Note on Ganjal Dam Alternate alignment studies

In the proposed Ganjal Dam depending upon the topography and Geological condition three different alternate dam sites have been explored whose details are shown in the below mentioned table.

S. No.	Particulars	Latitude/Longitude	Length in (m)	Catchment Area in Sq. Km.	Storage in MCM	Submergence area in Ha.	
						Forest Land	Other Land
1	Alternate Dam Alignment No.1	22^0 14' 7.8" 77^0 19' 58.3"	2528	415.20	91.50	1015.85	97.17
2	Alternate Dam Alignment No.2	22^0 13' 11.0" 77^0 20' 13.8"	920	406.37	86.00	838.32	97.17
3	Final Dam Alignment	22^0 13' 47.27" 77^0 19' 50.58"	1148	413.49	86.803	736.07	97.17

Alternate Dam Alignment No.1:

This alignment is having Dam length of 2.528 Km and proposed storage of this dam alignment is 91.50 MCM with F.R.L of 377.00m, the submergence area works out to 1015.85 Ha. As compared to its storage its submergence area is more. Moreover it's also submerges two village habituations. This alignment is techno economically not feasible.

Alternate Dam Alignment No.2:

This alignment is having Dam length of 0.920 Km proposed storage of this dam alignment is 86.00 MCM with F.R.L of 380.00m, the submergence area works out to 838.32 Ha. This alignment is having shorter length but its foundation is coming in weaker zone, moreover in the initial reach of proposed left bank canal 2 to 3 Km length the may have to run in the steep terrain which will not be technically feasible.

Considering its foundation aspects of Dam and steep terrain involvement in the initial reach of canal this proposed alignment is Techno economically not found feasible.

Final Dam Alignment:

This alignment is having Dam length of 1.148 Km and proposed storage of this dam alignment is 86.803 MCM with F.R.L of 376.067m, the submergence area works out to 833.24 Ha. This alignment submerges only one village.

Compared to other two alternate dam alignment, this alignment is having lesser submergence area and its foundation is very good and this alignment is Techno economically found feasible.

Comparative Study of Minimum demand for forest land from the three alternative proposals

(1) Ganjal Dam

Sl.No	Forest Division	Range	Forest Block	RF / PF	Compartment No	Storage capacity (Mcum)	Affected Area (Ha)	Irrigated Area (Ha)
(1) FRL: 376.067	Harda	Temagaon	Javardha	RF	126	86.803	55.27	52205
				RF	128		32.87	
				RF	129		170.79	
				RF	130		28.61	
				RF	132		89.77	
				RF	135		4.69	
				RF	136		6.92	
				RF	144		68.68	
				RF	149		17.25	
			Mahuakhal	RF	134		35.33	
				RF	146		41.38	
				RF	147		65.78	
				RF	148		113.86	
		Rehatgaon	Javardha	RF	112		1.86	
				RF	113		3.02	
	Total Forest Submergence						**736.07**	

(2) FRL: 377.00	Harda	Temgaon	Javardha	RF	126	91.50	76.92	52205
				RF	128		42.72	
				RF	129		210.45	
				RF	130		32.03	
				RF	132		103.67	
				RF	135		46.36	
				RF	136		34.48	
				RF	144		107.01	
				RF	149		45.06	
				RF	137		4.00	
				RF	150		0.79	
			Mahuakhal	RF	134		43.06	
				RF	146		48.33	
				RF	147		77.95	
				RF	148		124.01	
		Rehatgaon	Javardha	RF	112		11.71	
				RF	113		7.29	
	Total Forest Submergence						**1015.85**	

(3) FRL: 380.00	Harda	Temgaon	Javardha	RF	126	86.00	93.48	52205
				RF	128		52.83	
				RF	129		220.09	
				RF	130		40.15	
				RF	132		57.39	
				RF	149		60.90	
				RF	150		2.28	
			Mahuakhal	RF	146		47.03	
				RF	147		82.63	
				RF	148		144.38	
		Rehatgaon	Javardha	RF	111		0.65	
				RF	112		25.25	
				RF	113		11.26	
	Total Forest Submergence						**838.32**	

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Bhopal (M.P.)

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Morand Ganjal Complex Irrigation Project

Executive Summary

Morand Ganjal Irrigation Project is proposed on rivers Morand and Ganjal which are the tributaries of Narmada River in Hoshangabad and Harda District respectively of Madhya Pradesh. Morand Dam is proposed near Morghat village of Seoni Malwa Tehsil of Hoshangabad District whereas Ganjal Dam is proposed in the Jawardha Village of Rehatgaon Tehsil of Harda District. 52205 Ha of irrigation in Hoshangabad, Harda and Khandwa is proposed through the project. Added to this provision of drinking water for 211 villages located within command area and Seoni Malwa town is also made in the project.

Irrigation is proposed in 28 villages of Hoshangabad District, 121 villages of Harda Districts and 62 villages of Khandwa Districts. Irrigable command area of the project is 52205 hectares. However, with irrigation intensity of 135%, annual irrigation of 70477 Hectares can be done.

Morand Dam: Catchment area of this proposed dam on Morand River of Seoni Malwa Tehsil of Hoshangabad District is 1031.99 Sq. Km. Location of dam is 22° 19' 23.02" N and 77° 28' 43.30" E. MDDL of this dam is 349.250 m, FRL is 366.228 m and MWL is 367.006 m. Two canal systems MRBC and MLBC are proposed through this dam. Lengths of MRBC and MLBC are 20.816 Km and 19.428 Km respectively. Total submergence in Morand Dam is 2200.68 Hectares which comprises of 532.33 Ha Private Land, 230.70 Ha Revenue Land and 1437.65 Ha Forest Land respectively. Four villages of Seoni Malwa Tehsil (Hoshangabad District) namely Morghat, Lahi, Kamtha, Samardha and two villages of Chicholi tehsil (Betul District) namely Jamnagari and Jhiriyadoh are coming under partial submergence. 2253 populations are affected through this dam comprised of 34 Scheduled Caste, 2120 Scheduled Tribe and 99 General Caste. Rehabilitation site to Project Affected Families is proposed in nearby Lokhartalai village of Seoni Malawa Tehsil (Hoshangabad District)

Ganjal Dam: Catchment area of this proposed dam on Ganjal River of Rehatgaon Tehsil of Harda District is 413.49 Sq. Km. Location of dam is 22° 13' 47.27" N and 77° 19' 50.58" E. MDDL of this dam is 358.044 m, FRL is 376.067 m and MWL is 376.775 m. GLBC is proposed through this Dam having length of 4.095 Km. GLBC meets the junction of MLBC and Combined Canal (62.838Km). Total submergence in Ganjal Dam is 833.24 Hectares which comprises of 97.17 Ha Revenue and 736.07 Ha Forest Land respectively. Two Forest villages of Rehatgaon Tehsil (Harda District) namely Bothi and Kayarighat are coming under partial submergence. 795 populations are affected through this dam comprised of 785 Scheduled Tribe and 10 General Caste.

Morand and Ganjal Complex Project: A total of 52205 Ha of land will be irrigated by the canals which originate from the dams built separately across the tributaries of Narmada namely Morand and Ganjal. These canals will irrigate 211 villages and also facilitate domestic water supply to villages of Seoni-Malwa. The total Command Area has been divided into two parts- A and B.

Proposed Command Area-A covers a total of 133 villages out of which 21 villages belong to Khirkhiya tehsil, 50 villages belong to Sirali tehsil of Harda district and 62 villages belong to Harsud tehsil of Khandwa district. It is proposed to irrigate 35330 Ha in Command Area-A, which includes 10000 Ha by Pressure system and 25330 Ha by Open channel.

Proposed Command Area-B covers a total of 78 villages out of which 28 villages belong to Seoni-Malwa tehsil of Hoshangabad district and 33 villages belong to Rehatgaon tehsil, 17 villages belong to Harda tehsil of Harda district. It is proposed to irrigate 16875 Ha in Command Area-B. Cost-Benefit analysis of the project is 1.50.

Detailed Project Report (DPR) is submitted to Central Water Commission, New Delhi for approval vide CE – ISP (Canal) Letter No. W/52012/Part-II/2011/Sanawad dated 31.05.2011 and approval from all the directorates have been accorded.

Approval of TOR for carrying out EIA and EMP studies has been accorded by Ministry of Environment and Forest, New Delhi vide Letter No. J-12011/43/2011-IA-I dated 17.10.2012. The Expert Appraisal Committee of MoEF&CC has had detailed deliberations and has recommended the Environment Clearance of the project. Formal Environment Clearance is pending for diversion of forest affected by the project.

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The Dam site of Morand and Ganjal draw of catchment of 1031.99 sq km and 413.43 sq km respectively at the proposed site of the dams. The command of the project is closely located to dam sites as approximately 5 km wide strip between existing Tawa Left Bank Canal and the main canal emanating from the Dams.

The geo-physical investigations suggest economical availability of foundation grade strata on the proposed dam sites.

Central Water Commission has approved the locations after visiting the proposed sites and examining all the relevant aspects.

(Rajesh Haridas)
Executive Engineer
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Narmada Bhawan, Bhopal

Note on Morand Dam Alternate alignment studies

In the proposed Morand Dam depending upon the topography and Geological condition three different alternate dam sites have been explored whose details are shown in the below mentioned table.

S. No.	Particulars	Latitude/ Longitude	Length in (m)	Catchment Area in Sq. Km.	Storage in MCM	Submergence area in Ha.	
						Forest Land	Other Land
1	Alternate Dam Alignment No.1	22^0 20' 18.7" 77^0 28' 30.2"	2320	1043.10	226.00	1502.04	756.31
2	Alternate Dam Alignment No.2	22^0 19' 15.0" 77^0 28' 28.6"	1720	1031.00	226.00	1368.92	807.43
3	Final Dam Alignment	22^0 19' 17.25" 77^0 28' 55.51"	1055	1031.99	226.124	1437.65	763.03

Alternate Dam Alignment No.1:

This alignment is having Dam length of 2.320 Km and proposed storage of this dam alignment is 226.00 MCM with F.R.L of 364.00m, the total submergence area works out to 2258.35 Ha. This alignment submerges the forest area of 1502.04 Ha. In this alignment the Hard rock is met at deeper depth. This alignment is techno economically not feasible.

Alternate Dam Alignment No.2:

This alignment is having Dam length of 1.720 Km and proposed storage of this dam alignment is 226.00 MCM with F.R.L of 366.50m, the total submergence area works out to 2176.35 Ha. This alignment submerges the forest area of 1368.92 Ha. In this alignment the Hard rock is met at deeper depth. This alignment is techno economically not feasible.

Final Dam Alignment:

This alignment is having one Main Dam & one Saddle Dam and its length are 455m & 600m respectively. Proposed storage of this dam alignment is 226.124 MCM with F.R.L of 366.23m, the total submergence area works out to 2200.68 Ha.

Compared to other two alternate dam alignment, this alignment is having lesser Dam length and its foundation is very good and cost effective and this alignment is Techno economically found feasible.

Comparative Study of Minimum demand for forest land from the three alternative proposals

(1) Morand Dam

Sl.No	Forest Division	Range	Forest Block	RF / PF	Compartment No	Storage Capacity (Mcum)	Affected Area (Ha)	Irrigated Area (Ha)
(1) FRL: 366.23	Hoshangabad	Seoni Malwa	Lokhartalai	RF	210	226.124	0.45	52205
				RF	211		17.63	
				RF	219		0.61	
				RF	221		10.03	
			Morghat	RF	215		58.65	
				RF	216		16.58	
				RF	227		81.85	
			Kamtha	RF	217		27.73	
				RF	218		5.59	
			Samardha	RF	222		106.47	
				RF	223		5.98	
			Lahi	RF	224		108.29	
				RF	225		184.11	
			Mahuadhan	RF	226		133.92	
				RF	230		135.13	
				RF	231		13.22	
			Manakpura	RF	232		0.19	

				RF	238		26.73	
				RF	239		2.59	
			Bhudiamai	RF	237		18.44	
		Seoni Malwa	Kamtha	PF	429		15.23	
				PF	429 B		14.82	
				PF	429 D		0.79	
			Lahi	PF	470		16.3	
			Samardha	PF	428 A		28.91	
				PF	428 D		25.79	
			Sirupura	PF	433 A		0.52	
				PF	433 B		41.11	
		Banapur		RF	243		0.15	
				RF	244		10.03	
				RF	245		11.50	
	North Betul	Bhoura	Panchhi	RF	73		0.10	
				RF	74		49.20	
				RF	75		31.61	
				RF	76		2.51	
				RF	80		21.92	
				RF	81		41.10	
				RF	82		13.15	
				RF	83		28.12	
				RF	84		1.05	

				RF	85		0.32	
	West Betul	Gavasen	Panchhi	RF	26		13.34	
				RF	27		2.81	
			Jhiriyadoh - 2	PF	365		6.74	
			Jhiriyadoh - 1	PF	366		11.41	
			Revenue forest				94.935	
	Total Forest Submergence						**1437.65**	
(2) FRL: 364.00	Hoshangabad	Seoni Malwa	Lokhartalai	RF	210	226.00	0.03	52205
				RF	211		13.48	
				RF	221		5.67	
			Morghat	RF	215		46.51	
				RF	216		11.82	
				RF	227		295.22	
			Kamtha	RF	217		23.86	
				RF	218		4.46	
			Samardha	RF	222		93.05	
				RF	223		2.66	
			Lahi	RF	224		104.86	
				RF	225		180.15	
			Mahuadhan	RF	226		158.98	
				RF	230		130.07	
				RF	231		10.44	

			Manakpura	RF	232		0.20	
				RF	238		23.54	
				RF	239		0.60	
			Bhudiamai	RF	237		16.43	
		Seoni Malwa	Kamtha	PF	429		10.77	
				PF	429 B		14.81	
				PF	429 D		0.46	
			Lahi	PF	470		23.48	
			Samardha	PF	428 A		39.62	
				PF	428 D		21.50	
			Sirupura	PF	433 B		33.04	
		Banapur		RF	244		6.23	
				RF	245		6.66	
	North Betul	Bhoura	Panchhi	RF	74		34.37	
				RF	75		23.92	
				RF	76		0.43	
				RF	80		20.15	
				RF	81		38.01	
				RF	82		11.47	
				RF	83		21.45	
				RF	84		0.61	
	West Betul	Gavasen	Panchhi	RF	26		8.07	
			Jhiriyadoh - 2	PF	365		9.80	

			Jhiriyadoh - 1	PF	366		5.78	
		Total Forest Submergence					**1502.04**	
(3) FRL: 366.50	Hoshangabad	Seoni Malwa	Lokhartalai	RF	210	226.00	0.70	52205
				RF	211		18.38	
				RF	219		0.65	
				RF	221		10.47	
			Morghat	RF	215		60.89	
				RF	216		17.53	
				RF	227		38.60	
			Kamtha	RF	217		28.35	
				RF	218		6.67	
			Samardha	RF	222		107.80	
				RF	223		6.34	
			Lahi	RF	224		108.62	
				RF	225		214.69	
			Mahuadhan	RF	226		125.94	
				RF	230		136.35	
				RF	231		13.70	
			Manakpura	RF	232		0.23	
				RF	238		27.52	
				RF	239		2.82	

			Bhudiamai	RF	237		18.81	
		Seoni Malwa	Kamtha	PF	429		14.87	
				PF	429 B		14.81	
				PF	429 D		0.92	
			Lahi	PF	470		26.33	
			Samardha	PF	428 A		42.16	
				PF	428 D		26.43	
			Sirupura	PF	433 A		0.65	
				PF	433 B		43.80	
		Banapur		RF	243		0.38	
				RF	244		10.62	
				RF	245		12.21	
	North Betul	Bhoura	Panchhi	RF	73		0.15	
							49.96	
				RF	74			
				RF	75		33.36	
				RF	76		2.86	
				RF	80		22.26	
				RF	81		41.63	
				RF	82		13.42	
				RF	83		29.32	
				RF	84		1.11	
	West Betul	Gavasen	Panchhi	RF	26		14.30	

				RF	27		3.47	
			Jhiriyadoh - 2	PF	365		11.53	
			Jhiriyadoh - 1	PF	366		6.94	
	Total Forest Submergence						**1368.92**	

Executive Engineer
Narmada Development Division No.23
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District Forest Officer
..... Forest Division
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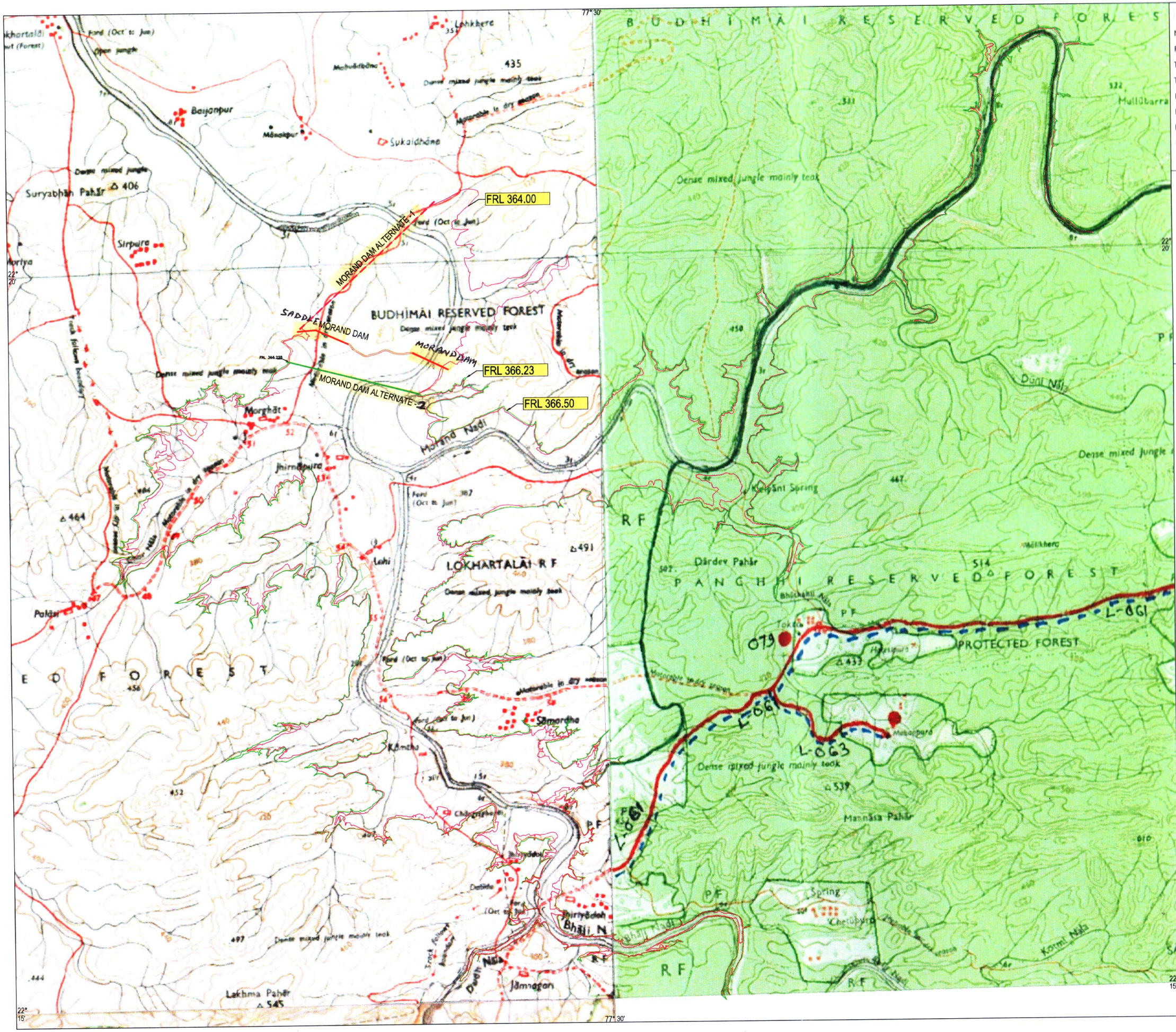

LEGEND

NH/SH; metalled with bridge & embankment; unmetalled.
Ford or Ferry. Cart-track. Pack-track. Foot-path.
Towns or Villages: inhabited; deserted. Fort. Huts: permanent; temporary.
Temple. Chhatri. Church. Mosque. Idgah. Tomb.
Hospital. Dispensary. Veterinary hospital. Watch tower. Graves.
River: dry with water channel; with island & rocks. Tidal river.
Railways, broad gauge: double; single with station and distance stone; other.
Routs: Approach roads; Project Loction

N

Sub-Divisional Officer,
Hydrometeorological Division No. 4
(N.V.D.A.) Hoshangabad (M.P.)

Executive Engineer
Narmada Development
Division No.23, BHOPAL

NO	DATE	DESCRIPTIONS	BY	CHKD	APPD	PROJ ENGR

CLIENT
NARMADA VALLEY DEVELOPMENT AUTHORITY (NVDA)
BHOPAL, M.P

PROJECT
MORAND & GANJAL COMPLEX PROJECT

TITLE
MORAND DAM ALTERNATE SUBMERGENCE MAP (HOSHANGABAD)

SCALE
2500m 2000 1500 1000 500 0 2500m
1:50000 OR 2CM=1KM
CONTOUR INTERVAL 5 METRES (Contours are approximate)

DRAWING NO. SE/CDR/NVDA/ALTERNATE SUBMERGENCE MAP

NH/SH; metalled with bridge & embankment; unmetalled.

Ford or Ferry. Cart-track. Pack-track. Foot-path.

Towns or Villages: inhabited; deserted. Fort. Huts: permanent; temporary.

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Hospital. Dispensary. Veterinary hospital. Watch tower. Graves.

River: dry with water channel; with island & rocks. Tidal river.

Railways, broad gauge: double; single with station and distance stone; other.

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CLIENT
NARMADA VALLEY DEVELOPMENT AUTHORITY (NVDA)
BHOPAL, M.P

PROJECT
MORAND & GANJAL COMPLEX PROJECT

TITLE
GANJAL DAM ALTERNATE SUBMERGENCE MAP (HARDA)

SCALE
2500m 2000 1500 1000 500 0 2500m
1:50000 OR 2CM=1KM
CONTOUR INTERVAL 5 METRES (Contours are approximate)

DRAWING NO. SECON/NVDA/ALTERNATE SUBMERGENCE MAP