PSK
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Bangalore
April 16, 1994

To

The Deputy Chief Minister.
Government of Karnataka.

Subject: BEDTHI HYDRO POWER PROJECT.

Honorable Minister,

Kindly refer to our discussions on 6-3-94 regarding alternative proposals for Bedthi Hydro Power Project.

In this connection, we have enclosed a short report with computerized drawings (5) which brings out that the proposed Bedthi Project is extremely attractive and fully meets environmental requirements. Salient features and results of the study are clearly illustrated in the drawings and in "notes" contained in the drawings.

Some of them are:

1. There will be 6 Diversion weirs (not Dams) on Bedthi main stem, one on Koulgi, nine on Gangavalli downstream of Magod Falls, and one on Sonda. There will also be a 10 km long 3.5 m dia Sonda-Bedthi link tunnel.

2. In the First Phase, the Stage 7 (FSL 440 on Bedthi), stage 8 (FSL 80 on Gangavalli), stage 5 (FSL 462 on Bedthi) and stage 6 (FSL 460 on Koulgi) could be taken up. This will provide about 1000 million Kwh energy, annually.

3. In order to make the Project provide assured Firm Power even without co-ordinated operation with neighboring Storage Projects (Kali and Sharavathi) it may be necessary to take up Sonda Diversion weir along with the Link Tunnel. The additional energy due to the diversion for the Phase I scheme is about 300 million Kwh. This will increase to 500 million kWh when stages 8 to 15 are completed.

4. The electromechanical equipment for Phase I Power station as per Invoice obtained from Kvaerner Boving of U.K. is Rs. 900 million for Bedthi (2 units of 150 MW)+ Rs.45 million for Koulgi (1 of 5 MW)+ Rs. 240 million (1 of 40 MW)

= Rs. 1185 million or 118.5 crores.

5. The civil works estimate could be finalized on the basis of designs in progress. But approximate estimates indicate civil works cost may not exceed an aggregate Rs. 800 million. Hence the overall cost will be restricted to Rs. 200 crores in our designs.

6. The total submergence due to the Lakes of Phase I (stages 5,6,7 and 8) is about 1400 Ha and mostly forms the river bed, rock outcrops and naturally grown trees along the Banks. However 50 percent of this is considered as forest i.e 700 Ha. It may be pointed out that due to lakes and ingress of water at root level, the intensity of forest may increase from about 0.5 to 1.0. Moreover due to drawdown in run off river projects, the existing trees may not be affected.

7. The stages 5 and 6 could provide 500ha compensatory Forest and also irrigate another 500ha paddy as second crop in the existing agricultural lands.

8. Without considering benefits from afforestation and value of second Paddy Crop from irrigation the cost per kwh may be as low as 50 paise or with unforseen civil works the final cost will not exceed one rupee per unit.

9. The Benefits will increase considerably when all stages are taken up and completed. The computerized drawings and estimates will be put up after receipt of concurrence to our environmentally sound Planning Principles which is based on Water Balance, Energy Balance and Water Energy Balance studies in the Bedthi/Gangavalli Basin. Also all aspects related to water quality management in the reservoir, upstream and downstream of reservoirs during three stages baseline environment, reservoir formation and project operation will be described. They will take care of watershed land use, river characteristics, vegetation, soil characteristics, climatic aspects, flooding process, hydro thermal behavior, dissolved oxygen budget, circulation patterns, low level discharges, intake configuration, tributaries, delta, dry reaches, flow fluctuations, water quality parameter profiles and assimilation capacity etc will be outlined.

10. In the Bedthi Project most of the Plantations (Teak and Eucalyptus) are between 450 and 470m. Hence in our approach we have split the Bedthi reservoir into 3 lakes 462 on Bedthi near Siddalgundi, 460m on Koulgi and 440m on Bedthi at Magod. The Lakes regulate the flows to provide water for

second crop (paddy) and improve density of forest (Between Koulgi and Bedthi) from 0.4 to 1 intensity.

1. Thus the loss of about 200 crores due to submergence of agricultural land and forestry which was considered in the earlier proposal (468.8m FSL) could be considered on the income side. Regarding hydro power, it was seen that 60 to 70 percent of annual energy in the Bedthi is concentrated in 3 to 4 monsoon months. In order to obtain the balance 30 to 40 percent energy submergence of 6000 Ha was earlier required which makes the project uneconomical. Moreover, the TWL is now increased from 467m to 480m which reduces the expensive water conductor system to 30 percent of the original figure and thus Civil Works are minimized. This also helps us to absorb the Sonda monsoon flows between 80 to 60m in large capacity single unit Power House (stage 8) at Kelasi which will provide construction Power for the Bedthi Project. The dry weather flow (mainly subsurface return flow from the Sonda-Pattanada Halla basin) is diverted to the already created Bedthi Lake instead of creating huge reservoirs on Sonda, Pattanada Halla and Billi Halla necessitating link tunnels, pressure shafts, underground power house etc. All these facilities available at Bedthi are used. Hence saving in submergence and knocking off ecological problems. We finally point out that the Basic Principle outlined above are drawn from the intellectuals of the Bedthi Basin and put in the form of a report with neat drawings for ease in understanding of the project by decision makers.

The Project (16 Diversion structures and power stations) could be handled partly by "Blue Print approach" and remaining by "Learning Process approach". This could be elaborated later. We are preparing a "Concession Package" which could be priced by KPCL to attract Entrepreneurs, or Independent Power Developers/utilities on competitive basis and who can handle the remaining/urgent site investigations and initiate preliminary works for early start of the most promising Bedthi/Gangavalli Project. The packages are normally considered confidential and similar packages prepared by us for other countries could be shown.

Your Faithfully

(A.S.Chelvaraj)

(A.C.Sivaguru)

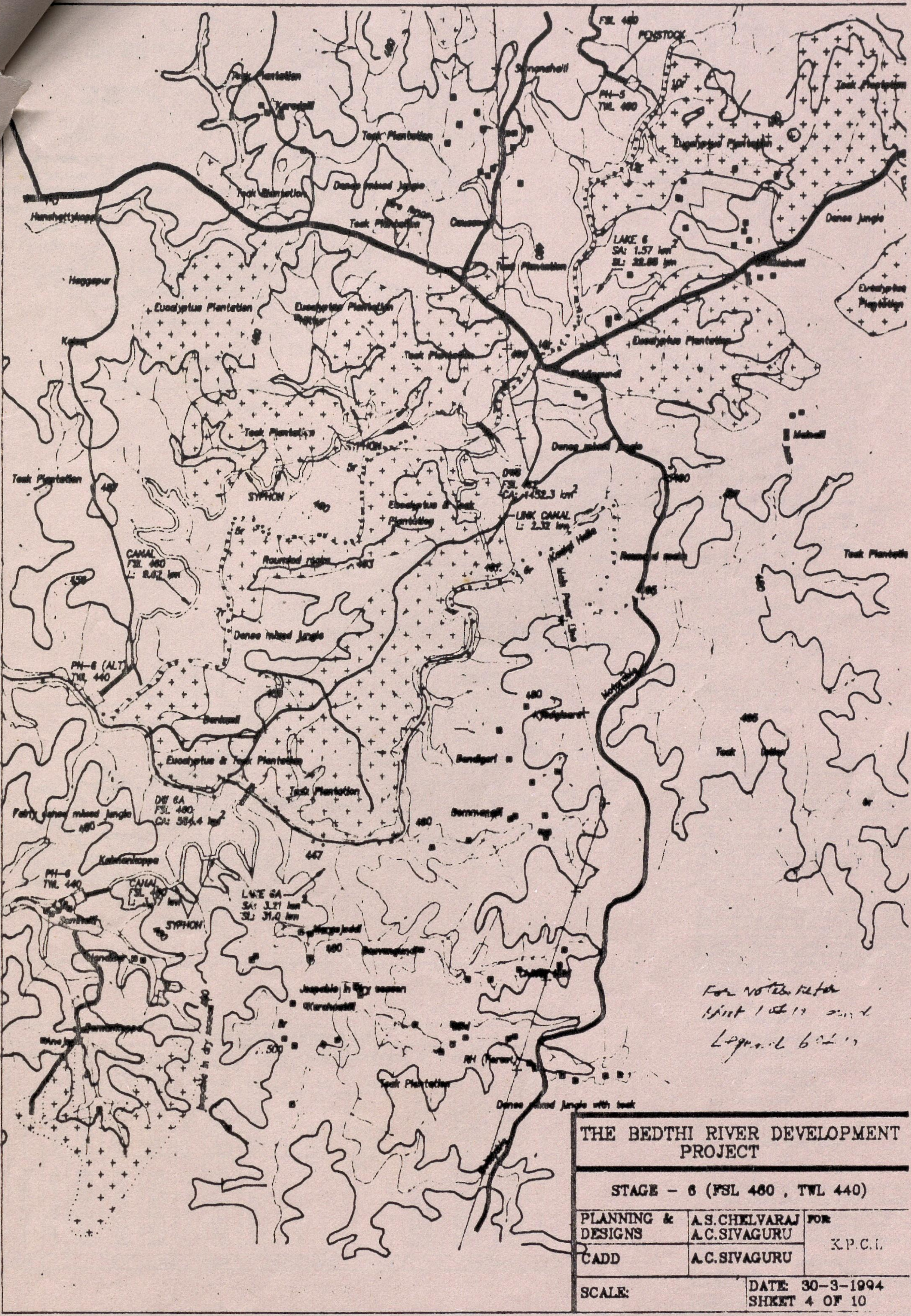
Copy to:

1. The Managing Director,
   Karnataka Power Corporation Ltd.

2. Mr. G.S.Hegde, Hulgod
   President,
   Bedthi Aghanashini Kolla Samrakshana Samiti
   Sirsi 581401.

Enclosures:

1. Bedthi river basin and proposed projects through Digital Terrain Modelling.
2. Drainage network, Hydrometerological stations and diversion weir sites.
3. Bedthi project layout for FSL's 480, 460 and 440m.
4. Bedthi project longitudinal profile with proposed diversion weir sites and power stations.
5. Sonda - Bedthi diversion proposal



For notation refer Sheet 1 of 10 and Legend 6 of 10

THE BEDTHI RIVER DEVELOPMENT PROJECT		
STAGE - 6 (FSL 460 , TWL 440)		
PLANNING & DESIGNS	A.S.CHELVARAJ A.C.SIVAGURU	FOR: K.P.C.L
CADD	A.C.SIVAGURU	
SCALE:		DATE: 30-3-1994 SHEET 4 OF 10

DETAIL AT 'X' WITH LAYOUT ALTERNATIVE FOR SCHEME 7

SCALE 1:75000

NOTES

The Bedthi river carries negligible flows upto site 6 and thereafter due to increase in precipitation from Kaulgi and Sonda basins the flow increases considerably. Kaulgi joins upstream of Bedthi reservoir but Sonda joins downstream of the Bedthi reservoir. In order to reduce submergence of land and other plantations a small diversion weir is proposed on Kaulgi and flows diverted to Bedthi. Sonda and Pattanad Halla are diverted through a link tunnel into Bedthi reservoir. There is no need to divert Sonda to Bedthi reservoir in monsoon months (July to November). The diversion from Sonda during dry season (December to June) is useful and allows use of smaller diameter link tunnel and thus reduces cost of diversion and increases benefit to an extent of 880 million kWh energy from stage 7 to 15. Out of this, stage 7 alone contributes 400 million kWh.

The active storage of stage 3 is 12.40MCM. It is assumed that about 10 MCM is available for irrigation and afforestation. Each hectare needs 10000 cubic metres of water. Hence in 10MCM 1000 ha can be irrigated. Five thousand hectares is considered for paddy as a second crop and another 300 ha for afforestation. The benefit per hectare from paddy is 3000kg annually valued at Rs. [illegible] million. The benefit through afforestation is 0.25 million Rupees per hectare annually for about fifty years, i.e. 100 million Rupees per year.

LEGEND

- RIVER
- DAM/DIVERSION WEIR
- INTERVENING CATCHMENT AREA BOUNDARY
- EXISTING ROADS
- RAIN GAUGING STATION
- [illegible]
- GROUND LEVELS

REFERENCE

SURVEY OF INDIA TOPO SHEETS 1:250000

SUMMARY OF PROJECT FEATURES IN BASIN

DW NO	FRL (m)	CA (SQ KM)	LAKE SURFACE AREA (SQ KM)	LAKE SHORE LENGTH (KM)	DRAW DOWN (m)	ACTIVE STORAGE (MCM)	TWL (m)	CANAL LENGTH (km)	IRRIGATION (ha)	AFFORESTATION (ha)	QI (CUM/S)	Hd (m)	POWER (KW)	E (GWh/yr)
1	530	803	0.33	6.12	2	0.06	515	-			12.50	10.00	2 x 1800	1500 without Sonda / 3000 with Sonda
2	510	882	0.56	11.08	3	1.16	510	-			12.50	10.00	2 x 1000	
3	500	923	1.24	12.58	10	12.40	480	15.36			12.50	20.00	2 x 2000	
4	480	1266	8.14	31.40	10	31.4	480	7.00	About 3000 ha from stage III storage only.	About 3000 ha from stage III storage only.	12.50	20.00	2 x 2000	
5	460	1462	1.87	22.66	10	15.7	440	8.82			26.00	20.00	2 x 5000	
6	460	508	3.21	31.00	10	32.10	440	3.37			-	-	-	
7	440	2263	6.71	63.00	30	88.00	80	1.17			80.00	360.00	2 x 190000	
											12.50	360.00	1 x 40000	
8	80	2894	1.69	14.56	10	16.9	60	-			250.00	20.00	1 x 40000	
9	60	3005	1.42	14.58	5	7.10	50	-			250.00	10.00	1 x 20000	
10	50	3359	4.53	32.35	7	31.7	35	-			250.00	15.00	1 x 35000	
11	35	3369	2.76	13.10	2	5.52	30	-			250.00	5.00	1 x 10000	
12	30	3416	1.17	8.60	2	2.34	25	-			250.00	5.00	1 x 10000	
13	25	3536	2.73	14.33	5	13.6	15	-			250.00	10.00	1 x 20000	
14	15	3670	1.06	8.34	2	2.12	10	-			250.00	5.00	1 x 10000	
15	10	3711	3.43	18.40	2	6.86	5	-			250.00	5.00	1 x 10000	
16	5	3692	15.89	43.63	2	31.78	0	-			250.00	5.00	1 x 10000	
TOTAL			46.46	347.36		306.34		38.47	3000.00	3000.00			23 822000	

THE BEDTHI RIVER DEVELOPMENT PROJECT	
DRAINAGE NETWORK & HYDROMETEOROLOGICAL STATIONS WITH DIVERSION SCHEMES	
PLANNING, DESIGNS & CADD BY: A.S. CHELVARAJ, A.C. SIVAGURU	FOR: KARNATAKA POWER CORPORATION LIMITED, GOVERNMENT OF KARNATAKA
SCALE 1:375000	DWG NO. /Ka1-2