

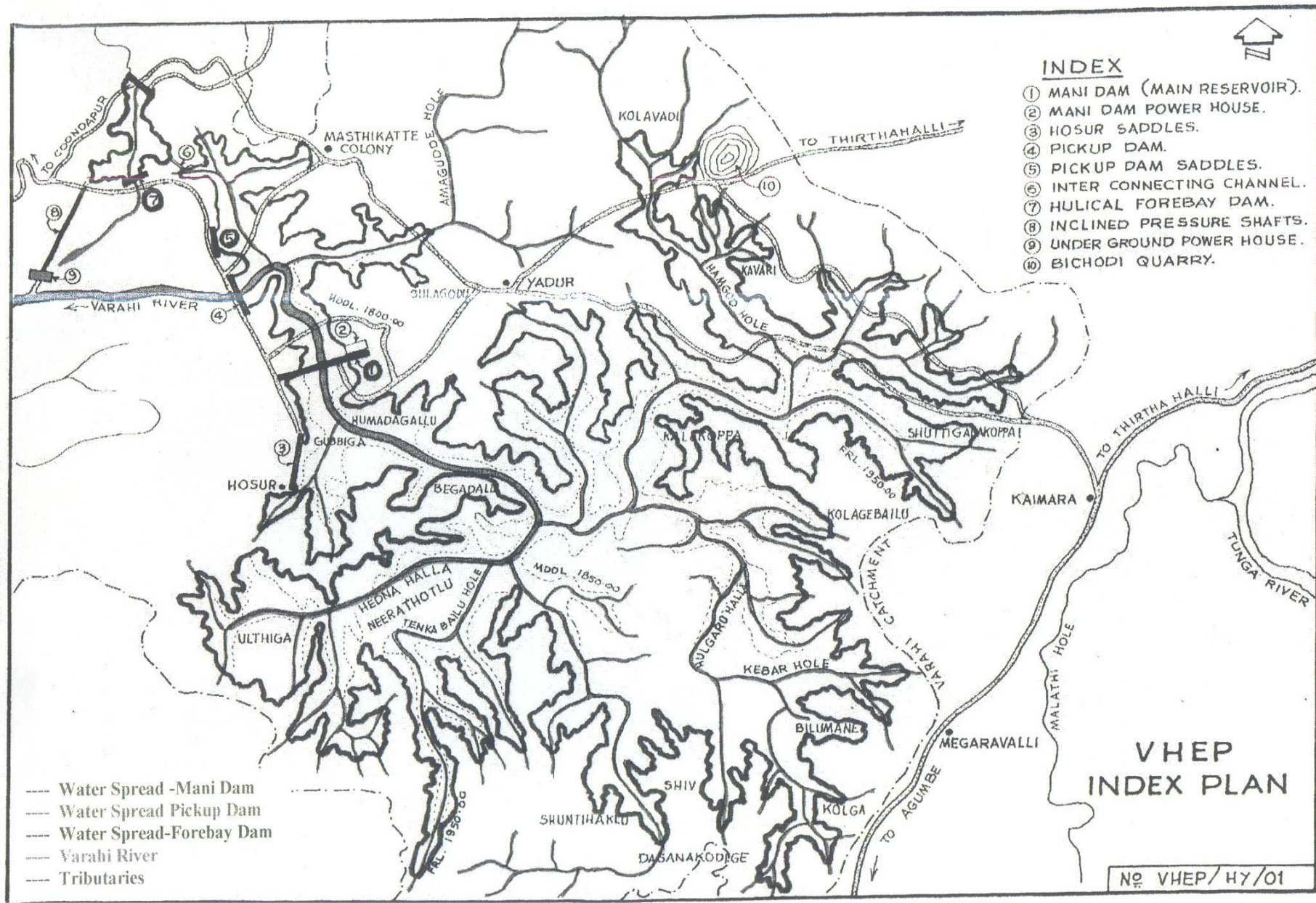
KARNATAKA POWER CORPORATION LIMITED

**VARAHI HYDRO ELECTRIC PROJECT
INFORMATION FOR ENGINEERING DATA**

Sl.No	DETAILS	HULICAL FOREBAY DAM
A.	GENERAL:	
1.	Name of the dam/project.	Hulical fore bay Dam / Varahi Hydro Electric Project
2.	Location.	State:Karnataka; District:Shimoga, Taluk-Hosanagar. Long 75° 00' 57"E, Lati-13° 42' 45"N
3.	Type of dam.	Earthen Embankment
4.	Year of completion.	1989
5.	Height of dam.	42.00m above the deepest foundation.
6.	Impounding capacity at FRL/MWL	15 Mcum/15 Mcum
7.	Index map of the dam.	Enclosed as Annexure -1
B	PROJECT FEATURES:	
1.	Salient features.	Details furnished in the proforma for Salient features of the Project.
2.	Construction drawings.	Available
3.	Emergency preparedness.	Enclosed as Annexure-2.
C	HYDROLOGY:	
1.	Description of drainage basin.	The total catchment area of varahi river is 221.38 Sq.Km.& Hulical fore bay dam is having 9.42 Sq.Km.of indepenent catchment area,with an average rain fall of 6350mm.and is subject to heavy rain fall during the south-west monsoon which extends from June to September.
2.	Design inflow flood.	4476.00 cumecs i.e.,158070 Cusecs.
3.	Spillway discharging capacity and flood routing criteria.	No independent spillway is provided for this dam.The reservoir of Hulical fore bay dam is connected with the reservoir of Varahi Pick up dam by an inter - connecting channel . Both the reservoirs are inter connected above MDDL. The reservoir can be operated through 5 number of radial gates each of size 15m x 12m with total discharging capacity of 4476 Cumecs provided in the Pick up dam and also water letting out to the Varahi under ground Power house through intake.

4.	Area capacity curves.	Enclosed as Annexure-3
5.	Elevation of crest and details of spillway.	No spillway is provided
6.	Details of outlet works.	No outlet works are provided
7.	Emergency drawdown capacity.	Enclosed as Annexure- 4
8.	Hydro meteorological data.	The hydro meteorological details are being collected daily and sent to CWC and other offices.
D.	GEOLOGY & FOUNDATION:	
1.	Geological map profiles and cross section.	Available
2.	Effects of geology on design.	All the geological aspects have been considered while designing the dam.
3.	Adequacy of investigation.	The investigations have been extensively carried out before construction of dam.
4.	Foundation treatment.	Curtain grouting have been done through cut off trench up to a depth of 20 m. .
5.	Cut-off.	Cut off trenches have been provided.
E.	Construction history.	The construction of Hulical Forebay dam of VHEP was taken up during 1978 & completed during 1989. Detailed History of the project is available.
F.	Operation and regulation plan under normal and other emergency.	The reservoir of Hulical fore bay dam is connected with the reservoir of Varahi Pick up dam by an inter - connecting channel . Both the reservoirs are inter connected above MDDL. The reservoir can be operated through 5 number of radial gates provided in the Pick up dam and also water letting out to the Varahi under ground Power house through intake.
G	Operation record-during past major floods.	No major floods are observed in the past .However, operation records are maintained at site
H	Stability and stress analysis of the dam.	Available
I	Instrumentation records.	Maintained.
J	Any known deficiency.	Nil

Chief Engineer(Civil Designs)



NOTE ON THE EMERGENCY PREPAREDNESS

Following are the Emergency Preparedness of the Organization:

1. Prior to onset of monsoon flood zone markings will be painted for different discharges.
2. Monsoon protocol has been drawn by KPCL in respect of flood warning system. As per the protocol, three warnings will be issued. The 1st warning will be issued when the reservoir reaches 65% of its capacity. The 2nd warning will be issued when the reservoir reaches 75% of its capacity and the 3rd and final warning will be issued when the reservoir reaches 85% of its capacity. The flood warning notification will be sent to all the elected representatives of the district, State Government officers such as Chief Secretary, Secretaries of Energy & Public Works Departments, and Revenue Department including District, Taluk and Local administrations and to the Officers of KPCL. Announcements will be made through AIR, Doordarshan and other TV channels. Even public address system will be resorted to before releasing the water from reservoirs.
3. The control room will be set up at the downstream of the dam at Taluk headquarters. The KPCL personnel will be posted to monitor the activities. With the help of police, the persons living at the low-level areas will be asked to shift to higher elevation places along with their live stock.
4. The KPCL authorities will inspect the downstream areas along with the local administration.
5. Before release of floods, announcements will be made through public address system. The administration will be alerted so that no untoward incidents take place.

6. Soon after the release of floods, the KPCL authorities will inspect the area so as to ensure the safety of public along with their live stock.
7. When the floods starts receding, the area will be inspected once again to assess the havoc that might have caused due to floods.

Other areas where EPP is prevailing:

Sl. No.	Requirement	Status in KPCL.
1.	Emergency identification and evaluation.	The Executive Engineer who is in charge of dams will receive instructions from their respective Chief Engineers. Depending upon the seriousness, the situation will be evaluated.
2.	Preventive actions.	The necessary men, materials and machinery will be mobilised for taking preventive actions.
3.	Notification procedure.	The official designate are identified.
4.	Notification flow chart.	The procedure is enumerated above.
5.	Communication systems.	Both internal and external communications are existing. The communication systems that are available are; <ul style="list-style-type: none"> • VHF. • Internal telephones. • P&T. • Fax. • E-mail. • Mobile phones.
6.	Access to site.	All weather roads are available to access the dams and appurtenant structures.
7.	Response during period of darkness.	Adequate lighting is provided. And alternate source of power supply is available to tackle the situation in case of power failure.
8.	Response during period of adverse weather.	The dams are situated in the western ghats of Karnataka. The question of extreme cold, snow, storms does not prevail.

Sl. No.	Requirement	Status in KPCL.
9.	Sources of equipment.	The KPCL is having its own equipment for handling the crisis. Apart from this, a list of contractors who possess the required equipment are also available in site and will be made use of as and when the situation arises.
10.	Stock piling supplies and materials.	The location and availability of stockpiled materials and equipment for emergency are identified, and action will be taken when the situation arises.
11.	Emergency power sources.	Apart from supply of power from grid, DG sets are available to act as standby.
12.	Inundation maps.	KPCL has constructed dams across west flowing rivers such as Varahi, Sharavathi & Kali rivers and their tributaries only to generate power and most of the river course runs in the gorge portion of hilly terrain and therefore no habitation is observed on the downstream of the dams except few locations on the downstream of Supa, Kadra and Gerusoppa dams for which demarcation has been done for various spillway design / maximum observed discharges to ensure public safety on the downstream. Since, the action plan for implementation of National Water Policy 2002 stipulates for carrying out "Flood Plain Zoning Maps" / Inundation Maps action has already been taken for the same.
13.	Warning systems (if used)	Please vide Para-2

**KARNATAKA POWER CORPORATION LIMITED
VARAHI HYDRO ELECTRIC PROJECT
AREA CAPACITY TABLE OF HULICAL FORE BAY RESERVOIR**

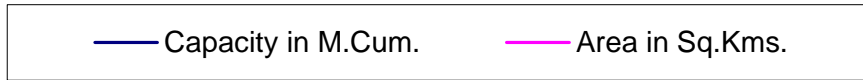
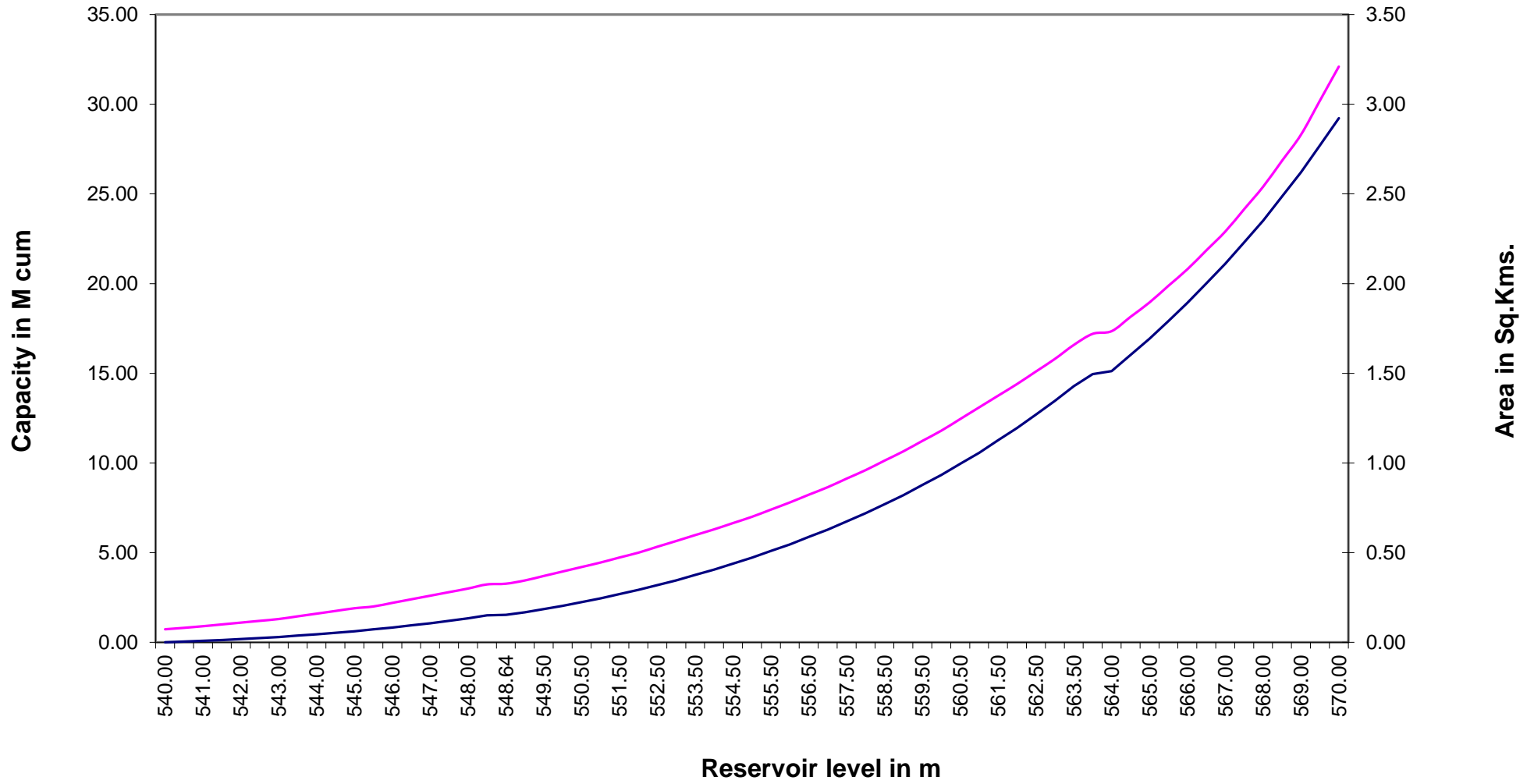
Annexure-- 3

Reservoir levels in	Area in Sq.km.	Capacity in M.Cum.
540.00	0.073	0.000
540.50	0.081	0.040
541.00	0.090	0.081
541.50	0.100	0.131
542.00	0.110	0.184
542.50	0.120	0.241
543.00	0.130	0.301
543.50	0.145	0.373
544.00	0.160	0.446
544.50	0.175	0.533
545.00	0.190	0.620
545.50	0.200	0.721
546.00	0.220	0.825
546.50	0.240	0.945
547.00	0.260	1.065
547.50	0.280	1.205
548.00	0.300	1.345
548.50	0.323	1.506
548.64	0.327	1.538
549.00	0.345	1.667
549.50	0.370	1.852
550.00	0.395	2.037
550.50	0.420	2.247
551.00	0.445	2.457
551.50	0.473	2.693
552.00	0.500	2.929
552.50	0.533	3.195
553.00	0.565	3.461
553.50	0.598	3.76
554.00	0.630	4.058
554.50	0.665	4.391
555.00	0.700	4.723
555.50	0.740	5.092
556.00	0.780	5.463
556.50	0.823	5.874
557.00	0.865	6.285
557.50	0.913	6.741

558.00	0.960	7.197
558.50	1.013	7.703
559.00	1.065	8.209
559.50	1.123	8.77
560.00	1.180	9.331
560.50	1.245	9.953
561.00	1.310	10.575
561.50	1.375	11.262
562.00	1.440	11.95
562.50	1.510	12.704
563.00	1.580	13.459
563.50	1.658	14.288
563.90	1.720	14.950
564.00	1.735	15.116
564.50	1.815	16.023
565.00	1.895	16.930
565.50	1.988	17.924
566.00	2.080	18.917
566.50	2.185	20.009
567.00	2.290	21.101
567.50	2.415	22.308
568.00	2.540	23.515
568.50	2.685	24.857
569.00	2.830	26.199
569.50	3.020	27.708
570.00	3.210	29.217

VHEP-HULICAL FOREBAY-AREA CAPACITY CURVE

Annexure-- 3



KARNATAKA POWER CORPORATION LIMITED.

Emergency drawdown in respect of KPCL dams.

VARAHI HYDRO ELECTRIC PROJECT.

Hulical fore bay Dam;

No independent spillway is provided for Hulical forebay dam. The reservoir of Hulical fore bay dam is connected with the reservoir of Varahi Pick up dam by an inter - connecting channel . Both the reservoirs are inter connected above MDDL. The details are as under.

		Combined Capacity of Pick up dam and Hulical forebay dam	Combined water spread area
		M.Cum.	Sq.kms
Top of dam.	RL 567.60 m.		
FRL.	RL 563.88 m.	82.35	6.99
MWL.	RL 563.88 m.	82.35	6.99
Crest.	RL 551.88 m.	22.36	3.37
MDDL.	RL 557.00 m.	42.48	4.75
Design inflow flood.	4476 cumecs.		
Spillway gates.	Radial type 5 nos. of 15m x 12 m height.		
Location, sill level and capacity of low level outlets and scouring sluices	One each in 5 th & 6 th block at RL 539.00 of Pick up dam and of size 1.50mx 2.50m.		

The reservoir can be operated through 5 number of radial gates provided in the Pick up dam with max. discharging capacity of 4476 cumecs and also water letting out to the Varahi under ground Power house through intake. Also the floods can be discharged through sluices to the river course, which joins the Arabian Sea.

KARNATAKA POWER CORPORATION LIMITED
SALIENT FEATURES OF HULICAL FORE BAY DAM OF KPCL COMING UNDER VARAHI HYDRO ELECTRIC
PROJECT

SI.No	Particulars	Hulical forebay dam
1	Name of the Project	Hulical forebay dam/VHEP
2	Name of Stream / Sub - basin	Hulical nala
3	Location	
	a) Nearby village / town	Hulical
	b) Taluk	Hosanagar
	c) District	Shimoga
	d) Latitude	13° 42' 45"N
	e) Longitude	75° 00' 57"E
4(i)	Year of commencement of work	1979
(ii)	Year of completion / target for completion	1989
5	Catchment area in Sq.km (Sq.miles)	9.42 Sq.km(3.64 Sq.miles)
6	Planned utilization in Mm3 (TMC)	Not applicable since the dam is constructed only for power generation.
	a) Withdrawals by canals	
	b) Reservoir losses	
	c) Cross utilization	
7	Irrigable area in ha. (acres)	
8	Submersion	
	a) Area in ha (acres)	90.65 Sq Kmts(34.99Sq.Miles) for entire VHEP Project
	b) Villages affected (Nos)	28 for entire VHEP Project
	c) Population effected (Nos)	7200 for entire VHEP Project i.e 1475 families
9	Dam	
	a) Type	Earthen dam
	b) Height in mtrs (Ft.)	42.00
	c) Length in mtrs (R)	412 m
	d) MWL (mtrs)	563.88

10	Spillway	Not provided
	a) Location	Not applicable
	b) Length (Mtrs.)	Not applicable
	c) Discharging capacity (cumecs)	Not applicable
	d) Gates	Not applicable
	i) Type	Not applicable
	ii) Nos.	Not applicable
	iii) Size (in mtrs)	Not applicable
11	Storage in (Mm3) (Mcft)	
	a) Gross	15 Mcum
	b) Live (above sill)	8.70 Mcum above MDDL
12	Canal System	Not applicable since the dam is constructed only for power generation.
	a) Length (Km)	
	b) Capacity (cumecs)	
	c) Area irrigated / contemplated in hectares / (acres)	
13	Crop pattern in Hectare (acres)	
	a) Mulberry	
	b) Khariff paddy	
	c) Khariff semidry	
14	District wise / Taluk wise Atchkat in Hectares (acres)	
15	Cost of the project	
	a) Original	627.34 Crores for entire Varahi Hydro Electric Project
	b) Revised	
16	Stage of the project as on Mar - 91.	Completed

Chief Engineer(Civil Designs)

KARNATAKA POWER CORPORATION LIMITED.

Performance report of reservoir.

Name of the reservoir :- Hulical fore bay dam

Name of the project :- VARAHI HYDRO ELECTRIC PROJECT.

Sl. No.	Particulars.	As contemplated in the project.	As per actuals.										Remarks.	
			1999-2000	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09		
1	Storage capacity of reservoir in Mm ³ .													
	a.Gross storage in M.Cum.	82.352*												
	b.Live storage in M.Cum.	39.874*												
2.	Reservoir levels in meters.													
	a.FRL in meters.	563.88												
	b.Water level (in metres) in the beginning of June.		The details furnished for Varahi pick up dam are holds good for this dam also, since the reservoirs of Varahi Pick up dam and Hulical fore bay dam are interconnected by a channel above MDDL and forming a combined reservoir having a spillway at Pick up dam. .											
3.	Inflow at dam site during the irrigation year.(In M.Cum).													
4.	Actual storage at the beginning (Mm ³) of the year as on 31 st May.													
5.	Quantity of water allotted for irrigation.													This entire scheme is purely for the purpose of Hydro Power generation. Hence this is not applicable
	a.Khariff.													
	b.Rabi.													
	c.Summer.													
6.	Total release of water in canal for													
	a.Irrigation.													
	b.Water supply.													
7.	Actual water used for irrigation.													
	a.Khariff.													
	b.Rabi.													
	c.Summer.													
8.	Total extent of area irrigated in Ha.													
	a.Khariff.													
	b.Rabi.													
	c.Summer.													
9.	Details of crop grown in command area.													
	a.Khariff.													
	b.Rabi.													
	c.Summer.													

Note: * Combined storage capacity of Pick up and Hulical Fore bay reservoirs.

Chief Engineer (Civil Designs)