average height of around 26 m in lower reservoir of Shahpur PSP. Intake structure and trash rack for eight number of independent pressure shafts will be taking off from Power block of Shahpur PSP upper reservoir. Surface Powerhouse will be located at about 825 m from the intake structure and shall be equipped with eight vertical-axis reversible Francis type units composed each of a generator/motor and a pump/turbine having generating/pumping capacity of 315MW / 309MW respectively. 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

Place : Hyderabad
Date : 20-06-2023

N. Gopi Krushna

Gopi Krushna N
Deputy General Manager (DGM)
Authorised Signatory
Greenko Energies Private Limited

(Gopi Krushna N)
Authorized Signatory
Greenko Energies Private Limited

Countersigned -
Divisional Forests Officer
Forest Division_____
Office Seal_____