केंद्रीय भूमि जल बोर्ड

जल संसाधन, नदी विकास और गंगा संरक्षण मंत्रालय

भारत सरकार

Central Ground Water Board

Ministry of Water Resources, River Development and Ganga Rejuvenation

Government of India

Report

on

AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN

Khatav, Man, Phaltan, Satara and Wai Taluka

Satara District, Maharashtra

मध्यक्षेत्र, नागपुर

Central Region, Nagpur

AQUIFER MAPS AND GROUND WATER MANAGEMENT PLANS, KHATAV, MAN, PHALTAN, SATARA AND WAI BLOCKS, SATARA DISTRICT, MAHARASHTRA

CONTRIBUTORS

Principal Authors

Anu Radha Bhatia	:	Senior Hydrogeologist/ Scientist-D
J. R. Verma	:	Scientist-D
Catherine Louis	:	Junior Hydrogeologist/ Scientist-B

Supervision & Guidance

P. K. Parchure	:	Regional Director
Dr. P. K. Jain	:	Superintending Hydrogeologist
Sourabh Gupta	:	Senior Hydrogeologist/ Scientist-D

Hydrogeology, GIS maps and Management Plan

Anu Radha Bhatia	:	Senior Hydrogeologist/ Scientist-D
J. R. Verma	:	Scientist-D
Catherine Louis	:	Junior Hydrogeologist/ Scientist-B

Groundwater Exploration

Catherine Louis	:	Junior Hydrogeologist/ Scientist-B
Junaid Ahmad	:	Junior Hydrogeologist/ Scientist-B

Chemical Analysis

Dr. Devsharan Verma	:	Scientist B (Chemist)
Dr. Rajni Kant Sharma	:	Scientist B (Chemist)
T. Dinesh Kumar	:	Assistant Chemist

SATARA DISTRICT AT A GLANCE

1. GENERAL INFORMATION			
	Geographical Area	:	10480 sq.km
	Administrative Divisions	:	Taluka – 11; Satara,Wai, Khandala, Phaltan, Mahabaleshwar, Patan, Karad, Jaoli, Koregaon, Man, Khatav.
	Villages	:	1739
	Population (2011)	:	3,003,741
	Normal Annual Rainfall	:	301.6 mm to 5660.4 mm
2. GEOMORPHOLOGY			
	Major Physiographic unit	:	Western Ghat, Foothill zone Central , Plateau and eastern Plains
	Major Drainage	:	Krishna, Nira, Man
3. LAND USE			
	Forest Area (2013-14)	:	1592 sq km
	Net Area Sown (2010)	:	6829.07 sq km
	Cultivable Area (2010)	:	7573 .00 sq km
4. SOIL TYPE			
	Two types	:	Medium black, deep black
5. PRINCIPAL CROPS (2011-12)			
	Jawar	:	2101 sq km
	Bajra		899 sq km
	Cereals	:	942 sq km
	Oil Seeds	:	886 sq km
	Sugarcane		470 sq km
6. IRRIGATION BY DIFFERENT SOURCES (2006-07)			
	Dugwells	:	69230
	Shallow Tubewells/ Deep Tubewells	:	2708/712
	Net Irrigated Area	:	1890 Sq km
7. GROUND WATER MONITORING WELLS (As on 31/05/2011)			
	Dugwells	:	50
	Piezometers	:	03
8. GEOLOGY			
	Recent	:	Alluvium
	Upper Cretaceous to Eocene	:	Deccan Trap (Basalt)
9. HYDROGEOLOGY			
	Water Bearing Formation	:	Basalt- Weathered /Fractured / Jointed/ Vesicular/ massive/ under Phreatic and semi confined Condition
	Pre-monsoon Depth to Water Level (May-2017)	:	0.90 to 25.00 mbgl
	Post-monsoon Depth to Water Level (Nov.- 2017)	:	0.10 to 19.00 mbgl
	Pre-monsoon Water Level Trend (2008-2017)	:	Rise : 0.0066 to 1.3679 m/year
			Fall : 0.2647 to 0.0165 m/year
	Post-monsoon Water Level Trend (2008-2017)	:	Rise : 0.0005 to 1.3407 m/year
			Fall : 0.2287 to 0.0376 m/year

10. GROUND WATER EXPLORATION			
	Wells Drilled	:	EW 66, OW 28
	Depth Range	:	25 to 200 mbgl
	Discharge	:	traces to 15 lps
11. GROUND WATER QUALITY			
	Ground Water is Suitable for Drinking and irrigation purpose		
12. DYNAMIC GROUND WATER RESOURCES- (2011)			
	Annual Replenishable GW Resources	:	1033.50 MCM
	Gross Ground Water Draft	:	754.11 MCM
	Projected Demand (Domestic + Industrial)	:	956.40 MCM
	Stage of Ground Water Development	:	72.97%
14. GROUND WATER CONTROL & REGULATION			
	Over-Exploited Taluka	:	Nil
	Critical Taluka	:	one
	Semi-critical Taluka		six
15. MAJOR GROUND WATER PROBLEMS AND ISSUES			
	The stage of ground water development in 6 talukas (Karad, Khatav, Koregaon, Phaltan, Man and Wai) has already crossed 70%. Most of these talukas fall in rain shadow zone of Western Ghats, where rainfall is low. Water logged area occurring in the command area of Nira right bank canal. The western part of the district has prominent hill ranges, isolated hillocks and undulating topography, which gives rise to very highr surface run-off. The underlying basalt formation has poor storage and transmission capability rendering the aquifer to limited potential. The unconfined aquifer gets fully recharged instantaneously and a situation of rejected recharge emerges. Also, the aquifer gets drained off quickly due to sloping and undulating topography.		

AQUIFER MAPS AND GROUND WATER MANAGEMENT PLANS, KHATAV, MAN, PHALTAN, SATARA AND WAI BLOCKS, SATARA DISTRICT, MAHARASHTRA

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1.0 INTRODUCTION

1.1 About the area

Satara district is one of the oldest districts and located in western part of Maharashtra State. In 1960 Northern Satara district was named as Satara and Southern Satara district named as Sangli district. It is bounded by Pune district in the north, Solapur district in the east, Sangli district in the south, Ratnagiri district in the west and Raigad district in its north-west. Satara district is located in the western part of Deccan plateau and lies between 17°05' and 18°11' north latitudes and 73°33' and 74°54' east longitudes. The entire area of the district falls in parts of Survey of India degree sheet numbers 47-G, 47-K, 47-J and 47-F. The district has an area of 10480 sq.km, which constitutes about 3% of the total area of Maharashtra. Prior to 1971, district had 9 talukas but presently there are 11 talukas, namely Satara, Karad, Wai, Mahabaleshwar, Phaltan, Man, Khatav, Koregaon, Patan, Jaoli and Khandala. There are eight Vidhan Sabha constituencies in this district. Karad North, Karad South, Patan, Koregaon, Wai and Satara are part of Satara (Lok Sabha constituency) and Phaltan, Man are part of Madha (Lok Sabha constituency). Satara is the capital of the district and other major towns include Wai, Karad, Koregaon, Dahiwadi (Maan), Koynanagar, Rahimatpur, Phaltan, Mahabaleshwar and Panchgani. This district comes under Pune Administrative Division along with Pune, Sangli, Solapur and Kolhapur.

The total population of Satara district as per 2011 census is 3,003,741 out of which rural population is 2,433,363 (81.01%) while urban population is 570,378 (18.99). The male population is 1,510,842 and female population is 1,492,899 whereas the population density is 268 person /sq.km. The increase in population is 6.93% over the period of 10 years from 2001 to 2011.

Satara is one of the famous districts for tourist destination. Mahabaleshwar and Panchghani are the two hill stations which have great tourism attraction and Pratapgarh has quite a historical importance. Shingarpur, Sajjangarh, Pusgaon, Godavale, Buchafal are the religious places of great importance. Mumbai- Bangalore Highway NH-4 passes through the District and the district is well connected by a good network of metal roads and is traversed from north to south by Mumbai-Miraj broad gauge line of South-Central Railway, which passes 15 km east Satara town.

Since 1980, Central Ground Water Board has taken up several studies in the district. Keeping in view the current demand and supply and futuristic requirement of water, Central Ground Water Board has initiated the National Aquifer Mapping Programme (NAQUIM) in country during XII five-year plan, with a priority to study Over-exploited, Critical and Semi-Critical talukas. Hence, Satara district has been taken up to carry out detailed hydrogeological investigations in the year 2016-17 and 2017-18. Satara district is categorized as safe as per Ground Water Resources Estimation as on March 2013. The Administrative and Index map of the study area is presented in Fig.1 .1.1 & 1.1.2.

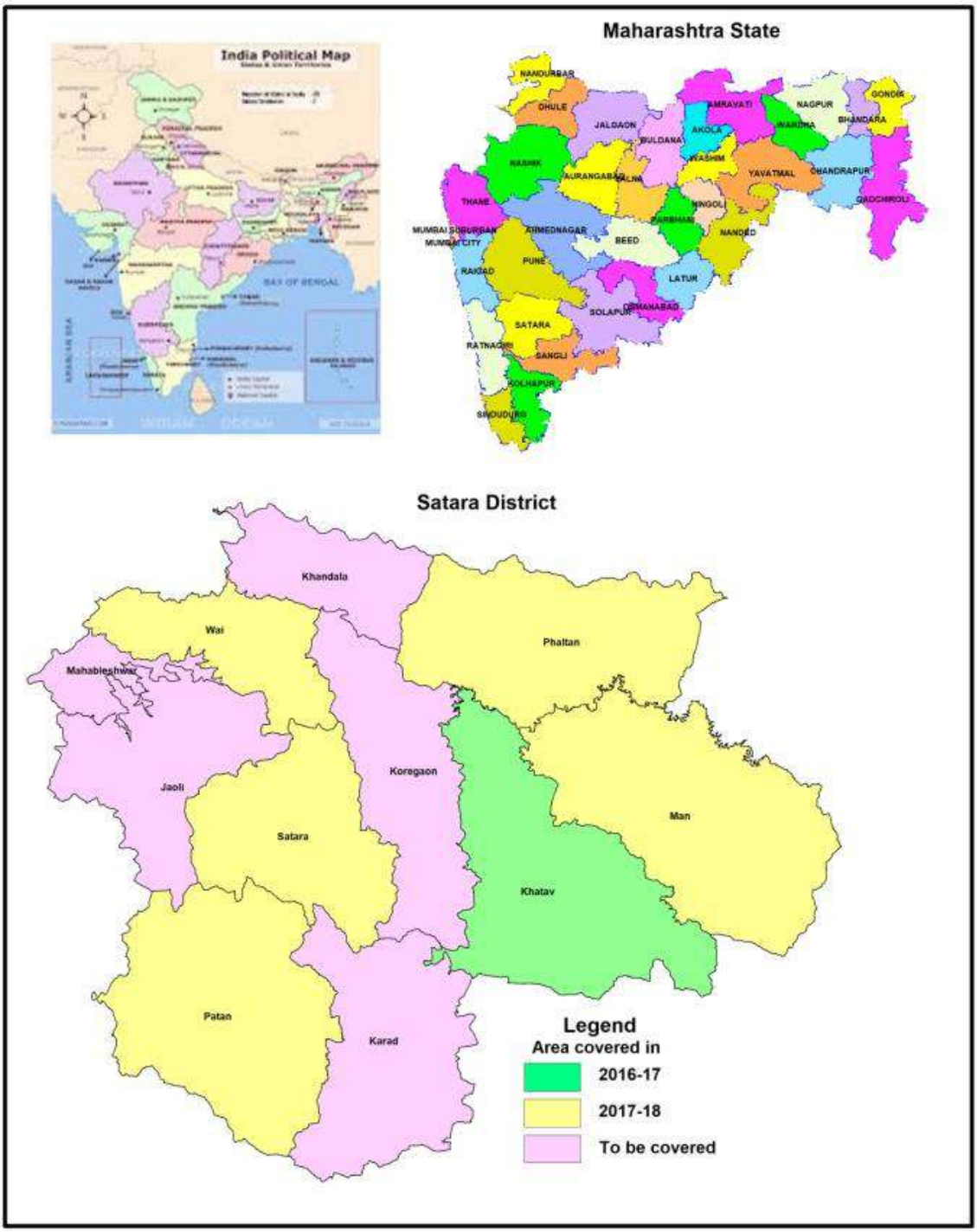


Figure 1.1.1: Index map, Satara District

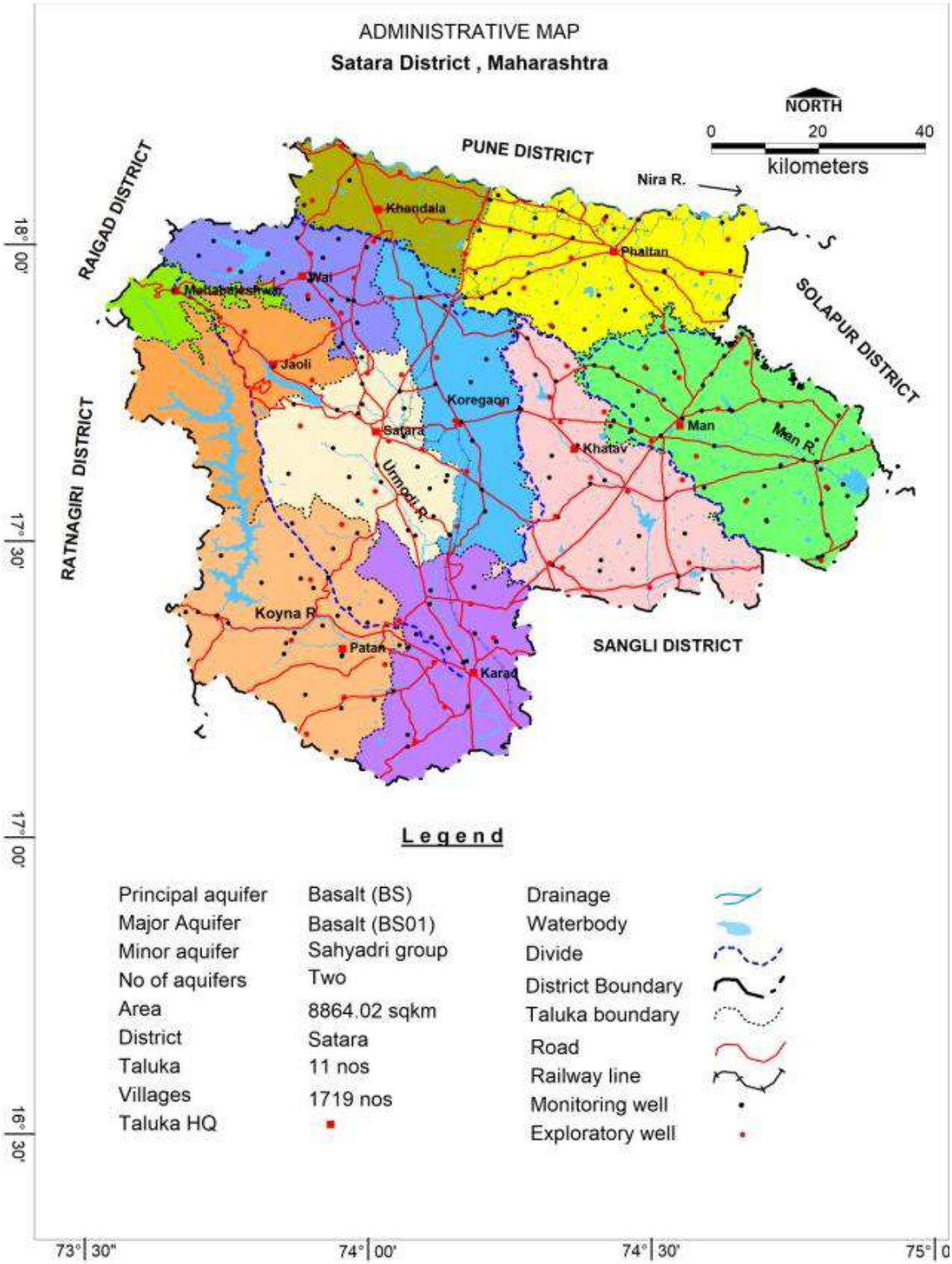


Figure 1.1.2: Administrative map, Satara District

Ground water exploratory drilling in the district has been taken up in different phases since 1979. The ground water exploration has been done in Alluvial and hard rock areas occupied by Deccan Trap Basalt. To establish the aquifer geometry, disposition and potential of aquifers, ground water exploration down to the depth of 200 m bgl has been taken up where the data gap exists and accordingly 11 exploratory wells and 6 observation wells and 01 Piezometer have been constructed during 2016-17. A total of 66 EW, 28 OW and 3 Piezometers have been constructed till March 2018.

Salient Features of Ground Water Exploration are given in **Annexure –I** and location in **Fig 1.1.3.**

Table 1: Salient feature of ground water exploration, Satara district, Maharashtra

S. No	Taluka	Wells Drilled	Drilled Depth (m bgl)	Zones (m bgl)	Discharge (lps)	SWL (m bgl)
1.	Jaoli	3EW	200.00	16.00 to 181.00	0.14 to 2.16	5.00 to 12.00
2.	Karad	5EW + 1OW	95.00 to 200.00	7.40 to 95.80	1.37 to 5.77	6.25 to 50.00
3.	Khandala	7EW + 4OW + 1Pz	40.00 to 200.00	10.00 to 79.00	0.38 to 10.00	3.20 to 7.95
4.	Khatav	12EW + 5OW	67.40 to 301.00	6.00 to 196.70	0.14 to 5.00	2 to 95
5.	Koregaon	5EW + 3OW	122.25 to 200.00	4.25 to 134.55	0.14 to 12.18	1.40 to 17.50
6.	Man	11EW + 6OW	135.50 to 201.60	16.2 to 150.0	0.71 to 10.00	1.00 to 64.50
7.	Patan	6EW + 2OW	80.60 to 200.00	22.6 to 186.3	Traces to 3.00	1.47 to 74.50
8.	Phaltan	9EW + 3OW + 1Pz	7.70 to 201.00	28.00 to 96.80	0.14 to 0.72	3.17 to 190
9.	Satara	7EW + 2OW + 1Pz	177.10 to 201.5.50	35.00 to 36.00 152.00 to 153.00	2.16 to 5.15	1.40 to 18.20
10.	Wai	6EW + 2OW + 1Pz	5.70 to 200.00	12.00 to 16.00	Traces to 3.00	1.60 to 17.29
Total		**66 EW + 28 OW + 3 PZ**	**5.70 to 301.00**	**4.25 to 186.30**	**Traces to 10.00**	**1.00 to 190**

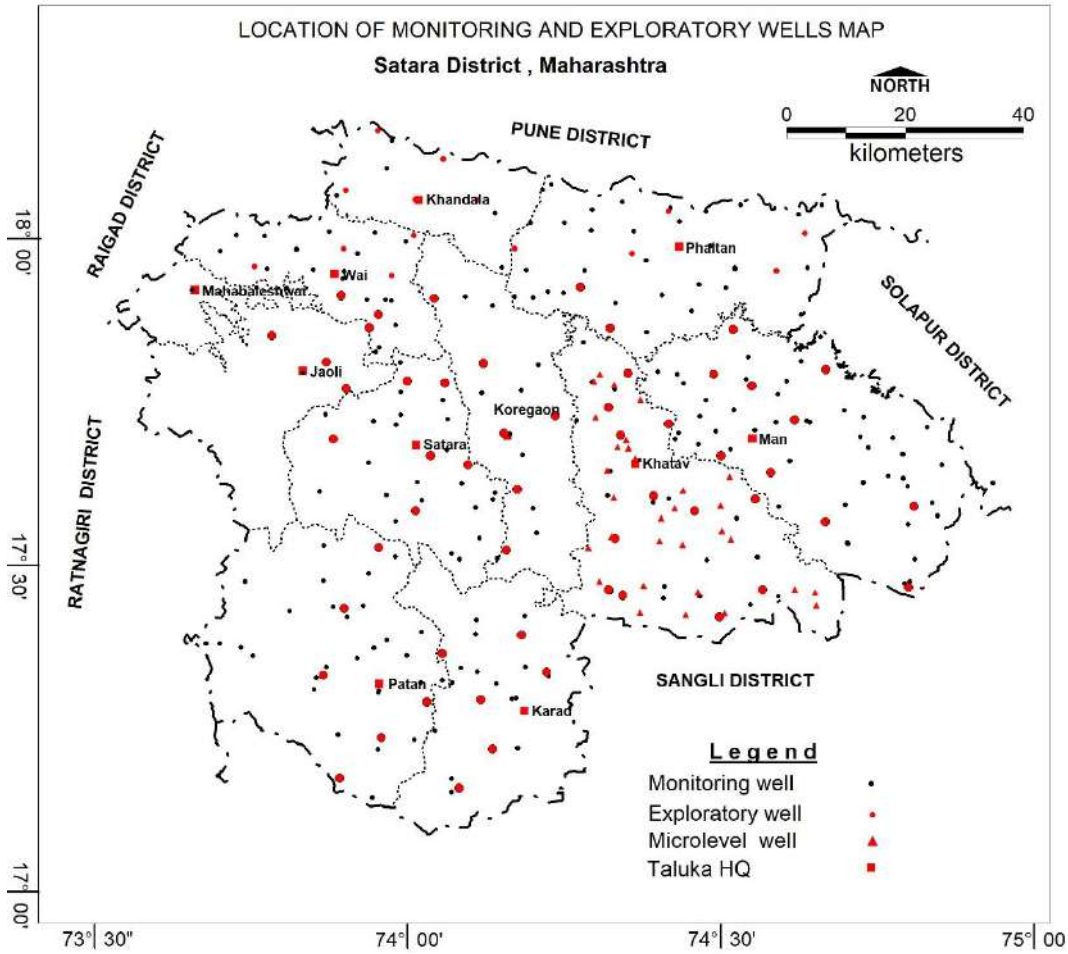


Figure 1.1.3: Locations of Existing Exploratory wells and Ground Water Monitoring Wells.

1.2 Physiography, Drainage and Soil Types

Physiographically, the district forms part of western Maharashtra plateau of the Sahayadri ranges and can be broadly divided in four major units viz., (i) hills and Ghats, (ii) foothills zones, (iii) plateaus and (iv) plains. The district forms part of Deccan plateau of Sahayadri hill range. The Sahyadri range, the main range of the Western Ghats, runs north

and south along the western edge of the district, separating it from Ratnagiri District. The residual hill ranges and the intermediate valley, all well developed on the table land surface form the main geomorphic element of landscape in the district. In the west, the district has the Sahaydri scarp and its major peaks usually flat topped with intervening saddles. The Mahadeo range, which is next major well-developed range in the district, an off-shoot of the Sahayadri in the north western part starts about 10 m. north of Mahabaleshwar and stretches east and south-east across the whole of the district. The Mahadeo hills are bold, presenting bare scarps of Deccan Trap basalt. The elevation of the district ranges from 483 m.amsl (along Nira River) to 1348 mamsl (Mahabaleshwar). Geomorphological map of the district is presented in **Fig 1.2.1**

The entire Satara district falls in the drainage of the Krishna river basin and is drained by the Nira River and its tributaries in the entire northern part, the Man River and its tributaries in the south-east and the Krishna River and its tributaries in the south. Krishna River which is one of the major rivers of Southern Peninsula rises on the eastern brow of the Mahabaleshwar plateau in the district and flows for about 176 km. in the district. Kudal, Vena, Urmodi, Tarli, Koyna, Vasna and Verla rivers are the main tributaries of Krishna River. The entire river system has sub-parallel to semi-dendritic drainage pattern and the drainage density is quite high in the district. Satara district is part of two main watersheds, the Nira River and Man River forming the Bhima River watershed north of the Mahadeo hills and the upper Krishna watershed to the south and further divided into 50 minor watersheds. The drainage map of the district is presented in **Fig 1.2.2**

The soils in the district are derived from the Deccan basalt formation. The western fringe of the district is covered by laterite and lateritic soils which are followed by reddish to yellowish brown soils of mixed origin eastwards on hill slopes. Further east, coarse shallow soils occur on plateau flats, medium black soil occurring in central part are rich in clay content in the intermediate area and deep black soil occur in the valleys in central and southern parts of the district. Along the major river/tributaries silty loam soil (>100 cm) is observed.

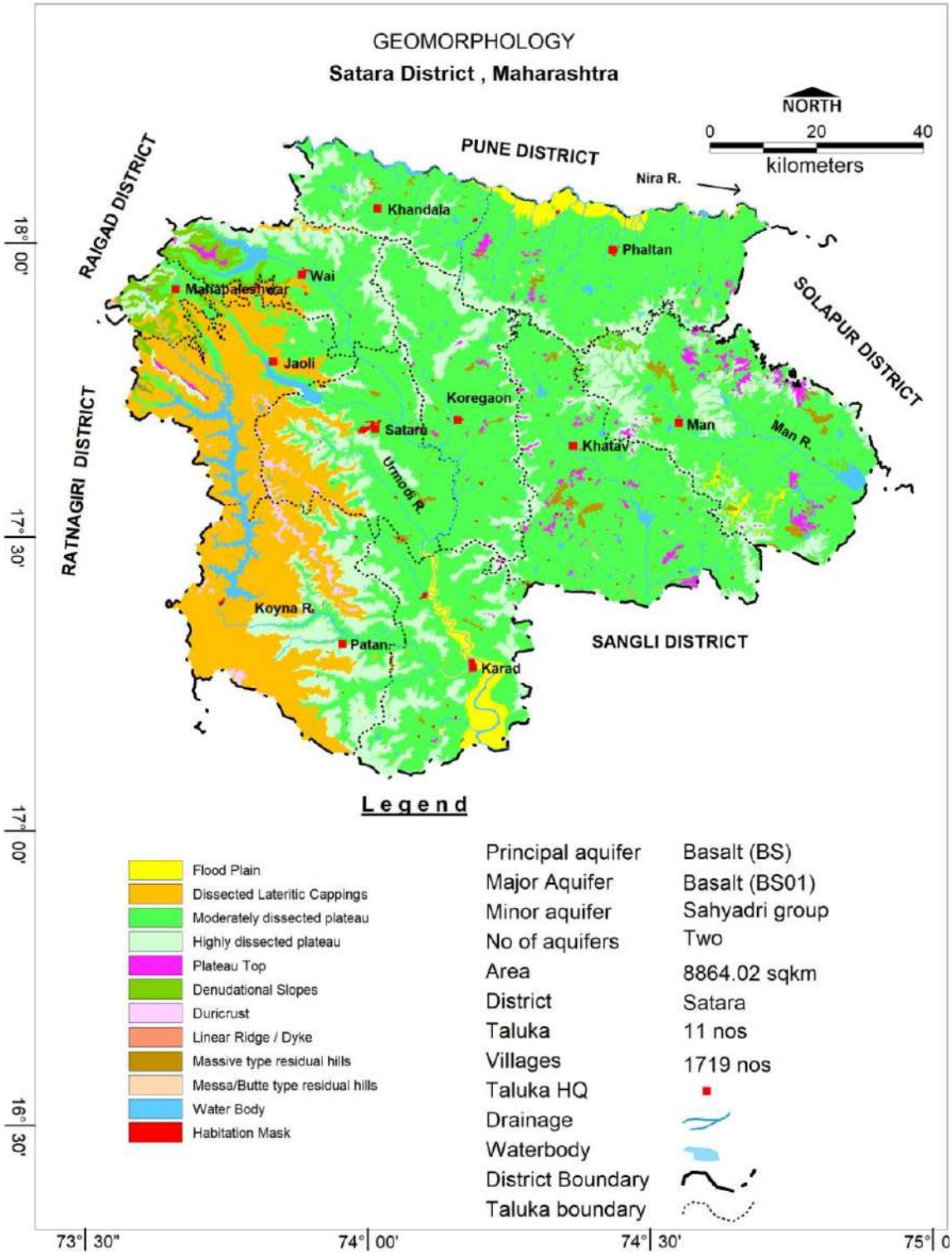


Figure 1.2.1: Geomorphological map of Satara district

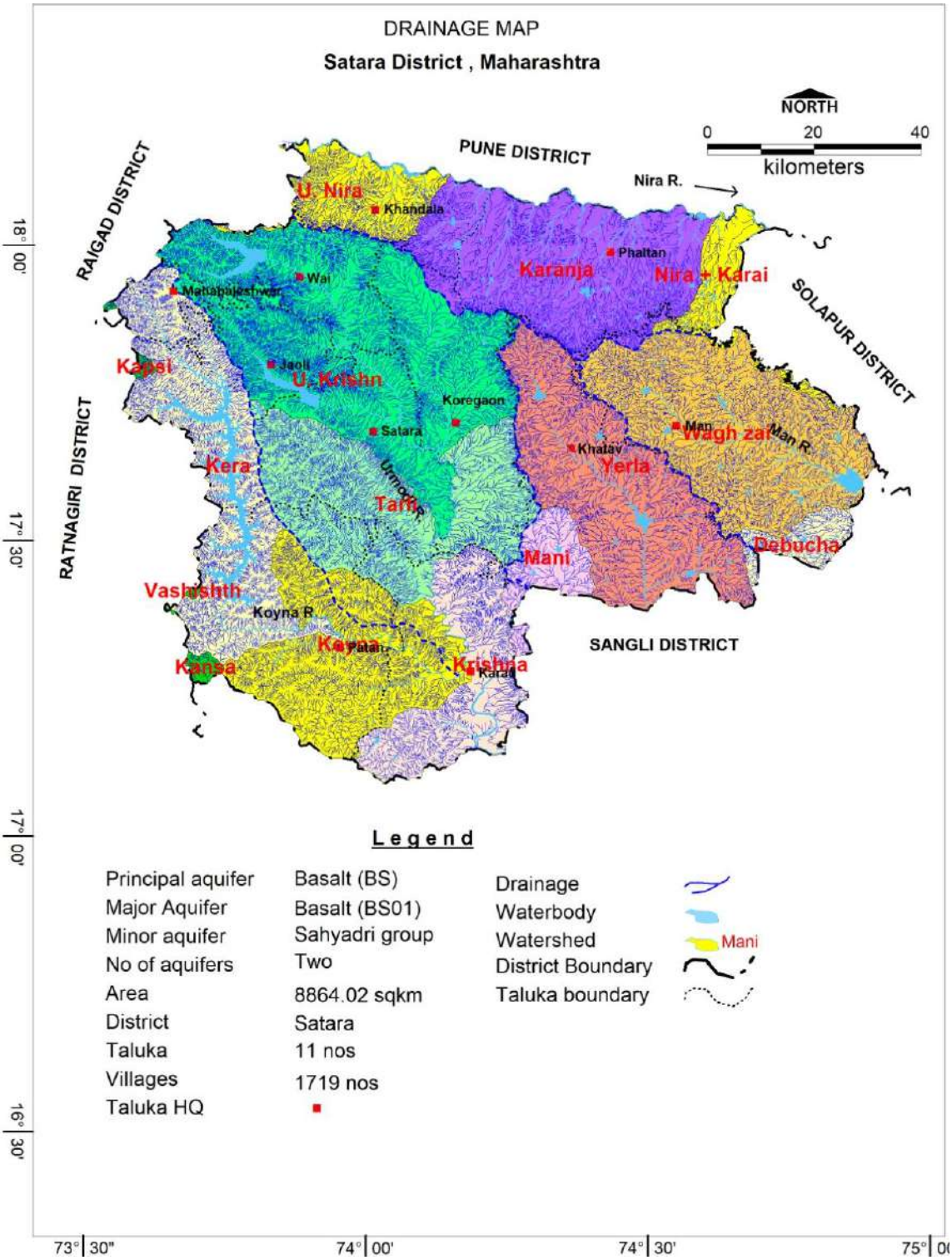


Figure 1.2.2 : Drainage map of Satara district

1.3 Climate and Rainfall

Satara District has a tropical climate and on the whole, is agreeable. The warmest month of the year is May, with an average temperature of 28.1 °C. The mean minimum temperature is 14.4 °C and the mean maximum temperature is 36.8 °C at Satara town in the district. December is the coldest month, with temperatures averaging 21.4 °C. The winter

season is from December to about the middle of February followed by summer season which last up to May, June to September is the south-west monsoon season, whereas October and November constitute the post-monsoon season.

The rainfall varies in different parts of the district, the mountains being the controlling factor on the intensity of rainfall in Satara District. Thus, the western part has a high rainfall on account of its mountainous topography, while the eastern part of the district has a low rainfall. The normal annual rainfall over the district is 1291 mm. Taluka-wise decadal average annual rainfall is 493.15 mm (minimum) in Man taluka, in the eastern part of the district, increases towards the west and reaches a maximum of 4867 mm at Mahabaleshwar, Mahabaleshwar taluka and the same is presented in **Table 1.3.1**. The average annual rainfall for the last ten years when compared with the normal annual rainfall, it is observed that the average annual rainfall for the last ten years of the district is much less than the normal annual rainfall. Thus, the rainfall has definitely decreased in the district over the period of time. The study also reveals that entire north-eastern and south-western part of district comprising entire Khandala, Phaltan, Khatav, Man talukas and part of Koregaon and Karad talukas which experienced drought for more than 20% of the years can be categorized as “drought area”. The average rainfall data for the period 2008 to 2017 are represented in **Table 1.3.2** and **Fig 1.3.1**

(1) Paddy zone comprising Mahabaleshwar, western parts of Jaoli, Wai, Patan and Satara talukas and Khandala peta, having an annual average rainfall of more than 1000 mm.

(2) Jowar zone comprising eastern parts of Jaoli, Wai, Satara Patan, Karad and Koregaon talukas and Khandala peta having an annual average rainfall of 600 to 1000 mm.

(3) Bajra zone comprising eastern part of Man and Phaltan talukas and Khandala peta having an annual average rainfall of less than 600 mm.

Based on long term rainfall analysis it is observed that:

i. The normal annual rainfall in the district varies between 491.1 mm in Phaltan taluka and 5972.7 mm in Mahabaleshwar taluka.
ii. The coefficient of variation of the annual rainfall from the normal rainfall has been observed between 20% and 41%.
iii. The of probability of drought varies from 11% at Mahabaleshwar to 33% (Khatav Vaduj Taluka) and receiving excess rainfall varies from 14 % at Patan and Mahabaleshwar talukas to 25 % at Khandala taluka.

Table 1.3.1: Long-term rainfall analysis

Taluka	Period	No of Years	Normal Rainfall	Std. Deviation	Coefficient ofVariation	Rainfall Trend/Slope (mm/year)	Departures - Number of Years (% of Total Years)						
							Positive	Negative	Droughts			Normal & Excess R/F	
									Moderate	Severe	Acute	Normal	Excess
Javli medha	1998 - 2017	20	1681.6 mm	525 mm	31 %	3.124 mm/year	8 (40%)	12 (60%)	4 (20%)	0 (0%)	0 (0%)	13 (65%)	3 (15%)
Karad	1901 - 2017	112	750.4 mm	200 mm	27 %	0.791 mm/year	56 (50%)	56 (50%)	18 (16%)	2 (2%)	0 (0%)	74 (66%)	18 (16%)
Khandala	1901 - 2017	87	528 mm	169 mm	32 %	0.777 mm/year	42 (48%)	45 (52%)	18 (21%)	3 (3%)	0 (0%)	44 (51%)	22 (25%)
Khatav vaduj	1990 - 2017	21	563.6 mm	230 mm	41 %	8.164 mm/year	10 (48%)	11 (52%)	4 (19%)	3 (14%)	0 (0%)	9 (43%)	5 (24%)
Koregaon	1901 - 2017	100	746 mm	221 mm	30 %	0.823 mm/year	48 (48%)	52 (52%)	17 (17%)	3 (3%)	0 (0%)	64 (64%)	16 (16%)
Mahabaleshwar	1901 - 2017	118	5972.7 mm	1195 mm	20 %	7.367 mm/year	57 (48%)	61 (52%)	13 (11%)	0 (0%)	0 (0%)	89 (75%)	16 (14%)
Man dahiwadi	1901 - 2017	100	508.3 mm	195 mm	38 %	1.102 mm/year	44 (44%)	56 (56%)	22 (22%)	6 (6%)	0 (0%)	48 (48%)	24 (24%)
Patan	1901 - 2017	112	1793.9 mm	476 mm	27 %	-0.537 mm/year	50 (45%)	62 (55%)	18 (16%)	1 (1%)	0 (0%)	77 (69%)	16 (14%)
Phaltan	1901 - 2017	103	491.1 mm	176 mm	36 %	0.772 mm/year	48 (47%)	55 (53%)	21 (20%)	3 (3%)	1 (1%)	56 (55%)	22 (21%)
Satara	1901 - 2017	116	1030.5 mm	275 mm	27 %	0.198 mm/year	55 (47%)	61 (53%)	18 (16%)	2 (2%)	0 (0%)	77 (66%)	19 (16%)
Wai	1901 - 2017	101	799.6 mm	264 mm	33 %	2.297 mm/year	46 (46%)	55 (57%)	21 (21%)	2 (2%)	0 (0%)	61 (60%)	17 (17%)

NOTE: Rainfall departure: EXCESS: > +25; NORMAL: +25 TO -25; MODERATE: -25 TO -50; SEVERE: -50 TO -75; ACUTE: < -74

Table 1.3.2: Annual rainfall data (2007-2017 (in mm)

Taluka	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Decadal Average Rainfall
Jaoli	1520.6	1719.2	1617.9	1721	1236.7	1788.5	1654.7	1341.5	1685.8	1642.4	1592.83
Karad	880.7	894	957.1	617.3	546.2	570.1	668.3	410	695	753.9	699.26
Khandala	440.6	722.1	752.4	443.8	469.9	633.7	523.2	557.6	557.9	572.5	567.37
Khatav	419.7	1006.1	896.9	393.9	275.4	602	601.6	543.7	515.1	705.4	595.98
Koregaon	568.2	950.3	938.9	514.9	360.5	595.9	479.8	442.3	582.9	485.1	591.88
Mahabaleshwar	5604.8	4531.2	4351.1	6555.3	3882.7	3820.4	5660.4	3697.9	5609.8	4956.6	4867.02
Man	455.1	977.1	827.5	242.2	269.6	392.6	483.1	381.3	448.1	454.9	493.15
Patan	1239	1298.7	1599.8	1909.6	1497.3	1498.4	1571.8	924.3	1505.4	1283.8	1432.81
Phaltan	342.4	1132.4	1120.4	311.9	278	486.5	301.6	394.4	413.2	532.1	531.29
Satara	764.1	1113.1	1093.4	851.9	685.4	1182.3	1090.6	658	1013.1	943.9	939.58
Wai	836.3	1118	1128.4	903.6	683	885.4	799.7	522.4	814.1	760	845.09
District Average	**1188.32**	**1405.65**	**1389.44**	**1315.04**	**925.88**	**1132.35**	**1257.71**	**897.58**	**1258.22**	**1190.05**	**1196.02**

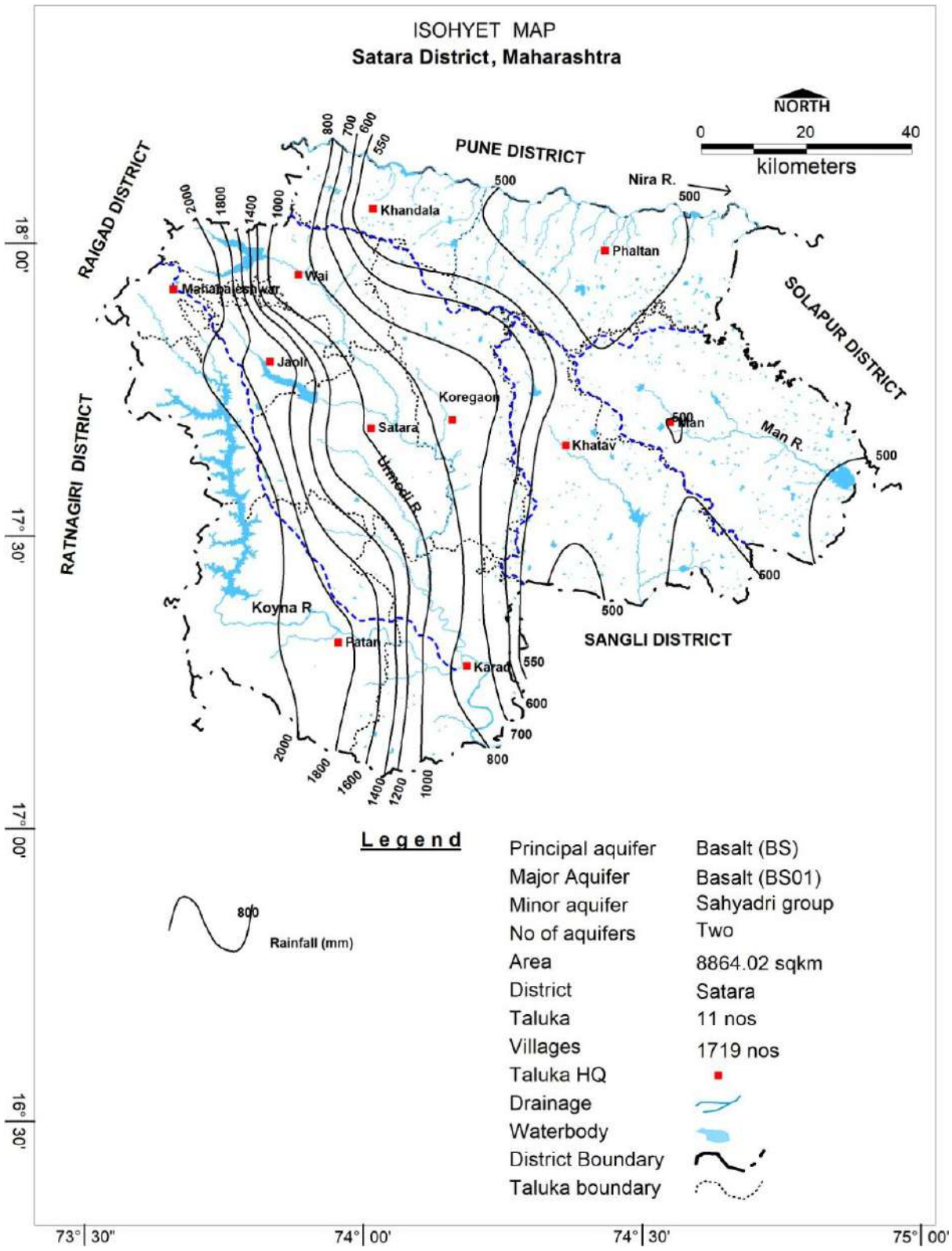


Figure 1.3.1: Average Annual Rainfall

1.4 Geology

Geologically, the area is divided into following two parts i.e., Deccan Trap Laterites formation. Geological map of the Satara district is presented in **Fig 1.4.1.** The generalized geological sequence occurring in the Basin is given in **Table 1.4.1**.

Table 1.4.1: Generalized Geological sequence, Satara district

Age	Group	Sub-groups	Formation	Thickness in meters	Lithology
Cainozoic (1 to 60 million years)			Laterites		Ferruginous, hard, and massive, exhibiting a vesicular and tubular structure with a dark brown limonitic coating.
Upper Cretaceous to Eocene (30-60 million years)	North Sahyadri	Diveghat	Mahabaleshwar	350	Deccan Trap basalt with inter- trappeans. : Aa aa flows, phyric
			Purandargad	300	Deccan Trap basalt with inter- trappeans. : Simple flows, aphyric to plagioclase microphyric
			Diveghat/Chakhli	350	Deccan Trap basalt with inter- trappeans. : Simple/ Aa aa flows, aphyric
		Lonavala	Karla	250	Deccan Trap basalt with inter- trappeans. : Fine grained, aphyric, pahoehoe flows

1.4.1 Laterites:

Laterite occur extensively covering almost entire plateau area of the Western Ghats- and also in the north and central portions of the district. The laterite deposits are considered to be sub-recent (Cainozoic) in geological age. Laterite rock is ferruginous, hard, and massive and generally varies in colour from dark red to yellowish and dark brown to dirty brown. A typical laterite invariably shows a red and yellow mottled appearance exhibiting a vesicular and tubular structure with a dark brown limonitic coating. A freshly cut surface of the laterite bed is usually soft but becomes very hard and tough, on exposure to atmosphere. At places, as in the Panchgani plateau, the laterite is seen to pass downwards through a zone of lithomarge into an altered trap. Most of the laterite beds in the district are categorised as ferruginous laterite or a very low-grade aluminous laterite. Bauxite Ore occurs in a few places of the district. The laterite ultimately yields a red to reddish-brown ferruginous soil.

1.4.2 Deccan Trap Basalt:

Almost the entire district is underlain by Deccan Volcanic Basalts belonging to Sahyadri Group of Upper Cretaceous to Eocene age, comprises of various lava flows, which can be classified in the field into two types as simple and compound flows. The compound flows occur at lower elevations whereas the simple flows are confined to the elevation above 680 m. The compound flows although vesicular and amygdaloidal in nature, hard and compact in their middle sections. They are fractured and jointed, and show moderate degree of weathering at places. Each individual lava flow consists of lower massive part becoming vesicular /amygdaloidal towards top, ranges in their individual thickness from a few centimeters to tens of meters. The flows have wide variation in colour and texture especially when they are amygdaloidal in nature with secondary mineral infillings such as Zeolites, calcite, and Agate and Chalcedony etc. The red /green/black bole beds constituting the marker horizons separating the two flows were discontinuous and generally inconsistent.

The basalts are intruded by dykes and are found commonly in pahoehoe flows in the area. The dykes vary in thickness from one or two meters to as much as 10 meters and extend for long distances. The dykes display the joints parallel to the walls, at right angle to the walls besides horizontal ones, with chilled margins. The dykes act as barrier or as water conduits / pathways for

the movement of groundwater flow depending on intensity of fracturing in the dyke rock. The location and orientation of the dykes with respect to the groundwater flow are very important.

Karla Formation essentially comprises of compound lava flows exhibiting the pahoehoe characters. Based on geochemical characters this formation has been classified as Bushe Formation. It is comprised of aphyric or sparsely plagioclase phyric compound flows. The flows are characterized by the presence coarse grained, altered, amygdaloidal basalt and near absence of plagioclase. From the ground water point of view this form action occupies the low -lying fiat plains and gives rise to moderate to good aquifers.

Diveghat Formation, overlying the Karla Formation, comprises 15 flows with thickness varying from 100 to 300 m, is exposed on the hills and along the hill slopes above 700 m from msl. They are simple flows, showing mixed characters of 'aa' type and 'pahoehoe' type lavas. The lava flows of this formation are characterized by presence of vesicular, plagioclase basalt with medium-grained groundmass. These flows are exposed along the valleys of Man, Koyna, Yerla, Urmadi and Krishna rivers and from hydrogeological view point these flows have moderate potential for groundwater.

The Chikhli Formation is a single massive flow (two or more flows at places) of limited extent. Vertical jointing, horizontal fractures, and spheroidal weathering characterize the Chikhli flow. Rarely, a basal flow breccia of this formation is exposed. The Chikhli basalt is moderate to highly porphyritic with plagioclase size ranging up to 2 cm. The flows are exposed along the valleys of rivers and from hydrogeological view point these flows have good potential for groundwater.

Purandargad formation comprises 8 basaltic flows, mostly 'aa' type flows, characterized by the presence of aphyric to plagioclase microphyric basalt with the phenociysts embedded in a fine-grained groundmass. The thickness of this formation varies from 15 to 30 m and is exposed around Vaduj, Dahiwadi, Koregaon, Khandala, Patan and Karad. From hydrogeological point of view, this formation is not very significant as it occupies hill slopes. This formation is not potential for the development of groundwater resources as it forms the runoff zone.

Mahabaleshwar Formation, the youngest formation, comprises 9 'aa' type flows, phyric in nature. The thickness of this formation varies from 350 to 400 m and occurs at the top of hills. From hydrogeological view point these flows occur on the hilly terrain and therefore not potential for groundwater.

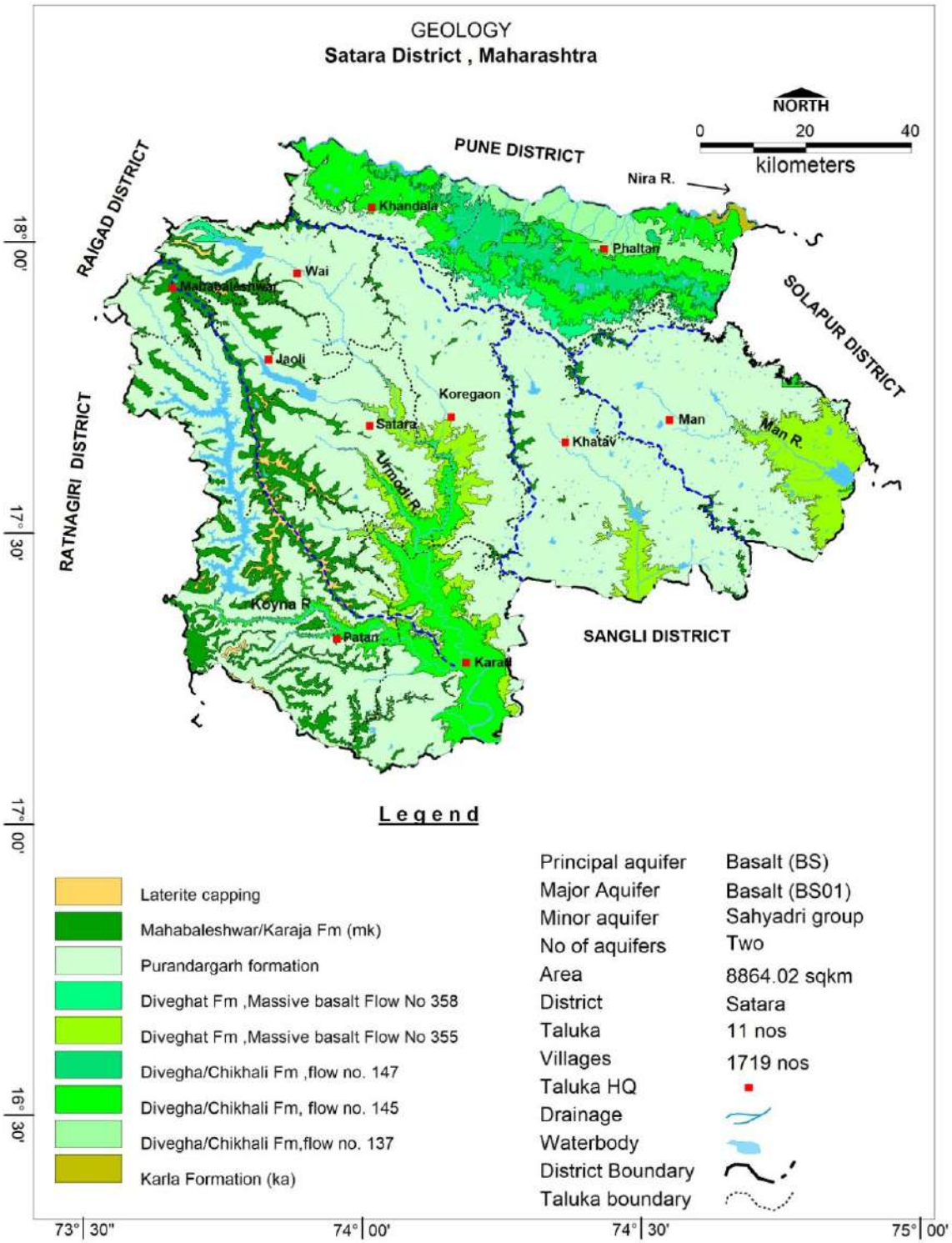


Figure 1.4.1: Geological Map

2.0 HYDROGEOLOGY

2.1 Major Aquifer Systems

Laterite and Basalt aquifers are the main aquifers in the district. Two aquifer Systems in Basalt and one aquifer in Laterite are found to be prevailing in the district **(Figure 2.1).** Deccan Trap Basalt of upper Cretaceous to lower Eocene age is the major rock formation in the district. Laterite occurs covering almost all the plateaus of the Western Ghats- and also in the north and central portions of the district. A map depicting hydrogeological features is presented in **Figure 2.2.** Water table contour in **Figure 2.3.**

Figure 2.1: Major Aquifers

Laterites, although occurring at high elevations, on top of plateaus, form moderately good aquifers (perched aquifers), suitable for constructing large diameter wells. Shallow Aquifer occurs from 2 to 10 m bgl depth with very shallow water levels.

Deccan basalts are hydrogeologically in-homogeneous rocks. The weathered and jointed / fractured parts of the rock, as also permeable inter-flow beds constitute the zone of ground water storage and flow. The existence of multiple aquifers is characteristic of basalt and exhibits wide variation in the joint/fracture intensity. The yields of well is function of the permeability and transmissivity of aquifer and it depends upon the degree of weathering and topographic setting of the aquifer. Due to wide variation in secondary openings, the potential areas for ground water are generally localized. In general, ground water occurs under phreatic/unconfined to semi-confined conditions in basalts.

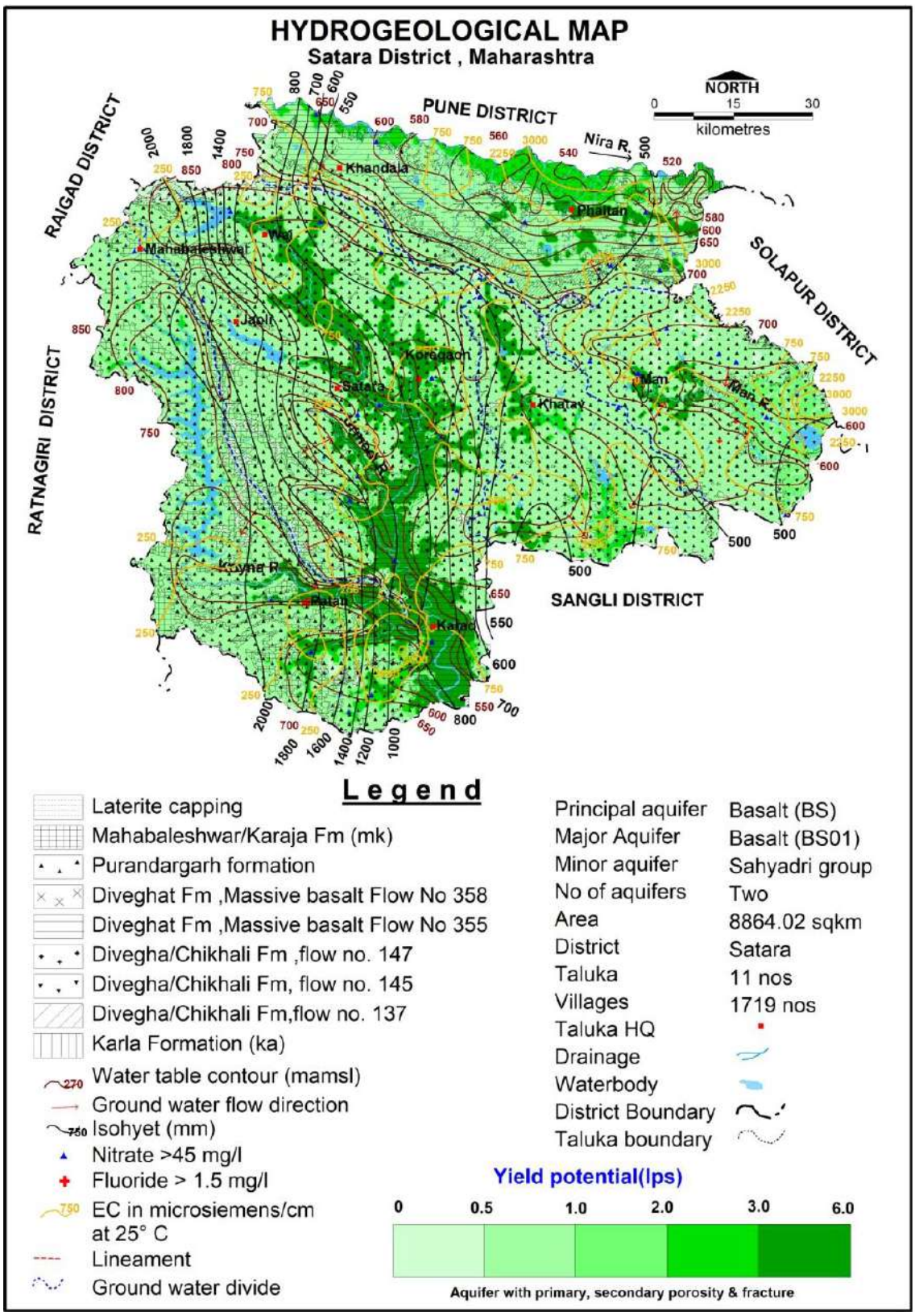


Figure 2.2 - Hydrogeology

Two Aquifer system has been delineated: Aquifer I from 9 to 34 m (Weathered /Jointed Basalt); and Aquifer II from 35 to 193 m (Jointed/fractured basalt). Shallow Aquifer generally tapped by the dug wells of 9 to 35 m depth, have water levels ranging from 0.9 to 25.0 m bgl and yield varies

from 10 to 200 m^3/day. The deeper Aquifer is being tapped by borewells with depth ranging from 35 to 200 m bgl and the water level from 9.0 to 95 m bgl and yields vary from 0 to 3 lps. Based on Ground Water Exploration, Aquifer wise characteristics are given **Table 2.2.1**. Maps depicting depth of occurrence and fractured/Granular rock thickness and Aquifer wise yield potential maps are shown in **fig 2.4, Fig 2.5, Fig 2.6 and Fig 2.7**.

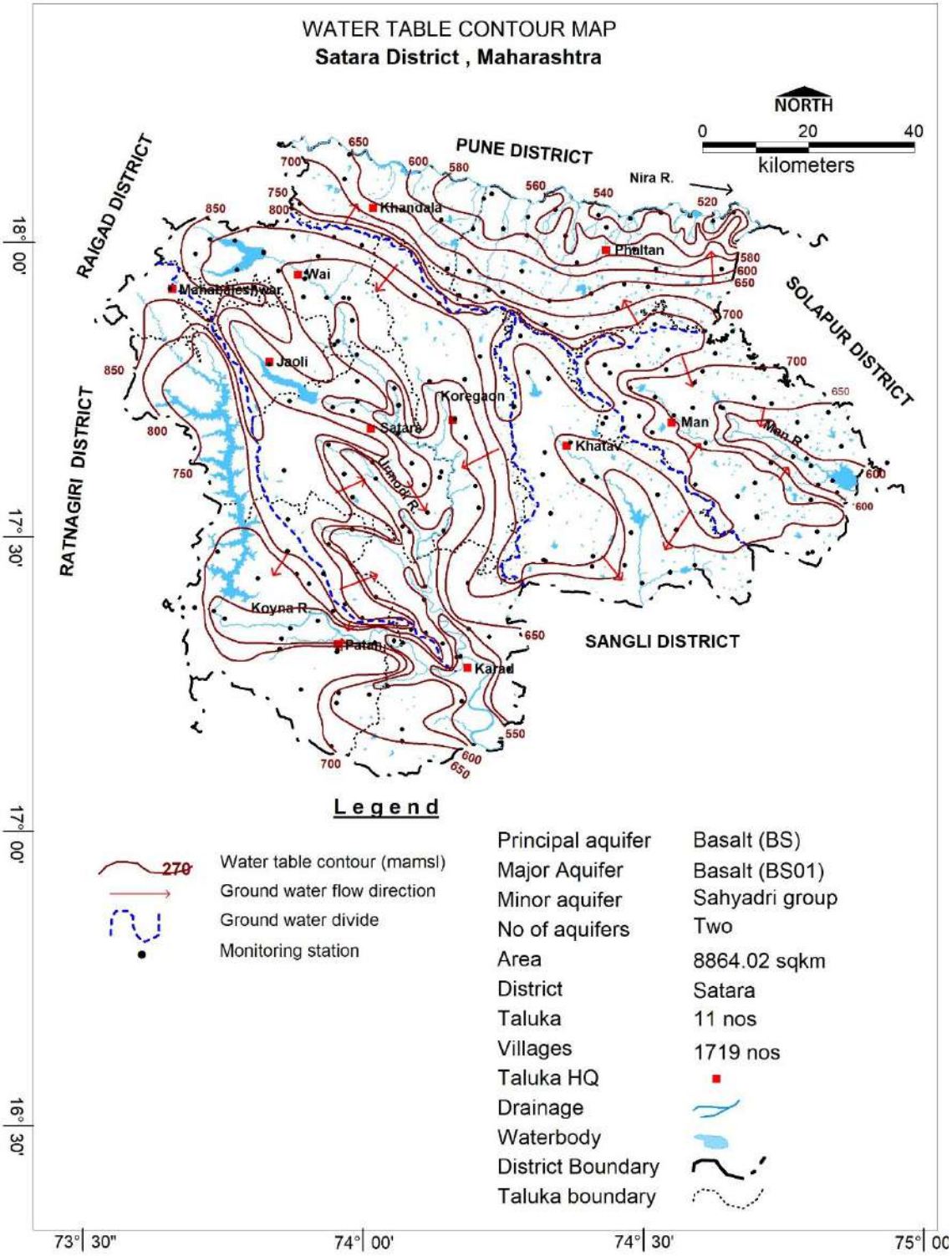


Figure 2.3 – Water table contour map

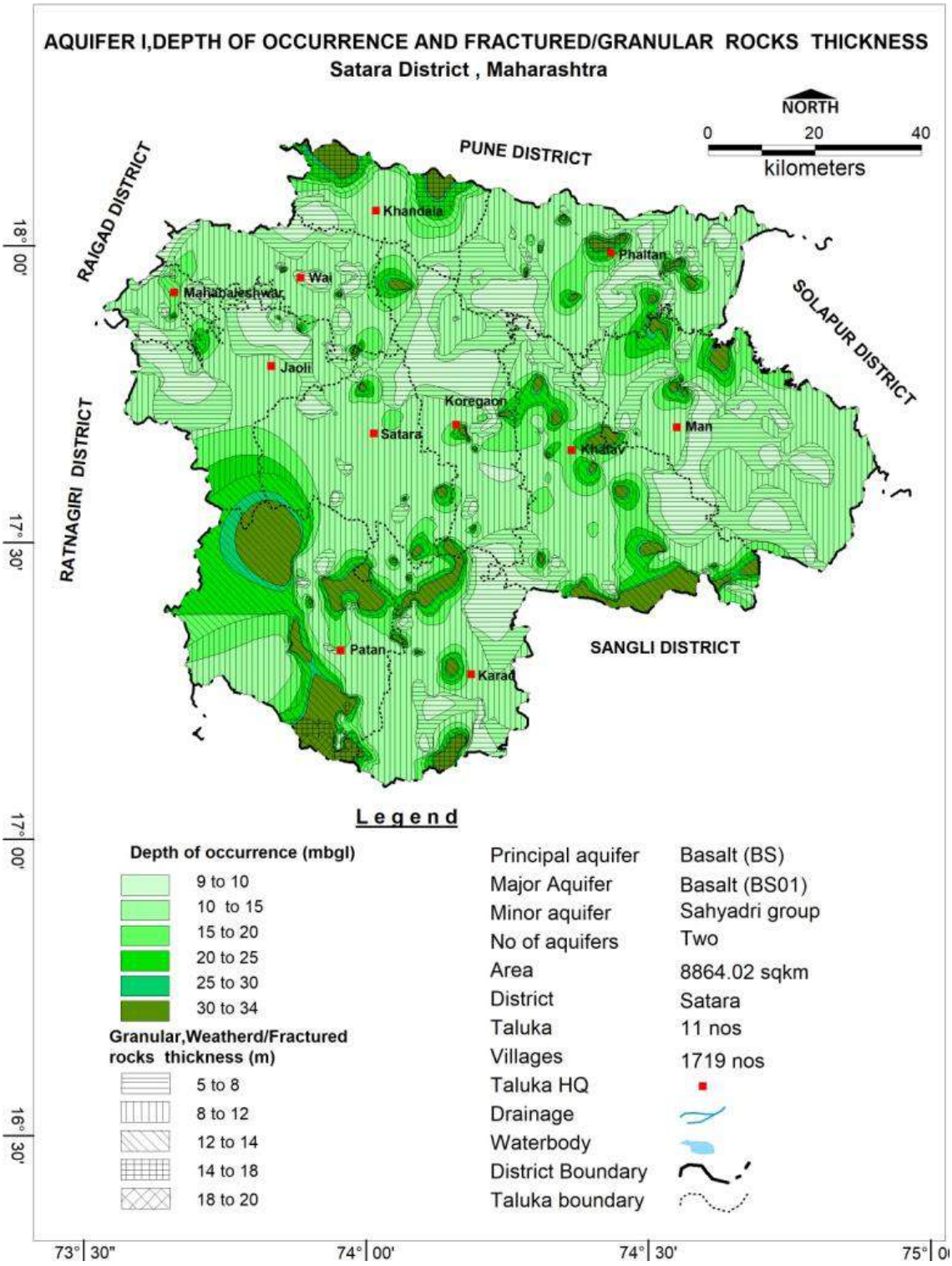


Figure 2.4 Aquifer I, Depth of occurrence and fractured rocks thickness

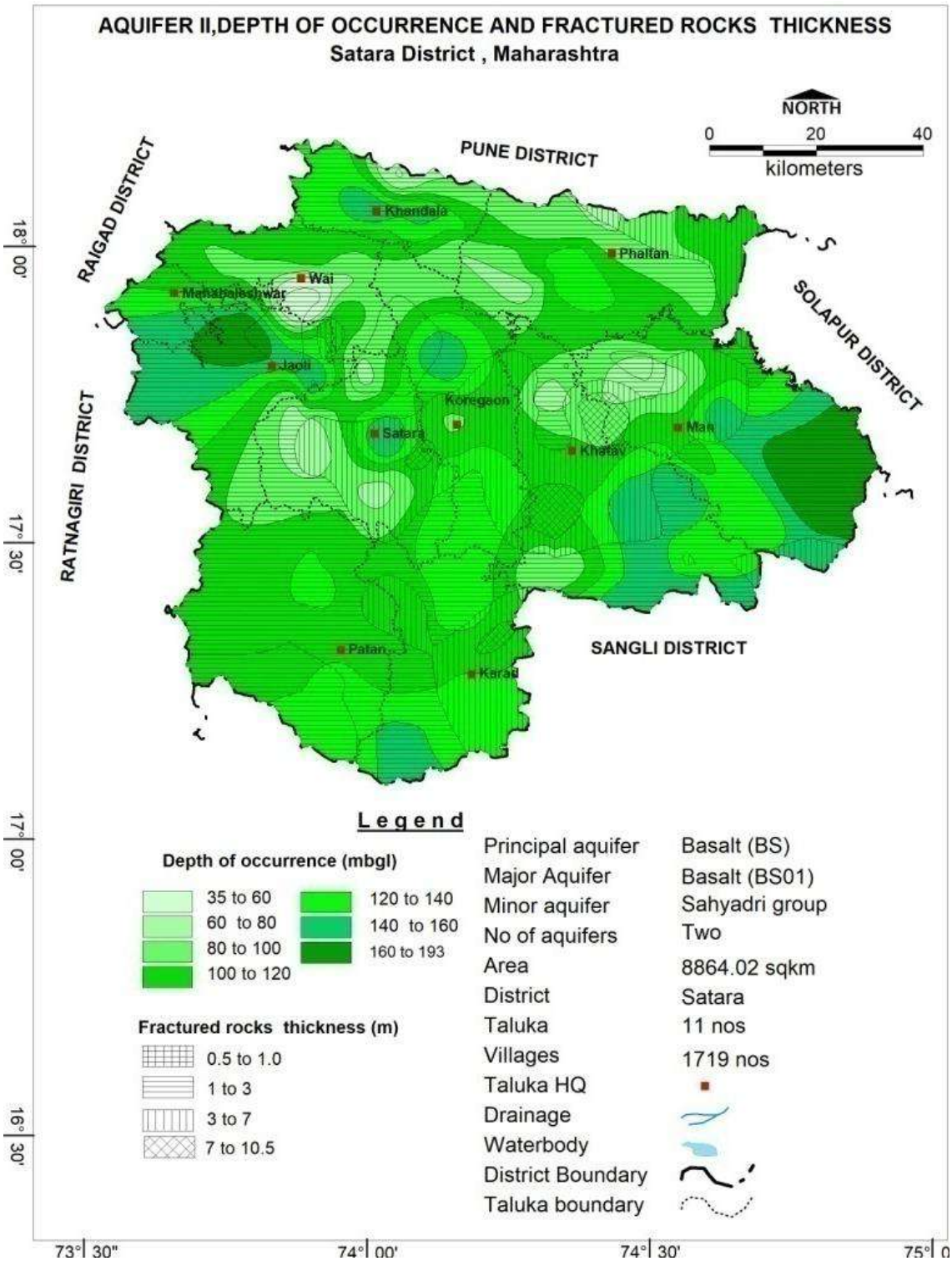


Figure 2.5 Aquifer II, Depth of occurrence and fractured rocks thickness

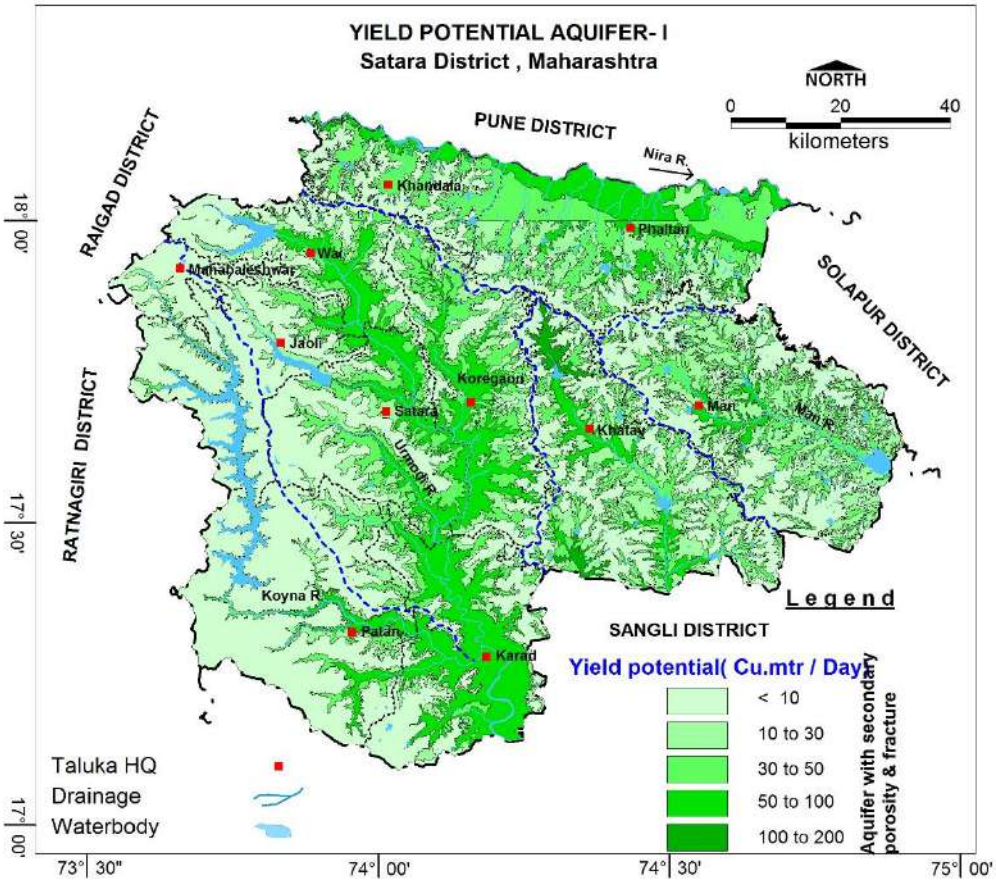


Figure 2.6 Yield Potential Aquifer I

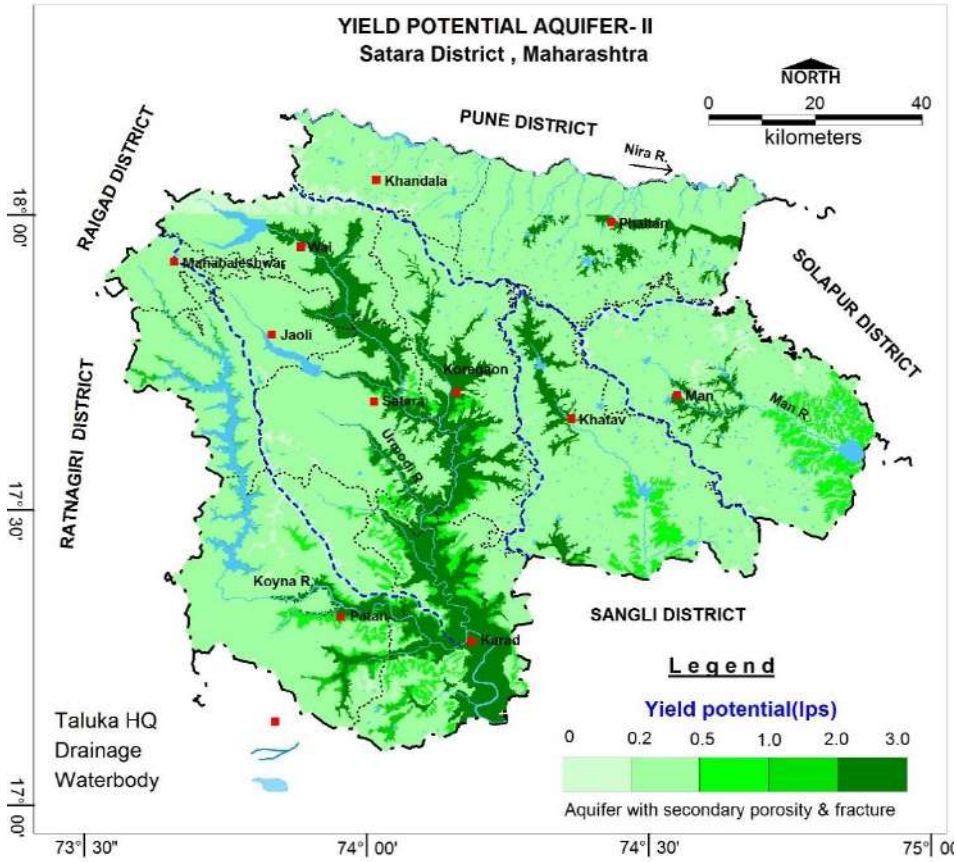


Figure 2.7 Yield Potential Aquifer II

Table 2.2.1: Aquifer Characteristic of Satara district

Type of Aquifer	Formation	Depth range of the aquifers (mbgl)	SWL (mbgl)	Thickness (m)	Fractures encountered (mbgl)	Yield	Sustainability	Aquifer parameter (Transmissivity m^2/day)	Sy/S	Suitability for drinking/ irrigation
Aquifer-I	**Deccan Trap-** Weathered/ Fractured Basalt	9 to 34	0.9 to 25	1-12	up to 34	10 to 200 m^3/day	1 to 2 hrs	9.25 to 30 m^2/day	0.019 to 0.028	Suitable for both (except NO_3 & F affected villages for drinking)
Aquifer-II	Jointed / Fractured Basalt	35 193	9 to 95	1-6t	up to 193	0 to 3 lps	0.5 to 3 hrs	10 to 97 m^2/day	1.2 $x10^{-4}$ to 3.57 X $x10^{-4}$	Suitable for both (except NO_3 & F affected villages for drinking)

2.2 Aquifer Parameters

Aquifer parameters are available from ground water exploration carried out in the basaltic terrain of the district as well as from the pumping tests carried out on dugwells in basaltic terrain. The specific capacity of the wells tapping Deccan Trap Basalt ranges between 1.6 and 4.2 lps/m of draw down and the transmissivity ranges from 10 to 97 m^2/day. The storativity varies from 1.2 $x10^{-4}$ to 3.57 X $x10^{-4}$.

2.3 3-D and 2-D Aquifer Disposition

Based on the existing data, aquifer disposition in 3D, Fence diagram, and several hydrogeological sections have been prepared along section lines shown in **figure 2.3.1, figure 2.3.2, figure 2.3.3**, **figure 2.3.4 to figure 2.3.7** to understand the subsurface disposition of aquifer system.

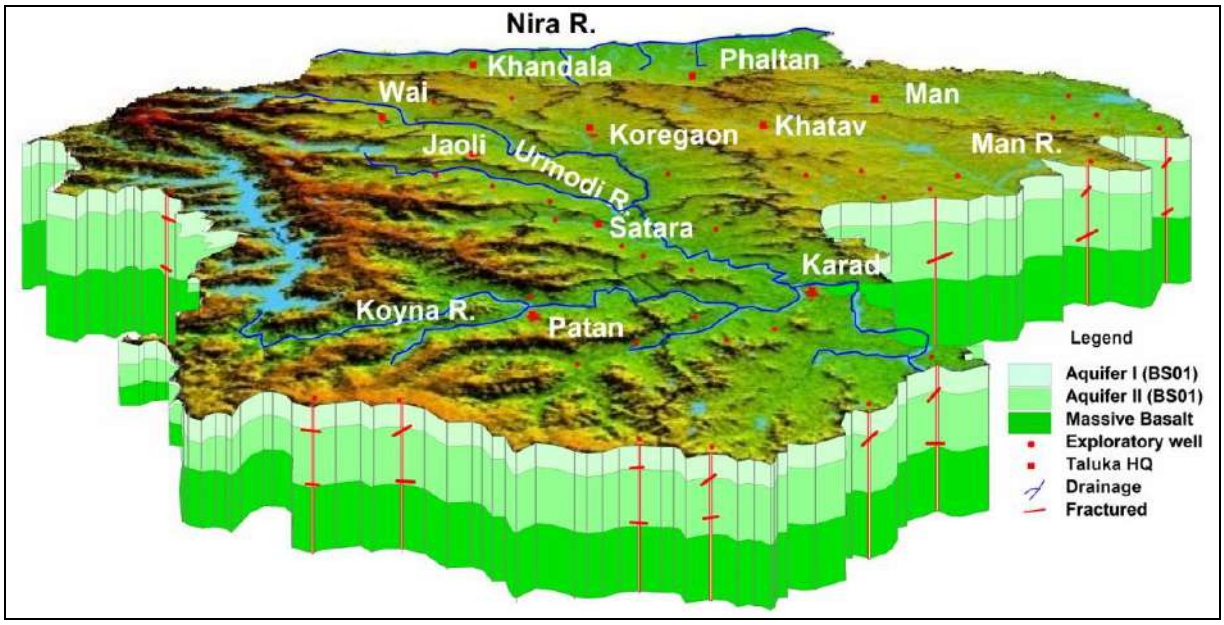


Fig. 2.3.1: 3D Aquifer Disposition

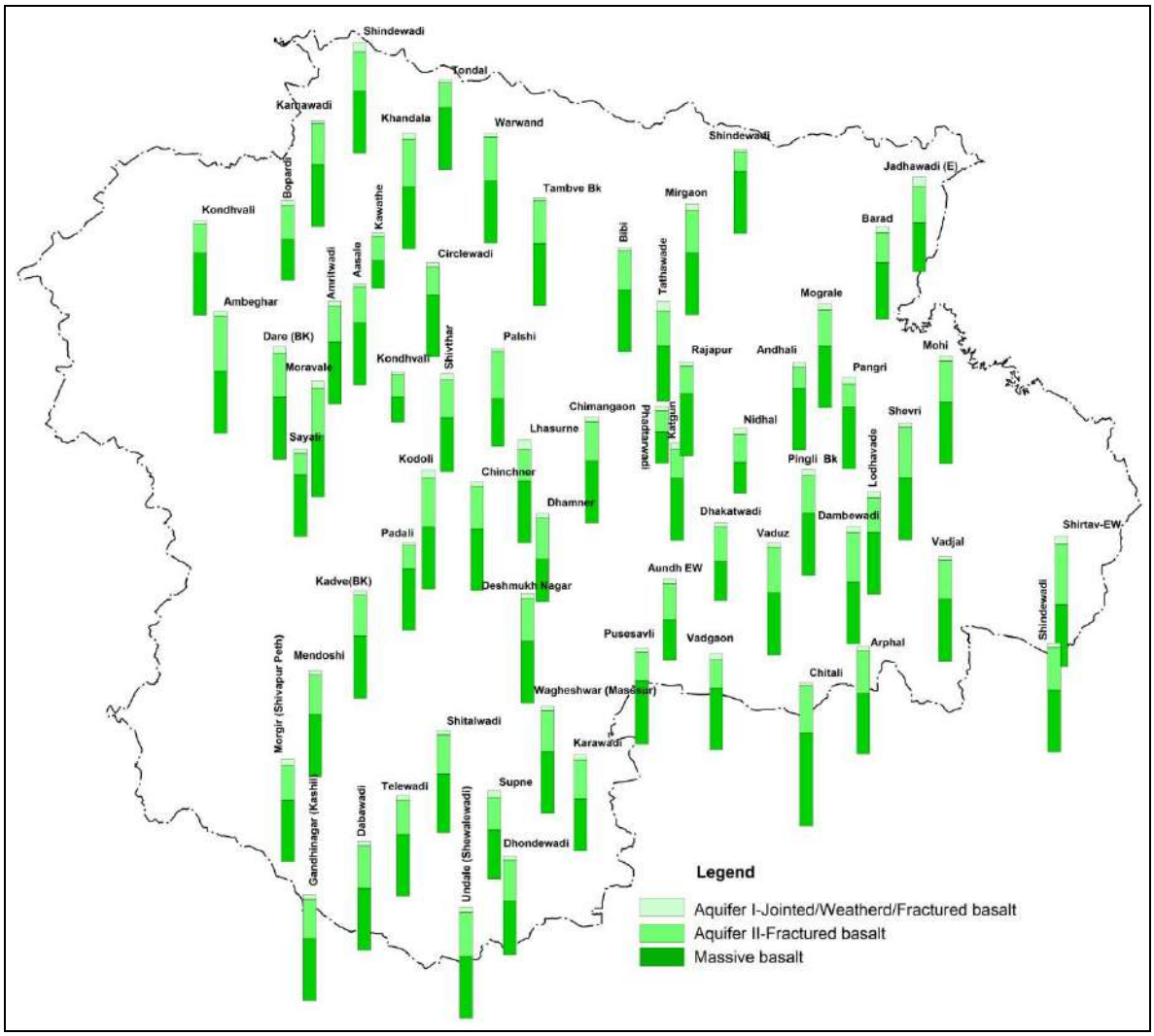


Fig. 2.3.2: Subsurface disposition of aquifer system

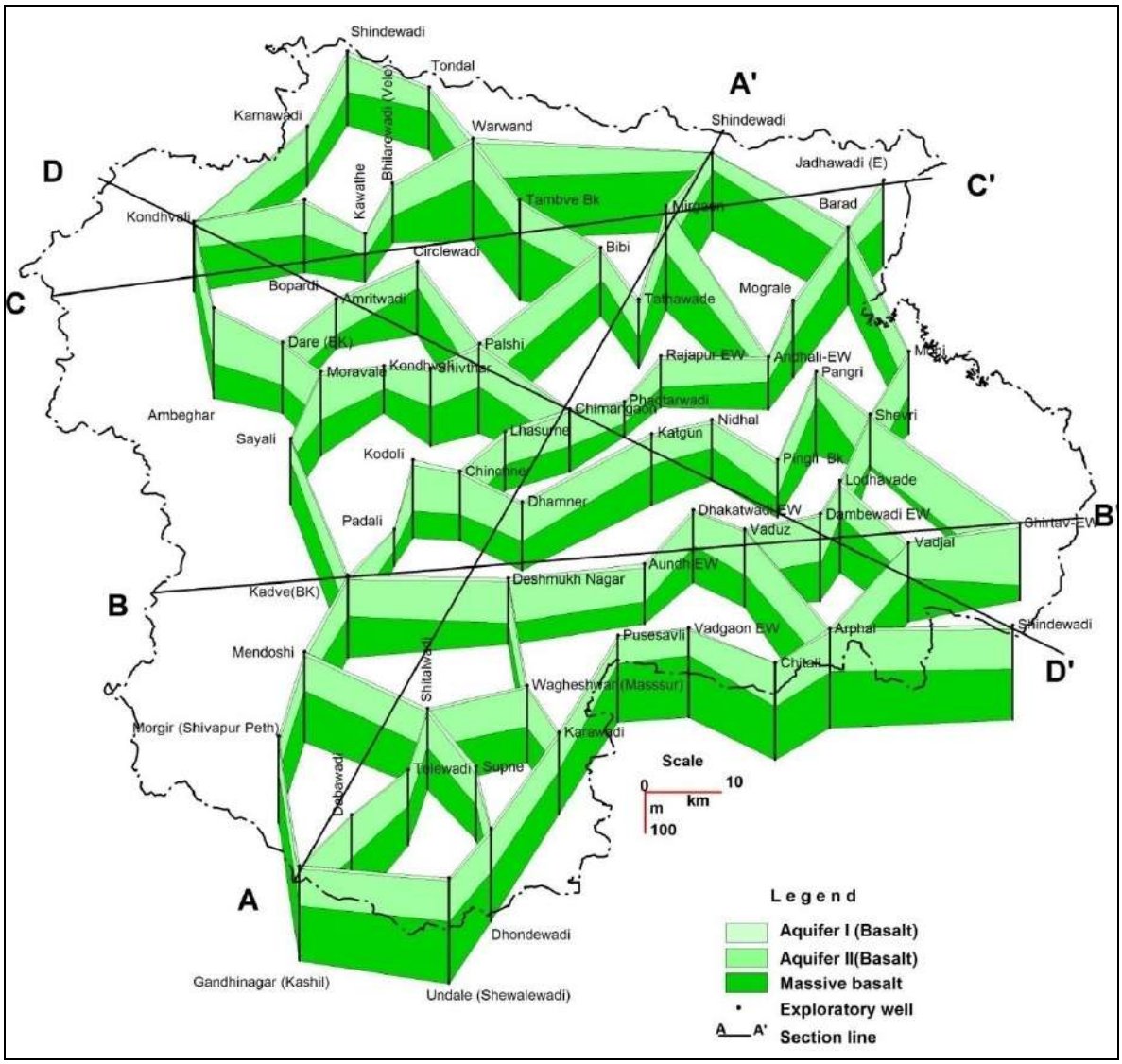


Fig. 2.3.3: 3D Fence Diagram

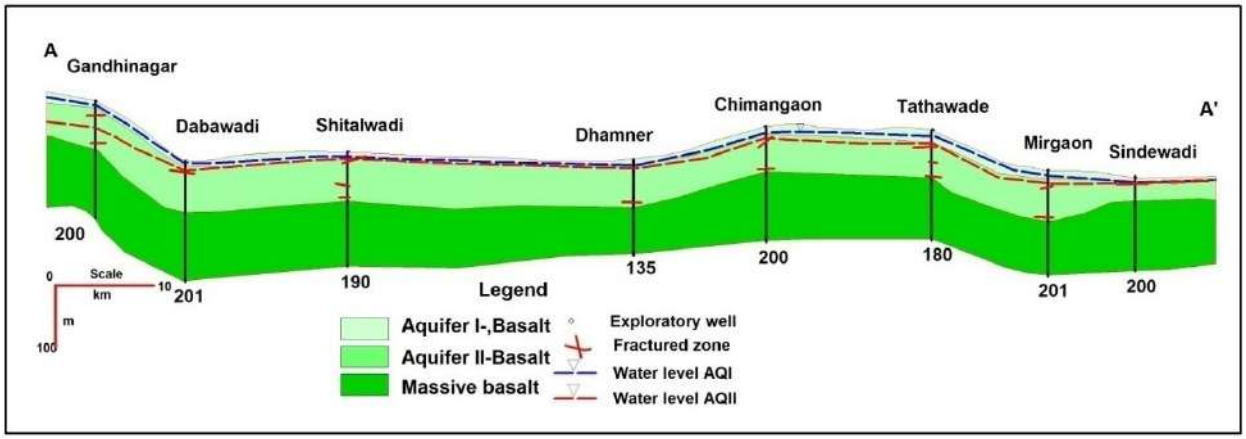


Fig. 2.3.4: Lithological section A-A'

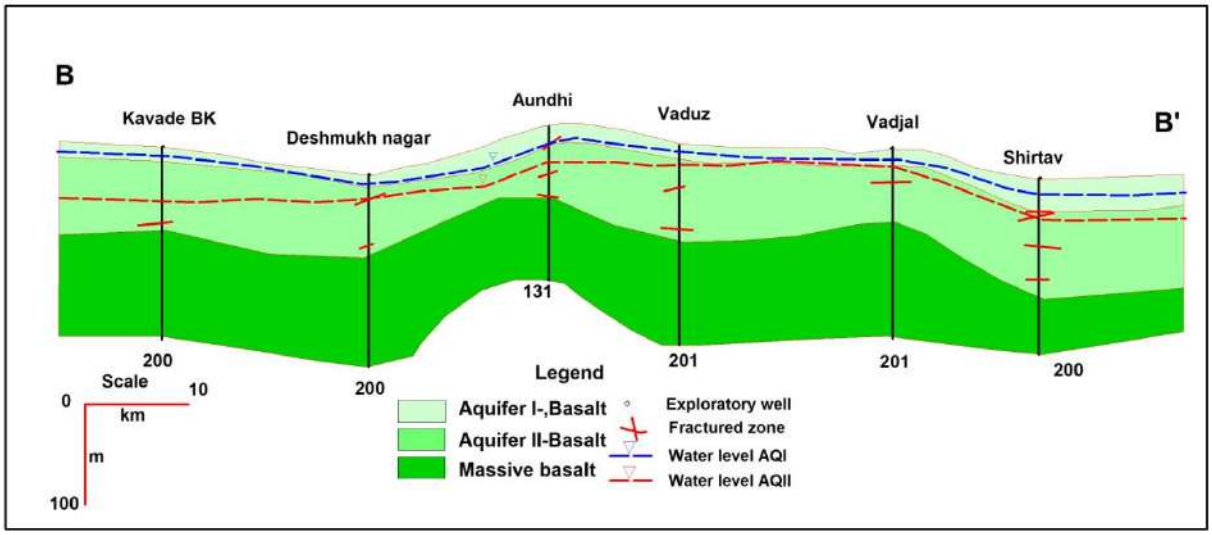


Fig. 2.3.5: Lithological section B-B'

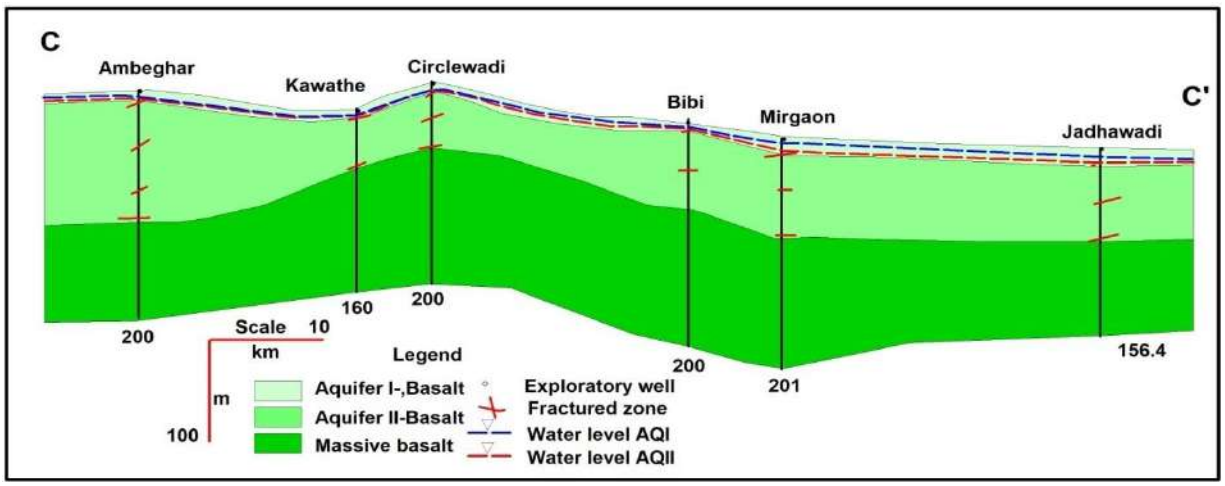


Fig. 2.3.6: Lithological section C-C'

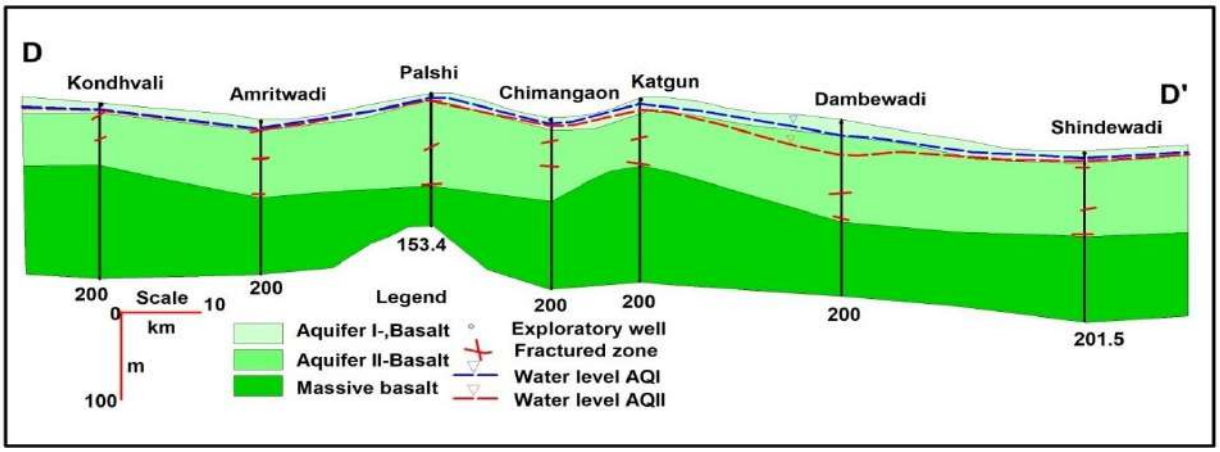


Fig..2.3.7: Lithological section D-D'

3.0 WATER LEVEL SCENARIO

3.1 Depth to water level (Shallow Aquifer-I)

Central Ground Water Board periodically monitors 37 Ground Water monitoring wells in the Satara district, four times a year i.e. in January, May (Pre monsoon), August and November (Post monsoon). Apart from this under NAQUIM study; 17 KOW were also established and monitored during the year 2016 and 101 KOW were also established and monitored during the year 2017. These data have been used for preparation of depth to water level maps of the district. Pre-monsoon and post monsoon water levels along with fluctuation during 2017 and long-term water level trends (2008-2017) are given in **Annexure-II.**

Depth to Water Level – Pre-monsoon (May-2017)

The depth to water levels in Satara district during May 2017 ranges between 0.9 mbgl (Morgiri, Patan taluka) and 25.00 mbgl (Pachgani, Mahabaleshwar taluka). The depth to Water levels varies between 5 and 10 mbgl in major part of the District. The depth to water levels less than 5 mbgl are observed in western part of the district covering Patan taluka and in patches in Karad, Jaoli Satara talukas and in isolated wells in Pkaltan, Koregaon, Khandala, Man and Wai talukas. The depth to water level between 10 to 20 mbgl observed in patches in north-western and eastern parts of the district. The Deeper water levels between 20 and 30 mbgl are observed in two isolated patches in Mahabaleshwar and Khatav talukas. The pre-monsoon depth to water level map is depicted in **Figure-3.1.1.**

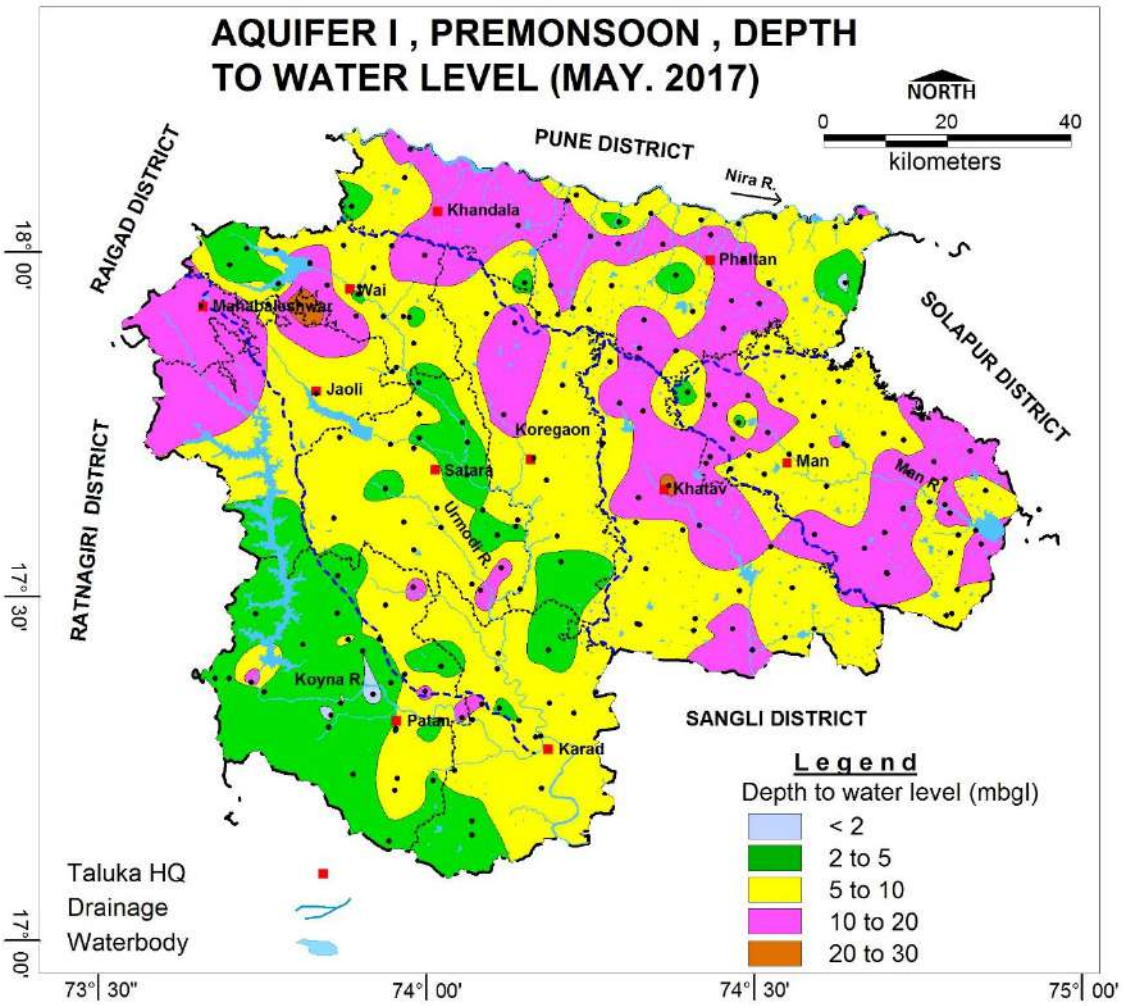


Fig 3.1.1: DTWL shallow aquifer (May 2017)

3.1.1 Depth to Water Level – Post monsoon (Nov-2017)

The depth to water levels in Satara district during Nov. 2017 ranges between 0.1 mbgl (Dhuldev, Man taluka) and 19.0 mbgl (Khatav, Khatav taluka). Shallow water levels within 5 m bgl are observed in major part of the district. The depth to water level between 10 to 20 mbgl has been observed in parts of Mahabaleshwar, Khatav and Phaltan talukas and in parts few isolated wells. Spatial variation in post monsoon depth to water levels is shown in **Figure-3.1.2**

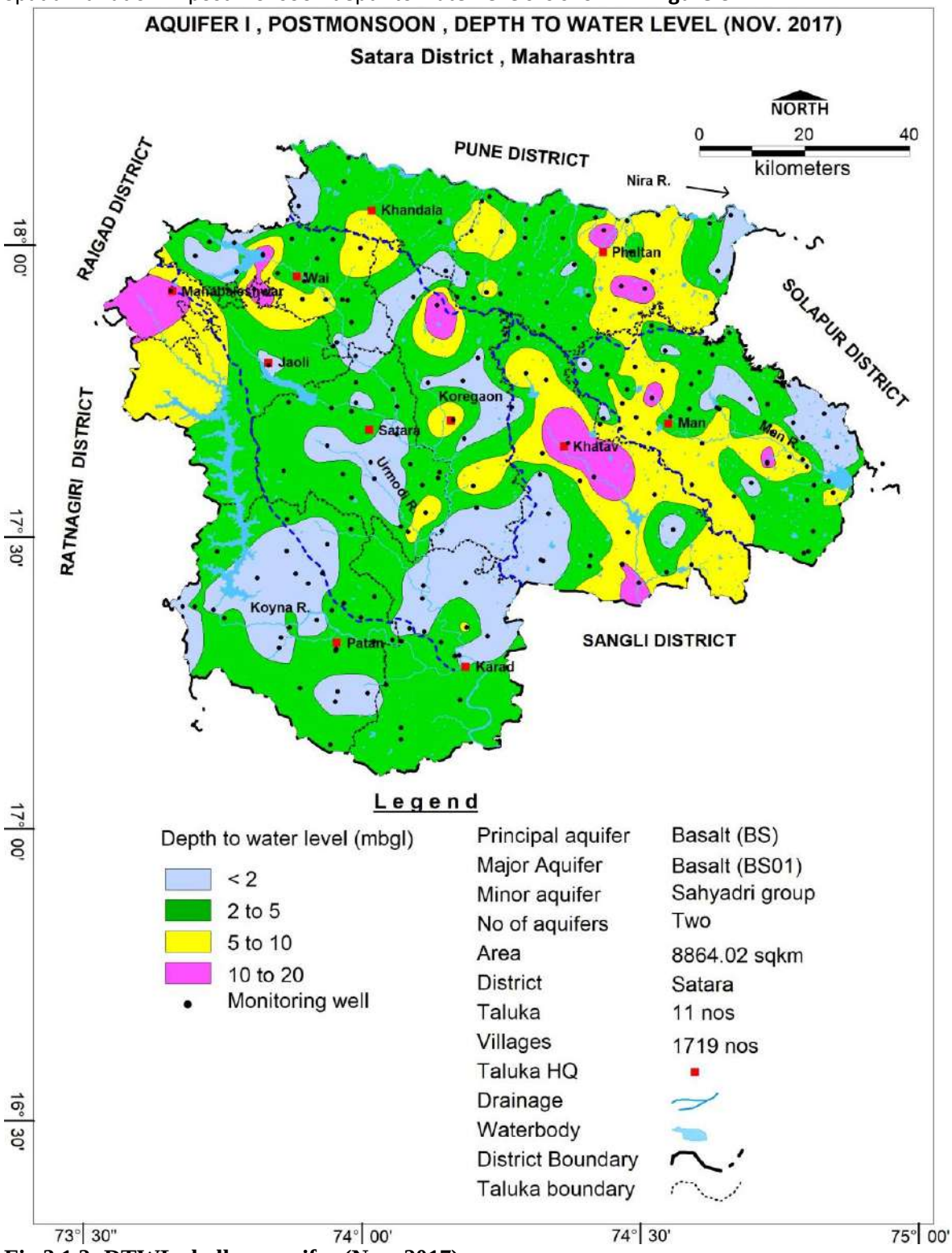


Fig 3.1.2: DTWL shallow aquifer (Nov. 2017)

3.1.2 Seasonal Water Level Fluctuation (May-Nov. 2017)

It is observed that minimal water level fluctuation was measured at Vaduth, Satara taluka and Rajuri, Phaltan taluka (0.10 m) while maximal water level fluctuation was measured at Pachgani, Mahabaleshwar taluka (13.0 m). Rise in water level has been observed in entire district, mainly in the range of 0 to 4 m and >4 m in. Decline in water level was observed in 7 isolated wells in Khatav, Koregaon and Phaltan talukas in the District. Water level fluctuation is presented in **Fig 3.1.3.**

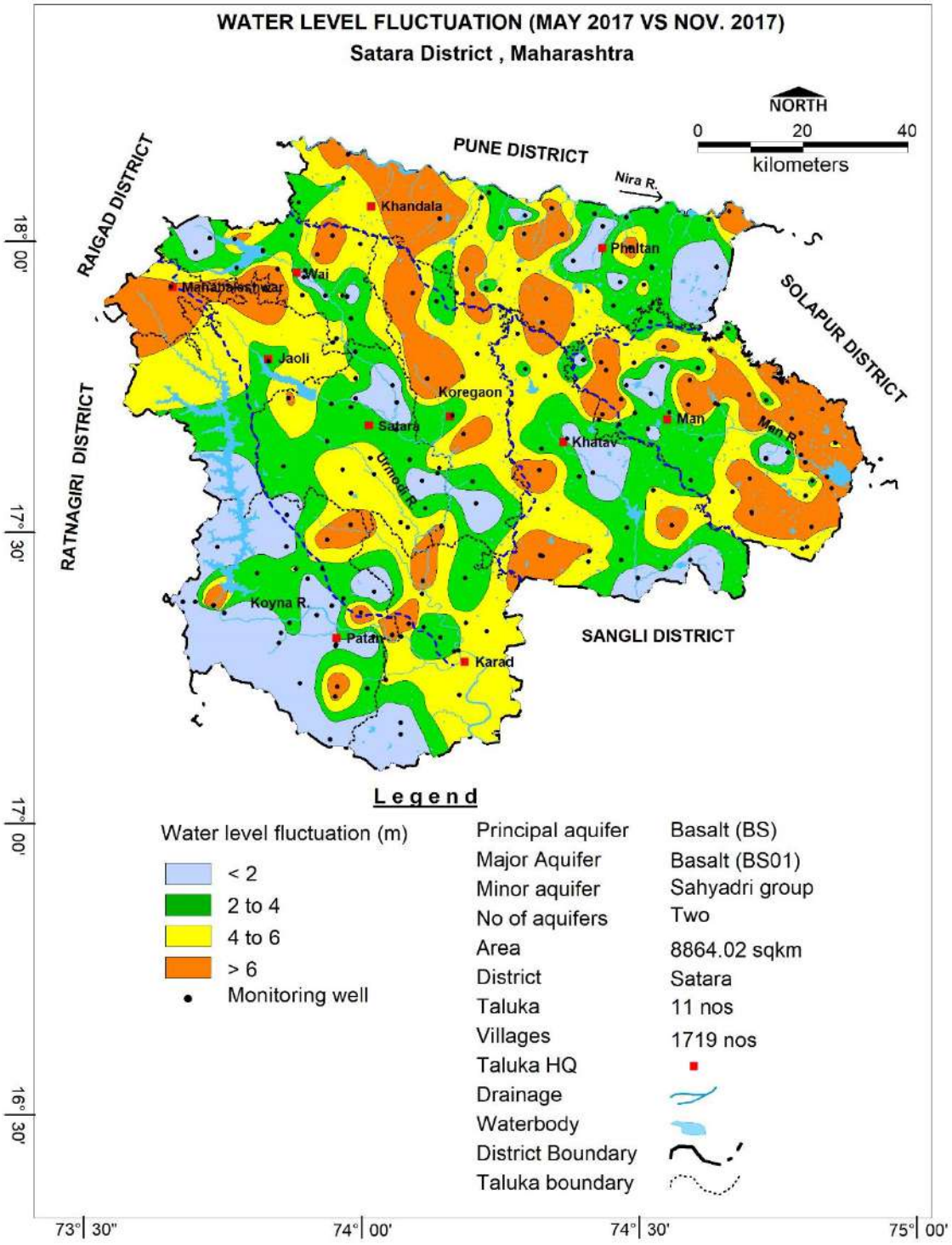


Fig 3.1.3: Water level fluctuation (May 2017 Vs Nov 2017)

3.2 Depth to water level (Deeper Aquifer-II)

3.2.1 Pre-monsoon Depth to Water Level (May-2017)

In Deeper Aquifer-II, the pre-monsoon depth to water levels, in Satara District during May 2017, range from 9.00 (Lhasurne, Koregaon taluka) to 95.00 mbgl (Vadgaon, Phaltan taluka). The depth to water level varies between 10 to 30 mbgl in major part of the district. The deep water level (>50 mbgl) has been observed in Phaltan (Vadgaon and Andhali EW), Karad (Wagheshwar EW), Patan (Mendoshi and Morgir EW), Jaoli (Dare BK EW), Satara (Kadve BK EW), Man (Rajale EW, Khatav (Rajapur EW) and Wai (Eksar OW) Talukas. The pre-monsoon depth to water level for Aquifer –II is given in **Fig. 3.2.1** and the details are presented in **Annexure VIII**.

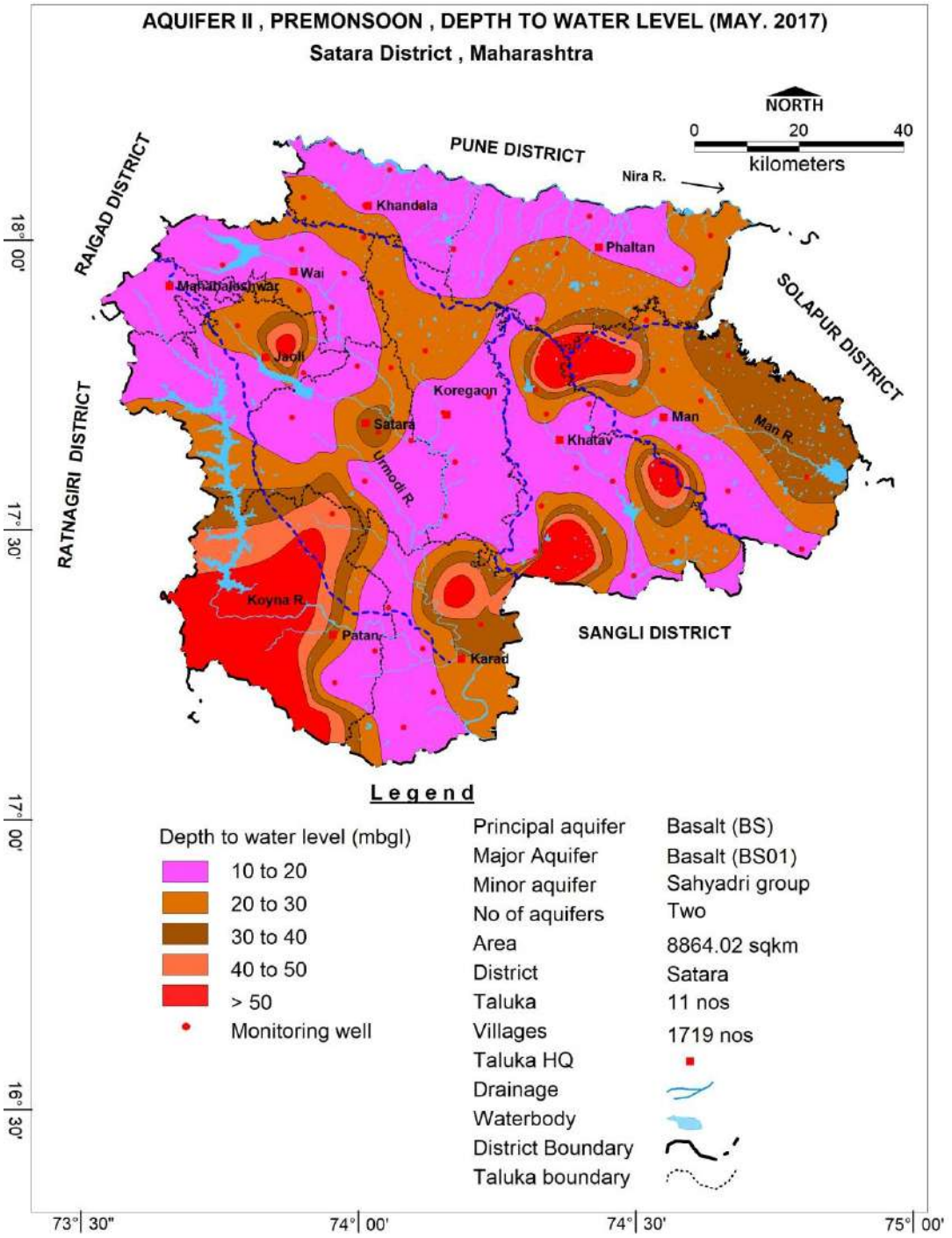


Fig 3.2.1: DTWL deeper aquifer (May 2017)

3.2.2 Post monsoon Depth to Water Level (Nov.-2017)

In Aquifer-II, the post monsoon depth to water levels in Satara District during Nov. 2017 range between 1.40 (Lhasurne, Koregaon taluka and Padali, Satara taluka) and >100 mbgl (isolated EW at Surul, Patan taluka). Depth to water level less than 5 m bgl has been observed in patches in Central and western part of the district. The major part of the district shows deeper water levels ranging between 5 and 20 mbgl. The deepest water level of more than 30 mbgl is observed at Wagheshwar EW and Karawadi OW, Karad taluka, Rajapur EW, Khatav taluka, Dare BK EW, Jaoli taluka, Vihe, Mendoshi and Morgir EWs, Patan taluka, Mohi, Man taluka, Andhali-EW, Phaltan taluka and Gandhinagar EW, Phaltan taluka. The post monsoon depth to water level for Aquifer –II is given in **Fig. 3.2.2**

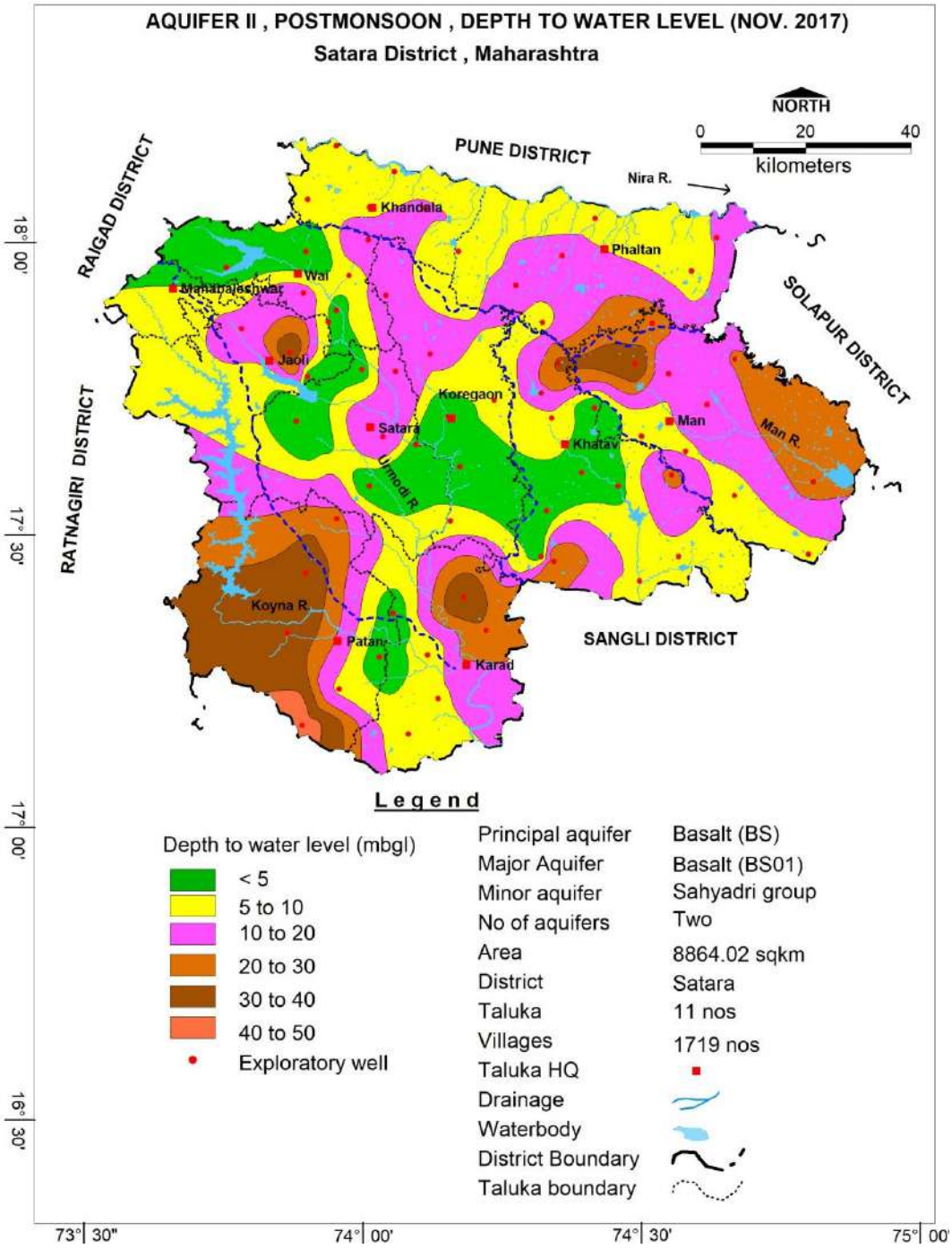


Fig 3.2.2: DTWL deeper aquifer (Nov. 2017)

3.3 Water Level Trend (2008-2017)

In Satara district, pre-monsoon fall in water levels trend has been recorded at 101 stations and ranges from 0.0066 (Surali, Koregaon taluka) to 1.3679 m/year (Jakhangaon, Khatav taluka) while rising trend was observed in 11 stations varying from 0.0165 m/year (Chitali, Khatav taluka) to 0.2647 (Satara Road (Padali), Koregaon taluka). During pre-monsoon, declining water level trend has been observed in about 9839 sq km area during 2008-17, i.e., 93 % of the area. Significant decline more than 0.20 m/year has been observed in 4137 sq km, i.e., 40 % area covering major part of Man, Khatav, Phaltan,Patan and Khandala talukas and southern portion of the Karad taluka. Rise in water level trend has been observed in central part of the district covering major part of Satara, Wai and Patan talukas. **(Fig. 3.3.1)**

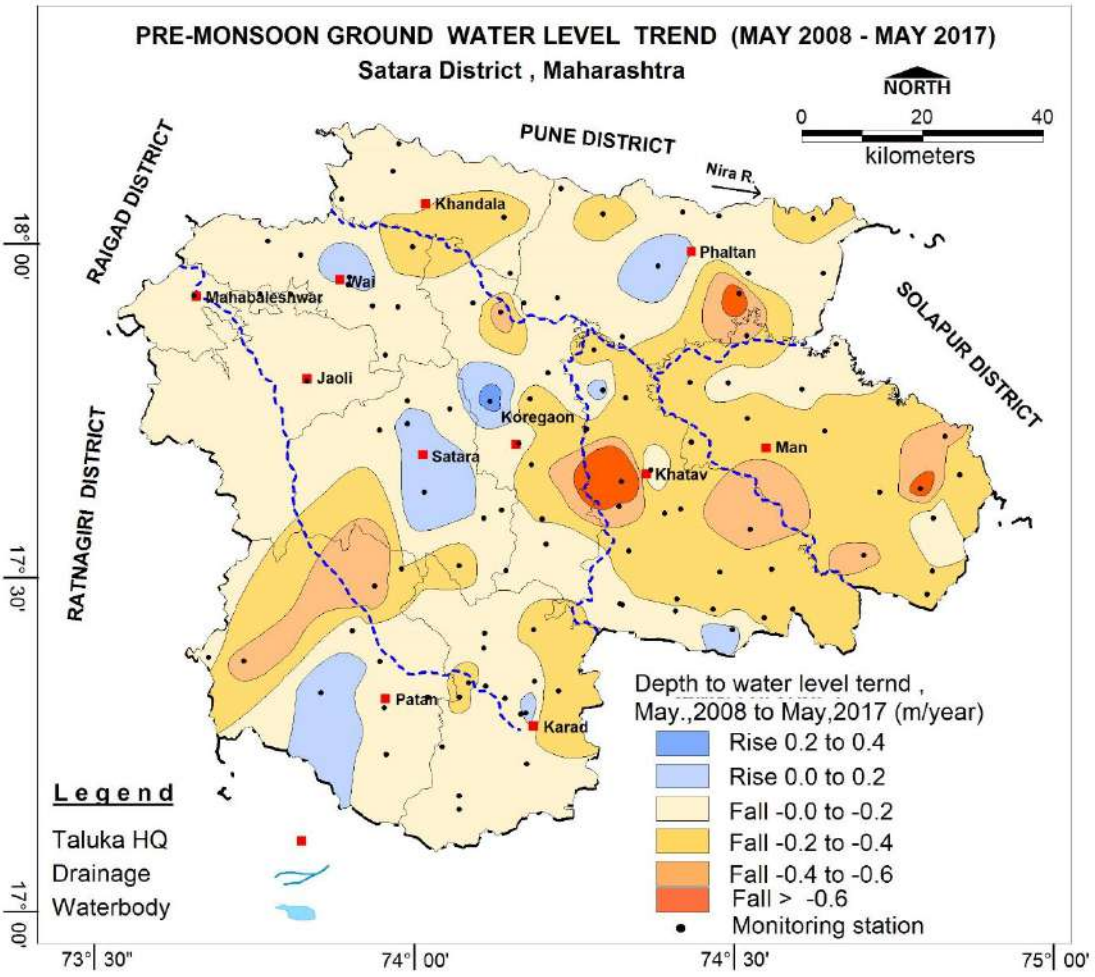


Fig. 3.3.1: Pre-monsoon water level trend (May 2008-May 17)

In Satara district, post monsoon fall in water levels trend has been recorded at 88 stations and it ranges between 0.0005 (Vaduth, Satara taluka) to 1.3407 m/year (Khatav, Khatav taluka) while falling trend was observed in 22 stations varying from0.0376 m/year (Beldare, Karad taluka) to 0.2287 (Chachali, Koregaon taluka). During post-monsoon, declining water level trend has been observed in about 8444 sq km area during 2008-17, i.e., 80 % of the area. Significant decline more than 0.20 m/year has been observed in 1953 sq km, i.e., 18.6 % area covering major part of Man, Khatav, Koregaon and Phaltan talukas and southern portion of the Karad taluka. Rise in water level

trend has been observed in western,northern and southern part of the district covering major part of Mahabaleshwar, Wai, Satara and Patan talukas. **(Fig 3.3.2).**

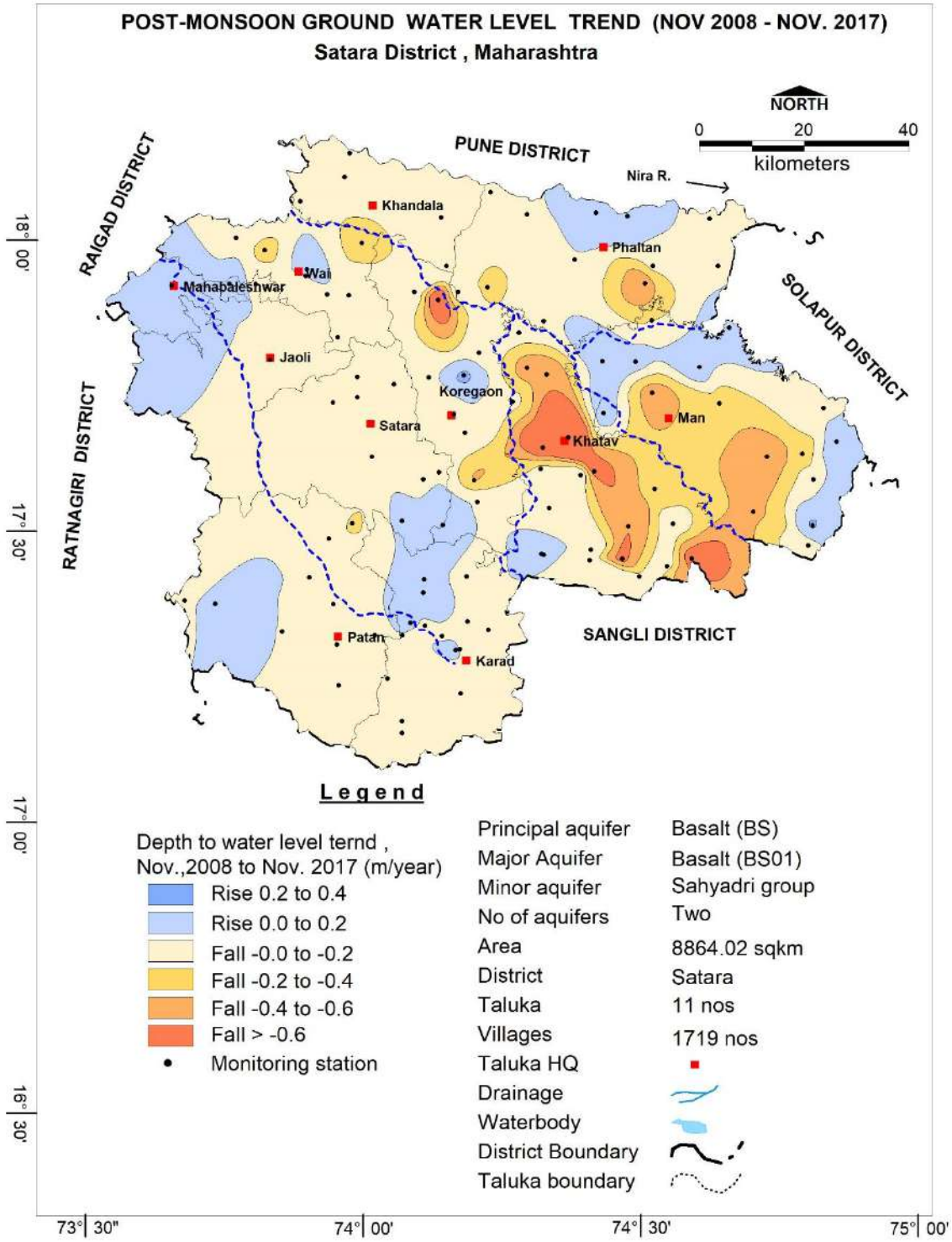


Fig 3.3.2: Postmonsoon water level trend (Nov 2008-Nov. 17)

3.4 Hydrograph Analysis

The variation in short term and long-term water level trends may be due to variation in natural recharge due to rainfall and withdrawal of groundwater for various agricultural activity, domestic requirements and industrial needs. The analysis of hydrographs shows that the annual rising limbs in hydrographs indicate the natural recharge of groundwater regime due to monsoon

rainfall, as the monsoon rainfall is the only natural source of water for recharge to the ground water regime (**Fig. 3.4.1 a to 3.4.9).** However, continuous increase in the groundwater draft is indicated by the recessionary limb.

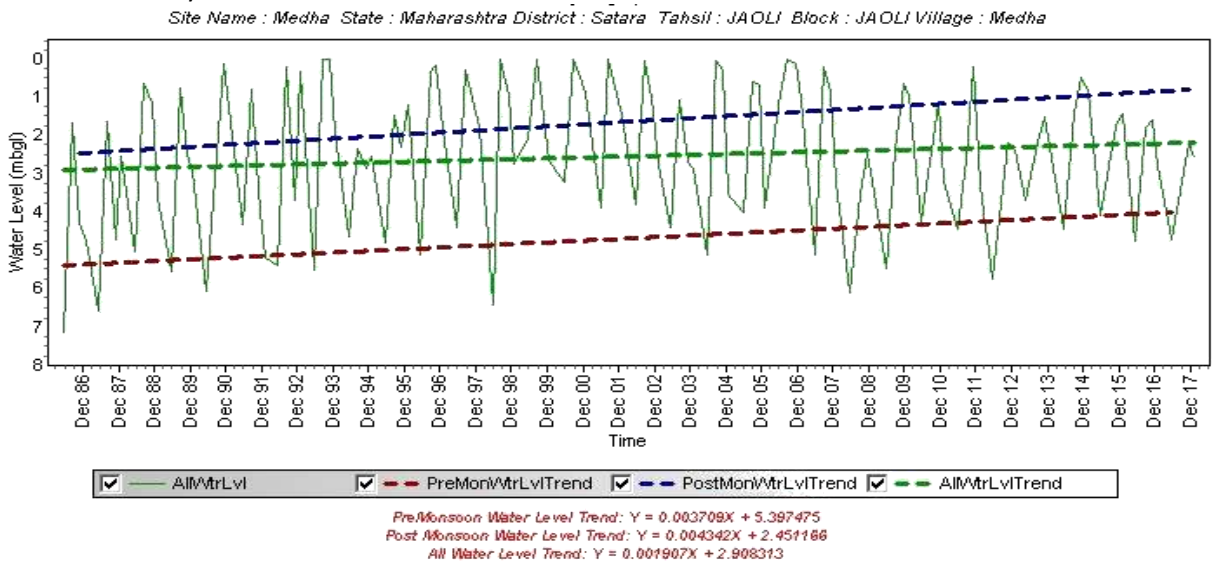


Fig 3.4.1: Hydrograph (2008-17), Medha, Jaoli Taluka

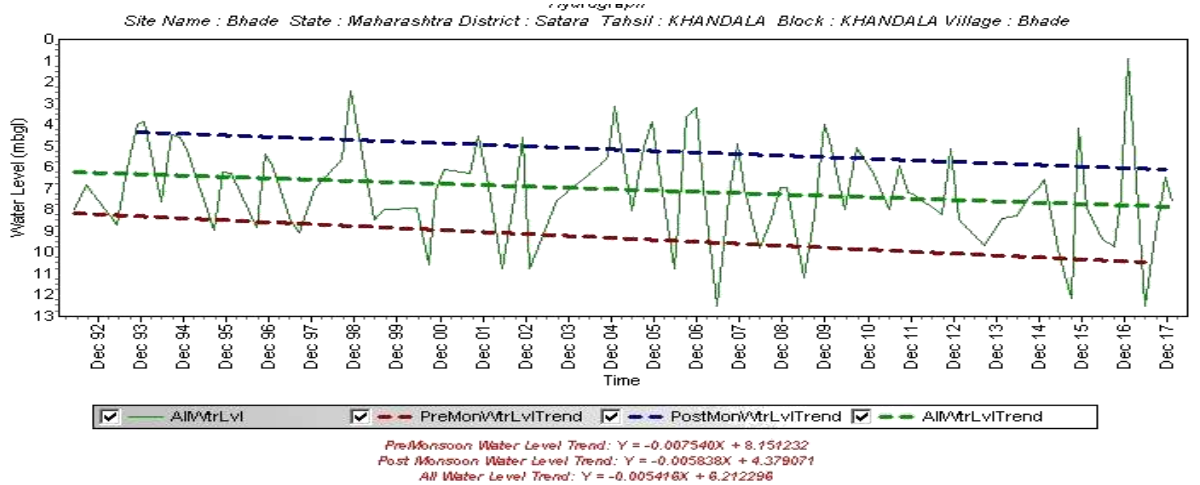


Fig 3.4.2: Hydrograph (2008-17), Bhade, Khandala Taluka

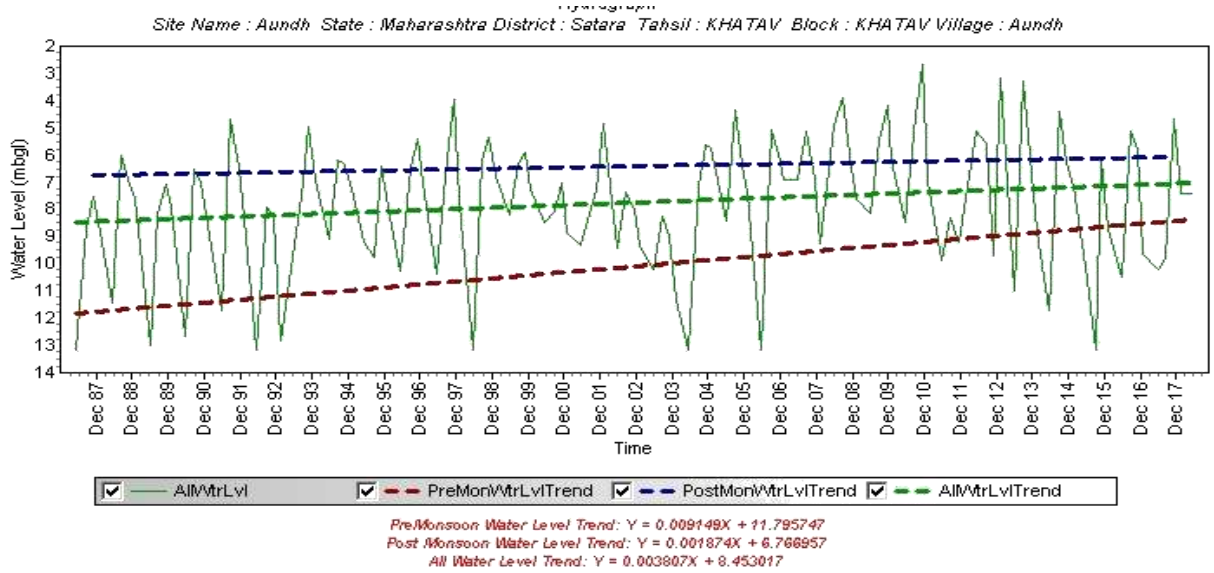


Fig 3.4.3: Hydrograph (2008-17), Aundh, Khatav Taluka

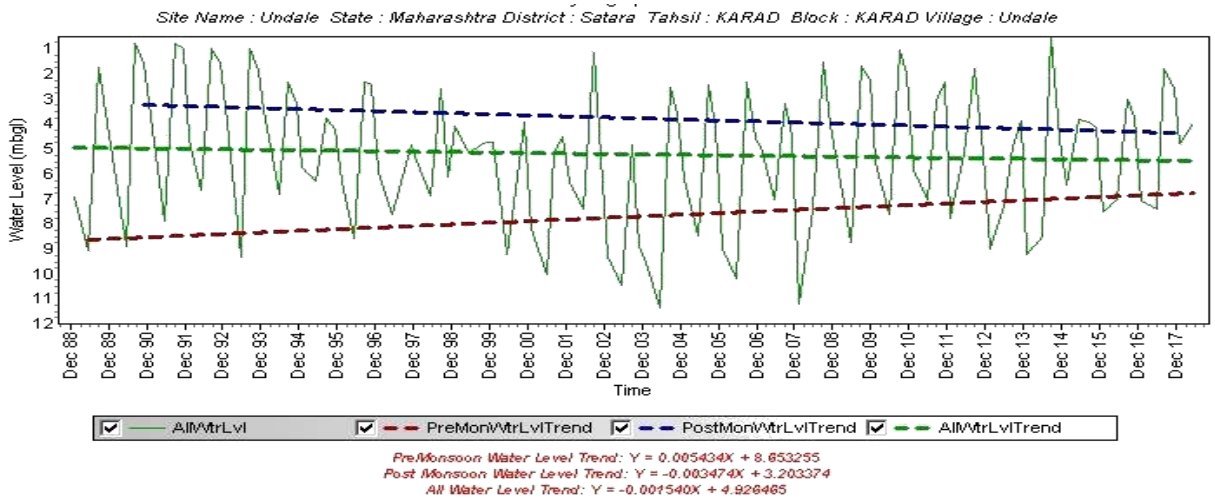


Fig 3.4.4: Hydrograph (2008-17), Undale, Karad Taluka

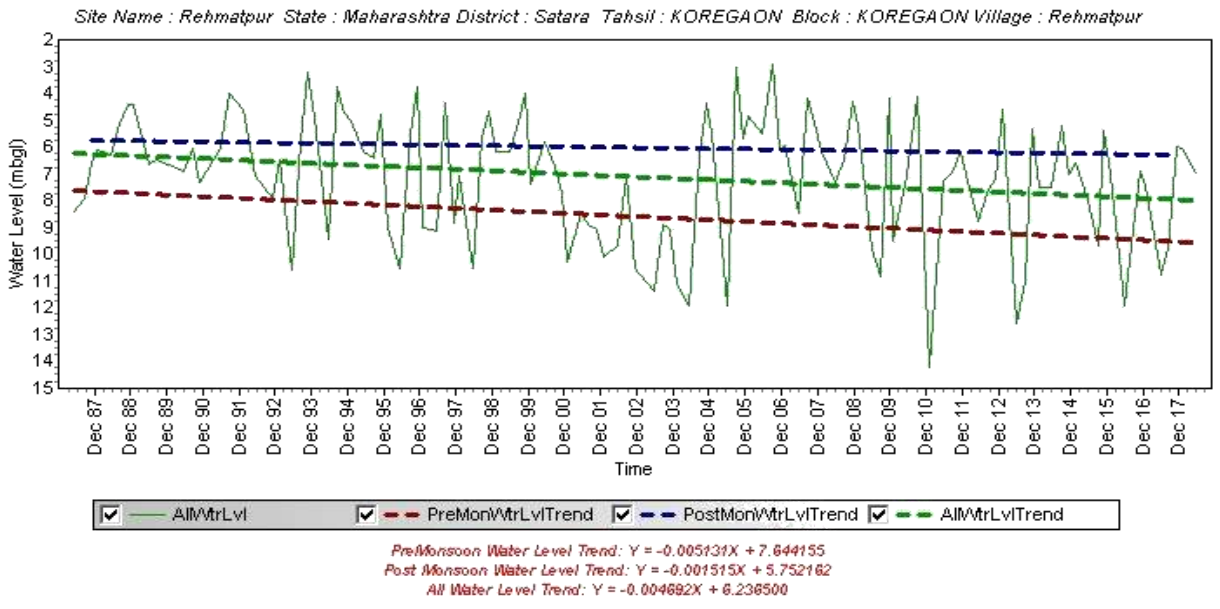


Fig 3.4.5: Hydrograph (2008-17), Rehmatpur, Koregaon Taluka

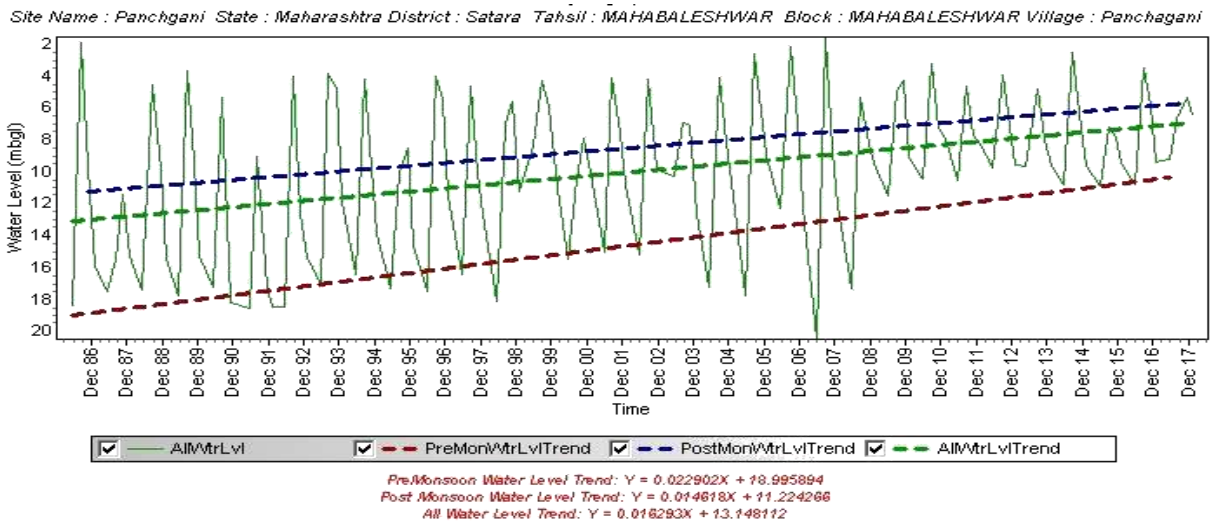


Fig 3.4.6: Hydrograph (2008-17), Pachgani, Mahabaleshwar Taluka

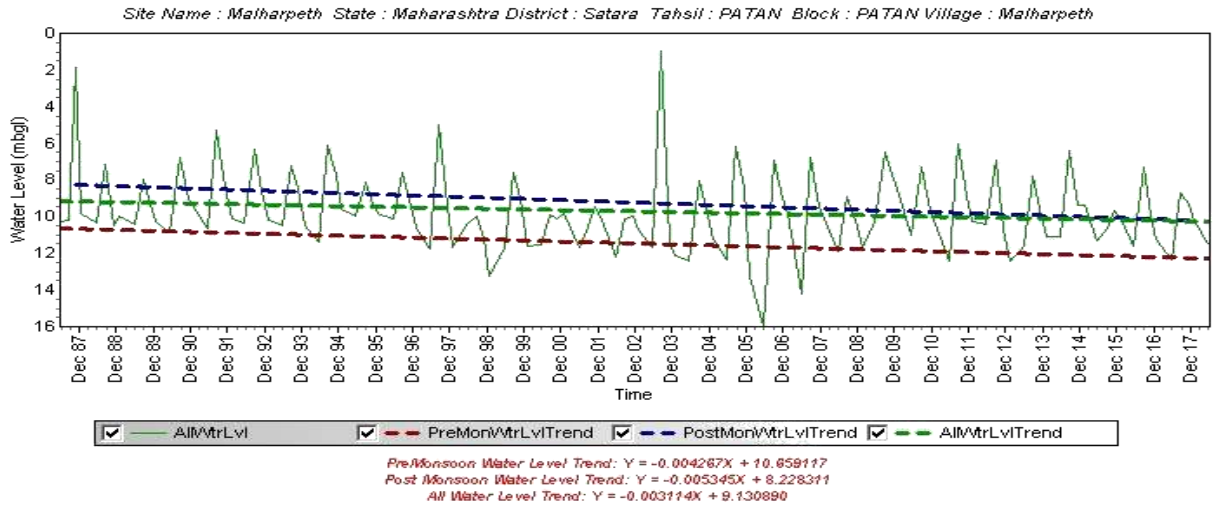


Fig 3.4.7: Hydrograph (2008-17), Malharpeth, Patan Taluka

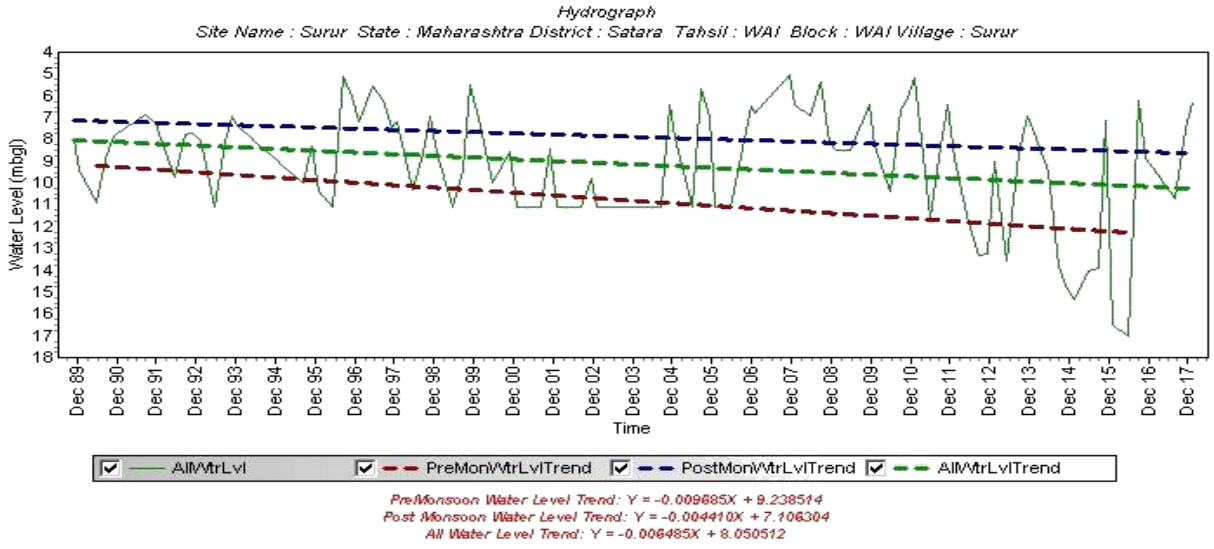


Fig 3.4.8: Hydrograph (2008-17), Kondwe, Satara Taluka

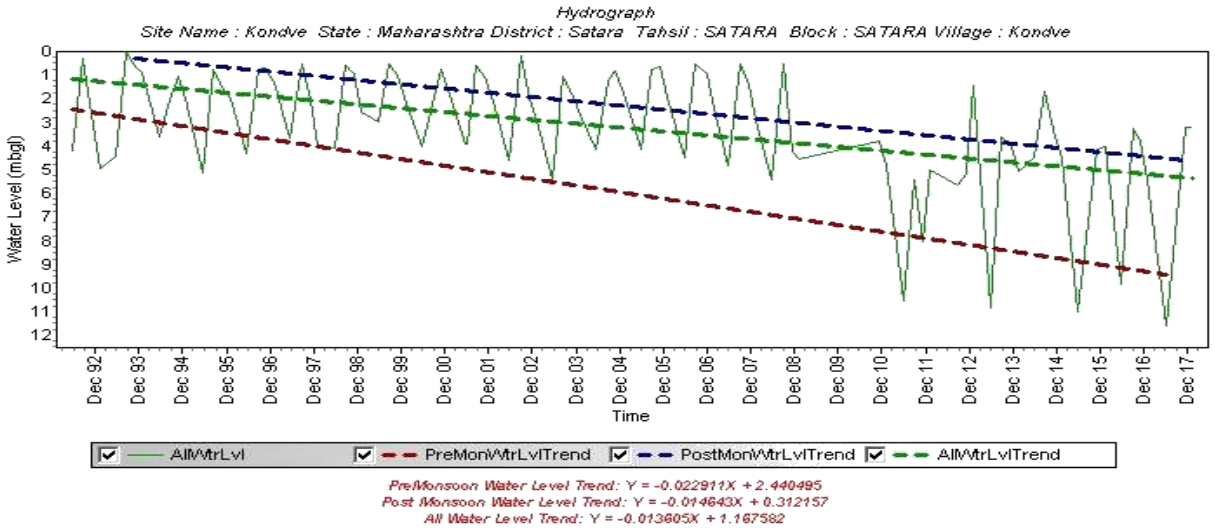


Fig 3.4.9: Hydrograph (2008-17), Surur, Wai Taluka

4.0 GROUND WATER QUALITY

Water sampling is being done every year from GWM wells during pre-monsoon period (May). The data gap analysis has been carried out to find out the adequacy of information on water quality and identified additional locations, 66 for shallow and 8 for deeper aquifers. Ground water quality data of 178 monitoring wells of CGWB and GSDA representing shallow aquifer have been utilised to decipher the quality scenario of shallow aquifer. 94 exploratory wells tubewells / borewells of CGWB and GSDA representing deeper aquifer have been utilised to decipher the quality scenario of deeper aquifer. The aquifer wise ranges of different chemical constituents present in ground water are given in **Table 4.1**. The details of water quality analysis are given in **Annexure IV.**

Table 4.1: Aquifer wise ranges of chemical constituents in Satara district

Constituents	Shallow aquifer		Deeper aquifer	
	Min	Max	Min	Max
pH	7.1	10.1	6.7	9.2
EC	44	11137	75	2000
TDS	99	7128	225	683
TH	24.9	1460	25	840
Calcium	11.2	448	4	330
Magnesium	1.0	107.9	1	76.6
Potassium	0.03	318	0	94
Sodium	1.7	2200	0	365
Bi-carbonate	4.9	585.6	12.2	404
Chloride	7.7	3400	7	270
Sulphate	0.6	1368	0	596.6
Nitrate	0.1	285	0	352
Iron	0.9	27.48	0	145
Fluoride	0	2.5	BDL	2

4.1 Electrical Conductivity (EC)

4.1.1 Distribution of Electrical Conductivity in Shallow Aquifer:

The concentration of EC in shallow aquifer varies between 44 (Matrewadi, Patan taluka) and 11137 µS/cm (Somanthali, Phaltan taluka). Out of 178 samples collected from dug wells, 51 samples are having EC below 500 µS/cm. Western part of the district shows EC less than 750 µS/cm. Major part of rest of the district shows EC in the range of 750-2250 µS/cm. Only 7 samples are having EC more than 2250 µS/cmr around Phaltan, Gokhali, Rajuri & Somanthali, Phaltan taluka, Chitali, Karad taluka, Dhuldeo, Man taluka and Katar Khatav, Khatav taluka. The ground water is potable in southern and south-east part of district. The distribution of electrical conductivity in shallow aquifers is shown in **Fig: 4.1.1** and analytical data is presented in **Table 4.1.1**.

4.1.2 Distribution of Electrical Conductivity in Deeper Aquifer:

The concentration of EC in deep aquifer varies between 6.7 (Kawthe, Wai taluka) and 2000 µS/cm (Shindewadi, Khandala taluka). All 94 samples collected from tube wells/bore wells are having EC in less than of 2250 µS/cm. The ground water is potable in major parts of the district. The distribution of electrical conductivity in deeper aquifers is shown in **Fig: 4.1.2** and analytical data is presented in **Table 4.1.1**.

Table 4.1.1: Aquifer wise Electrical conductivity data

S. No.	EC (µS/cm)	shallow aquifer		Deeper Aquifer	
		No. of samples	% of samples	No. of samples	% of samples
1	< 250	11	6.18	2	2.13
2	>250-750	100	56.18	59	62.77
3	>750-2250	60	33.71	33	35.11

S. No.	EC (µS/cm)	shallow aquifer		Deeper Aquifer	
		No. of samples	% of samples	No. of samples	% of samples
4	2250-3000	2	1.12	0	0
5	3000-7500	4	2.25	0	0
6	>7500	1	0.56	0	0
Total samples		**178**		**94**	

4.2 Nitrate:

Nitrogen in the form of dissolved nitrate nutrient for vegetation, and the element is essential to all life. The major contribution in ground water is from sewage, waste disposal, nitrate fertilizer and decaying of organic matter. In Satara district nitrate concentration varies between 0.1 to 285 mg/l (Mhaswad, Man Taluka). As per BIS (2012) the desirable limit is 45 mg/l. In shallow aquifer, 178 samples were analysed, out of this 49 water samples show the nitrate concentration exceeded the desirable limit of 45 mg/l. The high concentration of Nitrate may be due to domestic waste and sewage in the urban and rural parts of district. In deeper aquifer, nitrate concentration varies between neglegible to 352 mg/l (Shindewadi, Karad Taluka). Out of 86 water samplesanalysed, 29 water samples show that the nitrate concentration exceeded the desirable limit of 45 mg/l. The deeper aquifer are also affected by nitrate contamination, it may be due to percolation of nitrate contaminants from the ground surface as there are no other reasons for nitrate contamination in deeper aquifers. Aquifer wise nitrate concentration is given in **table 4.3**.

4.3 Fluoride:

In shallow aquifer, concentration of fluoride ranges from 0.02 (at Dhawadi, Wai Taluka) to 3.7 mg/l (at Gatewadi (dhakani), Man Taluka). Out of 178 samples analyzed, only 10 samples show fluoride concertation more than 1 mg/l. In shallow aquifer, the highest concentration of fluoride is found in Gatewadi (dhakani) village, Man taluka (3.7 mg/l). In Deeper Aquifer, concentration of fluoride ranges from from below detection limit (BDL) to 2 mg/l (at Kadve, Satara Taluka). Out of 82 samples analysed, only 6 samples show fluoride concertation more than 1 mg/l. In Deeper aquifer, the highest concentration of fluoride is found in Kadve village, Satara taluka (2.0 mg/l). Fluoride concentration more than permissible limit is observed in ground water samples from deeper aquifer at Kadve, Satara taluka and Andhali, Man taluka and ground water from deeper aquifer may be used with caution for drinking water. This high concentration of fluoride may be due to the lithological reason only. Aquifer wise fluoride concentration is given in **Table 4.1.2**.

Table 4.1.2: Aquifer wise nitrate and Fluoride concentration in Satara district

	No_3 > 45 mg/l		**fluoride >1 mg/l**	
Taluka	No of samples Shallow Aquifer	No of samples Deeper Aquifer	No of samples Shallow Aquifer	No of samples Deeper Aquifer
Javli medha	1			
Karad	6	3		1
Khandala	2	10		
Khatav vaduj	3	3	2	
Koregaon	4	2		2
Mahableshwar	1			
Man dahiwadi	8		3	1
Patan	2		2	
Phaltan	5	5	3	
Satara	4	4		2
Wai	3	2		
Grand Total	**39**	**29**	**10**	**6**

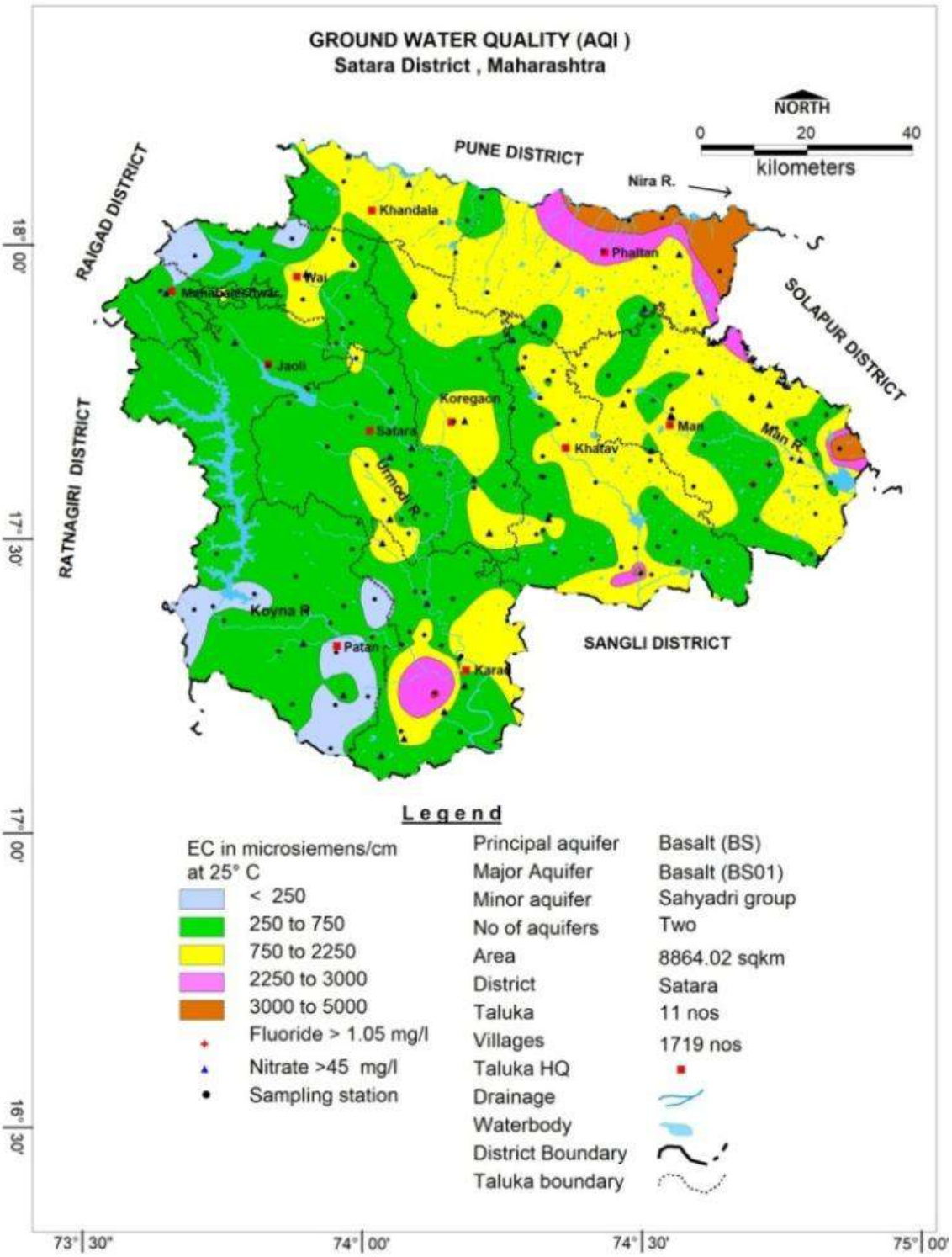


Fig. 4.1.1: Ground water quality, Aquifer-I

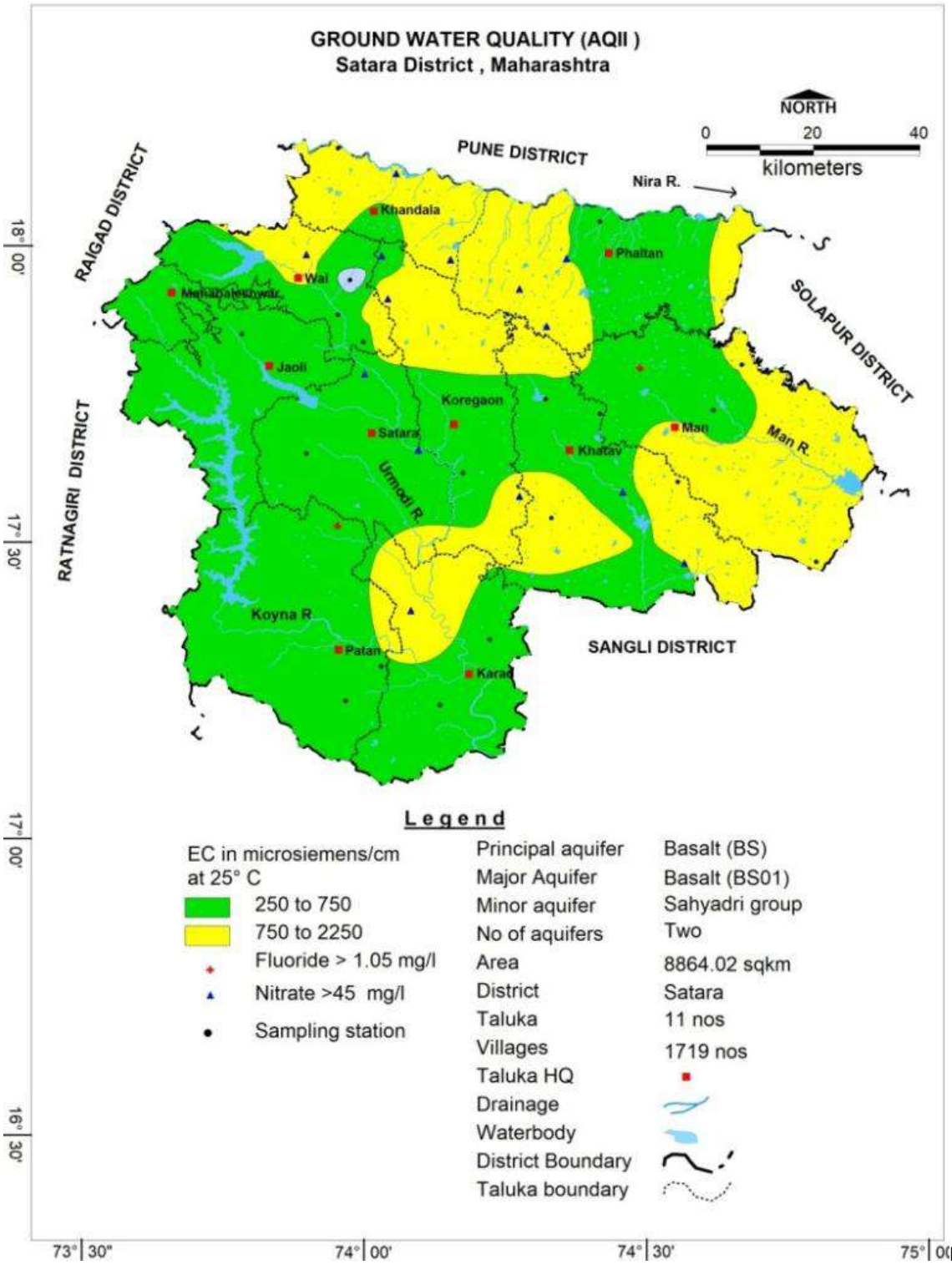


Fig. 4.1.2: Ground water quality, Aquifer-II

4.4 Suitability of ground water for drinking purpose

In shallow aquifer, only 4.88 % samples are having TDS concentration more than maximum permissible limit (MPL) of 2000 mg/l and 27.64 % of samples have TDS concentration above the Desirable limit (DL) but below the MPL. It is also seen that about very few samples have parameters like TH, Ca, Mg, Cl, SO_4 and NO_3 beyond the maximum permissible limit for drinking, indicating that the water is not suitable for drinking purpose. Samples from shallow aquifer of Mhaswad and Dhuldeo villages, Man Taluka, Rajuri and Somanthali villages, Phaltan Taluka and Katar Khatav,

Khatav Taluka have more than one parameter like TH, Ca, Mg, Cl, SO_4, F and NO_3 beyond the maximum permissible limit for drinking, indicating water from such area is not fit for drinking purpose if directly consumed without treatment. Concentration of Chemical constituents in shallow Aquifer is given in **Table 4.2.1**.

In Deeper aquifer, samples from Chandaydewadi, Sonwadisupe, Rui & Sherechiwadi, Baramati taluka, Ranjangaon, Shirur taluka, Rakh, Purandhar taluka and NhaviSanaas, Haveli taluka have more than one parameter like TH, Ca, Mg, Cl, SO_4 and NO_3 beyond the maximum permissible limit for drinking, indicating water from such area is not fit for drinking purpose if directly consumed without treatment. Concentration of Chemical constituents in shallow Aquifer is given in **Table 4.2.2**.

Table 4.2.1: Concentration of Chemical constituents in shallow Aquifer

Parameter	Drinking water Standards (IS-10500-2012)		Total no of ground water samples	Shallow aquifer					
				Samples (<DL)		Samples (DL-MPL)		Samples (>MPL)	
	DL	MPL		No	%	No	%	No	%
pH	6.5-8.5	-	133	-	-	129	96.99	4	3.01
TDS	500	2000	123	83	67.48	34	27.64	6	4.88
TH	300	600	178	126	70.79	48	26.97	4	2.25
Ca (mg/L)	75	200	178	94	52.81	78	43.82	6	3.37
Mg (mg/L)	30	100	178	128	71.91	49	27.53	1	0.56
Cl (mg/L)	250	1000	178	160	89.89	16	8.99	2	1.12
SO_4 (mg/L)	200	400	178	166	93.26	9	5.06	3	1.69
NO_3 (mg/L)	45	No relax	178	139	78.09	-	-	39	21.91
Fe (mg/L)	0.3	1	178	147	82.58	29	16.29	2	1.12
F (mg/L)	1	1.5	178	168	94.38	8	4.49	2	1.12

(Here, DL- Desirable Limit, MPL- Maximum Permissible Limit)

Table 4.2.2: Concentration of Chemical constituents in Deeper Aquifer

Parameter	Drinking water Standards (IS-10500-2012)		Total no of ground water samples	Deeper aquifer					
				Samples (<DL)		Samples (DL-MPL)		Samples (>MPL)	
	DL	MPL		No	%	No	%	No	%
pH	6.5-8.5	-	94	-	-	84	89.36	10	10.64
TDS	500	2000	43	42	97.67	1	2.33	0	0
TH	300	600	90	71	78.89	16	17.78	3	3.33
Ca (mg/L)	75	200	77	65	84.42	9	11.69	3	3.9
Mg (mg/L)	30	100	72	20	27.78	52	72.22	0	0
Cl (mg/L)	250	1000	71	67	94.37	4	5.63	0	0
SO_4 (mg/L)	200	400	66	64	96.97	0	0	2	3.03
NO_3 (mg/L)	45	No relax	86	57	66.28	-	-	29	33.72
Fe (mg/L)	0.3	1	94	72	76.60	8	8.51	14	14.89
F (mg/L)	1	1.5	82	76	92.68	3	3.66	3	3.66

(Here, DL- Desirable Limit, MPL- Maximum Permissible Limit)

4.5 Suitability of ground water for irrigation

The water used for irrigation is an important factor in productivity of crop, its yield and quality of irrigated crops. The quality of irrigation water depends primarily on the presence of dissolved salts and their concentrations. The Electrical Conductivity (EC), Sodium Absorption Ratio (SAR) and Residual Sodium Carbonate (RSC) are the most important quality criteria, which influence the water quality and its suitability for irrigation.

4.5.1 Electrical Conductivity (EC)

The amount of dissolved ions in the water is best represented by the parameter electrical conductivity. The classification of water for irrigation based on the EC values is given in **Table 4.3.1** and discussed as follows: -

Low Salinity Water (EC: 100-250 µS/cm): This water can be used for irrigation with most crops on most soils with little likelihood that salinity will develop.

Medium Salinity Water (EC: 250 – 750 µS/cm): This water can be used if moderate amount of leaching occurs. Plants with moderate salt tolerance can be grown in most cases without special practices for salinity control.

High Salinity Water (EC: 750 – 2250 µS/cm): This water cannot be used on soils with restricted drainage. Even with adequate drainage, special management for salinity control may be required and plants with good salt tolerance should be selected.

Very High Salinity Water (EC: >2250 µS/cm): This water is not suitable for irrigation under ordinary condition. The soils must be permeable, drainage must be adequate, irrigation water must be applied in excess to provide considerable leaching and very salt tolerant crops should be selected.

Table 4.3.1: Classification of Ground water for Irrigation based on EC values

sl.	Water Quality Type	EC in µS/cm	shallow aquifer		Deeper Aquifer	
			No. of samples	% of samples	No. of samples	% of samples
1	Low Salinity Water	< 250	11	6.18	2	2.13
2	Medium Salinity Water	250 to 750	100	56.18	59	62.77
3	High Salinity Water	750 to 2250	60	33.71	33	35.11
4	Very High Salinity Water	> 2250	7	3.93	0	0
		Total	**178**		**94**	

In shallow as well as deeper aquifer, maximum numbers of samples fall under the category of medium to high salinity type of water. In general, Plants with moderate salt tolerance can be grown in most cases and special management for salinity control may be required and plants with good salt tolerance should be selected. In shallow aquifer around Phaltan, Gokhali, Rajuri & Somanthali, Phaltan taluka, Chitali, Karad taluka, Dhuldeo, Man taluka and Katar Khatav, Khatav taluka, very high salinity prevails (>2250 µS/cm) and around this area ground water can be used for irrigation for very high salt tolerant crops and with proper soil and crop management practices. No sample from deeper aquifer recorded very high salinity.

4.5.2 Sodium Absorption Ratio (SAR)

Since Calcium and Magnesium will replace Sodium more readily than vice versa, the ratio reflects the Sodium hazard. The SAR indicates the relative activity of the Sodium ions in exchange reactions with the soil. The main problem with high sodium concentration is its effect on soil permeability; hardening of soil & water irrigation system. Sodium also contributes directly to the total salinity of the water and may be toxic to sensitive crops such as fruit trees. The higher value of SAR indicates soil structure damage.

It is observed that Sodium hazard is not present in ground water of the area in shallow as well as deeper aquifer, and as per SAR values, the water is suitable for irrigation. In shallow aquifer, out of 178 samples, 174 (97.75) samples are having SAR less than 10 in **'Good'** and **'Good to Permissible' category**. Only around Gokhali and Somanthali villages in Phaltan Taluka, Sodium hazard is present ground water and around this village the ground water is unsuitable for irrigation.

While in deeper aquifer, 97.1% samples are having SAR value less than 10 in '**Good' category'**. Only around Shindewadi village in Phaltan Taluka, Sodium hazard is likely to be present

ground water and around this village the ground water is 'doubtful' to be suitable for irrigation.

The classification of ground water samples based on SAR values for its suitability for irrigation purpose is shown in **Table 4.3.2.**

Table 4.3.2: Classification of Ground water for Irrigation based on SAR values

Characteristics	Quality	SAR value							
		< 10		10-18		18-26		> 26	
		Good		Good to Permissible		Doubtful		Bad (Unsuitable)	
	Total No of GW samples	No. of Samples %		No. of Samples %		No. of Samples %		No. of Samples %	
Shallow Aquifer	178	174	97.75	2	1.12	1	0.56	1	0.56
Deeper Aquifer	69	67	97.10	2	2.90	0	0	0	0
Total	**247**	**241**	**97.57**	**4**	**1.62**	**1**	**0.40**	**1**	**0.40**

4.5.3 Residual Sodium Carbonate (RSC):

Residual Sodium Carbonate (RSC) is considered to be superior to SAR as a measure of sodacity particularly at low salinity levels. Calcium reacts with bi-carbonate and precipitate as $CaCO_3$. Magnesium salt is more soluble and so there are fewer tendencies for it to precipitate. When calcium and magnesium are lost from the water, the proportion of sodium is increased resulting in the increase in sodium hazard. This hazard is evaluated in terms of RSC. The classification of ground water samples based on RSC values for its suitability for irrigation purpose is shown in **Table 4.3.3.**

Table-4.3.3: Classification of Ground water for Irrigation based on RSC values.

Characteristics	Quality	RSC values (meq/L)					
		< 1.25		1.25-2.50		> 2.50	
		Good		Doubtful		Bad (Unsuitable)	
	Total No of GW samples	No. of Samples %		No. of Samples %		No. of Samples %	
Shallow Aquifer	178	172	96.63	2	1.12	4	2.25
Deeper Aquifer	67	61	91.04	3	4.48	3	4.48
Total	**280**	**233**	83.21	**5**	1.79	**7**	2.5

In shallow aquifer, it is observed that in general, the ground water of the area is suitable for irrigation as 96.63 % samples show RSC values less than 1.25 meq/l. Only 1.12% samples show RSC values between 1.25 meq/l and 2.50 meq/l, at Karad, Karad taluka and Marde, Satara taluka and 2.25% samples show RSC values more than 2.50 meq/l at Valai & Vavarhire, Man taluka and Gokhali & Phaltan, Phaltan taluka - ground water of the these areas is not suitable for irrigation.

Ground water of deeper aquifer of the area, in general, is suitable for irrigation as 88.24 % samples show RSC values less than 1.25 meq/l. Only 2.25% samples show RSC values more between 1.25 meq/l and 2.50 meq/l, at Dhamner, Phaltan taluka and 4.5% samples show RSC values more than 2.50 meq/l at Shindewadi, Phaltan taluka - ground water of these areas is not suitable for irrigation.

5.0 GROUND WATER RESOURCES

5.1 Ground Water Resources – Aquifer-I

Central Ground Water Board and Groundwater Survey and Development Agency (GSDA), Govt. of Maharashtra, have jointly estimated the ground water resources of Satara district based on GEC-97 methodology. Taluka wise ground water resources are given in **Table 5.1.1**, and graphical

representations of the resources on the map are shown in **Figure-5.1.1**.

Table 5.1.1: Ground water resources, Aquifer-I (Shallow aquifer), Satara district (2013)

Administrative Unit	Command / Non-Command / Total	Net Annual Ground Water Availability	Existing Gross Ground Water Draft for irrigation	Existing Gross Ground Water Draft for domestic and industrial water supply	Existing Gross Ground Water Draft for All uses	Provision for domestic and industrial requirement supply to 2025	Net Ground Water Availability for future irrigation development	Stage of Ground Water Development %
Jaoli	Command	139.70	63.43	6.36	69.79			
Jaoli	Non Command	3284.68	1437.73	280.20	1717.93			
Jaoli	Total	3424.38	1501.16	286.56	1787.71	639.82	2172.04	52.21 / Safe
Karad	Command	1610.45	1662.51	185.06	1847.57			
Karad	Non Command	8639.59	5463.14	761.82	6224.96			
Karad	Total	10250.04	7125.65	946.88	8072.53	1838.54	1285.86	78.76 / Safe
Khandala	Command	692.73	111.16	6.91	118.06			
Khandala	Non Command	4545.56	3166.52	172.55	3339.07			
Khandala	Total	5238.29	3277.68	179.46	3457.14	370.65	1931.65	66.00 / Safe
Khatav	Command	502.65	627.74	87.68	715.42			
Khatav	Non Command	12858.07	10697.70	500.98	11198.7			
Khatav	Total	13360.72	11325.44	588.66	11914.1	1125.68	909.60	89.17 / Critical
Koregaon	Command	3711.31	2268.99	239.42	2508.41			
Koregaon	Non Command	8220.05	6274.63	241.70	6516.33			
Koregaon	Total	11931.36	8543.62	481.12	9024.74	988.11	2498.57	75.64 / Safe
Mahabaleshwar	Command							
	Non Command	262.30	198.71	20.28	218.99			
	Total	262.30	198.71	20.28	218.99	37.09	50.50	83.49 / Safe
Man	Command	163.32	161.28	18.10	179.38			
Man	Non Command	16462.94	12348.87	585.83	12934.7			
Man	Total	16626.26	12510.15	603.94	13114.1	1220.08	2903.84	78.88 / Safe
Patan	Command							
Patan	Non Command	2705.32	1467.31	369.80	1837.11			
Patan	Total	2705.32	1467.31	369.80	1837.11	685.63	552.38	67.91 / Safe
Phaltan	Command	6057.13	4829.87	205.27	5035.14			
Phaltan	Non Command	8567.82	7656.86	268.86	7925.72			
Phaltan	Total	14624.96	12486.73	474.13	12960.9	869.39	919.33	88.62 / Safe
Satara	Command	5921.83	3544.13	355.76	3899.90			
Satara	Non Command	7317.98	3747.80	373.81	4121.60			
Satara	Total	13239.81	7291.93	729.57	8021.50	1309.03	3863.61	60.59 / Safe
Wai	Command	2812.45	2456.62	141.86	2598.48			
Wai	Non Command	4775.71	3636.96	250.68	3887.64			
Wai	Total	7588.16	6093.58	392.54	6486.12	736.44	672.93	85.48 / Safe
Total (ham)		**99251.6**	**71821.96**	**5072.94**	**76894.89**	**9820.46**	**17760.31**	**77.47 / Safe**
Total (MCM)		**992.52**	**718.22**	**50.73**	**768.95**	**98.2**	**177.6**	

Ground Water Resources estimation was carried out for 8775.07 sq. km. area out of which

743.26 sq. km. is under command and 8031.81 sq. km. is non-command. No area has poor ground water quality area. As per the estimation, the net annual ground water availability comes to be 992.52 MCM. The gross draft for all uses is estimated at 768.95 MCM with irrigation sector being the major consumer having a draft of 718.22 MCM. The domestic and industrial water requirements are worked at 50.79 MCM. The net ground water availability for future irrigation is estimated at 177.6 MCM. Stage of ground water development varies from 52.21% (Jaoli taluka) to 89.17 % (Khatav taluka). The overall stage of ground water development for the district is 77.47%. Taluka wise assessments indicate that all the talukas except Khatav taluka in the district fall under "Safe" category. Khatav taluka falls under "Semi Critical" category.

5.2 Ground Water Resources – Aquifer-II

The ground water resources of Aquifer-II (Basalt) were also assessed to have the correct quantification of resources so that proper management strategy can be framed. The total resources of aquifer-II have been estimated as 135.56 mcm. Taluka wise summarized Ground Water Resources of Aquifer-II is given in T**able 5.2.1**.

Table 5.2.1: Taluka wise summarized Ground Water Resources of Aquifer-II (Deeper aquifer)

Taluka	mean thickness (m)	Area (sqkm)	Piezometric head (m)	Sy	S	Resource above confining layer (MCM)	Resource in confining aquifer (MCM)	Total Resource (MCM)
Jaoli	0.75	1.45313	35	0.005	0.00012	0.0061	0.0054	0.0116
Jaoli	0.75	89.0131	25	0.0025	0.00036	0.7944	0.1669	0.9613
Jaoli	2	443.883	30	0.0025	0.00026	3.4223	2.2194	5.6418
Jaoli	5	0.527005	20	0.005	0.00012	0.0013	0.0132	0.0144
Jaoli	5	17.7127	15	0.0025	0.00016	0.0417	0.2214	0.2631
Karad	0.75	1.72705	25	0.005	0.00016	0.0068	0.0065	0.0133
Karad	2	414	35	0.005	0.00012	1.7388	4.1400	5.8788
Karad	5	433.978	25	0.0025	0.00036	3.8733	5.4247	9.2980
Karad	5	9.13838	30	0.0025	0.00026	0.0705	0.1142	0.1847
Karad	8.75	24.9892	20	0.005	0.00012	0.0600	1.0933	1.1533
Khandala	2	455.51	15	0.0025	0.00016	1.0727	2.2776	3.3503
Koregaon	0.75	93.0232	25	0.005	0.00016	0.3651	0.3488	0.7140
Koregaon	2	306.6	30	0.0025	0.00026	2.3639	1.5330	3.8969
Koregaon	5	374.265	20	0.005	0.00012	0.8982	9.3566	10.2549
Koregaon	8.75	8.98608	15	0.0025	0.00016	0.0212	0.1966	0.2177
Koregaon	8.75	3.86484	25	0.005	0.00016	0.0152	0.1691	0.1843
Mahableshwar	0.75	3.50971	30	0.0025	0.00026	0.0271	0.0066	0.0336
Mahableshwar	2	57.425	30	0.0025	0.00026	0.4427	0.2871	0.7299
Patan	0.75	337.134	15	0.0025	0.00016	0.7940	0.6321	1.4261
Patan	2	542.24	25	0.005	0.00016	2.1283	5.4224	7.5507
Patan	5	48.3679	30	0.0025	0.00026	0.3729	0.6046	0.9775
Patan	5	3.2589	20	0.005	0.00012	0.0078	0.0815	0.0893
Khatav	0.75	0.511264	25	0.005	0.000157	0.0020	0.0019	0.0039
Khatav	2	205	30	0.0025	0.000257	5.6151	3.6414	9.2565
Khatav	5	3.38621	20	0.005	0.00012	0.0081	0.0847	0.0928
Khatav	5	21.941	15	0.0025	0.000157	0.0517	0.2743	0.3259
Khatav	5	3.06048	25	0.005	0.000157	0.0120	0.0765	0.0885
Khatav	5	390.741	30	0.0025	0.000257	3.0126	4.8843	7.8969
Khatav	8.75	80.7868	20	0.005	0.00012	0.1939	3.5344	3.7283
Khatav	8.75	40.5438	15	0.0025	0.000157	0.0955	0.8869	0.9824
Man	0.75	30.21	35	0.005	0.00012	0.1270	0.1130	0.2400
Man	2	950.69	25	0.0025	0.000357	8.4850	4.7530	13.2380
Man	5	46.85	30	0.0025	0.000257	0.3610	0.5860	0.9470
Man	5	9.58	20	0.005	0.00012	0.0230	0.2390	0.2620
Man	5	350.31	15	0.0025	0.000157	0.8250	4.3790	5.2040

Taluka	mean thickness (m)	Area (sqkm)	Piezometric head (m)	Sy	S	Resource above confining layer (MCM)	Resource in confining aquifer (MCM)	Total Resource (MCM)
Man	8.75	37.99	25	0.005	0.000157	0.1490	1.6620	1.8110
Phaltan	2	856.19	30	0.005	0.00025	6.4210	8.5620	14.9830
Phaltan	5	247.34	25	0.0025	0.000157	0.9710	3.0920	4.0630
Satara	0.75	79.09	25	0.0025	0.000157	0.3100	0.1480	0.4590
Satara	2	396.68	30	0.005	0.00012	1.4280	3.9670	5.3950
Satara	5	0.04	20	0.0025	0.000357	0.0003	0.0010	0.0010
Satara	5	250.25	15	0.005	0.000157	0.5890	6.2560	6.8460
Satara	8.75	17.28	25	0.005	0.00012	0.0520	0.7560	0.8080
Wai	0.75	35.15	30	0.0025	0.000357	0.3760	0.0660	0.4420
Wai	0.75	25.62	20	0.0025	0.000157	0.0800	0.0480	0.1280
Wai	2	451.24	15	0.005	0.00012	0.8120	4.5120	5.3250
Wai	5	12.14	20	0.0025	0.000157	0.0380	0.1520	0.1900
						48.5624	86.9974	135.5625

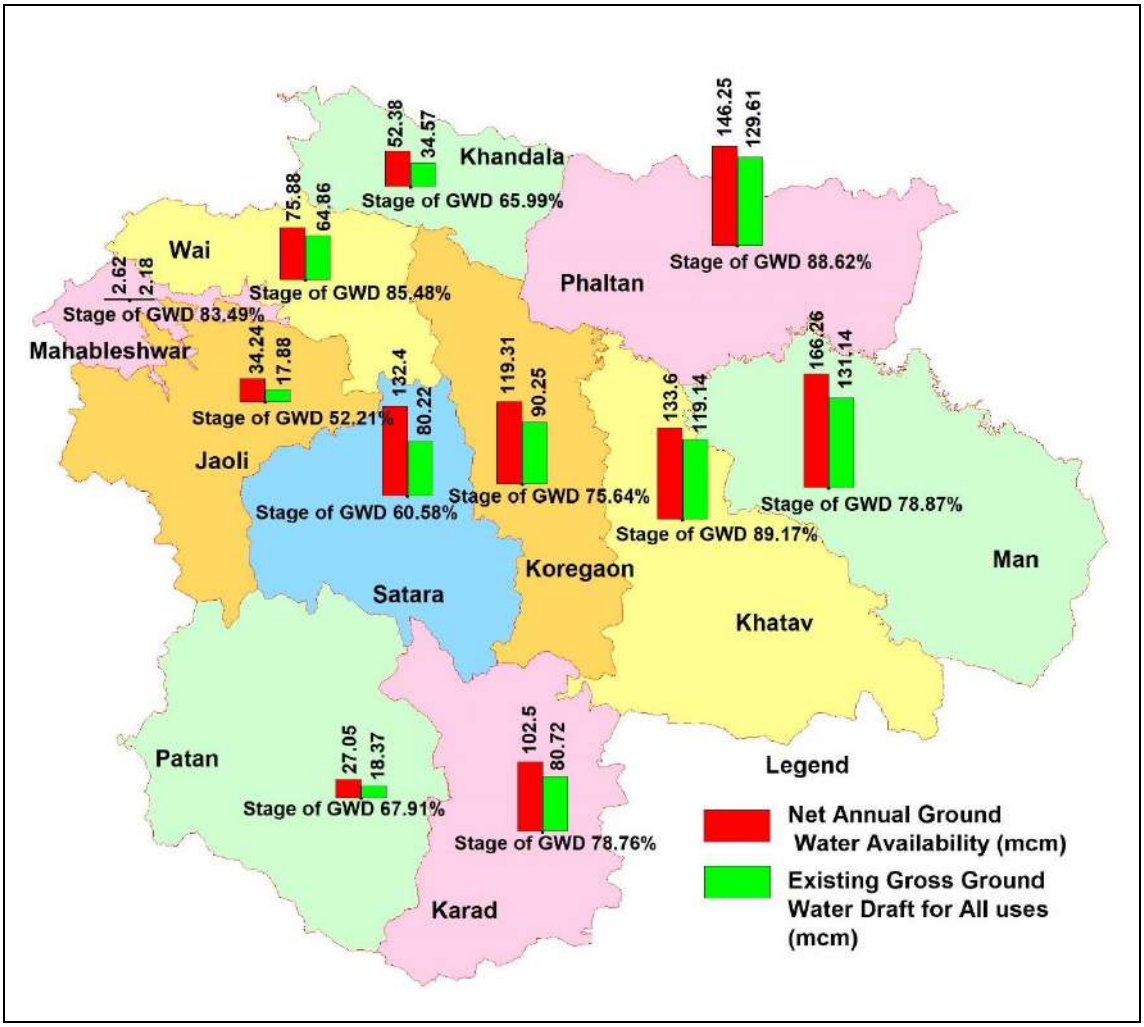


Fig 5.1.1: Ground Water Resources, Satara district

6.0 GROUND WATER RELATED ISSUES

6.1 Declining Water Levels

During pre-monsoon, declining water level trend has been observed in about 9839 sq km area during 2008-17, i.e., 93 % of the area **(Fig. 6.1.1)**. Significant decline more than 0.20 m/year has been observed in 4137 sq km, i.e., 40 % area covering major part of Man, Khatav, Phaltan, Patan and Khandala talukas and southern portion of the Karad taluka. Rise in water level trend has been observed in central part of the district covering major part of Satara, Wai and Patan talukas.

In Satara district, post monsoon fall in water levels trend has been in about 8444 sq km area during 2008-17, i.e., 80 % of the area **(Fig. 6.1.1)**. Significant decline more than 0.20 m/year has been observed in 1953 sq km, i.e., 18.6 % area covering major part of Man, Khatav, Koregaon and Phaltan talukas and southern portion of the Karad taluka. Rise in water level trend has been observed in western, northern and southern part of the district covering major part of Mahabaleshwar, Wai, Satara and Patan talukas.

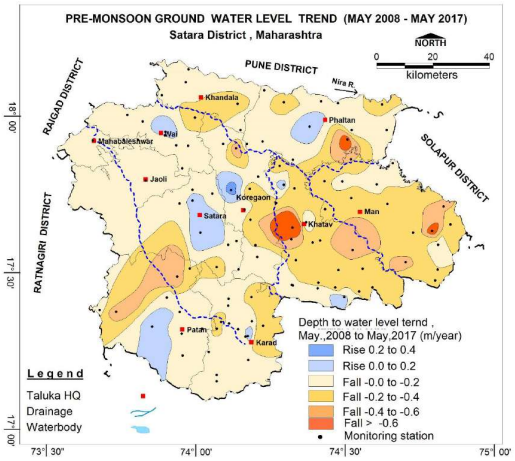


Fig 6.1.1 Pre monsoon Fall @.0.2/year 829 Sq km

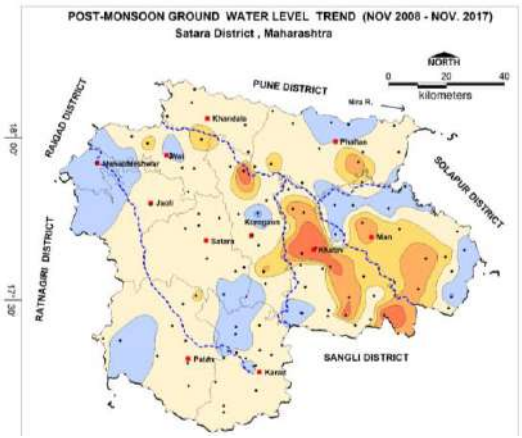


Fig 6.1.2. Postmonsoon Fall @.0.2/year 1454 Sq km

6.2 Low Rainfall and Droughts

The average annual rainfall for the last twenty and ten years when compared with the normal annual rainfall (**Fig 6.2.1**), It is observed that the average annual rainfall of the district is much less than the normal annual rainfall. Thus, the rainfall has definitely decreased in the district over the period of time. The study also reveals that entire north eastern and south-western part of district comprising entire Khandala, Phaltan, Khatav, Man talukas and part of Koregaon and Karad talukaswhich experienced drought for more than 20% of the years can be categorized as “drought area”.

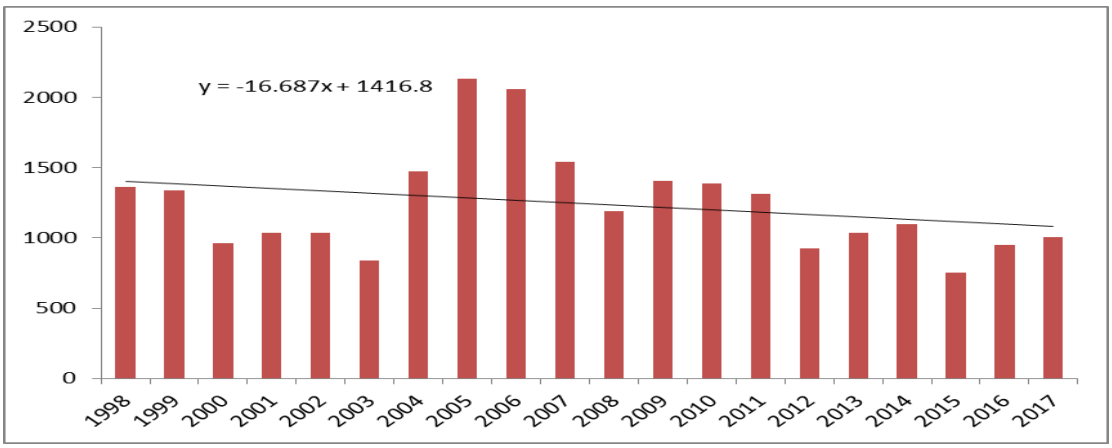


Fig. 6.2.1 Rainfall Trend (1998-17), Satara taluka

Period	1998 to 2017
No. of years	20
Normal rainfall (mm)	1416.8
Standard deviation (mm)	366.59
Coefficient of variation (%)	21.2367
Slope (mm/year)	-165.687
Intercept	1416.8
Equation of trend line	Y = -16.687x + 1416.8

6.3 Caving and loss of drilling formation

Red boles, black boles, the intertrappean beds, have collapsible nature when they are saturated. The weathered/highly fractured saturated formation at the contact zones also collapse as a result of which drill rods assembly gets stuck up. This sometimes leads to loss of circulation of fluid there by compounding the problems further. The red bole is usually encountered at the depth of more than 170 m in this area with thickness ranging from 8 to 10 m. The water bearing zones encountered fills up the bore well and that infuses the bole beds in the succession resulting in the collapse of the bole beds. The casing or cement sealing of the red bole is not possible below 100 m bgl, as the present rig is equipped to lower casing down to 100 m bgl depth.

Loss of air in jointed and fractured Basalt was observed during drilling. The problem can be solved by sealing the zones by lowering casing or by cement sealing. This process may often damage the potential aquifer zones if not carried out meticulously with proper equipment.

6.4 Continues Increase in Draft, Increase in Stage of GW Dev:

The stage of ground water development has increased over the period of time from 2004 to 2013 in all the talukas from 68.99 % to 77.47 %. The main reason for ground water overdraft is intensive irrigation for cash crop. Overall draft for these talukas has increased from 375.04 MCM in 2004 to 768.94 MCM in 2013 (**Fig. 6.4.1**).

Fig. 6.4.1. Stage of ground water development and Ground Water draft

7.0 GROUND WATER MANAGEMENT PLAN

Talukawise aquifer management plan have been prepared for Aquifer I (Weathered and jointed fractured Basalt) and Aquifer II (jointed and fractured basalt), with the objective of bringing the current stage of ground water development up to 70% by adopting supply side and demand interventions, for the five talukas (out of 11 talukas of Satara District), namely, Khatav, Man, Phaltan, Satara and Wai talukas, where aquifer mapping has been completed till 2017-18.The management plan has been proposed to manage the ground water resources and to arrest further decline in water levels. The management plan comprises two components namelysupply-side management and demand side management. The supply side Managementis proposed based on surplus surface water availability and the unsaturated thickness of aquifer whereas the demand side management is proposed by use of micro irrigation techniques. Change in cropping pattern towards less water-intensive irrigation crops (Demand side intervention) has not been proposed in the area cash crop cultivation drives the economy of the region.

7.1 Supply Side Management

The supply side management of ground water resources can be done through the artificial recharge of surplus runoff available within river sub basins and micro watersheds. Also, it is necessary to understand the unsaturated aquifer volume available for recharge. The unsaturated volume of aquifer was computed based on the area feasible for recharge, unsaturated depth below 5 mbgl and the specific yield of the aquifer. The **Table 7.1.1** gives the taluka wise volume available for the recharge.

Table 7.1.1: Area feasible and volume available for Artificial Recharge

Taluka	Geographical Area (sq. km.)	Area feasible for reacharge (Sqkm)	Unsaturated Volume (MCM)
Man	1425.17	538.93	1077.86
Phaltan	**1103.45**	641.815	1283.63
Satara	783.36	12.74	25.48
Wai	524.67	157.68	315.36
Khatav	745	828.585	1657.17
	4581.65	2179.75	4359.50

The total unsaturated volume available for artificial recharge is 4359.5 MCM and it ranges from 25.48 MCM in Satara taluka to 1667.17 MCM in Khatav taluka. The available surplus runoff can be utilized for artificial recharge through construction of percolation tanks and Check dams at suitable sites.

Table 7.1.2: Proposed Artificial Recharge Structures

Taluka	Geographical Area (Sqkm)	Area feasible for recharge (sq. km.)	Unsaturated Volume (MCM)	Surplus water available for AR (MCM)	Proposed number of structures		Total Volume of Water expected to be recharged@ 75 % efficiency (MCM)		Total recharged @ 75 % efficiency (MCM)
					PT	CD	PT	CD	
Man	1425.17	538.93	1077.86	13.20	46	133	6.90	2.99	9.89
Phaltan	**1103.45**	641.815	1283.63	15.72	55	157	8.25	3.53	11.78
Satara	783.36	12.74	25.48	0.31	1	3	0.15	0.07	0.22
Wai	524.67	157.68	315.36	3.86	14	36	2.10	0.81	2.91
Khatav	**745**	828.585	1657.17	20.30	71	203	10.65	4.57	15.22
	4581.65	2179.75	4359.50	53.39	187	532	28.05	11.97	40.02

Thus, after taking into consideration all the factors, only 53.39 MCM of surplus water can be utilised for recharge, which is given in **table 7.1.2**. This surplus water can be utilized for constructing

532 check dams and 187 percolation tanks at suitable sites. The number of feasible artificial recharge structures was calculated by considering 0.20 MCM per percolation tanks and 0.03 MCM per check dam. This intervention should lead to recharge @ 75% efficiency of about 40.02 MCM/year. Tentative locations of these structures are given in **Fig. 7.1.1** and details also given in **Annexures VI, VII and VIII**. The rainwater harvesting in urban areas can be adopted in 25% of the household with 50 sq. km roof area. A total of 1.787 MCM potential can be generated by taking 80% runoff coefficient.

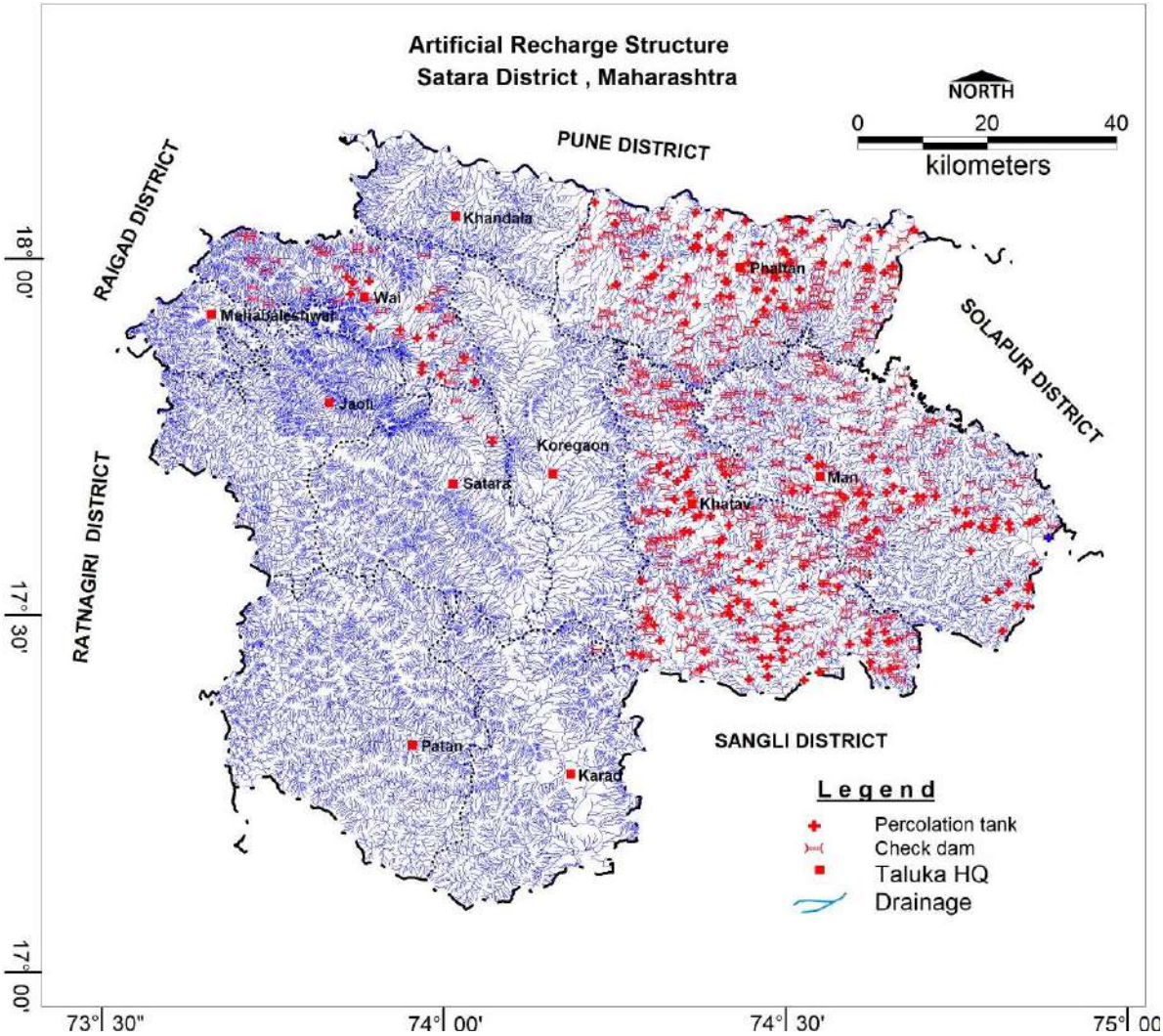


Figure 7.1.1: Location of Proposed Artificial Recharge structures

7.2 Demand Side Management

The Demand Side Management is proposed in areas where the Stage of Ground Water Development is relatively high and adopting micro-irrigation techniques for water intensive crops to save water. **Fig 7.3.1** depicts the proposed demand side interventions of 4581.65 Sq Km area (Man, Phaltan, Satara, Wai and Khatav Blocks of Satara District).

The micro-irrigation techniques are proposed to be adopted in 86.5 Sq. Km Suagarcane cropped area in Man, Phaltan, Satara, Wai and Khatav Blocks by saving a total of 49.305 MCM and 17.75 Sqkm of Onion cropped area in Khatav block by saving a total of 4.615 MCM, as given **Table 7.2.1**. No change in cropping patterns is proposed in any of the blocks.

Table 7.2.1: Demand side intervention

Taluka	Geographical Area (Sqkm)	Sugarcane crop area sqkm	Sugarcane crop area sqkm area is ground water irrigated, 100 % ground water irrigated proposed to be covered under Drip (sq.km.)	Volume of Water expected to be saved (MCM). Surface Flooding req- 2.45 m. Drip Req. - 1.88, WUE- 0.57 m	Area proposed to be covered under Drip (sq.km.) Onion area	Volume of Water expected to be conserved (MCM). Onion requirement - 0.78 m, Drip - 0.52 m,	Total save water
Man	1425.17	22.11	14	7.98			7.98
Phaltan	1103.45	46.37	34	19.38			19.38
Satara	783.36	46.89	2	1.14			1.14
Wai	524.67	19.52	17.5	9.975			9.98
Khatav	745	34.4	19	10.83	17.75	4.615	15.45
	4581.65	169.29	86.5	49.305	17.75	4.615	53.92

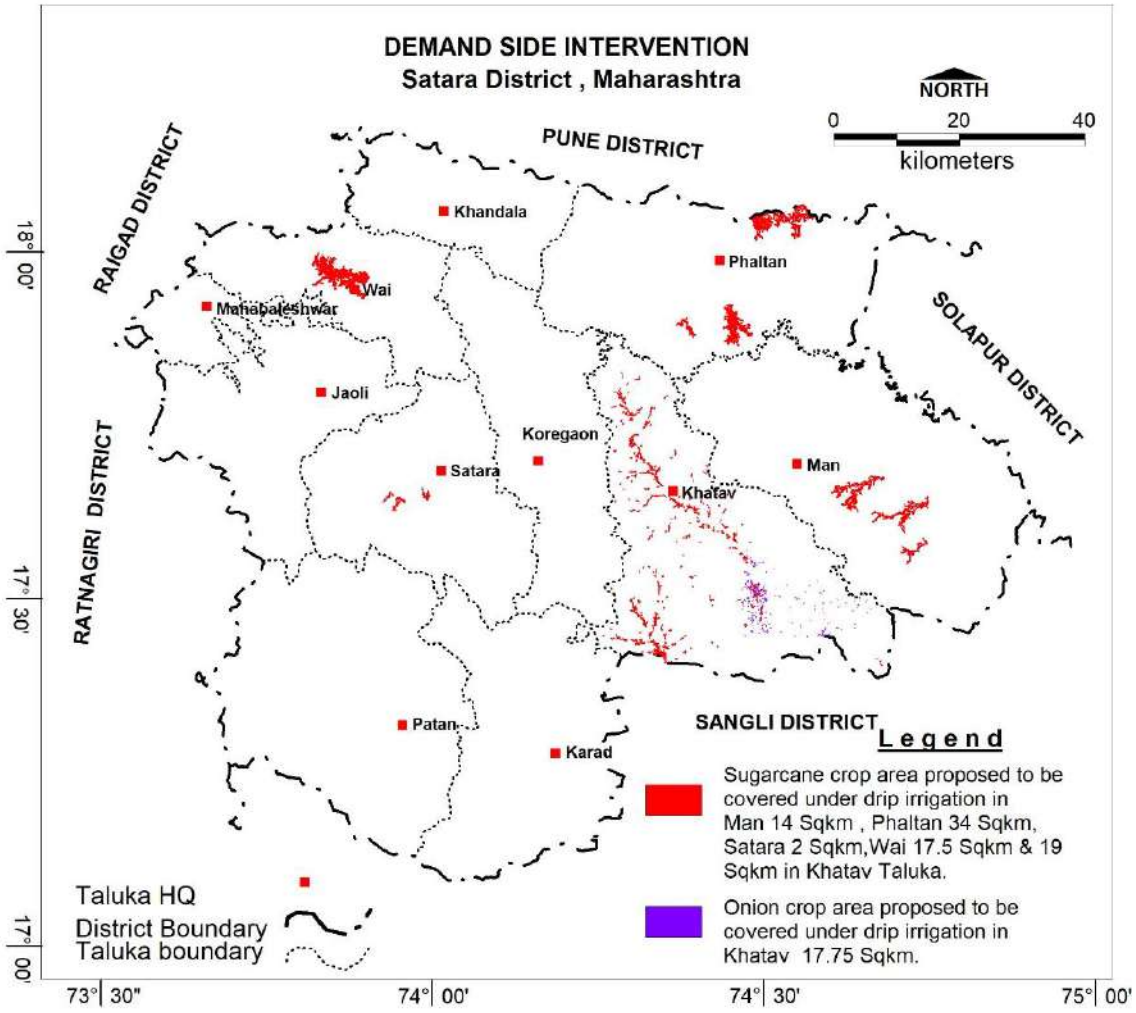


Figure 7.3.1: Demand side intervention

7.3 Expected Benefits

The impact of groundwater management plans on the groundwater system in the district after its implementation is evaluated and the outcome shows significant improvement in groundwater scenario in all talukas as given in the **Table 7.3.1.**

Table 7.3.1: Expected benefits after management options

Taluka	Water Recharged by Supply side intervention (MCM)	Water saving by demand side interventions (MCM)	Net Ground water availability (MCM)	Total ground water draft (MCM)	Ground water resources after supply side management (MCM)	Ground water Draft after demand side management (MCM)	Expected stage of Development (%)
Man	9.89	7.98	166.27	131.14	176.16	123.16	69.91
Phaltan	11.78	19.38	146.25	129.61	158.03	110.23	69.75
Satara	0.22	1.14	132.40	80.21	132.62	79.07	59.62
Wai	2.91	9.98	75.88	64.86	78.79	54.89	69.66
Khatav	15.22	15.45	133.60	119.14	148.82	103.70	69.68
	40.02	53.92	654.40	524.96	694.42	471.04	67.83

7.4 Development Plan

The ground water development plan has been proposed in the view of developing the additional ground water resources available after supply side interventions to bring the stage of ground water development up to 70%. The 15.054 MCM volume of ground water generated can bring 23.16 sq km additional area under assured ground water irrigation with average crop water requirement of 0.65 m by constructing 903 Dug wells and 100 Borewells. Taluka wise details are given in **Table 7.4.1**. The area feasible for ground development is shown in **Fig. 7.4.2**

Table 7.4.1: Taluka wise additional area under assured GW Irrigation

Taluka	Ground water resources after supply side management (MCM)	Ground water Draft after demand side management (MCM)	Expected stage of Development %	Balance GWR available for GW Development after STAGE OF GWD is brought to 60% (MCM)	Proposed No. of DW @1.5 ham for 90% of GWR Available)	Proposed No. of BW @1.5 ham for 10% of GWR Available)	Additional Area (sq.km.) proposed to be brought under assured GW irrigation with av. CWR of 0.65 m after 70% stage of GWD is achieved (Sq.Km)
Man	176.16	123.16	69.91	0.15375	9	1	0.24
Phaltan	158.03	110.23	69.75	0.39275	24	3	0.60
Satara	132.62	79.07	59.62	13.76225	826	92	21.17
Wai	78.79	54.89	69.66	0.268	16	2	0.41
Khatav	148.82	103.70	69.68	0.47725	29	3	0.73
	694.42	471.04	67.83	15.054	903	100	23.16

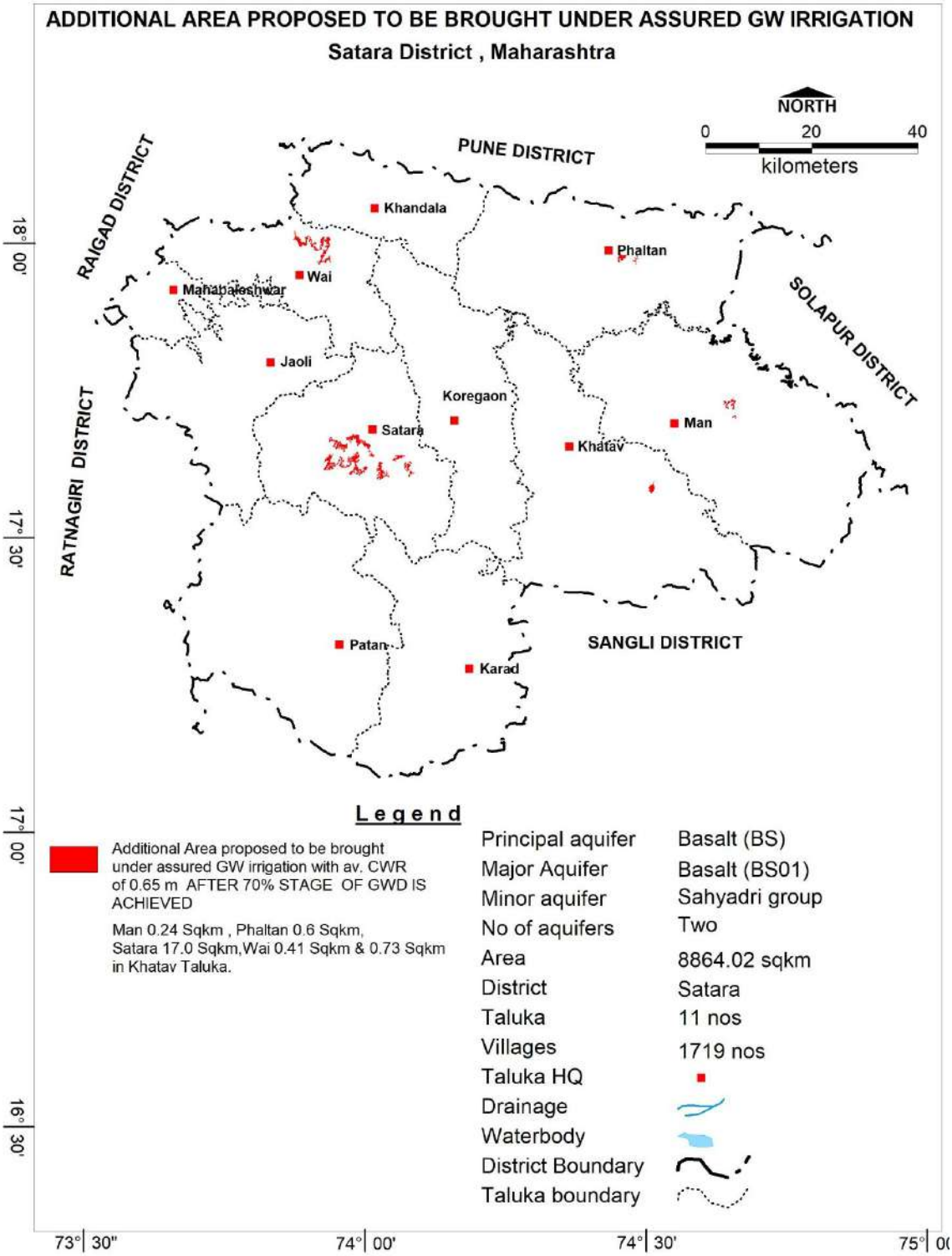


Figure 7.4.2: Additional area Proposed to be bought under Assured GW irrigation.

8.0 SUM UP

A thorough study was carried out based on data gap analysis, data generated in-house, data acquired from State Govt. departments and GIS maps prepared for various themes. All the available data was brought on GIS platform and an integrated approach was adopted for the preparation of taluka wise aquifer maps and aquifer management plans of Satara district.

Satara district is one of the oldest districts and located in western part of Maharashtra State. In 1960 Northern Satara district was named as Satara and Southern Satara district named as Sangli district. Satara district is located in the western part of Deccan plateau and lies between 17°05' and 18°11' north latitudes and 73°33' and 74°54' east longitudes. The entire area of the district falls in parts of Survey of India degree sheet numbers 47-G, 47-K, 47-J and 47-F. The district has an area of 10480 sq.km. which constitutes about 3% of the total area of Maharashtra. Prior to 1971, district had 9 talukas but presently there are 11 talukas, namely Satara, Karad, Wai, Mahabaleshwar, Phaltan, Man, Khatav, Koregaon, Patan, Jaoli and Khandala. There are eight Vidhan Sabha constituencies in this district. Karad North, Karad South, Patan, Koregaon, Wai and Satara are part of Satara (Lok Sabha constituency) and Phaltan, Man are part of Madha (Lok Sabha constituency). Satara is the capital of the district and other major towns include Wai, Karad, Koregaon, Dahiwadi (Maan), Koynanagar, Rahimatpur, Phaltan, Mahabaleshwar and Panchgani. This district comes under Pune Administrative Division along with Pune, Sangli, Solapur and Kolhapur. The total population of Satara district as per 2011 census is 3,003,741.

Physiographically the district forms part of western Maharashtra plateau of the Sahyadri ranges and can be broadly divided in four major units viz., (i) hills and Ghats, (ii) foothills zones, (iii) plateaus and (iv) plains, with altitude ranging between 483 m.amsl (along Nira River) to 1348 m.amsl (Mahabaleshwar). The entire Satara district falls in the drainage of the Krishna river basin and is drained by the Nira River and its tributaries in the entire northern part, the Man River and its tributaries in the south-east and the Krishna River and its tributaries in the south. Krishna River which is one of the major rivers of Southern Peninsula rises on the eastern brow of the Mahabaleshwar plateau in the district and flows for about 176 km. in the district. Kudal, Vena, Urmodi, Tarli, Koyna, Vasna and Verla rivers are the main tributaries of Krishna River. The entire river system has sub-parallel to semi-dendritic drainage pattern and the drainage density is quite high in the district. Satara district is part of two main watersheds, the Nira River and Man River forming the Bhima River watershed north of the Mahadeo hills and the upper Krishna watershed to the south and further divided into 50 minor watersheds.

Deccan Trap Basalt of upper Cretaceous to lower Eocene age is the major rock formation in the district, whereas only a very narrow belt confined to the banks of rivers is underlain by Recent Alluvium. Alluvium and Basalt form main aquifers in the district. Two aquifer Systems in Basalt and one shallow aquifer in Alluvium (limited to river banks) are found to be prevailing in the district. Deccan basalts are hydrogeologically in-homogeneous rocks. The weathered and jointed /fractured parts of the rock, as also permeable inter-flow beds constitute the zone of ground water storage and flow.

The specific capacity of the wells tapping Deccan Trap Basalt ranges between 1.6 and 4.2 lps/m of draw down and the permeability ranges from 12 to 65 m/day and the transmissivity ranges from 2.1 to 97 m^2/day. The specific yield ranges from 0.019 to 0.028. During the pumping tests conducted on the exploratory wells tapping aquifer-II, the transmissivity was found to vary from 10 to 90 m^2/day. The storage coefficient varied between 1.2 $x10^{-4}$to 3.57 $x10^{-4}$.

The depth to water levels in Satara district during May 2017 ranges between 0.9 mbgl (Morgiri, Patan taluka) and 25.00 mbgl (Pachgani, Mahabaleshwar taluka). The depth to Water levels varies between 5 and 10 mbgl in major part of the District. The depth to water levels less than 5 mbgl are observed in western part of the district covering Patan taluka and in patches in Karad, Jaoli Satara talukas and in isolated wells in Pkaltan, Koregaon, Khandala, Man and Wai talukas. The depth to water level between 10 to 20 mbgl observed in patches in north-western and eatern parts of the district. The Deeper water levels between 20 and 30 mbgl are observed in two isolated patches in Mahabaleshwar and Khatav talukas. During Nov. 2017 ranges between 0.1 mbgl (Dhuldev, Man taluka) and 19.0 mbgl (Khatav, Khatavtaluka). Shallow water levels within 5 m bgl are observed in major part of the district. The depth to water level between 10 to 20 mbgl has been observed in parts of Mahabaleshwar, Khatav and Phaltan talukas and in parts few isolated wells

In Deeper Aquifer-II, the pre-monsoon depth to water levels, in Satara District during May 2017, range from 9.00 (Lhasurne, Koregaon taluka) to 95.00 mbgl (Vadgaon, Phaltan taluka). The depth to water level varies between 10 to 30 mbgl in major part of the district. The deep water level (>50 mbgl) has been observed in Phaltan (Vadgaon and Andhali EW), Karad (Wagheshwar EW), Patan (Mendoshi and Morgir EW), Jaoli (Dare BK EW), Satara (Kadve BK EW), Man (Rajale EW, Khatav (Rajapur EW) and Wai (Eksar OW) Talukas. Post monsoon depth to water levels in Satara District during Nov. 2017 range between 1.40 (Lhasurne, Koregaon taluka and Padali, Satara taluka) and >100 mbgl (isolated EW at Surul, Patan taluka). Depth to water level less than 5 m bgl has been observed in patches in Central and western part of the district. The major part of the district shows deeper water levels ranging between 5 and 20 mbgl. The deepest water level of more than 30 mbgl is observed at Wagheshwar EW and Karawadi OW, Karad taluka, Rajapur EW, Khatav taluka, Dare BK EW, Jaoli taluka, Vihe, Mendoshi and Morgir EWs, Patan taluka, Mohi, Man taluka, Andhali-EW, Phaltan taluka and Gandhinagar EW, Phaltan taluka.

It has been estimated that the Net annual ground water availability in Satara district is 99251.6 ham. The existing ground water draft for all uses is 76894.89 ham. The net annual ground water availability for future irrigation is 17760.31 ham The provision for domestic and industrial water supply for year 2025 is projected as 9820.46 ham. The average stage of ground water development is 77.47%.

The stage of ground water development varies from 52.21 % (Jaoli) to 89.17% (Khatav). Out of 11 talukas Khatav taluka is categorised as “Semi critical” . Care should be taken before taking further development in Khatav talukas. There is much scope of ground water development in Jaoli,Satara and Patan taluka where stage of ground water development is less than 70%. Thus the stage of ground water development in the district is 77.47% that make it under “Safe” category.

In Deeper Aquifer-II (Jointed/Fractured Basalt), yield is low (less than 3.0 lps), the transmissivity varies from 10 to 90 m^2/day. The storage coefficient varied between 1.2 $x10^{-4}$and 3.57 $x10^{-4}$.

Taluka wise aquifer management plans have been prepared for Aquifer I (Weathered and jointed fractured Basalt) and Aquifer II (jointed and fractured basalt), with the objective of bringing the current stage of ground water development up to 70% by adopting supply side and demand interventions, for the five talukas (out of 11 talukas of Satara District), namely, Khatav, Man, Phaltan, Satara and Wai talukas, where aquifer mapping has been completed till 2017-18. The management plan has been proposed to manage the ground water resources and to arrest further decline in water levels. The management plan comprises two components namely supply-side management and demand side management. The supply side Management is proposed based on surplus surface water availability and the unsaturated thickness of aquifer whereas the demand side management is proposed by use of micro irrigation techniques in areas where the Stage of Ground Water

Development is relatively high and adopting micro-irrigation techniques for water intensive crops to save water.The supply side interventions include utilizing 53.39 MCM of Surplus runoff water by a proposal to construct 187 Percolation Tanks and 532 Check Dams. This supply side intervention should lead to recharge (@ 75% efficiency) of about 40.02 MCM/year. The demand side interventions include proposal to bring 100 % ground water irrigated Sugarcane crop area (86.5 sq.km.) is proposed to be covered under Drip Irrigation. Volume of water expected to be saved is estimated as 49.305 MCM (Sugarcane Surface Flooding irrigation req- 2.45 m. Drip Req. - 1.88 m, WUE- 0.57 m), Onion crop area (17.5 sq.km.) is proposed to be covered under Drip Irrigation. Volume of water expected to be saved is estimated as 4.615 MCM (onion crop Surface Flooding irrigation req- 0.78 m. Drip Req. – 0.52 m)

Balance ground water resources available for ground water development is 15.054 MCM after the stage of ground water development is brought down to 70% after implementing demand side management, which can bring additional 23.16 sq. km. area under assured ground water irrigation.

These interventions also need to be supported by regulation of deeper aquifer and hence it is recommended to regulate/ban deeper tubewells/borewells of more than 60 m depth in these talukas, so that the deeper ground water resources are protected for future generation and also serve as ground water sanctuary in times of distress/drought. IEC activities and capacity building activities need to be aggressively propagated to establish the institutional framework for participatory ground water management.

PROPOSED MANAGEMENT PLAN

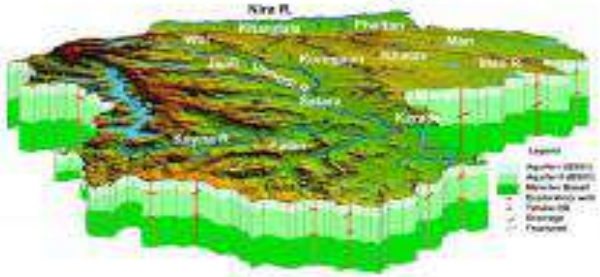
Augmentation by AR – 40.02 MCM

GW quantum saved by WUE – 53.92 MCM

Total Draft – 524.96 MCM

Aquifer I Resources – Dy- 654.4 MCM

Aquifer II Resources – 82.6 MCM



GW scenario after implementing

Supply side interventions /Artificial Recharge

GWA 654.4 + 40.2 MCM by AR
= 694.42 MCM

Demand Side/ WUE Measures

GW saved by WUE measures: 53.92 MCM.

Man,Phaltan , Wai & Khatav: GW quantum required to bring stage of GWD @70% :-51.49mcm

Availability of GWR after Supply & demand side Interventions

1. Man: GWR available for Development after bringing stage of GWD up to 70% =0.15 mcm
2. Phaltan : = 0.39 mcm
3. Wai: 0.27 mcm
4. Satara : GWR available to bring the SOD up to 70% 12.62 + 1.14 mcm by WUE = 13.76 MCM
5. Khatav: 0.48 mcm

PROBABLE BENEFITS AFTER IMPLEMENTING AR & WUE MEASURES

- Bringing down to STAGE OF GW DEVELOPMENT to 70 % from Present stage of GW development of 78.88%,88.62% & 85.48% 89.1%of Man,Phaltan , Wai & Khatav respectively with enhance availability of GWR after supply side & Demand side intervention, Satara:GWR available to bring the SOD up to 70% 12.62 mcm.
- Beside this, about 2316 ha of additional Area can also be brought under assured GW irrigation from 15.05 MCM of Balance GWR available for GW Development after STAGE OF GWD is brought to 70% (safe category)

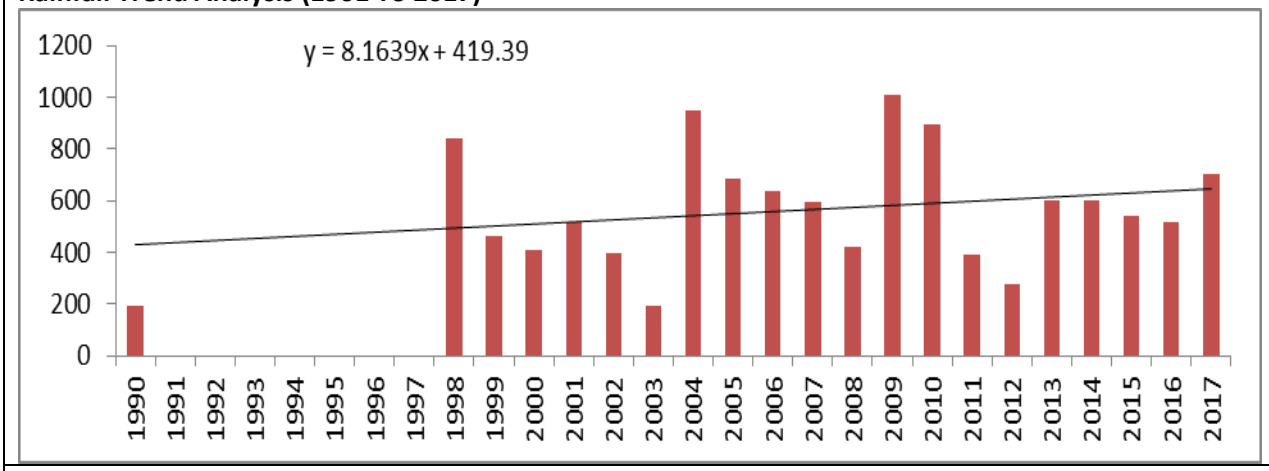
BLOCK WISE AQUIFER MAPS AND MANAGEMENT PLAN

1. KHATAV TALUKA
2. MAN TALUKA
3. PHALTAN TALUKA
4. SATARA TALUKA
5. WAI TALUKA

9.0 AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, KHATAV TALUKA, SATARA DISTRICT, MAHARASHTRA

1. SALIENT FEATURE		
1.1 Introduction		
Taluka Name		**KHATAV**
Geographical Area (Sq. Km.)		1357.9
Hilly Area (Sq. Km)		88.85
Saline Area (Sq. Km.)		0
Ground Water worthy Area (Sq. Km.)		1269.05
Population (2011)		275274
Climate		Summer Tropical
1.2 Rainfall Analysis		
Normal Rainfall (mm)		705.4 mm
Annual Rainfall (2017)(mm)		595.98 mm
Decadal Average Annual Rainfall (2007-17) (mm)		563.6 mm
Long Term Rainfall Analysis(1901-2017)	Rising Trend 8.16 mm/year Probability of Normal/Excess Rainfall- 43% & 24%. Probability of Drought (Moderate/Severe)-: 19% Moderate & 14% Severe.	

Rainfall Trend Analysis (1901 To 2017)



1.3. Geomorphology, Soil & Geology	
Geomorphic Unit	Plateau Undissected to highly Dissected, with weathered thickness ranging from 0 to 2 m. Major parts of the taluka covered with Plateau moderately Dissected (PLM), 0-1m weathering, central and northern parts covered with residual hills.
Soil	In general, they are clayey loam in texture and fairly high in calcium carbonate, high porosity but moderate to low permeability, thus having low to moderate infiltration capacity. Based on physical characteristics the soils of the area have been classified into two major groups: Medium black soil and Shallow black soils
Geology	Deccan Traps (Basalt) , Age: Upper Cretaceous to Lower Eocene

1.4. Hydrology & Drainage		
Hydrology	Bigger Minor Irrigation Project (>100 Ha.)	Completed: -2 Major irrigation Tanks
	Minor Irrigation Project (<100 Ha.)	Completed: -8 Irrigation pond, 216 PT, 228 KT weirs
Drainage	The central part of taluka is drain by Yerla rivers and its tributaries, flow from NW to SE direction. The taluka falls in Main upper most Krishna and Yerla catchment of Krishna basin.	
1.5. Land Use, Agriculture, Irrigation & Cropping Pattern		

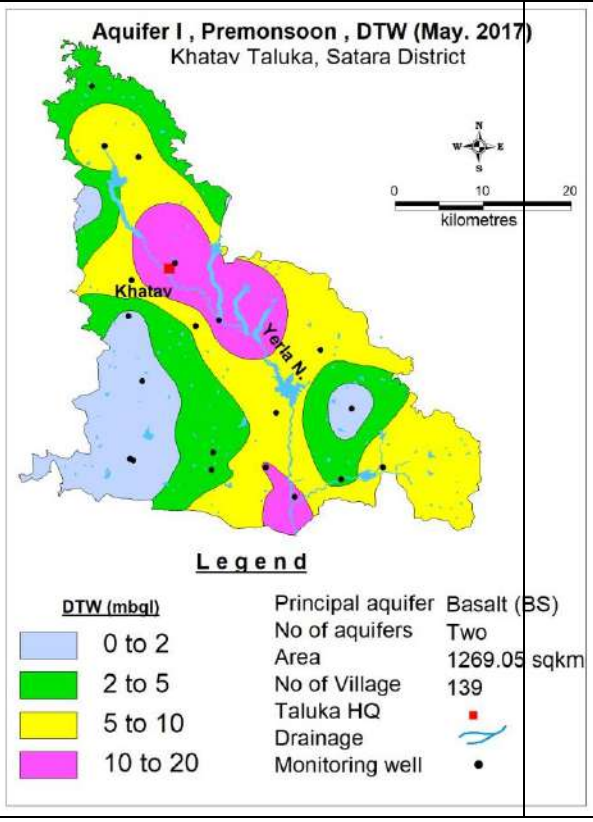
Geographical Area (Sq. Km.)		1357.9
Forest Area (Sq. Km.)		41.21
Cultivable Area (Sq. Km.)		1034.81
Net Sown Area (Sq. Km.)		655.29
Double Cropped Area (Sq. Km.)		178.99
Area under Irrigation (Sq. Km.)	Surface Water	58.1
	Ground Water	98.52
Principal Crops*(Reference year 2015-16)*	Crop Type	Area (Sq. Km.)
	Rice	3.05
	Wheat	43.15
	Jowar	174.29
	Bajra	337
	Gram (harbhara)	30.91
	Sugarcane	35.4
	Onion	14.81
	Cotton	9.62
	Ground nut	20.89
	Sunflower	4.12

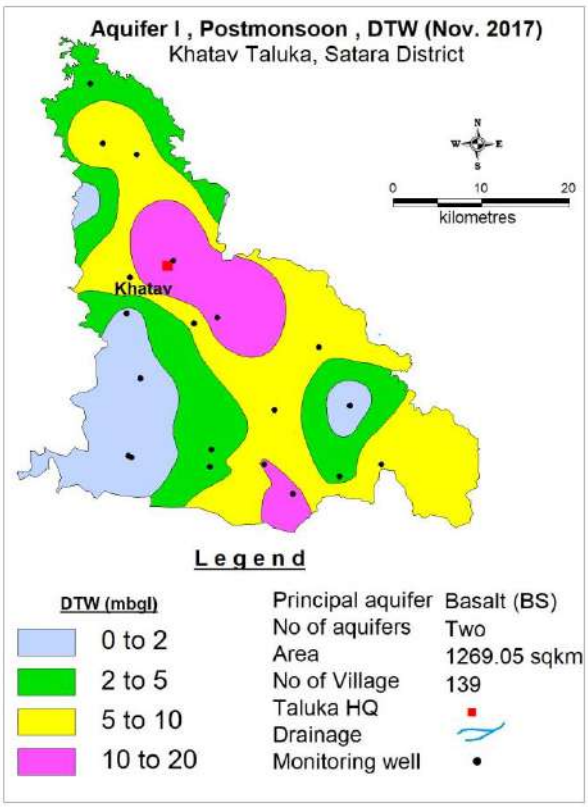
1.6. Water Level Behaviour

1.6.1 Phreatic Aquifer (Shallow aquifer)

Pre-Monsoon (May-2017): The depth to water levels ranges between 5.8 to 21.0 mbgl. Water level less than 10 mbgl has been observed in major parts of the taluka while water level in the range of 10 to 20 mbgl is observed in central and northern part of the taluka. Deepest water level observed at Khatav.

Post-Monsoon (November-2017): The depth to water levels ranges between 0.9 to 19.1 mbgl. Water Level less than 10 mbgl has been observed in major parts of the taluka while water level in the range of 10 to 20 mbgl is observed at Khatav and Wakeshwar village. Less than 2 mbgl is observed in south western parts of the taluka.

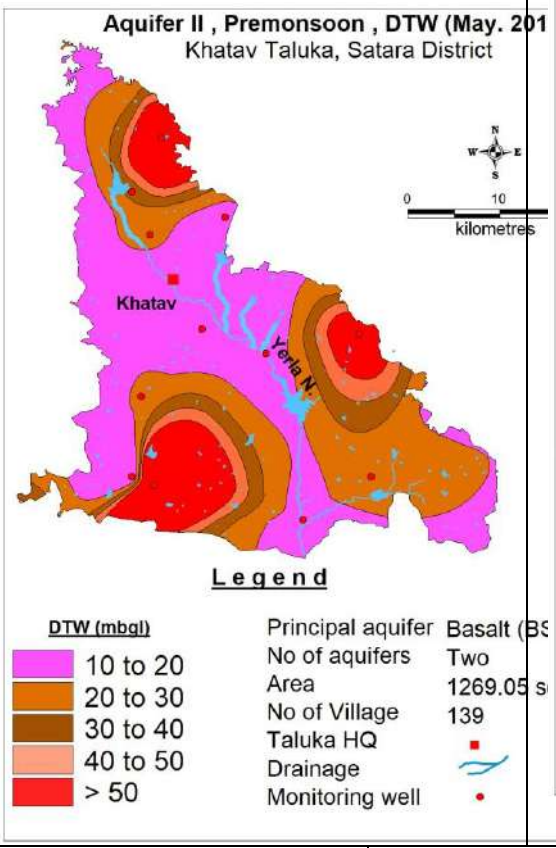


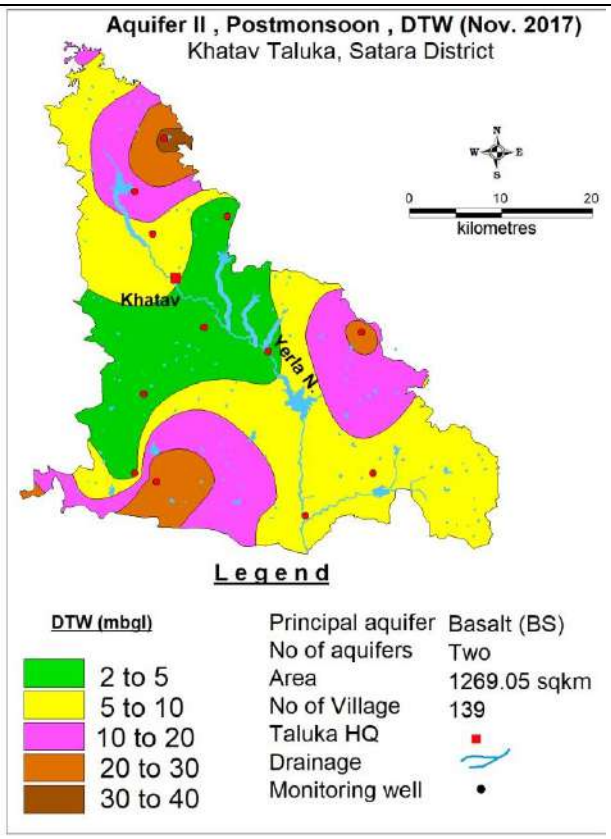


1.6.2 Semi-Confined/Confined Aquifer-Water Level (Deeper aquifer)

Pre-Monsoon (May-2017): The depth to water levels in Khatav Taluka during May 2017 ranges between 12 to 95 mbgl. Water level in the range of 10 to 20 mbgl has been observed in major parts of the taluka while water level in the range of 20 to 50 mbgl is observed in northern and southern part of the taluka. Deepest water level > 50 mbgl observed at Dambewadi, Rajapur and Vadgaon villages.

Post-Monsoon (November-2017): The depth to water levels in Khatav Taluka during Nov. 2017 ranges between 2 to 31 mbgl. Water Level less than 10 mbgl have been observed in major parts of the taluka while water level in the range of 10 to 20 mbgl are observed in northern and southern part of the taluka. Deepest water level > 20 mbgl observed at Dambewadi, Rajapur and Vadgaon village

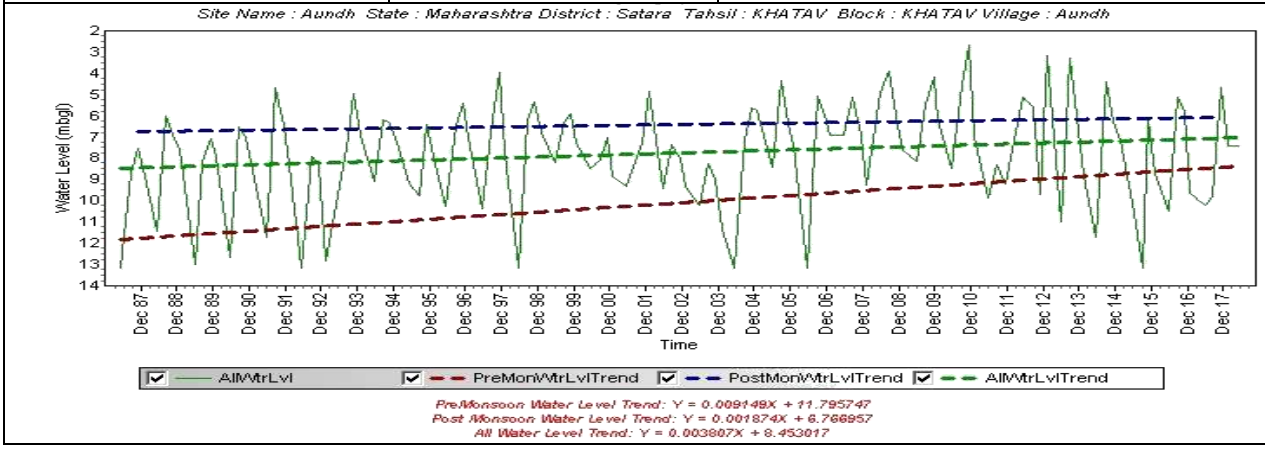




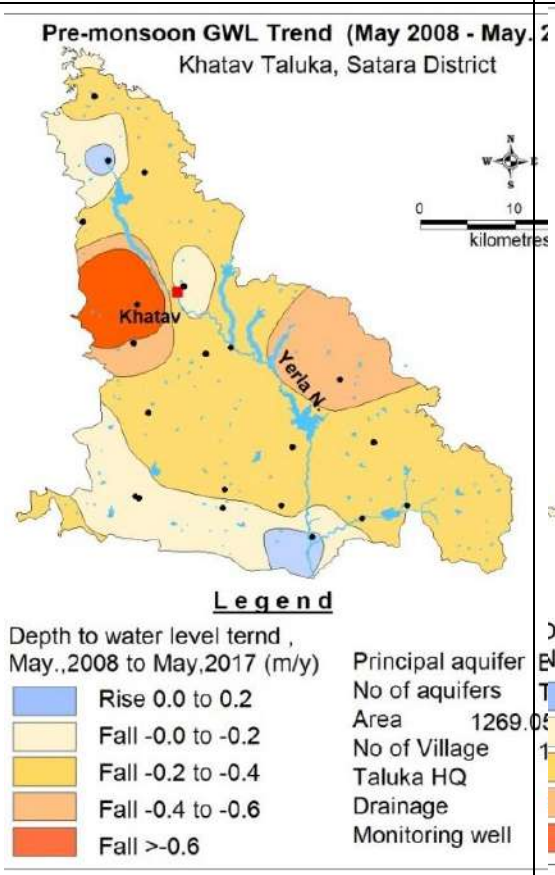
1.6.3 . Hydrograph

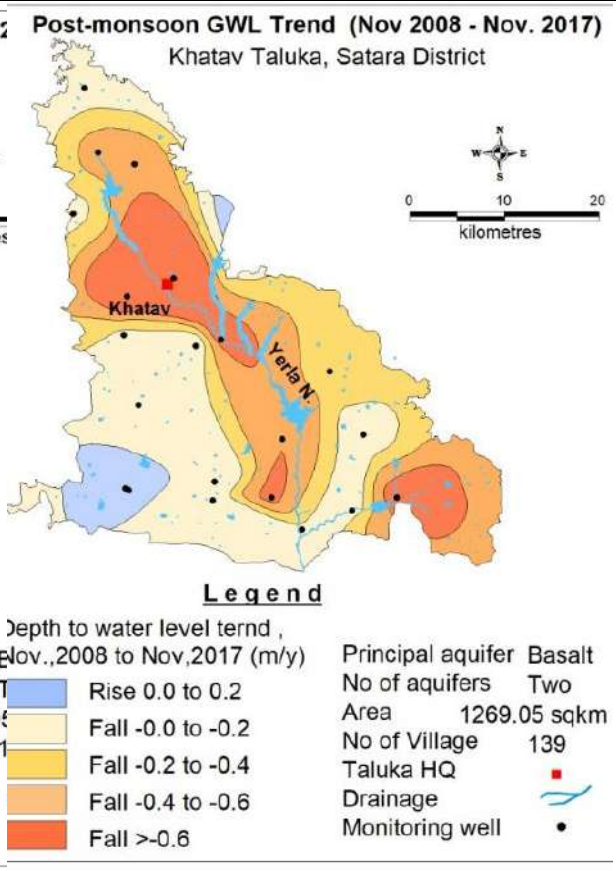
Hydrograph shows Pre-monsoon rising trend @ 0.0091 m/year

Hydrograph shows Post-monsoon rising trend @ 0.00187m/year



1.6.4 Water Level Trend (2008-2017)	
Pre-Monsoon trend	**Post-Monsoon trend**
Rising 0.016 to 0.045 m/year	Rising 0.105 m/year
Falling 0.013 to 1.36 m/year	Falling 0.015 to 1.34 m/year
Declining trend up to 1.36 m/year is observed in almost entire taluka; decline in water level >0.2 m/year has been observed in 1064 sqkm (78% of total geographical area) major part of the taluka. Rising water level trend has been observed in small part in northern and southern parts of the taluka.	Declining trend up to 1.34 m/year is observed in almost entire taluka; decline in water level >0.2 m/year has been observed in 831 sqkm (54% of total geographical area) major part of the taluka. Rising water level trend has been observed in small part in northern and southern parts of the taluka



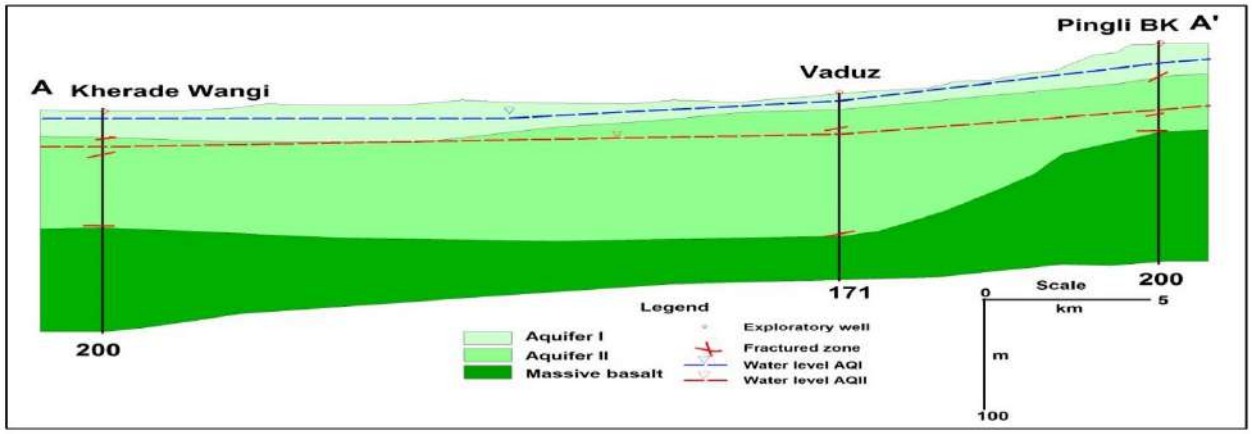


2. Ground Water Issues	I.	Decline in water level >0.2 m/year has been observed in 1064 sqkm (78% of total geographical area) during premonsoon & 831 sqkm (54% of total geographical area) in postmonsoon, major part of the taluka.
	II.	The stage of ground water development has increased over the period of time from 2004 to 2013 of the talukas from 82.07 % to 89.17 %. The main reason for ground water over draft is intensive irrigation for cash crop. Overall draft has increased from 118 MCM in 2004 to 119.14 MCM in 2013
	II.	Low ground water potential areas have been identified in 595 sq km (about 44 % of the area, Yield less than 50 m3/day, mostly due to limited depth of weathering in Aquifer-I
	V.	Taluka is experiencing frequent droughts ie, 19% Moderate & 14% Severe.

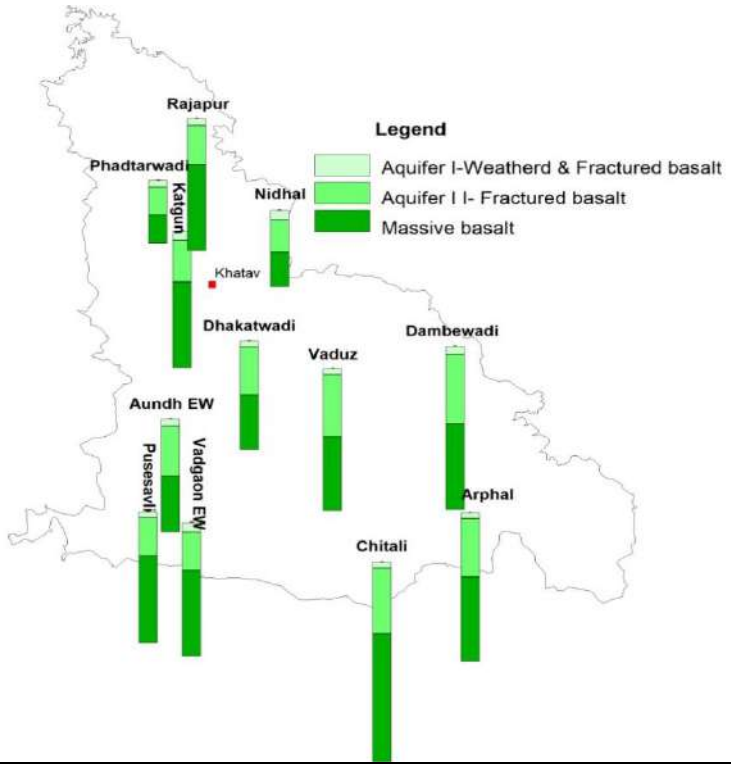
3. AQUIFER DISPOSITION		
3.1. Number of Aquifers	Aquifer-I Basalt (Unconfined, Shallow	Aquifer-II Basalt (Semiconfined /confined, Deeper aquifer)

	aquifer) Weathered and jointed / fractured Basalt	Jointed and fracture Basalt

3.2 Cross section



3.3. Lithological Disposition



3.4. Aquifer Characteristics

Major Aquifers	Basalt	Basalt
Type of Aquifer	Aquifer-I Basalt (Unconfined, Shallow aquifer) Weathered and jointed / fractured Basalt	Aquifer-II Basalt (Semiconfined /confined, Deeper aquifer) Jointed and fracture Basalt
Depth of Occurrence (mbgl)	9-28	65 - 160
Thickness of wearherd / fractured rocks (m)	6-14	1-12
Yield	10 - 200 m3/day	0.2 - 3 lps
Specific yield (Sy)	0.018- 0.025	0.0025

Storativity (S)	--	0.00012-0.000257
Transmissivity (T) (m2/day)	T: 10-30m^2/day	T: 15-90 m^2/day

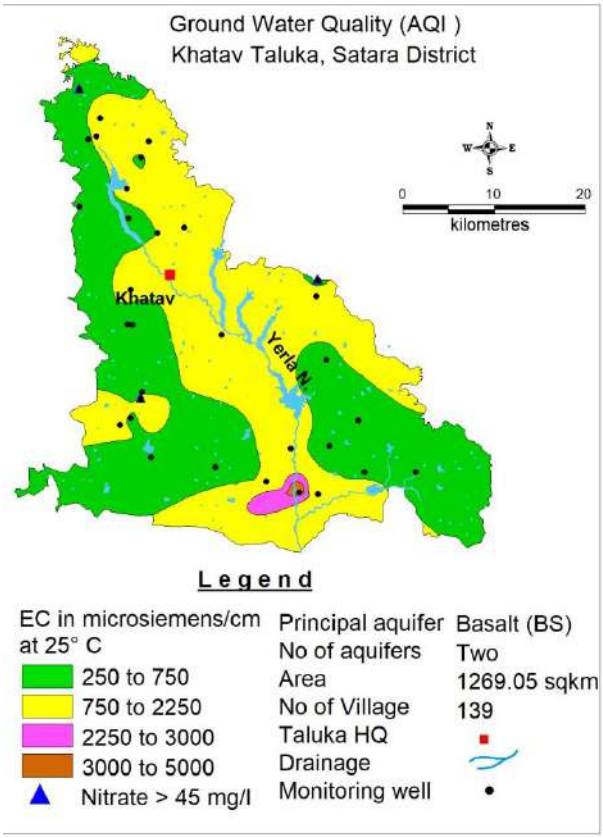
4.0 GROUND WATER QUALITY

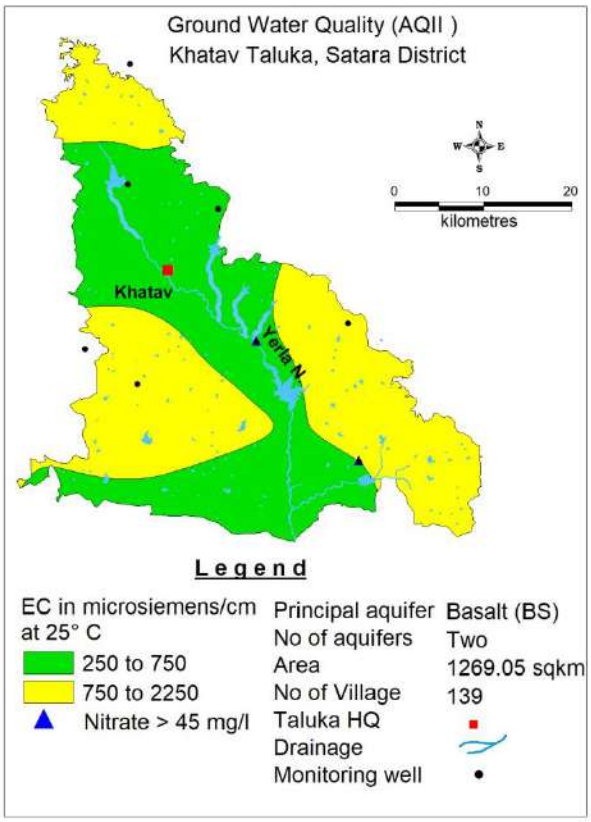
5.1 Aquifer-I (Phreatic / Shallow Aquifer) :

In general the water quality of shallow aquifer in Khatav taluka is potable and good for drinking, domestic, industrial as well as irrigation purposes, except around Aundh and Manjarwadi are not fit for drinking purpose if directly consumed without treatment. Nitrate more than 45 mg per litre was detected in water sample. Around Chitali, very high salinity prevails (EC >2250 µS/cm), which is not suitable for drinking, domestic, industrial as well as irrigation purposes. Ground water can be used for drinking only after treatment and for irrigation for very high salt tolerant crops and with proper soil and crop management practices.

5.2 Aquifer II (Semiconfined/Confined / Deeper aquifer)

In general the water quality of deep aquifer in Khatav taluka is potable and very good for drinking, domestic, industrial as well as irrigation purposes. Ground water around Vaduz and Arphal is not fit for drinking purpose if directly consumed without treatment. Nitrate more than 45 mg per litre was detected.





5. GROUND WATER RESOURCES

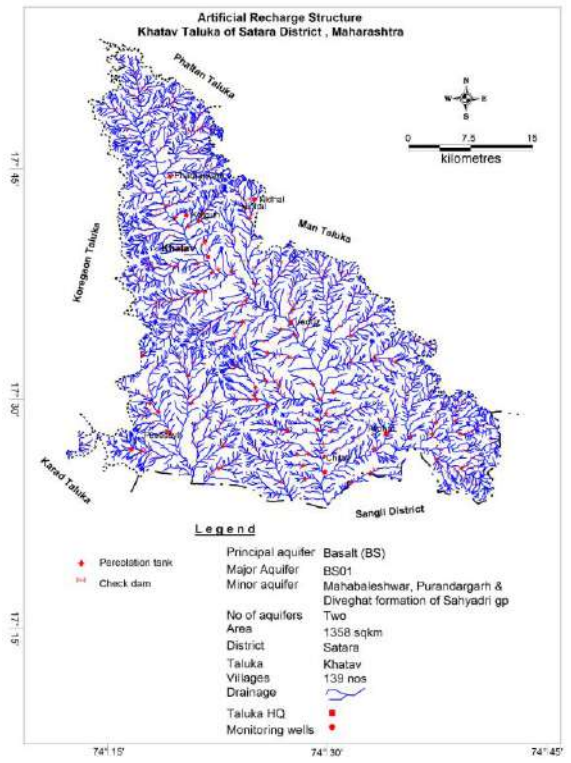
5.1 Aquifer-I: Phreatic / Shaalow Aquifer (Basalt)

Ground Water Recharge Worthy Area (Sq. Km.)	1269.05
Total Annual Ground Water Recharge (MCM)	140.64
Natural Discharge (MCM)	7.03
Net Annual Ground Water Availability (MCM)	133.61
Existing Gross Ground Water Draft for irrigation (MCM)	113.25
Existing Gross Ground Water Draft for domestic and industrial water supply (MCM)	5.88
Existing Gross Ground Water Draft for All uses (MCM)	119.14
Provision for domestic and industrial requirement supply to 2025(MCM)	11.25

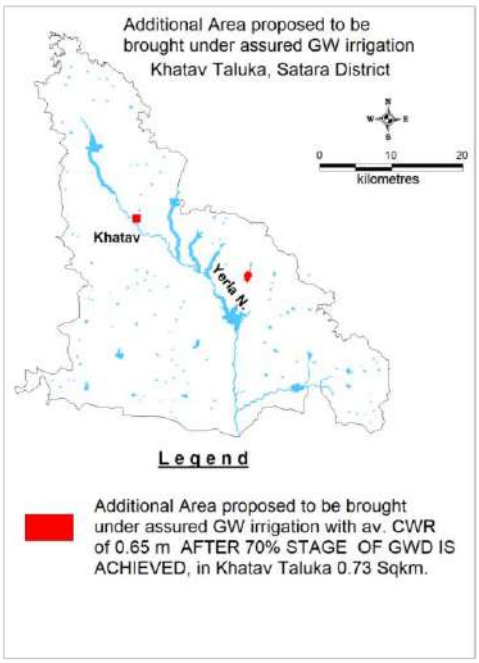
Net Ground Water Availability for future irrigation development (MCM)								9.09
Stage of Ground Water Development (%)								89.17
Category								SAFE
5.2 Aquifer-II: Semiconfined/Confined / Deeper Aquifer (Basalt)								
Mean thickness (m)	Area (sq km)	Piezometric head (m)	Specific yield	Storativity	Resource above confining layer (MCM)	Resource in confining aquifer (MCM)	Total Resource (MCM)	mean thickness (m)
5.03125	745.9	28	0.005	0.00017275	3.607918	18.76405	22.372	5.03125
6.0. GROUND WATER RESOURCE MANAGEMENT								
6.1. Supply Side Management								
Net Available Resource (MCM)								133.61
Gross Annual Draft (MCM)								119.14
Agricultural Supply –GW (MCM)								113.25
Agricultural Supply –SW (MCM)								52.29
Domestic Supply - GW(MCM)								5.88
Domestic Supply - SW(MCM)								1.47
Total Supply (MCM)								172.89
Area of Taluka (Sq. Km.)								1269.05
Area suitable for Artificial recharge (Sq. Km)								828.59
Type of Aquifer								Hard Rock
Area feasible for Artificial Recharge (WL >5mbgl) (Sq. Km.)								828.59
Volume of Unsaturated Zone (MCM)								1657.18
Average Specific Yield								0.02
Volume of Sub surface Storage Space available for Artificial Recharge (MCM)								33.1436
Surplus water Available (MCM)					20.300455			
Proposed Structures	Percolation Tank (Av. Gross Capacity-100 TCM*2 fillings = 200 TCM)				Check Dam (Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM)			
Number of Structures	71				203			
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	10.65				4.5675			
RTRWH Structures – Urban Areas								
Households to be covered (25% with 50 m^2 area)								15,000.00
Total RWH potential (MCM)								0.39
Rainwater harvested / recharged @ 80% runoff co-efficient								0.3096
RTRWH Structures – Urban Areas Economically not viable & Not Recommended								
6.2. Demand Side Management								
Micro irrigation techniques								
Sugarcane crop area (Total Sugarcane crop area area 35.4 sqkm), about 19 sq km area is ground water irrigated, 100 % ground water irrigated (19 sq km) proposed to be covered under Drip (sq.km.)								19
Volume of Water expected to be saved (MCM). Surface Flooding req- 2.45 m. Drip Req. - 1.88, WUE- 0.57 m								10.83
Area proposed to be covered (35.5 sq.km.) 50% Onion area								17.75

Volume of Water expected to be conserved (MCM). Onion requirement - 0.78 m, Drip - 0.52 m,	4.615
Proposed Cropping Pattern change	Not proposed
6.3. Expected Benefits	
Net Ground Water Availability (MCM)	133.61
Additional GW resources available after Supply side interventions (MCM)	15.2175
Ground Water Availability after Supply side intervention (MCM)	148.8275
Existing Ground Water Draft for All Purposes (MCM)	119.14
GW draft after Demand Side Interventions (MCM)	103.70
Present stage of Ground Water Development (%)	89.17
Expected Stage of Ground Water Development after interventions (%)	69.67
Other Interventions Proposed, if any	Not proposed
Alternate Water Sources Available	Nil
6.4 Development Plan	
Volume of water available for GWD to 60% (MCM)	0.48425
Proposed Number of DW (@ 1.5 ham for 90% of GWR Available)	29
Proposed Number of BW (@ 1.5 ham for 10% of GWR Available)	3
Additional Area (sq.km.) proposed to be brought under assured GW irrigation with av. CWR of 0.65 m	0.75
Regulatory Measures	60 m borewell/tube well

Proposed AR Structures



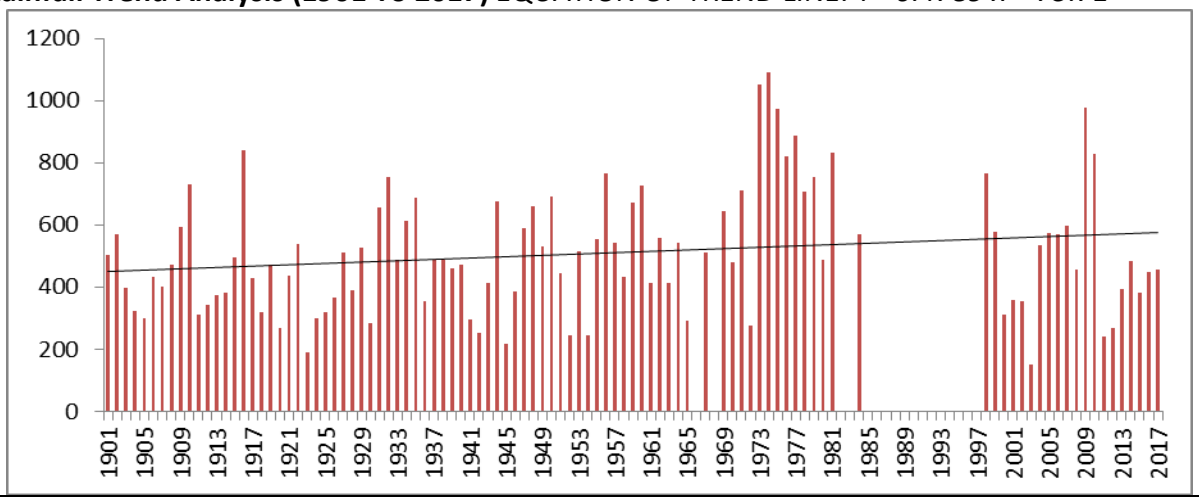
Additional area proposed to be bought under assured GW irrigation



10.0 MAPS AND GROUND WATER MANAGEMENT PLAN, MAN TALUKA, SATARA DISTRICT, MAHARASHTRA

1. SALIENT FEATURE		
1.1 Introduction		
Taluka Name		**MAN**
Geographical Area (Sq. Km.)		1575.49
Hilly Area (Sq. Km)		150.32
Saline Area (Sq. Km.)		0
Ground Water worthy Area (Sq. Km.)		1425.17
Population (2011)		2,25,634
Climate		Summar Tropical
1.2 Rainfall Analysis		
Normal Rainfall (mm)		454.9 mm
Annual Rainfall (2017)(mm)		493.15 mm
Decadal Average Annual Rainfall (2007-17) (mm)		508.3 mm
Long Term Rainfall Analysis(1901-2017)	Rising Trend 1.102 mm/year Probability of Normal/Excess Rainfall- 48% & 24%. Probability of Drought (Moderate/Severe)-: 22% Moderate & 6 % Severe.	

Rainfall Trend Analysis (1901 To 2017) *EQUATION OF TREND LINE: Y= 0.4789 x + 75.71*



1.3. Geomorphology & Geology		
Geomorphic Unit	Plateau Undissected to highly Dissected, with weathered thickness ranging from 0 to 2 m.Mojor parts of the taluka covered with Plateau moderately Dissected (PLM), 0-1m weathering,central and western parts covered with hilly dessected plateau and isolated residual hills .	
Soil	In general they are clayey loam in texture and fairly high in calcium carbonate, high porosity but moderate to low permeability, thus having low to moderate infiltration capacity. Based on physical characteristics the soils of the area have been classified into three major groups: Medium black soil, Red Sandy soils and Shallow black soils	
Geology	Deccan Traps (Basalt), Age: Upper Cretaceous to Lower Eocene	
1.4. Hydrology & Drainage		
Hydrology	Bigger Minor Irrigation Project (>100 Ha.)	Completed: -3 MI Tanks
	Minor Irrigation Project (<100 Ha.)	Completed: -7 Irrigation pond, 308 PT, 120 KT weirs

Drainage	The central part of taluka is drain by Man rivers and its tributaries,flow from NW to SE direction The taluka falls in Bhima subbasin (RB Bhima Sina to Man)

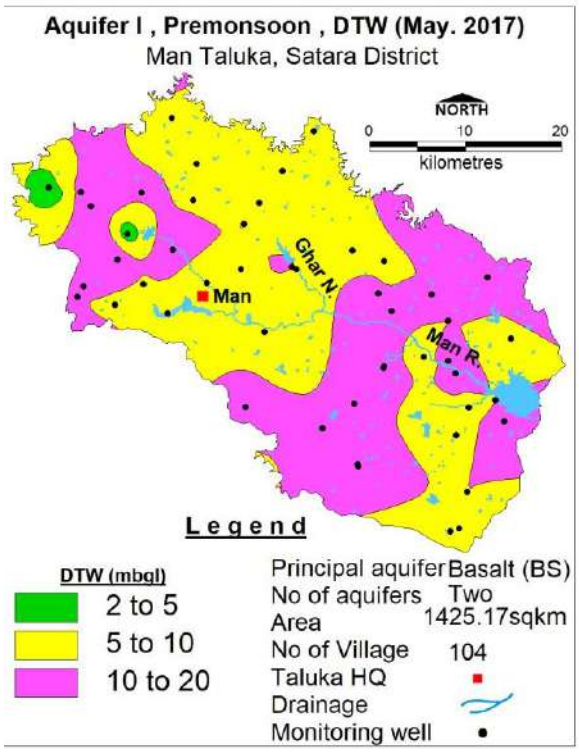
1.5. Land Use, Agriculture, Irrigation & Cropping Pattern

Geographical Area (Sq. Km.)		1575.49
Forest Area (Sq. Km.)		129.54
Cultivable Area (Sq. Km.)		961.94
Net Sown Area (Sq. Km.)		400.84
Double Cropped Area (Sq. Km.)		157.67
Area under Irrigation (Sq. Km.)	Surface Water	104.25
	Ground Water	50.97
Principal Crops *(Reference year 2015-16)*	**Crop Type**	**Area (Sq. Km.)**
	Wheat	18.93
	Jowar	135.05
	Bajra	192.11
	Gramharbhara	19.83
	Sugarcane	22.91
	Onion	11.08
	Cotton	4.56

1.6. Water Level Behaviour

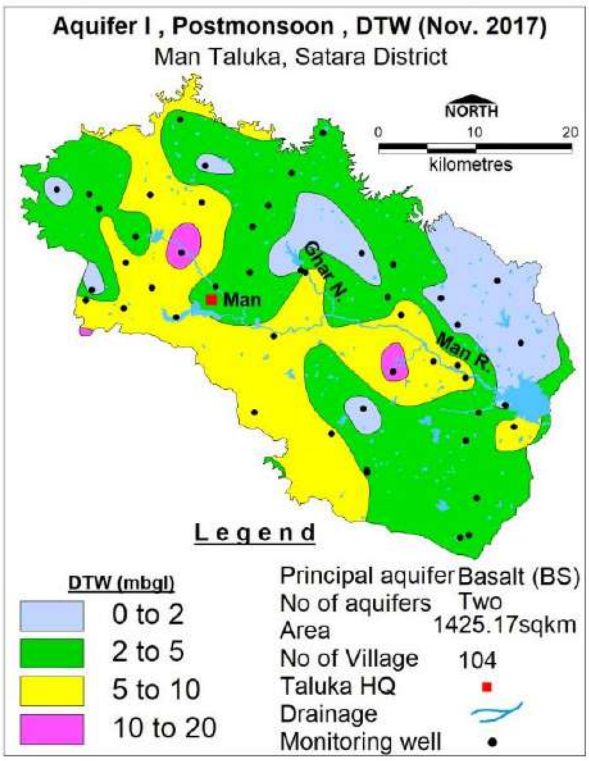
1.6.1 Phreatic Aquifer (Shallow aquifer)

Pre-Monsoon (May-2017):



The depth to water levels in Man Taluka during May 2017 ranges between 3.2 to 14.1 mbgl . Water level less than 10 mbgl has been observed in major parts of the taluka while water level in the range of 10 to 20 mbgl is observed in central and western part of the taluka shallow water level less than 5 mbgl observed atAndheli and Kulkjai villages.

Post-Monsoon (November-2017):

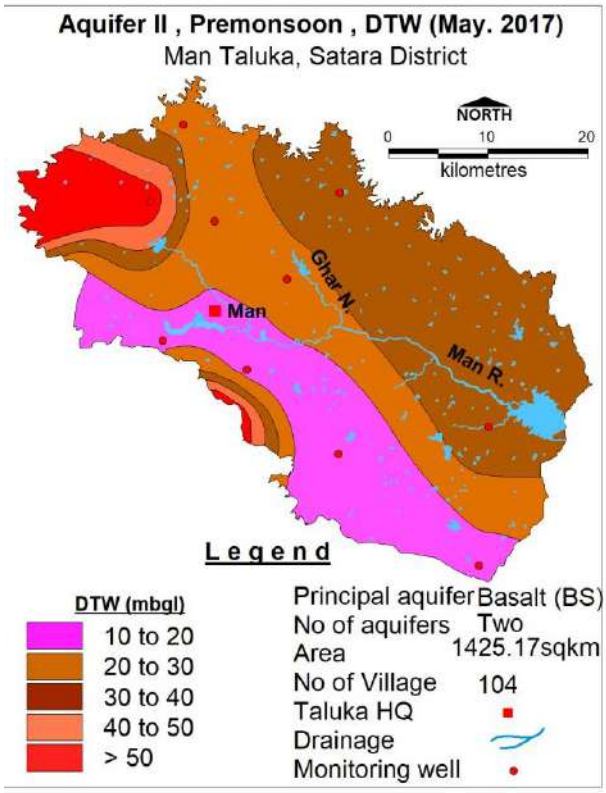


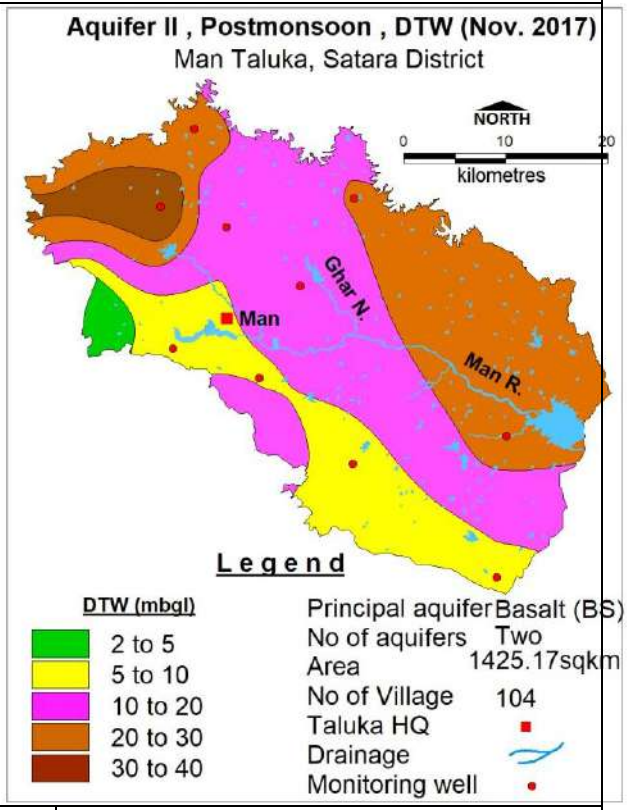
The depth to water levels in Man Taluka during Nov. 2017 ranges between 0.1 to 12.6 mbgl. Water Level less than 10 mbgl has been observed in major parts of the taluka while water level in the range of 10 to 20 mbgl is observed at Bidal-New and Divad village. Less than 2mbgl observed in north estern and central parts of the taluka

1.6.2 Aquifer-II: Semi-Confined/Confined, Deeper aquifer (Basalt)

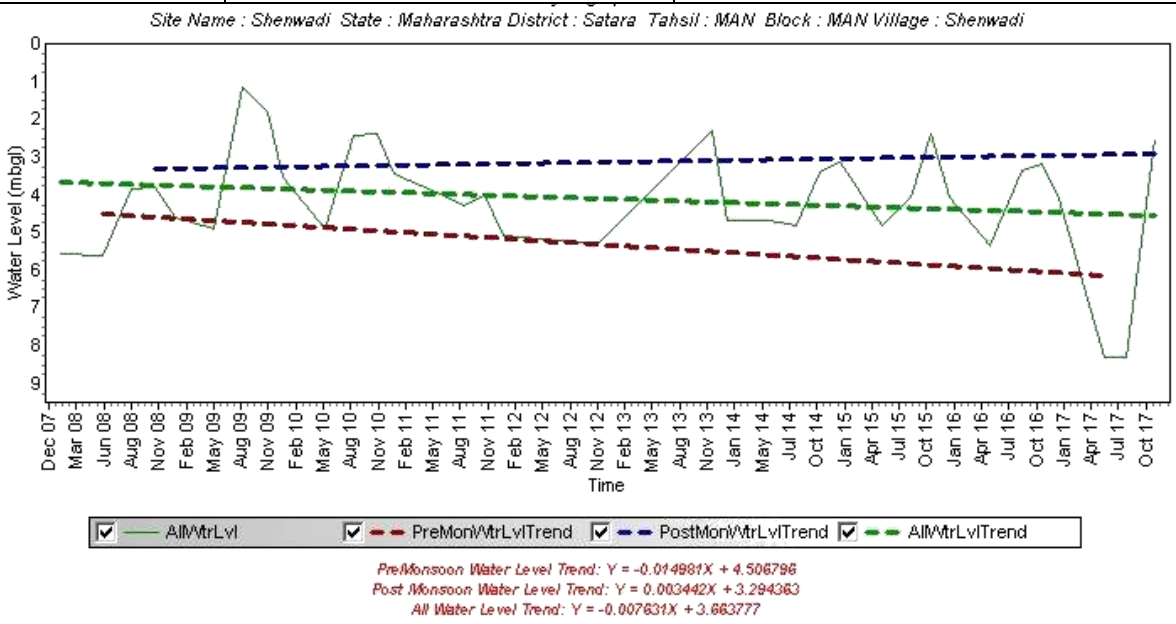
Pre-Monsoon (May-2017): The depth to water levels in Man Taluka during May 2017 ranges between 12 to 64.5 mbgl . Water level in the range of 20 to 40 mbgl has been observed in major parts of the taluka while water level in the range of 40 to 50 mbgl is observed in northern and estern part of the taluka. Deepest water level > 50 mbgl observed at Andhali villages.

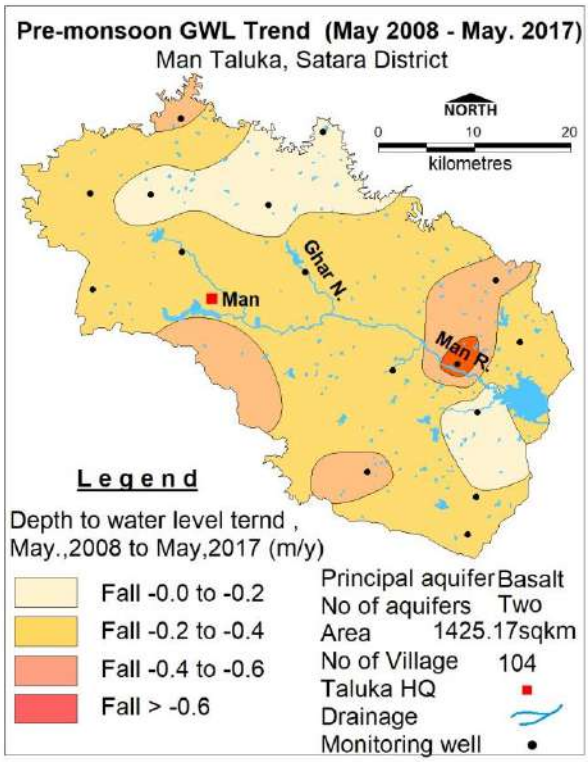
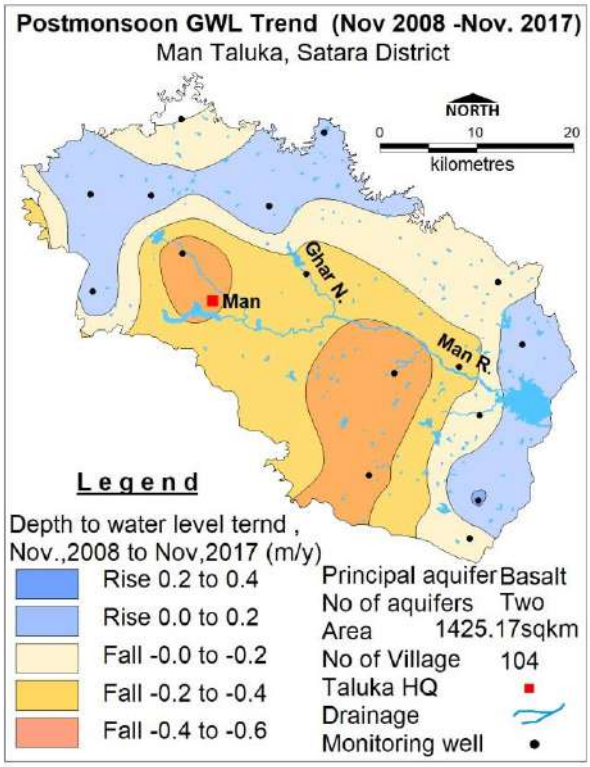
Post-Monsoon (November-2017): The depth to water levels in Man Taluka during May 2017 ranges between 3.2 to 37 mbgl . Water level in the range of 10 to 20 mbgl has been observed in major parts of the taluka while water level in the range of 20 to30 mbgl is observed in northern and estern part of the taluka. Deepest water level > 30 mbgl observed at Andhali villages.





1.6.3 . Hydrograph	Hydrograph shows Pre-monsoon falling trend @- 0.014981 m/year	Hydrograph shows Post-monsoon rising trend @ 0.00344 m/year

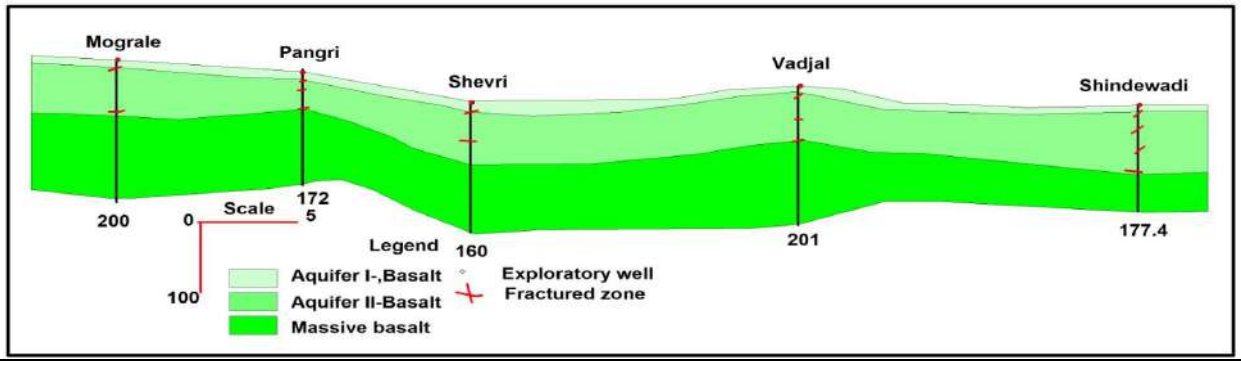


1.6.4 Water Level Trend (2008-2017)	
Pre-Monsoon trend	**Post-Monsoon trend**
Falling 0.061 to 0.698 m/year	Rising 0.09 to 0.21 m/year Falling 0.09 to 0.21 m/year
Declining trend up to 0.69 m/year is observed in almost entire taluka; decline in water level >0.2 m/year has been observed in 1242 sqkm (78% of total geographical area) major part of the taluka.	Declining trend up to 0.21 m/year is observed in major parts of the taluka; decline in water level >0.2 m/year has been observed in 688 sqkm (43% of total geographical area) . Rising water level trend has been observed in eastern and western parts of the taluka.
	

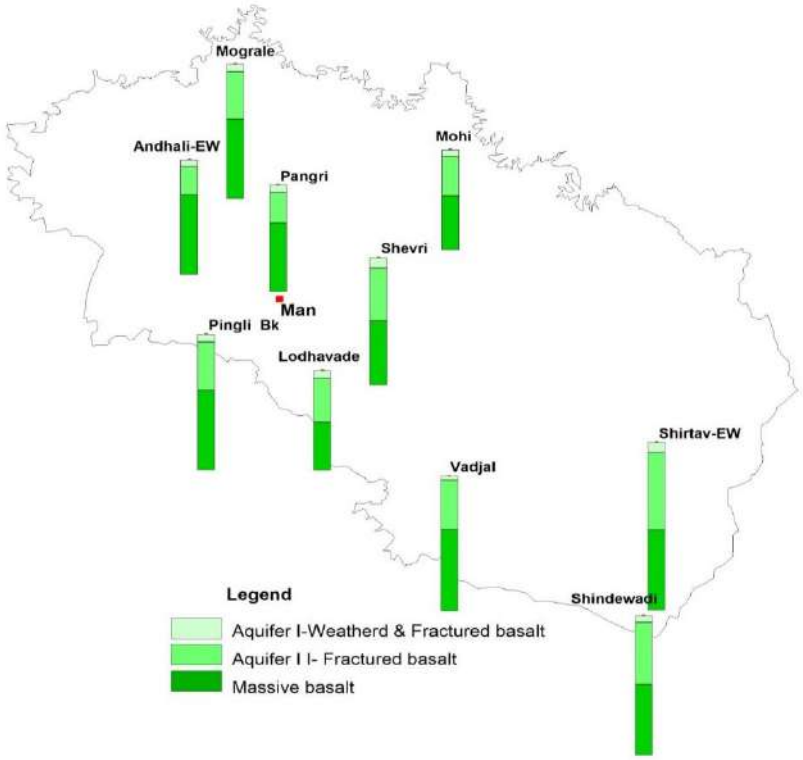
2. Ground Water Issues	I. Decline in water level >0.2 m/year has been observed in 1242 sqkm (78% of total geographical area) during premonsoon & 688 sqkm (43% of total geographical area) in postmonsoon, major part of the taluka. II. The stage of ground water development has increased over the period of time from 2004 to 2013 of the talukas from 68.44 % to 78.88 %. The main reason for ground water over draft is intensive irrigation for cash crop. III. Low ground water potential areas have been identified in 1300 sq km (about 80 % of the area, Yield less than 50 m3/day, mostly due to limited depth of weathering in Aquifer-I. IV. Taluka is experiencing frequent droughts ie, 22% Moderate & 6 % Severe.

3. AQUIFER DISPOSITION		
3.1. Number of Aquifers	Aquifer-I Basalt (Unconfined, Shallow aquifer) Weathered and jointed / fractured Basalt	Aquifer-II Basalt (Semiconfined /confined, Deeper aquifer) Jointed and fracture Basalt

3.2 Cross section



3.2. Lithological disposition



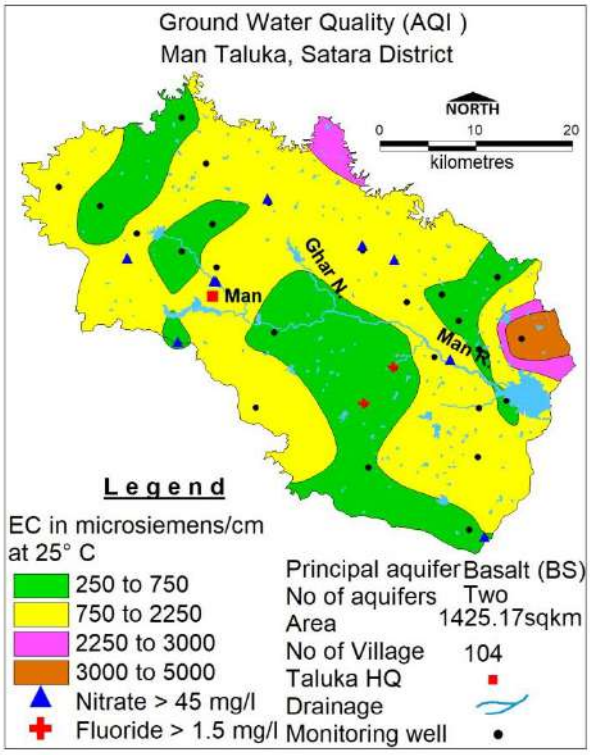
3.4. Aquifer Characteristics

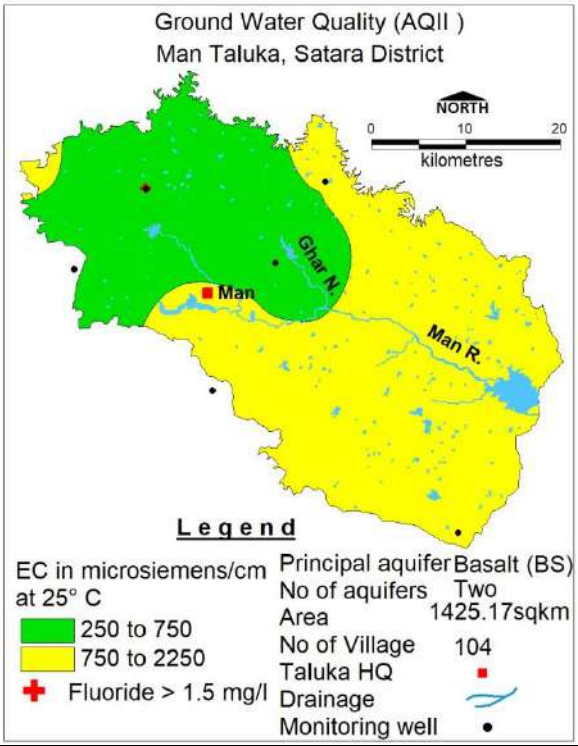
Major Aquifers	Basalt	Basalt
Type of Aquifer	Aquifer-I Basalt (Unconfined, Shallow aquifer) Weathered and jointed / fractured Basalt	Aquifer-II Basalt (Semiconfined /confined, Deeper aquifer) Jointed and fracture Basalt
Depth of Occurrence (mbgl)	9-88	76 - 161
Thickness of wearherd / fractured rocks (m)	6-14	1-6
Yield	10 - 100 m3/day	0.2 -3.0 lps
Specific yield (Sy)	0.018- 0.028	0.0025
Storativity (S)	--	0.00012-0.000357
Transmissivity (T) (m2/day)	T: 9-25m^2/day	T: 25-80 m^2/day

4.0 GROUND WATER QUALITY

4.1 Aquifer-I-(Phreatic shallow Aquifer) :In general the water quality of shallow aquifer in Man taluka is potable and good for drinking, domestic, industrial as	**4.2 Aquifer II (Semiconfined/Confined, Deeper aquifer)** :In general the water quality of deep aquifer in Man taluka is potable and very good for

well as irrigation purposes, except around Pingli, Mordi, Mhaswadi,Bholvadi,Kasarwadi and Shenewadi are not fit for drinking purpose if directly consumed without treatment. Nitrate more than 45 mg per litre was detected in water sample. High concentration of fluoride is found in Divadi and Gatewadi. Around Dhuldeo very high salinity prevails (EC >2250 µS/cm), which is not suitable for drinking, domestic, industrial as well as irrigation purposes. Ground water can be used for drinking only after treatment and for irrigation for very high salt tolerant crops and with proper soil and crop management practices.	drinking, domestic, industrial as well as irrigation purposes. High concentration of fluoride is found in Andhali village is not fit for drinking purpose if directly consumed without treatment.





5. GROUND WATER RESOURCE

5.1 Aquifer-I: Phreatic /Shallow Aquifer (Basalt)

Ground Water Recharge Worthy Area (Sq. Km.)	1425.17
Total Annual Ground Water Recharge (MCM)	175.01
Natural Discharge (MCM)	8.75
Net Annual Ground Water Availability (MCM)	166.26
Existing Gross Ground Water Draft for irrigation (MCM)	12.51
Existing Gross Ground Water Draft for domestic and industrial water supply(MCM)	6.04
Existing Gross Ground Water Draft for All uses(MCM)	131.14
Provision for domestic and industrial requirement supply to 2025(MCM)	12.20
Net Ground Water Availability for future irrigation development(MCM)	29.04
Stage of Ground Water Development (%)	78.88
Category	SAFE

5.2 Aquifer-II : Semiconfined/Confined/ Deeper Aquifer (Basalt)

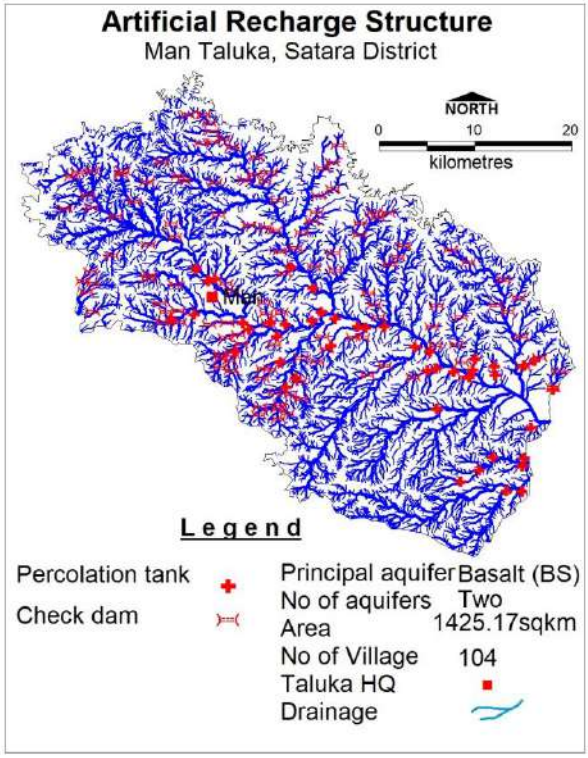
Mean thickness (m)	Area (sqkm)	Piezometric head (m)	Specific yield	Storativity	Resource above confining	Resource in confining aquifer	Total Resource (MCM)

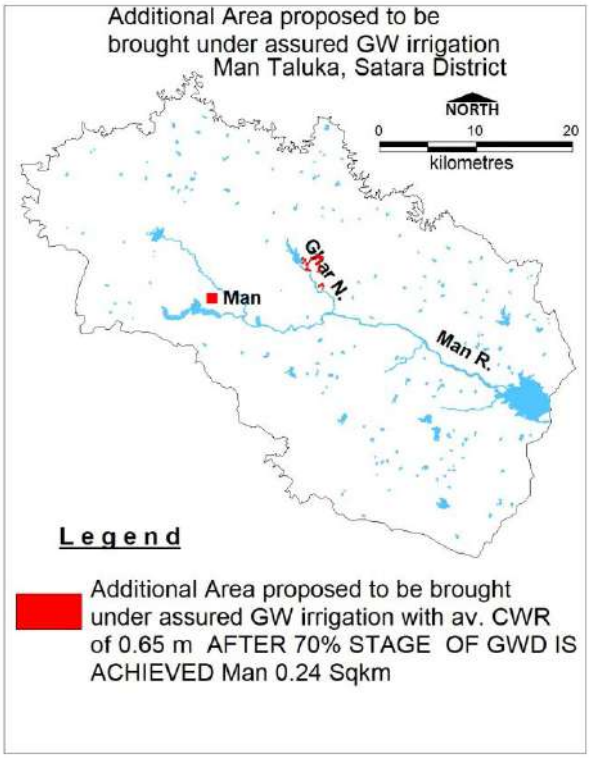
					layer (MCM)	(MCM)	
4.416	1425.62	25	0.00233	0.000194367	6.927334	14.6686033	21.59595

6.0. GROUND WATER RESOURCE MANAGEMENT.		
6.1. Supply Side Management		
Net Available Resource (MCM)		166.26
Gross Annual Draft (MCM)		131.14
Agricultural Supply -GW		12.51
Agricultural Supply -SW		93.825
Domestic Supply - GW		6.04
Domestic Supply - SW		1.51
Total Supply		113.885
Area of Taluka (Sq. Km.)		1425.17
Area suitable for Artificial recharge(Sq. Km)		538.93
Type of Aquifer		Hard Rock
Area feasible for Artificial Recharge(WL >5mbgl) (Sq. Km.)		538.93
Volume of Unsaturated Zone (MCM)		3853.02
Average Specific Yield		0.02
Volume of Sub surface Storage Space available for Artificial Recharge (MCM)		77.0604
Surplus water Available (MCM)		13.203785
Proposed Structures	Percolation Tank (Av. Gross Capacity-100 TCM*2 fillings = 200 TCM)	Check Dam (Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM)
Number of Structures	46	133
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	6.9	2.9925
RTRWH Structures – Urban Areas		
Households to be covered (25% with 50 m^2area)	12,000.00	
Total RWH potential (MCM)	0.34	
Rainwater harvested / recharged @ 80% runoff co-efficient	0.268176	
RTRWH Structures – Urban Areas Economically not viable & Not Recommended		
6.2. Demand Side Management		
Micro irrigation techniques		
Sugarcane crop area (Total Sugarcane crop area 22.91Sqkm), about 14 sqkm area is ground water irrigated ,100 % ground water irrigated (20 sqkm) proposed to be covered under Drip (sq.km.)		14
Volume of Water expected to be saved (MCM). Surface Flooding req- 2.45 m. Drip Req. - 1.88, WUE- 0.57 m		7.98
Proposed Cropping Pattern change		Not proposed
6.3. Expected Benefits		
Net Ground Water Availability (MCM)		166.26
Additional GW resources available after Supply side interventions (MCM)		9.8925
Ground Water Availability after Supply side intervention		176.1525
Existing Ground Water Draft for All Purposes (MCM)		131.14
GW draft after Demand Side Interventions (MCM)		123.16
Present stage of Ground Water Development (%)		78.88
Expected Stage of Ground Water Development after interventions (%)		69.92
Alternate Water Sources Available		Nil

6.4 Development Plan	
Volume of water available for GWD to 60% (MCM)	0.14675
Proposed Number of DW(@ 1.5 ham for 90% of GWR Available)	9
Proposed Number of BW(@ 1.5 ham for 10% of GWR Available)	1
Additional Area (sq.km.) proposed to be brought under assured GW irrigation with av. CWR of 0.65 m	0.23

Regulatory Measures	60m borewell/tube well
Proposed AR Structures	**Additional area proposed to be bought under Assussred GW Irrigation**





11.0 AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, PHALTAN TALUKA, SATARA DISTRICT, MAHARASHTRA

1. SALIENT FEATURE

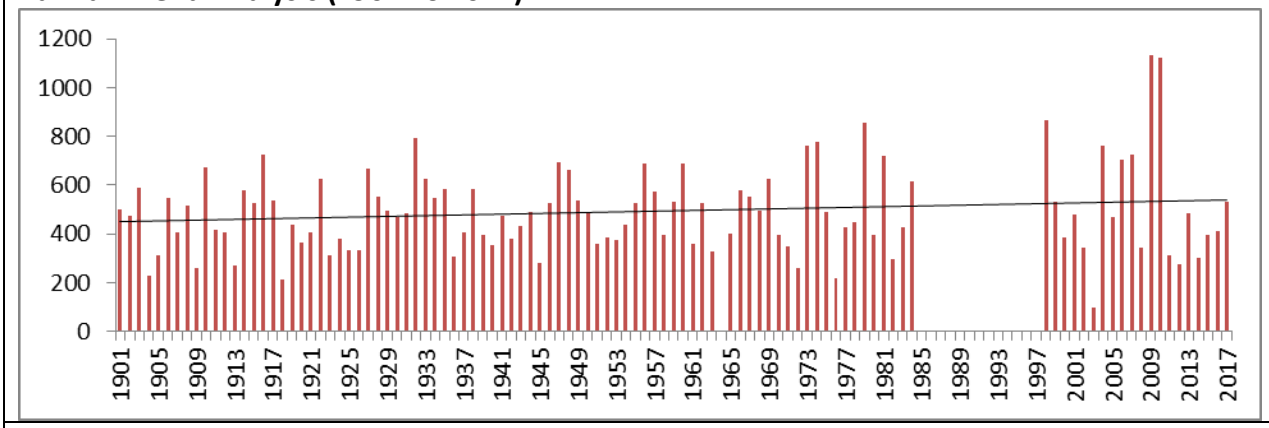
1.1 Introduction

Taluka Name	PHALTAN
Geographical Area (Sq. Km.)	1167.04
Hilly Area (Sq. Km)	63.59
Saline Area (Sq. Km.)	0
Ground Water worthy Area (Sq. Km.)	1103.45
Population (2011)	3,42,667
Climate	Summar Tropical

1.2 Rainfall Analysis

Normal Rainfall (mm)	532.1 mm
Annual Rainfall (2017)(mm)	531.29 mm
Decadal Average Annual Rainfall (2007-17) (mm)	491.1 mm
Long Term Rainfall Analysis(1901-2017)	Rising Trend 0.772 mm/year Probability of Normal/Excess Rainfall- 55% & 21%. Probability of Drought (Moderate/Severe)-: 20% Moderate & 3% Severe.

Rainfall Trend Analysis (1901 To 2017)



1.3. Geomorphology, Soil & Geology

Geomorphic Unit	Plateau Undissected to highly Dissected, with weathered thickness ranging from 0 to 2 m.Mojor parts of the taluka covered with Plateau moderately Dissected (PLM), 0-1m weathering, northern parts covered with pediplain,and southern parts by hilly dessected plateau.
Soil	In general they are clayey loam in texture and fairly high in calcium carbonate, high porosity but moderate to low permeability, thus having low to moderate infiltration capacity. Based on physical characteristics the soils of the area have been classified into three major groups: Medium black soil, Red Sandy soils and Shallow black soils
Geology	Deccan Traps (Basalt) Age: Upper Cretaceous to Lower Eocene

1.4. Hydrology & Drainage

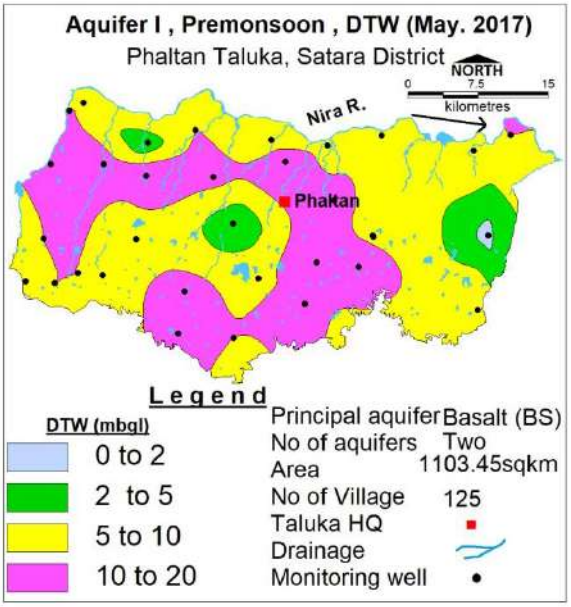
Hydrology	Bigger Minor Irrigation Project (>100 Ha.)	Completed: -1 Majori rrigation Tanks
	Minor Irrigation Project (<100 Ha.)	Completed: -11 Irrigation pond, 180 PT, 76 KT weirs
Drainage	The central part of taluka is drain by Nira rivers and its tributaries, flow from south to north direction the area falls in Upper Bhima Upto Conl. With Sina catchment of the krishna basin.	

1.5. Land Use, Agriculture, Irrigation & Cropping Pattern		
Geographical Area (Sq. Km.)		1167.04
Forest Area (Sq. Km.)		108.92
Cultivable Area (Sq. Km.)		794.26
Net Sown Area (Sq. Km.)		410.63
Double Cropped Area (Sq. Km.)		233.56
Area under Irrigation (Sq. Km.)	Surface Water	124.77
	Ground Water	90.34
Principal Crops*(Reference year 2015-16)*	**Crop Type**	**Area (Sq. Km.)**
	Rice	0.09
	Wheat	44.04
	Jowar	247.93
	Bajra	82.02
	Maize	13.87
	Gramharbhara	4.9
	Sugarcane	46.37
	Onion	8.54
	Cotton	8.82
	Ground nut	4.12
	Sunflower	3.9

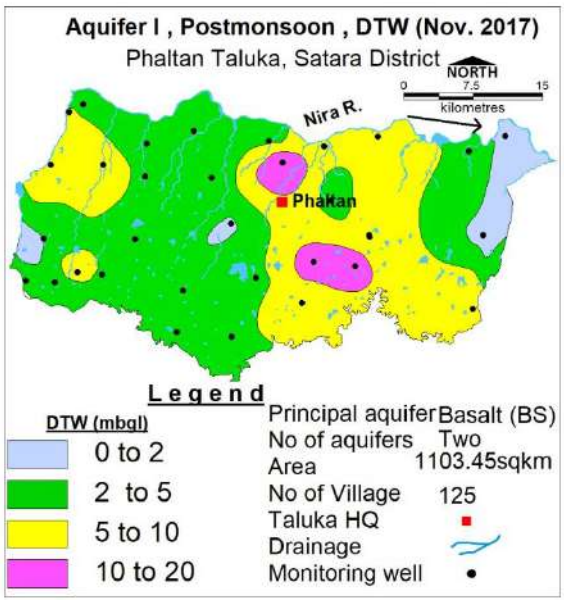
1.6. Water Level Behaviour

1.6.1 Aquifer I : Phreatic / Shallow Aquifer(Basalt)

Pre-Monsoon (May-2017): The depth to water levels in Phaltan Taluka during May 2017 ranges between 1.7 to 16.8 mbgl. Water level less than 10 mbgl has been observed in major parts of the taluka while water level in the range of 10 to 20 mbgl is observed in central and western and southern part of the taluka.



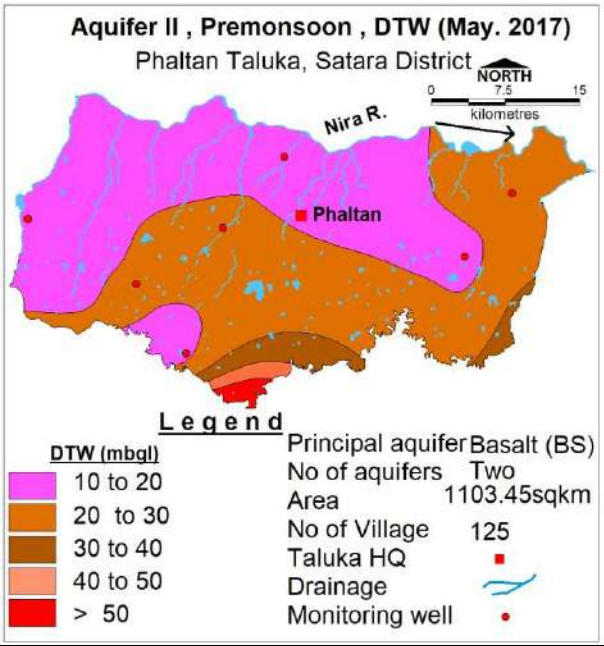
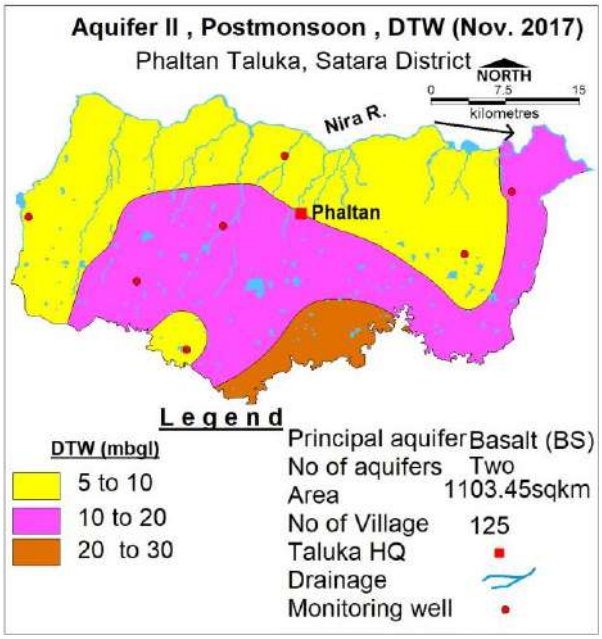
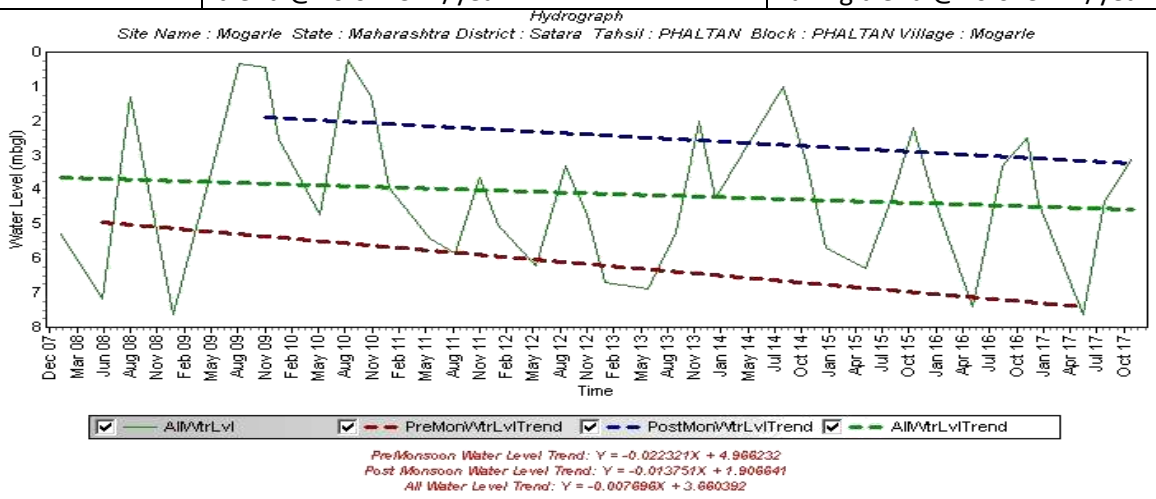
Post-Monsoon (November-2017): The depth to water levels in Phaltan Taluka during Nov. 2017 ranges between 1.4 to 14.2 mbgl. Water Level less than 5 mbgl has been observed in major parts of the taluka while water level in the range of 5 to 10 mbgl is observed in central estern parts and less than 2mbgl observed in north estern parts of the taluka.



1.6.2 Aquifer II: Semi-Confined/Confined /Deeper Aquifer

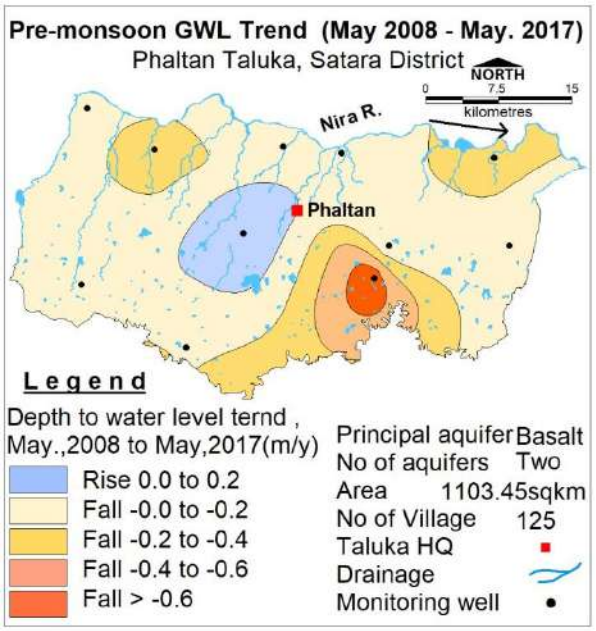
Pre-Monsoon (May-2017): The depth to water levels in Phaltan Taluka during May 2017 ranges between 12 to 60 mbgl. Water level in the range

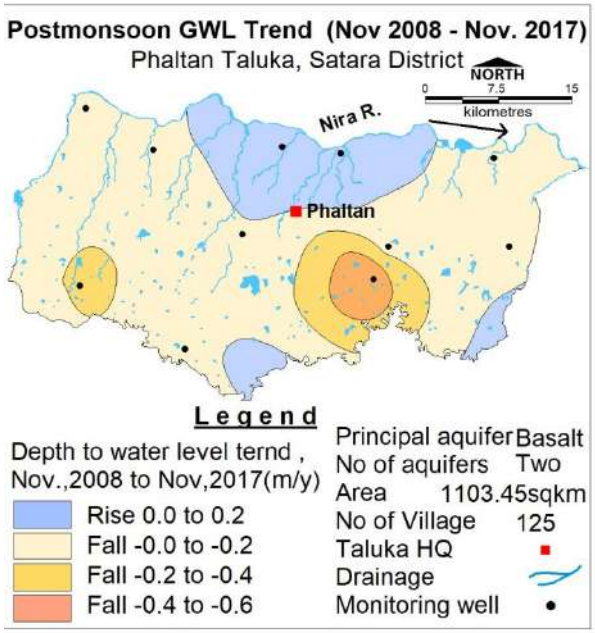
Post-Monsoon (November-2017): The depth to water levels in Phaltan Taluka during Nov. 2017 ranges between 5 to 30 mbgl. Water Level less than 10 mbgl

of 10 to 20 mbgl has been observed in northern parts of the taluka while water level in the range of 20 to 30 mbgl is observed in estern and southern part of the taluka.Deepest water level > 50 mbgl observed southern part of the taluka.	has been observed in northern parts of the taluka along Nira River while water level in the range of 10 to 20 mbgl is observed in central & southern parts. Water level in the range of 20 to 30 mbgl is observed in small patch in southern part of the taluka.	
		
1.6.3 Hydrograph	Hydrograph shows Pre-monsoon falling trend @ -0.0223 m/year	Hydrograph shows Post-monsoon falling trend @- 0.0137 m/year
		

1.6.4 Water Level Trend (2008-2017)

Pre-Monsoon trend	Post-Monsoon trend
Rising 0.0107 to 0.172 m/year	Rising 0.15 to 0.17 m/year
Falling 0.014 to 0.697 m/year	Falling 0.01 to 0.56 m/year
Declining trend up to 0.697 m/year is observed in almost entire taluka; decline in water level >0.2 m/year has been observed in 315 sqkm (27% of total geographical area) . Rising water level trend has been observed in small patch in central part of the taluka.	Declining trend up to 0.56 m/year is observed in almost entire taluka; decline in water level >0.2 m/year has been observed in 144 sqkm (12% of total geographical area). Rising water level trend has been observed in small patch in northern part of the taluka.



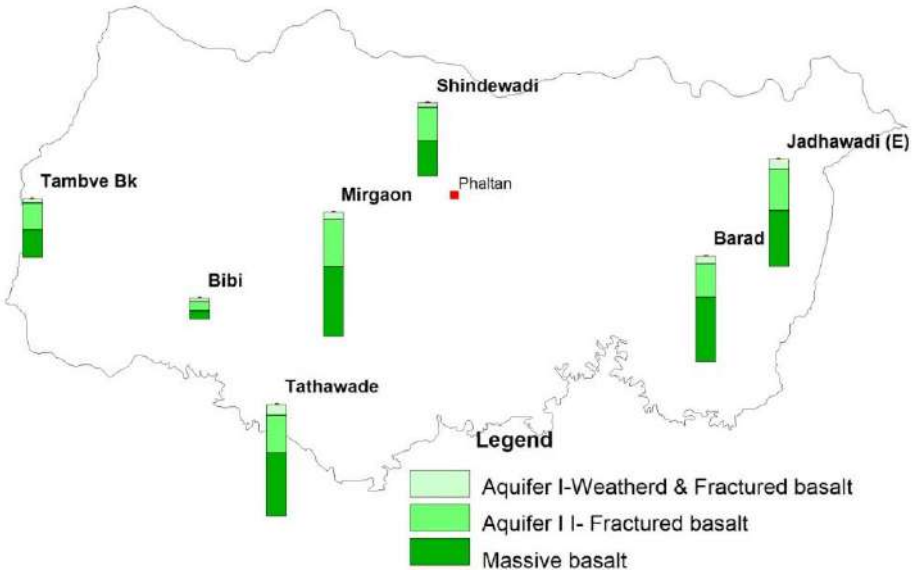


2. Ground Water Issues	I. Decline in water level >0.2 m/year has been observed in 315 sqkm (27 % of total geographical area) during premonsoon & 144 sqkm (12% of total geographical area) in postmonsoon, major part of the taluka. II. The stage of ground water development has increased over the period of time from 2004 to 2013 of the talukas from 86.2 % to 88.62 %. The main reason for ground water over draft is intensive irrigation for cash crop. III. Low ground water potential areas have been identified in 700 sq km (about 63 % of the area, Yield less than 50 m3/day, mostly due to limited depth of weathering in Aquifer-I IV. Frequent droughts 20% Moderate & 3% Severe.

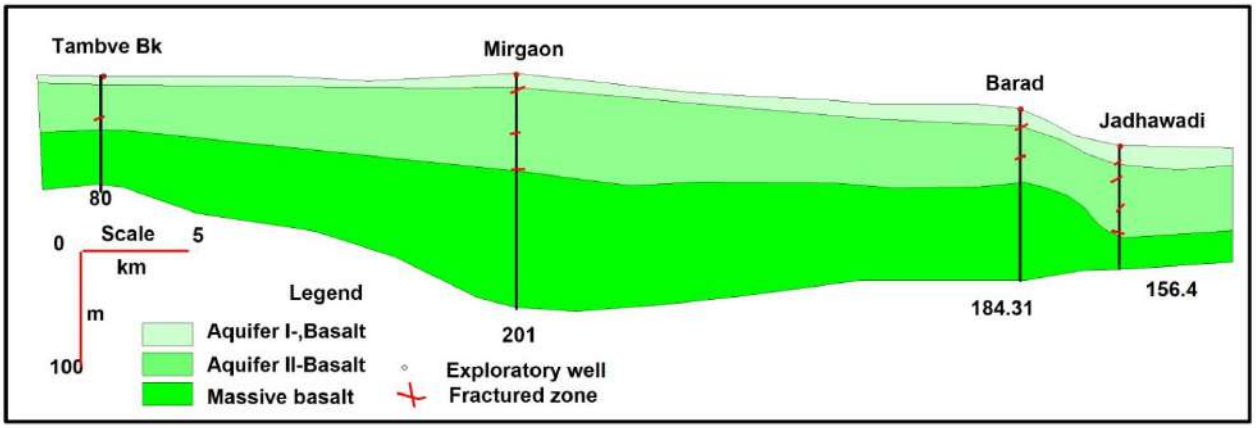
3. AQUIFER DISPOSITION

3.1. Number of Aquifers	Aquifer-I Basalt (Unconfined, Shallow aquifer) Weathered and jointed / fractured Basalt	Aquifer-II Basalt (Semiconfined /confined, Deeper aquifer) Jointed and fracture Basalt

3.2. Lithological Disposition



3.3. Cross Sections



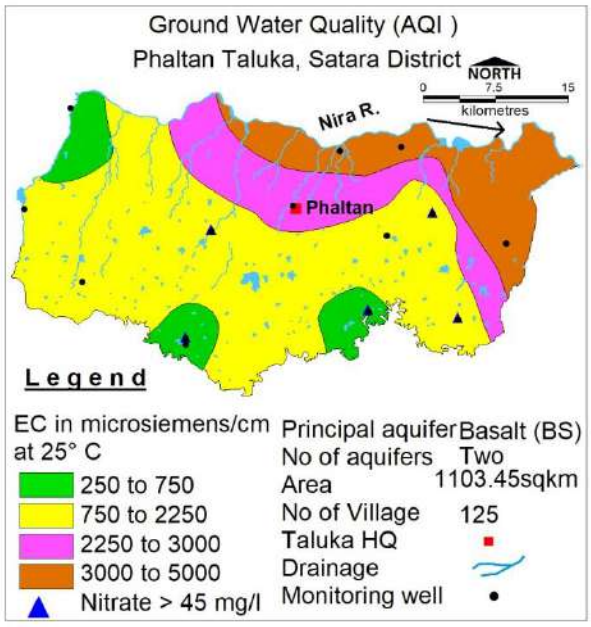
3.4. Aquifer Characteristics

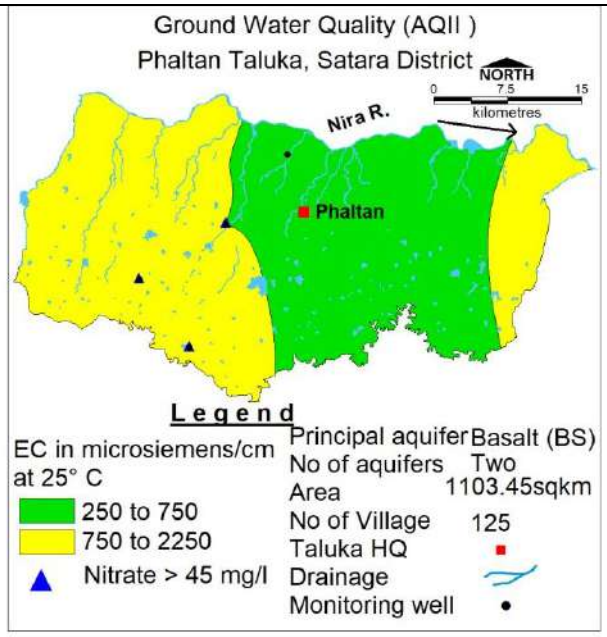
Major Aquifers	Basalt	Basalt
Type of Aquifer	Aquifer-I Basalt (Unconfined, Shallow aquifer) Weathered and jointed / fractured Basalt	Aquifer-II Basalt (Semiconfined /confined, Deeper aquifer) Jointed and fracture Basalt
Depth of Occurrence (mbgl)	9-28	25 - 193
Thickness of wearherd /fractured rocks (m)	5-14	0.5-6
Yield	10 - 100 m3/day	0.2 - 3.0 lps
Specific yield (Sy)	0.018- 0.028	0.0025
Storativity (S)		0.000157-0.00025
Transmissivity (T) (m2/day)	T:10-25m^2/day	T: 20-70 m^2/day

4.0 GROUND WATER QUALITY

4.1 Aquifer-I : Phreatic/ Shallow Aquifer (Basalt) :In general the water quality of shallow aquifer in Phaltan taluka is potable and good for drinking, domestic, industrial as well as irrigation purposes, except around Thatvade, Mirgaon, Nimbak, Javeli and Mongrale are not fit for drinking purpose if directly consumed without treatment. Nitrate more than 45 mg per litre was detected in water sample from around Somanthal, Gokheli, Rajuri and Phaltan very high salinity prevails (EC >2250 µS/cm), which is not suitable for drinking, domestic, industrial as well as irrigation purposes. Ground water can be used for drinking only after treatment and for irrigation for very high salt tolerant crops and with proper soil and crop management practices.

4.2 Aquifer-II :Semiconfined/Confined Deeper Aquifer (Basalt) :In general the water quality of deep aquifer in Phaltan taluka is potable and very good for drinking, domestic, industrial as well as irrigation purposes. Except Nitrate more than 45 mg per litre was detected in water sample at places around Mirgaon, Bibi and Tathwade which is not fit for drinking purpose if directly consumed without treatment.





5. GROUND WATER RESOURCE

5.1 Aquifer-I: Phreatic, Shallow Aquifer (Basalt)

Ground Water Recharge Worthy Area (Sq. Km.)	1103.45
Total Annual Ground Water Recharge (MCM)	154.52
Natural Discharge (MCM)	8.27
Net Annual Ground Water Availability (MCM)	146.25
Existing Gross Ground Water Draft for irrigation (MCM)	124.87
Existing Gross Ground Water Draft for domestic and industrial water supply(MCM)	4.74
Existing Gross Ground Water Draft for All uses(MCM)	129.61
Provision for domestic and industrial requirement supply to 2025(MCM)	8.69
Net Ground Water Availability for future irrigation development(MCM)	9.19
Stage of Ground Water Development (%)	88.62
Category	SAFE

5.2 Aquifer-II: Semiconfined/Confined/ Deeper Aquifer (Basalt)

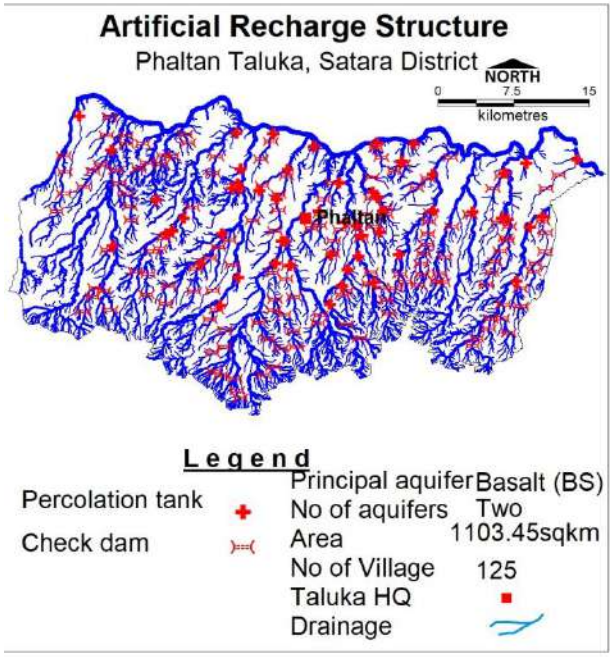
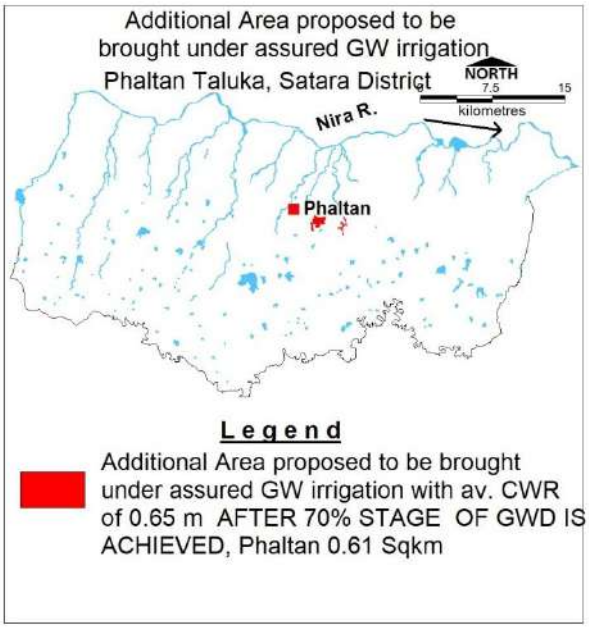
Mean thickness (m)	Area (sqkm)	Piezometric head (m)	Specific yield	Storativity	Resource above confining layer (MCM)	Resource in confining aquifer (MCM)	Total Resource (MCM)
3.5	1103.53	27.5	0.00333	0.0002035	6.1756298	12.8616422	19.03727

6.0. GROUND WATER RESOURCE MANAGEMENT

6.1. Supply Side Management

Net Available Resource (MCM)	146.2495659
Gross Annual Draft (MCM)	129.6086248
Agricultural Supply -GW	124.867323
Agricultural Supply -SW	112.293
Domestic Supply - GW	4.741301744
Domestic Supply - SW	1.185325436
Total Supply	243.0869502
Area of Taluka (Sq. Km.)	1103.45
Area suitable for Artificial recharge(Sq. Km)	641.81

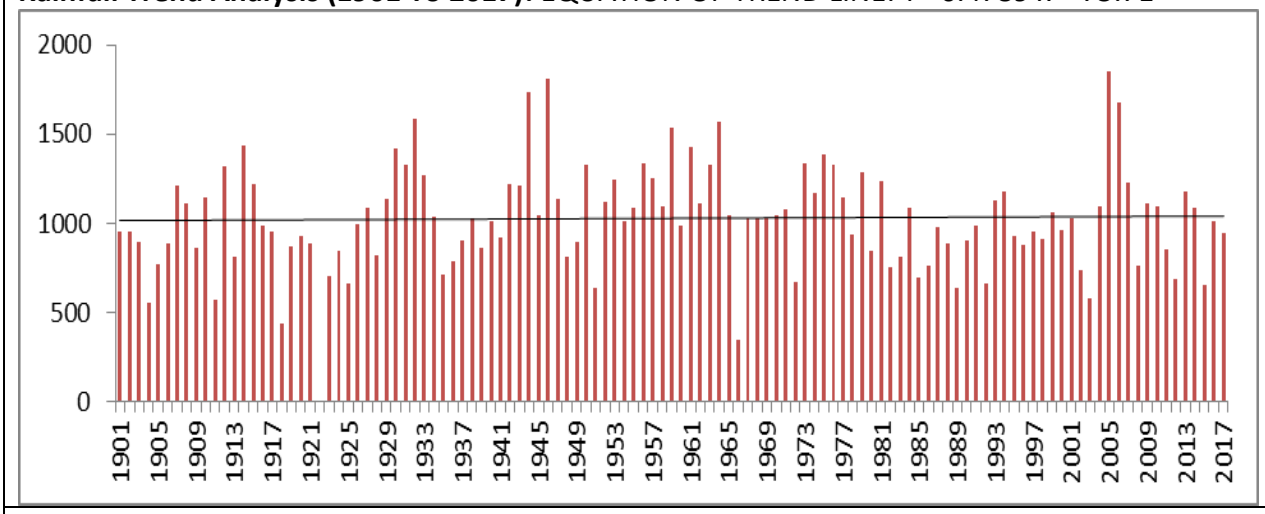
Type of Aquifer		Hard Rock
Area feasible for Artificial Recharge(WL >5mbgl) (Sq. Km.)		641.81
Volume of Unsaturated Zone (MCM)		3853.02
Average Specific Yield		0.02
Volume of Sub surface Storage Space available for Artificial Recharge (MCM)		77.0604
Surplus water Available (MCM)		15.724345
Proposed Structures	Percolation Tank (Av. Gross Capacity-100 TCM*2 fillings = 200 TCM)	Check Dam (Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM)
Number of Structures	55	157
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	8.25	3.5325
RTRWH Structures – Urban Area		
Households to be covered (25% with 50 m^2 area)	17,700.00	
Total RWH potential (MCM)	0.50	
Rainwater harvested / recharged @ 80% runoff co-efficient	0.40002	Economically not viable & Not Recommended
6.2. Demand Side Management		
Micro irrigation techniques		
Sugarcane crop area (Total Sugarcane crop area 46.37 Sqkm) ,about 346 sqkm area is ground water irrigated ,100 % ground water irrigated (20 sqkm) proposed to be covered under Drip (sq.km.)		34
Volume of Water expected to be saved (MCM). Surface Flooding req- 2.45 m. Drip Req. - 1.88, WUE- 0.57 m		19.38
Proposed Cropping Pattern change		Not proposed
6.3. Expected Benefits		
Net Ground Water Availability (MCM)		146.2495659
Additional GW resources available after Supply side interventions (MCM)		11.7825
Ground Water Availability after Supply side intervention		158.0320659
Existing Ground Water Draft for All Purposes (MCM)		129.6086248
GW draft after Demand Side Interventions (MCM)		110.2286248
Present stage of Ground Water Development (%)		88.62
Expected Stage of Ground Water Development after interventions (%)		69.75
Other Interventions Proposed, if any		
Alternate Water Sources Available		Nil
6.4 Development Plan		
Volume of water available for GWD to 60% (MCM)		0.393821372
Proposed Number of DW(@ 1.5 ham for 90% of GWR Available)		24
Proposed Number of BW(@ 1.5 ham for 10% of GWR Available)		3
Additional Area (sq.km.) proposed to be brought under assured GW irrigation with av. CWR of 0.65 m		0.61
Regulatory Measures	60m borewell/tube well	

Proposed AR Structures	Additional area proposed to be bought under assured GW irrigation
	

12.0 AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, SATARA TALUKA, SATARA DISTRICT, MAHARASHTRA

1. SALIENT FEATURE		
1.1 Introduction		
Taluka Name		**SATARA**
Geographical Area (Sq. Km.)		888.83
Hilly Area (Sq. Km)		105.47
Saline Area (Sq. Km.)		0
Ground Water worthy Area (Sq. Km.)		783.36
Population (2011)		5,02,049
Climate		Summar Tropical
1.2 Rainfall Analysis		
Normal Rainfall (mm)		943.9 mm
Annual Rainfall (2017)(mm)		939.58 mm
Decadal Average Annual Rainfall (2007-17) (mm)		1030.5 mm
Long Term Rainfall Analysis(1901-2017)	Rising Trend 0.19 mm/year Probability of Normal/Excess Rainfall- 66% & 16%. Probability of Drought (Moderate/Severe)-: 16% Moderate & 2% Severe.	

Rainfall Trend Analysis (1901 To 2017): EQUATION OF TREND LINE: Y= 0.4789 x + 75.71



1.3. Geomorphology, Soil & Geology	
Geomorphic Unit	Plateau Undissected to highly Dissected, with weathered thickness ranging from 0 to 2 m.Mojor parts of the taluka covered with Plateau moderately Dissected (PLM), 0-1m weathering,south western parts covered with lateritic capping ,and Linear Ridge / Dyke
Soil	In general they are clayey loam in texture and fairly high in calcium carbonate, high porosity but moderate to low permeability, thus having low to moderate infiltration capacity. Based on physical characteristics the soils of the area have been classified into three major groups: Medium black soil, Red Sandy soils and Shallow black soils
Geology	Deccan Traps (Basalt), Age: Upper Cretaceous to Lower Eocene

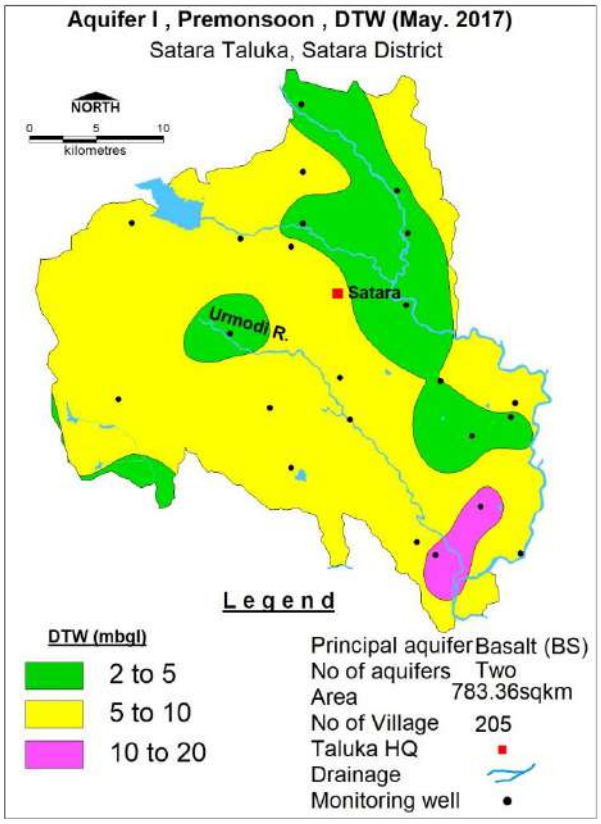
1.4. Hydrology & Drainage		
Hydrology	Bigger Minor Irrigation Project (>100 Ha.)	Completed: -2 Major irrigation Tanks
	Minor Irrigation Project (<100 Ha.)	Completed: -11 Irrigation pond, 28 PT, 66 KT weirs
Drainage	The taluka is drain by Urmodi rivers and its tributaries, flow from NW to SE direction, the	

	area fall Main Krishna above confl. Catchment of Krishna basin.	
1.5. Land Use, Agriculture, Irrigation & Cropping Pattern		
Geographical Area (Sq. Km.)	888.83	
Forest Area (Sq. Km.)	85	
Cultivable Area (Sq. Km.)	863.22	
Net Sown Area (Sq. Km.)	736.63	
Double Cropped Area (Sq. Km.)	184.95	
Area under Irrigation (Sq. Km.)	Surface Water	108.46
	Ground Water	76.08
Principal Crops *(Reference year 2015-16)*	**Crop Type**	**Area (Sq. Km.)**
	Rice	67.7
	Wheat	38.19
	Jowar	324.57
	Maize	16.31
	Gramharbhara	21.91
	Sugarcane	46.89
	Onion	20.38
	Ground nut	167.01

1.6. Water Level Behaviour

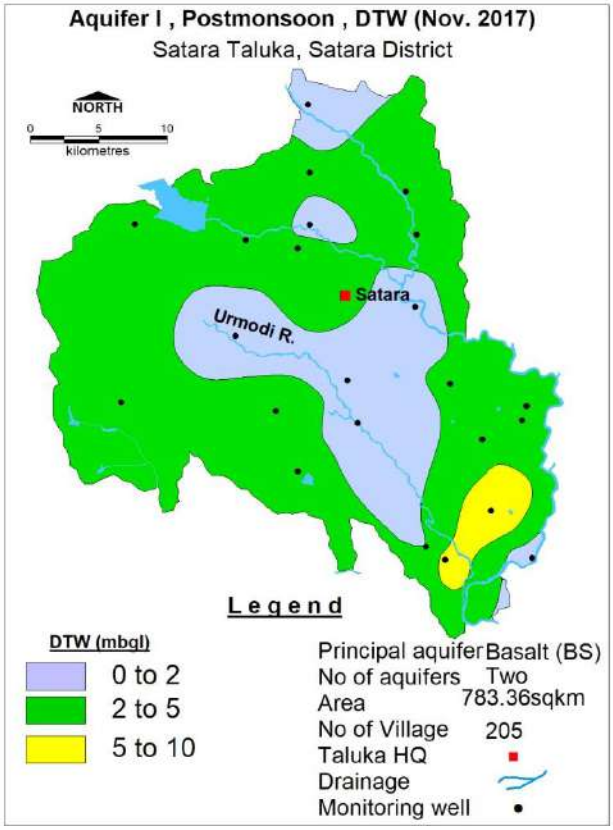
1.6.1 Aquifer I: Phreatic Aquifer(Shallow aquifer)

Pre-Monsoon (May-2017):



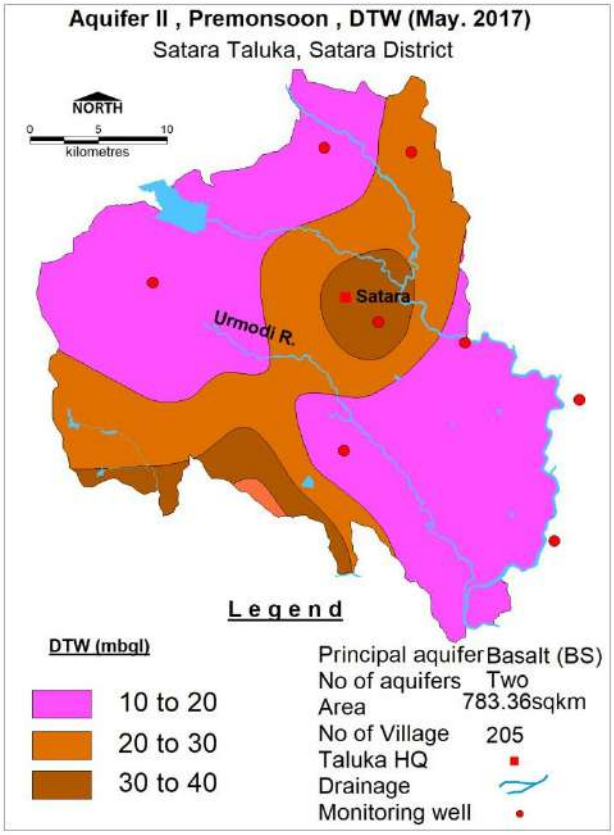
The depth to water levels in Satara Taluka during May 2017 ranges between 2.5 to 12.2 mbgl . Water level less than 10 mbgl has been observed in major parts of the taluka while water level in the range of 10 to 20 mbgl is observed Fatyapur and Khodad villages, and less than 5 mbgl obseved in isolated

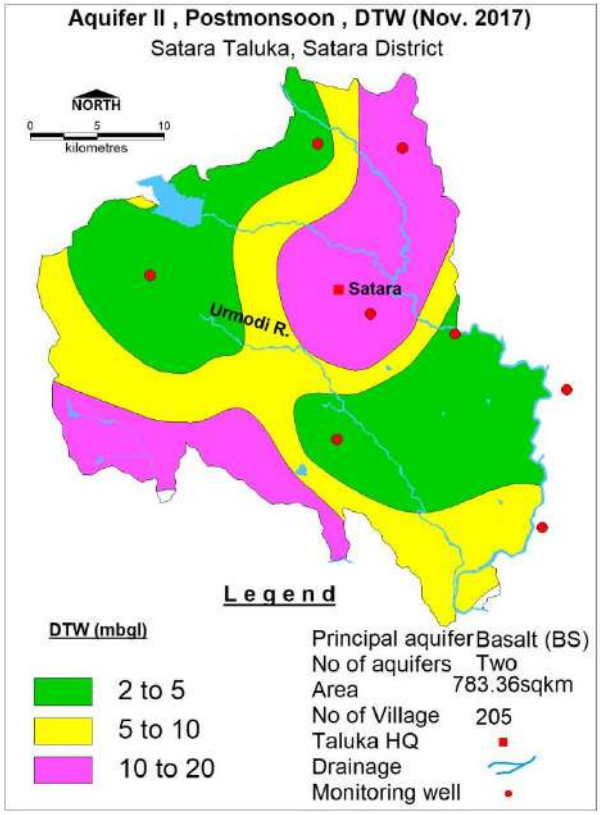
Post-Monsoon (November-2017):



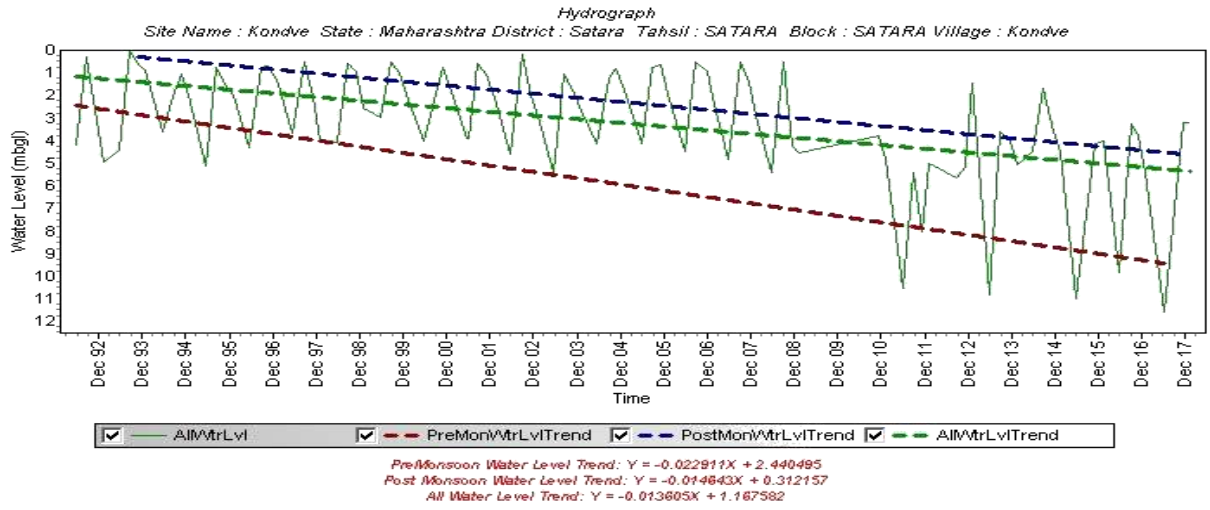
The depth to water levels in Satara Taluka during Nov. 2017 ranges between 0.5 to 8.2 mbgl . Water Level less than 5 mbgl has been observed in major parts of the taluka while water level in the range of 5 to 10 mbgl is observed Fatyapur and Khodad villages, and less than 2 mbgl obseved in isolated

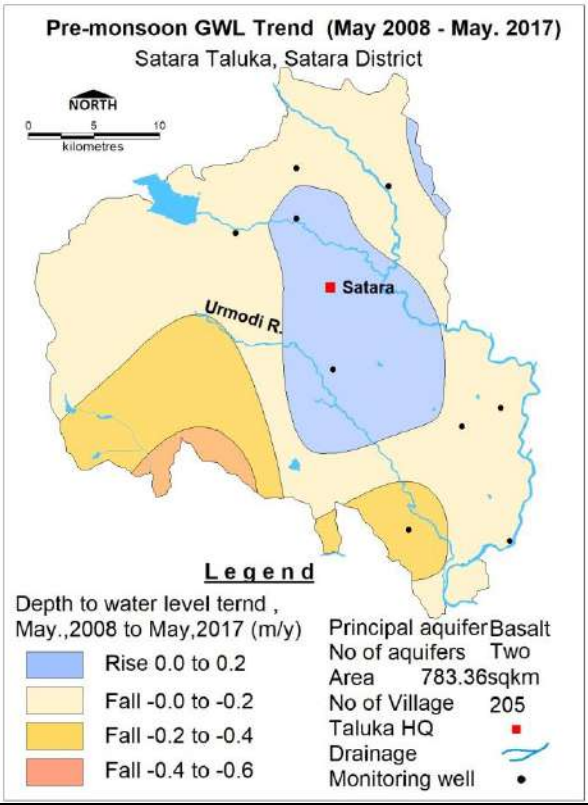
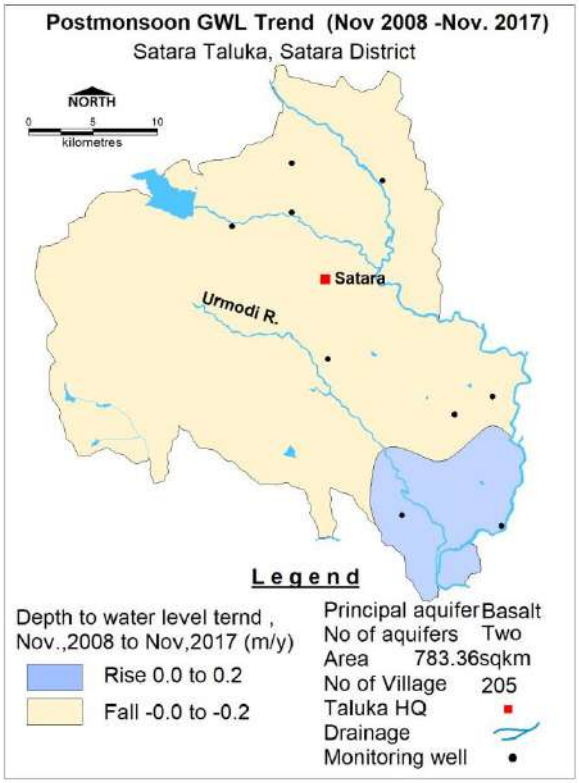
patches in north central parts.	patches in north centraland northern part
1.6.2 Aquifer-II: Semi-Confined/Confined, Deeper aquifer (Basalt)	
Pre-Monsoon (May-2017): The depth to water levels in Satara Taluka during May 2017 ranges between 9 to 74.5 mbgl. Water level in the range of 10 to 20 mbgl has been observed in major parts of the taluka while water level in the range of 20 to 50 mbgl is observed in central and southern part of the taluka.	**Post-Monsoon (November-2017):** The depth to water levels in Satara Taluka during Nov. 2017 ranges between 1.4 to 35 mbgl. Water Level less than 10 mbgl has been observed in major parts of the taluka while water level in the range of 10 to 20 mbgl are observed in northern and southern part of the taluka.Deepest water level > 20 mbgl observed in southern part of the taluka.





1.6.3. Hydrograph	Hydrograph shows Pre-monsoon falling trend @- 0.022 m/year	Hydrograph shows Post-monsoon falling trend @ -0.0146 m/year

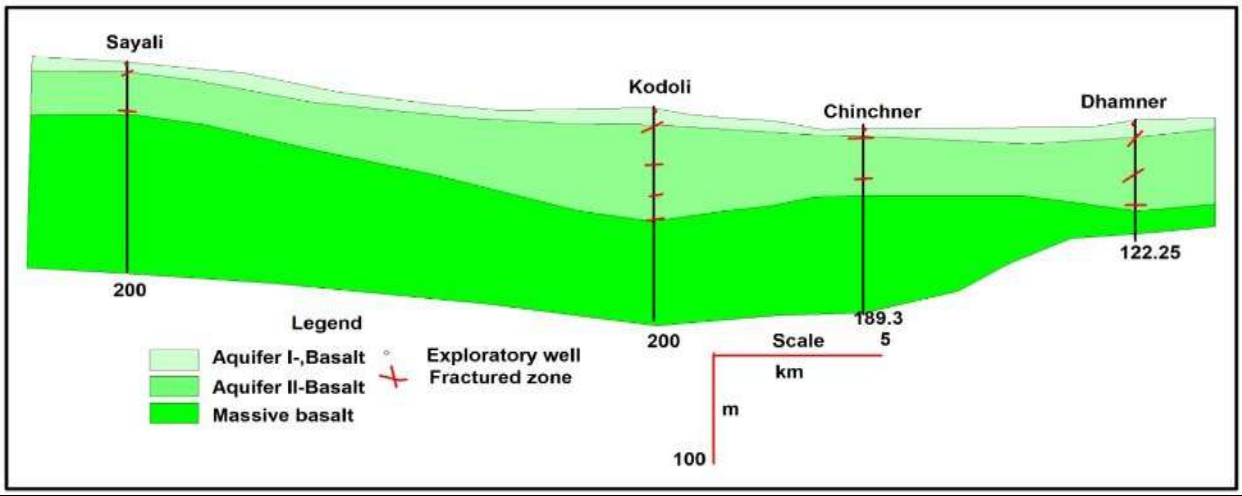


1.6.4 Water Level Trend (2008-2017)	
Pre-Monsoon trend	**Post-Monsoon trend**
Rising 0.152 to 0.157 m/year	Rising 0.04 to 0.16 m/year
Falling 0.0102 to 0.285 m/year	Falling 0.0053 to 0.13 m/year
Declining trend up to 0.285 m/year is observed in almost entire taluka; decline in water level >0.2 m/year has been observed in 178 sqkm (20% of total geographical area) . Rising water level trend has been observed in central parts of the taluka.	Declining trend up to 0.13 m/year is observed in almost entire taluka. Rising water level trend has been observed in southern part of the taluka.
	

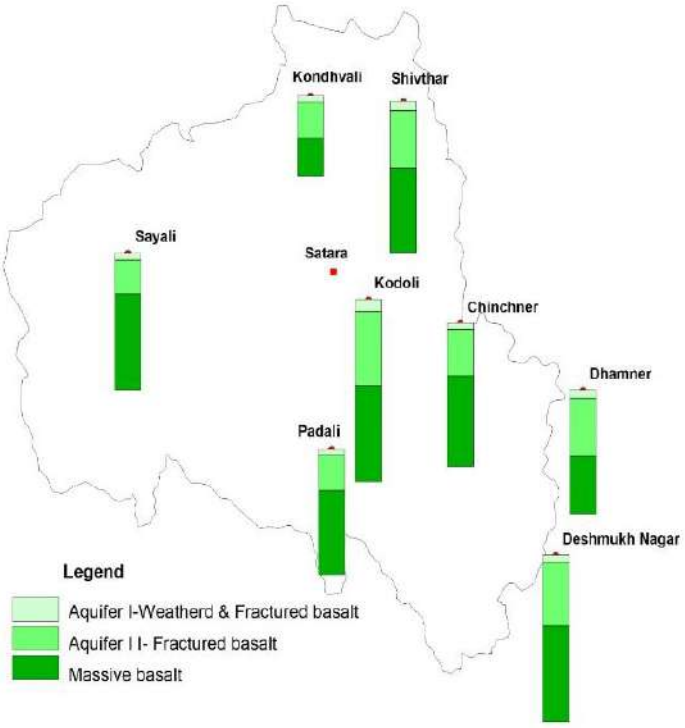
2. Ground Water Issues	I. Decline in water level >0.2 m/year has been observed in 178 sqkm (20% of total geographical area) during premonsoon. II. The stage of ground water development has increased over the period of time from 2004 to 2013 of the talukas from 53.56 % to 60.59 %. The main reason for ground water over draft is intensive irrigation for cash crop. Overall draft has increased from 72.46 MCM in 2004 to 80.21 MCM in 2013 III. Low ground water potential areas have been identified in 500 sq km (about 53 % of the area, Yield less than 50 m3/day, mostly due to limited depth of weathering in Aquifer-I.

3. AQUIFER DISPOSITION		
3.1. Number of Aquifers	Aquifer-I Basalt (Unconfined, Shallow aquifer) Weathered and jointed / fractured Basalt	Aquifer-II Basalt (Semiconfined /confined, Deeper aquifer) Jointed and fracture Basalt

3.2 Cross section



3.3. Lithological Disposition



3.4. Aquifer Characteristics

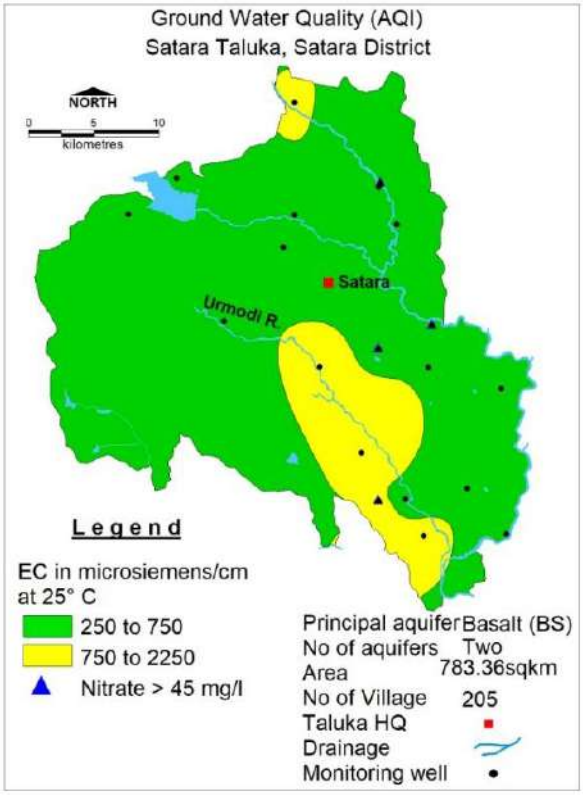
Major Aquifers	Basalt	Basalt
Type of Aquifer	Aquifer-I Basalt (Unconfined, Shallow aquifer) Weathered and jointed / fractured Basalt	Aquifer-II Basalt (Semiconfined /confined, Deeper aquifer) Jointed and fracture Basalt
Depth of Occurrence (mbgl)	9-28	70-154
Thickness of wearherd / fractured rocks (m)	5-14	0.5-9
Yield	10 - 100 m3/day	0.2 - 3 lps
Specific yield (Sy)	0.018- 0.02	0.0025
Storativity (S)		0.00012-0.000357

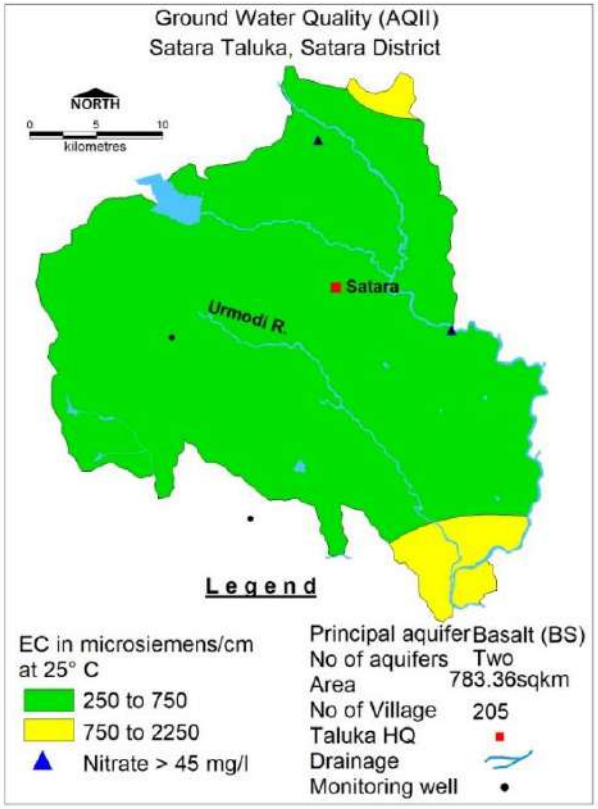
Transmissivity (T) (m2/day)	T: 10-30 m^2/day	T: 25-97 m^2/day

4.0 GROUND WATER QUALITY

4.1 Aquifer-I : Phreatic/ Shallow Aquifer (Basalt) :In general the water quality of shallow aquifer in Satara taluka is potable and good for drinking, domestic, industrial as well as irrigation purposes, except around Shendri,Atit,Vardhut and Chichner Vandan are not fit for drinking purpose if directly consumed without treatment. Nitrate more than 45 mg per litre was detected in water sample.

4.2 Aquifer-II :Semiconfined/Confined Deeper Aquifer (Basalt) :In general the water quality of deeper aquifer in Satara taluka is potable and good for drinking, domestic, industrial as well as irrigation purposes, except around Kontarwadi and Chichner Vandan are not fit for drinking purpose if directly consumed without treatment. Nitrate more than 45 mg per litre was detected in water sample.





5. GROUND WATER RESOURCE

5.1 Aquifer-I/ Phreatic Aquifer (Basalt)

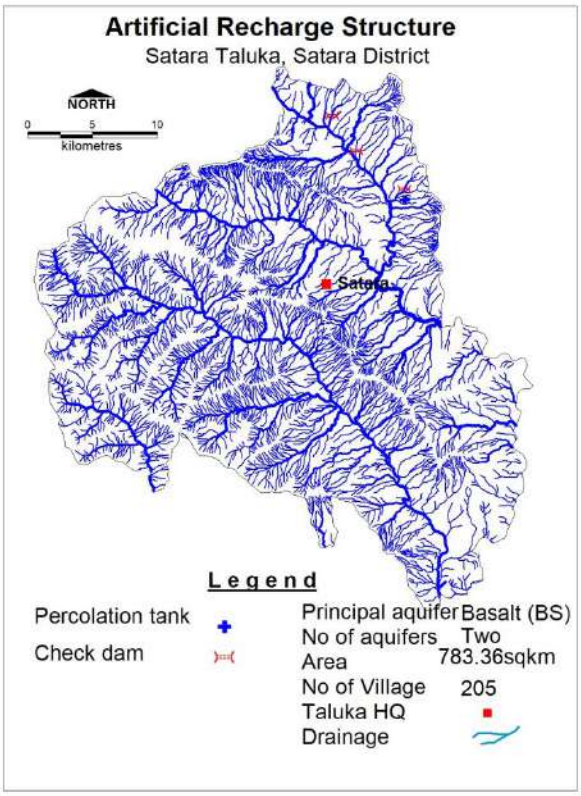
Ground Water Recharge Worthy Area (Sq. Km.)	783.36
Total Annual Ground Water Recharge (MCM)	139.37
Natural Discharge (MCM)	6.97
Net Annual Ground Water Availability (MCM)	132.40
Existing Gross Ground Water Draft for irrigation (MCM)	72.92
Existing Gross Ground Water Draft for domestic and industrial water supply(MCM)	7.30
Existing Gross Ground Water Draft for All uses(MCM)	80.21
Provision for domestic and industrial requirement supply to 2025(MCM)	13.09
Net Ground Water Availability for future irrigation development(MCM)	38.64
Stage of Ground Water Development (%)	60.59
Category	SAFE

5.2 Aquifer-II (Deeper aquifer) Semiconfined/Confined Aquifer (Basalt)							
Mean thickness (m)	Area (sqkm)	Piezometric head (m)	Specific yield	Storativity	Resource above confining layer (MCM)	Resource in confining aquifer (MCM)	Total Resource (MCM)
4.3	783.34	23	0.003036	0.0001822	3.2826646	10.2263470	13.50901

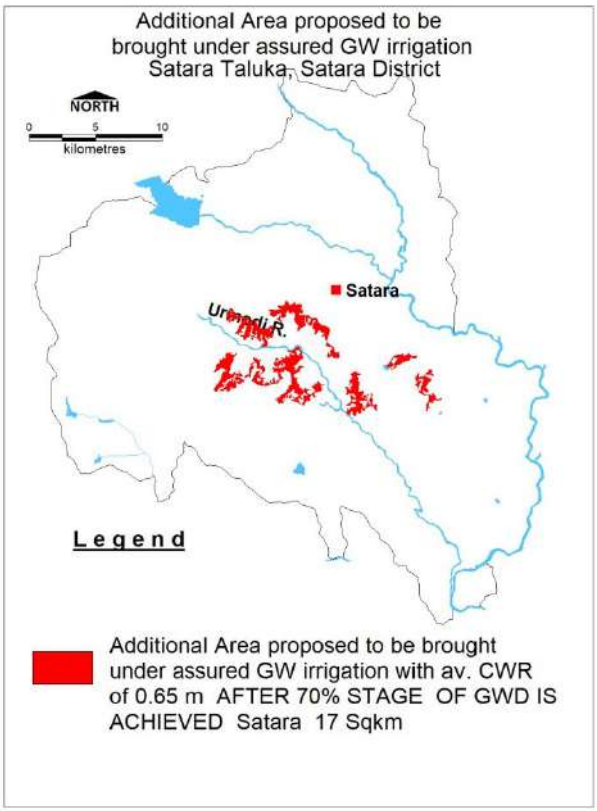
6.0. GROUND WATER RESOURCE MANAGEMENT		
6.1. Supply Side Management		
Net Available Resource (MCM)		132.3980959
Gross Annual Draft (MCM)		80.21499718
Agricultural Supply -GW		72.91929972
Agricultural Supply -SW		97.614
Domestic Supply - GW		7.295697465
Domestic Supply - SW		1.823924366
Total Supply		179.6529215
Area of Taluka (Sq. Km.)		783.36
Area suitable for Artificial recharge(Sq. Km)		12.74
Type of Aquifer		Hard Rock
Area feasible for Artificial Recharge(WL >5mbgl) (Sq. Km.)		783.36
Volume of Unsaturated Zone (MCM)		3853.02
Average Specific Yield		0.02
Volume of Sub surface Storage Space available for Artificial Recharge (MCM)		77.0604
Surplus water Available (MCM)		0.31213
Proposed Structures	Percolation Tank (Av. Gross Capacity-100 TCM*2 fillings = 200 TCM)	Check Dam (Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM)
Number of Structures	1	3
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	0.15	0.0675
RTRWH Structures – Urban Areas		
Households to be covered (25% with 50 m^2area)	24,900.00	
Total RWH potential (MCM)	0.70	
Rainwater harvested / recharged @ 80% runoff co-efficient	0.556465	**Economically not viable & Not Recommended**
6.2. Demand Side Management		
Micro irrigation techniques		
Sugarcane crop area (Total Sugarcane crop area 46.89 sqkm) , about 2 sqkm area is ground water irrigated ,100 % ground water irrigated (2 sqkm) proposed to be covered under Drip (sq.km.)		2
Volume of Water expected to be saved (MCM). Surface Flooding req- 2.45 m. Drip Req. - 1.88, WUE- 0.57 m		1.14
Proposed Cropping Pattern change		Not proposed
6.3. Expected Benefits		
Net Ground Water Availability (MCM)		132.3980959
Additional GW resources available after Supply side interventions (MCM)		0.2175

Ground Water Availability after Supply side intervention	132.6155959
Existing Ground Water Draft for All Purposes (MCM)	80.21499718
GW draft after Demand Side Interventions (MCM)	79.07499718
Present stage of Ground Water Development (%)	60.59
Expected Stage of Ground Water Development after interventions (%)	59.63
Alternate Water Sources Available	Nil
6.4 Development Plan	
Volume of water available for GWD to 60% (MCM)	13.75591992
Proposed Number of DW(@ 1.5 ham for 90% of GWR Available	825
Proposed Number of BW(@ 1.5 ham for 10% of GWR Available	92
Additional Area (sq.km.) proposed to be brought under assured GW irrigation with av. CWR of 0.65 m	21.16
Regulatory Measures	**60m borewell/tube well**

Proposed AR Structures



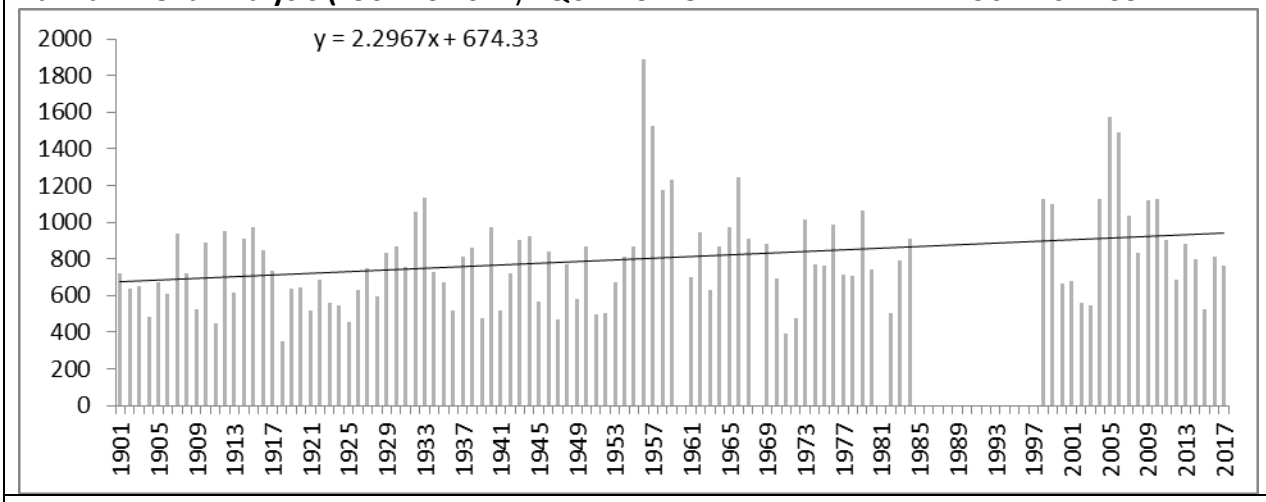
Additional area proposed to be bought under assured GW irrigation



13.0 AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, WAI TALUKA, SATARA DISTRICT, MAHARASHTRA

1. SALIENT FEATURE		
1.1 Introduction		
Taluka Name		**WAI**
Geographical Area (Sq. Km.)		622.78
Hilly Area (Sq. Km)		98.11
Saline Area (Sq. Km.)		0
Ground Water worthy Area (Sq. Km.)		524.67
Population (2011)		2,00,269
Climate		Summar Tropical
1.2 Rainfall Analysis		
Normal Rainfall (mm)		760 mm
Annual Rainfall (2017)(mm)		845.09 mm
Decadal Average Annual Rainfall (2007-17) (mm)		799.6 mm
Long Term Rainfall Analysis(1901-2017)	Rising Trend 2.3 mm/year Probability of Normal/Excess Rainfall- 60% & 17%. Probability of Drought (Moderate/Severe)-: 21% Moderate & 2% Severe.	

Rainfall Trend Analysis (1901 To 2017) EQUATION OF TREND LINE: Y= 2.2967x+674.33



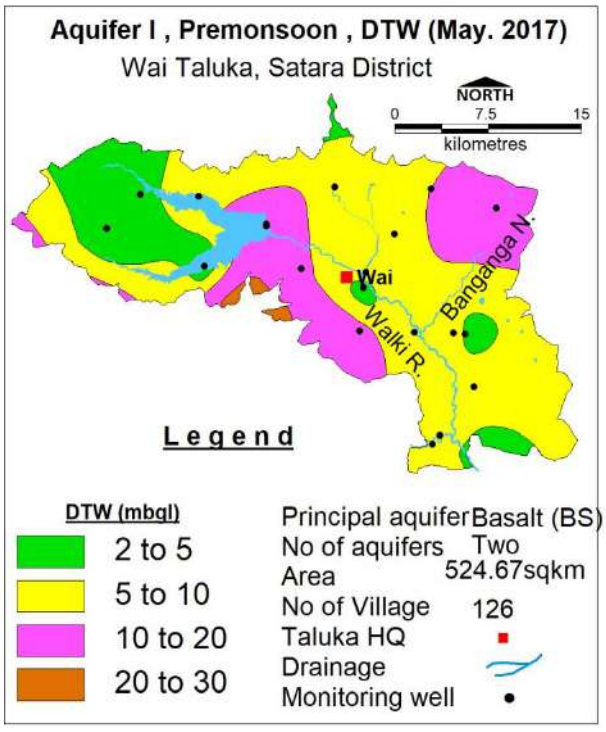
1.3. Geomorphology, Soil & Geology		
Geomorphic Unit	Plateau Undissected to highly Dissected, with weathered thickness ranging from 0 to 2 m.Mojor parts of the taluka covered with Plateau moderately Dissected (PLM), 0-1m weathering, south western parts covered with hill, and plateau top.	
Soil	In general they are clayey loam in texture and fairly high in calcium carbonate, high porosity but moderate to low permeability, thus having low to moderate infiltration capacity. Based on physical characteristics the soils of the area have been classified into three major groups: Medium black soil, Red Sandy soils and Shallow black soils	
Geology	Deccan Traps (Basalt) Age: Upper Cretaceous to Lower Eocene	
1.4. Hydrology & Drainage		
Hydrology	Bigger Minor Irrigation Project (>100 Ha.)	Completed: -2 Major,2 MI Tanks
	Minor Irrigation Project (<100 Ha.)	Completed: -2 Irrigation pond, 34 PT, 43 KT weirs
Drainage	The taluka is drain by Urmodi rivers and its tributaries, flow from NW to SE direction, the area fall Main Krishna above confl. Catchment of Krishna basin.	

1.5. Land Use, Agriculture, Irrigation & Cropping Pattern		
Geographical Area (Sq. Km.)		622.78
Forest Area (Sq. Km.)		127.66
Cultivable Area (Sq. Km.)		424.59
Net Sown Area (Sq. Km.)		308.8
Double Cropped Area (Sq. Km.)		192.32
Area under Irrigation (Sq. Km.)	Surface Water	114.69
	Ground Water	35.96
Principal Crops ***(Reference year 2015-16)***	**Crop Type**	**Area (Sq. Km.)**
	Rice	37.36
	Wheat	24.26
	Jowar	170.89
	Bajra	16.13
	Maize	10.13
	Gramharbhara	16.85
	Sugarcane	19.52
	Onion	9.54
	Cotton	1.57
	Ground nut	56.62
	Sunflower	2.26

1.6. Water Level Behaviour

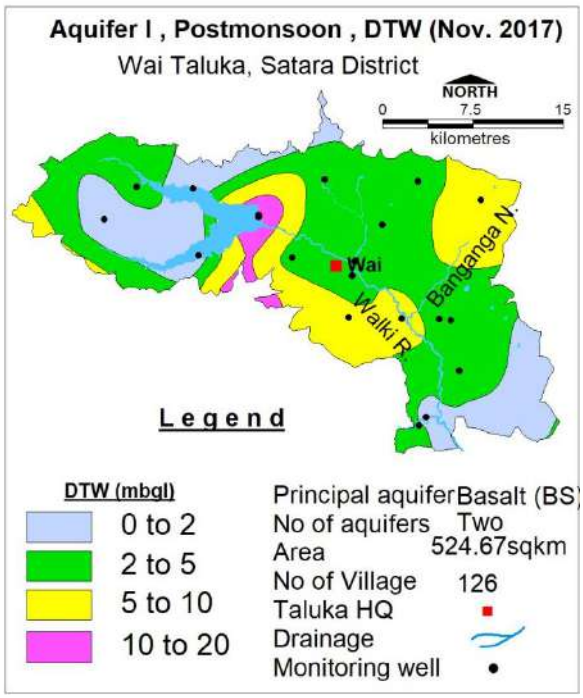
1.6.1 Aquifer I: Phreatic Aquifer (Shallow aquifer)

Pre-Monsoon (May-2017):



The depth to water levels in Wai Taluka ranges between 2.1 to 16.6 mbgl. Water level less than 10 mbgl has been observed in major parts of the taluka while water level in the range of 10 to 20 mbgl is observed in central, southern and northern part of the taluka.

Post-Monsoon (November-2017):

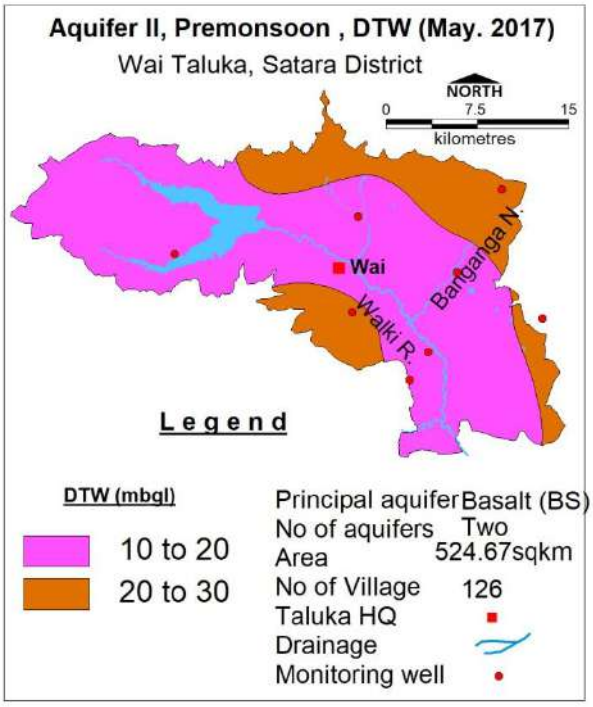


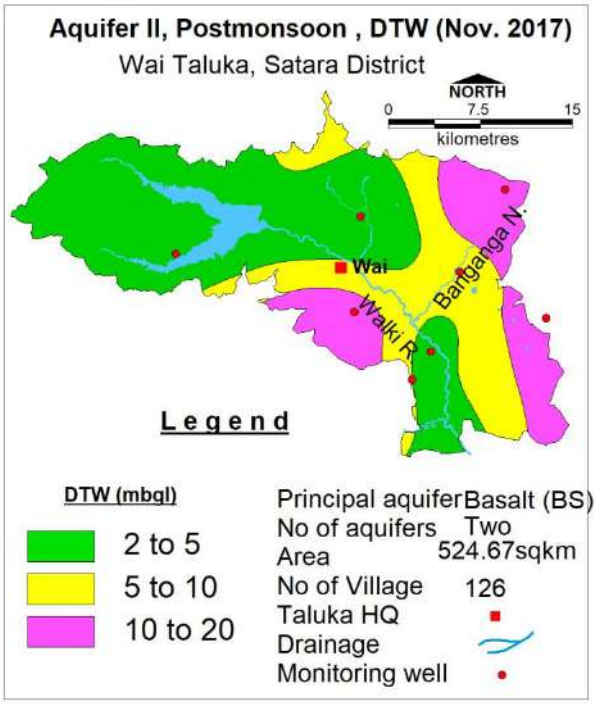
The depth to water levels in Khatav Taluka during Nov. 2017 ranges between 0.6 to 14.2 mbgl. Water Level less than 5 mbgl has been observed in major parts of the taluka while water level in the range of 5 to 10 mbgl is observed in southern parts and more than 10 mbgl observed at Dhom village.

1.6.2 Aquifer-II: Semi-Confined/Confined, Deeper aquifer (Basalt)

Pre-Monsoon (May-2017): The depth to water levels in Wai Taluka during May 2017 ranges between 12 to 25 mbgl. Water level in the range of 10 to 20 mbgl has been observed in major parts of the taluka while water level in the range of 20 to 30 mbgl is observed in northern and southern part of the taluka.

Post-Monsoon (November-2017): The depth to water levels in Wai Taluka during Nov. 2017 ranges between 1.6 to 17.3 mbgl. Water Level less than 10 mbgl has been observed in major parts of the taluka while water level in the range of 10 to 20 mbgl are observed in northern ,estern and southern part of the taluka.

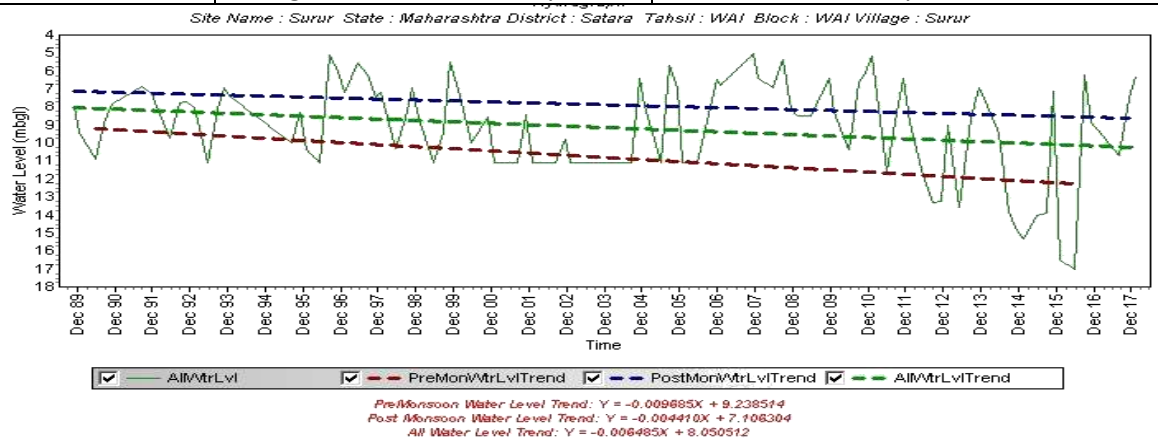




1.6.3. Hydrograph

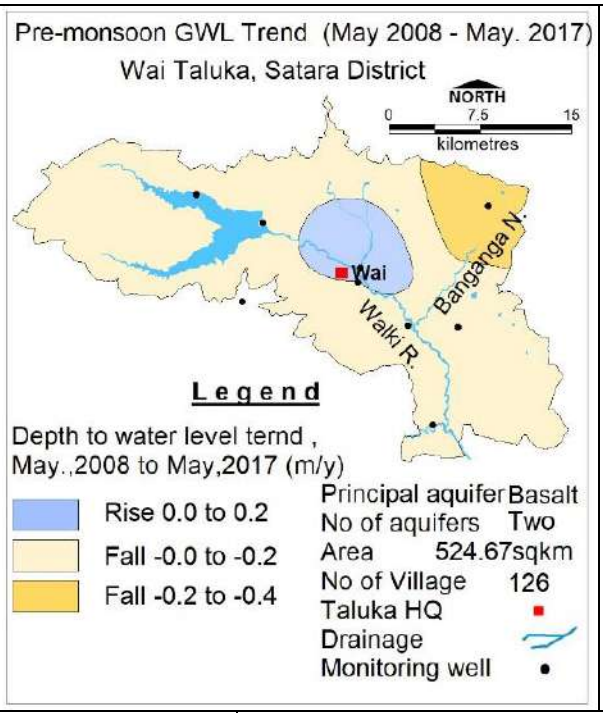
Hydrograph shows Pre-monsoon falling trend @ -0.0096 m/year

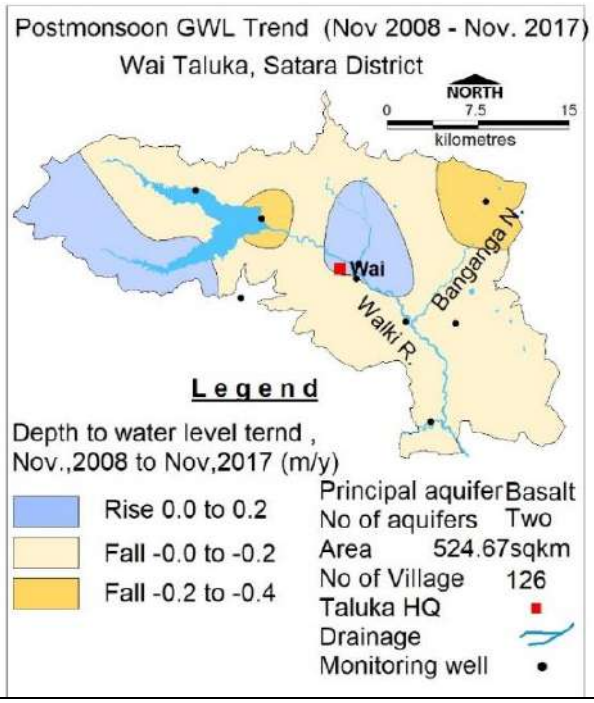
Hydrograph shows Post-monsoon falling trend @- 0.0044 m/year



1.6.4 Water Level Trend (2008-2017)

Pre-Monsoon trend	Post-Monsoon trend
Rising 0.1375 m/year	Rising 0.1167 m/year
Falling 0.009 to 0.3124m/year	Falling 0.006 to 0.265 m/year
Declining trend up to 0.312 m/year is observed in almost entire taluka; decline in water level >0.2 m/year has been observed in 53 sqkm (8.5% of total geographical area) .Rising water level trend has been observed in central parts of the taluka.	Declining trend up to 0.265 m/year is observed in almost entire taluka; decline in water level >0.2 m/year has been observed in 57 sqkm (9% of total geographical area) . Rising water level trend has been observed in central parts of the taluka.



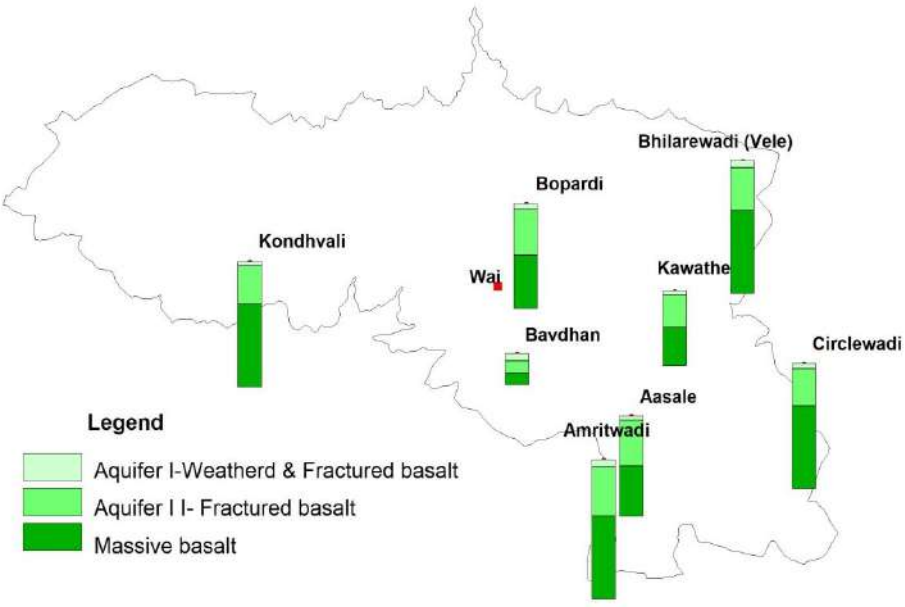


2. Ground Water Issues	I. The stage of ground water development has increased over the period of time from 2004 to 2013 of the talukas from 76.72 % to 85.48 %. The main reason for ground water over draft is intensive irrigation for cash crop. Overall draft has increased from 53.61 MCM in 2004 to 64.86 MCM in 2013 II. Low ground water potential areas have been identified in 408 sq km (about 65 % of the area, Yield less than 50 m3/day, mostly due to limited depth of weathering in Aquifer-I III. Taluka is experiencing frequent droughts 21% Moderate & 2% Severe.

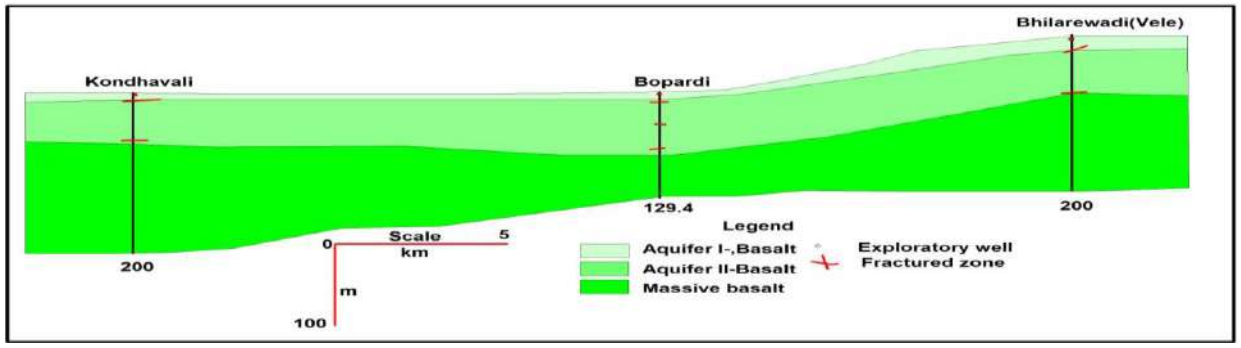
3. AQUIFER DISPOSITION

3.1. Number of Aquifers	Aquifer-I Basalt (Unconfined, Shallow aquifer) Weathered and jointed / fractured Basalt	Aquifer-II Basalt (Semiconfined /confined, Deeper aquifer) Jointed and fracture Basalt

3.2. Lithological Disposition

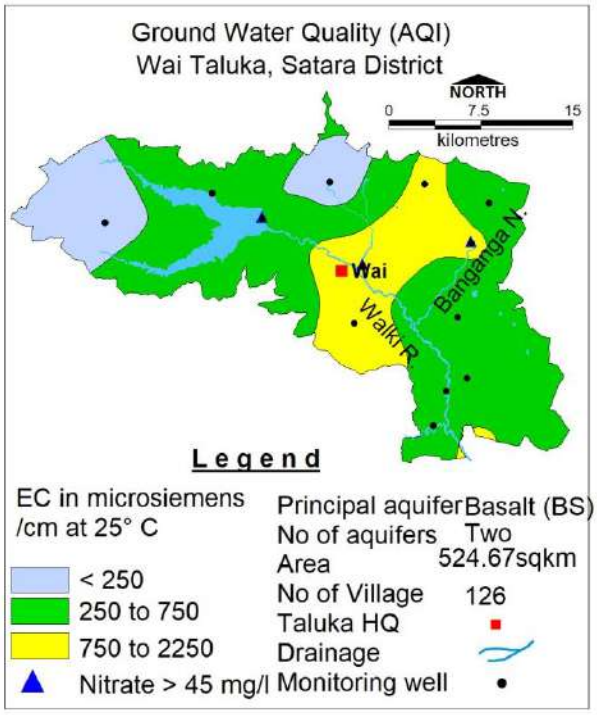


3.3. Cross Sections



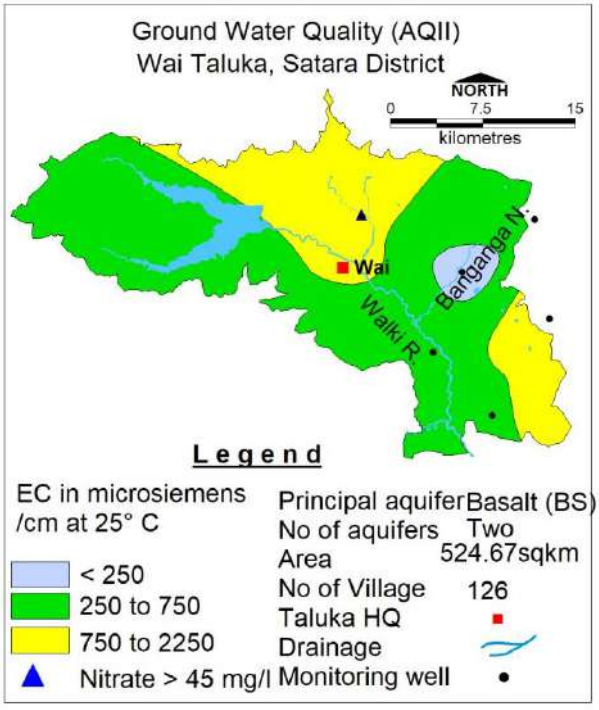
3.4. Aquifer Characteristics		
Major Aquifers	Basalt	Basalt
Type of Aquifer	Aquifer-I Basalt (Unconfined, Shallow aquifer) Weathered and jointed / fractured Basalt	Aquifer-II Basalt (Semiconfined /confined, Deeper aquifer) Jointed and fracture Basalt
Depth of Occurrence (mbgl)	9-28	30-117
Thickness of wearherd /fractured rocks (m)	5-18	0.5-4
Yield	10 - 100 m3/day	0.2 - 3 lps
Specific yield (Sy)	0.018- 0.02	0.0025
Storativity (S)		0.00012-0.000357
Transmissivity (T) (m2/day)	T: 10-28 m^2/day	T: 25-97 m^2/day
4.0 GROUND WATER QUALITY		

4.1 Aquifer-I : Phreatic/ Shallow Aquifer (Basalt):



In general the water quality of shallow aquifer in Wai taluka is potable and good for drinking, domestic, industrial as well as irrigation purposes, except around Shurur, Dhom and Wai

4.2 Aquifer-II :Semiconfined/Confined Deeper Aquifer (Basalt):



In general the water quality of deeper aquifer in Wai taluka is potable and good for drinking, domestic, industrial as well as irrigation purposes, except around Bopardi are not fit for drinking purpose if

are not fit for drinking purpose if directly consumed without treatment. Nitrate more than 45 mg per litre was detected in water sample.	directly consumed without treatment. Nitrate more than 45 mg per litre was detected in water sample.

5. GROUND WATER RESOURCES

5.1 Aquifer-I/ Phreatic Aquifer (Basalt)

Ground Water Recharge Worthy Area (Sq. Km.)	524.67
Total Annual Ground Water Recharge (MCM)	79.88
Natural Discharge (MCM)	3.99
Net Annual Ground Water Availability (MCM)	75.88
Existing Gross Ground Water Draft for irrigation (MCM)	60.94
Existing Gross Ground Water Draft for domestic and industrial water supply(MCM)	3.93
Existing Gross Ground Water Draft for All uses(MCM)	64.86
Provision for domestic and industrial requirement supply to 2025(MCM)	7.36
Net Ground Water Availability for future irrigation development(MCM)	6.73
Stage of Ground Water Development (%)	85.48
Category	SAFE

5.2 Aquifer-II (Deeper aquifer) Semiconfined/Confined Aquifer (Basalt)

Mean thickness (m)	Area (sqkm)	Piezometric head (m)	Specific yield	Storativity	Resource above confining layer (MCM)	Resource in confining aquifer (MCM)	Total Resource (MCM)
2.125	524.15	21.25	0.00349	0.0001977	2.20257658	3.8872274	6.089804

6.0. GROUND WATER RESOURCE MANAGEMENT.

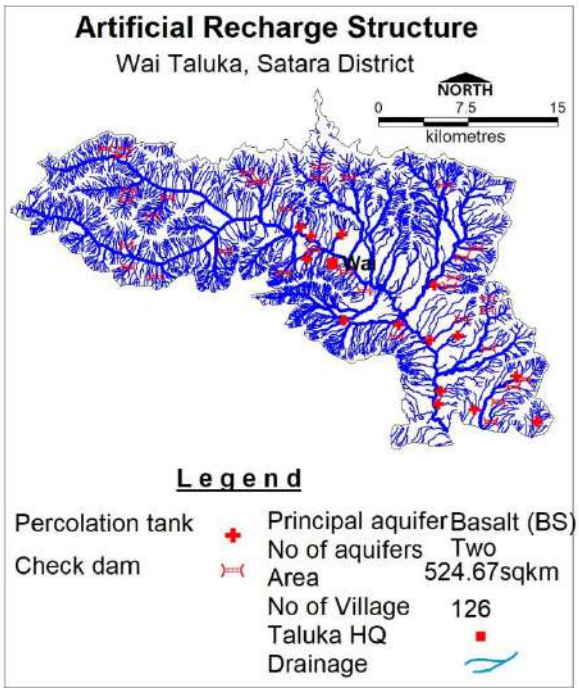
6.1. Supply Side Management

Net Available Resource (MCM)	75.88
Gross Annual Draft (MCM)	64.86
Agricultural Supply -GW	60.93
Agricultural Supply -SW	103.221
Domestic Supply - GW	3.92
Domestic Supply - SW	0.98
Total Supply	169.06
Area of Taluka (Sq. Km.)	524.67
Area suitable for Artificial recharge(Sq. Km)	157.68
Type of Aquifer	Hard Rock
Area feasible for Artificial Recharge(WL >5mbgl) (Sq. Km.)	157.68
Volume of Unsaturated Zone (MCM)	3853.02
Average Specific Yield	0.02
Volume of Sub surface Storage Space available for Artificial Recharge (MCM)	77.0604
Surplus water Available (MCM)	3.86316

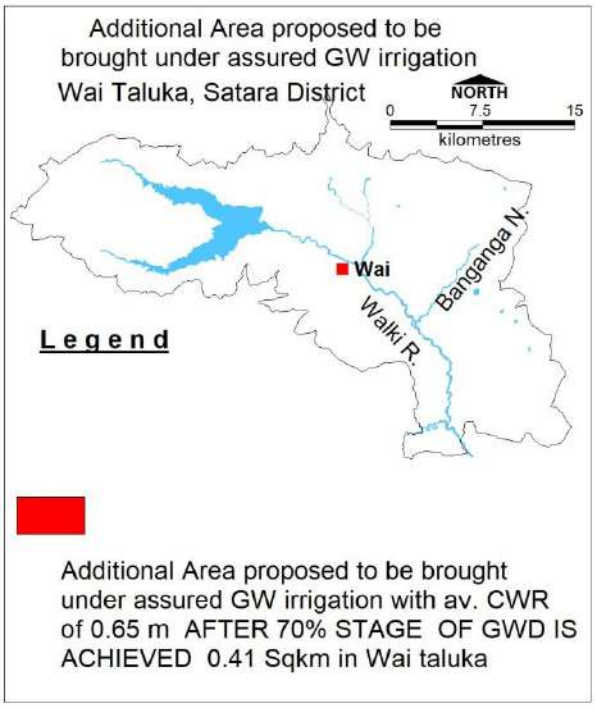
Proposed Structures	Percolation Tank (Av. Gross Capacity-100 TCM*2 fillings = 200 TCM)	Check Dam (Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM)
Number of Structures	14	36
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	2.1	0.81
RTRWH Structures – Urban Areas		
Households to be covered (25% with 50 m^2 area)	11,200.00	
Total RWH potential (MCM)	0.32	
Rainwater harvested / recharged @ 80% runoff co-	0.25312	**Economically not viable**

efficient		**& Not Recommended**
6.2. Demand Side Management		
Micro irrigation techniques		
Sugarcane crop area (19.52), about 17.5 sqkm area is ground water irrigated, 100 % ground water irrigated (20 sqkm) proposed to be covered under Drip (sq.km.)		17.5
Volume of Water expected to be saved (MCM). Surface Flooding req- 2.45 m. Drip Req. - 1.88, WUE- 0.57 m		9.975
Proposed Cropping Pattern change		
Irrigated area under Water Intensive Crop(ha)		Not proposed
Water Saving by Change in Cropping Pattern		Nil
6.3. Expected Benefits		
Net Ground Water Availability (MCM)		75.8816
Additional GW resources available after Supply side interventions (MCM)		2.91
Ground Water Availability after Supply side intervention		78.7916
Existing Ground Water Draft for All Purposes (MCM)		64.8612
GW draft after Demand Side Interventions (MCM)		54.8862
Present stage of Ground Water Development (%)		85.48
Expected Stage of Ground Water Development after interventions (%)		69.66
Alternate Water Sources Available		Nil
6.4 Development Plan		
Volume of water available for GWD to 60% (MCM)		0.26793
Proposed Number of DW(@ 1.5 ham for 90% of GWR Available)		16
Proposed Number of BW(@ 1.5 ham for 10% of GWR Available)		2
Additional Area (sq.km.) proposed to be brought under assured GW irrigation with av. CWR of 0.65 m		0.41
Regulatory Measures		**60m borewell/tube well**

Locations of Artificial Recharge strucutres



Additional area proposed to be bought under assured GW irrigation



Annexures

Annexure-I: Salient Features of Ground Water Exploration

S No	Taluka	Village	Type EW/ OW	Drilling depth	Casing	AQ Zones	Pre SWL	Post SWL	PYT Discharge	PYT Draw-down	AQI	AQII	Massive	Thick ness AQII
				(m)	(m)	(m.bgl)	(m.bgl)		(lps)	(m)	(m.bgl)			(m)
1	Jaoli	Ambeghar	EW	200		16-17, 180-181	21	12	0.14		17	181	200	1
2	Jaoli	Dare (BK)	EW	200			55	35	NIL		21	143	200	0.5
3	Karad	Dhondewadi	EW	172.1	5.8		19	8.75	1.37		18	132	172.1	3
4	Karad	Karawadi	EW	166	5.8		35	25.9	4.77		18	125	166	6
5	Karad	Karawadi	OW	95	5.8		42	32.1	5.77		18	90	95	9
6	Karad	Shitalwadi	EW	186.3	5.8		13	4.3	3		15	90	186.3	4
7	Karad	Shitalwadi	OW	190.4	4.5		12	2.7	1.37		16	125	190.4	3
8	Karad	Supne	EW	160	5.8		19	6.25	2.16		19	105	160	3
9	Karad	Undale (Shewalewadi)	EW	200	5.8		15	5.9			18	143	200	2
10	Karad	Wagheshwar (Masssur)	EW	200	5.8		55	36			16	132	200	2
11	Khandala	Karnawadi	EW	200	5.7	129.4-130.4	23	6.9	0.431	>50	12	130	200	1
12	Khandala	Khandala	EW	200	5.6		19	8	0.43		21	154	200	1
13	Khandala	Shindewadi	EW	200	5.7	28-29	15	7.7	0.431	>50	29	125	200	1
14	Khandala	Tambve Bk	EW	200	5.7	11-12 , 33-34	12	5.05	3	37.35	12	135	200	3
15	Khandala	Tambve Bk	OW	40	5.7	10-11 , 30-31	16	5.7	3	33	11	31	40	3
16	Khandala	Tambve Bk	PZ	80	5.7	73-74	17	4.5	0.38	>50	12	74	80	1
17	Khandala	Tondal	EW	200	5.7	10-11 , 78-79	12	3.2	10	5	12	79	200	3
18	Khandala	Tondal	OW	100	5.7	31-32 , 78-79	16	6.75	10	5.5	12	79	100	3
19	Khandala	Tondal	EW	40	5.7	12-13 , 29-30	15	5	10	5	12	30	40	3
20	Khandala	Tondal	OW	40	5.7	12-13 , 29-30	12	5.59	10	3.3	12	30	40	3
21	Khandala	Tondal	OW	100	16.5	12-13 , 30-31 , 78-79	17	7.95	1.37	36.2	30	79	100	3
22	Khatav	Arphal	EW	196	-		25	9	1.73	45.75	15	135	196	3
23	Khatav	Aundh	EW	131	9.5	44.2-47.2, 90-93 , 116-117.4	21	2.72	3.17	30.25 m	17	117.4	131	9
24	Khatav	Chitali	EW	301	-	13 - ,152 -	17	8.28	-	17.26	13	152	301	1
25	Khatav	Dhakarwadi	EW	126.5	9.5	62.5 - 65 , 89.9 -93 , 108.2 - 111.3	12	2	2.16	33.24 m	15	111	126.5	6

S No	Taluka	Village	Type EW/ OW	Drilling depth	Casing	AQ Zones	Pre SWL	Post SWL	PYT Discharge	PYT Draw-down	AQI	AQII	Massive	Thick ness AQII
26	Khatav	Katgun	EW	200		19.6-20.6 , 96-97	21	9	0.38		21	97	200	2
27	Khatav	Nidhal	EW	97.8	-		15	2.15	10.98	30.55	19	90	97.8	12
28	Khatav	Nidhal	OW	79.6	-		17	2.02	5.94	36.28	21	75	79.6	9
29	Khatav	Phadtarwadi	EW	97.9	-	16.5 - , 32.3 -34.8	33	16	15	-	16	70	97.9	2
30	Khatav	Phadtarwadi	OW	67.4	-	17.5 - , 33.8 -37.9	34	17	-	-	17	65	67.4	2
31	Khatav	Pusesavli	EW	203.53	-	6 - ,67.33 -	12	4.35	0.83	28	15	90	203.53	2
32	Khatav	Rajapur	EW	200	14	16 mbgl (Seepage) , 92 mbgl	82.8	31	0.14	-	16	92	200	1
33	Khatav	Vaduz	EW	201.05	-		12	4.8	2.16	-	15	145	201.05	4
34	Khatav	Vaduz	OW	171	-		19	4.09	3.17	-	15	145	171	5
35	Koregaon	Chimangaon	EW	200		14-15 ,100-101 ,124-125	16	8.5	12.18		15	125	200	6
36	Koregaon	Chimangaon	OW	140		14-16 ,92-93	12	5.3	6.81		16	93	140	6
37	Koregaon	Circlewadi	EW	200	5.7	13-14	21	12	0.38	>50	14	90	200	1
38	Koregaon	Deshmukh Nagar	EW	200	5.6		12	7	0.43		15	135	200	1
39	Koregaon	Dhamner	EW	134.55	-	4.25 - ,134.55 -	17	2.45	3.77	38.6	15	134	134.55	3
40	Koregaon	Dhamner	OW	122.25	-	-122.25	12	2.55	1.73	46.5	19	122	122.25	3
41	Koregaon	Kodoli	EW	200	5.8		35	18.2	3		25	156	200	4
42	Koregaon	Lhasurne	EW	200		16-17 ,29-30 ,95.6-96.6	9	2	3		30	98	200	5
43	Koregaon	Lhasurne	OW	150		16-17 ,29-30 ,95.6-96.6	16	1.4	0.38		30	98	150	5
44	Malshiras	Palshi	EW	153.4	153.4	145 -150	25	11	-	-	12	150	153.4	1
45	Man	Lodhavade	EW	200	5.6		15.5	7	3	>50.00	21	110	200	4
46	Man	Lodhavade	OW	120	5.6		21	12	0.14		21	110	120	1
47	Man	Mograle	EW	200		74.5-75.5 ,116.3-117.3	28	22.3	0.712		21	117	200	2
48	Man	Mohi	EW	200	5.7	15-16.50 , 80.60-81.60 , 129.4-130.4	64.5	37	3	>50	16	130	200	4
49	Man	Mohi	OW	135.5	5.7	37-38 , 83.60-84.60	14	3.2	1.37	>50	16	98	135.5	2
50	Man	Pangri	EW	200		68.4-69.4 ,74.5-75.5	23	9	3		19	76	200	4

S No	Taluka	Village	Type EW/ OW	Drilling depth	Casing	AQ Zones	Pre SWL	Post SWL	PYT Discharge	PYT Draw-down	AQI	AQII	Massive	Thick ness AQII
51	Man	Pangri	OW	172.1		07.4-10.4 ,68.4-69.4	18	11.5	1.37		19	76	172.1	4
52	Man	Pingli Bk	EW	200		42-43 ,62.3-63.3	18	6.6	10		19	120	200	4
53	Man	Pingli Bk	OW	178.2		42-43 ,62.3-63.3	21	6.6	10		21	120	178.2	4
54	Man	Rajale	EW	200	29.5	12 -13 , 96 -97	>50		meagre		13	97	200	1
55	Man	Shevri	EW	200	5.7	50.1-51.1 159.9-160.9	25	17.8	3	>50	18	161	200	5
56	Man	Shevri	OW	160	5.7	22.6-23.6 , 77.5-78.5 , 132.4-133.4	23	16.3	0.78	>50	24	133	160	2
57	Man	Shindewadi	EW	201.5	-		17	7	5	-	17	135	201.5	6
58	Man	Shindewadi	OW	177.1	-		18	9	-	-	18	154	177.1	1
59	Man	Vadjal	EW	201.6	-		12	8	0.78	46.4	12	125	201.6	1
60	Patan	Dabawadi	EW	201.5	-		12	8.9	0.78	-	17	135	201.5	1
61	Patan	Mendoshi	EW	200	5.8		55	35			16	125	200	2
62	Patan	Morgir (Shivapur Peth)	EW	200	10.1		55	35			19	110	200	1
63	Patan	Surul	EW	200	17.5	10.6 -13.7 , 101 -105	14	>100		Meager	14	105	200	4
64	Patan	Telewadi	EW	200	5.8		16	3.94	0.78		18	110	200	1
65	Patan	Vihe	EW	200	17.5	114 – 117	12	44.66		0.38	15	117	200	3
66	Patoda	Jadhawadi	EW	156.4	156.4	16.2 -29.3 ,36.5 -43.6 ,106.7 -117.3 ,99.5 -102.6	25	10.24	1.6	2.42	29	117	156.4	4
67	Phaltan	Andhali	EW	200	29.5	13.7 -16.7	53	36	Dry	Dry	17	70	200	0.5
68	Phaltan	Barad	EW	184.31	11	34.8-37.8 , 50.1-53.1 , 95.8-96.8	18	3.17	10	37	21	97	184.31	6
69	Phaltan	Barad	OW	7.7	-		18	9	-	-	21	97	7.7	1
70	Phaltan	Barad	OW	100	11.7	28.7-29.7	19	5.5	0.431	>50	29	70	100	1
71	Phaltan	Bibi	EW	200	5.7		21	13	0.14		12	125	200	1
72	Phaltan	Bibi	PZ	25	5.7		21	13	0.721		12	25	25	2
73	Phaltan	Gandhinagar (Kashil)	EW	200	5.7	19.60-20.60	60	43	Traces		16	126	200	0.5
74	Phaltan	Mirgaon	EW	201	-		24	17.25	0.58	-	22	135	201	2
75	Phaltan	Shindewadi	EW	200	5.7	37-38 ,61-62	12	9	3	44	11	62	200	3
76	Phaltan	Shindewadi	OW	100	5.7	95-96	18	3.1	0.431	>50	11	96	100	3
77	Phaltan	Shirtav-EW	EW	200	29.5	190.60 – 193.60	35	22	1.4		24	193	200	1.0
78	Phaltan	Tathawade	EW	180	5.7	27.50-28.50 , 55-56	19	8.4	0.14	>50	29	110	180	2

S No	Taluka	Village	Type EW/ OW	Drilling depth	Casing	AQ Zones	Pre SWL	Post SWL	PYT Discharge	PYT Draw-down	AQI	AQII	Massive	Thick ness AQII
79	Phaltan	Vadgaon	EW	200	29.5	44.20-47.20 (seepage) , 190.60-196.70	95	25	0.1	_	21	90	200	2
80	Phaltan	Warwand	EW	200			16	11			11	143	200	1
81	Satara	Chinchaner	EW	200	-		17	2.95	3.77	28	17	135	200	6
82	Satara	Chinchaner	OW	189.3	-		15	4.05	5.94	25.65	12	98	189.3	9
83	Satara	Dambewadi	EW	200	29.5	157-160 ,	61.5	21	0.14	_	19	160	200	1
84	Satara	Kadve(BK)	EW	200	5.8		74.5	35			18	132	200	2
85	Satara	Kadve(BK)	OW	80.6	5.8		19	8			19	76	80.6	2
86	Satara	Moravale	EW	200		19-20 ,153-154	13	3.6	1.05		20	154	200	3
87	Satara	Padali	EW	201.5	-	65 -73	9	1.47	5.15	-	12	73	201.5	6
88	Satara	Padali	OW	177.1	-	65 -73	19	1.4	4.43	-	12	73	177.1	6
89	Satara	Sayali		200	5.8		13	1.8	1.8	2.16	15	70	200	3
90	Satara	Shivthar	EW	175		49-50	24	17.5	<0.14		21	120	175	0.5
91	Wai	Aasale	EW	200	5.7	12-13 ,115-116	15	5.05	3	>50	13	116	200	3
92	Wai	Aasale	OW	120	5.7		16	3			12	110	120	1
93	Wai	Amritwadi	EW	200		114.1-117.2	17	5	2.16		17	117	200	4
94	Wai	Bavdhan	EW	30			21	12			5.7		5.7	1
95	Wai	Bavdhan	PZ	29.8	6.5	16.9-17.9	21	12	Traces		18	29.8	29.8	0.5
96	Wai	Bhilarewadi (Vele)	EW	200	5.7	102-103	25	17.29	0.14	>50	19	103	200	1
97	Wai	Bopardi	EW	129.4	5.7	13.5	18	1.6	3		15	110	129.4	3
98	Wai	Eksar	EW	200	17.5	36 -37 , 115 - 118	19.35		2.16		15	118	200	3
99	Wai	Eksar	OW	142	11.5	50.3 -53.3 , 79 - 81, 96 - 99.1	86.1		Meager		15	99	142	6
100	Wai	Kawathe	EW	92	5.7	53.10-54.10	17	6.8	0.14	>50	12	80	92	2
101	Wai	Kondhavali	OW	111.1	5.7	18-19	12.9	4	2.16	>50	19	105	111.1	2
102	Wai	Kondhavali	PZ	80	5.6	75-76	12	4	Traces		12	76	80	0.5
103	Wai	Kondhavali	EW	200	5.75	92-93	22	2.6	3	>50	12	93	200	3

Annexure-II: Water Level of Ground water monitoring wells (2017) with long term trend (2008-2017)

Sl No.	Taluka	Well Name	May 2017	Nov. 2017	Fluctuation	Premonsoon WL trend (m/year)		Postmonsoon WL trend (m/year)	
			(mbgl)	(mbgl)	(m)	Rise	Fall	Rise	Fall
1	JAOLI	meda	5.5	1.80	3.70	0.0260		0.0454	
2	KARAD	Beldare	10.2	0.80	9.40	0.3944			0.0376
3	KARAD	Gote	7	3.00	4.00	0.1723			0.0444
4	KARAD	Kale(Narayanvadi)	9	3.00	6.00	0.1813		0.1547	
5	KARAD	Kambirwadi	3.9	1.00	2.90	0.2556		0.0351	
6	KARAD	Karad-New	5	1.00	4.00		0.1250	0.0105	
7	KARAD	Khadakwadi(tarukh)	6.5	2.34	4.16	0.1366		0.0194	
8	KARAD	Korti	7	0.20	6.80	0.0295			0.0581
9	KARAD	Mhopare-Sakpalwasti	7.5	3.20	4.30	0.2358		0.0044	
10	KARAD	Padali--Helgaon	9.4	5.20	4.20	0.0279		0.0192	
11	KARAD	Sadashivgad-Ogalewadi	6.6	1.40	5.20	0.3904		0.0460	
12	KARAD	Savade	3.8	3.05	0.75	0.0573		0.0282	
13	KARAD	Talbid	4.4	1.90	2.50	0.0105		0.0201	
14	KARAD	Talgaon	3.5	2.70	0.80	0.0885		0.0702	
15	KARAD	Umbraj	6.6	0.90	5.70	0.0780			0.1212
16	KARAD	Vanavasmachi	5	2.50	2.50	0.0994		0.0105	
17	KHANDALA	Ghadgewadi	4.4	1.00	3.40	0.1548		0.0304	
18	KHANDALA	Khed Bk	11	2.90	8.10	0.2612		0.0217	
19	KHANDALA	Koparde	4.1	1.30	2.80	0.0576		0.0031	
20	KHANDALA	Naigaon	8	4.00	4.00	0.0239		0.0656	
21	KHANDALA	Shirval	11	4.00	7.00	0.0509		0.0187	
22	Khatav	Ambavade	9.3	6.2	3.10	0.2821		0.6000	
23	Khatav	Aundh	6.3	1.7	4.60	0.2423		0.0442	
24	Khatav	Bhushangad	8.5	2.45	6.05	0.3988		0.0150	
25	Khatav	Budh-New	10.6	6	4.60	0.3796		0.5533	
26	Khatav	Chitali	11.9	10.6	1.30		0.0165	0.1767	
27	Khatav	Datewadi	7.9	0.7	7.20	0.2831		0.0767	
28	Khatav	Jakhangaon	7.4	8.9	-1.50	1.3679		0.9060	
29	Khatav	Kankatre	9	7.7	1.30	0.3402		0.6884	
30	Khatav	Katarkhatav	10	5.9	4.10	0.4652		0.3440	
31	Khatav	Khatav	18.9	19.1	-0.20	0.1112		1.3407	
32	Khatav	Kokarale	9.8	1.55	8.25	0.5654		0.1533	
33	Khatav	Kuroli	8.7	5.4	3.30	0.3363		0.0567	
34	Khatav	Lalgun	12.2	8.35	3.85		0.0456	0.5069	
35	Khatav	Mayani	5.8	3.65	2.15	0.2598		0.1158	
36	Khatav	Mol	9.1	3.9	5.20	0.2919		0.1091	
37	Khatav	Musandwadi	8.9	3.3	5.60	0.0138		0.0783	
38	Khatav	Nimsod	7.6	10.1	-2.50	0.2997		0.6429	
39	Khatav	Pusesavali.	8.5	1.05	7.45	0.2744		0.0558	
40	Khatav	Pusesawali	9.9	2	7.90	0.0700			0.1050
41	Khatav	Vardhangad-New	6.2	0.9	5.30	0.2321		0.1522	
42	Khatav	Wakeshwar	13	14.7	-1.70	0.3683		0.6633	
43	KOREGAON	Chachali-New	7.5	1.40	6.10	0.3107			0.2287
44	KOREGAON	Eksal-New	8.4	1.60	6.80	0.3696		0.0019	
45	KOREGAON	Jamb Kh.	7	1.90	5.10	0.1005		0.0935	
46	KOREGAON	Koregaon	9	6.60	2.40	0.1074		0.1259	
47	KOREGAON	Pimpode Bk	8.1	0.95	7.15	0.1074		0.0458	
48	KOREGAON	Rahimatpur	9.9	7.00	2.90	0.2175		0.3972	
49	KOREGAON	Satara Road(Padali)	1	1.78	-0.78		0.2647	0.0404	

Sl No.	Taluka	Well Name	May 2017	Nov. 2017	Fluctuation	Premonsoon WL trend (m/year)		Postmonsoon WL trend (m/year)	
			(mbgl)	(mbgl)	(m)	Rise	Fall	Rise	Fall
50	KOREGAON	Surali	2.6	1.90	0.70	0.0066		0.0102	
51	KOREGAON	Watherstation	15.1	17.20	-2.10	0.5147		0.8281	
52	MAHABALESHWAR	Bhose	8.5	2.10	6.40	0.0294			0.1079
53	MAHABALESHWAR	Mahabaleshwar	17	10.80	6.20	0.0404			0.1027
54	MAHABALESHWAR	Pachgani	25	12.00	13.00	0.0702		0.0494	
55	MAN	Bidal-New	12.5	11.50	1.00	0.3604		0.4910	
56	MAN	Dhuldev	6	0.10	5.90	0.2682			0.1074
57	MAN	Divad	12.8	12.60	0.20	0.2473		0.5072	
58	MAN	Kasarwadi	17.5	0.60	16.90	0.4169		0.0519	
59	MAN	Mhaswad	14.1	5.40	8.70	0.6984		0.2989	
60	MAN	Mogarale	7.4	4.60	2.80	0.4215		0.2027	
61	MAN	Pandherewadi	12.5	0.70	11.80	0.2991			0.0990
62	MAN	Ranand	9	5.80	3.20	0.3390		0.2808	
63	MAN	Shenwadi	7	2.20	4.80	0.2498		0.0871	
64	MAN	Shindi kh	10.6	2.40	8.20	0.2690			0.1039
65	MAN	Shingnapur	8	4.30	3.70	0.0612			0.1070
66	MAN	Shirtav	6.8	3.40	3.40	0.1365		0.1237	
67	MAN	Takewadi	10.6	6.20	4.40	0.1034			0.0971
68	MAN	Valai	12.6	6.70	5.90	0.4171		0.4254	
69	MAN	Varkute Malvadi	10	3.00	7.00	0.2026			0.2120
70	MAN	Wawarhire	5.2	2.50	2.70	0.0908			0.1389
71	PATAN	Dhebewadi	8.9	1.20	7.70	0.0392		0.0575	
72	PATAN	Ghot	7.8	1.00	6.80	0.5809		0.0509	
73	PATAN	Girewadi	4.8	4.00	0.80	0.0868		0.0296	
74	PATAN	Goshatwadi	3.3	1.60	1.70	0.1338		0.0541	
75	PATAN	Helwak-Budha Colony	12	1.10	10.90	0.5412			0.0678
76	PATAN	Marali	2	1.00	1.00	0.1838		0.0073	
77	PATAN	Morgiri	0.9	0.60	0.30		0.1184	0.0028	
78	PATAN	Sakhari	2	0.90	1.10	0.0397		0.0267	
79	PATAN	Tarale	10.5	3.20	7.30	0.2029		0.2256	
80	PATAN	Yerphale	3.5	2.90	0.60	0.0088		0.0414	
81	PHALTAN	Adarki Bk	10	7.75	2.25	0.0147		0.2224	
82	PHALTAN	Adarki Kh	6.3	2.30	4.00	0.0213		0.0577	
83	PHALTAN	Dudhebavi	16.8	12.40	4.40	0.6971		0.5601	
84	PHALTAN	Gokhali	8.1	4.70	3.40	0.2618		0.0817	
85	PHALTAN	Khunte	7	4.80	2.20	0.0794			0.1579
86	PHALTAN	Murum	3	2.20	0.80	0.2776		0.0734	
87	PHALTAN	Padegaon	3.4	4.60	-1.20	0.1164		0.1432	
88	PHALTAN	Phaltan-New	3	1.90	1.10		0.1153	0.0111	
89	PHALTAN	Rajuri	1.7	1.60	0.10	0.0848		0.0433	
90	PHALTAN	Somanthali	8.2	5.90	2.30	0.0956			0.1707
91	PHALTAN	Tathavada	14	3.60	10.40	0.1728		0.0192	
92	PHALTAN	Vadale	5.9	2.40	3.50	0.0603		0.1462	
93	SATARA	Atit	7	2.00	5.00	0.2850			0.0432
94	SATARA	Fadtarwadi	3.6	1.99	1.61	0.1295		0.0038	
95	SATARA	Kurun	6	0.60	5.40	0.0224			0.0652
96	SATARA	Nagewadi	7.6	4.70	2.90	0.0916		0.0674	
97	SATARA	Nandgaon	7	0.90	6.10	0.0102			0.1639
98	SATARA	Nune	7.1	4.00	3.10	0.1626		0.1341	
99	SATARA	Shendre	6	1.50	4.50		0.1574	0.0007	
100	SATARA	Vaduth	4.6	4.50	0.10	0.0764		0.0005	

Sl No.	Taluka	Well Name	May 2017	Nov. 2017	Fluctuation	Premonsoon WL trend (m/year)		Postmonsoon WL trend (m/year)	
			(mbgl)	(mbgl)	(m)	Rise	Fall	Rise	Fall
101	SATARA	Varne	2.5	2.30	0.20	0.0170		0.0481	
102	SATARA	Warye	2.6	1.00	1.60		0.1529	0.0256	
103	WAI	Anavadi	4	2.90	1.10	0.0236		0.0006	
104	WAI	Asare	7.6	1.00	6.60	0.0209		0.0507	
105	WAI	Dhom	15	12.00	3.00	0.0436		0.2559	
106	WAI	Kadegaon	7.6	5.80	1.80	0.0964		0.0339	
107	WAI	Udatare	6.7	1.50	5.20	0.1648		0.0206	
108	WAI	Vele	12.75	7.50	5.25	0.3124		0.2656	
109	WAI	Wai (R)	3.2	2.90	0.30	0.0097		0.0120	
110	WAI	Wai (U)	7.5	4.90	2.60		0.1376		0.1167

Annexure-III : Details of GW monitoring wells and KOWs in Satara district.

S. No.	Taluka	Village	Altitude (m)	Longitude deci	Latitude deci	Depth (mbgl)	Diameter (m)	Aquifer material	Lining (mbgl)	MP (magl)	Premon May 17 Water Level (mbgl)	Postmon Nov 17 Water Level (mbgl)	EC (µS /cm)
1	Jaoli	Meda	716.5	73.8319	17.7944	6.5					5.5	1.8	
2	Karad	Beldare	616.1	74.0847	17.3431	12.9					10.2	0.8	
3	Karad	Gote	573.9	74.1667	17.2958	10.11					7	3	
4	Karad	Kale (Narayanvadi)	571.2	74.1753	17.2208	12					9	3	
5	Karad	Kambirwadi	661.9	74.1861	17.4222	9.3					3.9	1	
6	Karad	Karad-New	568.2	74.1736	17.2972	12					5	1	
7	Karad	Khadakwadi (Tarukh)	603	74.0436	17.2472	8.5					6.5	2.34	
8	Karad	Korti	592	74.11	17.4167	10.5					7	0.2	
9	Karad	Mhopare-Sakpalwasti	567	74.0708	17.3208	9					7.5	3.2	
10	Karad	Padali-Helgaon	590.5	74.1878	17.3447	9.61					9.4	5.2	
11	Karad	Sadashivgad-Ogalewadi	615	74.225	17.3306	8.1					6.6	1.4	
12	Karad	Savade	634.4	74.0694	17.1736	7.31					3.8	3.05	
13	Karad	Talbid	655.4	74.1111	17.3375	15					4.4	1.9	
14	Karad	Talgaon	627	74.0694	17.1531	5.2					3.5	2.7	
15	Karad	Umbraj	593.5	74.1083	17.3944	9.2					6.6	0.9	
16	Karad	Vanavasmachi	594.4	74.1417	17.3194	16					5	2.5	
17	Khandala	Ghadgewadi	792.1	73.8861	18.0667	10					4.4	1	
18	Khandala	Khed Bk	621.6	74.1397	18.0394	18.3					11	2.9	
19	Khandala	Koparde	698.1	74.15	17.9561	6					4.1	1.3	
20	Khandala	Naigaon	617	73.9667	18.1083	9					8	4	
21	Khandala	Shirval	592	73.975	18.15	16.15					11	4	
22	Khatav	Ambavade	703.7	74.47778	17.50833	15					9.3	6.2	
23	Khatav	Anphal	717	74.56483	17.46178	12.6	6.7	- W. Fr. Basalt	6.9	1.2	11.4	3.5	989
24	Khatav	Aundh	802	74.33444	17.54028	13.11					6.3	1.7	
25	Khatav	Bhosare	789	74.32415	17.60654	10.3	10.7	- Fr. Basalt	3.6		6.7	2.1	460
26	Khatav	Bhushangad	762	74.41	17.46778	14					8.5	2.45	
27	Khatav	Budh-New	839.6	74.33056	17.76944	14.5					10.6	6	
28	Khatav	Chitali	666.7	74.49722	17.42222	13.9					11.9	10.6	
29	Khatav	Datewadi	745	74.55833	17.5125	13					7.9	0.7	

S. No.	Taluka	Village	Altitude (m)	Longitude deci	Latitude deci	Depth (mbgl)	Diameter (m)	Aquifer material	Lining (mbgl)	MP (magl)	Premon May 17 Water Level (mbgl)	Postmon Nov 17 Water Level (mbgl)	EC (µS /cm)
30	Khatav	Dhondewadi	686	74.52868	17.48766	10	7	- W. Fr. Basalt	3		9.2	2.1	686.1
31	Khatav	Diskal	837	74.29064	17.80944	13.45	12	- W. Massive Basalt	3.15	0.3	12.1	4.6	698
32	Khatav	Ganehswadi	775	74.3226	17.51488	11.8	3.6	- Fr. Basalt	7.4	0.8	11.7	0.9	680
33	Khatav	Gopuj	785	74.38692	17.53154	15	14 x 12	- Fr. Basalt	3		11.2	4.3	580
34	Khatav	Jakhangaon	788	74.32333	17.64389	51.76					12	8.9	
35	Khatav	Jakhangaon	796	74.32235	17.64084	10.65	9	- Fr. Basalt	8.4	0.1	9.8	**5.5**	545
36	Khatav	Kankatre	714.7	74.59167	17.45278	23					9	7.7	
37	Khatav	Katarkhatav	723	74.525	17.57222	13.3					10	5.9	
38	Khatav	Katarkhatav	717	74.52487	17.57165	15	10	- Fr. Basalt	4		14.9	2.4	486
39	Khatav	Katgun	785	74.35032	17.69674	15.7	10.3	- W. Massive Basalt	3.1	1.3	15	3.2	520
40	Khatav	Khatav	779.8	74.36944	17.66111	30					21	19.1	
41	Khatav	Kokarale	801.2	74.31944	17.60694	14.5					9.8	1.55	
42	Khatav	Kuroli	756	74.39167	17.59667	13					8.7	5.4	
43	Khatav	Ladegaon	715	74.34352	17.47613	12.4	4.3	- W. Massive Basalt	12.4	1	5.5	3.2	425
44	Khatav	Lalgun	832.7	74.29444	17.78056	16					12.2	8.35	
45	Khatav	Mayani	681.9	74.54722	17.44028	9.9					5.8	3.65	
46	Khatav	Mol	883.3	74.28056	17.84167	11.5					9.1	3.9	
47	Khatav	Musandwadi	740	74.40833	17.45	10					8.9	3.3	
48	Khatav	Nidhal	820	74.37787	17.7021	5.5	5		5.5	0.7	2.95	**0.5**	617
49	Khatav	Nimsod	688.3	74.46667	17.45278	30					13	10.1	
50	Khatav	Nimsod	676	74.46297	17.45277	14.65	10.5	- Fr. Basalt	4.15	0.35	13.15	2.5	620
51	Khatav	Pusegaon	780	74.32021	17.71117	7	9.3	- W. Fr. Basalt	6.1		4.4	3.6	880
52	Khatav	Pusesavali.	718	74.32139	17.46111	13.9					8.5	1.05	
53	Khatav	Pusesawali	720.3	74.325	17.45972	22					9.9	2	

S. No.	Taluka	Village	Altitude (m)	Longitude deci	Latitude deci	Depth (mbgl)	Diameter (m)	Aquifer material	Lining (mbgl)	MP (magl)	Premon May 17 Water Level (mbgl)	Postmon Nov 17 Water Level (mbgl)	EC (µS /cm)
54	Khatav	Rajapur	846	74.34128	17.78645	9.1	2.5		8.2	0.9	8.9	4.7	670
55	Khatav	Shindewadi	794	74.28706	17.79163	10	8	- Fr. Basalt	10		9.7	5	1675
56	Khatav	Tadavale	755	74.51478	17.63434	9.3	5	- W. Fr. Basalt	7.1	0.2	7.95	2.3	702
57	Khatav	Vardhangad-New	869	74.26944	17.72222	12.2					6.2	0.9	
58	Khatav	Wakeshwar	726.3	74.41667	17.60278	15					15	14.7	
59	Khatav	Wakeshwar	640	74.42533	17.6217	12.4	6	- Fr. Basalt		0.6	6.6	2.4	780
60	Koregaon	Chachali-New	714.7	74.1806	17.7681	11.2					7.5	1.4	
61	Koregaon	Eksal-New	662	74.1833	17.6694	13					8.4	1.6	
62	Koregaon	Jamb Kh.	774.3	74.2083	17.8069	7.5					7	1.9	
63	Koregaon	Koregaon	667.3	74.1636	17.7006	13					9	6.6	
64	Koregaon	Pimpode Bk	798.7	74.0917	17.9111	12.9					8.1	0.95	
65	Koregaon	Rahimatpur	647	74.2	17.5875	12.5					9.9	7	
66	Koregaon	Satara Road (Padali)	713.6	74.1183	17.7644	14					12	1.78	
67	Koregaon	Surali	645.7	74.2056	17.55	7.31					2.6	1.9	
68	Koregaon	Watherstation	795.3	74.135	17.8972	20.8					20	17.2	
69	Mahabaleshwar	Bhose	1283.9	73.7583	17.925	9					8.5	2.1	
70	Mahabaleshwar	Mahabaleshwar	1321	73.6556	17.9222	19	Laterite/				17	10.8	
71	Mahabaleshwar	Pachgani	1333.3	73.8061	17.9244	26.05					25	12	
72	Man	Andhali	594	74.4758	17.7529	9.5	6.7	- Weathered Basalt	5	0.7	3.7	2.7	1818
73	Man	Bhalavadi	707	74.7282	17.7273	10	5	- Fr. Basalt	5	0.55	7.9	4.6	987
74	Man	Bhandavali	838	74.4401	17.7788	15	7	- Weathered Basalt	8	1	14.2	4.6	1112
75	Man	Bhatki	634	74.7909	17.6708	10	8		2	1.3	10	1.7	
76	MAN	Bidal-New	750.6	74.5208	17.7381	12.5					12.5	11.5	
77	Man	Bijavadi	787	74.5437	17.8188	9.7	4.5	- Fr. Basalt	4	0.4	8.3	1.7	860
78	Man	Dahivadi	733	74.5539	17.7066	10	3.5	- Fr. Basalt	4	0.7	5.7	3.2	1710
79	Man	Dhuldev	610.6	74.8528	17.6542	8					6	0.1	
80	Man	Divad	652	74.7275	17.6265	12.2	6.7	- Fr. Basalt	5	0.5	11.07	10	4010

S. No.	Taluka	Village	Altitude (m)	Longitude deci	Latitude deci	Depth (mbgl)	Diameter (m)	Aquifer material	Lining (mbgl)	MP (magl)	Premon May 17 Water Level (mbgl)	Postmon Nov 17 Water Level (mbgl)	EC (µS /cm)
81	Man	Divad	640.2	74.7278	17.6278	15					12.8	12.6	
82	Man	Gatewadi (dhakani)	620	74.6986	17.5926	14.5	7	- Fr. Basalt	6	0.6	10.9	0.3	910
83	Man	Gondavale Kh.	693	74.6105	17.6602	11.2	5.2		3	GL	8.55	5.2	799
84	Man	Hingani	607	74.8374	17.5958	10	7		3.2	0.5	10	1.6	
85	Man	Kalewadi (naravane)	716	74.5922	17.5897	12	6.2	- Fr. Basalt	6	0.6	11.2	8.6	1320
86	Man	Kasarwadi	856	74.4666	17.7288	15	2.5	- W. Fr. Basalt	13	1	13.25	6.4	712
87	Man	Kasarwadi	641.2	74.8292	17.7117	17.6					17.5	0.6	
88	Man	Khadaki	658	74.7746	17.6957	12.57	10		4.5	0.6	12.57	1	
89	Man	Kulakjai	908	74.3991	17.7966	9	6	- W. Fr. Basalt	8.5	1.4	3.2	1.7	1156
90	Man	Mardi	687	74.697	17.7371	10	2.5		5.2	1	8.23	0.5	1037
91	Man	MHASWAD	606	74.7672	17.6371	9.7	4	- Fr. Basalt		0.8	8	6.2	515
92	Man	MHASWAD	612	74.7983	17.6211	16.53	3.7	-	5	0.6	13.2	5.4	790
93	Man	Mhaswad	603.7	74.7911	17.6333	16					14.1	5.4	
94	Man	Mogarale	819.8	74.5197	17.8622	10.2					7.4	4.6	
95	Man	Pachvad	772	74.8457	17.5759	13	4	- Fr. Basalt	Nil	GL	12.6	5.9	789
96	Man	Pandharwadi (Mahimangad)	812	74.427	17.6934	10.2	9	- Fr. Basalt		GL	10.2	6.4	
97	Man	Pandherewadi	818.4	74.4328	17.7031	16.8					12.5	0.7	
98	Man	Pangari	757	74.5405	17.7849	10	5	- Fr. Basalt	3.5	0.5	9.5	8.7	876
99	Man	Pingali Bk	716	74.51564	17.67783	10	5*5	- Fr. Basalt		0.8	7.87	5.9	1098
100	Man	Ranand	663	74.6372	17.7216	11.5	8	- Fr. Basalt	5	1.5	10.25	1.7	1319
101	Man	Ranand	660.1	74.6417	17.7194	15.61					9	5.8	
102	Man	Ranjani	609	74.7226	17.6967	11	4		7	1	11	2.2	
103	Man	Shenwadi	651	74.7931	17.4726	8.32	2.5	- Fr. Basalt	8	1	8.32	2.6	
104	Man	Shenwadi	646	74.8014	17.475	9.6					7	2.2	
105	Man	Shevri	690	74.5878	17.7196	9.4	4			GL	9.4	2.2	
106	Man	Shindi Bk.	781	74.492	17.7055	10.2	6	- Fr. Basalt	8.62	1.3	9.7	5.7	599
107	Man	Shindi kh	826	74.4306	17.7925	13.8					10.6	2.4	
108	Man	Shingnapur	845.5	74.6592	17.8497	12.4					8	4.3	
109	Man	Shirtav	608	74.7989	17.5632	9	5	- Fr. Basalt	8	2	7.7	2.2	1130

S. No.	Taluka	Village	Altitude (m)	Longitude deci	Latitude deci	Depth (mbgl)	Diameter (m)	Aquifer material	Lining (mbgl)	MP (magl)	Premon May 17 Water Level (mbgl)	Postmon Nov 17 Water Level (mbgl)	EC (µS /cm)
110	Man	Shirtav	603.6	74.8111	17.5889	9.7					6.8	3.4	
111	Man	Takewadi	804.4	74.4903	17.7917	12					10.6	6.2	
112	Man	Thadale	771	74.6282	17.8124	10.2	2.7		8	1	8.2	2.1	1010
113	Man	Ukirde	837	74.4641	17.6859	9.6	Irregular	- Fr. Basalt	Nil	GL	9.2	5.6	972
114	Man	Valai	699	74.702	17.5353	12	5		Dry	1.2	12	3.2	
115	Man	Valai	719.4	74.7028	17.5333	12.6					12.6	6.7	
116	Man	Varkute Malvadi	635.7	74.8097	17.5097	15.2					10	3	
117	Man	Wadjal	707	74.6677	17.5695	13	7.3	- Fr. Basalt	10	1	10.2	5.3	1316
118	Man	Warkute Mhaswad	632	74.7355	17.6801	12	7		5.7	GL	12	8.5	
119	Man	Wawarhire	712	74.5906	17.7623	10	2.5		8.75	1	10	2.3	
120	Man	Wawarhire	704.5	74.6056	17.7819	11					5.2	2.5	
121	Patan	Bopoli	601	73.69944	17.38063	6.7	6	- Fr. Basalt	1.2	6	4	2.6	189
122	Patan	Chafal	649	74.0222	17.3983	12	8	- W. Fr. Basalt	5.2	1	4.2	3.4	468
123	Patan	Dadholi	749	73.9668	17.3864	9.8	4.7	- Fr. Basalt		1.7	5.15	2.57	575
124	Patan	Dhavade	820	73.8506	17.3101	4.2	5	- Fr. Basalt	3	1	3.2	1.7	227
125	Patan	Dhebewadi	629.2	73.9561	17.2353	16.1					8.9	1.2	
126	Patan	Ghoshatwadi	592	73.75246	17.36172	7	5		4	1.2	3.5	2.2	125
127	Patan	Ghot	691	73.9375	17.4875	10					7.8	1	
128	Patan	Girewadi	595	74.0208	17.3208	8.9					4.8	4	
129	Patan	Goshatwadi	770.1	73.6778	17.3806	8.2					3.3	1.6	
130	Patan	Helwak-Budha Colony	579.8	73.7333	17.375	12					12	1.1	
131	Patan	Jalu	1045	73.8655	17.5303	4	4*4			GL	3.6	2.2	39
132	Patan	Kalgaon	682	73.943	17.1446	5	7	- Fr. Basalt	4	0.5	4.15	3.7	397
133	Patan	Keral	874	73.8809	17.4371	8	12	- Fr. Basalt	7.4	1.2	5.2	1.1	289
134	Patan	Manainagar	694	73.73977	17.47536	7	5		5	0.6	2.7	2.3	201
135	Patan	Manewadi(Manegaon)	620	74.0101	17.2328	12	6.5	- W. Fr. Basalt	5	1	4.8	1.2	716
136	Patan	Marali	602	73.9535	17.3081	12	6.2	- Fr. Basalt	6.1	1.7	8.1	5.3	468
137	Patan	Marali	631.2	73.9528	17.3056	7.41					2	1	
138	Patan	Matrewadi	618	73.95202	17.21842	8	5	- Fr. Basalt	3	1.5	7.5	1.2	333
139	Patan	Morgiri	659.3	73.8542	17.3278	5.31					0.9	0.6	

S. No.	Taluka	Village	Altitude (m)	Longitude deci	Latitude deci	Depth (mbgl)	Diameter (m)	Aquifer material	Lining (mbgl)	MP (magl)	Premon May 17 Water Level (mbgl)	Postmon Nov 17 Water Level (mbgl)	EC (µS /cm)
140	Patan	Nerale	594	73.8695	17.3448	5.2	6	- Fr. Basalt	5	1	5.1	2.2	196
141	Patan	Nivakane	800	73.8647	17.4763	4.2	4	- Fr. Basalt	4	GL	2.1	0.9	167
142	Patan	Ruvale	837	73.8887	17.2411	3	2.5	- Fr. Basalt	2.5	1	2.8	2.2	168
143	Patan	Sadawaghapur	1033	73.9288	17.4381	10.2	5	- Fr. Basalt	3.2	0.8	5.1	1.6	333
144	Patan	Sakhari	639.5	73.9028	17.4208	3.21					2	0.9	
145	Patan	Tarale	647	73.98	17.5133	12.5					10.5	3.2	
146	Patan	Thomase	712	73.9984	17.3622	15	6	- Fr. Basalt	6	2	10.7	3	568
147	Patan	Tripudi	611	73.9186	17.3579	5.1	4.5	- Fr. Basalt	4	GL	1.2	1	567
148	Patan	Vatole	983	73.8113	17.43	4.5	Irregular	- Fr. Basalt		GL	4.5	1.55	38
149	Patan	Vihe	583	74.0549	17.3242	12	8	- W. Fr. Basalt	3	0.3	11.1	2.2	558
150	Patan	Yerphale	647.4	73.9458	17.3744	9					3.5	2.9	
151	Phaltan	Adarki Bk	679.5	74.2236	17.9194	12					10	7.75	
152	Phaltan	Adarki Kh	741.8	74.1708	17.9111	11					6.3	2.3	
153	Phaltan	Adarki Kh.	589	74.2002	17.9098	10	6		5	1	10	2.3	
154	Phaltan	Aljapur	677	74.2485	17.917	9	5	- Fr. Basalt	Nil	GL	9	4.2	
155	Phaltan	Andrud	622	74.62792	17.88398	9	6	- Fr. Basalt	2.3	0.7	9	8.5	
156	Phaltan	Asu	524	74.66142	18.05197	10	9	- W. Fr. Basalt	1.4	0.6	10	1.4	
157	Phaltan	Dhaval	657	74.3317	17.9015	11	6		4	0.7	11	2.2	
158	Phaltan	Dudhebavi	618.6	74.5078	17.9253	18					16.8	12.4	
159	Phaltan	Ghadgewadi	631	74.2826	17.9519	8	6		4	0.7	8	2.7	
160	Phaltan	Girvi	647	74.4533	17.8895	11	3.5	- W. Fr. Basalt	7	0.3	11	7.3	
161	Phaltan	Gokhali	516.7	74.6242	18.0372	12					8.1	4.7	
162	Phaltan	Kalaj	572	74.2929	18.0128	13	6	- W. Fr. Basalt	6	0.8	13	4.2	
163	Phaltan	Kapadgaon	594	74.1962	18.0242	13	6	- Fr. Basalt		GL	13	8.2	
164	Phaltan	Khunte	534.1	74.4194	18.0472	12					7	4.8	
165	Phaltan	Kurvali Bk.	584	74.9347	17.62612	10	Irregular	- Fr. Basalt	Nil	GL	10	3.4	
166	Phaltan	mandav Khadak	609	74.4065	17.914	9	6	- Fr. Basalt	3	0.8	9	4.2	
167	Phaltan	Murum	553	74.2944	18.0444	4.31					3	2.2	

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168	Phaltan	Nimbhore	544	74.3608	18.0118	11	6.2	- Fr. Basalt		1	11	3.8	
169	Phaltan	Padegaon	567	74.2152	18.0753	10.5	6	- Fr. Basalt	5	1	10.5	5.2	
170	Phaltan	Padegaon	561.5	74.2292	18.0831	9.5					8	4.6	
171	Phaltan	Phaltan-New	582.7	74.3806	17.9667	7					3	1.9	
172	Phaltan	Pimpalwadi	543	74.3426	18.0568	10	7		4.9	0.5	10	3.6	
173	Phaltan	Rajuri	560	74.6389	17.9556	12					1.7	1.6	
174	Phaltan	Saskal	604	74.4652	17.9298	13	7	- Fr. Basalt	10	0.3	13	11.7	
175	Phaltan	Sastewadi	562	74.4338	18.0261	15	10	- Fr. Basalt	1.4	0.6	15	14.2	
176	Phaltan	Sherechiwadi	657	74.1889	17.9522	10	3	- W. Fr. Basalt	10	0.3	10	2	
177	Phaltan	Somanthali	527.3	74.4764	18.0417	13					8.2	5.9	
178	Phaltan	Songaon	564	74.5311	18.0518	9	6	- Fr. Basalt	1.7	0.3	9	5.7	
179	Phaltan	Taradgaon	543	74.24993	18.0239	11	7	- Fr. Basalt	7	0.5	11	7.5	
180	Phaltan	Tathavada	734.2	74.325	17.8611	15.6					14	3.6	
181	Phaltan	Upalave	667	74.3812	17.85705	10	6	- Weathered Basalt	Nil	GL	10	4.2	
182	Phaltan	Vadale	583	74.5225	17.9538	12	Irregular	- W. Fr. Basalt	2	GL	12	10.5	
183	Phaltan	Vadale	579.7	74.5222	17.9556	10.8					5.9	2.4	
184	Phaltan	Vidani	574	74.4827	17.9892	11	5	- Fr. Basalt	Unlined	0.5	11	4.1	
185	Satara	Atit	631.2	74.0697	17.5181	8.4					7	2	
186	Satara	Bhondavade	681	73.9376	17.6572	4.3	3.5		4	1	4.2	0.7	416
187	Satara	Borkhal	641	74.0631	17.7241	9.1	5.2	- Fr. Basalt	2.5	1	3.8	2.7	592
188	Satara	Fadtarwadi	627.7	74.1361	17.6014	10					3.6	1.99	
189	Satara	Fatyapur	634	74.1146	17.5418	12.5	10	- Fr. Basalt		0.7	11	8.2	478
190	Satara	Jihe	627	74.1391	17.6108	7.2	11	- Fr. Basalt		1.2	7.2	2.2	310
191	Satara	Kamathi T.satara	721	73.8682	17.7311	12	6.2	- Fr. Basalt	5	0.4	9.3	3.2	515
192	Satara	Khodad	610	74.0827	17.5095	13.1	9.2	- Fr. Basalt	3.7	GL	11.2	5.7	807
193	Satara	Kurun	723.2	73.9889	17.7653	8.5					6	0.6	
194	Satara	Mahagaon	624	74.0621	17.6764	8	5	- Fr. Basalt	4	2.5	3.7	1.6	1116
195	Satara	Mardhe	661	73.9881	17.8101	7.5	5		3	5	3.7	0.5	717

S. No.	Taluka	Village	Altitude (m)	Longitude deci	Latitude deci	Depth (mbgl)	Diameter (m)	Aquifer material	Lining (mbgl)	MP (magl)	Premon May 17 Water Level (mbgl)	Postmon Nov 17 Water Level (mbgl)	EC (µS /cm)
196	Satara	Nagewadi	723.2	73.9889	17.7653	10					7.6	4.7	
197	Satara	Nandgaon	594.1	74.1428	17.5106	8					7	0.9	
198	Satara	Nigdi	675	74.08626	17.62552	12	10	- Fr. Basalt	4.5	1	5	2.1	424
199	Satara	Ninam	680	73.9807	17.5678	10.2	8.7	- Fr. Basalt	1	0.3	7.2	2.9	508
200	Satara	Nune	670.1	73.945	17.7208	9.9					7.1	4	
201	Satara	Saidapur	687	73.9808	17.7152	6.2	10.1	- W. Fr. Basalt	4.5	0.4	6	3.2	412
202	Satara	Shendre	661.2	74.0153	17.6278	8.5					6	1.5	
203	Satara	Sherewadi	707	73.9656	17.6078	13	10	- Fr. Basalt	10	1.5	8.7	3.1	586
204	Satara	Thoseghar	1055	73.8588	17.6134	7	7.2	- Fr. Basalt		2	6	3.2	106
205	Satara	Vaduth	645.9	74.0556	17.7528	6.7					4.6	4.5	
206	Satara	Valase	642	74.0224	17.5997	8.2	5*3	- Fr. Basalt	0.5	GL	6.5	1.2	1074
207	Satara	Varne	660.4	74.1083	17.5889	5					2.5	2.3	
208	Satara	Warye	649.3	73.9889	17.7306	8.2					2.6	1	
209	Wai	Anavadi	713.6	73.9736	17.9056	9.5					4	2.9	
210	Wai	Asare	746.2	73.7706	18.0042	11.7					7.6	1	
211	Wai	Bavdhan	715	73.8933	17.9078	12.2	7.1	- Fr. Basalt	5	1	11	6.2	972
212	Wai	Bhuinj	686	73.9803	17.8681	8.5	3.5	- Fr. Basalt	7	0.4	6.7	3.1	801
213	Wai	Chandak	841	73.9474	18.0096	10	6	- Fr. Basalt	1	0.7	10	3.2	
214	Wai	Dhawadi	883	73.8743	18.011	8	6*6	- Fr. Basalt	1	0.5	6.9	3.3	433
215	Wai	Dhom	731	73.8224	17.9847	17	5	- Fr. Basalt	12	2	16.6	14.2	1467
216	Wai	Dhom	730.1	73.8222	17.9833	17.7					15	12	
217	Wai	Jor	850	73.7007	17.9815	3	2.7	- Fr. Basalt	2.8	1	2.1	0.6	101
218	Wai	Kadegaon	688.7	73.9347	17.9069	11.1					7.6	5.8	
219	Wai	Kondhavali Kh	740	73.7748	17.95415	5.9	3	- Fr. Basalt	2.5	0.7	3.6	1.4	207
220	Wai	Ozarde	710	73.9647	17.9066	13	6	- Fr. Basalt	12.5	0.7	8.7	4.3	886
221	Wai	Parkhandi	771	73.9196	17.9774	12	8	- Fr. Basalt	4	1	9.5	3	887
222	Wai	Pasarni	761	73.8488	17.9526	12.5	5	- Fr. Basalt	11	0.5	10.2	4.1	716
223	Wai	Udatare	682	73.9483	17.8271	9	4.5	- Fr. Basalt	5	1.3	6.7	2.1	887
224	Wai	Udatare	669.8	73.9542	17.8333	9.2					6.7	1.5	
225	Wai	Vele	821.9	73.9972	17.9958	16.5					12.75	7.5	
226	Wai	Wai (R)	711	73.8958	17.9389	9.2					3.2	2.9	

S. No.	Taluka	Village	Altitude (m)	Longitude deci	Latitude deci	Depth (mbgl)	Diameter (m)	Aquifer material	Lining (mbgl)	MP (magl)	Premon May 17 Water Level (mbgl)	Postmon Nov 17 Water Level (mbgl)	EC (µS /cm)
227	Wai	Wai (U)	712.7	73.8981	17.95	17.61					7.5	4.9	
228	Wai	Washivali	758	73.72628	18.00579	12	9.2	- W. Fr. Basalt	3	2	4.2	2.7	416

BWL: Below water level, GL: Gorund level

Annexure-IV Details of micro-level wells, Satara district

Sl.No.	Taluka	Village	Latitude (°,M,S)	Longitude (°,M,S)	Elevation amsl	Well. Depth (mbgl)	Water Level (mbgl)	EC µS/cm @25° C	Total Thickness weatherd portion (m)	Annual pum ping hours.	HP of Pump	Rate of discharge (m^3/hr)	Kharif draft (m^3)	Rabi Draft (m^3)	Summer Draft (m^3)	Annual Draft m^3/year
1	Khatav	Anphale	17° 27' 42.38''	74° 33' 52.6212''	710	14	11.3	803	7	558	5	1.4	476.4	272.2	10.9	759.5
2	Khatav	Aundh	17° 32' 34.5779''	74° 19' 34.608''	800	13	10	656	5	735	5	1.4	510.0	510.0	21.3	1041.3
3	Khatav	Banpuri	17° 32' 18.9852''	74° 31' 0.354''		8.5	6.1	1283	5	420	3	0.9	310.0	25.8	25.8	361.7
4	Khatav	Bhosare	17° 36' 10.8828''	74° 19' 47.964''	787.1	12	11.3	466	5	1035	5	1.4	793.3	637.5	35.4	1466.3
5	Khatav	Budh	17° 46' 29''	74° 19' 50''	832.6	8	5.4	736	2	760	3	0.9	320.0	320.0	35.6	675.6
6	Khatav	Chorade	17° 25' 35.22''	74° 22' 17.0328''	700.1	12	11.1	812	5	610	5	1.3	560.0	240.0	13.3	813.3
7	Khatav	Dalmodi	17° 35' 25.2024''	74° 30' 0.1152''	742	9.5	7.4	872	6.5	615	5	1.3	480.0	320.0	20.0	820.0
8	Khatav	Ganeshwadi	17° 34' 59.2068''	74° 27' 37.5336''	706.8	10.5	8	909	1	490	3	0.9	258.3	155.0	8.6	421.9
9	Khatav	Gopuj	17° 32' 9.5928''	74° 24' 10.3608''	781.3	11.5	11	588	3	605	5	1.4	510.0	340.0	7.1	857.1
10	Khatav	Gursale	17° 31' 49.9908''	74° 26' 23.3988''	718	12	10.5	419	4	730	3	0.9	320.0	320.0	8.9	648.9
11	Khatav	Jakhangaon	17° 38' 36.96''	74° 19' 8.2308''	783.2	15	9	776	9	900	5	1.4	510.0	708.3	56.7	1275.0
12	Khatav	Kaledhon	17° 26' 15.4284''	74° 39' 12.7548''	765	7	5.9	710	3	570	5	1.3	456.9	274.2	13.1	744.2
13	Khatav	Katgun	17° 41' 28''	74° 20' 58''	777.3	10	4.9	909	7	890	5	1.4	510.0	680.0	70.8	1260.8
14	Khatav	Khatav	17° 39' 46''	74° 21' 52''	757.9	15	4.8	630	4.5	1120	5	1.4	793.3	680.0	113.3	1586.7
15	Khatav	Khatgun	17° 40' 46.074''	74° 20' 8.79''	758.4	14	4.9	724	10	1500	5	1.4	1020.0	935.0	170.0	2125.0
16	Khatav	Kumathe	17° 34' 14.268''	74° 24' 20.3688''	763.4	13	12.5	558	2.8	505	5	1.4	490.0	190.6	6.8	687.4
17	Khatav	Lalgun	17° 46' 49''	74° 17' 53''	832.9	12	6.7	1114	5	1090	5	1.4	952.8	490.0	40.8	1483.6
18	Khatav	Mhasurne	17° 25' 24.33''	74° 26' 39.1956''	680.9	8	5.6	756	3	1030	5	1.4	816.7	544.4	40.8	1401.9
19	Khatav	Mulikwadi	17° 27' 24.7896''	74° 39' 3.8484''	772	10	6.5	562	6.5	650	5	1.3	480.0	360.0	26.7	866.7
20	Khatav	Naikachiwadi	17° 35' 9.258''	74° 25' 37.0416''	713	13	12.1	1114	4	745	5	1.4	510.0	510.0	35.4	1055.4
21	Khatav	Ner	17° 43' 31''	74° 18' 2''	790.4	8.5	4.9	1015	3.5	870	5	1.4	680.0	510.0	42.5	1232.5
22	Khatav	Nimsod	17° 27' 27.6228''	74° 27' 52.1064''	683.3	10.5	7.8	948	4	675	5	1.4	490.0	408.3	20.4	918.8
23	Khatav	Pusesawali	17° 28' 26.9148''	74° 18' 25.1568''	731.6	11	8.3	678	4	705	5	1.4	510.0	453.3	35.4	998.8
24	Khatav	Ranshingwadi	17° 45' 9''	74° 22' 20''	870	7	1.5	701	2	800	5	1.3	560.0	480.0	26.7	1066.7
25	Khatav	Satewadi	17° 36' 46''	74° 26' 24''	710.7	20	12.4	550	7	720	5	1.4	595.0	396.7	28.3	1020.0
26	Khatav	Shendgewadi	17° 25' 33.4848''	74° 30' 24.8976''	655.6	17	15.5	2491	3	1060	5	1.4	595.0	850.0	56.7	1501.7
27	Khatav	Shindewadi	17° 47' 29''	74° 18' 26''	834.5	10	7.4	844	6	740	5	1.4	476.4	490.0	40.8	1007.2
28	Khatav	Tadavale	17° 38' 4.344''	74° 30' 53.6868''	686	19	6.8	404	6.5	1120	7.5	1.9	781.7	1116.7	186.1	2084.4
29	Khatav	Trimali	17° 31' 31.6128''	74° 17' 20.6988''	801.8	14	10.5	649	3	705	5	1.4	595.0	382.5	21.3	998.8
30	Khatav	Umbarmale	17° 40' 40''	74° 21' 12''	798	12	10.5	282	2.5	480	5	1.3	235.0	365.6	26.1	626.7
31	Khatav	Vanzoli	17° 28' 3.0288''	74° 22' 38.37''	734.4	10.5	6.3	692	2	660	5	1.4	510.0	382.5	42.5	935.0
32	Khatav	Vikhale	17° 27' 40.1472''	74° 37' 7.5936''	741	12	11	714	4.8	580	5	1.4	408.3	367.5	13.6	789.4
33	Khatav	Yaralwadi	17° 33' 5.9328''	74° 30' 9.6444''	704.3	9	3.5	1014	2	1590	5	1.4	906.7	1246.7	99.2	2252.5

Annexure-V: Chemical analysis of ground water samples, Shallow aquifers

S. No.	Taluka	Location	Agency	pH	EC	Hardness	TDS	Na	K	Ca	Mg	CO_3	HCO_3	Cl	NO_3	SO_4	F	Fe	SAR	RSC
					µS/cm	---------- mg/l ----------														
1	Jaoli	Medha	NHS2016	0	493	262	230	21.2	0.39	62.124	18.2	0.0	128.1	60.265	106	7	0.29	0.0	0.61	-2.53
2	Jaoli	Medha	GSDA	7.8	399	255	188	25.0	0.5	11.2	38.9	1.0	163.0	56	0.9	13	0.1	0.1	0.79	-1.10
3	Karad	Bhairavnath Nagar	NHS2016	0	749	394	355	30.5	5.26	78.156	38.9	0.0	305.0	102.805	61	9	0.24	0.0	0.70	-2.15
4	Karad	Malkapur	NHS2016	0	532	282	230	36.3	1.44	70.14	13.4	0.0	140.3	49.63	134	16	0.32	0.0	1.04	-2.32
5	Karad	Pal	NHS2016	0	931	493	470	38.2	10.58	120.24	41.3	0.0	323.3	99.26	203	14	0.35	0.0	0.77	-4.16
6	Karad	Undale	NHS2016	0	810	430	345	43.7	0.47	82.164	34.0	0.0	256.2	124.075	68	26	0.26	0.0	1.02	-2.74
7	Karad	Varade	NHS2016	0	657	349	270	45.2	0.26	58.116	30.4	0.0	213.5	74.445	97	17	0.21	0.0	1.20	-1.94
8	Karad	Yelegaon-1	NHS2016	0	427	227	220	13.5	0.48	56.112	19.4	0.0	170.8	31.905	48	7	0.2	0.0	0.40	-1.63
9	Karad	Beldare	GSDA	7.6	660	422	200	61.0	6	54.4	15.6	1.0	259.0	56	11	24	0.4	0.1	1.88	0.26
10	Karad	Chitali	GSDA	8.1	3530	2259	600	479.0	0.1	148.8	55.4	0.0	405.0	484	5.1	842	0.7	0.1	8.50	-5.42
11	Karad	Gote	GSDA	7.7	832	532	268	47.0	2.2	56	31.1	0.0	375.8	70	1	14	0.2	0.1	1.25	0.77
12	Karad	Kale	GSDA	7.4	652	417	280	29.0	3	75.2	22.4	0.7	295.3	56	6	20	0.9	0.1	0.75	-0.76
13	Karad	Karad	GSDA	8.3	648	415	180	52.0	7.5	51.2	12.6	5.5	294.4	52	8	6	0.3	0.2	1.69	1.40
14	Karad	Korti	GSDA	8.2	522	334	160	40.0	5	56	4.9	2.8	189.1	54	4	43	0.1	0.3	1.37	-0.01
15	Karad	Masur	GSDA	8.3	456	292	128	20.0	0.1	20.8	18.5	2.4	129.5	22	1.7	13	0.2	0.5	0.77	-0.38
16	Karad	Mhopre	GSDA	8.2	442	283	188	35.0	0.6	60.8	8.7	2.9	197.0	58	3	7	0.1	0.2	1.11	-0.44
17	Karad	Padali Helgaon	GSDA	8.1	568	364	176	21.0	0.1	19.2	31.1	2.6	221.3	28	5.9	13	0.4	0.6	0.69	0.16
18	Karad	Saidapur	GSDA	7.6	1578	1010	388	200.0	14.7	112	26.2	0.0	502.6	210	13	84	0.7	0.1	4.41	0.45
19	Karad	Savade	GSDA	8.6	774	495	192	44.0	64	44.8	19.4	9.1	242.7	100	6	48	0.1	0.7	1.38	0.42
20	Karad	Talbid	GSDA	7.6	953	610	288	80.0	8	80	21.4	0.0	273.3	136	15	7	0.1	0.1	2.05	-1.30
21	Karad	Umbraj	GSDA	8.1	548	351	252	26.0	2	72	17.5	2.6	217.4	62	5.8	6	0.5	0.1	0.71	-1.41
22	Karad	Vanvasmachi	GSDA	7.8	471	301	184	20.0	3	60.8	7.8	1.4	234.6	27	4	18	0.1	0.1	0.64	0.20
23	Khandala	Bhade	NHS2016	0	1851	983	460	190.0	19.25	100.2	51.0	9.0	335.5	315.505	192	7	0.38	0.0	3.85	-3.46
24	Khandala	Shirwal	NHS2016	0	1184	628	460	69.7	0.2	54.108	79.0	0.0	317.2	138.255	168	41	0.38	0.0	1.41	-4.09
25	Khandala	Khed Bk	GSDA	8.3	1230	787	328	120.0	0.7	75.2	34.0	0.0	170.8	340	8	55	0.1	0.6	2.88	-3.80
26	Khandala	Lonand	GSDA	8.3	401	257	128	37.0	1.7	35.2	9.7	3.3	176.6	24	0.4	11	0.3	1.0	1.42	0.44
27	Khandala	Naygaon	GSDA	8.1	778	498	224	42.0	0.4	51.2	23.3	2.7	225.3	50	5.8	22	0.5	0.5	1.22	-0.72
28	Khandala	Shirval	GSDA	8.1	558	357	144	23.0	0.9	20.8	22.4	2.5	213.4	28	1.4	14	0.1	0.7	0.83	0.68
29	Khatav	Aundh	NHS2016	0	1309	690	315	80.1	10.36	80.16	27.9	0.0	317.2	180.795	135	35	0.29	0.0	1.96	-1.14
30	Khatav	Manjarvadi (Mol)	NHS2016	0	505	268	220	28.6	1.28	68.136	12.2	0.0	225.7	38.995	54	10	0.44	0.0	0.84	-0.72
31	Khatav	Pingli	NHS2016	0	716	379	345	36.2	3.53	100.2	23.1	0.0	268.4	99.26	53	8	0.49	0.0	0.85	-2.53
32	Khatav	Vikhle	NHS2016	0	703	371	215	75.0	0.42	50.1	21.9	0.0	280.6	88.625	37	17	0.38	0.0	2.22	0.27

S.	Taluka	Location	Agency	pH	EC	Hardness	TDS	Na	K	Ca	Mg	CO_3	HCO_3	Cl	NO_3	SO_4	F	Fe	SAR	RSC
33	Khatav	Anphal	KOW2016	8.3	653		204.18	60.9	0.63	99.6	25.4	14.4	73.2	89.9544	8	103	0.355	0.0	1.41	-5.42
34	Khatav	Bhosare	KOW2016	8.1	571		89.64	93.5	0.12	49.8	9.7	0.0	151.3	69.3934	29	29	0.98	0.0	3.17	-0.82
35	Khatav	Dhondewadi	KOW2016	8.2	480		164.34	29.0	0.03	109.56	13.3	0.0	156.2	35.9817	8	40	0.368	0.0	0.70	-4.03
36	Khatav	Diskal	KOW2016	7.7	1014		378.48	58.9	2.17	154.38	54.5	0.0	253.8	125.936	32	104	0.359	0.0	1.04	-8.10
37	Khatav	Ganehswadi	KOW2016	8	556		239.04	18.8	1.48	154.38	20.6	0.0	258.6	38.5519	15	5	0.238	0.0	0.38	-5.19
38	Khatav	Jakhangaon	KOW2016	8	801		333.66	36.0	0.14	124.5	50.8	0.0	283.0	79.6739	17	58	0.373	0.0	0.69	-5.82
39	Khatav	Katarkhatav	KOW2016	8.2	698		199.2	69.0	0.41	104.58	23.0	0.0	292.8	71.9635	8	15	0.517	0.0	1.59	-2.35
40	Khatav	Katgun	KOW2016	8	750		244.02	55.2	0.18	154.38	21.8	0.0	253.8	89.9544	8	30	0.462	0.0	1.10	-5.37
41	Khatav	Ladegaon	KOW2016	7.9	483		169.32	25.9	0.36	134.46	8.5	0.0	219.6	28.2714	7	7	0.352	0.0	0.58	-3.83
42	Khatav	Nidhal	KOW2016	8.2	915		338.64	54.0	1.71	124.5	52.0	0.0	292.8	115.656	7	52	0.299	0.0	1.02	-5.76
43	Khatav	Nimsod	KOW2016	8	791		278.88	50.0	0.76	174.3	25.4	0.0	244.0	89.9544	30	47	0.317	0.0	0.94	-6.83
44	Khatav	Pusegaon	KOW2016	8	633		249	38.0	0.42	159.36	21.8	0.0	200.1	79.6739	8	40	0.37	0.0	0.75	-6.50
45	Khatav	Rajapur	KOW2016	7.7	1024		403.38	53.4	1.71	189.24	52.0	0.0	327.0	120.796	34	53	0.483	0.0	0.89	-8.44
46	Khatav	Shindewadi	KOW2016	7.9	845		308.76	42.0	0.09	159.36	36.3	0.0	322.1	51.4025	34	47	0.68	0.0	0.78	-5.71
47	Khatav	Tadavale	KOW2016	8.3	842		333.66	45.0	0.77	184.26	36.3	52.8	278.2	48.8324	18	24	0.497	0.0	0.79	-5.92
48	Khatav	Ambavade	GSDA	7.6	974	623	312	90.0	0.2	104	12.6	0.0	336.7	124	5.8	124	0.4	0.1	2.22	-0.73
49	Khatav	Aundh	GSDA	8.1	571	365	184	19.0	0.2	67.2	3.9	2.3	197.6	44	4.9	17	0.1	0.1	0.61	-0.37
50	Khatav	Bhusangad	GSDA	8.1	462	296	160	38.0	0.7	59.2	2.9	2.7	229.2	44	1	15	0.1	0.1	1.31	0.65
51	Khatav	Budh	GSDA	7.7	733	469	220	47.0	0.4	48	24.3	0.9	183.1	72	19	32	0.6	0.1	1.38	-1.39
52	Khatav	Datewadi	GSDA	8.1	439	281	196	30.0	7.4	56	13.6	2.8	237.1	36	5.8	16	0.5	0.1	0.93	0.05
53	Khatav	Katar Khatav	GSDA	7.4	6800	4352	560	584.0	318	168	34.0	0.0	414.8	486	5.8	990	0.7	0.1	10.73	-4.44
54	Khatav	Kokrale	GSDA	8.1	622	398	200	20.0	0.1	56	14.6	1.9	158.1	62	6.1	32	1.2	0.1	0.61	-1.36
55	Khatav	Lalgun	GSDA	7.7	711	455	200	47.0	0.1	38.4	25.3	0.8	179.1	76	13	24	0.1	0.1	1.44	-1.06
56	Khatav	Mayani	GSDA	8.1	962	616	236	108.0	0.8	88	3.9	0.0	229.4	170	5.6	112	0.1	0.1	3.06	-0.96
57	Khatav	Pusesavali	GSDA	8.2	907	580	212	69.0	13	80	2.9	0.0	258.6	96	11	61	0.1	0.1	2.06	0.00
58	Khatav	S.kuroli	GSDA	7.7	1336	855	522	116.0	1.5	179.2	18.0	0.0	573.4	262	5.8	44	0.5	0.1	2.21	-1.06
59	Khatav	Vankeswar	GSDA	7.9	1336	855	400	108.0	1	123.2	22.4	0.0	322.1	136	5.8	246	1.1	0.1	2.35	-2.74
60	Khatav	Vardhangad	GSDA	8.7	387	248	164	24.0	0.1	25.6	24.3	10.6	225.1	24	0.2	6	0.4	0.7	0.81	0.74
61	Koregaon	Arvi-1	NHS2016	0	922	494	390	54.5	2.77	84.168	43.7	0.0	244.0	127.62	144	48	0.27	0.0	1.20	-3.85
62	Koregaon	Koregaon	NHS2016	0	1538	816	560	105.7	3.75	140.28	51.0	0.0	128.1	404.13	176	14	0.24	0.0	1.94	-9.17
63	Koregaon	Pimpode (Bk)-1	NHS2016	0	735	386	315	29.5	0.29	84.168	25.5	0.0	158.6	85.08	135	41	0.12	0.0	0.72	-3.74
64	Koregaon	Rehmatpur	NHS2016	0	734	389	305	36.4	0.32	66.132	34.0	0.0	146.4	148.89	60	41	0.35	0.0	0.91	-3.74
65	Koregaon	Eksal	GSDA	7.7	493	316	160	29.0	0.1	36.8	16.5	0.9	183.1	56	4	19	0.7	0.1	1.00	-0.19
66	Koregaon	Jamb Kh	GSDA	8.5	470	301	184	22.0	0.1	30.4	26.2	6.6	223.2	28	1.6	8	0.5	0.6	0.71	0.17
67	Koregaon	Koregaon	GSDA	8.3	1170	749	340	84.0	0.1	96	24.3	0.0	248.9	196	17	50	0.2	0.4	1.98	-2.75

S.	Taluka	Location	Agency	pH	EC	Hardness	TDS	Na	K	Ca	Mg	CO_3	HCO_3	Cl	NO_3	SO_4	F	Fe	SAR	RSC
68	Koregaon	Rahimatpur	GSDA	7.8	761	487	292	24.0	0.2	70.4	28.2	1.3	218.7	84	6.4	31	0.7	0.1	0.61	-2.24
69	Koregaon	Surali	GSDA	8.2	574	367	196	28.0	2	56	13.6	3.2	216.7	56	0.2	10	0.3	0.1	0.87	-0.27
70	Koregaon	Wathar Station	GSDA	8.1	1370	877	424	78.0	0.1	150.4	11.7	0.0	219.6	198	5.1	76	0.4	0.5	1.65	-4.89
71	Mahabaleshwar	Mahabaleswar	NHS2016	0	245	130	50	33.1	2.45	16.032	2.4	0.0	30.5	31.905	51	14	0.12	0.0	2.03	-0.50
72	Mahabaleshwar	Panchagani	NHS2016	0	772	409	55	4.0	0.19	16.032	3.6	0.0	30.5	24.815	7	4	0.29	0.0	0.23	-0.61
73	Mahabaleshwer	Mahabaleshwer	GSDA	8.4	311	199	124	21.0	2.1	44.8	2.9	2.8	117.1	46	4.4	9	0.1	0.2	0.82	-0.47
74	Mahabaleshwer	Pachgani	GSDA	7.2	288	184	132	14.0	0.1	35.2	10.7	0.1	51.9	54	6.5	8	0.6	0.9	0.53	-1.80
75	Man	Dahivadi	NHS2016	0	1660	881	445	117.4	1.22	96.192	49.8	0.0	231.8	230.425	196	48	0.29	0.0	2.42	-5.16
76	Man	Mardi	NHS2016	0	1123	596	300	103.6	1.47	64.128	34.0	0.0	274.5	134.71	141	37	0.44	0.0	2.60	-1.54
77	Man	Mhaswad	NHS2016	0	2001	1060	665	179.0	1.93	128.256	83.8	0.0	231.8	425.4	285	32	0.22	0.0	3.02	-9.60
78	Man	Shenwadi	NHS2016	0	740	392	285	57.3	0.36	74.148	24.3	0.0	311.1	67.355	50	37	0.45	0.0	1.47	-0.63
79	Man	Wavarhire-1	NHS2016	0	733	389	185	95.0	1.04	36.072	23.1	0.0	274.5	70.9	77	7	0.41	0.0	3.04	0.77
80	Man	Andhali	KOW2017	7.7	929		438.2	25.0	1.4	259	43.6	0.0	200.1	51.4	33	146	0.4	0.0	0.38	-13.30
81	Man	Bhalavadi	KOW2017	8.1	1887		288.8	195.1	1.5	84.7	49.6	0.0	322.1	287.9	120	95	0.6	0.0	4.16	-3.09
82	Man	Bhandavali	KOW2017	7.8	265		114.5	9.3	2.8	74.7	9.7	0.0	102.5	33.4	4	5	0.1	0.0	0.27	-2.86
83	Man	Bhatki	KOW2017	8	600		273.9	12.1	1.1	159.4	27.8	0.0	170.8	69.4	20	32	0.09	0.0	0.23	-7.49
84	Man	Bijavadi	KOW2017	8.3	1008		259	62.4	1.5	109.6	36.3	43.2	165.9	136.2	5	62	0.4	0.0	1.32	-4.35
85	Man	Dahivadi	KOW2017	7.9	838		209.2	59.2	6.9	69.7	33.9	0.0	73.2	143.9	47	70	0.5	0.0	1.45	-5.11
86	Man	Divad	KOW2017	10.1	329		84.7	31.1	0.6	24.9	14.5	52.8	4.9	43.7	0.4	22	2	0.0	1.22	-0.61
87	Man	Gatewadi (dhakani)	KOW2017	8.3	547		114.5	49.7	0.7	34.9	19.4	33.6	65.9	48.8	36	31	3.7	0.0	1.67	-1.16
88	Man	Gondavale Kh.	KOW2017	8.2	676		234.1	30.2	0.8	149.4	20.6	0.0	248.9	43.7	9	40	0.5	0.0	0.61	-5.11
89	Man	Hingani	KOW2017	8.3	623		169.3	35.3	0.6	134.5	8.5	38.4	109.8	64.3	17	24	0.9	0.0	0.80	-4.35
90	Man	Kalewadi (naravane)	KOW2017	8	1100		293.8	61.2	1.3	124.5	41.1	0.0	300.1	138.8	30	52	0.4	0.0	1.21	-4.73
91	Man	Kasarwadi	KOW2017	7.7	1001		353.6	24.7	7.3	234.1	29.0	0.0	217.2	136.2	62	41	0.2	0.0	0.40	-10.56
92	Man	Khadaki	KOW2017	7.8	523		234.1	9.8	0.6	154.4	19.4	0.0	214.7	23.1	20	5	0.2	0.0	0.20	-5.82
93	Man	Kulakjai	KOW2017	8.3	1471		403.4	89.0	3.7	109.6	71.4	43.2	346.5	154.2	36	67	0.4	0.0	1.62	-4.31
94	Man	Mardi	KOW2017	8	529		104.6	50.0	1.3	44.8	14.5	0.0	117.1	61.7	7	39	0.5	0.0	1.66	-1.53
95	Man	MHASWAD	KOW2017	8.2	1292		448.2	61.9	1.3	84.7	88.3	0.0	317.2	177.3	28	55	0.3	0.0	1.12	-6.39
96	Man	Bidal	GSDA	7.7	312	200	52	73.0	8	16	2.9	0.4	87.6	66	0.1	37	0.1	0.2	4.40	0.41
97	Man	Dahivadi	GSDA	7.8	1276	817	180	237.0	0.5	70.4	1.0	0.0	214.7	236	11	129	1.2	0.3	7.68	-0.08
98	Man	Dhuldeo	GSDA	7.7	3700	2368	1044	200.0	3.2	240	107.9	0.0	214.7	834	27.5	270	0.5	0.9	2.69	-17.47
99	Man	Divad	GSDA	8.2	502	321	152	33.0	7	35.2	15.6	2.9	193.0	40	0.2	12	0.1	0.2	1.16	0.20
100	Man	Kasarwadi	GSDA	8.5	560	358	184	51.0	0.5	24	30.1	6.6	221.3	36	5	29	0.7	0.2	1.63	0.14
101	Man	Malwadi	GSDA	8.2	2070	1325	524	169.0	2.37	201.6	4.9	0.0	351.4	414	25	132	0.3	0.4	3.21	-4.73
102	Man	Mograle	GSDA	8.2	648	415	200	32.0	0.6	64	9.7	2.9	197.0	70	5.8	30	0.1	0.1	0.98	-0.68

S.	Taluka	Location	Agency	pH	EC	Hardness	TDS	Na	K	Ca	Mg	CO_3	HCO_3	Cl	NO_3	SO_4	F	Fe	SAR	RSC
103	Man	Pandharwadi	GSDA	8.5	827	529	212	64.0	8	80	2.9	1.2	258.8	90	10	10	0.1	0.4	1.91	0.04
104	Man	Shenvadi	GSDA	8.5	552	353	168	29.0	0.2	27.2	24.3	5.7	190.2	52	6.23	24	0.7	0.2	0.97	-0.08
105	Man	Sirtav	GSDA	8.5	1286	823	448	50.0	41	131.2	29.2	0.0	307.4	228	2.4	90	0.1	0.3	1.03	-3.95
106	Man	Valai	GSDA	8.8	735	470	172	108.0	0.7	48	12.6	19.9	335.8	58	5.2	36	0.7	0.1	3.58	2.72
107	Man	Vavarhire	GSDA	8.1	802	513	200	110.0	1.2	78.4	1.0	0.0	473.4	66	5.8	29	0.1	0.1	3.38	3.76
108	Patan	Dhebevadi	NHS2016	0	552	292	235	26.1	0.3	66.132	17.0	0.0	97.6	70.9	122	13	0.38	0.0	0.74	-3.12
109	Patan	Malharpeth	NHS2016	0	269	142	135	8.7	0.47	46.092	4.9	0.0	128.1	24.815	16	7	0.24	0.0	0.33	-0.61
110	Patan	Morgiri (Shivpurpeth)	NHS2016	0	432	229	170	33.2	9.15	42.084	15.8	0.0	122.0	74.445	51	24	0.17	0.0	1.11	-1.42
111	Patan	Muttalvadi	NHS2016	0	336	178	150	11.0	1.02	50.1	6.1	0.0	103.7	49.63	26	7	0.26	0.0	0.39	-1.31
112	Patan	Patan	NHS2016	0	483	256	200	24.3	1.7	76.152	2.4	0.0	140.3	70.9	13	7	0.15	0.0	0.75	-1.71
113	Patan	Savanthwadi (Jinti)	NHS2016	0	353	158	150	14.3	0.32	38.076	13.4	0.0	122.0	38.995	33	7	0.2	0.0	0.51	-1.02
114	Patan	Velkhandwadi (Tarli)	NHS2016	0	481	255	235	16.9	0.74	62.124	19.4	0.0	195.2	35.45	44	9	1.17	0.0	0.48	-1.53
115	Patan	Yerphale	NHS2016	0	442	233	215	11.8	0.11	62.124	14.6	0.0	170.8	35.45	28	22	0.35	0.0	0.35	-1.52
116	Patan	Bopoli	KOW2017	7.3	88		44.8	2.1	0.6	34.9	2.4	0.0	34.2	10.3	1	3	0.1	0.0	0.09	-1.38
117	Patan	Chafal	KOW2017	7.4	45		24.9	2.0	0.6	24.9	0.0	0.0	19.5	10.3	1	2	0.07	0.0	0.11	-0.93
118	Patan	Dadholi	KOW2017	8.2	535		219.1	10.3	3.5	169.3	12.1	0.0	229.4	23.1	8	3	0.2	0.0	0.21	-5.71
119	Patan	Dhavade	KOW2017	7.7	598		244	9.0	0.5	179.3	15.7	0.0	197.6	36	34	18	0.1	0.0	0.17	-7.03
120	Patan	Ghoshatwadi	KOW2017	7.9	355		159.4	9.1	1.4	94.6	15.7	0.0	141.5	23.1	8	5	0.2	0.0	0.23	-3.72
121	Patan	Kalgaon	KOW2017	7.1	47		29.9	1.7	0.7	14.9	3.6	0.0	19.5	12.9	1	1	0.04	0.0	0.10	-0.73
122	Patan	Keral	KOW2017	8.1	663		244	14.8	1.5	174.3	16.9	0.0	251.3	48.8	15	16	0.2	0.0	0.29	-6.00
123	Patan	Manainagar	KOW2017	8.1	461		229.1	12.1	0.7	109.6	29.0	0.0	180.6	28.3	18	12	0.2	0.0	0.27	-4.94
124	Patan	Manewadi(Manegaon)	KOW2017	7.5	129		69.7	3.4	0.5	39.8	7.3	0.0	73.2	7.7	1	0.6	0.1	0.0	0.13	-1.40
125	Patan	Marali	KOW2017	7.2	78		34.9	2.7	1.4	19.9	3.6	0.0	17.1	12.9	11	0.9	0.06	0.0	0.15	-1.01
126	Patan	Matrewadi	KOW2017	7.5	44		24.9	2.9	0.4	14.9	2.4	0.0	22.0	7.7	1	8	0.04	0.0	0.18	-0.58
127	Patan	Helwak	GSDA	7.9	188	120	88	21.0	2	20.8	8.7	0.8	107.2	30	1.1	7	1.2	0.1	0.97	0.01
128	Phaltan	Javali	NHS2016	0	1242	658	380	96.3	28.57	76.152	46.2	0.0	323.3	138.255	188	43	0.44	0.0	2.15	-2.36
129	Phaltan	Mirgaon	NHS2016	0	1380	733	400	102.5	0.66	76.152	51.0	0.0	152.5	255.24	178	33	0.27	0.0	2.23	-5.56
130	Phaltan	Mogarle	NHS2016	0	660	347	295	34.5	1.57	76.152	25.5	0.0	195.2	81.535	123	18	0.32	0.0	0.87	-2.73
131	Phaltan	Nimblak	NHS2016	0	627	332	275	40.6	1.47	58.116	31.6	0.0	128.1	106.35	132	15	0.15	0.0	1.06	-3.44
132	Phaltan	Tathvade	NHS2016	0	566	300	230	39.8	0.44	58.116	20.7	0.0	146.4	56.72	121	31	0.29	0.0	1.14	-2.23
133	Phaltan	Adarki Bk	GSDA	8.3	1946	1245	472	194.0	5.2	164.8	14.6	0.0	585.6	336	11.5	94	0.2	1.5	3.88	0.14
134	Phaltan	Gokhali	GSDA	8.1	3300	2112	248	665.4	0.4	73.6	15.6	0.0	507.5	600	8	230	1.3	0.2	18.37	3.34
135	Phaltan	Nimbalak	GSDA	8.3	1626	1041	256	220.0	0.8	73.6	17.5	0.0	351.4	276	5.2	65	0.8	0.2	5.98	0.62
136	Phaltan	Padegaon	GSDA	8.3	570	365	188	34.0	0.4	25.6	30.1	4.3	231.6	30	4.8	15	0.3	0.5	1.08	0.15
137	Phaltan	Phaltan	GSDA	8.3	2950	1888	220	470.0	0.5	83.2	2.9	0.0	546.6	320	8.6	186	0.9	0.1	13.78	4.56

S.	Taluka	Location	Agency	pH	EC	Hardness	TDS	Na	K	Ca	Mg	CO_3	HCO_3	Cl	NO_3	SO_4	F	Fe	SAR	RSC
138	Phaltan	Rajuri	GSDA	7.8	5320	3405	1460	420.0	3.9	448	82.6	0.0	161.0	1220	5.1	196	0.9	0.2	4.78	-26.65
139	Phaltan	Somanthali	GSDA	7.8	11137	7128	1212	2200.0	1	424	36.9	0.0	366.0	3400	5	1368	1.3	0.1	27.48	-18.28
140	Phaltan	Tambve	GSDA	8	1652	1057	400	100.0	55.5	134.4	15.6	0.0	273.3	314	24	100	1.1	2.5	2.17	-3.54
141	Phaltan	Tathavade	GSDA	8.4	567	363	136	59.0	0.6	36.8	10.7	3.5	148.4	56	4.6	18	0.4	0.2	2.20	-0.18
142	Phaltan	Vadale	GSDA	8.3	1322	846	260	180.0	0.3	86.4	10.7	0.0	248.9	240	5	61	0.6	0.2	4.85	-1.13
143	Satara	Atit	NHS2016	0	866	459	325	57.8	1.43	80.16	30.4	0.0	195.2	124.075	127	41	0.32	0.0	1.39	-3.34
144	Satara	Chinchner Vandan	NHS2016	0	734	388	325	51.0	7.13	58.116	43.7	0.0	366.0	60.265	71	22	0.35	0.0	1.23	-0.55
145	Satara	Chinchni Kanheri	NHS2016	0	390	206	195	11.8	0.05	56.112	13.4	0.0	189.1	38.995	16	7	0.14	0.0	0.37	-0.82
146	Satara	Kondve	NHS2016	0	442	239	235	15.8	0.08	52.104	25.5	0.0	280.6	31.905	20	7	0.26	0.0	0.45	-0.13
147	Satara	Shendri	NHS2016	0	577	305	260	29.1	9.29	60.12	26.7	0.0	146.4	60.265	151	7	0.27	0.0	0.78	-2.83
148	Satara	Vaduth	NHS2016	0	355	188	170	15.1	0.19	50.1	10.9	0.0	67.1	38.995	75	7	0.29	0.0	0.50	-2.32
149	Satara	Bhondavade	KOW2017	7.9	393		189.2	9.6	0.4	119.5	16.9	0.0	180.6	20.6	10	2	0.1	0.0	0.22	-4.42
150	Satara	Borkhal	KOW2017	8.4	316		164.3	8.2	0.8	109.6	13.3	24.0	92.7	18	6	4	0.1	0.0	0.20	-4.27
151	Satara	Fatyapur	KOW2017	7.9	465		194.2	11.2	0.5	129.5	15.7	0.0	183.0	25.7	16	10	0.1	0.0	0.25	-4.78
152	Satara	Jihe	KOW2017	8.3	288		134.5	8.5	0.7	99.6	8.5	24.0	83.0	15.4	1	2	0.1	0.0	0.22	-3.53
153	Satara	Kamathi T.satara	KOW2017	7.7	602		229.1	26.8	1.3	104.6	30.3	0.0	75.6	102.8	34	58	0.1	0.0	0.59	-6.52
154	Satara	Khodad	KOW2017	8.1	866		333.7	31.2	11.9	159.4	42.4	0.0	327.0	59.1	21	43	0.2	0.0	0.57	-6.14
155	Satara	Nigdi	KOW2017	7.9	692		308.8	25.7	0.7	144.4	39.9	0.0	270.8	43.7	23	22	0.2	0.0	0.49	-6.11
156	Satara	Atit	GSDA	8.3	538	344	216	23.0	0.1	43.2	26.2	4.0	211.9	44	3	22	0.2	0.7	0.68	-0.74
157	Satara	Karanje	GSDA	8.3	1027	657	324	65.0	0.2	84.8	27.2	0.0	190.3	192	15	50	0.1	0.3	1.57	-3.39
158	Satara	Kuran	GSDA	8.3	155	99	88	12.0	0.4	25.6	5.8	1.7	90.2	18	4.8	5	0.1	0.6	0.56	-0.23
159	Satara	Marde	GSDA	8.4	792	507	236	79.0	0.5	72	13.6	0.0	429.4	50	10	15	0.2	0.4	2.24	2.31
160	Satara	Nagewadi	GSDA	8.3	618	396	248	23.0	0.5	73.6	15.6	5.5	294.4	30	0.6	12	0.3	0.5	0.64	0.03
161	Satara	Nandgaon	GSDA	8.3	456	292	140	20.0	0.1	40	9.7	2.4	127.5	34	5.8	16	0.1	0.6	0.73	-0.64
162	Satara	Nune	GSDA	8.1	456	292	252	17.0	0.5	73.6	16.5	3.1	260.9	26	1.2	6	0.1	0.8	0.47	-0.68
163	Satara	Shendre	GSDA	7.8	1096	701	436	30.0	0.4	89.68	51.5	0.0	195.2	246	2	44	0.2	0.8	0.62	-5.57
164	Satara	Varne	GSDA	8	565	362	160	21.0	1.4	32	19.4	1.7	178.3	34	3	13	0.3	0.6	0.72	-0.24
165	Satara	Waduth	GSDA	8.5	274	175	116	15.0	0.1	27.2	11.7	3.5	116.4	26	2.5	16	0.1	0.6	0.61	-0.31
166	Wai	Surur	NHS2016	0	803	425	310	58.9	1.16	62.124	37.7	0.0	213.5	102.805	144	22	0.35	0.0	1.45	-2.75
167	Wai	Wai	NHS2016	0	952	504	480	49.4	0.29	72.144	72.9	0.0	146.4	244.605	170	8	0.24	0.0	0.98	-7.28
168	Wai	Bavdhan	KOW2017	8.3	889		353.6	55.4	3.4	134.5	53.2	43.2	263.5	69.4	32	21	0.2	0.0	1.02	-5.40
169	Wai	Bhuinj	KOW2017	7.8	596		194.2	50.5	0.7	114.5	19.4	0.0	246.4	23.1	27	11	0.2	0.0	1.15	-3.30
170	Wai	Chandak	KOW2017	7.9	804		343.6	31.6	0.8	119.5	54.5	0.0	356.2	41.1	17	14	0.3	0.0	0.60	-4.68
171	Wai	Dhawadi	KOW2017	7.5	88		39.8	3.6	0.5	29.9	2.4	0.0	24.4	10.3	4	3	0.02	0.0	0.17	-1.30
172	Wai	Dhom	KOW2017	7.9	668		323.7	18.2	0.4	124.5	48.4	0.0	236.7	38.6	50	11	0.2	0.0	0.35	-6.38

S.	Taluka	Location	Agency	pH	EC	Hardness	TDS	Na	K	Ca	Mg	CO_3	HCO_3	Cl	NO_3	SO_4	F	Fe	SAR	RSC
173	Wai	Jor	KOW2017	7.7	130		69.7	4.6	0.5	59.8	2.4	0.0	58.6	12.9	0.7	5	0.06	0.0	0.16	-2.23
174	Wai	Anawadi	GSDA	8.5	334	214	152	19.0	0.5	25.6	21.4	4.8	163.0	20	3.1	8	0.1	0.4	0.67	-0.23
175	Wai	Asare	GSDA	8.2	459	294	220	16.0	2.4	73.6	8.7	3.4	228.5	30	0.7	8	0.4	0.6	0.47	-0.55
176	Wai	Chindhavali	GSDA	8	658	421	208	59.0	0.4	54.4	17.5	2.5	269.4	34	10	13	0.3	0.5	1.78	0.32
177	Wai	Udtare	GSDA	8.3	654	419	272	31.0	0.1	91.2	10.7	5.7	306.2	22	4.1	9	0.3	0.4	0.82	-0.24
178	Wai	Vele	GSDA	8.2	594	380	204	38.0	0.5	67.2	8.7	4.0	267.9	40	6.1	13	0.1	0.3	1.16	0.44

Annexure VI: Chemical analysis of ground water samples, deeper aquifers

S. No.	Taluka	Location	Source	pH	EC	Hardness	TDS	Na	K	Ca	Mg	CO_3	HCO_3	Cl	NO_3	SO_4	F	Fe	SAR	RSC
					µS/cm	mg/l														
1	Jaoli	Ambeghar	EW	9.2	480	NA	175	29.0	0.7	46	15.0	NA	NA	35	20	15	0.12	0.0	0.95	
2	Jaoli	Ambeghar	Exploration	9.2	480	NA	NA	15.0	29	175	46.0	0.7	NA	NA	15	35	0.12	20.0	0.26	
3	Karad	Karawadi	PYT	8.9	680	356	260	34.0	0.4	66	23.0	42.0	262.0	28	24	8	0.09	0.0	0.92	0.48
4	Karad	Karawadi 1st	EW	8.8	600	320	195	40.0	0.9	40	23.0	24.0	189.0	28	35	35	0.14	0.0	1.25	-0.02
5	Karad	Karawadi 1st	OW	8.9	570	300	210	27.0	0.4	42	26.0	30.0	201.0	32	30	12	0.14	0.0	0.81	0.03
6	Karad	Karawadi 1st	EW	8.7	580	304	210	30.0	0.6	40	27.0	30.0	171.0	35	38	18	0.18	0.0	0.90	-0.45
7	Karad	Karawadi 2NA	EW	8.8	650	346	300	12.0	0.5	66	33.0	18.0	189.0	64	44	14	0.2	0.0	0.30	-2.35
8	Karad	Shindewadi	PTEST	7	1100	NA	90	200.0	8	20	9.7	0.0	359.9	57	11	153	0.34	0.0	9.17	4.09
9	Karad	Shitalwadi	Exploration	7.9	600	NA	190	NA	NA	200	NA	NA	NA	NA	NA	NA	BDL	6.0		
10	Karad	Shitalwadi 1st	OW	8.1	440	225	200	11.0	0.1	30	30.0	0.0	214.0	21	13	7	0.38	0.0	0.34	-0.49
11	Karad	Shitalwadi 2NA	OW	8.2	490	255	195	20.0	0.1	36	26.0	0.0	165.0	57	12	15	1.08	0.0	0.62	-1.26
12	Karad	Shindewadi	PYT	7.1	1680	NA	650	NA	NA	NA	NA	NA	NA	NA	329	NA	0.1	0.0		
13	Karad	Shindewadi	EW	6.9	1820	NA	680	NA	NA	NA	NA	NA	NA	NA	352	NA	BDL	0.0		
14	Karad	Supne 1st	EW	8	600	310	275	12.0	0.2	38	44.0	0.0	201.0	53	37	27	0.27	0.0	0.31	-2.27
15	Karad	Supne 2NA	EW	8.2	630	325	265	16.0	0.5	50	34.0	0.0	244.0	50	42	10	0.18	0.0	0.43	-1.33
16	Khandala	Shindewadi	EW II ZONE	7.1	2000	NA	270	362.0	17	66	25.5	0.0	85.4	266	10	593.2	0.47	0.0	9.58	-4.03
17	Khandala	Shindewadi	Exploration	7.9	600	NA	190	NA	NA	200	NA	NA	NA	NA	NA	NA	BDL	6.0		
18	Khandala	Tambve	P2-PYT	8.4	1840	NA	420	NA	NA	NA	NA	NA	NA	NA	260	NA	BDL	0.0		
19	Khandala	Tambve	OW-PYT	8.8	1150	NA	380	NA	NA	NA	NA	NA	NA	NA	160	NA	0.62	0.0		
20	Khandala	Tambve	OW-2NA Zone	8.7	1390	NA	840	NA	NA	NA	NA	NA	NA	NA	147	NA	0.6	0.0		
21	Khandala	Tambve	OW-1st Zone	7.8	1320	NA	460	NA	NA	NA	NA	NA	NA	NA	165	NA	0.18	0.0		
22	Khandala	Tambve BK	E.W - PYT	7.9	1160	NA	430	NA	NA	NA	NA	NA	NA	NA	147	NA	BDL	0.0		
23	Khandala	Tambve BK	EW-2NA Zone	7.9	1130	NA	390	NA	NA	NA	NA	NA	NA	NA	145	NA	0.22	0.0		
24	Khandala	Tambve BK	EW-1st Zone	7.8	1250	NA	500	NA	NA	NA	NA	NA	NA	NA	165	NA	BDL	0.0		
25	Khandala	Tonaal	OW-4,PYT	7.9	920	NA	330	NA	NA	NA	NA	NA	NA	NA	143	NA	BDL	0.0		
26	Khandala	Tonaal	OW-4,2NA Zone	7.9	880	NA	330	NA	NA	NA	NA	NA	NA	NA	142	NA	BDL	0.0		
27	Khandala	Tonaal	OW-4,1st Zone	7.9	870	NA	300	NA	NA	NA	NA	NA	NA	NA	145	NA	BDL	0.0		
28	Khandala	Tondal	Exploration	7.9	870	NA	150	NA	NA	300	NA	NA	NA	NA	NA	NA	BDL	145.0		
29	Khandala	Tondal	Exploration	7.9	880	NA	140	NA	NA	330	NA	NA	NA	NA	NA	NA	BDL	142.0		
30	Khandala	Tondal	Exploration	7.9	920	NA	140	NA	NA	330	NA	NA	NA	NA	NA	NA	BDL	143.0		
31	Khatav	Arphal	EW	8	750	420	245	60.0	0.1	76	13.0	0.0	342.0	35	58	3	NA	0.0	1.67	0.72
32	Khatav	Arphal	Exploration	7.99	750	420	245	60.0	0	76	13.0	0.0	342.0	35	58	3	0	0.5	1.67	0.72

S.	Taluka	Location	Source	pH	EC	Hardness	TDS	Na	K	Ca	Mg	CO_3	HCO_3	Cl	NO_3	SO_4	F	Fe	SAR	RSC
33	Khatav	Aundh	Pump Test-2	8	899	476	418	43.0	0.9	114	32.0	0.0	404.0	70	40	34	0.67	0.0	0.92	-1.74
34	Khatav	Aundh	Pump Test-1	8	918	486	408	41.0	0.8	119	27.0	0.0	363.0	65	43	26	0.25	0.0	0.88	-2.25
35	Khatav	Dambewadi	EW	7.4	1290	683	245	137.0	8.1	45	32.0	0.0	107.0	270	1	124	0.39	0.0	3.81	-3.16
36	Khatav	Nidhal	EW	7.8	440	240	135	39.0	2	32	13.0	0.0	214.0	18	23	5	NA	0.0	1.47	0.82
37	Khatav	Nidhal	Exploration	7.8	440	240	135	39.0	2	32	13.0	0.0	214.0	18	23	5	0	0.7	1.47	0.82
38	Khatav	Phadtarwadi	EW	7.9	600	NA	125	NA	NA	24	16.0	0.0	174.0	74	NA	NA	NA	0.0		0.32
39	Khatav	Phadtarwadi	Exploration	7.86	600	384	125	0.0	0	24	16.0	0.0	174.0	74	0	0	0	1.2	0.00	0.32
40	Khatav	Vaduz	OW	7.8	690	430	65	129.0	1	22	2.0	0.0	61.0	131	35	80	NA	0.0	7.05	-0.27
41	Khatav	Vaduz	EW	7.5	600	365	105	90.0	2	30	7.0	0.0	183.0	43	70	30	NA	0.0	3.84	0.92
42	Khatav	Vaduz	Exploration	7.5	600	365	105	90.0	2	30	7.0	0.0	183.0	43	70	30	0	0.6	3.84	0.92
43	Khatav	Vaduz	Exploration	7.75	690	430	65	129.0	1	22	2.0	0.0	61.0	131	35	80	0	0.4	7.05	-0.27
44	Koregaon	Circlewadi	EW-PYT	8.9	1060	NA	460	NA	NA	NA	NA	NA	NA	NA	196	NA	BDL	0.0		
45	Koregaon	Dhamner	OW	7.9	630	NA	175	NA	NA	24	27.0	0.0	285.0	54	NA	NA	NA	0.0		1.22
46	Koregaon	Dhamner	EW	7.8	570	NA	130	NA	NA	42	6.0	0.0	253.0	40	NA	NA	NA	0.0		1.55
47	Koregaon	Dhamner	Exploration	7.83	570	364.8	130	0.0	0	42	6.0	0.0	253.0	40	0	0	0	0.7	0.00	1.55
48	Koregaon	Dhamner	Exploration	7.88	630	403.2	175	0.0	0	24	27.0	0.0	285.0	54	0	0	0	0.1	0.00	1.22
49	Koregaon	Kodoli	EW	7.7	480	290	30	94.0	1.2	10	1.0	0.0	104.0	57	2.8	70	1.03	0.0	7.57	1.12
50	Koregaon	Kodoli	Exploration	7.7	480	290	NA	1.0	94	30	10.0	1.2	Nil	104	70	57	1.03	2.8	0.04	
51	Man	Andhali	EW	8	535	283	148	41.0	0.9	20	23.0	0.0	119.0	55	8	80	1.7	0.0	1.48	-0.97
52	Man	Mohi	E.W	7.4	760	NA	220	NA	NA	NA	NA	NA	NA	NA	26	NA	0.2	0.0		
53	Man	Shindewadi	OW	8.1	570	350	115	78.0	0.5	22	15.0	0.0	61.0	85	29	90	NA	0.0	3.14	-1.35
54	Man	Shindewadi	EW	7.9	600	365	110	87.0	0.1	14	18.0	0.0	43.0	106	18	100	NA	0.0	3.62	-1.50
55	Man	Shindewadi	OW I ZONE	7	670	NA	30	132.0	8	8	2.4	0.0	237.9	60	11	18	0.23	0.0	10.50	3.30
56	Man	Shindewadi	EW I ZONE	7.2	2000	NA	275	365.0	15	66	26.8	0.0	85.4	266	8	596.6	0.46	0.0	9.56	-4.13
57	Man	Shindewadi	Exploration	8.1	570	350	115	78.0	0.5	22	15.0	0.0	61.0	85	29	90	0	1.6	3.14	-1.35
58	Man	Shindewadi	Exploration	7.88	600	365	110	87.0	0	14	18.0	0.0	43.0	106	18	100	0	1.3	3.62	-1.50
59	Man	Shindewadi	EW-1st Zone	7.9	600	NA	200	NA	NA	NA	NA	NA	NA	NA	6	NA	BDL	0.0		
60	Patan	Dabawadi	EW	7.6	470	250	155	37.0	0.5	12	30.0	0.0	220.0	18	40	NA	NA	0.0	1.30	0.51
61	Patan	Dabawadi	Exploration	7.55	470	250	155	37.0	0.5	12	30.0	0.0	220.0	18	40	0	0	1.4	1.30	0.51
62	Patan	Telewadi	EW	8	720	370	290	33.0	0.2	36	49.0	0.0	268.0	78	7	30	0.38	0.0	0.84	-1.49
63	Phaltan	Bibi	EW	7.3	490	NA	350	NA	NA	NA	NA	NA	NA	NA	19	NA	0.1	0.0		
64	Phaltan	Bibi	EW PYT	7	1610	NA	495	152.0	1	88	66.9	0.0	231.0	252	220	69.1	0.15	0.0	2.97	-6.19
65	Phaltan	Bibi	EW I ZONE	7	1600	NA	500	150.0	2	74	76.6	0.0	256.0	241	223	64.8	0.15	0.0	2.92	-5.89
66	Phaltan	Mirgaon	Exploration	7.3	750	460	125	115.0	2	26	15.0	0.0	92.0	142	62	50	0	22.5	4.44	-1.04
67	Phaltan	Shindewadi	OW PYT	7	990	NA	125	160.0	8	26	14.6	0.0	286.7	67	10	129.3	0.32	0.0	6.22	2.18

S.	Taluka	Location	Source	pH	EC	Hardness	TDS	Na	K	Ca	Mg	CO_3	HCO_3	Cl	NO_3	SO_4	F	Fe	SAR	RSC
68	Phaltan	Shindewadi	OW II ZONE	7	670	NA	25	135.0	8	8	1.2	0.0	231.8	64	11	17.6	0.23	0.0	11.75	3.30
69	Phaltan	Shindewadi	PYT	8.1	550	NA	310	NA	NA	NA	NA	NA	NA	NA	9	NA	BDL	0.0		
70	Phaltan	Tathwade	EW PYT	7.1	1110	NA	250	144.0	1	30	42.6	0.0	164.7	124	116	140	0.1	0.0	3.96	-2.35
71	Phaltan	Tathwade	EW I ZONE	7.1	1140	NA	245	150.0	4	28	42.6	0.0	164.7	124	130	149	0.12	0.0	4.16	-2.25
72	Satara	Chinchner	EW	8	450	230	175	23.0	0.5	30	24.0	0.0	238.0	7	29	NA	NA	0.0	0.76	0.40
73	Satara	Chinchner	OW	7.9	480	280	170	37.0	0.5	34	21.0	0.0	232.0	7	67	NA	NA	0.0	1.23	0.35
74	Satara	Chinchner	Exploration	8	450	230	175	23.0	0.5	30	24.0	0.0	238.0	7	29	0	0	1.3	0.76	0.40
75	Satara	Chinchner	Exploration	7.85	480	280	170	37.0	0.5	34	21.0	0.0	232.0	7	67	0	0	0.7	1.23	0.35
76	Satara	Kadve	EW	7.8	590	330	125	77.0	1.5	40	6.0	0.0	220.0	50	0.8	43	2	0.0	3.00	1.11
77	Satara	Kadve(BK)	Exploration	7.8	590	330	NA	6.0	77	125	40.0	1.5	Nil	220	43	50	2	0.8	0.12	
78	Satara	Konahawali	OW PYT	7	630	NA	175	60.0	8	32	23.1	0.0	195.0	99	5	4.2	0.12	0.0	1.97	-0.33
79	Satara	Konahawali	OW I ZONE	6.7	1000	NA	250	112.0	14	26	45.0	0.0	214.0	184	71	29.7	0.08	0.0	3.08	-1.54
80	Satara	Konahawali	EW PYT	6.8	590	NA	185	45.0	6	28	28.0	0.0	189.0	85	1	14.1	0.07	0.0	1.44	-0.63
81	Satara	Konahawali	EW I ZONE	6.7	570	NA	175	48.0	5	26	26.8	0.0	183.0	85	1	12.5	0.08	0.0	1.58	-0.53
82	Satara	Sayali	EW	7.9	470	252	180	22.0	1.6	54	11.0	0.0	201.0	35	20	8	0.2	0.0	0.71	-0.32
83	Satara	Sayali	Exploration	7.9	470	252	NA	11.0	22	180	54.0	1.6	Nil	201	8	35	0.2	20.0	0.18	
84	Satara	Velu	EW PYT	7.1	1010	NA	260	103.0	7	30	45.0	0.0	232.0	156	71	30.1	0.24	0.0	2.78	-1.45
85	Satara	Velu	EW PYT IST ZONE	6.9	660	NA	215	51.0	9	40	28.0	0.0	183.0	110	16	20.7	0.22	0.0	1.51	-1.33
86	Wai	Asale	APT	6.8	710	NA	205	65.0	4	22	36.5	0.0	213.0	89	35	28.5	0.05	0.0	1.97	-0.65
87	Wai	Asale	APT	6.9	770	NA	235	62.0	5	28	40.1	0.0	210.0	92	35	42	0.04	0.0	1.76	-1.30
88	Wai	Asale	OW PYT	6.8	790	NA	190	86.0	7	18	35.3	0.0	213.0	92	43	45	0.05	0.0	2.71	-0.35
89	Wai	Asale	OW I ZONE	6.8	380	NA	30	60.0	10	10	1.2	0.0	85.4	50	14	27.3	0.02	0.0	4.77	0.80
90	Wai	Asale	EW	7	740	NA	180	85.0	8	28	26.8	0.0	220.0	92	42	40	0.06	0.0	2.75	-0.03
91	Wai	Bopardi	EW PYT	7	1030	NA	325	78.0	4	52	47.4	0.0	244.0	110	125	36.9	0.05	0.0	1.88	-2.55
92	Wai	Bopardi	EW I ZONE	7	630	NA	180	57.0	5	26	28.0	0.0	201.3	43	95	14.2	0.04	0.0	1.85	-0.33
93	Wai	Jamb Chillianagar	GSDA BW	8.1	620	397	228	28.0	0.3	35.2	34.0	2.3	193.6	42	6.4	29	0.2	0.5	0.81	-1.34
94	Wai	Kawthe	EW PYT	6.7	75	NA	35	15.0	1	4	6.1	0.0	12.2	21	43	0.6	0.01	0.0	1.10	-0.51

Annexure VII: Location of proposed Percolation tanks in Satara district

S.No.	Village	Taluka	Type of structure	Longitude	Latitude
1	Ambavade	Khatav	Percolation tank	74.4833	17.5159
2	Ambavade	Khatav	Percolation tank	74.4905	17.4998
3	Bhandewadi	Khatav	Percolation tank	74.3267	17.6433
4	Bhurakvadi (n.v.)	Khatav	Percolation tank	74.3598	17.6154
5	Chitali	Khatav	Percolation tank	74.4747	17.4127
6	Chitali	Khatav	Percolation tank	74.527	17.4085
7	Chorade	Khatav	Percolation tank	74.3759	17.424
8	Dharpuri	Khatav	Percolation tank	74.3603	17.6709
9	Ganeshwadi (n.v.)	Khatav	Percolation tank	74.4631	17.5687
10	Ganeshwadi (n.v.)	Khatav	Percolation tank	74.4608	17.5966
11	Ganeshwadi (n.v.)	Khatav	Percolation tank	74.4318	17.5494
12	Garalewadi	Khatav	Percolation tank	74.6241	17.4334
13	Gopuj	Khatav	Percolation tank	74.3945	17.5349
14	Goregaon (vangi)	Khatav	Percolation tank	74.4983	17.4843
15	Gundewadi (n.v.)	Khatav	Percolation tank	74.4965	17.4371
16	Gursale	Khatav	Percolation tank	74.4452	17.5139
17	Gursale	Khatav	Percolation tank	74.4294	17.5196
18	Gursale	Khatav	Percolation tank	74.4178	17.5122
19	Husenpur	Khatav	Percolation tank	74.3521	17.6166
20	Kalambi	Khatav	Percolation tank	74.2982	17.4949
21	Kalambi	Khatav	Percolation tank	74.3075	17.4855
22	Kaledhon	Khatav	Percolation tank	74.6531	17.4249
23	Karandewadi (n.v.)	Khatav	Percolation tank	74.3414	17.5246
24	Katarkhatav	Khatav	Percolation tank	74.5265	17.568
25	Katarkhatav	Khatav	Percolation tank	74.5263	17.5398
26	Katarkhatav	Khatav	Percolation tank	74.5547	17.543
27	Katgun	Khatav	Percolation tank	74.3417	17.687
28	Katgun	Khatav	Percolation tank	74.357	17.7008
29	Katgun	Khatav	Percolation tank	74.327	17.6971
30	Katgun	Khatav	Percolation tank	74.3534	17.6934
31	Kharashinge	Khatav	Percolation tank	74.3453	17.4953
32	Khatav	Khatav	Percolation tank	74.3756	17.6401
33	Khatav	Khatav	Percolation tank	74.3383	17.6615
34	Khatav	Khatav	Percolation tank	74.3521	17.647
35	Khatav	Khatav	Percolation tank	74.3684	17.6369
36	Khatval	Khatav	Percolation tank	74.5775	17.5396
37	Kurle	Khatav	Percolation tank	74.2773	17.4445
38	Kuroli	Khatav	Percolation tank	74.403	17.5838
39	Maradwak	Khatav	Percolation tank	74.5037	17.4645
40	Mayani	Khatav	Percolation tank	74.5941	17.4588
41	Mayani	Khatav	Percolation tank	74.5527	17.445
42	Mayani	Khatav	Percolation tank	74.5493	17.4193
43	Mhasurne	Khatav	Percolation tank	74.4724	17.4275
44	Mhasurne	Khatav	Percolation tank	74.4468	17.4094
45	Mulikwadi (n.v.)	Khatav	Percolation tank	74.6505	17.4624
46	Nadhawal	Khatav	Percolation tank	74.4558	17.5446
47	Naikachiwadi (n.v.)	Khatav	Percolation tank	74.447	17.5751
48	Nandoshi	Khatav	Percolation tank	74.2897	17.5471
49	Nidhal	Khatav	Percolation tank	74.4064	17.707
50	Nidhal	Khatav	Percolation tank	74.4111	17.6959
51	Nimsod	Khatav	Percolation tank	74.4885	17.466
52	Nimsod	Khatav	Percolation tank	74.4952	17.4509
53	Nimsod	Khatav	Percolation tank	74.4892	17.4771
54	Nimsod	Khatav	Percolation tank	74.4778	17.4398
55	Nimsod	Khatav	Percolation tank	74.4546	17.4651
56	Nimsod	Khatav	Percolation tank	74.4654	17.4391
57	Pachwad	Khatav	Percolation tank	74.6451	17.476
58	Pargaon	Khatav	Percolation tank	74.2884	17.443

S.No.	Village	Taluka	Type of structure	Longitude	Latitude
59	Pusegaon	Khatav	Percolation tank	74.3166	17.7092
60	Rahatani	Khatav	Percolation tank	74.381	17.448
61	Shirswadi	Khatav	Percolation tank	74.4331	17.4922
62	Suryachiwadi (n.v.)	Khatav	Percolation tank	74.5066	17.507
63	Unchithane	Khatav	Percolation tank	74.3166	17.464
64	Vikhale	Khatav	Percolation tank	74.6192	17.4613
65	Vikhale	Khatav	Percolation tank	74.6233	17.474
66	Wakalwadi (n.v.)	Khatav	Percolation tank	74.4194	17.4991
67	Wakalwadi (n.v.)	Khatav	Percolation tank	74.4162	17.5037
68	Wakeshwar	Khatav	Percolation tank	74.4168	17.625
69	Wakeshwar	Khatav	Percolation tank	74.3906	17.6378
70	Wakeshwar	Khatav	Percolation tank	74.4072	17.607
71	Wakeshwar	Khatav	Percolation tank	74.4028	17.6016
72	Bamgarwadi (N.V.) (96	Man	Percoltion tank	74.7939	17.5212
73	Dahivadi	Man	Percoltion tank	74.5463	17.7086
74	Dahivadi	Man	Percoltion tank	74.5345	17.72
75	Dahivadi	Man	Percoltion tank	74.5529	17.7106
76	Gangoti	Man	Percoltion tank	74.7707	17.5893
77	Gondavale Bk.	Man	Percoltion tank	74.5868	17.6634
78	Gondavale Bk.	Man	Percoltion tank	74.5801	17.6692
79	Gondavale Kh.	Man	Percoltion tank	74.622	17.6682
80	Gondavale Kh.	Man	Percoltion tank	74.614	17.6565
81	Gondavale Kh.	Man	Percoltion tank	74.6076	17.6702
82	Hingani	Man	Percoltion tank	74.8561	17.6295
83	Hingani	Man	Percoltion tank	74.8665	17.6342
84	Hingani	Man	Percoltion tank	74.8845	17.6072
85	Jashi	Man	Percoltion tank	74.6574	17.6794
86	Kiraksal	Man	Percoltion tank	74.5732	17.6425
87	Kuranwadi (N.V.) (96)	Man	Percoltion tank	74.8544	17.5354
88	Kuranwadi (N.V.) (96)	Man	Percoltion tank	74.8541	17.512
89	Lodhavade	Man	Percoltion tank	74.6169	17.6329
90	Mankarnawadi (Palashi	Man	Percoltion tank	74.7009	17.6649
91	Mankarnawadi (Palashi	Man	Percoltion tank	74.6929	17.6659
92	Mankarnawadi (Palashi	Man	Percoltion tank	74.6481	17.6712
93	Mhasvad	Man	Percoltion tank	74.8024	17.6191
94	Mhasvad	Man	Percoltion tank	74.8059	17.6252
95	Mhasvad	Man	Percoltion tank	74.8084	17.6355
96	Mhasvad	Man	Percoltion tank	74.8279	17.6203
97	Mhasvad	Man	Percoltion tank	74.8268	17.6286
98	Mhasvad	Man	Percoltion tank	74.7871	17.6236
99	Mhasvad	Man	Percoltion tank	74.7702	17.6271
100	Mhasvad	Man	Percoltion tank	74.7619	17.6246
101	Mhasvad	Man	Percoltion tank	74.7638	17.6425
102	Mhasvad	Man	Percoltion tank	74.7491	17.6467
103	Naravane	Man	Percoltion tank	74.6326	17.6177
104	Naravane	Man	Percoltion tank	74.623	17.609
105	Palashi	Man	Percoltion tank	74.671	17.6735
106	Palsavade	Man	Percoltion tank	74.8632	17.572
107	Pimpari	Man	Percoltion tank	74.6673	17.6481
108	Pingali Bk.	Man	Percoltion tank	74.5327	17.6771
109	Pingali Bk.	Man	Percoltion tank	74.51	17.673
110	Ranand	Man	Percoltion tank	74.6492	17.7017
111	Shenwadi	Man	Percoltion tank	74.8174	17.477
112	Shevari	Man	Percoltion tank	74.6273	17.7213
113	Varkute Malavadi Varu	Man	Percoltion tank	74.8563	17.5433
114	Varkute Malavadi Varu	Man	Percoltion tank	74.8259	17.5435
115	Varkute Malavadi Varu	Man	Percoltion tank	74.812	17.5321
116	Varkute Malavadi Varu	Man	Percoltion tank	74.8387	17.5125
117	Waki	Man	Percoltion tank	74.7193	17.6657

S.No.	Village	Taluka	Type of structure	Longitude	Latitude
118	Alagudewadi	Phaltan	Percoltion tank	74.4647	18.0187
119	Alagudewadi	Phaltan	Percoltion tank	74.4458	17.9933
120	Asu	Phaltan	Percoltion tank	74.6883	18.0392
121	Bhadali Bk.	Phaltan	Percoltion tank	74.473	17.9414
122	Bhilkatti	Phaltan	Percoltion tank	74.3901	18.0116
123	Chaudharwadi	Phaltan	Percoltion tank	74.4063	18.0042
124	Dhavalewadi	Phaltan	Percoltion tank	74.6404	18.0362
125	Dhuldev	Phaltan	Percoltion tank	74.4703	17.9834
126	Dudhe Bavi	Phaltan	Percoltion tank	74.4975	17.93
127	fadatarwadi	Phaltan	Percoltion tank	74.3722	18.0311
128	Gokhali	Phaltan	Percoltion tank	74.6201	18.0276
129	Gunware	Phaltan	Percoltion tank	74.59	17.9926
130	Gunware	Phaltan	Percoltion tank	74.618	17.9875
131	Jinti	Phaltan	Percoltion tank	74.3685	18.063
132	Kalaj	Phaltan	Percoltion tank	74.2928	18.0035
133	Kambleshwar	Phaltan	Percoltion tank	74.4415	18.0512
134	Khadaki	Phaltan	Percoltion tank	74.3344	17.9469
135	Khunte	Phaltan	Percoltion tank	74.4031	18.0625
136	Kurvali Bk.	Phaltan	Percoltion tank	74.6313	17.9315
137	Kurvali Kh.	Phaltan	Percoltion tank	74.4191	17.9452
138	Malewadi	Phaltan	Percoltion tank	74.2507	18.0478
139	Miragaon	Phaltan	Percoltion tank	74.3546	17.9733
140	Mulikwadi	Phaltan	Percoltion tank	74.3024	17.9736
141	Mulikwadi	Phaltan	Percoltion tank	74.3082	17.9761
142	Munjwadi	Phaltan	Percoltion tank	74.6558	17.9883
143	Munjwadi	Phaltan	Percoltion tank	74.6233	17.9865
144	Munjwadi	Phaltan	Percoltion tank	74.6441	17.9794
145	Nandal	Phaltan	Percoltion tank	74.3189	17.9875
146	Nimbhore	Phaltan	Percoltion tank	74.3711	18.0134
147	Nimbhore	Phaltan	Percoltion tank	74.3695	18.0174
148	Nimbhore	Phaltan	Percoltion tank	74.3642	18.0139
149	Nirugudi	Phaltan	Percoltion tank	74.4564	17.9107
150	Padegaon	Phaltan	Percoltion tank	74.2208	18.0781
151	Rajale	Phaltan	Percoltion tank	74.5527	18.0263
152	Sangavi	Phaltan	Percoltion tank	74.5002	18.0539
153	Sangavi	Phaltan	Percoltion tank	74.5236	18.0377
154	Saskal	Phaltan	Percoltion tank	74.4676	17.9269
155	Shindewadi (N.V.) (3)	Phaltan	Percoltion tank	74.4165	18.0306
156	Songaon	Phaltan	Percoltion tank	74.5353	18.0532
157	Takalwade	Phaltan	Percoltion tank	74.5535	17.9941
158	Tavadi	Phaltan	Percoltion tank	74.4045	17.9467
159	Thakubaichiwadi	Phaltan	Percoltion tank	74.2523	17.9626
160	Thakurli	Phaltan	Percoltion tank	74.4149	17.9667
161	Thakurli	Phaltan	Percoltion tank	74.4111	17.967
162	Tirakwadi	Phaltan	Percoltion tank	74.4831	17.9535
163	Vadale	Phaltan	Percoltion tank	74.5212	17.9553
164	Vidani	Phaltan	Percoltion tank	74.5063	17.9936
165	Vidani	Phaltan	Percoltion tank	74.4967	18.0106
166	Vidani	Phaltan	Percoltion tank	74.486	17.9723
167	Vidani	Phaltan	Percoltion tank	74.4815	17.9802
168	Vidani	Phaltan	Percoltion tank	74.5028	17.9748
169	Vidani	Phaltan	Percoltion tank	74.501	18.0058
170	Wakhari	Phaltan	Percoltion tank	74.353	17.9099
171	Wathar (Nimbalkar)	Phaltan	Percoltion tank	74.3701	17.9345
172	Zirpwadi	Phaltan	Percoltion tank	74.4572	17.9546
173	Songaon S.Nimb	Satara	Percoltion tank	74.067	17.7129
174	Bhogaon	Wai	Percoltion tank	73.858	17.973
175	Bhuinj	Wai	Percoltion tank	73.9609	17.8877
176	Bhuinj	Wai	Percoltion tank	73.9828	17.8913

S.No.	Village	Taluka	Type of structure	Longitude	Latitude
177	Bopegaon	Wai	Percoltion tank	73.9644	17.9291
178	Chindhawali	Wai	Percoltion tank	73.9694	17.8497
179	Jamb	Wai	Percoltion tank	73.9964	17.8355
180	Kadegaon	Wai	Percoltion tank	73.9361	17.8994
181	Khadaki	Wai	Percoltion tank	73.9676	17.8395
182	Kholvadi	Wai	Percoltion tank	74.0457	17.8266
183	Logadwadi	Wai	Percoltion tank	74.0294	17.8606
184	Menavali	Wai	Percoltion tank	73.8668	17.9659
185	Pandharechiwadi (N.V.	Wai	Percoltion tank	73.8929	17.9024
186	Pasarni	Wai	Percoltion tank	73.8633	17.9491
187	Wai(Rural)	Wai	Percoltion tank	73.8908	17.9676

Annexure VIII : Location of proposed check dams in Satara district

S. No.	Village	Taluka	Type of structure	Longitude	Latitude
1	Amalewadi (n.v.)	Khatav	Check dam	74.2977	17.6439
2	Amalewadi (n.v.)	Khatav	Check dam	74.2972	17.6474
3	Anpatwadi (n.v.)	Khatav	Check dam	74.2723	17.7935
4	Anphale	Khatav	Check dam	74.5757	17.4783
5	Aundh	Khatav	Check dam	74.336	17.5343
6	Aundh	Khatav	Check dam	74.3044	17.534
7	Aundh	Khatav	Check dam	74.3308	17.5442
8	Aundh	Khatav	Check dam	74.3469	17.5383
9	Bhandewadi	Khatav	Check dam	74.3194	17.646
10	Bhandewadi	Khatav	Check dam	74.3187	17.6054
11	Bhandewadi	Khatav	Check dam	74.3236	17.6079
12	Bhosare	Khatav	Check dam	74.3251	17.5824
13	Bhosare	Khatav	Check dam	74.3037	17.5906
14	Bombale	Khatav	Check dam	74.5151	17.5794
15	Bombale	Khatav	Check dam	74.5239	17.5996
16	Bombale	Khatav	Check dam	74.5322	17.613
17	Budh	Khatav	Check dam	74.3122	17.7728
18	Budh	Khatav	Check dam	74.3458	17.7669
19	Budh	Khatav	Check dam	74.354	17.7716
20	Budh	Khatav	Check dam	74.2993	17.7778
21	Chinchani (n.v.)	Khatav	Check dam	74.2589	17.8143
22	Chorade	Khatav	Check dam	74.3676	17.4191
23	Chorade	Khatav	Check dam	74.381	17.427
24	Chorade	Khatav	Check dam	74.3935	17.4319
25	Dambhewadi	Khatav	Check dam	74.5426	17.5843
26	Dambhewadi	Khatav	Check dam	74.5545	17.5937
27	Darajai	Khatav	Check dam	74.393	17.6722
28	Dhokalwadi (n.v.)	Khatav	Check dam	74.6171	17.4639
29	Dhondewadi	Khatav	Check dam	74.5187	17.4822
30	Dhondewadi	Khatav	Check dam	74.5358	17.4881
31	Diskal	Khatav	Check dam	74.2956	17.8113
32	Enkul	Khatav	Check dam	74.5679	17.5552
33	Enkul	Khatav	Check dam	74.5866	17.5607
34	Enkul	Khatav	Check dam	74.6011	17.5629
35	Enkul	Khatav	Check dam	74.615	17.5568
36	Fadtarwadi (n.v.)	Khatav	Check dam	74.3194	17.724
37	Fadtarwadi (n.v.)	Khatav	Check dam	74.2967	17.723
38	Fadtarwadi (n.v.)	Khatav	Check dam	74.2894	17.7269
39	Gakhadi (n.v.)	Khatav	Check dam	74.3251	17.8281
40	Gakhadi (n.v.)	Khatav	Check dam	74.3122	17.8222
41	Gakhadi (n.v.)	Khatav	Check dam	74.3267	17.8222
42	Gakhadi (n.v.)	Khatav	Check dam	74.3224	17.8184
43	Ganeshwadi	Khatav	Check dam	74.2982	17.5088
44	Ganeshwadi (n.v.)	Khatav	Check dam	74.4571	17.5922
45	Ganeshwadi (n.v.)	Khatav	Check dam	74.4639	17.6031
46	Ganeshwadi (n.v.)	Khatav	Check dam	74.4742	17.5755
47	Ganeshwadi (n.v.)	Khatav	Check dam	74.482	17.5868
48	Ganeshwadi (n.v.)	Khatav	Check dam	74.4571	17.606
49	Ganeshwadi (n.v.)	Khatav	Check dam	74.4426	17.5468
50	Ganeshwadi (n.v.)	Khatav	Check dam	74.4302	17.5621
51	Ganeshwadi (n.v.)	Khatav	Check dam	74.4232	17.5813
52	Garalewadi	Khatav	Check dam	74.6298	17.4252

S. No.	Village	Taluka	Type of structure	Longitude	Latitude
53	Garalewadi	Khatav	Check dam	74.6368	17.4205
54	Garalewadi	Khatav	Check dam	74.6466	17.4215
55	Garalewadi	Khatav	Check dam	74.6585	17.4141
56	Garalewadi	Khatav	Check dam	74.6678	17.4067
57	Garudi	Khatav	Check dam	74.6849	17.4723
58	Garudi	Khatav	Check dam	74.688	17.4526
59	Ghakarwadi (n.v.)	Khatav	Check dam	74.388	17.603
60	Girijashankarwadi (n.v.)	Khatav	Check dam	74.2237	17.4502
61	Goregaon (n)	Khatav	Check dam	74.3086	17.4364
62	Goregaon (vangi)	Khatav	Check dam	74.5042	17.4807
63	Gursale	Khatav	Check dam	74.4406	17.5198
64	Gursale	Khatav	Check dam	74.424	17.5282
65	Gursale	Khatav	Check dam	74.4137	17.5366
66	Hingane	Khatav	Check dam	74.5011	17.6105
67	Hivarwadi	Khatav	Check dam	74.6153	17.5022
68	Holichagaon	Khatav	Check dam	74.4349	17.4719
69	Holichagaon	Khatav	Check dam	74.4401	17.4645
70	Jakhangaon	Khatav	Check dam	74.2868	17.6297
71	Jakhangaon	Khatav	Check dam	74.306	17.6421
72	Jakhangaon	Khatav	Check dam	74.2811	17.6343
73	Jaygaon	Khatav	Check dam	74.3205	17.5706
74	Kalambi	Khatav	Check dam	74.3003	17.4837
75	Kalambi	Khatav	Check dam	74.2961	17.4877
76	Kalambi	Khatav	Check dam	74.2889	17.4818
77	Kaledhon	Khatav	Check dam	74.657	17.4437
78	Kaledhon	Khatav	Check dam	74.658	17.4269
79	Kaledhon	Khatav	Check dam	74.6652	17.4358
80	Kaledhon	Khatav	Check dam	74.6689	17.4269
81	Kankatre (n.v.)	Khatav	Check dam	74.5591	17.4467
82	Katalgewadi (n.v.)	Khatav	Check dam	74.3986	17.7239
83	Katarkhatav	Khatav	Check dam	74.5281	17.5745
84	Katarkhatav	Khatav	Check dam	74.5363	17.5755
85	Katarkhatav	Khatav	Check dam	74.5555	17.5468
86	Katgun	Khatav	Check dam	74.3231	17.6776
87	Kharashinge	Khatav	Check dam	74.3391	17.501
88	Khatav	Khatav	Check dam	74.364	17.6613
89	Khatav	Khatav	Check dam	74.3588	17.6677
90	Khatav	Khatav	Check dam	74.3303	17.6628
91	Khatval	Khatav	Check dam	74.5715	17.5419
92	Khatval	Khatav	Check dam	74.57	17.5306
93	Kokarale	Khatav	Check dam	74.3034	17.5988
94	Kokarale	Khatav	Check dam	74.3068	17.6035
95	Kokarale	Khatav	Check dam	74.3101	17.6064
96	Kumathe	Khatav	Check dam	74.394	17.5668
97	Kumathe	Khatav	Check dam	74.395	17.5715
98	Kumathe	Khatav	Check dam	74.3741	17.5628
99	Kumathe	Khatav	Check dam	74.3854	17.5578
100	Kurle	Khatav	Check dam	74.2739	17.4467
101	Kuroli	Khatav	Check dam	74.4033	17.5814
102	Kuroli	Khatav	Check dam	74.3764	17.5858
103	Kuroli	Khatav	Check dam	74.3658	17.5763
104	Ladegaon	Khatav	Check dam	74.3495	17.4699
105	Ladegaon	Khatav	Check dam	74.3598	17.4797

S. No.	Village	Taluka	Type of structure	Longitude	Latitude
106	Lalgun	Khatav	Check dam	74.2842	17.7802
107	Loni	Khatav	Check dam	74.3314	17.5952
108	Loni	Khatav	Check dam	74.3407	17.608
109	Mandave	Khatav	Check dam	74.4918	17.6391
110	Mandave	Khatav	Check dam	74.4887	17.6489
111	Mayani	Khatav	Check dam	74.5664	17.46
112	Mayani	Khatav	Check dam	74.5332	17.4575
113	Mayani	Khatav	Check dam	74.5555	17.4235
114	Mol	Khatav	Check dam	74.278	17.8301
115	Morale.	Khatav	Check dam	74.5125	17.4452
116	Mulikwadi (n.v.)	Khatav	Check dam	74.6546	17.4607
117	Mulikwadi (n.v.)	Khatav	Check dam	74.6627	17.4639
118	Mulikwadi (n.v.)	Khatav	Check dam	74.6694	17.4684
119	Nadhawal	Khatav	Check dam	74.4608	17.5444
120	Nidhal	Khatav	Check dam	74.4121	17.7171
121	Nidhal	Khatav	Check dam	74.4043	17.7156
122	Nidhal	Khatav	Check dam	74.3769	17.723
123	Nidhal	Khatav	Check dam	74.3909	17.683
124	Nidhal	Khatav	Check dam	74.4137	17.7008
125	Nimsod	Khatav	Check dam	74.453	17.4521
126	Nimsod	Khatav	Check dam	74.4504	17.4655
127	Nimsod	Khatav	Check dam	74.4737	17.4837
128	Pachwad	Khatav	Check dam	74.6461	17.4861
129	Pachwad	Khatav	Check dam	74.6482	17.496
130	Pachwad	Khatav	Check dam	74.6549	17.498
131	Padal	Khatav	Check dam	74.5959	17.5177
132	Padal	Khatav	Check dam	74.5897	17.5064
133	Padal	Khatav	Check dam	74.5881	17.4965
134	Palasgaon	Khatav	Check dam	74.5576	17.5311
135	Palashi	Khatav	Check dam	74.3521	17.5019
136	Palashi	Khatav	Check dam	74.3614	17.5158
137	Palashi	Khatav	Check dam	74.3691	17.497
138	Pandharwadi (n.v.)	Khatav	Check dam	74.2669	17.8118
139	Pargaon	Khatav	Check dam	74.2967	17.4467
140	Pargaon	Khatav	Check dam	74.2967	17.4393
141	Pedgaon	Khatav	Check dam	74.4489	17.6386
142	Pedgaon	Khatav	Check dam	74.4582	17.649
143	Pedgaon	Khatav	Check dam	74.4463	17.6485
144	Pedgaon	Khatav	Check dam	74.4364	17.6327
145	Pedgaon	Khatav	Check dam	74.4282	17.6514
146	Pusegaon	Khatav	Check dam	74.3267	17.7111
147	Pusegaon	Khatav	Check dam	74.2998	17.6889
148	Pusegaon	Khatav	Check dam	74.3075	17.6998
149	Pusegaon	Khatav	Check dam	74.3075	17.7052
150	Pusesawali	Khatav	Check dam	74.3003	17.4739
151	Rahatani	Khatav	Check dam	74.3816	17.4521
152	Rajapur	Khatav	Check dam	74.3453	17.7906
153	Rajapur	Khatav	Check dam	74.3474	17.8005
154	Rajapur	Khatav	Check dam	74.3552	17.8098
155	Rajapur	Khatav	Check dam	74.3205	17.7861
156	Rajapur	Khatav	Check dam	74.3257	17.8
157	Rajapur	Khatav	Check dam	74.3474	17.7817
158	Rajapur	Khatav	Check dam	74.3347	17.798

S. No.	Village	Taluka	Type of structure	Longitude	Latitude
159	Rajapur	Khatav	Check dam	74.3392	17.7897
160	Rajapur	Khatav	Check dam	74.3549	17.7944
161	Rajapur	Khatav	Check dam	74.3496	17.7909
162	Rajapur	Khatav	Check dam	74.36	17.7956
163	Rajapur	Khatav	Check dam	74.3697	17.793
164	Ranshingwadi (n.v.)	Khatav	Check dam	74.3598	17.7511
165	Ranshingwadi (n.v.)	Khatav	Check dam	74.3645	17.7585
166	Ranshingwadi (n.v.)	Khatav	Check dam	74.3702	17.7486
167	Satewadi (n.v.)	Khatav	Check dam	74.4571	17.6139
168	Satewadi (n.v.)	Khatav	Check dam	74.4634	17.6258
169	Shenawadi	Khatav	Check dam	74.4235	17.4348
170	Shenawadi	Khatav	Check dam	74.4168	17.4467
171	Shendgewadi (n.v.)	Khatav	Check dam	74.2905	17.838
172	Shendgewadi (n.v.)	Khatav	Check dam	74.2925	17.8345
173	Shendgewadi (n.v.)	Khatav	Check dam	74.2837	17.8424
174	Shendgewadi (n.v.)	Khatav	Check dam	74.2811	17.8532
175	Shendgewadi (n.v.)	Khatav	Check dam	74.2858	17.8222
176	Shindewadi (n.v.)	Khatav	Check dam	74.2736	17.7833
177	Shirswadi	Khatav	Check dam	74.4473	17.505
178	Sundarpur	Khatav	Check dam	74.4028	17.6495
179	Sundarpur	Khatav	Check dam	74.4168	17.6426
180	Suryachiwadi (n.v.)	Khatav	Check dam	74.5079	17.5094
181	Tadavale	Khatav	Check dam	74.511	17.6268
182	Tadavale	Khatav	Check dam	74.4944	17.6312
183	Tadavale	Khatav	Check dam	74.4986	17.6386
184	Tadavale	Khatav	Check dam	74.5154	17.6365
185	Tadavale	Khatav	Check dam	74.5219	17.6345
186	Umbarmale	Khatav	Check dam	74.3624	17.7067
187	Umbarmale	Khatav	Check dam	74.3396	17.7176
188	Vadgaon (j.s.)	Khatav	Check dam	74.3474	17.4516
189	Vadi	Khatav	Check dam	74.293	17.503
190	Vadkhal (bechirakh)	Khatav	Check dam	74.3314	17.608
191	Vadkhal (bechirakh)	Khatav	Check dam	74.3453	17.6144
192	Varud	Khatav	Check dam	74.3552	17.5735
193	Vikhale	Khatav	Check dam	74.6238	17.4837
194	Vikhale	Khatav	Check dam	74.6321	17.4931
195	Vikhale	Khatav	Check dam	74.6269	17.4457
196	Visapur	Khatav	Check dam	74.2951	17.6766
197	Visapur	Khatav	Check dam	74.2905	17.683
198	Wakalwadi (n.v.)	Khatav	Check dam	74.4126	17.4995
199	Wakalwadi (n.v.)	Khatav	Check dam	74.4002	17.4995
200	Wanzoli	Khatav	Check dam	74.3629	17.458
201	Wanzoli	Khatav	Check dam	74.3738	17.4654
202	Wanzoli	Khatav	Check dam	74.3795	17.4738
203	Yelmarwadi	Khatav	Check dam	74.5571	17.5809
204	Bhalavadi	Man	Check dam	74.7243	17.7238
205	Bhalavadi	Man	Check dam	74.7326	17.7309
206	Bhalavadi	Man	Check dam	74.7385	17.7416
207	Bhandavali	Man	Check dam	74.4316	17.7771
208	Bhatki	Man	Check dam	74.7942	17.6748
209	Bidal	Man	Check dam	74.5143	17.7497
210	Bijavadi	Man	Check dam	74.5529	17.8002
211	Bodake	Man	Check dam	74.5103	17.7616

S. No.	Village	Taluka	Type of structure	Longitude	Latitude
212	Bothe	Man	Check dam	74.4061	17.7763
213	Dahivadi	Man	Check dam	74.5708	17.6986
214	Dahivadi	Man	Check dam	74.5639	17.7065
215	Danavalewadi	Man	Check dam	74.6017	17.8012
216	Danavalewadi	Man	Check dam	74.6145	17.7837
217	Dangirewadi(N.V.	Man	Check dam	74.6553	17.788
218	Dangirewadi(N.V.	Man	Check dam	74.6529	17.772
219	Dhuldev	Man	Check dam	74.8539	17.6565
220	Divad	Man	Check dam	74.7025	17.6205
221	Divad	Man	Check dam	74.7195	17.6296
222	Divadi Mahimanga	Man	Check dam	74.4338	17.6799
223	Dorgewadi (Narav	Man	Check dam	74.6153	17.5795
224	Dorgewadi (Narav	Man	Check dam	74.5964	17.5838
225	Dorgewadi (Narav	Man	Check dam	74.5972	17.5907
226	Gadewadi (Kulakj	Man	Check dam	74.4183	17.8096
227	Gondavale Bk.	Man	Check dam	74.6014	17.6885
228	Gondavale Bk.	Man	Check dam	74.5785	17.6499
229	Gondavale Bk.	Man	Check dam	74.5633	17.6557
230	Gondavale Bk.	Man	Check dam	74.5761	17.6585
231	Gondavale Bk.	Man	Check dam	74.5652	17.6697
232	Gondavale Kh.	Man	Check dam	74.6113	17.6491
233	Gondavale Kh.	Man	Check dam	74.6038	17.6783
234	Gondavale Kh.	Man	Check dam	74.606	17.6684
235	Gondavale Kh.	Man	Check dam	74.6185	17.6793
236	Hingani	Man	Check dam	74.856	17.6281
237	Hingani	Man	Check dam	74.8715	17.6372
238	Hingani	Man	Check dam	74.8848	17.6093
239	Hingani	Man	Check dam	74.8912	17.624
240	Jadhavwadi	Man	Check dam	74.5228	17.802
241	Jadhavwadi	Man	Check dam	74.5175	17.8061
242	Kalewadi (Narava	Man	Check dam	74.6113	17.6036
243	Kalewadi (Narava	Man	Check dam	74.5998	17.6174
244	Kalewadi (Narava	Man	Check dam	74.6073	17.6265
245	Kalewadi (Narava	Man	Check dam	74.6004	17.6262
246	Karakhel	Man	Check dam	74.8406	17.6799
247	Karakhel	Man	Check dam	74.8507	17.6931
248	Kasarwadi (Andha	Man	Check dam	74.4514	17.7322
249	Kasarwadi (Andha	Man	Check dam	74.4882	17.7418
250	Khadaki (Lonar)	Man	Check dam	74.7664	17.6656
251	Khadaki (Lonar)	Man	Check dam	74.7707	17.6855
252	Khutvav	Man	Check dam	74.7131	17.7677
253	Khutvav	Man	Check dam	74.7233	17.7718
254	Khutvav	Man	Check dam	74.7083	17.7723
255	Kiraksal	Man	Check dam	74.5708	17.64
256	Kiraksal	Man	Check dam	74.558	17.6407
257	Kiraksal	Man	Check dam	74.5577	17.6275
258	Kiraksal	Man	Check dam	74.5591	17.6364
259	Kiraksal	Man	Check dam	74.5689	17.6247
260	Kiraksal	Man	Check dam	74.5673	17.6339
261	Kolewadi	Man	Check dam	74.4311	17.7169
262	Kulakjai	Man	Check dam	74.4127	17.8058
263	Lodhavade	Man	Check dam	74.6377	17.6367
264	Malavadi	Man	Check dam	74.4556	17.7685

S. No.	Village	Taluka	Type of structure	Longitude	Latitude
265	Mankarnawadi (Pa	Man	Check dam	74.6889	17.656
266	Mankarnawadi (Pa	Man	Check dam	74.6985	17.6555
267	Mankarnawadi (Pa	Man	Check dam	74.6585	17.6567
268	Mardi	Man	Check dam	74.6947	17.7517
269	Mardi	Man	Check dam	74.671	17.7182
270	Mardi	Man	Check dam	74.67	17.7345
271	Mardi	Man	Check dam	74.6958	17.7624
272	Mhasvad	Man	Check dam	74.7696	17.6484
273	Mhasvad	Man	Check dam	74.7952	17.6326
274	Mhasvad	Man	Check dam	74.7899	17.6489
275	Mhasvad	Man	Check dam	74.8288	17.686
276	Mhasvad	Man	Check dam	74.7984	17.6179
277	Mhasvad	Man	Check dam	74.7473	17.6189
278	Mogarale	Man	Check dam	74.5265	17.8634
279	Mogarale	Man	Check dam	74.542	17.8634
280	Mohi	Man	Check dam	74.6686	17.7946
281	Naravane	Man	Check dam	74.6372	17.5983
282	Naravane	Man	Check dam	74.6273	17.6024
283	Naravane	Man	Check dam	74.6241	17.5854
284	Naravane	Man	Check dam	74.6172	17.5932
285	Naravane	Man	Check dam	74.6148	17.5889
286	Naravane	Man	Check dam	74.6361	17.6146
287	Pachvad	Man	Check dam	74.5703	17.8332
288	Pachvad	Man	Check dam	74.5617	17.8408
289	Pachvad	Man	Check dam	74.5505	17.8479
290	Pachvad	Man	Check dam	74.5473	17.8561
291	Pachvad	Man	Check dam	74.5511	17.8383
292	Pachvad	Man	Check dam	74.5399	17.8375
293	Palashi	Man	Check dam	74.7137	17.6753
294	Palashi	Man	Check dam	74.7094	17.6865
295	Palashi	Man	Check dam	74.7035	17.6974
296	Pandharwadi (Mah	Man	Check dam	74.4274	17.6981
297	Pandharwadi (Mah	Man	Check dam	74.4338	17.7063
298	Pandharwadi (Mah	Man	Check dam	74.4237	17.7083
299	Pangari	Man	Check dam	74.5564	17.7702
300	Parkhandi	Man	Check dam	74.4615	17.8076
301	Parkhandi	Man	Check dam	74.4738	17.7824
302	Paryanti	Man	Check dam	74.8022	17.7256
303	Paryanti	Man	Check dam	74.8358	17.7098
304	Pimpari	Man	Check dam	74.6537	17.6336
305	Pimpari	Man	Check dam	74.6633	17.6448
306	Pingali Bk.	Man	Check dam	74.5183	17.6702
307	Pingali Bk.	Man	Check dam	74.5052	17.6793
308	Pingali Bk.	Man	Check dam	74.4994	17.6875
309	Pingali Bk.	Man	Check dam	74.5177	17.6809
310	Pingali Bk.	Man	Check dam	74.5012	17.6702
311	Pingali Kh.	Man	Check dam	74.5476	17.6679
312	Rajavadi	Man	Check dam	74.5823	17.8032
313	Rajavadi	Man	Check dam	74.6078	17.8098
314	Rajavadi	Man	Check dam	74.5916	17.8078
315	Rajavadi	Man	Check dam	74.5937	17.8236
316	Ranand	Man	Check dam	74.6502	17.722
317	Sambhukhed	Man	Check dam	74.784	17.7378

S. No.	Village	Taluka	Type of structure	Longitude	Latitude
318	Shevari	Man	Check dam	74.6214	17.7154
319	Shevari	Man	Check dam	74.6172	17.7362
320	Shindi Bk.	Man	Check dam	74.5148	17.7055
321	Shindi Bk.	Man	Check dam	74.489	17.7139
322	Shindi Bk.	Man	Check dam	74.4876	17.7108
323	Shindi Kh.	Man	Check dam	74.4279	17.7885
324	Shindi Kh.	Man	Check dam	74.4332	17.8114
325	Shinganapur	Man	Check dam	74.6684	17.819
326	Shinganapur	Man	Check dam	74.6737	17.8352
327	Sokasan	Man	Check dam	74.6326	17.7395
328	Sokasan	Man	Check dam	74.638	17.7535
329	Sokasan	Man	Check dam	74.6484	17.7639
330	Takewadi (Andhal	Man	Check dam	74.4631	17.8109
331	Takewadi (Andhal	Man	Check dam	74.4863	17.801
332	Thadale	Man	Check dam	74.6593	17.8134
333	Tondale	Man	Check dam	74.5004	17.82
334	Vadgaon	Man	Check dam	74.6113	17.7553
335	Vadgaon	Man	Check dam	74.5865	17.7606
336	Wawarhire	Man	Check dam	74.6028	17.7586
337	Adarki Bk.	Phaltan	Check dam	74.2235	17.9041
338	Adarki Bk.	Phaltan	Check dam	74.2331	17.9173
339	Adarki Bk.	Phaltan	Check dam	74.2357	17.9254
340	Alagudewadi	Phaltan	Check dam	74.45	18.004
341	Alagudewadi	Phaltan	Check dam	74.4586	18.0187
342	Aljapur	Phaltan	Check dam	74.2501	17.9061
343	Aljapur	Phaltan	Check dam	74.2437	17.9228
344	Andrud	Phaltan	Check dam	74.619	17.9109
345	Andrud	Phaltan	Check dam	74.618	17.8985
346	Andrud	Phaltan	Check dam	74.6241	17.8853
347	Asu	Phaltan	Check dam	74.6596	18.0141
348	Asu	Phaltan	Check dam	74.671	18.0255
349	Asu	Phaltan	Check dam	74.6867	18.0352
350	Barad	Phaltan	Check dam	74.611	17.9487
351	Barad	Phaltan	Check dam	74.6033	17.9282
352	Bhilkatti	Phaltan	Check dam	74.3925	18.0167
353	Bibi	Phaltan	Check dam	74.2837	17.9193
354	Bodkewadi	Phaltan	Check dam	74.4218	17.8868
355	Bodkewadi	Phaltan	Check dam	74.4245	17.8731
356	Chambharwadi	Phaltan	Check dam	74.1995	17.9933
357	Chaudharwadi	Phaltan	Check dam	74.4079	18.0085
358	Chaudharwadi	Phaltan	Check dam	74.4154	18.0248
359	Chavhanwadi	Phaltan	Check dam	74.2251	18.0156
360	Dalvadi	Phaltan	Check dam	74.3978	17.8802
361	Dalvadi	Phaltan	Check dam	74.3893	17.8944
362	Dhaval	Phaltan	Check dam	74.3434	17.8975
363	Dhumalwadi	Phaltan	Check dam	74.4842	17.8805
364	Dhumalwadi	Phaltan	Check dam	74.4711	17.8932
365	Dombalwadi	Phaltan	Check dam	74.277	18.0312
366	Dombalwadi	Phaltan	Check dam	74.284	18.0363
367	Dudhe Bavi	Phaltan	Check dam	74.518	17.9249
368	Dudhe Bavi	Phaltan	Check dam	74.5092	17.9145
369	Dudhe Bavi	Phaltan	Check dam	74.5044	17.9259
370	Dudhe Bavi	Phaltan	Check dam	74.4927	17.929

S. No.	Village	Taluka	Type of structure	Longitude	Latitude
371	Dudhe Bavi	Phaltan	Check dam	74.5113	17.9028
372	fadatarwadi	Phaltan	Check dam	74.3914	18.04
373	Farandwadi	Phaltan	Check dam	74.4047	17.9761
374	Farandwadi	Phaltan	Check dam	74.4079	17.9943
375	Farandwadi	Phaltan	Check dam	74.3834	17.9852
376	Ghadgewadi	Phaltan	Check dam	74.2853	17.9375
377	Ghadgewadi	Phaltan	Check dam	74.2736	17.9401
378	Girvi	Phaltan	Check dam	74.4452	17.8939
379	Girvi	Phaltan	Check dam	74.4474	17.901
380	Gokhali	Phaltan	Check dam	74.6097	18.0141
381	Gokhali	Phaltan	Check dam	74.6174	18.0248
382	Gunware	Phaltan	Check dam	74.6142	17.9834
383	Jaoli	Phaltan	Check dam	74.5903	17.8739
384	Jaoli	Phaltan	Check dam	74.594	17.8803
385	Jaoli	Phaltan	Check dam	74.6054	17.8894
386	Jaoli	Phaltan	Check dam	74.6078	17.898
387	Jinti	Phaltan	Check dam	74.4005	18.0552
388	Kapadgaon	Phaltan	Check dam	74.2064	18.009
389	Kapadgaon	Phaltan	Check dam	74.2075	18.0283
390	Khadaki	Phaltan	Check dam	74.3434	17.9517
391	Khamgaon	Phaltan	Check dam	74.32	18.0619
392	Khamgaon	Phaltan	Check dam	74.3232	18.0545
393	Kolki	Phaltan	Check dam	74.4468	17.9812
394	Kolki	Phaltan	Check dam	74.4596	17.9672
395	Kolki	Phaltan	Check dam	74.466	17.9771
396	Koregaon	Phaltan	Check dam	74.2059	18.043
397	Kurvali Bk.	Phaltan	Check dam	74.6081	17.9396
398	Kurvali Bk.	Phaltan	Check dam	74.6358	17.9092
399	Kurvali Bk.	Phaltan	Check dam	74.635	17.9249
400	Kurvali Kh.	Phaltan	Check dam	74.4021	17.9391
401	Kurvali Kh.	Phaltan	Check dam	74.4149	17.9335
402	Kurvali Kh.	Phaltan	Check dam	74.417	17.9446
403	Kusur	Phaltan	Check dam	74.2464	18.0613
404	Malvadi	Phaltan	Check dam	74.3301	17.9426
405	Malvadi	Phaltan	Check dam	74.305	17.9269
406	mandav Khadak	Phaltan	Check dam	74.4133	17.9015
407	mandav Khadak	Phaltan	Check dam	74.4047	17.9152
408	mandav Khadak	Phaltan	Check dam	74.4037	17.9051
409	Mathachiwadi	Phaltan	Check dam	74.5879	17.9908
410	Miragaon	Phaltan	Check dam	74.3514	17.9614
411	Miragaon	Phaltan	Check dam	74.3615	17.968
412	Mirewadi (N.V.)	Phaltan	Check dam	74.2491	18.0775
413	Munjwadi	Phaltan	Check dam	74.6588	17.9743
414	Munjwadi	Phaltan	Check dam	74.6561	17.9847
415	Munjwadi	Phaltan	Check dam	74.6214	17.97
416	Munjwadi	Phaltan	Check dam	74.6246	17.9796
417	Murum	Phaltan	Check dam	74.2997	18.0431
418	Murum	Phaltan	Check dam	74.3074	18.0424
419	Naik Bombawadi	Phaltan	Check dam	74.5431	17.937
420	Naik Bombawadi	Phaltan	Check dam	74.5393	17.9282
421	Nandal	Phaltan	Check dam	74.3269	17.9974
422	Nandal	Phaltan	Check dam	74.2965	17.9604
423	Nandal	Phaltan	Check dam	74.3002	17.9695

S. No.	Village	Taluka	Type of structure	Longitude	Latitude
424	Nandal	Phaltan	Check dam	74.2901	17.9578
425	Nimbalk	Phaltan	Check dam	74.5708	17.9799
426	Phaltan Urban	Phaltan	Check dam	74.4386	17.9781
427	Phaltan Urban	Phaltan	Check dam	74.4474	17.9913
428	Pimpalwadi	Phaltan	Check dam	74.3498	18.042
429	Pimparad	Phaltan	Check dam	74.5471	17.9634
430	Pimparad	Phaltan	Check dam	74.5481	17.9733
431	Rajale	Phaltan	Check dam	74.5375	18.0144
432	Rajale	Phaltan	Check dam	74.5481	18.0227
433	Rajuri	Phaltan	Check dam	74.6473	17.9398
434	Rajuri	Phaltan	Check dam	74.6489	17.9472
435	Rajuri	Phaltan	Check dam	74.658	17.9578
436	Rajuri	Phaltan	Check dam	74.6161	17.9583
437	Rajuri	Phaltan	Check dam	74.6233	17.9672
438	Ravadi Bk.	Phaltan	Check dam	74.2802	18.0538
439	Ravadi Kh.	Phaltan	Check dam	74.2648	18.0611
440	Ravadi Kh.	Phaltan	Check dam	74.265	18.0533
441	Sangavi	Phaltan	Check dam	74.5249	18.0357
442	Sangavi	Phaltan	Check dam	74.4959	18.0237
443	Sangavi	Phaltan	Check dam	74.5172	18.0296
444	Sangavi	Phaltan	Check dam	74.5044	18.0415
445	Sangavi	Phaltan	Check dam	74.4994	18.0501
446	Sarade	Phaltan	Check dam	74.5695	18.0412
447	Saskal	Phaltan	Check dam	74.4714	17.9231
448	Saskal	Phaltan	Check dam	74.4682	17.9186
449	Saswad	Phaltan	Check dam	74.2698	17.9857
450	Sherechiwadi	Phaltan	Check dam	74.3285	17.9223
451	Shindemal	Phaltan	Check dam	74.2405	18.0349
452	Shreshindewai	Phaltan	Check dam	74.5623	17.9304
453	Shreshindewai	Phaltan	Check dam	74.5588	17.9381
454	Shreshindewai	Phaltan	Check dam	74.5564	17.9315
455	Shreshindewai	Phaltan	Check dam	74.5641	17.953
456	Sonwadi Kh.	Phaltan	Check dam	74.4858	17.969
457	Survadi	Phaltan	Check dam	74.3461	18.0273
458	Tadavale	Phaltan	Check dam	74.2986	18.0353
459	Takalwade	Phaltan	Check dam	74.5492	17.9844
460	Takalwade	Phaltan	Check dam	74.5508	17.9921
461	Taradgaon	Phaltan	Check dam	74.2576	18.0182
462	Taradgaon	Phaltan	Check dam	74.2555	18.0303
463	Taradgaon	Phaltan	Check dam	74.2341	18.0288
464	Tardaf	Phaltan	Check dam	74.3535	17.8483
465	Tardaf	Phaltan	Check dam	74.3471	17.8508
466	Thakubaichiwadi	Phaltan	Check dam	74.2469	17.9588
467	Tirakwadi	Phaltan	Check dam	74.4948	17.9396
468	Trathavade	Phaltan	Check dam	74.3456	17.8676
469	Trathavade	Phaltan	Check dam	74.3562	17.8731
470	Upalave	Phaltan	Check dam	74.4101	17.8711
471	Upalave	Phaltan	Check dam	74.4031	17.8554
472	Upalave	Phaltan	Check dam	74.3941	17.8483
473	Vadale	Phaltan	Check dam	74.5417	17.9472
474	Vadale	Phaltan	Check dam	74.5444	17.9563
475	Vadale	Phaltan	Check dam	74.5268	17.931
476	Vadale	Phaltan	Check dam	74.522	17.9378

S. No.	Village	Taluka	Type of structure	Longitude	Latitude
477	Vadgaon	Phaltan	Check dam	74.3013	17.9112
478	Veloshi	Phaltan	Check dam	74.3674	17.8447
479	Veloshi	Phaltan	Check dam	74.369	17.8341
480	Veloshi	Phaltan	Check dam	74.3722	17.8275
481	Vidani	Phaltan	Check dam	74.509	17.9905
482	Vidani	Phaltan	Check dam	74.5087	17.9969
483	Vidani	Phaltan	Check dam	74.4895	17.9905
484	Vidani	Phaltan	Check dam	74.4948	18.005
485	Vidani	Phaltan	Check dam	74.497	17.9796
486	Vinchurni	Phaltan	Check dam	74.4223	17.9173
487	Vithalwadi	Phaltan	Check dam	74.2688	17.9979
488	Vithalwadi	Phaltan	Check dam	74.265	18.009
489	Wakhari	Phaltan	Check dam	74.3498	17.9061
490	Wakhari	Phaltan	Check dam	74.3461	17.9233
491	Wathar (Nimbalka	Phaltan	Check dam	74.3642	17.9457
492	Zadkbaichiwadi	Phaltan	Check dam	74.3578	17.8878
493	Zirpwadi	Phaltan	Check dam	74.4586	17.9561
494	Gove	Satara	Check dam	74.0179	17.7997
495	Vaduth	Satara	Check dam	74.0705	17.7489
496	Vangal	Satara	Check dam	74.0355	17.7755
497	Abhepuri	Wai	Check dam	73.8215	18.007
498	Abhepuri	Wai	Check dam	73.8164	18.0136
499	Abhepuri	Wai	Check dam	73.8282	18.007
500	Ananvadi	Wai	Check dam	73.9862	17.9035
501	Balakavadi	Wai	Check dam	73.7202	17.9588
502	Bavdhan	Wai	Check dam	73.9087	17.9251
503	Belamachi	Wai	Check dam	74.0153	17.8416
504	Belamachi	Wai	Check dam	74.027	17.8525
505	Bopardi	Wai	Check dam	73.8972	18.0103
506	Bopegaon	Wai	Check dam	73.9766	17.9284
507	Borgaon Bk.	Wai	Check dam	73.7431	17.9355
508	Dasvadi	Wai	Check dam	73.798	17.955
509	Deogaon	Wai	Check dam	74.0076	17.8814
510	Gulumb	Wai	Check dam	73.9724	18.0045
511	Jambhali	Wai	Check dam	73.7157	18.0263
512	Jambhali	Wai	Check dam	73.7181	18.0321
513	Jambhali	Wai	Check dam	73.7031	18.0319
514	Kawathe	Wai	Check dam	73.9804	17.9352
515	Kawathe	Wai	Check dam	73.9865	17.9499
516	Kondhavale	Wai	Check dam	73.7199	17.9931
517	Kondhavale	Wai	Check dam	73.7223	18.0002
518	Logadwadi	Wai	Check dam	74.0355	17.8583
519	Nikamwadi	Wai	Check dam	74.0089	17.8264
520	Pandewad	Wai	Check dam	73.8468	17.9865
521	Pasarni	Wai	Check dam	73.8679	17.9555
522	Pasarni	Wai	Check dam	73.8449	17.9388
523	Pirachiwadi	Wai	Check dam	73.8735	18.0096
524	Pirachiwadi	Wai	Check dam	73.874	18.0184
525	Shirgaon	Wai	Check dam	74.0062	17.9101
526	Shirgaon	Wai	Check dam	74.0076	17.9192
527	Songirwadi	Wai	Check dam	73.8948	17.9393
528	Vahagaon	Wai	Check dam	73.9972	17.9565
529	Vaigaon	Wai	Check dam	73.7215	17.9428

S. No.	Village	Taluka	Type of structure	Longitude	Latitude
530	Vasole	Wai	Check dam	73.7407	17.9814
531	Vasole	Wai	Check dam	73.7533	17.9951
532	Vyahali (R.H.V.)	Wai	Check dam	73.9348	17.8906