CERTIFICATE

[Format-4]

Certified that the Satdharu Tank of District Damoh is located on Survey of India toposheet no M55/6,9,10 at Longitude 23^0 – 42' -36"and Latitude 79^0-27'-12" The Total Catchment Area at tank site is worked out to be 145.68 Sq Km, having intercepted Catchment Area as 145.68 Sq.Km. The Principal levels are connected with GTS.

(D.K.Jain)
Sub-Divisional Officer
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Damoh

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Executive Engineer
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Damoh

SATDHARU MEDIUM TANK PROJECT

WATER AVAILABILITY STUDIES

PROJECT AT GLANCE

The Satdharu Medium Project is proposed in Jabera block of Damoh Tehsil and distt. Damoh of MP on Satdharu river in Dhasan ken basin having a catchment area of 145.68 sq. km. The latitude and longitude of proposed dam site are 23°42'36" and 79°27' 09" and can be seen on Topo Sheet no. 55- M/6. There is no scheme proposed / constructed in the upstream of the proposed Satdharu medium project.

WATER AVAILABILITY STUDIES

No systematic gauging has been done on the Satdharu river in or near the project sites. There is one G &D site on Dhasan river at Garraulli which is the nearest to the proposed project. The satdharu river joins Bearma river, which finally joins Ken river. Thus both rivers are in sub basins of Yamuna river.

The rain fall data of Damoh rain gauge station have been used to compute the 75 % dependable rainfall data of proposed dam, which is nearest and about 20 kms from dam site. The rain fall data has been taken from WRD website. The areal rain fall of Damoh rain gauge station for the year 1981-82 to 2013-14 has been used for computation of 75 % dependable. There is one Jera medium project proposed on Dhasan river the lacation of which is almost parallel to proposed Satdharu project. Yield for Jera project is computed on the basis of Garraulli G &D site data located on Dhasan river downstream. The yield for Jera project is calculated both by RR equations and catchment area rainfall proportion basis. The average rainfall of Garraulli G&D site catchment is computed using Thiessen polygon method in Jera medium project report.

The names of influencing stations are given below along with their Thiessen weights:

Garrulli catchment: Begumganj (0.04), Banda (0.15), Tikamgarh (0.09), Mahroni (0.05), Chandia nala (0.24), Sagar (0.17) , Khurai (0.02) , Bijawar (0.14) , Chhatarpur (0.02) and Nowgaon (0.09).

Jera dam Catchment : Begumganj (0.02) and J.C. Nagar (0.98) .

S.No.	project /site	Areal Average Rain fall (MM)
1.	Garraulli G&D site	1080.02mm
2.	Jera dam site	1226.28mm
3.	Satdharu dam site	1233.35mm

The above table shows the areal average rain fall of Garraulli site as well as Jera dam site and proposed dam are in the range of 1080.02 mm to 1233.35 mm. The normal rainfall in Dhasan basin reduces from upper to lower reaches and it is observed that the rainfall of Garraulli G&D Site (1080.02mm) is comparatively lower then Jera and Satdharu catchment. Based on the rainfall pattern and proximity to the proposed dam, Garraulli G&D site data has been further used in computation of yield series of the project.

The Catchment area of the proposed Satdharu project has been derived using the relevant Topographic Sheet 55 M/6. The Catchment area map is attached as Annex- I. The Physiographic Parameters of the Satdharu Project are tabulated below:

S.No.	Project Name	C.A. (sqkm)	Longest Flow Path (Km)
1.	Satdharu Dam	145.68	28.10 Km

The annual runoff coefficient at Garraulli G &D site are in the range of 0.12 to 1.04 with an average value of 0.53 which is consistent with the area. The virgin flows of Garraulli G& D site have been used to compute the yield series at the proposed dam location in the following two methods:

- Rainfall - Runoff Relationship
- In Catchment area rainfall proportion

Rainfali - Runoff Relationship :-

The month wise Rainfall - runoff relationships for monsoon season at Garraulli G& D site have been developed for Jera project and the same are tabulated below and used for computation of flow series for Satdharu project.

No.	Month	Equation	R Value
1.	June	**Y = 0.082X - 0.862**	0.85
2.	July	**Y = 0.991X - 208.46**	0.85
3.	August	**Y = 0.7112X - 46.232**	0.86

4.	September	Y = 0.9922X - 17.748	0.89
5.	October	Y = 1.11121195X1+ 0.279329X2- 11.9323	0.92

*X1 Rainfall (mm) of current Month, X2 - Rainfall (mm) of previous month and Y- Runoff (mm)

The monsoon yield at the dam site has been computed using the above Rainfall Runoff relationship and concerned catchment area monthly areal rainfall depths. The non monsoon yield was computed using the ratio of non monsoon to monsoon rainfall depth of the concerned year and this non monsoon yield has been further distributed to the individual months using average ratios of non monsoon monthly rainfall to total non monsoon rainfall. The flow series computation using RR equation gives a 75 % dependable yield of 73.66 MCM which gives a higher yield factor of 0.5.

Catchment Area Rainfall Proportion Method:

As used in Jera project, the individual dam yield for Satdharu project has been computed using the catchment area and average areal rainfall ratio of Garraulli G& D site and the concerned dam catchment. The Following Equation Shows The method.

Qsatdharu = Qgarraulli * (C.A.satdharu/C.A.garraulli)*(R.F. satdharu/R.F.garraulli)

By the catchment area and rainfall proportion method 75% Dependable yield comes out **63.03 MCM** which gives a yield factor of 0.43 at the project site. Individual Rainfall- runoff relationship method yields few negative values in monsoon months, which cannot be correct. To remove such discrepancies, the yield series developments with the catchment area and rainfall Proportion method have been adopted. Therefore 75% Dependable yield 63.03 MCM by catchment area and rainfall proportion method has been adopted for Satdharu medium project which gives ratc as 0.43 MCM per sq km of the catchment.

SIE

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SATDHARU MEDIUM PROJECT

RAINFALL DATA OF DAMOH RAINGUAGE STATION

S.NO	Year	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	Monsoon	Non-monsoon	Annual	Exceedence Probability
1	1981-82	49.30	261.50	335.90	209.00	16.40	6.20	32.60	3.40	2.00	36.20	0.00	15.20	872.10	95.60	967.70	2.94
2	1982-83	52.30	224.70	774.80	111.70	4.80	13.40	0.00	105.80	5.00	0.00	0.00	3.40	1168.30	127.60	1295.90	5.88
3	1983-84	38.00	342.20	293.30	396.10	15.00	0.00	4.20	4.00	4.00	0.00	0.00	0.00	1074.60	12.20	1086.80	8.82
4	1984-85	120.70	136.50	760.20	62.90	0.00	0.00	0.00	33.60	57.20	0.00	0.00	0.00	1080.30	90.80	1171.10	11.76
5	1985-86	144.00	443.60	397.20	123.30	41.90	0.00	0.00	6.00	0.00	0.00	6.40	0.00	1150.00	12.40	1162.40	14.71
6	1986-87	185.70	246.40	270.10	110.00	12.80	0.00	19.10	6.40	98.20	32.60	0.00	4.60	825.00	160.90	985.90	17.65
7	1987-88	47.70	409.00	856.80	241.20	72.40	0.00	10.30	44.80	66.40	0.00	0.00	9.50	1627.10	131.00	1758.10	20.59
8	1988-89	292.60	396.30	399.60	48.60	6.60	0.00	0.00	3.40	26.30	0.00	0.00	0.00	1143.70	29.70	1173.40	23.53
9	1989-90	138.80	230.80	349.10	77.00	0.00	2.40	6.40	0.00	0.00	15.20	0.00	0.60	795.70	24.60	820.30	26.47
10	1990-91	496.60	288.00	456.00	420.30	12.20	0.00	20.60	0.00	30.60	0.00	0.00	36.80	1673.10	88.00	1761.10	29.41
11	1991-92	142.60	342.60	750.40	13.60	0.00	8.60	0.00	0.00	3.60	14.60	5.40	13.20	1249.20	45.40	1294.60	32.35
12	1992-93	14.00	306.50	485.70	314.40	0.00	0.00	0.00	0.00	0.00	0.00	6.00	9.80	1120.70	15.80	1136.50	35.29
13	1993-94	131.00	175.20	356.00	364.60	0.00	0.00	0.00	0.00	22.20	13.40	0.00	0.00	1026.80	35.60	1062.40	38.24
14	1994-95	0.00	794.60	762.80	38.60	3.40	0.00	0.00	14.00	25.60	0.00	0.00	0.00	1599.40	39.60	1639.00	41.18
15	1995-96	91.60	244.00	534.20	96.80	0.00	0.00	12.60	25.40	4.00	41.80	0.00	9.20	966.60	93.00	1059.60	44.12
16	1996-97	13.50	329.70	285.20	157.20	106.60	0.00	0.00	55.40	17.40	0.00	0.00	0.00	892.20	72.80	965.00	47.06
17	1997-98	51.60	615.00	335.20	160.60	0.00	0.00	0.00	0.20	3.00	0.00	0.00	0.00	1162.40	0.00	1162.40	50.00
18	1998-99	40.80	210.20	510.80	136.40	162.80	98.20	55.40	0.00	0.00	0.00	0.00	0.00	1061.00	153.60	1214.60	52.94
19	1999-00	20.60	208.00	539.60	558.00	30.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1414.00	0.00	1414.00	55.88
20	2000-01	145.40	422.90	333.20	127.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1028.90	0.00	1028.90	58.82
21	2001-02	215.60	389.40	212.80	37.00	116.40	8.20	0.00	6.40	1.40	0.00	19.80	19.60	971.20	55.40	1026.60	61.76
22	2002-03	59.00	42.60	452.60	134.00	92.00	12.40	2.60	0.00	0.00	0.00	0.00	0.00	780.20	30.80	811.00	64.71
23	2003-04	138.60	559.80	419.20	522.80	0.00	0.00	52.20	0.00	102.40	0.00	0.00	0.00	1440.40	153.60	1594.00	67.65
24	2004-05	349.00	194.00	352.70	34.20	25.20	0.00	0.00	52.20	0.00	0.00	20.00	11.00	955.10	83.20	1038.30	70.59
25	2005-06	181.20	910.70	352.40	166.20	7.00	0.00	18.50	7.00	0.00	42.80	0.00	0.00	1617.50	68.30	1685.80	73.53
26	2006-07	20.00	339.00	338.00	79.00	10.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	786.40	0.00	786.40	76.47
27	2007-08	103.00	237.40	356.60	127.50	0.00	0.00	4.80	0.00	22.60	4.60	0.00	22.40	814.50	54.40	868.90	79.41
28	2008-09	981.00	243.00	435.00	165.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	18.00	1824.00	18.20	1842.20	82.35
29	2009-10	14.00	160.00	282.00	360.00	75.00	74.00	3.00	0.00	0.00	0.00	0.00	0.00	891.00	77.00	968.00	85.29
30	2010-11	12.60	554.40	359.40	210.60	14.20	0.00	2.60	0.00	4.00	0.00	0.00	0.00	1151.20	6.60	1157.80	88.24
31	2011-12	509.40	366.00	281.20	416.40	0.00	0.00	0.00	0.00	3.60	0.00	17.20	3.60	1573.00	24.40	1597.40	91.18
32	2012-13	126.60	579.40	264.20	140.80	0.00	0.00	0.00	29.20	0.00	1.40	3.30	0.00	1111.00	38.90	1149.90	94.12
33	2013-14	506.1	566.1	750.3	50.5	78.7	13.3	0	0	15	40.6	3.1	0	1951.70	72.00	2023.70	97.06
34	2014-15	166.4	183.1	281.6	90.3	18.4	0	15.8	68.6	52.7	2.2	5.2	0	739.80	144.50	884.30	100.00

75% Dependable monsoon rainfall = 1201.95 mm 120.195

75% Dependable annual rainfall = 1236.1 mm 123.61

SATDHARU MEDIUM PROJECT

Annual Runoff of SATDHARU Tank Catchment 145.68 sq. km

Q Satdharu = $Q_{garrulli}$ *(C.A.Satharu/C.A.GARRULLI)*(R.F.Satdharu/R.F.GARRULLI)

Catchment Area at Garrulli 6400 Sq. Km.

Monthly Virgin flow at Garrulli G&D Site CWC catchment (MCM)

S .NO	YEAR	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	Monsoon	Non MONSOON	Annual
1	1982-83	20.9	348.5	4439.4	1232.5	137.9	71.6	41.4	34.7	31.9	21.4	14.3	5.4	6179.2	220.6	6399.8
2	1983-84	40.8	920.7	1226.3	3512.3	422.2	87.0	49.0	50.0	41.4	17.1	5.0	2.8	6122.2	252.3	6374.5
3	1984-85	27.7	136.6	2156.0	588.4	91.1	38.6	23.0	25.4	17.8	7.8	2.8	2.8	2999.9	118.0	3117.9
4	1985-86	58.9	467.9	2090.4	417.4	1011.1	140.1	70.6	55.2	130.9	41.7	16.8	4.6	4045.6	459.9	4505.6
5	1986-87	241.4	629.9	936.1	216.0	66.2	21.3	3.4	6.5	3.1	2.8	2.8	2.8	2089.6	42.7	2132.3
6	1987-88	21.0	285.2	1191.0	985.2	264.1	107.0	17.2	12.6	9.7	4.5	4.7	2.9	2746.6	158.6	2905.2
7	1988-89	34.7	773.5	1036.4	187.6	63.5	9.7	3.3	2.8	2.8	2.8	2.8	2.8	2095.7	26.9	2122.7
8	1989-90	21.2	467.9	766.3	458.2	123.5	6.2	2.9	2.8	2.8	2.8	2.8	2.8	1837.1	23.1	1860.3
9	1990-91	191.6	1459.6	1787.4	2800.7	465.0	210.4	139.5	54.7	12.1	5.0	4.3	3.6	6704.3	429.5	7133.8
10	1991-92	91.1	634.7	2434.0	697.7	142.9	20.4	5.5	5.0	4.1	3.1	2.8	2.8	4000.3	43.7	4044.0
11	1992-93	21.6	316.7	1912.0	2568.6	226.5	117.9	9.0	7.7	6.2	7.3	5.0	3.8	5045.4	156.9	5202.3
12	1993 -94	191.6	1459.6	1787.4	2800.7	465.0	210.4	139.5	54.7	12.1	5.0	4.3	3.6	6704.3	429.5	7133.8
13	1994-95	31.1	3441.8	4850.6	654.3	159.0	17.1	11.1	10.8	7.6	9.0	7.6	4.7	9136.8	67.8	9204.6
14	1995-96	42.3	416.7	1483.7	527.6	55.4	9.1	4.4	5.1	5.0	3.8	2.8	2.8	2525.7	33.1	2558.8
15	1996- 97	21.4	744.0	2444.6	995.5	244.6	120.2	16.0	6.8	5.6	3.9	3.1	2.8	4450.1	158.3	4608.4
16	1997-98	21.4	506.1	1284.3	982.1	228.4	206.3	421.3	143.8	82.8	20.4	14.9	5.2	3022.4	894.8	3917.1
17	1998-99	21.6	617.9	1398.6	430.9	237.1	122.2	25.3	21.4	23.5	13.1	5.8	3.2	2706.2	214.6	2920.8
18	1999-00	21.4	215.5	3864.2	530.0	597.1	187.9	104.8	90.0	61.8	27.2	6.7	3.4	5228.2	481.9	5710.1
19	2000-01	21.9	1060.1	543.2	424.0	154.0	28.4	19.2	15.8	6.9	4.1	2.8	2.8	2203.2	80.1	2283.3
20	2001-02	167.8	1353.5	904.5	367.1	195.6	105.5	25.6	23.8	16.2	13.8	4.8	3.0	2988.5	192.7	3181.2
21	2002-03	21.4	56.2	1060.9	601.7	72.2	13.5	4.7	2.9	2.8	2.8	2.8	2.8	1812.4	32.5	1844.9
22	2003-04	46.2	237.2	365.1	1924.5	213.3	31.7	16.9	13.7	13.6	5.4	3.7	2.8	2786.3	87.8	2874.1
23	2004-05	80.1	92.5	735.7	159.0	64.1	17.6	5.8	5.5	4.7	2.8	2.8	2.8	1131.4	42.2	1173.6
24	2005-06	23.0	4040.7	577.4	249.8	65.0	18.6	11.2	9.3	3.4	2.8	5.4	2.8	4955.9	53.7	5009.6
25	2006-07	21.4	180.9	362.8	315.4	23.9	4.2	2.8	2.8	2.8	2.8	2.8	2.8	904.5	21.2	925.7
26	2007-08	21.6	102.5	171.0	85.6	23.5	11.1	5.9	2.9	2.9	2.9	2.9	2.8	404.1	31.3	435.4
27	2008-09	1867.1	630.0	1174.9	177.6	48.5	6.6	3.1	2.9	2.9	2.9	2.9	2.9	3898.1	24.1	3922.2
28	AVERAGE,	125.6	799.9	1592.0	921.9	217.1	71.9	43.8	24.8	19.2	8.9	5.2	3.3	3656.4	177.0	3833.4

SATDHARU MEDIUM PROJECT

Monthly Rainfall Series for Garrulli Site Catchment (mm)

S.NO	year	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	Monsoon	Non Monsoon	ANNUAL
1	1982-83	78.66	325.50	850.61	194.93	43.18	22.73	3.23	36.92	27.91	0.00	0.00	0.77	1492.9	91.6	1584.4
2	1983-84	93.43	447.77	350.62	451.68	61.97	18.32	0.20	2.47	2.48	1.39	3.13	5.75	1405.5	33.7	1439.2
3	1984-85	87.81	166.80	570.14	87.75	5.39	0.97	1.60	13.65	39.26	15.41	0.00	5.48	917.9	76.4	994.3
4	1985-86	78.86	317.67	409.26	213.48	166.50	0.00	0.00	49.39	33.72	4.42	1.43	0.20	1185.8	89.2	1274.9
5	1986-87	178.97	352.46	157.79	60.37	10.27	0.00	19.72	2.22	7.35	1.73	1.17	2.56	759.9	34.8	794.6
6	1987-88	43.99	355.76	381.87	218.04	37.13	1.22	13.94	0.10	0.00	2.99	0.00	0.00	1036.8	18.2	1055.0
7	1988-89	191.76	322.72	238.82	79.47	5.61	0.00	0.00	0.00	20.89	3.34	0.13	23.90	838.4	48.3	886.6
8	1989-90	94.10	176.93	434.46	53.02	0.00	0.00	19.27	0.00	5.60	4.63	0.81	3.97	758.5	34.3	792.8
9	1990-91	298.19	364.41	320.91	430.19	6.01	0.21	22.33	2.09	0.00	0.44	0.17	19.90	1419.7	45.1	1464.8
10	1991-92	98.43	357.52	455.21	46.41	0.50	5.52	1.34	1.51	10.42	13.47	0.73	1.95	958.1	34.9	993.0
11	1992-93	45.99	234.20	436.53	244.65	11.27	0.98	0.70	4.97	5.53	0.00	32.02	0.00	972.6	42.2	1014.8
12	1993 -94	102.09	146.45	356.39	468.68	14.13	0.00	0.90	25.51	1.43	37.11	1.13	0.00	1087.7	65.2	1152.9
13	1994-95	223.84	594.13	419.04	100.53	0.19	0.00	0.60	31.98	11.32	2.87	0.00	0.00	1337.7	46.2	1383.9
14	1995-96	53.81	311.17	366.05	98.63	8.79	0.00	5.61	0.00	1.53	7.62	0.75	1.61	838.4	17.1	855.6
15	1996- 97	41.26	330.77	560.15	118.77	48.89	0.00	0.00	0.00	0.00	16.10	17.47	2.10	1099.8	35.7	1135.5
16	1997-98	75.89	406.70	373.93	157.52	42.38	46.96	55.90	3.86	38.36	0.00	0.00	13.48	1056.4	158.6	1215.0
17	1998-99	69.08	304.72	531.23	160.24	21.33	16.33	0.00	1.69	0.00	0.00	0.00	19.52	1086.6	37.5	1124.1
18	1999-00	42.74	311.27	525.88	634.29	84.35	0.15	0.00	1.65	0.76	0.36	9.43	14.55	1598.5	26.9	1625.4
19	2000-01	98.46	415.60	180.91	88.18	0.17	0.00	0.00	9.11	24.73	6.40	0.33	4.17	783.5	44.7	828.3
20	2001-02	279.35	373.73	222.64	30.51	23.44	2.21	0.20	8.68	26.64	0.97	3.08	2.06	929.7	43.8	973.5
21	2002-03	44.97	68.85	431.02	121.47	15.88	10.37	1.05	12.01	3.93	0.00	0.00	13.36	682.2	40.7	722.9
22	2003-04	100.44	408.07	301.75	449.15	0.10	0.00	5.79	4.60	0.19	28.72	0.10	3.46	1259.5	42.9	1302.4
23	2004-05	226.27	153.98	392.89	74.11	31.73	2.30	0.00	4.68	0.05	29.62	0.10	3.46	879.0	40.2	919.2
24	2005-06	140.20	728.41	159.17	126.30	1.67	0.00	0.00	0.00	1.01	18.07	1.29	9.39	1155.7	29.8	1185.5
25	2006-07	58.56	396.13	249.06	84.14	2.85	1.49	0.00	0.00	16.21	3.24	0.57	1.49	790.7	23.0	813.7
26	2007-08	110.69	222.13	126.83	84.08	0.00	0.00	2.12	1.59	0.00	0.18	0.00	8.31	543.7	12.2	555.9
27	2008-09	360.15	325.32	262.38	85.05	7.49	1.02	0.00	16.09	3.83	0.00	1.07	9.76	1040.4	31.8	1072.2
28	average	122.9	330.3	372.8	183.8	24.1	4.8	5.7	8.7	10.4	7.4	2.8	6.3	1033.9	46.1	1080.0

SATDHARU MEDIUM PROJECT

Monthly Rainfall Series for Satdharu medium Project Dam Catchment (mm)

S.NO	YEAR	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	Monsoon	Non Monsoon	Annual
1	1982-83	52.30	224.70	774.80	11.70	4.80	13.40	0.00	105.80	5.00	0.00	0.00	3.40	1168.30	127.60	1295.90
2	1983-84	38.00	342.20	283.30	196.10	15.00	0.00	4.20	4.00	4.00	0.00	0.00	0.00	1074.60	12.20	1086.80
3	1984-85	120.70	136.50	760.20	52.90	0.00	0.00	0.00	33.60	57.20	0.00	0.00	0.00	1080.30	90.80	1171.10
4	1985-86	144.00	443.60	397.20	23.30	41.90	0.00	0.00	6.00	0.00	0.00	6.40	0.00	1150.00	12.40	1162.40
5	1986-87	185.70	246.40	270.10	10.00	12.80	0.00	19.10	6.40	98.20	32.60	0.00	4.60	825.00	160.90	985.90
6	1987-88	47.70	409.00	856.80	41.20	72.40	0.00	10.30	44.80	66.40	0.00	0.00	9.50	1627.10	131.00	1758.10
7	1988-89	292.60	396.30	399.60	18.60	6.60	0.00	0.00	3.40	26.30	0.00	0.00	0.00	1143.70	29.70	1173.40
8	1989-90	138.80	230.80	349.10	77.00	0.00	2.40	6.40	0.00	0.00	15.20	0.00	0.60	795.70	24.60	820.30
9	1990-91	496.60	288.00	456.00	20.30	12.20	0.00	20.60	0.00	30.60	0.00	0.00	36.80	1673.10	88.00	1761.10
10	1991-92	142.60	342.60	750.40	13.60	0.00	8.60	0.00	0.00	3.60	14.60	5.40	13.20	1249.20	45.40	1294.60
11	1992-93	14.00	306.60	485.70	14.40	0.00	0.00	0.00	0.00	0.00	0.00	6.00	9.80	1120.70	15.80	1136.50
12	1993 -94	131.00	175.20	356.00	364.60	0.00	0.00	0.00	0.00	22.20	13.40	0.00	0.00	1026.80	35.60	1062.40
13	1994-95	0.00	794.60	762.80	8.60	3.40	0.00	0.00	14.00	25.60	0.00	0.00	0.00	1599.40	39.60	1639.00
14	1995-96	91.60	244.00	534.20	96.80	0.00	0.00	12.60	25.40	4.00	41.80	0.00	9.20	966.60	93.00	1059.60
15	1996- 97	13.50	329.70	285.20	157.20	106.60	0.00	0.00	55.40	17.40	0.00	0.00	0.00	892.20	72.80	965.00
16	1997-98	51.60	615.00	335.20	150.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1162.40	0.00	1162.40
17	1998-99	40.80	210.20	510.80	136.40	162.80	98.20	55.40	0.00	0.00	0.00	0.00	0.00	1061.00	153.60	1214.60
18	1999-00	26.00	200.00	539.60	558.00	90.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1414.00	0.00	1414.00
19	2000-01	145.40	422.90	333.20	117.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1028.90	0.00	1028.90
20	2001-02	215.60	389.40	212.80	97.00	116.40	8.20	0.00	6.40	1.40	0.00	19.80	19.60	971.20	55.40	1026.60
21	2002-03	59.00	42.60	452.60	194.00	92.00	17.40	2.60	0.00	10.80	0.00	0.00	0.00	780.20	30.80	811.00
22	2003-04	138.60	359.80	419.20	502.80	0.00	0.00	52.20	0.00	101.40	0.00	0.00	0.00	1440.40	153.60	1594.00
23	2004-05	349.00	194.00	352.70	84.20	25.20	0.00	0.00	52.20	0.00	0.00	20.00	11.00	955.10	83.20	1038.30
24	2005-06	181.20	910.70	352.40	186.20	7.00	0.00	52.50	7.00	0.00	42.80	0.00	0.00	1617.50	68.30	1685.80
25	2006-07	20.00	339.00	338.00	79.00	10.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	786.40	0.00	786.40
26	2007-08	103.00	227.40	356.60	117.50	0.00	0.00	4.80	0.00	22.60	4.60	0.00	22.40	814.50	54.40	868.90
27	2008-09	981.00	243.00	435.00	165.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	18.00	1824.00	18.20	1842.20
28	2009-10	14.00	160.00	282.00	360.00	75.00	74.00	3.00	0.00	0.00	0.00	0.00	0.00	891.00	77.00	968.00
29	2010-11	12.60	554.40	359.40	210.60	14.20	0.00	2.60	0.00	4.00	0.00	0.00	0.00	1151.20	6.60	1157.80
30	2011-12	509.40	366.00	281.20	416.40	0.00	0.00	0.00	0.00	3.60	0.00	17.20	3.60	1573.00	24.40	1597.40
31	2012-13	126.60	579.40	264.20	140.80	0.00	0.00	0.00	29.20	0.00	1.40	8.30	0.00	1111.00	38.90	1149.90
32	2013-14	506.10	566.10	750.30	50.50	78.70	13.30	0.00	0.00	15.00	40.60	3.10	0.00	1951.70	72.00	2023.70
33	2014-15	166.40	183.10	281.60	90.30	18.40	0.00	15.80	68.60	52.70	2.20	5.20	0.00	739.80	144.50	884.30
28	AVERAGE	168.3	347.7	441.8	184.6	29.3	7.1	6.9	14.0	17.3	6.3	2.8	4.9	1171.7	57.3	1231.1

SATDHARU MEDIUM PROJECT

Monthly & Annual runoff series for Satdharu medium Project Dam Catchment (MCM)

Catchment Area at Satdharu Dam 145.68 Sq . Km

S .NO	YEAR	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	Monsoon	Non Monsoon	Annual
1	1982-83	0.32	5.48	92.04	16.08	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	114.26	0.00	114.26
2	1983-84	0.38	16.02	22.55	70.11	2.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	111.39	0.00	111.39
3	1984-85	0.87	2.55	65.44	9.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	78.45	0.00	78.45
4	1985-86	2.45	14.87	46.18	5.49	5.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	74.78	0.00	74.78
5	1986-87	5.70	10.02	36.47	8.96	1.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.03	0.00	63.03
6	1987-88	0.52	7.46	60.83	24.81	11.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	105.34	0.00	105.34
7	1988-89	1.21	21.62	39.47	2.61	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.61	0.00	66.61
8	1989-90	0.71	13.89	14.02	15.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.77	0.00	43.77
9	1990-91	7.26	26.26	57.81	62.28	21.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	175.11	0.00	175.11
10	1991-92	3.00	13.84	31.33	4.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	112.83	0.00	112.83
11	1992-93	0.15	9.44	48.42	75.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	133.15	0.00	133.15
12	1993-94	5.60	39.75	40.64	49.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	135.58	0.00	135.58
13	1994-95	0.00	104.78	200.99	5.72	65.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	376.70	0.00	376.70
14	1995-96	1.64	7.44	49.29	11.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70.15	0.00	70.15
15	1996- 97	0.16	16.68	28.33	29.99	12.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	87.50	0.00	87.50
16	1997-98	0.33	17.42	26.21	22.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.75	0.00	66.75
17	1998-99	0.29	9.70	30.61	8.35	41.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90.16	0.00	90.16
18	1999-00	0.30	3.15	90.25	10.61	14.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	118.88	0.00	118.88
19	2000-01	0.74	24.54	22.77	13.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.00	0.00	62.00
20	2001-02	2.95	32.10	29.68	10.13	22.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	86.97	0.00	86.97
21	2002-03	0.64	0.79	25.36	15.11	9.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.41	0.00	51.41
22	2003-04	1.45	4.76	11.54	50.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	68.75	0.00	68.75
23	2004-05	2.81	2.65	15.03	1.67	1.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.33	0.00	23.33
24	2005-06	0.68	114.99	29.10	7.48	6.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	158.47	0.00	158.47
25	2006-07	0.17	3.52	11.21	6.74	1.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.62	0.00	23.62
26	2007-08	0.46	2.39	10.94	2.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.74	0.00	16.74
27	2008-09	115.77	10.71	44.34	7.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	178.66	0.00	178.66
28	AVERAGE	5.80	19.89	45.59	20.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.79	0.00	99.79

SATDHARU MEDIUM PROJECT

Monthly & Annual runoff series for Satdharu medium Project Dam Catchment (MCM)

Catchment Area at JERA Dam 145.68 Sq . Km

S .NO	YEAR	JUNE	JULY	AUG	SEP	OCT	Monsoon	on Monsoo	Total
1	1982-83	0.32	5.48	92.04	16.08	0.35	114.26	0.00	114.26
2	1983-84	0.38	16.02	22.55	70.11	2.33	111.39	0.00	111.39
3	1984-85	0.87	2.55	65.44	9.60	0.00	78.45	0.00	78.45
4	1985-86	2.45	14.87	46.18	5.49	5.79	74.78	0.00	74.78
5	1986-87	5.70	10.02	36.47	8.96	1.88	63.03	0.00	63.03
6	1987-88	0.52	7.46	60.83	24.81	11.72	105.34	0.00	105.34
7	1988-89	1.21	21.62	39.47	2.61	1.70	66.61	0.00	66.61
8	1989-90	0.71	13.89	14.02	15.15	0.00	43.77	0.00	43.77
9	1990-91	7.26	26.26	57.81	62.28	21.49	175.11	0.00	175.11
10	1991-92	3.00	13.84	91.33	4.65	0.00	112.83	0.00	112.83
11	1992-93	0.15	9.44	48.42	75.14	0.00	133.15	0.00	133.15
12	1993 -94	5.60	39.75	40.64	49.59	0.00	135.58	0.00	135.58
13	1994-95	0.00	104.78	200.99	5.72	65.21	376.70	0.00	376.70
14	1995-96	1.64	7.44	49.29	11.79	0.00	70.15	0.00	70.15
15	1996- 97	0.16	16.88	28.33	29.99	12.14	87.50	0.00	87.50
16	1997-98	0.33	17.42	26.21	22.79	0.00	66.75	0.00	66.75
17	1998-99	0.29	9.70	30.61	8.35	41.20	90.16	0.00	90.16
18	1999-00	0.30	3.15	90.25	10.61	14.57	118.88	0.00	118.88
19	2000-01	0.74	24.54	22.77	13.94	0.00	62.00	0.00	62.00
20	2001-02	2.95	32.10	19.68	10.13	22.11	86.97	0.00	86.97
21	2002-03	0.64	0.79	25.36	15.11	9.51	51.41	0.00	51.41
22	2003-04	1.45	4.76	11.54	50.99	0.00	68.75	0.00	68.75
23	2004-05	2.81	2.65	15.03	1.67	1.16	23.33	0.00	23.33
24	2005-06	0.68	114.99	29.10	7.48	6.22	158.47	0.00	158.47
25	2006-07	0.17	3.52	11.21	6.74	1.98	23.62	0.00	23.62
26	2007-08	0.46	2.39	10.94	2.95	0.00	16.74	0.00	16.74
27	2008-09	115.77	10.71	44.34	7.84	0.00	178.66	0.00	178.66

SATDHARU MEDIUM PROJECT

75% Dependable yield by Catchment area for Satdharu Dam

For catchment of 145.68 sq. km.

S.No.	Year	Annual Inflow MCM	Decending order	Rank	Exceedence Probability
1	1982-83	114.26	376.70	1	3.6
2	1983-84	111.39	178.66	2	7.1
3	1984-85	78.45	175.11	3	10.7
4	1985-86	74.78	158.47	4	14.3
5	1986-87	63.03	135.58	5	17.9
6	1987-88	105.34	133.15	6	21.4
7	1988-89	66.61	118.88	7	25.0
8	1989-90	43.77	114.26	8	28.6
9	1990-91	175.11	112.83	9	32.1
10	1991-92	112.83	111.39	10	35.7
11	1992-93	133.15	105.34	11	39.3
12	1993 -94	135.58	90.16	12	42.9
13	1994-95	376.70	87.50	13	46.4
14	1995-96	70.15	86.97	14	50.0
15	1996- 97	87.50	78.45	15	53.6
16	1997-98	66.75	74.78	16	57.1
17	1998-99	90.16	70.15	17	60.7
18	1999-00	118.88	68.75	18	64.3
19	2000-01	62.00	66.75	19	67.9
20	2001-02	86.97	66.61	20	71.4
21	2002-03	51.41	63.03	21	75.0
22	2003-04	68.75	62.00	22	78.6
23	2004-05	23.33	51.41	23	82.1
24	2005-06	158.47	43.77	24	85.7
25	2006-07	23.62	23.62	25	89.3
26	2007-08	16.74	23.33	26	92.9
27	2008-09	178.66	16.74	27	96.4

75% Dependable Yield for C.A. 145.68 Sq Km = 63.03 MCM

Yield rate = 0.43 Mcum/Sq.km

Computation of Runoff by Rainfall - Runoff Equation (mm)

Rainfall - Runoff Equation of GARRULLI G&D Site approved by CWC for Bansujara project

June	$Y = 0.091X - 4.905$
July	$Y = 0.816X - 163.33$
Aug	$Y = 0.771X - 61.89$
Sep	$Y = 0.566X_1 + 0.036X_2 + 17.3$
Oct	$Y = 0.735X_1 + 0.071X_2 + 2.916$

S.NO	YEAR	JUNE	JULY	AUG	SEP	OCT	Monsoon	Non Monsoon	Annual
1	1981-82	-0.4	50.1	197.1	147.7	29.8	424.2	0.0	424.2
2	1982-83	-0.1	20.0	535.5	108.4	14.4	678.2	0.0	678.2
3	1983-84	-1.4	115.9	156.5	251.7	42.1	564.7	0.0	564.7
4	1984-85	6.1	-51.9	524.2	80.3	7.4	566.0	0.0	566.0
5	1985-86	8.2	198.6	244.4	101.4	42.5	595.1	0.0	595.1
6	1986-87	12.0	37.7	146.4	89.3	20.1	305.5	0.0	305.5
7	1987-88	-0.6	179.4	598.7	184.7	73.3	1026.5	0.0	1026.5
8	1988-89	21.7	160.1	246.2	59.2	11.2	498.4	0.0	498.4
9	1989-90	7.7	25.0	207.3	73.4	8.4	321.8	0.0	321.8
10	1990-91	40.3	71.7	289.7	271.6	41.7	715.0	0.0	715.0
11	1991-92	8.1	116.2	516.7	52.0	3.9	696.9	0.0	696.9
12	1992-93	-3.6	86.9	312.6	212.7	25.2	633.8	0.0	633.8
13	1993 -94	7.0	-20.4	212.6	236.5	28.8	464.5	0.0	464.5
14	1994-95	-4.9	485.1	526.2	66.6	8.2	1081.2	0.0	1081.2
15	1995-96	3.4	35.8	350.0	91.3	9.8	490.3	0.0	490.3
16	1996- 97	-3.7	105.7	158.0	116.5	92.4	469.0	0.0	469.0
17	1997-98	-0.2	338.5	196.5	120.3	14.3	669.4	0.0	669.4
18	1998-99	-1.2	8.2	331.9	112.9	132.3	584.1	0.0	584.1
19	1999-00	-2.5	-0.1	354.1	352.6	109.0	813.0	0.0	813.0
20	2000-01	8.3	181.8	195.0	101.4	12.0	498.5	0.0	498.5
21	2001-02	14.7	154.4	102.2	45.9	91.1	408.3	0.0	408.3
22	2002-03	0.5	-128.6	287.1	109.4	80.1	348.4	0.0	348.4
23	2003-04	7.7	130.3	261.3	328.3	40.0	767.6	0.0	767.6
24	2004-05	26.9	-5.0	210.0	49.4	23.9	305.1	0.0	305.1
25	2005-06	11.6	579.8	209.8	124.1	19.9	945.1	0.0	945.1
26	2006-07	-3.1	113.3	198.7	74.2	16.2	399.3	0.0	399.3
27	2007-08	4.5	22.2	213.0	102.3	12.0	354.0	0.0	354.0
28	2008-09	84.4	35.0	273.5	126.4	14.6	533.8	0.0	533.8
29	2009-10	-3.6	-32.8	155.5	231.2	83.6	433.9	0.0	433.9
30	2010-11	-3.8	289.1	215.2	149.4	28.3	678.3	0.0	678.3
31	2011-12	41.5	135.3	154.9	263.1	32.5	627.3	0.0	627.3
32	2012-13	6.6	309.5	141.8	106.5	12.9	577.3	0.0	577.3
33	2013-14	41.2	298.6	516.6	72.9	64.3	993.6	0.0	993.6
34	2014-15	10.2	-13.9	155.2	78.5	22.9	252.9	0.0	252.9

SATDHARU MEDIUM PROJECT

RAINFALL DATA OF DAMOH RAINGUAGE STATION

S.NO	Year	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	Monsoon	Non-monsoo	Annual
1	1981-82	49.30	261.50	335.90	209.0(	16.40	6.20	32.60	3.40	2.00	36.20	0.00	15.20	872.1	95.6	967.7
2	1982-83	52.30	224.70	774.80	111.7(	4.80	13.40	0.00	105.80	5.00	0.00	0.00	3.40	1168.3	127.6	1295.9
3	1983-84	38.00	342.20	283.30	396.1(	15.00	0.00	4.20	4.00	4.00	0.00	0.00	0.00	1074.3	12.2	1086.8
4	1984-85	120.70	136.50	760.20	62.9(	0.00	0.00	0.00	33.60	57.20	0.00	0.00	0.00	1080.3	90.8	1171.1
5	1985-86	144.00	443.60	397.20	123.3(	41.90	0.00	0.00	6.00	0.00	0.00	6.40	0.00	1150	12.4	1162.4
6	1986-87	185.70	246.40	270.10	110.0(	12.80	0.00	19.10	6.40	98.20	32.60	0.00	4.60	825	160.9	985.9
7	1987-88	47.70	409.00	856.80	241.2(	72.40	0.00	10.30	44.80	66.40	0.00	0.00	9.50	1627.1	131	1758.1
8	1988-89	292.60	396.30	399.60	48.6(	6.60	0.00	0.00	3.40	26.30	0.00	0.00	0.00	1143.7	29.7	1173.4
9	1989-90	138.80	230.80	349.10	77.0(	0.00	2.40	6.40	0.00	0.00	15.20	0.00	0.60	795.7	24.6	820.3
10	1990-91	496.60	288.00	456.00	420.3(	12.20	0.00	20.60	0.00	30.60	0.00	0.00	36.80	1673.1	88	1761.1
11	1991-92	142.60	342.60	750.40	13.6(	0.00	8.60	0.00	0.00	3.60	14.60	5.40	13.20	1249.2	45.4	1294.6
12	1992-93	14.00	306.60	485.70	314.4(	0.00	0.00	0.00	0.00	0.00	0.00	6.00	9.80	1120.7	15.8	1136.5
13	1993 -94	131.00	175.20	356.00	364.6(	0.00	0.00	0.00	0.00	22.20	13.40	0.00	0.00	1026.8	35.6	1062.4
14	1994-95	0.00	794.60	762.80	38.6(	3.40	0.00	0.00	14.00	25.60	0.00	0.00	0.00	1599.4	39.6	1639
15	1995-96	91.60	244.00	534.20	96.8(	0.00	0.00	12.60	25.40	4.00	41.80	0.00	9.20	966.6	93	1059.6
16	1996- 97	13.50	329.70	285.20	157.2(	106.60	0.00	0.00	55.40	17.40	0.00	0.00	0.00	892.2	72.8	965
17	1997-98	51.60	615.00	335.20	160.6(	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1162.4	0	1162.4
18	1998-99	40.80	210.20	510.80	136.4(	162.80	98.20	55.40	0.00	0.00	0.00	0.00	0.00	1061	153.6	1214.6
19	1999-00	26.00	200.00	539.60	558.0(	90.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1414	0	1414
20	2000-01	145.40	422.90	333.20	127.4(	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1028.9	0	1028.9
21	2001-02	215.60	389.40	212.80	37.0(	116.40	8.20	0.00	6.40	1.40	0.00	19.80	19.60	971.2	55.4	1026.6
22	2002-03	59.00	42.60	452.60	134.0(	92.00	17.40	2.60	0.00	10.80	0.00	0.00	0.00	780.2	30.8	811
23	2003-04	138.60	359.80	419.20	522.8(	0.00	0.00	52.20	0.00	101.40	0.00	0.00	0.00	1440.4	153.6	1594
24	2004-05	349.00	194.00	352.70	34.2(	25.20	0.00	0.00	52.20	0.00	0.00	20.00	11.00	955.1	83.2	1038.3
25	2005-06	181.20	910.70	352.40	166.2(	7.00	0.00	18.50	7.00	0.00	42.80	0.00	0.00	1617.5	68.3	1685.8
26	2006-07	20.00	339.00	338.00	79.0(	10.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	786.4	0	786.4
27	2007-08	103.00	227.40	356.60	127.5(	0.00	0.00	4.80	0.00	22.60	4.60	0.00	22.40	814.5	54.4	868.9
28	2008-09	981.00	243.00	435.00	165.0(	0.00	0.00	0.00	0.00	0.00	0.00	0.20	18.00	1824	18.2	1842.2
29	2009-10	14.00	160.00	282.00	360.0(	75.00	74.00	3.00	0.00	0.00	0.00	0.00	0.00	891	77	968
30	2010-11	12.60	554.40	359.40	210.6(	14.20	0.00	2.60	0.00	4.00	0.00	0.00	0.00	1151.2	6.6	1157.8
31	2011-12	509.40	366.00	281.20	416.4(	0.00	0.00	0.00	0.00	3.60	0.00	17.20	3.60	1573	24.4	1597.4
32	2012-13	126.60	579.40	264.20	140.8(	0.00	0.00	0.00	29.20	0.00	1.40	8.30	0.00	1111	38.9	1149.9
33	2013-14	506.1	566.1	750.3	50.5	78.7	13.3	0	0	15	40.6	3.1	0	1951.7	72	2023.7
34	2014-15	166.4	183.1	281.6	90.3	18.4	0	15.8	63.6	52.7	2.2	5.2	0	739.8	144.5	884.3

Computation of Runoff by Rainfall - Runoff Equation for Satdharu medium Project Catchment (MCM)

Catchment area of Satdharu Tank= 145.68 Sq.km

S.NO	YEAR	JUNE	JULY	AUG	SEP	OCT	Monsoon	Non Monsoon	Annual
1	1981-82	0.0	7.3	28.7	21.5	4.3	61.9	0.0	61.9
2	1982-83	0.0	2.9	78.0	15.8	2.1	98.8	0.0	98.8
3	1983-84	0.0	16.9	22.8	36.7	6.1	82.5	0.0	82.5
4	1984-85	0.9	0.0	76.4	11.7	1.1	90.0	0.0	90.0
5	1985-86	1.2	28.9	35.6	14.8	6.2	86.7	0.0	86.7
6	1986-87	1.7	5.5	21.3	13.0	2.9	44.5	0.0	44.5
7	1987-88	0.0	24.8	87.2	26.9	10.7	149.6	0.0	149.6
8	1988-89	3.2	23.3	35.9	8.6	1.6	72.6	0.0	72.6
9	1989-90	1.1	3.6	30.2	10.7	1.2	46.9	0.0	46.9
10	1990-91	5.9	10.4	42.2	39.6	6.1	104.2	0.0	104.2
11	1991-92	1.2	16.9	75.3	7.6	0.6	101.5	0.0	101.5
12	1992-93	0.0	12.7	45.5	31.0	3.7	92.9	0.0	92.9
13	1993 -94	1.0	0.0	31.0	34.5	4.2	70.6	0.0	70.6
14	1994-95	0.0	70.7	76.7	9.7	1.2	158.2	0.0	158.2
15	1995-96	0.5	5.2	51.0	13.3	1.4	71.4	0.0	71.4
16	1996-97	0.0	15.4	23.0	17.0	13.5	68.9	0.0	68.9
17	1997-98	0.0	49.3	28.6	17.5	2.1	97.5	0.0	97.5
18	1998-99	0.0	1.2	48.4	16.4	19.3	85.3	0.0	85.3
19	1999-00	0.0	0.0	51.6	51.4	15.9	118.8	0.0	118.8
20	2000-01	1.2	26.5	28.4	14.8	1.7	72.6	0.0	72.6
21	2001-02	2.1	22.5	14.9	6.7	13.3	59.5	0.0	59.5
22	2002-03	0.1	0.0	41.8	15.9	11.7	69.5	0.0	69.5
23	2003-04	1.1	19.0	38.1	47.8	5.8	111.8	0.0	111.8
24	2004-05	3.9	0.0	30.6	7.2	3.5	45.2	0.0	45.2
25	2005-06	1.7	84.5	30.6	18.1	2.9	137.7	0.0	137.7
26	2006-07	0.0	16.5	28.9	10.8	2.4	58.6	0.0	58.6
27	2007-08	0.7	3.2	31.0	14.9	1.7	51.6	0.0	51.6
28	2008-09	12.3	5.1	39.8	18.4	2.1	77.8	0.0	77.8
29	2009-10	0.0	0.0	22.7	33.7	12.2	68.5	0.0	68.5
30	2010-11	0.0	42.1	31.4	21.8	4.1	99.4	0.0	99.4
31	2011-12	6.0	19.7	22.6	38.3	4.7	91.4	0.0	91.4
32	2012-13	1.0	45.1	20.7	15.5	1.9	84.1	0.0	84.1
33	2013-14	6.0	43.5	75.3	10.6	9.4	144.7	0.0	144.7
34	2014-15	1.5	0.0	22.6	11.4	3.3	38.9	0.0	38.9

29	2009-10	-3.6	-32.8	155.5	231.2	83.6	433.9	0.0	433.9
30	2010-11	-3.8	289.1	215.2	149.4	28.3	678.3	0.0	678.3
31	2011-12	41.5	135.3	154.9	263.1	32.5	627.3	0.0	627.3
32	2012-13	6.6	309.5	141.8	106.5	12.9	577.3	0.0	577.3
33	2013-14	41.2	298.6	516.6	72.9	64.3	993.6	0.0	993.6
34	2014-15	10.2	-13.9	155.2	78.5	22.9	252.9	0.0	252.9

Computation of Runoff by Rainfall - Runoff Equation (mm)

Rainfall - Runoff Equation of GARRULLI G&D Site
approved by CWC for Bansujara project
Monsoon month equation = 0.953x - 445.7

S .NO	YEAR	Monsoon
1	1981-82	385.41
2	1982-83	667.69
3	1983-84	578.39
4	1984-85	583.83
5	1985-86	650.25
6	1986-87	340.53
7	1987-88	1104.93
8	1988-89	644.25
9	1989-90	312.60
10	1990-91	1148.70
11	1991-92	744.79
12	1992-93	622.33
13	1993 -94	532.84
14	1994-95	1078.53
15	1995-96	475.47
16	1996- 97	404.57
17	1997-98	662.07
18	1998-99	565.43
19	1999-00	901.84
20	2000-01	534.84
21	2001-02	479.85
22	2002-03	297.83
23	2003-04	927.00
24	2004-05	464.51
25	2005-06	1095.78
26	2006-07	303.74
27	2007-08	330.52
28	2008-09	1292.57
29	2009-10	403.42
30	2010-11	651.39
31	2011-12	1053.37
32	2012-13	613.08
33	2013-14	1414.27
34	2014-15	259.33

Computation of Runoff by Rainfall - Runoff Equation (MCM)

Catchment area of Satdharu Tank= 145.68 Sq.km

S .NO	YEAR	Monsoon	Non Monsoon	Annual
1	1981-82	56.1	0.0	56.1
2	1982-83	97.3	0.0	97.3
3	1983-84	84.3	0.0	84.3
4	1984-85	85.1	0.0	85.1
5	1985-86	94.7	0.0	94.7
6	1986-87	49.6	0.0	49.6
7	1987-88	161.0	0.0	161.0
8	1988-89	93.9	0.0	93.9
9	1989-90	45.5	0.0	45.5
10	1990-91	167.4	0.0	167.4
11	1991-92	108.5	0.0	108.5
12	1992-93	90.7	0.0	90.7
13	1993 -94	77.6	0.0	77.6
14	1994-95	157.1	0.0	157.1
15	1995-96	69.3	0.0	69.3
16	1996- 97	58.9	0.0	58.9
17	1997-98	96.4	0.0	96.4
18	1998-99	82.4	0.0	82.4
19	1999-00	131.4	0.0	131.4
20	2000-01	77.9	0.0	77.9
21	2001-02	69.9	0.0	69.9
22	2002-03	43.4	0.0	43.4
23	2003-04	135.0	0.0	135.0
24	2004-05	67.7	0.0	67.7
25	2005-06	159.6	0.0	159.6
26	2006-07	44.2	0.0	44.2
27	2007-08	48.1	0.0	48.1
28	2008-09	188.3	0.0	188.3
29	2009-10	58.8	0.0	58.8
30	2010-11	94.9	0.0	94.9
31	2011-12	153.5	0.0	153.5
32	2012-13	89.3	0.0	89.3
33	2013-14	206.0	0.0	206.0
34	2014-15	37.8	0.0	37.8

SATDHARU MEDIUM PROJECT

75% Dependable yield by Catchment area for Satdharu Dam

For catchment of 145.68sq. km.

S.No.	Year	Annual Inflow MCM	Decending order	Rank	Exceedence Probability
1	1981-82	56.15	206.03	1	2.9
2	1982-83	97.27	188.30	2	5.7
3	1983-84	84.26	167.35	3	8.6
4	1984-85	85.05	160.97	4	11.4
5	1985-86	94.73	159.63	5	14.3
6	1986-87	49.61	157.12	6	17.1
7	1987-88	160.97	153.45	7	20.0
8	1988-89	93.85	135.05	8	22.9
9	1989-90	45.54	131.38	9	25.7
10	1990-91	167.35	108.50	10	28.6
11	1991-92	108.50	97.27	11	31.4
12	1992-93	90.66	96.45	12	34.3
13	1993 -94	77.62	94.90	13	37.1
14	1994-95	157.12	94.73	14	40.0
15	1995-96	69.27	93.85	15	42.9
16	1996- 97	58.94	90.66	16	45.7
17	1997-98	96.45	89.31	17	48.6
18	1998-99	82.37	85.05	18	51.4
19	1999-00	131.38	84.26	19	54.3
20	2000-01	77.92	82.37	20	57.1
21	2001-02	69.91	77.92	21	60.0
22	2002-03	43.39	77.62	22	62.9
23	2003-04	135.05	69.91	23	65.7
24	2004-05	67.67	69.27	24	68.6
25	2005-06	159.63	67.67	25	71.4
26	2006-07	44.25	58.94	26	74.3
27	2007-08	48.15	58.77	27	77.1
28	2008-09	188.30	56.15	28	80.0
29	2009-10	58.77	49.61	29	82.9
30	2010-11	94.90	48.15	30	85.7
31	2011-12	153.45	45.54	31	88.6
32	2012-13	89.31	44.25	32	91.4
33	2013-14	206.03	43.39	33	94.3
34	2014-15	37.78	37.78	34	97.1

75% Dependable Yield for C.A. 145.68 Sq Km = 58.90 MCM

Yield rate = 0.40 Mcum/Sq.km

SATDHARU MEDIUM PROJECT

75% Dependable yield by Catchment area for Satdharu Dam

For catchment of 145.68sq. km.

S.No.	Year	Annual Inflow MCM	Decending order	Rank	Exceedence Probability
1	1981-82	61.86	158.22	1	2.9
2	1982-83	98.79	149.62	2	5.7
3	1983-84	82.48	144.75	3	8.6
4	1984-85	90.02	137.68	4	11.4
5	1985-86	86.69	118.81	5	14.3
6	1986-87	44.51	111.83	6	17.1
7	1987-88	149.62	104.16	7	20.0
8	1988-89	72.60	101.52	8	22.9
9	1989-90	46.88	99.36	9	25.7
10	1990-91	104.16	98.79	10	28.6
11	1991-92	101.52	97.52	11	31.4
12	1992-93	92.86	92.86	12	34.3
13	1993 -94	70.64	91.38	13	37.1
14	1994-95	158.22	90.02	14	40.0
15	1995-96	71.43	86.69	15	42.9
16	1996- 97	68.86	85.26	16	45.7
17	1997-98	97.52	84.10	17	48.6
18	1998-99	85.26	82.48	18	51.4
19	1999-00	118.81	77.76	19	54.3
20	2000-01	72.61	72.61	20	57.1
21	2001-02	59.48	72.60	21	60.0
22	2002-03	69.49	71.43	22	62.9
23	2003-04	111.83	70.64	23	65.7
24	2004-05	45.18	69.49	24	68.6
25	2005-06	137.68	68.86	25	71.4
26	2006-07	58.61	68.52	26	74.3
27	2007-08	51.57	61.86	27	77.1
28	2008-09	77.76	59.48	28	80.0
29	2009-10	68.52	58.61	29	82.9
30	2010-11	99.36	51.57	30	85.7
31	2011-12	91.38	46.88	31	88.6
32	2012-13	84.10	45.18	32	91.4
33	2013-14	144.75	44.51	33	94.3
34	2014-15	38.88	38.88	34	97.1

75% Dependable Yield for C.A. 145.68 Sq Km = 66.86 MCM

Yield rate = 0.46 Mcum/Sq.km

[Format-1]

SATDHARU IRRIGATION PROJECT

Salient Feature

S. No.	Particulars	Data	
1	District	Damoh	
	Tehsil	Damoh	
	River	Satdharu	
	Basin	Ken	
	Catchment area (Sq.Km)	145.68	
	Intercepted Catchment area (Sq.Km)	nil	
	Net Catchment area (Sq.Km)	145.68	
	Latitude	23^0 – 42' -36"	
	Longitude	79^0-27'-12"	
	Toposheet No	55M/6, 55M/10, 55M/9	
	Principal Levels (m)		
	NBL	333	M
	LSL	341.5	M
	FRL	354.15	M
	MWL	354.3	M
	TBL	357.8	M
	Maximum height of dam (m) (TBL-NBL)	24.8	M
	Gross Storage Capacity (MCM)	68.23	MCM
	Live Storage Capacity (MCM)	63.03	MCM
	Dead Storage Capacity (MCM)	5.2	MCM
	Details of waste weir Length (m)	---	
	Type Hydrology:		
	a. Yield		
	i. 75 % dependable yield (MCM)	63.03	MCM
	ii. Name of RG Station/Stations influencing the catchment of the project.	---	
	iii. Length of Rainfall data & period	(33 Years)1983 to 2014	
	iv. Maximum annual Rainfall (mm)	2023.7	
	v. 75 % dependable Rainfall (mm)	985.90 (1986)	
	vi. Name of G&D site/ tank (if inflow of tank guage data is used)	Garrauli GD site of CWC	
	vii. Length of Runoff data & period	(27 Years)1981-82 to 2008-09	
	b. Flood		
	i. Design Peak Flood (cumecs)	1284.74	cumecs
	ii. Observed HFL		
	c. Silt Study		
	i. Silt rate adopted (MCM/Sq.Km/year)	0.75 Acreft/Sq.mile/Year	
	ii. 100 year New Zero Elevation (NZE-m)	340.80	M

(D.K.Jain)
Sub Divisional Officer
Water Resources Sub Dn
Damoh

(R C. Tiwari)
Executive Engineer,
Water resources Dn.
Damoh (MP)