ALTERNATIVES EXAMINED

SECTION – 10

Final Conclusions and Recommendations

After a comprehensive study for techno-economic feasibility and based on the optimum techno-economic benefits, it emerges that ALT 3B (Dam near village Thana with a short water conductor system) is the most technically feasible layout and is recommended to be adopted for the DPR studies.

Independent intake from the reservoir is desirable as it involves lesser cost and gives flexibility in independent construction.

Though ALT-1 results in higher design energy, but the additional costs of providing a 6.5 km long water conductor system are not commensurate with the additional energies as compared to ALT-3; hence it is not considered further for DPR studies. More over accommodating the power house with80+8MW units as Dam Toe power house for utilizing environmental flows has its own limitations of space and technical problems and so not taken up for DPR stage layout.

ALT-3B is technically preferable over other alternative layouts studied due to the following engineering considerations:

(A) Technical issues in ALT-1

(i) Weak Geology and the risks and surprises associated with 8.0 m dia., 6.5 km long HRT can delay the overall schedule of the project during construction as well as increase the overall project costs.

(ii) Poor Geological conditions to locate a 26m dia. 96 m high Surge Shaft.

(iii) Acceptable rock is not available at reasonable depth for power house foundation.

(iv) Two separate powerhouses, one for main units 6.5 km D/s of Diversion site and the other for environmental units at the dam toe will require additional maintenance staff and increased length of transmission line for connecting the powerhouses to the switchyard which ultimately makes the alternative more uneconomical due to additional costs.

(v) It is anticipated that the tail race channel proposed for the dam toe powerhouse could get washed away during the operation of extreme left spillway bay (No. 5). After detailed examination of the site geology, side spill/drop from the power house tail pool may have to be adopted which will require the power house setting to be raised resulting in reduction in energy generation.

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(B) Technical issues in ALT-3A

(i) Stress concentration at Dam toe in the Trapezoidal block when angular chute spillway alignment is considered.

(ii) Within reasonable skewed alignment for chute spillway, Ski jump trajectory from the Chute is not getting directed sufficiently within the river which can lead to scouring of the left bank and hill slope failures.

(iii) Straight Chute Spillway blocks on the left bank adjacent to Undersluice blocks are not feasible because it will require large curved alignment to discharge water directed to the river area or else the water from chute will cause damages to the left bank leading to slope failure.

(C) Technical issues in ALT-3C

(i) To accommodate the dam intake, the spillway is to be moved towards the left bank which will result in massive excavation on the left bank for the dam and for the plunge pool formation.

(ii) The diversion tunnels need to have adequate rock cover with the proposed penstock shafts. In order to provide adequate cover between the penstocks and the diversion tunnels crossing at different elevations, suitable arrangement of large concrete pedestals will have to be provided on the dam D/s face and, the penstocks will have to be turned sharply through compound bends and taken across the NOF block joints which involves additional costs.

Based on the above considerations ALT-3B with the following configuration is recommended for the DPR which can be further optimized based on the detailed Geological mapping and other considerations.

(i) Independent intake from the reservoir,

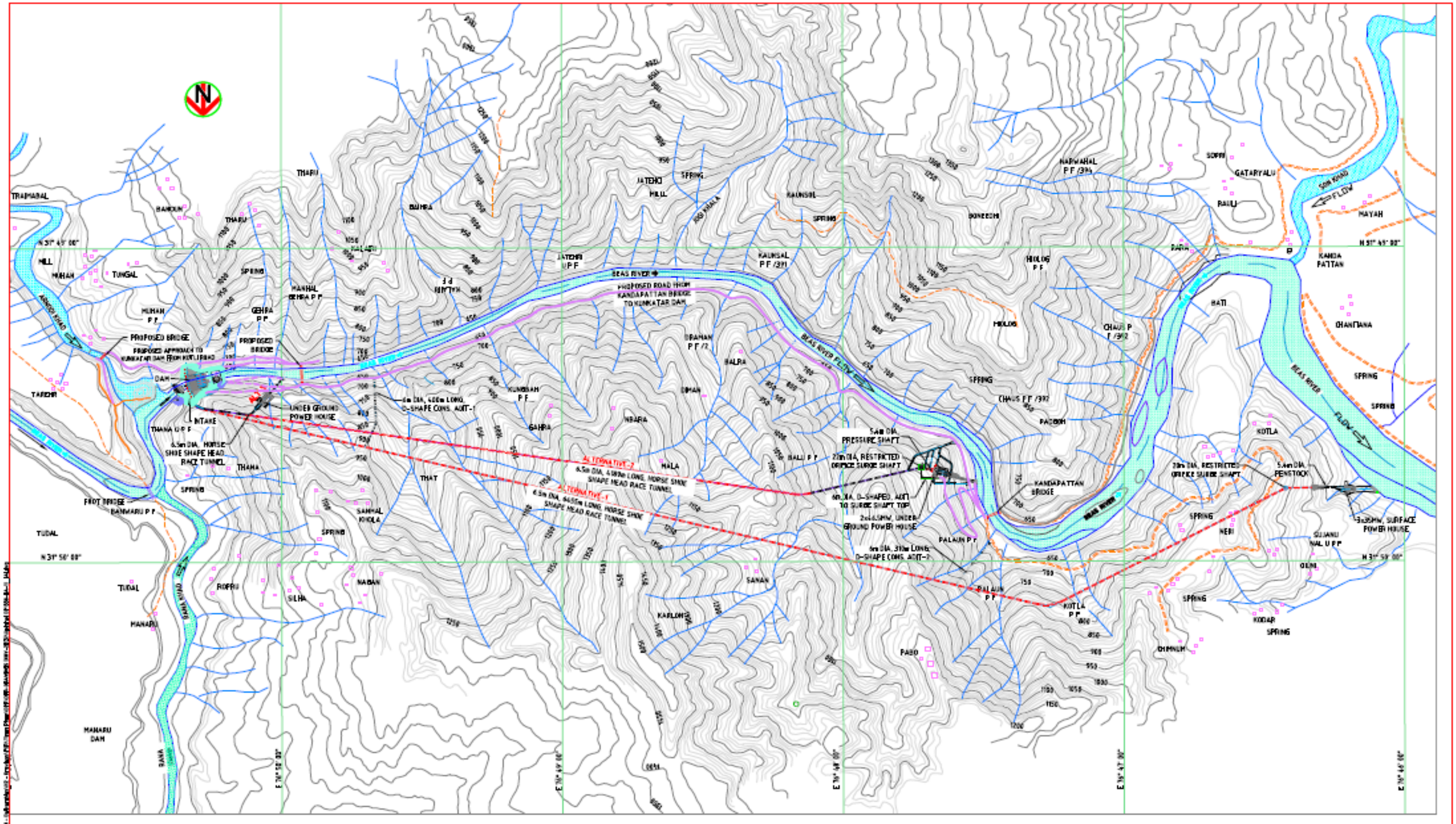
(ii) 9.8 m dia. and 90 m long Head Race Tunnel followed by pressure shaft,

(iii) **Underground power station housing 3 x 48 MW main units and 2 x 17 MW units for utilizing environmental flows.**

(iv) **Five Sluice spillway bays of size 11 m (W) x 15 m (H) with crest EL 670.0 m, with Ski-jump Bucket type energy dissipater, Bucket Invert EL 650.0 m with 35 m Radius.**

(v) Annual Design Energy (90% dependable year) is 631.59 GWh and Levellised Tariff At 90% Dep. yrs. is 5.96 Rs/KWh.

Since this option is technically preferable and gives lowest tariff over other alternative layouts studied it is recommended to be taken up for further DPR studies.



PROJECT ALTERNATIVES LAYOUT PLAN

SCALE (A1) 1:10000

No	Revision	SMEC	Date
A	ISSUED FOR APPROVAL	NA	12.11.13

CLIENT: HIMACHAL PRADESH POWER CORPORATION LTD.
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SCALES FOR A1: SCALE 1: 10000 (0 100 200 300 400 500m)

CONSULTANT: SMEC
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Client: HIMACHAL PRADESH POWER CORPORATION LIMITED
Project: THANA PLAUN HYDRO ELECTRIC PROJECT (3x50.33MW+2x20MW), H. P.
Title: PROJECT ALTERNATIVES LAYOUT PLAN

Original Size	Drawing Status	Drawing No.	Rev
A1	D.P.R.	1338-GA-11	A