

Par-Tapi-Narmada Link Project

Salient Features

Sl. No.	Particulars			
1	Name of the Project	Par-Tapi-Narmada Link Project		
2	Type of Project (Irrigation or Multipurpose)	Multipurpose		
3	Location	Maharashtra and Gujarat		
3.1	River Basin			
a)	Name	Par, Auranga, Ambica, Purna, Mindhola, Tapi, Kim and Narmada		
b)	Located in			
i)	State(s)	Gujarat and Maharashtra		
3.2	River / Tributary	Par/Aroti, Nar, Bhimtas, Vajra and Keng Auranga/Man and Tan, Ambica/Khapri, Olan, Kaveri and Kharera, Purna/Girra, Zankhari and Damas khadi		
3.3	State(s)/District(s)/ Taluka(s) in which the following are located:			
a)	Reservoirs	State	District	Taluka
	(i) Jheri Dam	Maharashtra	Nasik	Peint
	(ii) Paikhed Dam	Gujarat / Maharashtra	Valsad/Nasik	Dharampur/ Surgana
	(iii) Chasmandva Dam	Gujarat / Maharashtra	Valsad/Nasik	Dharampur/ Surgana
	(iv) Chikkar Dam	Gujarat	Dang	Ahwa
	(v) Dabdar Dam	Gujarat	Dang	Ahwa
	(vi) Kelwan Dam	Gujarat	Dang	Ahwa
b)	Head work	State	District	Taluka
	(i) Jheri Dam	Maharashtra	Nasik	Peint
	(ii) (a) Paikhed Dam	Gujarat	Valsad	Dharampur
	(b) Paikhed barrage	Gujarat	Valsad	Dharampur
	(iii) (a) Chasmandva Dam	Gujarat	Valsad	Dharampur
	(b) Chasmandva barrage	Gujarat	Valsad	Dharampur
	(iv) Chikkar Dam	Gujarat	Dang	Ahwa
	(v) Dabdar Dam	Gujarat	Dang	Ahwa
	(vi) Kelwan Dam	Gujarat	Dang	Ahwa

c)	Command Area	State	District	Taluka
1.	Enroute command area	Gujarat	Dang	Ahwa
			Bharuch	Ankleshwar, Valia Jhagadia
			Navsari	Vansda
			Surat	Mangrol, Mahuva, Mandvi
			Tapi	Vyara
			Valsad	Dharampur
2.	Projects proposed by Government of Gujarat	Gujarat	Navsari	Vansda, Chikhali Khergam
			Valsad	Kaprada, Valsad, Dharampur
			Tapi	Vyara, Songadh
			Surat	Mahuva
3.	Right side command area by lift	Gujarat	Tapi	Vyara
			Tapi	Songadh
			Surat	Mangrol, Umarpada
			Bharuch	Jhagadia, Valia
4.	Command area in the vicinity of proposed reservoirs by lift	Maharashtra	Nasik	Surgana, Peint
		Gujarat	Navsari	Vansada
			Valsad	Dharampur
			Dang	Ahwa, Waghai Subir
5.	Taken over command			
	1. Chhota Udepur	Gujarat	Chhota Udepur	Jetpur Pavi, Sankheda, Nasvadi, Kavant, Bodeli, Chhota Udepur
	2. Panchmahal	Gujarat	Panchmahal	Halol, Kalol, Ghoghamba
	3. Saurashtra Region	Saurashtra Region		
d)	Power house	State	District	Taluka
	(i) Paikhed Dam	Gujarat	Valsad	Dharampur
	(ii) Chasmandva Dam	Gujarat	Valsad	Dharampur
	(iii) Chikkar Dam	Gujarat	Dang	Ahwa
	(iv) Dabdar Dam	Gujarat	Dang	Ahwa
	(v) Kelwan Dam	Gujarat	Dang	Ahwa
	(vi) Kelwan Feeder	Gujarat	Dang	Ahwa

	Pipe line		
3.4	Name of village near Head works	Name of the village	
	(i)Jheri Dam	Jheri /Behadpada	
	(ii)Paikhed Dam	Paikhed/Tutarkhed	
	Paikhed barrage	Nanicoswadi	
	(iii) Chasmandva Dam	Chasmandva	
	Chasmandva barrage	Chondha Chikadi	
	(iv)Chikkar Dam	Chikkar	
	(v) Dabdar Dam	Dabdar	
	(vi) Kelwan Dam	Kelwan	
3.5	Location of Head works	Latitude (N)	Longitude (E)
	(i) Jheri Dam	20° 22' 25"	73° 25' 51"
	(ii) (a) Paikhed Dam	20° 27' 42"	73° 23' 37"
	(b) Paikhed barrage	20° 27' 11"	73° 22' 30"
	(iii) (a)Chasmandva Dam	20° 37' 02"	73° 22' 36"
	(b)Chasmandva barrage	20° 36' 05"	73° 18' 50"
	(iv)Chikkar Dam	20° 42' 00"	73° 30' 50"
	(v) Dabdar Dam	20° 48' 58"	73° 32' 05"
	(vi) Kelwan Dam	20° 55' 30 "	73° 32' 00"
c)	Lies in Earthquake Zone No.	The project sites lie in seismic Zone-III as per the zoning map of India (IS: 1893-2002, Part-1).	
3.6	Project area reference to:		
a)	Survey of India Topo-sheets-1:50,000 Scale	46 F/12 46G / 2, 3, 5, 6, 7, 8, 9, 11, 12 46H / 2, 3, 5, 6, 7, 9, 10	
b)	Index Plan	Plate: 1.1	
3.7	Access to the project	Name	Distance from project site
a)	Airport	Mumbai/ Surat	170 km to 300 km
b)	Rail head	Valsad/Surat on WR	90 km to 100 km
c)	Road head	Valsad/Surat West side of NH-8	80 km to 95 km
d)	River port	Hazira	100 km to 150 km
e)	Seaport	Mumbai	170 km to 300 km
4	InterState aspects of the project		

a)	Catchment area of the basin				
1)	State-wise details of catchment area	Maharashtra (km²)	Gujarat (km²)	Total (km²)	
	(i) Par Basin	773	875	1648	
	(ii) Auranga Basin	150	598	748	
	(iii) Ambica Basin	102	2583	2685	
	(iv) Purna Basin	58	2135	2193	
b)	State-wise details of catchment area up to diversion dam	Maharashtra (km²)	Gujarat (km²)	Total (km²)	
	(i) Jheri Dam-Par river	425	-	425	
	(ii) Paikhed-Nar river	269	46	315	
	(iii) Chasmandva-Auranga river	62	27	89	
	(iv) Chikkar-Ambica River	102	202	304	
	(v) Dabdar-Khapri River	-	457	457	
	(vi) Kelwan-Purna River	-	694	694	
c)	1.Submergence due to projects (ha)-State wise	Maharashtra (ha)	Gujarat (ha)	Total (ha)	
	(i) Jheri Dam	836	--	836	
	(ii) Paikhed	100	894	994	
	(iii) Chasmandva	32	583	615	
	(iv) Chikkar	--	742	742	
	(v) Dabdar	--	1249	1249	
	(vi) Kelwan	--	1629	1629	
	Total	968	5097	6065	
	2.Submergence due to projects (ha) & Land use / Land cover	Forest (ha)	Culturable land(ha)	River bed (ha)	Total (ha)
	(i) Jheri Dam	408	256	172	836
	(ii) Paikhed	317	589	88	994
	(iii) Chasmandva	300	255	60	615
	(iv) Chikkar	300	332	110	742
	(v) Dabdar	614	482	153	1249
	(vi) Kelwan	890	450	289	1629
	Total	2829	2364	872	6065
d)	Water allocation for the State (if any) / country	Water sharing between the States of Gujarat and Maharashtra is under finalisation			
e)	Committed utilisation	Jheri (MCM)		Paikhed (MCM)	

	Upstream Projects	Irrigation	Water supply	Industrial	Hydel	Envr. & Eco	Irrigation	Water supply	Industrial	Hydel	Envr. & Eco
i)	Projects completed	6.49	--	--	--	--	1.61	--	--	-	--
ii)	Projects under construction	1.58	--	--	--	--	--	--	--	-	--
iii)	Future projects	11.09	1.30	3.94	--	--	11.32	1.83	3.99	--	3.06
iv)	Any other	--	--	--	--	--	--	--	--	--	--
	Downstream Projects										
i)	Projects completed	--	--	--	--	--	--	--	--	--	--
ii)	Projects under construction	--	--	--	--	--	--	--	--	--	--
iii)	Future projects	--	--	--	--	--	--	--	--	--	--
iv)	Any other	--	--	--	--	--	--	--	--	--	--
	Sub-total	19.16	1.30	3.94	--	--	12.93	1.83	3.99	--	3.06
	Committed utilisation	Chasmandva (MCM)					Chikkar (MCM)				
	Upstream Projects	Irrigation	Water supply	Industrial	Hydel	Envr. & Eco	Irrigation	Water supply	Industrial	Hydel	Envr. & Eco
i)	Projects completed	--	--	--	--	--	--	--	--	--	--
ii)	Projects under construction	--	--	--	--	--	--	--	--	--	--
iii)	Future projects	5.88	0.27	0.85	--	0.59	52.79	0.64	2.20	--	2.42
	Downstream Projects										
i)	Projects completed	--	--	--	--	--	--	--	--	--	--
ii)	Projects under construction	--	--	--	--	--	--	--	--	--	--
iii)	Future projects	--	--	--	--	--	--	--	--	--	--
iv)	Any other	--	--	--	--	--	--	--	--	--	--
	Sub-total	5.88	0.27	0.85	--	0.59	52.79	0.64	2.20	--	2.42
	Committed utilisation	Dabdar (MCM)					Kelwan (MCM)				
	Upstream Projects	Irrigation	Water supply	Industrial	Hydel	Envr. & Eco	Irrigation	Water supply	Industrial	Hydel	Envr. & Eco
i)	Projects completed	--	--	--	--	--	--	--	--	--	--
ii)	Projects under	--	--	--	--	--	--	--	--	--	--

	construction											
iii)	Future projects	61.54	3.88	5.53	--	3.93	52.47	5.22	7.53	--	4.10	
iv)	Any other	--	--	--	--	--	--	--	--	--	--	
	Downstream Projects											
i)	Projects completed	--	--	--	--	--	--	--	--	--	--	
ii)	Projects under construction	--	--	--	--	--	--	--	--	--	--	
iii)	Future projects	--	--	--	--	--	--	--	--	--	--	
iv)	Any other	--	--	--	--	--	--	--	--	--	--	
	Sub-total	61.54	3.88	5.53	--	3.93	52.47	5.22	7.53	--	4.10	
f)	Proposed annual utilisation(net consumptive) by the project (MCM)		Jheri	Paikhed	Chas mandva	Chikkar	Dabdar	Kelwan				
i)	Irrigation		19.16	12.93	5.8	50.29	58.67	52.47				
ii)	Hydel (evaporation losses) (MCM)		nil	nil	nil	nil	nil	nil				
iii)	Thermal Power (MCM)		nil	nil	nil	nil	nil	nil				
iv)	Local Domestic and Industrial (MCM)		1.05	1.17	0.22	0.57	1.89	2.55				
v)	Gross annual utilisation (MCM) (sum of i to v)		20.21	14.10	6.02	50.86	60.56	55.02				
g)	Minimum agreed / proposed flow in the river for maintaining ecology		0.00	3.06	0.59	2.42	3.93	4.10				
5	Estimated life of the projects (years)	100 years										
6	Irrigation (ha)	The project will provide annual irrigation to 2.32 lakh hectare area in En-route and drought prone Saurashtra and Kutch area as detailed below:										
		Command					CCA (ha)	Annual Irrigation(ha)				
		a. En-route command										
		(i)	From Main canal				59920	59920				
		(ii)	From feeder pipe line				1270	1270				
		b. Project proposed by					45561	45561				

		Government of Gujrat on the left side of canal			
		c. Tribal area in enroute right of canal	36200	36200	
		d. Tribal area in vicinity of reservoirs	12514	12514	
		e. Tribal areas on right side of Narmada main canal by lift	34342	34342	
		f. Target command in drought prone Saurashtra and Kutch region	42368	42368	
		Grand Total	232175	232175	
		Say 2.32 lakh ha			
7	Flood control	No flood control envisaged			
8	Navigation	No navigation proposed			
9	Water supply				
9.1	Domestic and Industrial				
a)	Names of towns / villages/ Industries served	Local domestic and industrial demands considered in the vicinity of project area.			
b)	Size of population served	Villages in the vicinity of the dam sites			
c)	Quantum of water made available (MCM)	126 MCM (76 MCM for drinking + 50 MCM for filling tanks)			
d)	Quantum of water per capita (litre)	70/135			
10	Project performance	Jheri		Paikhed	
		Period of simulation	No. of failure	Period of simulation	No. of failure
a)	Irrigation	32	--	32	--
b)	Power	32	--	32	--
c)	Flood control	Not applicable		Not applicable	
d)	Water supply	32	--	32	--
e)	Navigation	Not applicable		Not applicable	
		Chasmandva		Chikkar	
a)	Irrigation	32	--	32	--
b)	Power	32	--	32	--
c)	Flood control	Not applicable		Not applicable	
d)	Water supply	32		32	
e)	Navigation	Not applicable		Not applicable	
		Dabdar		Kelwan	
a)	Irrigation	32	--	32	--
b)	Power	32	--	32	--
c)	Flood control	Not applicable		Not applicable	

d)	Water supply	32		32			
e)	Navigation	Not applicable			Not applicable		
11	Hydrology						
11.1	Catchments						
11.1.1	Catchments area at headwork site (km²)	Jheri	Paikhed	Chas mandva	Chikkar	Dabdar	Kelwan
a)	Gross	425	315	89	323	482	733
b)	Intercepted						
i)	By existing projects	5.83	1.34	-	-	-	-
ii)	By ongoing projects	2.55	-	-	-	-	-
iii)	By contemplated projects	17.90	18.27	8.16	44.3	58.26	53.98
c)	Un-intercepted	398.72	331.93	80.84	278.7	398.74	640.02
11.1.2	Catchment area classification according to mode of precipitation	(a) Rain-fed (km²)			(b) Snow-fed (km²)		
	(i) Jheri Dam	425			Nil		
	(ii) Paikhed	315			Nil		
	(iii) Chasmandva	89			Nil		
	(iv) Chikkar	323			Nil		
	(v) Dabdar	482			Nil		
	(vi) Kelwan	733			Nil		
11.2	Precipitation(mm)						
11.2.1	Catchments	Annual rainfall				Annual Snowfall	
		(a) Average	(b) Maximum	(c) Minimum			
	(i) Par	2180	2669	1920	Nil		
	(ii) Auranga	2050	2406	1644	Nil		
	(iii) Ambica	1830	2520	1419	Nil		
	(iv) Purna	1472	1972	782	Nil		
11.2.2	Command Area: Command area lies in the following basins	Mean annual rainfall					
	(i) Ambica and Purna	2528.5					
	(ii) Tapi	894.4					
	(iii) Narmada	1107.3					
11.3	Annual yield calculated at the proposed site (MCM)						
		Jheri			Paikhed		
		Gross	Net	Gross	Net	Gross	Net

a)	Average yield	528	508.70	380	366.60
b)	At 50% dependability	467	446.30	335	320.80
c)	At 75% dependability	391	371.10	264	249.90
d)	At 100% dependability	183	173.60	152	144.10
		Chasmandva		Chikkar	
		Gross	Net	Gross	Net
a)	Average yield	102	96.10	304	254.70
b)	At 50% dependability	91	84.90	257	206.20
c)	At 75% dependability	70	64.00	220	169.70
d)	At 100% dependability	41	37.40	139	107.10
		Dabdar		Kelwan	
		Gross	Net	Gross	Net
a)	Average yield	488	429.90	497	443.50
b)	At 50% dependability	455	394.20	445	390.30
c)	At 75% dependability	323	262.00	362	307.60
d)	At 100% dependability	150	122.00	252	214.10
11.4	Climatic Data (command)	Surat station		Vadodara station	
	IMD Stations in the command area				
		Max	Min	Max	Min
	Temperature (°C)	36.80	14.70	39.90	13.20
	Relative Humidity (%)	90.00	53.00	94.00	44.00
	Wind Speed (km/h)	6.40	1.70	13.30	2.20
	Cloud Cover (Oktas)	6.2	0.70	6.4	0.80
11.5	Seismic coefficients	Jheri		Paikhed	
		Concrete	Earthen	Concrete	Earthen
a)	Horizontal	0.090	0.017	0.086	0.024
b)	Vertical	0.085	0.012	0.078	0.017
		Chasmandva		Chikkar	
		Concrete	Earthen	Concrete	Earthen
a)	Horizontal	0.088	0.028	0.082	0.023
b)	Vertical	0.083	0.020	0.076	0.016
	Seismic coefficients	Dabdar		Kelwan	
		Concrete	Earthen	Concrete	Earthen
a)	Horizontal	0.097	0.028	0.097	0.029
b)	Vertical	0.091	0.019	0.091	0.020
11.6	Utilisation within the State (MCM)	1330 MCM (PTN link canal requirement:1210 MCM ; Environmental releases d/s of proposed dam sites: 20 MCM ; Drinking water and filling of tanks requirement in the vicinity of proposed			

		reservoirs: 60 MCM; and evaporation losses proposed in the reservoir: 40 MCM in Gujarat State			
11.6.1	Water availability (State's share in case of interState river)	Water sharing between the States of Gujarat and Maharashtra is under finalisation			
11.6.2	Committed utilisation				
		Jheri Dam (MCM)		Paikhed Dam (MCM)	
		Major & Medium	Minor	Major & Medium	Minor
a)	Upstream Projects				
i)	Projects completed	-	6.49		1.61
ii)	Projects under construction	-	1.58	-	-
iii)	Future projects	-	11.09		11.32
iv)	Any other	-	-	-	-
b)	Downstream Projects	-			
i)	Projects completed	-	-	-	-
ii)	Projects under construction	-	-	-	-
iii)	Future projects	-	-	-	-
iv)	Any other	-	-	-	-
		Chasmandva Dam (MCM)		Chikkar Dam (MCM)	
		Major & Medium	Minor	Major & Medium	Minor
a)	Upstream Projects				
i)	Projects completed	-	-	-	-
ii)	Projects under construction	-	-	-	-
iii)	Future projects	-	5.8	30.05	22.74
iv)	Any other	-	-	-	-
b)	Downstream Projects	-			
i)	Projects completed	-	-	-	-
ii)	Projects under construction	-	-	-	-
iii)	Future projects	-	-	-	-
iv)	Any other	-	-	-	-
	Committed utilisation	Dabdar Dam (MCM)		Kelwan Dam (MCM)	
		Major & Medium	Minor	Major & Medium	Minor
a)	Upstream Projects	-	-	-	-
i)	Projects completed	-	-	-	-
ii)	Projects under construction	-	-	-	-

iii)	Future projects	34.43	27.11	-	52.47		
iv)	Any other	-	-	-	-		
b)	Downstream Projects	-	-	-	-		
i)	Projects completed	-	-	-	-		
ii)	Projects under construction	-	-	-	-		
iii)	Future projects	-	-	-	-		
iv)	Any other	-	-	-	-		
11.6.3	Proposed utilisation by the project	(a) Irrigation (MCM)		(b) Water supply (MCM)			
	(i)Jheri Dam	0.00		10.00			
	(ii)Paikhed Dam	0.00		10.00			
	(iii)Chasmandva Dam	0.00		10.00			
	(iv)Chikkar Dam	0.00		10.00			
	(v)Dabdar Dam	5.00		10.00			
	(vi)Kelwan Dam	5.00		10.00			
		10.00		60.00			
11.7	Floods near the headwork site						
11.7.1	Observed period of record	(a) Maximum water level (El-m)		(b)Maximum discharge estimated (Cumec)		(c)Year of occurrence, date	
	(i)Jheri Dam	NA		NA		NA	
	(ii)Paikhed Dam	NA		NA		NA	
	(iii)Chasmandva Dam	NA		NA		NA	
	(iv)Chikkar Dam	NA		NA		NA	
	(v)Dabdar Dam	NA		NA		NA	
	(vi)Kelwan Dam	NA		NA		NA	
11.7.2	Estimated Flood -Magnitude (Cumec) /Dams	Jheri	Paikhed	Chasmandva	Chikkar	Dabdar	Kelwan
a)	50 year return period diversion flood (Cumec)	2703	2017	1024	2167	2539	3102
b)	100 year return period diversion flood (Cumec)	2989	2211	1065	2374	2796	3428
c)	Standard project flood	NA	NA	NA	NA	NA	NA
d)	Maximum probable	6539	5307	2578	5649	6683	7979

	flood (Cumec)						
	Barrage Sites	Paikhed			Chasmandva		
a)	500 year return period diversion flood (Cumec)	2819			1961		
b)	100 year return period diversion flood (Cumec)	2247			1572		
c)	Standard project flood	4596			3213		
11.7.3	Design flood (Cumec)	Jheri	Paikhed	Chasmandva	Chikkar	Dabdar	Kelwan
a)	Dam (Cumec)	6539	5307	2578	5649	6683	7979
b)	Barrage	NA	2247	1572	2758	NA	NA
c)	Construction Diversion	NA	NA	NA	NA	NA	NA
d)	Flood control works	NA	NA	NA	NA	NA	NA
11.7.4	River flows (minimum observed)	(a)Water level (El-m)		(b)Discharge (Cumec)	(c)Months of Nil flow, if any		
	Par River	River bed level		0.00	January to May		
	Auranga River	River bed level		0.00	January to May		
	Ambica River	River bed level		0.00	January to May		
	Purna River	River bed level		0.00	January to May		
	Mindhola River	River bed level		0.00	January to May		
	Tapi River	River bed level		0.00	January to May		
	Kim River	River bed level		0.00	January to May		
	Narmada River	River bed level		0.00	January to May		
12	Reservoir	Jheri	Paikhed	Chasmandva	Chikkar	Dabdar	Kelwan
12.1	Water levels (m)						
a)	Maximum Water Level (m)	247.00	249.00	215.00	212.00	170.00	166.00
b)	Full Reservoir Level (m)	246.00	248.00	214.00	210.00	169.00	164.00
c)	Minimum Draw Down Level (m)	204.00	190.00	190.00	179.00	139.00	136.00
d)	Outlet levels						
i)	Irrigation (m)						
ii)	Power TWL(m)	NA	172.00	173.02	172.00	136.96	135.46
iii)	Others (please specify) Invert level of penstock at inlet	NA	162.35	167.81	168.81	134.87	134.12
e)	Dead Storage	199.00	172.00	176.00	170.00	127.00	128.2

	Level (m)						
f)	Deepest River bed level (m)	180.00	163.14	170.00	152.43	112.00	115.27
12.4	Live storage (MCM)	190.18	218.30	75.86	129.03	201.06	258.28
12.5	Capacity at (MCM)	Jheri	Paikhed	Chas mandva	Chikkar	Dabdar	Kelwan
a)	Full reservoir level (MCM)	206.03	229.53	83.63	141.99	222.38	282.17
b)	Minimum draw down level (MCM)	15.85	11.23	7.77	12.96	21.32	23.89
c)	Dead storage level (MCM)	9.23	0.92	0.36	3.69	4.32	6.51
12.6	Flood absorption capacity (MCM)	No Flood storage is earmarked for any of these project					
12.7	Sedimentation (MCM) and levels after	Jheri Reservoir		Paikhed Reservoir			
	Years	50 Years	100 Year	50 Year	100 Year		
a)	Above MDDL	9.69	20.79	10.02	20.10		
b)	Below MDDL	8.47	14.81	3.64	7.00		
c)	Sedimentation volume (MCM)	18.01	35.94	13.57	27.11		
d)	New zero elevation	185.00	198.50	164.34	171.88		
		Chasmandva Reservoir		Chikkar Reservoir			
		50 Years	100 Year	50 Years	100 Year		
a)	Above MDDL	2.282	4.723	8.018	17.081		
b)	Below MDDL	1.572	3.099	5.025	8.746		
c)	Sedimentation volume (MCM)	3.88	7.76	13.04	26.03		
d)	New zero elevation	171.75	176.00	162.10	169.30		
	Sedimentation (MCM) and levels after	Dabdar Reservoir		Kelwan Reservoir			
	Years	50 Years	100 Year	50 Years	100 Year		
a)	Above MDDL	11.455	24.450	19.38	40.92		
b)	Below MDDL	7.994	14.950	10.29	18.33		
c)	Sedimentation volume (MCM)	19.55	39.03	29.90	59.69		

d)	New zero elevation	119.90	126.90	122.20	128.20`			
12.8	Average monthly evaporation losses from the reservoir	Monthly Evaporation depths (mm/day)						
		Jheri, Paikhed, Chasmandva, Chasmandva barrage, Dabdar and Kelwan				Paikhed barrage, Chikkar dam and Ukai dam		
i)	June	4.7				6.8		
ii)	July	2.3				3.3		
iii)	August	2.3				3.3		
iv)	September	3.6				5.1		
v)	October	4.6				6.5		
vi)	November	3.6				5.1		
vii)	December	2.9				4.1		
viii)	January	2.9				4.1		
ix)	February	3.0				4.6		
x)	March	4.6				6.5		
xi)	April	5.3				7.5		
xii)	May	5.7				8.1		
12.9	Seepage in the reservoir	All the reservoirs are water tight						
13	Submergence							
13.1	Land and property submerged							
	Name of project	Jheri	Paikhed	Chas mandva	Chikkar	Dabdar	Kelwan	Total
a)	Villages affected (No.)	6	11	7	9	11	17	61
i)	Fully	-	-	-	-	-	1	1
ii)	Partially	6	11	7	9	11	16	60
b)	Land affected (ha)							
i)	Gross	836	994	615	742	1249	1629	6065
ii)	Culturable	256	589	255	332	482	450	2364
iii)	Forest	408	317	300	300	614	890	2829
iv)	Others (specify) River portion	172	88	60	110	153	289	872
c)	Buildings / houses No.	98	331	379	345	563	793	2509
d)	Road / Rail (km)	Major road connecting	Major road connecting	nil	Waghai-Saputara National Highway (NH-		Wagh ai-Ahwa Major	Vyra-Ahwa Major Road

		Peint-Surgana (1km)	Sidumber-Tutarkhed		360) (8 km).	Road (8 km)	(7 km)
e)	Transmission lines (km)	nil	nil	nil	The power and telephone lines of about 10 km length connecting Baj-Lahen-Dabdar village	The power and telephone lines of about 12 km length connecting Waghai-Pimpri village	The power and telephone lines of about 4 km length connecting Karlipada-Khatal village
f)	Any other						
13.2	Submergence ratio (with reference to CCA)	Total submergence area (cultivated) under the 6 reservoirs is 2364 ha and the total CCA of the Link project is 232175 ha. Therefore, the submergence Ratio works out to 0.0102					
13.3	Number of families affected	Jheri	Paikhed	Chas mandva	Chikkar	Dabdar	Kelwan
		98	331	379	345	563	793
13.4	Anticipated back water levels at important places along the periphery of reservoir						
	(i)Jheri	247 m upto 14.60 km from dam axis					
	(ii)Paikhed	249 m upto 17.40 km from dam axis					
	(iii)Chasmandva	215 m upto 6.00 km from dam axis					
	(iv)Chikkar	212 m upto 11.00 km from dam axis					

	(v)Dabdar	170 m upto 11.00 km from dam axis					
	(vi)Kelwan	166 m upto 24.00 km from dam axis					
14	Head works						
14.1	Dam						
14.1.1	Embankment Dam	Jheri	Paikhed	Chas mandva	Chikkar	Dabdar	Kelwan
a)	Type of dam (Homogenous/Zone/Rock-fill/Concrete faced)	CFRD/Concrete	CFRD/Concrete	CFRD/Concrete	CFRD/Concrete	CFRD/Concrete	CFRD/Concrete
b)	TBL (m)	253.00	255.00	222.00	217.00	177.00	174.0
c)	Length of dam at top (m)	808.32	1431.85	2781	1887	1170	1330
i)	Right Flank	--	757.60	841	--	--	1141
ii)	Left Flank (m)	663.32	553.25	1862	1736	1035	--
d)	Top width (m)	10.00	10.00	10.00	10.00	10.00	10.00
e)	Maximum height above GL (m)	75.88	94.4	53.70	62.27	63.65	57.95
f)	Dyke(s)	The entire rim of proposed reservoirs is covered with the contours of value higher than the MWL as such no dyke(s) are proposed along the rim of reservoirs.					
i)	Number						
ii)	Total length (m)						
iii)	Maximum height m)						
g)	Type of cut off and maximum depth						
14.1.2	Masonry and Concrete Dam (Non-over flow section)	Jheri	Paikhed	Chas mandva	Chikkar	Dabdar	Kelwan
a)	Type of Dam (masonry/concrete/ composite, any other)	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete
b)	EL of top (m) (Road EL)	253	255	222	217	177	174
c)	EL of deepest foundation left side(m)	210	175	184	170	132	123
	EL of deepest foundation right	225	210	184	179	145	123

	side(m)						
d)	Length at top (m)	54	49	34	79	44	98
e)	Length at the river bed (m)	40	45	30	75	40	40
f)	Width at top (m)	7	10	10	7	7	8
g)	Width at deepest bed level (m)	65.4	72.89	69.12	87.18	157.80	34.81
h)	Maximum height above deepest foundation level (m)	43	80	38	47	45	51
14.1.3	Spillway (overflow section)	Jheri	Paikhed	Chas mandva	Chikkar	Dabdar	Kelwan
a)	Type of spillway (Ogee / chute / side channel / tunnel / siphon / any other type (specify))	Ogee	Ogee	Ogee	Ogee	Ogee	Ogee
b)	Full reservoir level (m)	246.00	248.00	214.00	210.00	169.00	164.00
c)	Maximum water level (m)	247.00	249.00	215.00	212.00	170.00	166.00
d)	Length (m)	91.00	72.00	44.00	72.00	91.00	91.00
e)	Crest level (m)	234.00	236.00	202.00	198.00	157.00	152.00
f)	Deepest foundation level (m)	215.00	210.00	184.00	170.00	132.00	123.00
g)	Maximum height up to crest level (m)	19	26	18	18	25	29
h)	Number of gates	5	4	3	4	5	5
i)	Type of gate	Radial	Radial	Radial	Radial	Radial	Radial
j)	Size of gate (m X m)	15x12	15x12	12x12	15x12	15x12	15x12
k)	Maximum routed out flow (cumec)	6586	5226	3044	5226	6582	6582
l)	Tail water level (m)						
i)	Maximum (m)	228.00	230.00	192.00	175.00	139.00	135.46

ii)	Minimum (m)	223.50	220.00	187.50	172.50	134.00	134.40	
m)	Type of energy dissipation arrangement	Ski jump bucket type (Stilling basin with Chute block and end sill)	Ski jump bucket type (Stilling basin with Chute block and end sill)	Ski jump bucket type (Stilling basin with Chute block and end sill)	Ski jump bucket type (Stilling basin with Chute block and end sill)	Ski jump bucket type (Stilling basin with Chute block and end sill)	Ski jump bucket type (Stilling basin with Chute block and end sill)	
n)	Type of hoisting arrangement and its capacity	Hydraulic hoisting	Hydraulic hoisting	Hydraulic hoisting	Hydraulic hoisting	Hydraulic hoisting	Hydraulic hoisting	
14.1.4	River sluice(s), Irrigation / Power outlet(s)	Paikhed dam	Paikhed barrage	Chasmandava dam	Chasmandava barrage	Chikkar	Dabdar	Kelwan
I	River sluice(s),	Nil						
II	Irrigation /Power							
a)	Purpose	Power	Irrigation	Power	Irrigation	Power/Irrigation	Power/Irrigation	
b)	Number	1	1	1	1	1	1	
c)	Size (m)	2.5	147.5	1.8	128.0	1.8	2.5	2.5
d)	Sill level (El-m)	185	136	185.50	123.0	174.50	134.37	133.37
e)	Number of gates	1	7	1	8	1	1	1
f)	Type of gate	Vertical lift	Radial	Vertical lift	Vertical lift	Vertical lift	Vertical lift	Vertical lift
g)	Size of gate (mXm)	1.8x2.5	15x7	1.42x1.8	12x8	1.42x1.8	2x2.5	1.8x2.5
h)	Type of hoisting arrangement and its capacity	Hydraulic, 200 t	Hydraulic, 200 t	Hydraulic, 180 t	Hydraulic, 200 t	Hydraulic, 200 t	Hydraulic, 200 t	Hydraulic, 200 t
14.2	Weir	No weir is proposed						
14.3	Barrage	Paikhed			Chasmandava			
(i)	Design Flood Discharge (cumecs)	2223				1571		

(ii)	Total Length (m)	68.320	63.350
(iii)	Total Waterway (m)	138.500	122.000
(iv)	Top level of pier/abut (m)	152.000	133.000
(v)	Crest Level (m)	136.000	123.000
(vi)	Cistern Level (m)	131.500	118.500
(vii)	Pond Level (m)	143.500 / 150.00	131.000
(viii)	HFL (1 in 100) (m)	140.529	127.446
(ix)	HFL (1 in 500) (m)	141.936	128.240
(x)	Width of Pier (m)	4.500	3.000
(xi)	Clear Width of each span (m)	15.000	12.000
14.4	Head Regulator(s)	1 No.	1 No.
15	Canal System		
15.1	Main Canal	Par-Tapi Reach	Tapi-Narmada Reach
15.1.1	Purpose of canal (Irrigation/Power/N avigation/Diversion/ Water Supply/ Multipurpose)	Irrigation/Power	Irrigation/Power
15.1.2	Type		
	(a) Flow /Lift	Flow	Flow
	(b) Lined / Un lined	Lined	Lined
	(c) Type of lining	C.C lining	C.C lining
15.1.3	Main canal data	Par-Tapi reach	Tapi-Narmada reach
(i)	Length (km) (Total length:406.118)	214.811 (including 37.075 km of feeder pipe line and 1.15 km of tunnels)	191.307
(ii)	FSL at Head/Tail (m)	142.800/105.275	81.790/53.573
(iii)	Maximum discharging capacity at head/tail (cumec)	38.170/63.69	46.640/17.260
(iv)	Full supply Depth at head (m)	2.80	3.22
(v)	Bed width at head (m)	8.50	8.80
(vi)	Side slope at head (H:V)	1.5:1	1.5:1
(vii)	Bed Slope(range)	1 in 7500 to 1 in 8500	1 in 10 000

(viii)	Total number of canal structures on main canal	154		315	
(ix)	Total assumed losses across the structures (m)	14.76		9.086	
(x)	Gross Command Area (En-route) (ha)	11448		57345	
(xi)	Culturable Command Area (En-route) (ha)	10100		49820	
15.1.4	Branch Canal(s)				
	(a) Number	22		22	
	(b) Total length (km)	86		238	
15.1.5	Total length of distribution system upto minimum discharge capacity of 24 cusec	-		-	
15.2	Feeder Pipe Lines	Chasmandva	Chikkar-Dabdar	Dabdar	Kelwan
(i)	Length (km) (Total length:37.075)	2.859	14.342	12.258	7.616
(ii)	F.S.L at Head/Tail (m)	130.600/ 129.748	172.000/ 169.128	136.960/ 132.768	135.460/ 117.309
(iii)	Maximum discharging capacity at head/tail (cumec)	8.50	6.40	17.00	17.00
(iv)	Full supply Depth at head (m)	1.60	1.50	2.2	2.25
(v)	Diameter of pipe line (m)	2.60	2.50	2.90	2.60
(vi)	Bed Slope(range)	1 in 5500	1 in 7500	1 in 5000	1 in 5500
(vii)	Joins main canal at RD(km)	62.072	-	108.250	129.600
15.3	Efficiencies (%)				
	(i) Conveyance	75		75	
	(ii)Field application	65		65	
15.4	Tunnel				
15.4.1	Jheri-Paikhed				

	Tunnel				
(i)	Length of tunnel (m)	12700			
(ii)	Dia of tunnel (m)	3.0, D-shaped			
(iii)	Invert Level (m)	EL. 199.50 at inlet			
(iv)	Invert level (m)	EL. 185.00 at out fall			
15.4.2	Adit				
(i)	Length of Adit (m)	408.60			
(ii)	Size (m)	6.0x6.0, D-Shaped			
(iii)	Invert level (m)	EL. 210.00			
15.4.3	Tunnels along the link canal	RD from (m)	RD to (m)	Length (m)	Diameter (m)
	Tunnel No.1	14650	14750	100	5.5
	Tunnel No.2	24000	24350	350	5.5
	Tunnel No.3	32350	32550	200	5.5
	Tunnel No.4	37750	37800	50	5.5
	Tunnel No.5	51500	51950	450	5.5
			Total	1150	
16	Proposed Cropping Pattern				
16.1	Cropping Pattern for En-route command				
	Season/ Name of the Crop	% age of Area	Area of crop for En-route command (59920 ha)	Area of crop for Command of projects proposed by Government of Gujarat (45561 ha)	
	Kharif				
	Paddy	8%	4794	3645	
	Jowar	8%	4794	3645	
	Pulses	4%	2397	1823	
	Ground nut	8%	4794	3645	
	Oilseed	8%	4794	3645	
	Vegetables	4%	2397	1823	
	L.S. Cotton	4%	2397	1823	
	S. S. Cotton	8%	4794	3645	
	Rabi				
	Wheat	8%	4794	3645	
	Jowar	4%	2397	1823	
	Maize	4%	2397	1823	
	Vegetable	4%	2397	1823	
	Pulses	8%	4794	3645	
	Oilseeds	4%	2397	1823	
	Ground nut	4%	2397	1823	
	Hot Weather				

	Bajra	2%	1197	910
	Vegetable	2%	1197	910
	Soyabean	2%	1197	910
	Perennial			
	Sugarcane	4%	2397	1822
	Fruits	2%	1198	910
	Total	100%	59920	45561

16.2 Cropping Pattern for feeder canal Command

	Season/ Name of the Crop	% age of Area	Area of crop for feeder canal (1270 ha)
	Kharif		
	Paddy	8%	102
	Jowar	8%	102
	Pulses	4%	51
	Ground nut	8%	102
	Oilseed	8%	102
	Vegetable	4%	51
	L.S. Cotton	4%	51
	S. S. Cotton	8%	102
	Rabi		
	Wheat	8%	102
	Jowar	4%	51
	Maize	4%	51
	Vegetable	4%	51
	Pulses	8%	102
	Oilseeds	4%	51
	Ground nut	4%	51
	Hot Weather		
	Bajra	2%	24
	Vegetable	2%	24
	Soyabean	2%	24
	Perennial		
	Sugarcane	4%	51
	Fruits	2%	25
	Total	100%	1270

16.3 Cropping Pattern adopted for the Command Areas of Tribal area of right side of canal, Vicinity of proposed reservoirs, tribal area on right side of NMC and command area of Narmada canal system of SSP to be taken over the Link Canal

S. No.	Crop Season/ Name of the Crop	Command Areas of Tribal area of right side of canal, Vicinity of proposed reservoirs and tribal area on right side of NMC (83056 ha)			Target command area of Narmada canal system of SSP to be taken over the Link Canal (43268 ha)		
		% age of CCA	Area of Crop (ha)	% age of CCA	Area of Crop (ha)		
Kharif							
1	Late Paddy	--	--	--	--	--	--
2	Early Paddy	--	--	--	--	--	--
3	Maize/Bajra	--	--	--	--	--	--
4	Oilseeds	10	8306	10		4237	
Rabi							
5	Wheat	55	45681	55		23302	
6	Jowar	--	--	--		--	
7	Pulses/Vegetables	20	16611	20		8474	
8	Potato	6	4983	6		2542	
Two Seasonal							
9	S. S. Cotton	--	--	--		--	
10	L. S. Cotton	--	--	--		--	
11	Tobacco	--	--	--		--	
12	Lucene	--	--	--		--	
Hot Weather							
13	Bajra	--	--	--		--	
14	Fodder	6	4983	6		2542	
Perennial							
15	Sugarcane	--	--	--		--	
16	Fruits	3	2492	3		1271	
Total		100	83056	100		43268	
17	Power	Paikhed	Chas mandva	Chikkar	Dabdar	Kelwan	Kelwan Feeder canal
17.1	Type – Conventional / Pumped storage	Conve ntional	Convent ional	Conventi onal	Conv entional	Conven tional	Conventio nal

17.2	Installed capacity (MW)	9	2	2	3.2	2.5	2
17.3	Annual PLF %	57.75	32.37	47.67	59.86	57.35	71.25
17.4	Annual energy (MU)						
a)	Firm (MU)	45.53	5.67	8.35	16.60	13.07	12.48
b)	Seasonal (secondary) (MU)	10.59	0.72	-	-	-	-
	Total (MU)	56.12	6.39	8.35	16.60	13.07	12.48
17.5	Off peak requirement for pumping	NA	NA	NA	NA	NA	NA
17.6	Head Race Channel / Tunnel	NA	NA	NA	8300 m	5925 m	NA
17.7	Balancing Reservoir	No Balancing Reservoir Proposed					
17.8	Fore bay	NA	NA	NA	1612 m ³	1781 m ³	1650 m ³
17.9	Intakes	Paikhed	Chas mandva	Chikkar	Dab dar	Kelwan	Kelwan Feeder canal
a)	Upper Intake						
i)	Type & size of intake	Dam Intake	Dam Intake	Dam Intake	Dam Intake	Dam Intake	Canal Intake
ii)	Submergence of the entry below water level	Yes	Yes	Yes	Yes	Yes	Yes
iii)	Intake gates-number, type & size	1 No, Fixed Wheel Gate, Size: 1800 mmX 2500 mm	1 No, Fixed Wheel Gate, Size:1420 mmX 1800 mm	1 No, Fixed Wheel Gate, Size:1420 mmX 1800 mm	1 Nos, Fixed Wheel Gate, Size: 2000 mmX 2500 mm	1 Nos, Fixed Wheel Gate, Size: 1800 mmX 2500 mm	1 No, Fixed Wheel Gate, Size: 2000 mmX 2500 mm
iv)	Details of anti-vortex	Centre line of Penstock	Centre line of Penstock is	Centre line of Penstock	Centre line of	Centre line of Penstock	-

	arrangements	is kept 3.75 m below MDDL	kept 3.40 m below MDDL	is kept 3.60 m below MDDL	Penstock is kept 3.38 m below MDDL	is kept 1.38 m below MDDL	
v)	Type of hoisting arrangement and its capacity	Hydraulic					
		50 t	25 t	30 t	30 t	25 t	12 t
b)	Lower Intake (for pumped storage scheme)	NA	NA	NA	NA	NA	NA
17.10	Surge tank / shaft	NA	NA	NA	NA	NA	NA
17.11	Penstocks / pressure shafts	Paikhed	Chas mandva	Chikkar	Dab dar	Kelwan	Kelwan Feeder canal
a)	i) Number	1	1	1	1	1	
	ii) Diameter and Length	2.5 m Dia: 230 m; 2.0 m Dia: 9 m; 1.6 m Dia: 71 m	1.8 m Dia: 78 m ; 1.2 m Dia: 36 m	1.8 m Dia: 59 m; 1.2 m Dia: 34 m	2.5 m Dia: 53 m; 1.6 m Dia: 51 m	2.5 m Dia: 51 m; 1.6 m Dia: 54 m	2.5 m Dia: 35 m; 1.6 m Dia: 16 m
b)	Bifurcation / trifurcation	Trifurcation	Bifurcation	Bifurcation	Bifurcation	Bifurcation	Bifurcation
17.12	Power House	Paikhed	Chas mandva	Chikkar	Dab dar	Kelwan	Kelwan Feeder canal
a)	Type (surface or underground)	Surface	Surface	Surface	Surface	Surface	Surface
b)	Maximum gross head (m)	76.00	40.98	38.00	32.04	28.54	16.17
c)	Minimum gross head (m)	18.20	16.98	7.00	2.04	0.54	-
d)	Head loss in water conductor system (m)	0.20	0.20	0.20	0.2	0.2	0.20
e)	Design net head (m)	56.53	32.78	27.47	24.49	22.16	15.97
f)	Dimensions (m) (L X B X H)	45.32 x 16.43	32.7x 13.90x	32.7x 13.90x	49.0 5x	32.7x 13.88x1	19.00x1 4.70x16.

		x19.00	17.62	17.62	20.85 x117.61	8.62	50
g)	Unit capacity(MW)	3x3	2x1	2x1	2x1.6	2x1.25	2x1
h)	Installed capacity (MW)	9	2	2	3.20	2.50	2
i)	Energy Generation(MU)	45.53	5.67	8.35	16.60	13.07	12.48
j)	Type of turbine	Francis	Francis	Francis	Francis	Francis	Kaplan
k)	Type of generator	AC Synchronous	AC Synchronous	AC Synchronous	AC Synchronous	AC Synchronous	AC Synchronous
l)	Type of power house crane	EOT	EOT	EOT	EOT	EOT	EOT
m)	Number & size of draft tube gates/bulk head & capacity of hoists	3 number vertical lift slide type (4020 mmX2300 mm) Rope drum hoist, 15 t	2 number vertical lift slide type (3400 mmX2340 mm) Rope drum hoist, 15 t	2 number vertical lift slide type (3400 mmX2340 mm) Rope drum hoist, 15t	2 number vertical lift slide type (5100 mmX2340 mm) Rope drum hoist, 15 t	2 number vertical lift slide type (3400 mmX2340 mm) Rope drum hoist, 12 t	2 number vertical lift slide type (2652 mmX1500mm) Rope drum hoist, 10 t
17.13	Switch yard	Paikhed	Chas mandva	Chikkar	Dab dar	Kelwan	Kelwan Feeder canal
a)	Type	Out Door	Out Door	Out Door	Out Door	Out Door	Out Door
b)	Voltage level	33 kV	33 kV	33 kV	33 kV	33 kV	33 kV
17.14	Transformer Cavern	NA	NA	NA	NA	NA	NA
17.15	Tail Race Channel	Paikhed	Chas mandva	Chikkar	Dab dar	Kelwan	Kelwan Feeder canal
a)	Shape & size	Open	Open	Open	Open	Open	Open

		Channel of width 26 m	Channel of width 5.00 m	Channel of width 5.00 m	Channel of width 5.00 m	Channel of width 5.00 m	Channel of width 3.00m
b)	Length (m)	40	470	22	40	20	5
c)	Recovery slope	1V:4H	1V:4.5H	1V:4H	1V:4H	1V:4H	1V:4H
d)	Maximum tail water level (m)	--	--	--	--	--	--
e)	Minimum tail water level (El-m)	170.50	171.52	170.00	134.00	134.00	116.57
f)	Average tail water level (El-m)	172.00	173.02	171.50	136.96	135.46	117.77
17.16	Tail Race Tunnel	NA	NA	NA	NA	NA	NA
18	Cost of project (lakh) Unit-wise						
	Unit – I: Head Works	474773 lakh					
	Unit – II: Canal and Conveyance system	455710 lakh					
	Unit – III: Power installations	18091 lakh					
	Unit – IV: Command Area Development	72547 lakh					
	Total cost of the project	1021121 lakh					
19	Benefits / Revenue	Quantity			Value (Rs. in lakh)		
a)	Food production (Quintals)	7510379			111176.70		
b)	Power (MU)	102			6120.00		
c)	Flood protection (ha)	-			-		
d)	Navigation	-			-		
e)	Water supply (MCM)	76			8987.00		
f)	Any other (fisheries) Tons	303			303.00		
	Total Benefits				126586.70		
g)	Total Annual cost				122364.64		

20	Benefit Cost (BC) Ratio and IRR	
a)	BC Ratio	1.035
b)	Internal Rate of Return (IRR)	10.172%