Note containing justification for locating the Project in forest land

Selection of Proposed schemes

(a) Earlier Proposals

The Government of MP formulated proposals for Ken Multi-Purpose Project (KMPP) on the Ken river which is also known as Greater Gangau dam and accordingly a DPR (1982) was prepared. As per this DPR, the project envisaged construction of a dam across the Ken river about 210 m down stream of the existing Gangau weir. The proposed FRL of the Greater Gangau dam was 278.89 m and corresponding live storage was 2062 MCM. This project was expected to provide annual irrigation on 3.23 lakh ha in Chhatarpur and Laundi tehsils of Chhatarpur district and Ajaigarh tehsil of Panna district. In these proposals hydro power generation was also envisaged through construction of two Power Houses, one (PH-I) at the foot of the dam and the other (PH-II) on the left bank of Ken river at 630 m downstream from the first power house. The installed capacities of the Power Houses were proposed as 2 x 15 MW for PH -I and 2 x 10 MW for PH-II.

As an alternative to the KMPP Project proposed by the State Water Resources Department, Govt. of MP, Ken-Betwa link was studied. As per studies carried out by NWDA, it was proposed earlier that the above said Greater Gangau dam would be utilized as the head works for the link. For this purpose, the reservoir at Greater Gangau was planned with FRL of 284.2 m with live storage 2544 MCM, keeping the other features similar as per KMPP of MP. The Ken-Betwa link was proposed to off take from the tail race of the PH-I with FSL 245.5 m to transfer (1100 MCM) surplus waters of Ken basin to water short Betwa basin. Accordingly the preliminary feasibility report on Ken-Betwa link was prepared in 1990 by NWDA and circulated to all the concerned basin States. Based on the comments and discussions in the TAC and with basin states, these proposals were further reviewed and modified whereby it was opted to provide link canal alignment to off take at FSL 260.0 m as against the earlier proposed FSL 245.5 m. It was proposed mainly to serve the command area at higher elevations where the present level of irrigation is seen to be low. However it was observed that by the construction of the Greater Gangau dam, the existing Gangau weir which has been functioning well since 1915 will be submerged. It was, therefore, felt better to locate the dam upstream of Gangau weir with possibility of utilizing the arrangement for generation of hydropower as a pumped storage scheme.

(b) Proposals at FR stage

Keeping above suggestion in view, it was decided to realign the Ken-Betwa link with higher offtake level. To ascertain the potential reservoir sites on Ken river, toposheet studies of Ken basin were carried out in the upper reaches of Greater Gangau dam site. Three reservoir sites were identified viz., Jhalar reservoir (CA 18205 sq km), Ghari Ghat reservoir (CA 18055 sq km) and Daudhan reservoir (CA 19534 sq km) as shown in Plate:1.1 of Drawing Volume-I, were identified on Ken river in the downstream of its confluence with Sonar and Bearma tributaries with Ken with the obvious advantage of having adequate yield for the proposed irrigation in Ken basin as planned, as well as transfer of the requisite quantity of water through the link canal.

Several parameters like submergence area, capacity of the reservoir at different elevation, number of villages affected, forest and culturable areas under submergence etc. were studied and finally Daudhan dam site was found suitable, which is located near Daudhan village at 2.5 km upstream of Gangau weir. The catchment area at Daudhan site is 19534 sq km, which is only 0.16% less than that at Greater Gangau. Therefore, the same annual yield at Greater Gangau was adopted for Daudhan site also at feasibility level. This link envisaged construction of dam at Daudhan, 231.45 km long link canal including 2 km long tunnel at the beginning, two power houses and four upper Betwa Projects, viz., Neemkheda, Richhan, Barari and Kesari.

The FRL of Daudhan dam site was proposed as 287.0 m and the corresponding gross storage capacity was 2755 MCM. The project was planned to provide irrigation to 4.97 lakh ha (3.23 lakh ha in command area as envisaged KMPP project, 0.47 lakh ha in enroute command and 1.27 lakh ha in upper Betwa command). Apart from this, provision of 850 MCM of water was kept to meet the demand of Ken command in Banda district of Uttar Pradesh being irrigated through Bariarpur head works. Provision of 12 MCM of water was kept to meet drinking water requirement of enroute village of 231.45 m long link canal. While keeping the general operational features of the State KMPP proposal more or less the same, the power generation was proposed as under.

Power House at toe of dam was proposed to utilize the irrigation releases from the reservoir at the tail race water level at 234.75m. This Power House is proposed to function as a pumped storage power plant i.e. the water released would be further picked up by Gangau weir which can be pumped back to generate additional power during peak period. The other power house was planned at the exit of tunnel on the right bank of Pukhreha Nalla, 2 km away from the dam with a tail water level 259 m from where Ken-Betwa link canal offtakes. The other details of the proposal are already discussed above. It can be seen that this was preferable to the Greater Gangau dam site because (i) it would not submerge the existing Gangau weir, (ii) it would provide enroute irrigation to higher level command along the canal alignment and (iii) additional power generation by pumped storage scheme during peak period.

(c) Present proposal at DPR stage

A DPR as per outline of the project has been described in Para no. 1.1 has been prepared effecting certain changes in the proposal of FR and the same was circulated during February, 2009. Consequent to the comments of Govt. of MP in respect of proposed Upper Betwa projects, a Secretary level meeting between Governments of MP and UP was convened by the Ministry of Water Resources on 03.02.2010 at New Delhi to arrive at consensus and as per the decisions taken during the meeting, it has been proposed to reframe the DPR into two phases viz., Phase-I comprising of components of Daudhan dam complex and Phase-2 comprising of Upper Betwa projects as proposed by Govt. of MP. In order to avoid undue delay in implementation of link project, the present DPR of Phase-I of the Ken-Betwa link project is reframed with following changes in the proposal of FR.

(i) FRL of Daudhan dam has been raised from 287 m to 288 m without changing its location & orientation.

(ii) Two tunnels have been proposed instead of one tunnel at FR stage. First one is Upper Level tunnel from the exit of which, the Ken-Betwa link canal takes off and

other is Lower Level tunnel (newly proposed) from which the Ken LBC catering KMPP command takes off through proposed PH-II.

(iii) Length of link canal has been reduced from 231 km to 219 km approximately due to realignment.

(iv) PH-II proposed earlier at the exit of the Upper Level tunnel has been shifted to Lower Level tunnel.

Project planning and optimization of Benefits

Ken-Betwa Link Project, Phase-I has been planned as a multipurpose project with irrigation as a major benefit whereas power, drinking water supply and flood moderation are other incidental benefits. Planning of the project has been done in such a way that 75% available yield at Daudhan will be utilised first for in-basin requirement of Ken. Accordingly, command area of 2.41 lakh ha proposed under KMPP by Govt. of Madhya Pradesh is proposed to be provided for irrigation at 134% intensity of irrigation, thus achieving annual irrigation of 3.23 lakh ha utilizing 1405 MCM of water. Apart from this, about 2266 MCM of water has been earmarked for existing, ongoing & proposed projects of MP in upstream of Daudhan dam and 1600 MCM of water has been earmarked for existing Ken command in downstream of Daudhan dam to provide assured irrigation to a CCA of 2.13 lakh ha in Banda district of UP.

After meeting these requirements, 1074 MCM of water is proposed to be transferred through Ken-Betwa link, out of which 366 MCM of water (277 MCM for MP and 89 MCM for UP) will be utilized for irrigating 0.60 lakh ha. in enroute command at 100% intensity of irrigation and 49 MCM of water will be provided for drinking water supply to enroute villages & towns. Remaining 591 MCM (excluding transmission losses of 68 MCM) will be delivered to Betwa river through Barwa Sagar reservoir & Barwa nallah (natural stream) in the upstream of Parichha weir.

During the course of above planning, it was found that two Power Houses can also be installed one at the toe of the dam and the other at the exit of lower level tunnel to generate 78 MW of power (2x30 MW + 3x6 MW). Thus, benefits from the project have been optimized in following manner:-

I.	Irrigation Benefit	Annual Irrigation
	New Command	
(i)	Ken command (MP)	3.234 lakh ha
(ii)	Enroute command (MP+UP)	0.603 lakh ha
(iii)	Existing Ken command i.e. 2.13 lakh of UP (which is presently getting 850 MCM of water will get 1600 MCM of water after implementation of project, thus helping in stabilization of irrigation.)	2.520 lakh ha
	Total	6.357 lakh ha
II.	Power Benefits	
	Powerhouse-I	2x30 MW
	Powerhouse-II	3x 6 MW
		78 MW

III. Drinking water supply

Provision of 49 MCM has been kept for providing drinking water to enroute villages & towns, out of which 38 MCM has been earmarked for MP and 11 MCM for UP.

IV. Flood control benefits

Flood cushion will have to be maintained below MWL in the reservoir for which care will have to be taken while framing reservoir rule curves of the project year to year. Flood cushion above MWL has not been provided to reduce submergence of forest area. Release of water to link canal and regulated release of water in downstream of Daudhan dam will provide incidental benefit of flood moderation in Ken river in downstream area of the dam.

V. Other benefits

Many other incidental benefits like pisciculture, recharge of ground water in command area, development of agro based industries/food processing units, employment generation in construction phase and afterwards, development of tourist spots, development of infrastructure etc. will accrue from the project though enumeration and tangisation for these benefits has not been done due to time & data unavailability constraint. In any case they will increase the Benefit/Cost ratio calculated in this report after tangisation of these benefits. This will result in upliftment of socio-economic condition of people in general living in water scarce areas of Chhatarpur, Panna and Tikamgarh districts of MP and Banda, Mahoba & Jhansi districts of UP state lying in Bundelkhand region.