

**Wainganga (Gosikhurd) – Nalganga (Purna Tapi) Link Project**

**Salient Features**

Sl. No.	Particulars			
<b>1</b>	<b>Name of the Project</b>	Wainganga (Gosikhurd) – Nalganga (Purna Tapi) link Project		
<b>2</b>	<b>Type of Project (Irrigation or Multipurpose)</b>	Multipurpose		
<b>3</b>	<b>Location</b>	Vidarbha region of Maharashtra		
3.1	River Basin			
a)	Name	Wainganga and Wardha sub basins of Godavari basin & Purna Tapi sub basin of Tapi basin		
b)	Located in	Maharashtra		
i)	State(s)			
3.2	River / Tributary	Wainganga river, a tributary of Godavari river and Nalganga river, a tributary of Purna river which in turn is a tributary of Tapi river		
3.3	State(s)/District(s)/ Taluka(s) in which the following are located:	All the project components are located in Maharashtra State.		
a)	Reservoirs (Enroute)	District	Taluka	
	1. Satara	Nagpur	Kuhi	
	2. Pandegaon			
	3. Sawargaon			
	4. Khursapur			
	5. Saiky (E)			Umred
	6. Makar dhoda (E)			
	7. Pandhrabori (E)			
	8. Thana (E)			
	9. Khairgaon Kargaon			
	10. Khalsana		Kuhi	
	11. Vadgaon		Hingna	
	12. Bhansuli		Nagpur	
	13. Mangli		Wardha	Seloo
	14. Seldoh			
	15. Juwadi Khairy			

	16. Borkhedi Kalan		
	17. Tamswada		
	18. Sukhali		Arvi
	19. Vai/Malatpur		
	20. Khurzadi		
	21. Vaiphad		
	22. Dahigaon		
	23. Rota I & II		Wardha
	24. Bembla	Yeotmal	Babhulgaon
	25. Khandala		Ner
	26. Wadgaon Dipori	Amravati	Dhamangaon
	27. Yerandgaon		Nandgaon Kh.
	28. Nandgaon		
	29. Shelgund		
	30. Takali Kannad		
	31. Papal-I		
	32. Kharbi		
	33. L.Katerpurna	Akola	Barshi Takali
	34. Yelwan		
	35. Sisa Udegaon		Akola
	36. Chikhalgaon		
	37. Kolori	Buldhana	Shegaon
	38. Shelodi		
b)	Head work	District	Taluka
	(1) Gosikhurd dam	Bhandara	Pauni
	(2) Lower Wardha dam	Wardha	Arvi
	(3) Katepurna dam	Akola	Barshi Takli
	(4) Nalganga dam	Buldhana	Motala
c)	Command Area	District (CCA in ha)	Taluka (CCA in ha)
	Enroute command area (371277)	Nagpur (92326)	Kuhi (44254) Umred (33558) Hingna (9697) Nagpur (4817)
		Wardha (56646)	Seloo (24349) Arvi (30659) Wardha (1638)
		Amravati (83571)	Dhamangaon (33604) Nandgaon Kh. (49967)
		Yeotmal (15895)	Babhulgaon (10897) Ner (4998)

		Akola (84625)	Barshi Takli (50756) Akola (33869)
		Buldhana (38214)	Shegaon (30044) Motala (8170)
3.4	Name of village near Head works	Name of the village	
	(1) Gosikhurd dam	Gosikhurd	
	(2) Lower Wardha dam	Dhanodi	
	(3) Katepurna dam	Mahan	
	(4) Nalganga dam	Sanglad	
3.5	Location of Head works	Latitude (N)	Longitude (E)
(a)	(1) Gosikhurd dam	20 <sup>0</sup> 52' 15"	79 <sup>0</sup> 37' 00"
&	(2) Lower Wardha dam	20 <sup>0</sup> 52' 30"	78 <sup>0</sup> 15' 30"
(b)	(3) Katepurna dam	20 <sup>0</sup> 28' 53"	77 <sup>0</sup> 09' 24"
	(4) Nalganga dam	20 <sup>0</sup> 45' 00" to 20 <sup>0</sup> 53' 00"	76 <sup>0</sup> 11' 00" to 76 <sup>0</sup> 20' 00"
(c)	Lies in Earthquake Zone No.	The project sites lie in Seismic Zones-I & II as per the zoning map of India (IS 1897 – 1984)	
3.6	Project area reference to:		
a)	Survey of India Topo-sheets -Degree Sheets -1:50,000 Scale	55D,H,L,O,P 55P/9,P/5,O/8,O/4,P/1,L/13,L/9,L/5,L/1,H/13, H/10,H/9,H/6,H/2,H/3,D/14,D/15,D/11,D/10, D/6,D/2	
b)	Index Plan	Plate: 1.1of Volume-IV	
3.7	Access to the project	Name	Distance from project site
a)	Airport	Nagpur	85 km
b)	Rail head	Nagpur	20 km
c)	Road head	NH- 44	Link canal @ RD 59.718 km
d)	River port	-	-
e)	Seaport	Mumbai	926 km from Gosikhurd dam & 502 km from Nalganga dam
<b>4 Inter State aspects of the project</b>			
a)	State-wise details of catchment area	MP	Chhattisgarh Maharashtra Telangana Total
	(1) Pranhita sub basin	24566	271 30100 6157 61094

	excluding Wardha & Penganga				
	(2) Wardha sub basin	1590	22316	361	24087
	(3) Purna Tapi sub basin	1343	17586		18929
b)	State-wise details of catchment area up to diversion dam	M P	Chhattisgarh	Maharashtra	Total
	(1) Wainganga sub basin upto Gosikhurd dam	24566	271	10025	34862
	(2) Wardha sub basin upto Lower Wardha dam	1602		4715	6317
	(3) Katepurna sub basin upto Katepurna dam			514	514
	(4) Nalganga sub basin upto Nalganga dam			316	316
c)	Submergence due to enroute storages (ha)-State wise	Maharashtra			
	(i) 31 new tanks	16940			
	(ii) Raising of six existing tanks	2878			
	Total	19818 (incl. forest land of 241 ha)			
d)	Water allocation for the State (if any) / country	The waters of Wainganga upto Gosikhurd are allocated to the State of Maharashtra by Godavari Water Disputes Tribunal.			
e)	Committed utilisation				
	Upstream Projects	----			
	Downstream Projects	----			
g)	Proposed annual utilisation by the project	1772 Mm <sup>3</sup>			
i)	Irrigation	1286 Mm <sup>3</sup>			
ii)	Water Supply	32 Mm <sup>3</sup>			
iii)	Hydel (evaporation losses)	Nil. No new dam is contemplated. All the head works of the link project are existing projects.			
iv)	Thermal Power	-----			
v)	Industrial	397 Mm <sup>3</sup>			
	Gross annual utilisation (Mm <sup>3</sup> ) (sum of i to v)	1772 Mm <sup>3</sup>			
g)	Minimum agreed / proposed flow in the river	Since, the proposed diversion is during the monsoon period and that too mostly from spills			

	for maintaining ecology	at Gosikhurd, no minimum flows are earmarked for maintaining ecology.																																																
<b>5</b>	<b>Estimated life of the projects (years)</b>	100 years																																																
<b>6</b>	<b>Irrigation (ha)</b>	The project will provide annual irrigation to 371277 ha area in drought prone Vidarbha through enroute storages.																																																
	(a) Gross command area (GCA)	464102 ha																																																
	(b) Culturable command area (CCA)	371277 ha																																																
	(c) Annual irrigation	371277 ha																																																
	(i) Intensity of irrigation	100%																																																
	(ii) Districts benefited	Nagpur, Wardha, Amravati, Yeotmal, Akola and Buldhana																																																
	(d) Cost per hectare of gross area irrigated	Rs. 14.48 lakh																																																
	(e) Cost per 1000 cum of gross/live storage	Rs. 4.69/7.26 lakh																																																
	(f) Cost per 1000 cum of water delivered at the (Canal head/outlet)	Rs. 3.03 lakh																																																
	(g) Water utilisation	1286 Mm <sup>3</sup> The storage tank wise details are as under:																																																
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		16. Borkhedi Kalan	7024	28.80
		17. Tamswada	4244	17.40
		18. Sukhali	7698	32.33
		19. Vai/Malatpur	11176	46.94
		20. Khurzadi	1921	8.07
		21. Vaiphad	2190	9.20
		22. Dahigaon	7674	32.23
		23. Rota I & II	1638	6.39
		24. L. Wardha	17438	69.75
		25. Bembla	10897	39.23
		26. Khandala	4998	20.99
		27. Wadgaon Dipori	16166	46.88
		28. Yerandgaon	3973	14.70
		29. Nandgaon	19197	71.03
		30. Shelgund	7662	28.35
		31. Takali Kannad	5208	19.27
		32. Papal-I	8357	30.92
		33. Kharbi	5570	20.61
		34. Katerpurna (E)	22479	76.43
		35. L.Katerpurna	18353	62.40
		36. Yelwan	9924	33.74
		37. Sisa Udegaon	22845	75.39
		38. Chikhalgaon	11024	36.38
		39. Kolori	6088	20.70
		40. Shelodi	23956	81.45
		41. Nalganga (Tail end)	8170	37.58
		Grand Total	371277	1286
<b>7</b>	<b>Flood control</b>	Flood control benefits will be incidental		
<b>8</b>	<b>Navigation</b>	No navigation is proposed		
<b>9</b>	<b>Water supply</b>			
9.1	Domestic			
a)	Names of towns / villages/ Industries served	A no. of villages in the command area proposed in 15 talukas of six districts viz. Nagpur, Wardha, Amravati, Yeotmal, Akola and Buldhana in Vidarbha region of Maharashtra will be served.		
b)	Size of population served	11.33 lakh (2050 AD)		
c)	Quantum of water made available (Mm <sup>3</sup> )	32		
d)	Quantum of water per capita (litre)	70 for rural /135 for urban		

9.2	Industrial				
(a)	Name(s) {location(s)}	In the vicinity of the proposed enroute storages in the six districts of Vidarbha region.			
(b)	Quantum of water made available (Mm <sup>3</sup> )	397			
<b>10</b>	<b>Project performance</b>	<b>Period of Simulation (years)</b>		<b>No. of failure (years)</b>	
a)	Irrigation	45		11	
b)	Water supply	45		11	
<b>11</b>	<b>Hydrology</b>				
11.1	Catchments				
11.1.1	Catchments area at headwork site (km <sup>2</sup> )	Gosikhurd Project			
a)	Gross	34862			
b)	Intercepted	No new dam is proposed as head works for the link project. The ongoing Gosikhurd project is used as the off-taking structure.			
i)	By existing projects				
ii)	By ongoing projects				
iii)	By contemplated projects				
c)	Un-intercepted				
11.1.2	Catchment area classification according to mode of precipitation				
(a)	Rain-fed (km <sup>2</sup> )	34862			
(b)	Snow-fed (km <sup>2</sup> )	Nil			
11.2	Precipitation (mm)				
11.2.1	Catchments	Annual Rainfall (mm)			
		Pench sub-catchment	Kanhan sub-catchment	Bagh sub-catchment	Wainganga sub-catchment
(a)	Average	1193			
(b)	Maximum	1563	1128	1594	1404
(c)	Minimum	980	933	1004	1076
11.2.2	Command	Six IMD observatories are located in the command area, based on the data (1981-2010) of which the information is furnished.			
		Cropping Season			
		Annual	Kharif (June-October)	Rabi (November - February)	Hot (March-May)
(a)	Normal Rainfall (mm)	782 -1100	710-984	41-65	27-51
(b)	ETO (mm)	1562-2008	612-777	366-466	560-765

11.3	Annual yield calculated at the proposed site (Mm <sup>3</sup> )	From Net Yield series at Gosikhurd	
(a)	Maximum	21926	
(b)	Minimum	0	
(c)	Average	5466	
(d)	Dependable (per cent)		
(i)	At 50% dependability	4729	
(ii)	At 75% dependability	1921	
(iii)	At 90% dependability	118	
(iv)	At 98% dependability	0	
11.4	Climatic Data (command)		
11.4.1	Name of Station(s) and period of record		
Sl. No.	Names	Period of Record	
		From	To
1	Nagpur	1981	2010
2	Wardha	1981	2010
3	Amravati	1981	2010
4	Yeotmal	1981	2010
5	Akola	1981	2010
6	Buldhana	1981	2010
11.4.2	Data (Normal/Mean values of all stations in command area)		
		Maximum	Minimum
(a)	Air Temperature (°C)	42.7	12.9
(b)	Humidity (%)	87.0	18.0
(c)	Wind Speed (km/hr)	13.9	2.4
(d)	Cloud Cover (Oktas)	6.8	0.3
11.5	Seismic coefficients		
a)	Horizontal	To be assessed for the enroute storages	
b)	Vertical		
11.6	Utilisation within the State (Mm <sup>3</sup> )	1772	
11.6.1	Water availability (State's share in case of interstate river)	The waters of Wainganga upto Gosikhurd are allocated to the State of Maharashtra by Godavari Water Disputes Tribunal.	
11.6.2	Committed utilisation	-----	
11.6.3	Proposed utilisation by the project (Mm <sup>3</sup> )	1772	
(a)	Irrigation	1286	
(b)	Domestic Water Supply	32	
(c)	Industrial Water Use	397	



(d)	Transmission losses	57			
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	
	Gosikhurd dam	237.115	27500	07.09.1994	
11.7.2	Estimated Flood	Gosikhurd	L. Wardha	Katepurna	Nalganga
a)	Standard project flood		20788		
b)	Maximum probable flood /Max. flood discharge (cumec)		22596		2158
11.7.3	Design flood (cumec)	Gosikhurd	Lower Wardha	Katepurna	Nalganga
a)	Dam (cumec)	67373	22788	2784	
<b>12</b>	<b>Reservoir</b>	<b>Gosikhurd</b>	<b>L.Wardha</b>	<b>Katepurna</b>	<b>Nalganga</b>
12.1	Water levels (m)				
a)	Maximum Water Level (m)	245.70	284.50	348.69	295.05
b)	Full Reservoir Level (m)	245.50	283.80	347.775	294.44
c)	Minimum Draw Down Level (m)	241.29	277.20	337.41	280.72
d)	Outlet levels				
i)	Irrigation (m)	238.5 (Left) 235.5(Right)	274.4	335.58	279.4
e)	Dead Storage Level (m)	--	--	--	279.40
f)	River bed level (m)	221.60	262.98	321.037	267.00
12.2	Free board (m)	4.35	3.30	2.44	1.83
12.3	Live storage (Mm <sup>3</sup> )	740	216.87	86.35	69.32
12.4	Capacity at (Mm <sup>3</sup> )				
a)	Full reservoir level (FRL)	1146	253.34	97.67	71.86
b)	Minimum draw down level (MDDL)	406	36.47	11.32	2.54
12.5	Flood absorption capacity (Mm <sup>3</sup> )	No Flood storage is earmarked for any of these projects			
12.6	Sedimentation (Mm <sup>3</sup> ) and levels after	Gosikhurd dam			

	Years	50 Years	100 Year
a)	Sedimentation volume (Mm <sup>3</sup> )	116.6	243.0
b)	New zero elevation	235.88	241.29
12.7	Average monthly evaporation depths (m) of reservoir		
	Month	Gosikhurd	
	June	0.236	
	July	0.133	
	August	0.109	
	September	0.103	
	October	0.113	
	November	0.100	
	December	0.075	
	January	0.085	
	February	0.135	
	March	0.200	
	April	0.248	
	May	0.362	
<b>13</b>	<b>Submergence</b>		
13.1	Land and property submerged under enroute storages		
a)	Villages affected (No.)	109	
i)	Fully	26	
ii)	Partially	83	
b)	Land affected (ha)		
i)	Gross	19818	
ii)	Culturable	To be worked out after detailed surveys by the State	
iii)	Forest (ha)	241	
iv)	Others (specify) River portion	To be worked out after detailed surveys by the State	
13.2	Submergence ratio (with reference to CCA)	0.0534 (5.34%)	
13.3	Number of families affected		
		Families	Persons
(a)	Total	3725	15640
(b)	Scheduled Castes	642	2690
(c)	Scheduled Tribes	437	1784
(d)	General & OBC	2646	11166
<b>14</b>	<b>Head works</b>	The existing Gosikhurd, Lower Wardha, Katepurna and Nalganga projects are proposed to be utilised as	

		the head works of the link project. No new dam is proposed for headworks.		
14.1	Head Regulator(s)	Gosikhurd	Lower Wardha	Katepurna
(a)	Total length (m)	40.5	24.5	10.5
(b)	Width of bay (m)	5.5	5.0	4.25
(c)	Sill / Crest level (EL-m)	236.50	278.50	340.0
(d)	Number of gates	6	4	2
(e)	Type of gates	Vertical lift type fixed wheel service gate		
(f)	Size of gate	5.5x9.0	5.0x5.3	4.25x7.8
(g)	Type of hoisting arrangement and its capacity	rope drum hoist of 24 ton capacity mounted on steel bridge supported on trestles	rope drum hoist of 11 ton capacity mounted on steel bridge supported on trestles	rope drum hoist of 14 ton capacity mounted on steel bridge supported on trestles
<b>15</b>	<b>Canal System</b>			
15.1	Main Canal	Wainganga (Gosikhurd) – Nalganga (Purna Tapi) Link Project		
15.1.1	Purpose of canal (Irrigation/Power/Navigation/Diversion / Water Supply/ Multipurpose)	Multi-purpose		
15.1.2	Type			
	(a) Flow /Lift	Canal involving six stages of lift (155 m)		
	(b) Lined / Unlined	Lined		
	(c) Type of lining	Cement Concrete 1:4:8 (100 mm thickness)		
15.1.3	Design data	Gosikhurd-Lower Wardha	L.Wardha - Katepurna	Katepurna - Nalganga
(a)	Length (km) (Total length:426.542)	167.9	130.7	127.9
(b)	Full supply level at head/tail (m)	241.0/284.38	281.0/348.30	342.8/310.53
(c)	Full supply depth at head/tail (m)	6.0/6.0	5.75/4.75	4.5/2.0
(d)	Bed width at head/ tail (m)	39.25/21.0	20.85/13.3	11.25/3.75

(e)	Side slope at head/ tail (H:V)	1.5:1	1.5:1	1.5:1	
(f)	Bed Slope(range)	1 :20000	1 :20000	1:20000 to 1 :10000	
(g)	Maximum discharging capacity at head/ tail (cumec)	348.0/211.3	192.7/97.1	77.1/10.7	
(h)	Total number of canal structures on main canal	235	135	212	
(i)	Gross Command Area (En-route) (ha)	186219	147275	130608	
(j)	Culturable Command Area (En-route) (ha)	148972	117819	104486	
15.1.4	Feeder Canal(s)				
	(a) Number	8	6	4	
	(b) Total length (km)				
	(c) Direct sluices	3	1	--	
15.1.5	Distribution System	Extent of pipe distribution network is to be firmed up after detailed surveys by the State.			
	(a) Number				
	(b) Total length (km)				
15.2	Efficiencies (%)				
	(i) Conveyance	95			
	(ii) Field application	80			
15.3	Lifting arrangements	RD from (m)	RD to (m)	Lift (m)	Energy (MU)
(a)	Stage -I	2400	2900	23.25	175.6
(b)	Stage -II	20000	20900	23.50	180.7
(c)	Stage -III	39900	42700	29.25	207.6
(d)	Stage -IV	169600	170400	28.00	108.5
(e)	Stage -V	176900	178100	30.00	117.2
(f)	Stage -VI	292850	293700	21.25	49.2
	Total			<b>155.25</b>	<b>838.8</b>

15.4	Tunnels along the link canal	RD from (m)	RD to (m)	Length (m)	Diameter (m)
(a)	Tunnel No.1	73500	76817	3317	12.34
(b)	Tunnel No.2	141450	142226	776	11.70
(c)	Tunnel No.3	150250	156739	6489	11.00
(d)	Tunnel No.4	298975	299642	668	6.80
(e)	Tunnel No.5	371525	372306	781	5.40
(f)	Tunnel No.6	406075	407023	948	3.44
(g)	Tunnel No.7	411775	412623	848	3.44
		Total		13826	
15.5	Pipe line reaches along the main canal			RD (m)	length(m)
(a)	Reach-1			27405	1210
(b)	Reach-2			44000	553
(c)	Reach-3			49650	1937
(d)	Reach-4			60050	9783
(e)	Reach-5			83600	3485
(f)	Reach-6			87700	1819
(g)	Reach-7			93400	3551
(h)	Reach-8			112450	1111
(i)	Reach-9			257100	500
(j)	Reach-10			363800	1698
(k)	Reach-11			370480	331
	Total				25978
15.6	Canal falls along the main canal			RD (m)	fall (m)
(a)	Fall - 1			302925	7
(b)	Fall - 2			426425	6
15.7	Lifting arrangements in feeder/branch canals				
	Feeder/Branch	Main canal RD (m)	Operating Head (m)	Energy (MU)	
(a)	Borkhedi kalan	115.45	7.07	0.96	
(b)	Sukhali	147.55	5.07	0.77	
(c)	Vai	150.00	10.56	5.10	
(d)	Papal-I	246.30	10.25	2.49	
(e)	Shelodi	377.13	8.26	3.16	
	Total			<b>12.50</b>	
<b>16</b>	<b>Cropping Pattern</b> : Taluk wise cropping pattern for the 40 enroute storages as approved by State Agriculture Department has been adopted. The details are given in Chapter-8: Irrigation Planning and Command Area Development.				

<b>17</b>	<b>Power</b>	No hydro power generation is envisaged in the link proposal.	
17.1	Canal Top/bank solar power		
(a)	Potential	1884 MW	
<b>18</b>	<b>Cost of project (lakh) Unit-wise</b>		
(a)	Unit – I: Head Works	2383348 lakh	
(b)	Unit – II: Canal and Conveyance system	2953115 lakh	
(c)	Unit – VI: Command Area Development	38735 lakh	
	Total cost of the project	5375198 lakh	
(d)	Annual cost	677426 lakh	
<b>19</b>	<b>Benefits / Revenue</b>	<b>Quantity</b>	<b>Value (Rs. in lakh)</b>
a)	Agricultural Produce (Quintals)	5916265	213381
b)	Domestic water supply (Mm <sup>3</sup> )	32	112
c)	Industrial water supply (Mm <sup>3</sup> )	397	952800
d)	Any other		
	(i) Pisciculture		3230
	(ii) Water charges (Irrigation service fee)		5569
	(iii) Canal Plantation		4866
	Total Benefits		1179958
<b>20</b>	<b>Benefit Cost (BC) Ratio and IRR</b>		
a)	B.C Ratio	1.74	
b)	Internal Rate of Return (IRR)	9.50	