



केंद्रीय भूमि जल बोर्ड

जल संसाधन, नदी विकास और गंगा संरक्षण

विभाग, जल शक्ति मंत्रालय

भारत सरकार

Central Ground Water Board

Department of Water Resources, River
Development and Ganga Rejuvenation,
Ministry of Jal Shakti
Government of India

AQUIFER MAPPING AND MANAGEMENT OF GROUND WATER RESOURCES

BULDHANA DISTRICT, MAHARASHTRA

मध्य क्षेत्र, नागपुर

Central Region, Nagpur

**AQUIFER MAPS AND GROUND WATER
MANAGEMENT PLAN, BULDHANA DISTRICT,
MAHARASHTRA
(AAP 2018-19)**

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BULDHANA DISTRICT AT A GLANCE

1. GENERAL INFORMATION		
	Geographical Area	: 9661 Sq Km
	Administrative Divisions (2011)	: Taluka- 13, Buldhana, Chikhli, Deulgaon Raja, Jalgaon (Jamod), Khamgaon, Lonar, Malkapur, Mehkar, Mohala, Nandura, Sangrampur, Sindkhed Raja and Shegaon
	Villages (Census 2011)	: 1444 Nos.
	Population	: 25,86,258
	Rainfall 2018	500 to 700 mm
	Normal rainfall (1998-2018)	786 mm (moderate to excess)
	Short term rainfall Trend (1998-2018)	-13.05 m/year
2. GEOMORPHOLOGY		
	Major Physiographic unit	: Three; Satpudas, Purna plains and Ajanta ranges
	Major Drainage	: Two: Purna and Penganga
3. LAND USE (2017-18) (sources: mahasdb.maharashtra.gov.in/district Report)		
	Forest Area	: 855.41 Sq. Km. (7.65 %)
	Net Area Sown	: 9536.2 Sq. Km. (79.54 %)
	Cultivable Area	: 7394 Sq. Km. (81.50 %)
4.	SOIL TYPE	: 3 Types- a) Shallow and gravelly reddish soil of Satpudas b) Deep and clayey black soil of Purna Alluvium and c) Shallow and black, brown or reddish soils of Ajanta ranges
5. PRINCIPAL CROPS (2017-18) (sources: mahasdb.maharashtra.gov.in/district Report)		
	Wheat	: 448.0 sq. km.
	Jower	: 138.2 sq. km.
	Pulces	: 2507.9 sq. km.
	Cotton	: 1180.7 sq. km.
	Oil seeds	4015.82
	Sugarcane	4.89
6. IRRIGATION BY DIFFERENT SOURCES (2016-17) - Nos. / Potential Created (ha)		
	Dugwells	: 72393/126319
	Tubewells/Borewells	: 1021/1803
	Surface Flow Schemes	: 3700/38539
	Surface Lift Schemes	:
7. GROUND WATER MONITORING WELLS (March 2018)		
	Dugwells	: 55
	Piezometers	: 13
8. GEOLOGY		
	Recent to sub-recent	: Alluvium
	Late Cretaceous to Eocene	: Basalt (Deccan Traps)
9. HYDROGEOLOGY		

	Water Bearing Formation	:	Basalt-Weathered/fractured/ jointed vesicular/amygdaloidal/massive, under phreatic and semi-confined to confined conditions. Alluvium- Sand and Gravel under semi-confined to confined conditions
Depth to water level in Shallow Aquifer			
	Premonsoon Depth to Water Level (May-2018)	:	3.7 to 24.9 mbgl
	Postmonsoon Depth to Water Level (Nov.-2018)	:	2.5 to 23.4 mbgl
Depth to water level in Deeper Aquifer			
	Premonsoon Depth to Water Level (May-2018)	:	6.3 to 25.19 mbgl
	Postmonsoon Depth to Water Level (Nov.-2018)	:	4.8 to 18.1 mbgl
Water level Trend (2009-18)			
	Premonsoon Water Level Trend (2008-2017)	:	Rise: 0.0061 to 0.4339 m/year Fall: 0.3 to 0.89 m/year
	Postmonsoon Water Level Trend (2008-2017)	:	Rise: 0.0027 to 0.967 m/year Fall: 0.89 to 0.0006 m/year
10. GROUND WATER EXPLORATION (As on March, 2018)			
	Wells Drilled	:	EW-80, OW-17, Pz-23
	Depth Range	:	19.55 to 311.20 m bgl
	Discharge	:	Traces to 14.89 lps
	Storativity	:	1.09 x 10 ⁻³ to 3 x 10 ⁻⁶ (Alluvium) 8 x 10 ⁻⁸ to 4.2 x 10 ⁻² (Basalt)
	Transmissivity	:	0.89 to 1575m ² /day (Alluvium) 8.35 to 396 m ² /day (Basalt)
11. GROUND WATER QUALITY			
	Good and suitable for drinking and irrigation purpose, however localized nitrate and fluoride contamination is observed.		
	Type of Water	:	Ca-Cl and Ca-HCO ₃
12. DYNAMIC GROUND WATER RESOURCES - (2013)			
	Net Annual Ground Water Availability (ham)	:	94448.21 ham
	Total Draft (Irrigation + Domestic+ Industrial)	:	3565.94 ham
	Projected Demand (Domestic + Industrial)	:	6841.92 ham
	Stage of Ground Water Development	:	71.83 %
	Category	:	OE: 1, Jalgaon (Jamod) , SC: 1, Motala, rest Blocks are Safe
13. MAJOR GROUND WATER PROBLEMS AND ISSUES			

	<p>The major parts of the district are showing falling ground water level trends mainly in central, northern and eastern parts of the district due to exploitation of ground water for irrigation and other purposes at a faster rate. There is much scope for conjunctive use in such areas. The conjunctive use of water is recommended in this area. The ground water quality is also non-potable at many places as the concentrations of nitrate and total hardness are above desirable limit. Adequate sanitary protection to the wells may be provided to control the nitrate contamination.</p>	
14.	Aquifer Management Plan	
	Supply side Management	Proposed AR structures: 262 Percolation tanks and 482 Check dams and recharge Shaft 158.
	Demand side Management	The 44.97 MCM volume of ground water generated can bring 146.20 sq km additional area under assured ground water irrigation with average crop water requirement of 0.65

**AQUIFER MAPS AND GROUND WATER
MANAGEMENT PLAN, BULDHANA DISTRICT,
MAHARASHTRA
(AAP 2018-19)**

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AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, BULDHANA DISTRICT, MAHARASHTRA (AAP 2018-19)

1.0 INTRODUCTION

In XII five year plan, National Aquifer Mapping (NAQUIM) had been taken up by CGWB to carry out detailed hydrogeological investigation on toposheet scale of 1:50,000. The NAQUIM has been prioritised to study Over-exploited, Critical and Semi-Critical talukas as well as the other stress areas recommended by the State Govt. Aquifer mapping is a process wherein a combination of geologic, geophysical, hydrologic and chemical analyses is applied to characterize the quantity, quality and sustainability of ground water in aquifers.

The vagaries of rainfall, inherent heterogeneity & unsustainable nature of hard rock aquifers, over exploitation of once copious alluvial aquifers, lack of regulation mechanism has a detrimental effect on ground water scenario of the Country in last decade or so. Thus, prompting the paradigm shift from **“traditional groundwater development concept”** to **“modern groundwater management concept”**.

Varied and diverse hydrogeological settings demand precise and comprehensive mapping of aquifers down to the optimum possible depth at appropriate scale to arrive at the robust and implementable ground water management plans. The proposed management plans will provide the **“Road Map”** for ensuring sustainable management and equitable distribution of ground water resources, thereby primarily improving drinking water security and irrigation coverage. Thus the crux of NAQUIM is not merely mapping, but reaching the goal-that of ground water management through community participation. The aquifer maps and management plans will be shared with the State Govt. for its effective implementation.

1.1 Objective and Scope

Aquifer mapping itself is an improved form of groundwater management – recharge, conservation, harvesting and protocols of managing groundwater. These protocols will be the real derivatives of the aquifer mapping exercise and will find a place in the output i.e, the aquifer map and management plan. The activities under NAQUIM are aimed at:

- identifying the aquifer geometry,
- aquifer characteristics and their yield potential
- quality of water occurring at various depths,
- aquifer wise assessment of ground water resources
- preparation of aquifer maps and
- Formulate ground water management plan.

This clear demarcation of aquifers and their potential will help the agencies involved in water supply in ascertaining, how much volume of water is under their control. The robust and implementable ground water management plan will provide a **“Road Map”** to systematically manage the ground water resources for equitable distribution across the spectrum.

1.2 About the Area

Buldhana is the western most district of Vidarbha. It lies between 19°51' and 21°17' north latitudes and 75°57' to 76°59' east longitudes and falls in Survey of India Toposheets 55-A, 55-C, 55-D and 55-P. The district covers a total geographical area of 9661.00 sq.km. It

is surrounded by Madhya Pradesh State in the north, on the east by Akola district, on the south by Parbhani district, in the west by Aurangabad and Jalgaon district and in the north east by Amravati district.

The district headquarters is located at Buldhana Town. For administrative convenience, the district is divided in 13 talukas viz, Buldhana, Chikhli, Motala, Deulgaon Raja, Jalgaon (Jamod), Khamgaon, Lonar, Malkapur, Mehkar, Nandura, Sangrampur, Sindkhed Raja, Shegaon. The population of Buldhana district is 25,86,258 persons and the population density is 268 persons/sq.km. as per the 2011 census. Agriculture is the main occupation of the people. The district forms part of Godavari and Tapi basin. Purna and Penganga Rivers are the main rivers flowing through 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 India during XII five year plan, with a priority to study Over-exploited, Critical and Semi-Critical talukas. Hence, Semi Critical talukas of Buldhana district has been taken up to carry out detailed hydrogeological investigation in Buldhana, Jalgaon Jamod, Motala during 2013-14, Malkapur, Sangrampur, Shegaon in the year 2016-17, Buldhana 2016-17 and Khamgaon, Chikhli, Lonar, Mehkar, Deulgaon Raja, Sindkhed Raja taluka by covering an area of 8206 sq.km. in the year 2018-19. The Administrative and Index map of the study area is presented in Fig. 1.1 (a & b).

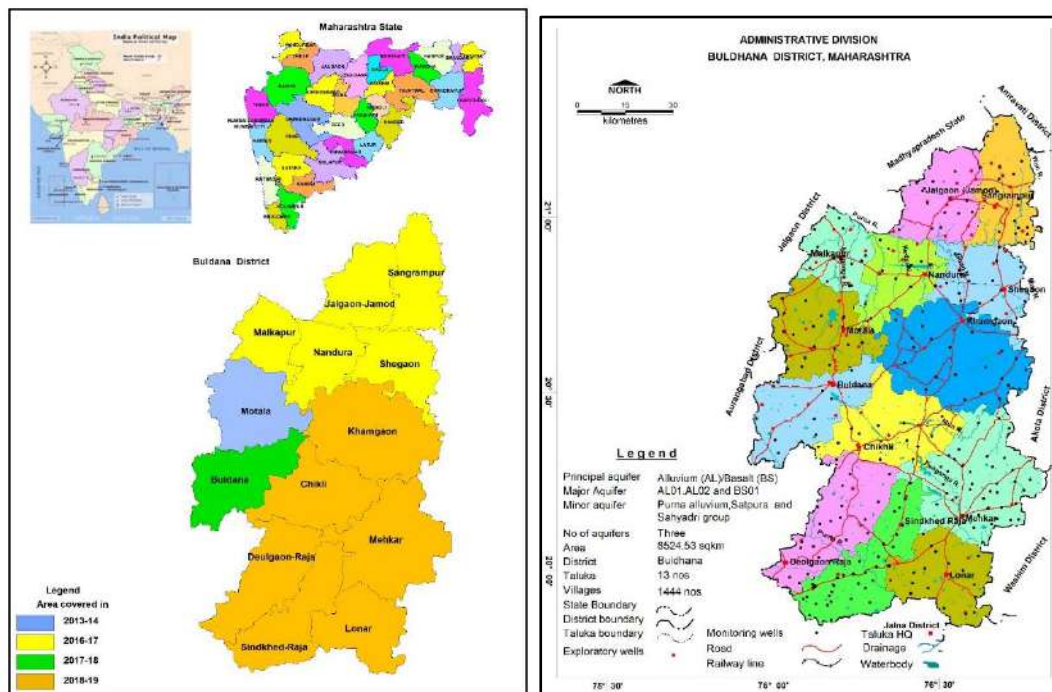


Fig. 1.1 a & b: Index and Administrative map Buldhana District

Ground water exploratory drilling in the district has been taken up in different phases since 1984. The ground water exploration has been done in 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 8 exploratory wells has been constructed during 2018-19. A total of 124 EW has been constructed till March 2018. Salient features of ground water exploration are given in Annexure-I.

To assess the ground water scenario of the district, 68 existing ground water monitoring stations were being monitored 4 times in a year. Based on data gap analysis 222

Key Observation Wells (KOWs) were inventoried to acquire micro level hydrogeological data to decipher the water level scenario, sub-surface lithological disposition and hydrogeological setup of shallow aquifer (Aquifer-I). The details 222 KOWs/GWM/micro level wells are given in **Annexure-II**. Locations of existing ground water monitoring stations and exploratory wells are shown in **Fig. 1.2**.

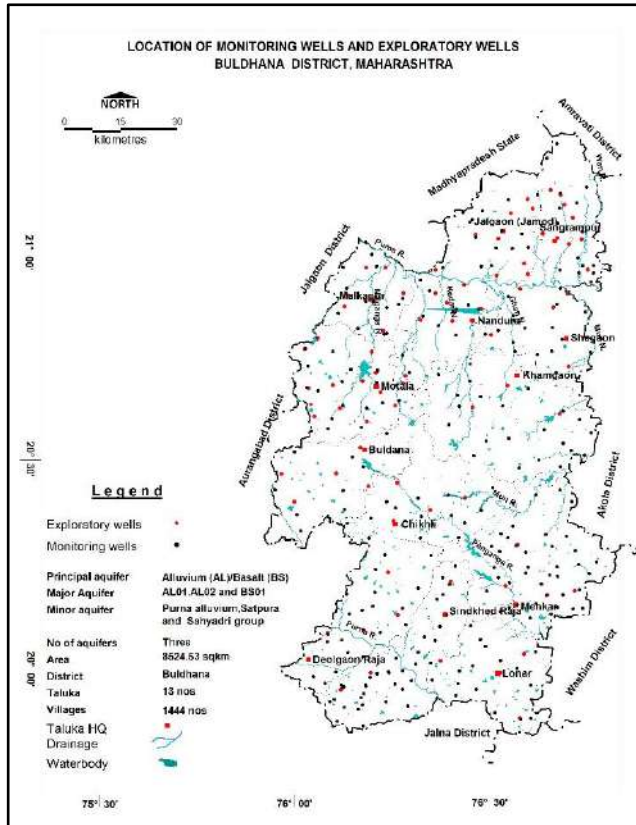


Fig. 1.2: Locations of Existing Exploratory wells and Ground Water Monitoring Wells

1.3 Geomorphology, Drainage and Soil Types

The area can be broadly divided into three physiographic units i.e., the Satpudas, the Purna plains and Ajanta ranges. The elevation in the area range between 240-667 m amsl. The analysis of geomorphological data and thematic map collected from MRSAC, Nagpur reveals that southern area forms the Upper Plateau-Highly Dissected (HDP), depending on extent of weathering and thickness of soil cover viz. 1) HDP-a, in Southern part of the area having negligible soil cover, 2) HDP-b, having little soil cover in isolated patches. The Upper Plateau-Moderately Dissected (MDP) covers almost entire area, depending on extent of weathering and soil cover viz. 1) MDP-a, occupying 20-30 % area with exposed rock and thin soil cover. 2) MDP-b, mostly covers 60-70 % area with moderate soil cover and exposure of rocks. 3) MDP-c, occurs in isolated patches in southern part with moderate to high soil cover. The geomorphological map of Buldhana district is shown in **Fig. 1.3**.

Drainage of the district is entirely drained by three major drainage systems. The Purna (Tapi) system covers the complete half of the area of the district. The system is developed along the northern side of the district. The Painganga system & the Purna (Godavari) system originate from the Ajanta hills & covers the southern half portion of the district. The Purna Tapi is having the westerly drainage system and the remaining two system i.e. of Painganga and Purna (Godavari) have SE drainage system. All the rivers have a sub parallel to semi dendritic drainage pattern which is controlled by structures of the bed rocks formed by Deccan basalt lava flows. Based on geomorphological setting and drainage pattern the district is divided into 57 watersheds. The drainage map of Buldhana district is

shown in **Fig. 1.4**

Soil plays a very important role in the agricultural activities and forest growth of the area. The fertility of the soil from agricultural point of view depends upon the texture and structure which controls the retaining and transmitting capacity of moisture and various nutrients such as nitrogen, phosphorous and potassium present in the soil. The formation of the soil in the area is influenced by the climate, geology, vegetation and topography. The soil data and the thematic map of the area available with the MRSAC, Nagpur has been collected and analysed.

It has been observed that the major part of the area is occupied by clayey deep soil. Maximum area of the talukas are covered by Clayey loamy soil with extremely shallow to very shallow depth. The clayey loamy soil is observed all along the major drainages. The soil varies both in texture and depth. Deep soils occur along plains of lower elevation, depressions and along river banks. These are dark black cotton soils. The thematic map on the soil distribution in the study area is shown in **Fig. 1.5**.

Agriculture, Irrigation and Cropping pattern

The landuse and the thematic map available with the MRSAC, Nagpur has been collected and analysed with reference to the present agricultural practices, various land use etc. The major part of the areas is covered by agricultural land. It has been observed that the major parts of the district are covered by agricultural land with net sown area of 6716.8 Sq. Km. (68.94 %). Forest covers very little area of 1057.42 Sq. Km. (10.84 %) in Khamgaon, Buldhana, Mehkar, and Sindhkhed raja blocks. Small waterbodies are widely spread all over the districts. The built up area is reflected wherever settlements have come up. The landuse map of Buldhana district is shown in **Fig. 1.6**.

The agriculture pattern in most of the area is under double crop and more than double crop. The main crops of area are Bajara, Rice, Jawar. The Wheat is the main Kharif crops. The Maka and Gram are grown during the rabbi season. Vegetables and cotton are main cash crops. After establishment of sugar factories, Sugarcane is also a cash crop grown in the area. The spatial distribution of cropping pattern is presented in **Table No 1.1 & Table No 1.2**.

Table- 1.1: Taluka wise Land Use (fig. in sq.km)

SR. No.	TALUKA	TOTAL GEOGRAPHICAL AREA(Sq.km)	FOREST	FALLOW LAND	NET AREA	The total area under cultivation (Sq.km)	CULTIVABLE AREA (Sq.km)	Area sown more than once (Sq.km)
1	BULDHANA	798.3675	139.3118	42.1647	37.9013	1033.072	576.382	456.69
2	CHIKHLI	1137.9044	114.67	41.63	879.27	1245.29	879.27	366.02
3	DEULGAON RAJA	476.4554	27.1454	78.664	332.018	478.508	332.018	146.49
4	JALGAON JAMOD	589.6992	123.84	7.98	407.49	483.06	407.49	75.57
5	KHAMGAON	1204.7547	188.0394	64.425	853.675	1053.525	853.675	199.85
6	LONAR	672.2608	14.4607	41.2121	514.725	655.775	514.725	141.05
7	MALKAPUR	465.2192	0.3913	4.7475	410.993	467.353	410.993	56.36
8	MEHKAR	1131.2206	115.8928	25.2163	868.254	1047.664	868.254	179.41
9	MOTALA	759.6277	74.37	3.008	587.49	713.36	587.49	125.87
10	NANDURA	540.9396	4.89	6.9948	486.595	531.735	486.595	45.14
11	SANGRAPUR	504.1415	4.1023	66.3	383.622	454.842	383.622	71.22
12	SHEGAON	505.4835	4.9985	1.37	454.56	485.074	454.56	30.514
13	SINDKHED RAJA	781.1977	43.3039	33.3178	638.98	887.02	638.98	248.04
	Total	9567.27	855.42	417.03	6855.57	9536.28	7394.05	2142.22

Table 1.2: Area Under Principal Crops in Buldhana District (fig. in sq.km)

SR. NO	TALUKA	WHEAT	JOWAR	BAJRA	MAKA	TOTAL CEREALS	TOTAL PULSES	TOTAL FOOD GRAINS	SPICES	TOTAL FOOD CROPS	SUGAR-CANE	COTTON	OIL-SEEDS
1	BULDHANA	51.12	8.48	0.08	94.14	154.23	352.35	506.58	2.97	3.45	0	26.14	391.23
2	CHIKHLI	91.94	24.92	0.71	23.75	141.32	407.79	550.72	3.86	7.26	0.24	10.97	615.93
3	DEULGAON RAJA	38.12	30.01	0.65	27.05	95.83	104.13	201.22	2.39	5.2	0.38	29.2	179.59
4	JALGAON JAMOD	21.99	8.76	0.51	16.33	47.59	107.01	154.6	0.83	10.4	0.01	114.51	177.11
5	KHAMGAON	61.5	10.8	6.2	10.2	88.7	232	320.7	1.15	4.22	0.15	247.13	425
6	LONAR	26.5	7.38	0.01	2.25	36.14	237.69	274.05	1.84	4.11	0	10.71	352.59
7	MALKAPUR	12.3	20.85	0	22.53	62.05	95.55	157.6	0.73	4.6	0.19	131.79	122.89
8	MEHKAR	36.01	4.42	0	5.11	45.54	273.17	317.87	2.03	3.31	2.02	28.31	677.62
9	MOTALA	12.3	13.82	2.18	28.9	113.07	111.38	224.45	1.31	2.54	0	251.08	141.06
10	NANDURA	7.97	36.69	0.15	22.53	67.72	126.52	194.24	0.17	2.59	0.02	88.23	187.11
11	SANGRAMPUR	13.5	11.76	0	13.33	38.59	102.84	141.43	0.61	13.75	0.01	127.07	146.88
12	SHEGAON	6.35	22.06	0.2	2.36	30.97	166.63	197.6	0.184	3.97	0	49.24	209.46
13	SINDKHED RAJA	60.61	78.3	0.07	8.4	147.38	188.6	335.98	0.54	4.94	1.87	66.47	389.45
		448.06	278.28	10.76	331.27	1070	2507.94	3577.94	18.61	63.1526	4.89	1180.76	4015.82

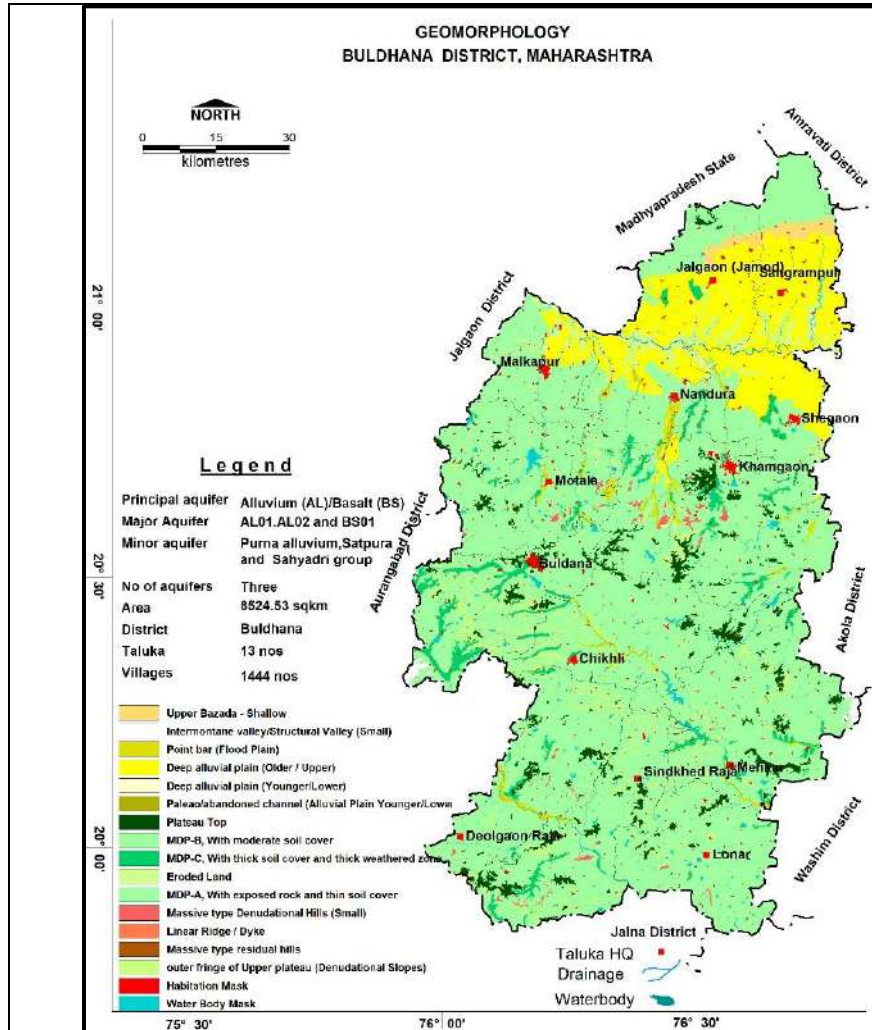


Fig. 1.3: Geomorphology ,Buldhana District

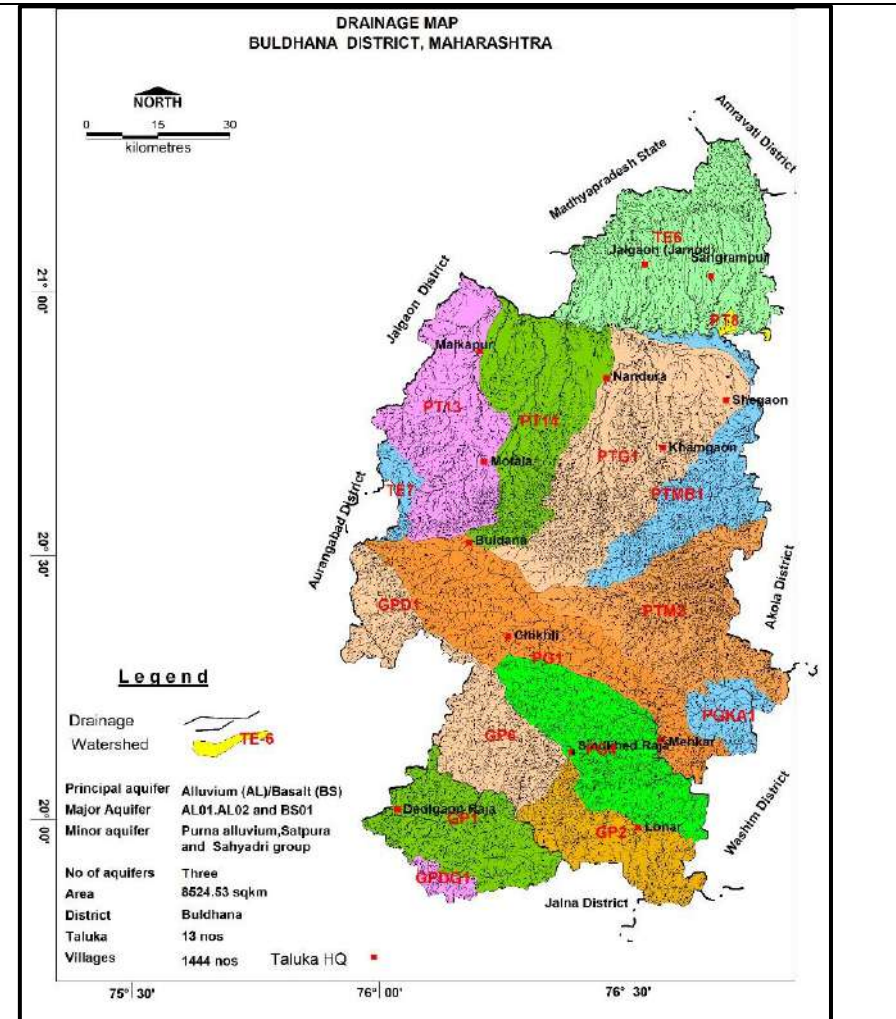


Fig. 1.4: Drainage, Buldhana District

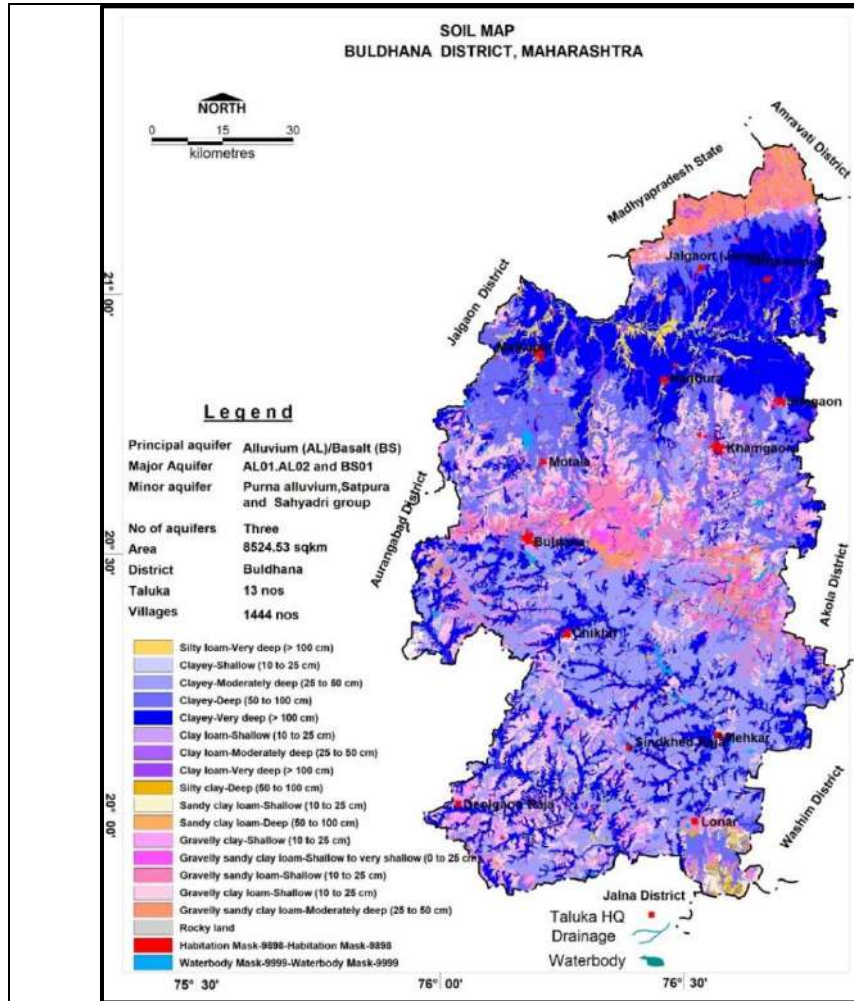


Fig. 1.5: Soil, Buldhana District

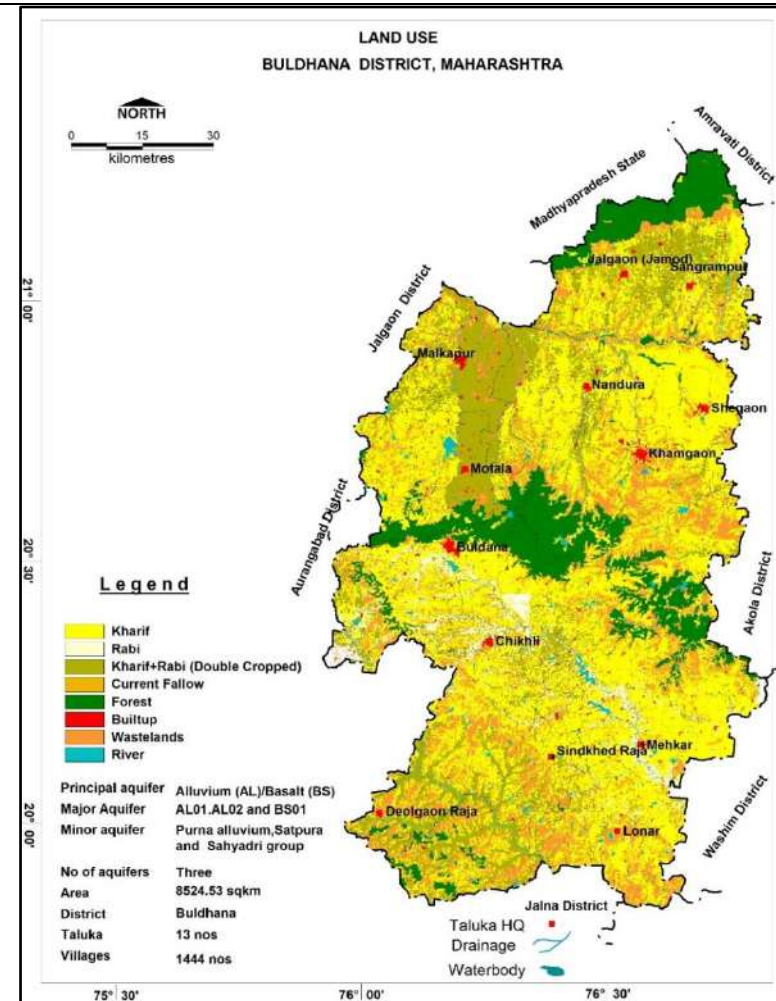


Fig. 1.6: Landuse , Buldhana District

1.4 Climate and Rainfall

Agriculture in the area depends mainly on the rainfall from south-west monsoon. The area experiences the sub-tropical to tropical temperate monsoon climate. The Short term rainfall data (1998-2018) of the rain gauge stations located at taluka headquarters had been collected from available sources and was subjected to various types of statistical analysis to understand the characteristic of the rainfall. The intensity of rainfall is the highest in July. In May, the average maximum temperature is 42.2 °C with the minimum being 15.10 °C. The Normal rainfall of the district is 785.9 mm spread over 47 to 50 rainy days in normal condition. Short term rainfall analysis (1998-2018) and annual rainfall data of last ten years is given in **Table 1.3 and 1.4**. The Isohyetal map of Buldhana district is given in **Fig. 1.7** and short term rainfall data if given in **Fig 1.8**.

Table 1.3: Short-term rainfall analysis

District	Period	No of years	Normal Rainfall (mm)	Std. Deviation (mm)	Coefficient of Variation (%)	Rainfall Trend (mm/year)
Buldhana	1998-2018	21	785.9	165.5	21.66	-13.05
		No		Years		
Departures						
Positive	6		29			
Negative	15		71			
Drought						
Moderate	3		14			
Severe	0		0			
Acute	0		0			
Normal & Excess RF						
Normal	15		71			
Excess	3		14			

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

Table 1.4: Annual rainfall data (1998-2019) (in mm)

Year	Average rainfall (mm)	Normal rainfall (mm)	Departure (%)	Category
1998	925.5	785.9	17.76	NORMAL
1999	925.5	785.9	17.76	NORMAL
2000	582.4	785.9	-25.89	MODERATE
2001	823.5	785.9	4.78	NORMAL
2002	997.6	785.9	26.94	EXCESS
2003	701.7	785.9	-10.71	NORMAL
2004	598.5	785.9	-23.85	NORMAL
2005	595.5	785.9	-24.23	NORMAL
2006	1006.6	785.9	28.08	EXCESS
2007	730.2	785.9	-7.09	NORMAL
2008	622.1	785.9	-20.84	NORMAL
2009	747.1	785.9	-4.94	NORMAL
2010	1039.8	785.9	32.31	EXCESS
2011	628.5	785.9	-20.03	NORMAL
2012	612.3	785.9	-22.09	NORMAL
2013	612.3	785.9	-22.09	NORMAL
2014	551.1	785.9	-29.88	MODERATE
2015	684.7	785.9	-12.88	NORMAL

Year	Average rainfall (mm)	Normal rainfall (mm)	Departure (%)	Category
2016	718.4	785.9	-8.59	NORMAL
2017	618.1	785.9	-21.35	NORMAL
2018	474.5	785.9	-39.62	MODERATE

(Source-website of Maharashtra Government: mahaagri.gov.in)

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

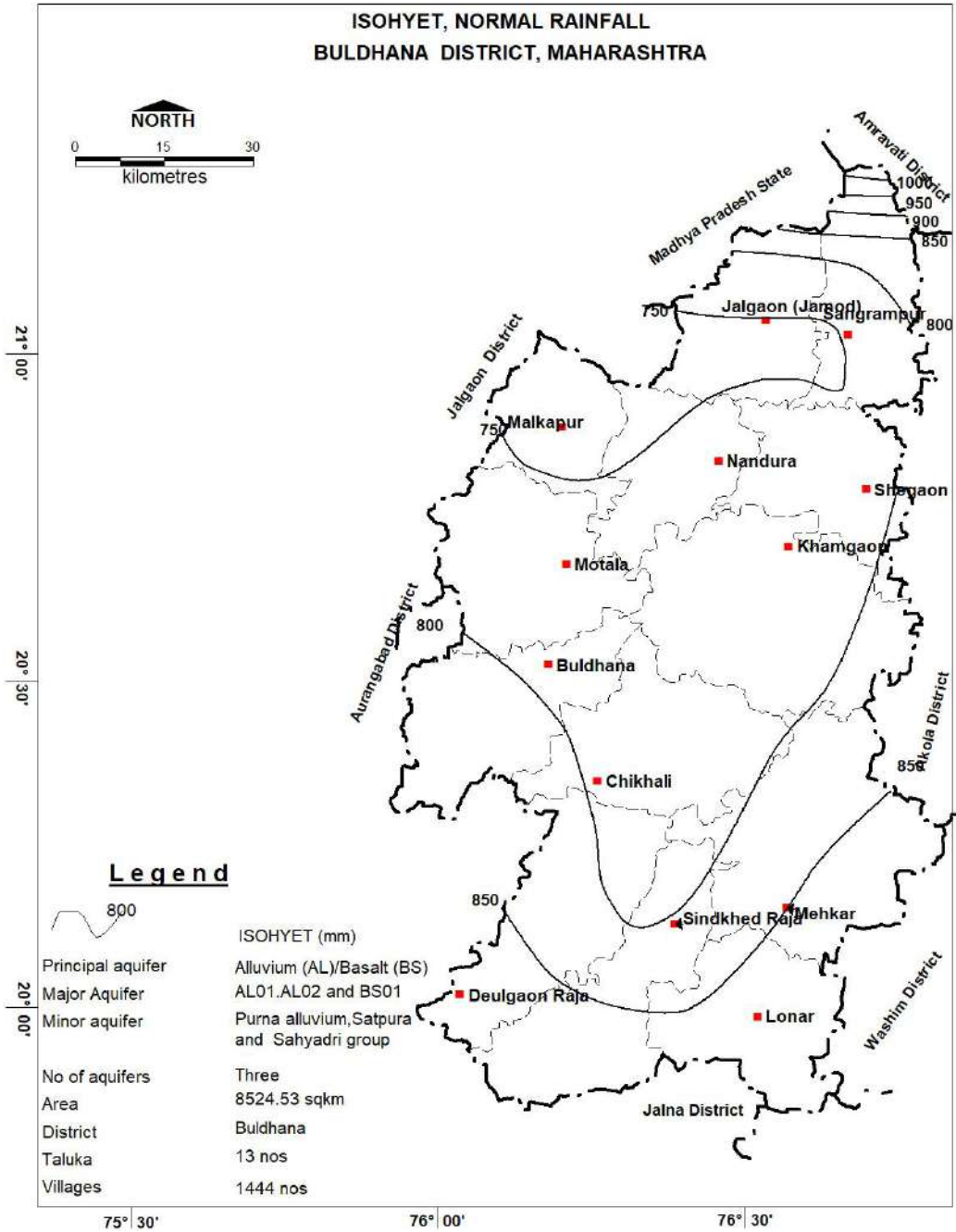


Fig. 1.7: Isohyetal map of Buldhana District

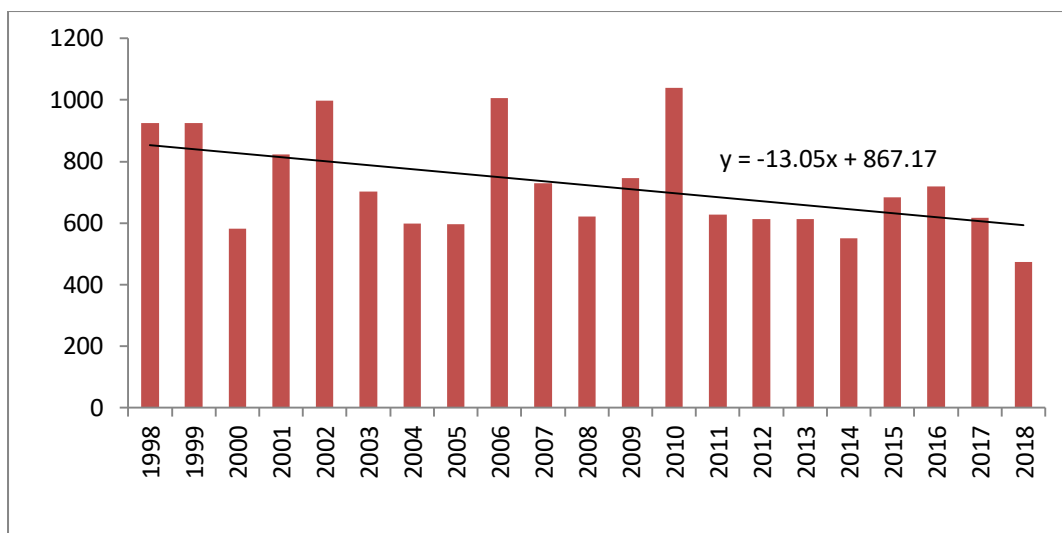


Fig. 1.8: Short-term annual rainfall (1998-2018)

1.5 Geology

Geologically, the area is divided into two stratigraphic units i.e., Alluvium and Deccan Trap Basalt formations. The generalized geological sequence occurring in the area is given in **Table 1.5**.

Table 1.5: Generalized Geological sequence of Buldhana district

Geologic Period	Stratigraphic unit	Lithology
Recent to Sub-Recent	River Alluvium	Clay, Silt, Sand, Gravel, Kanker etc.
Late Cretaceous to Eocene	Deccan traps	Basalt, vesicular, amygdaloidal with intertrappeans.

Alluvium:

The northern part of the district on either side of Purna River is underlain by thick Alluvial deposits of Pleistocene to Recent age and is termed as Purna Alluvium. The Alluvium is also observed in a small patch southwest of Malkapur and east of Khamgaon along the boundaries of district. The Alluvial valley lies in narrow belt and covers roughly about 1800 sq. km. The valley extends about 51 sq. km. in Buldhana district and it tapers towards the western end.

Purna Alluvium has a proven thickness of more than 300 meters. Based on studies the entire thickness of Alluvium has been divided into younger Alluvium and older Alluvium. The younger Alluvium contains comparatively more sand layers and thus forms good aquifer. The older Alluvium, which is more clayey with thin horizons of sand and silt forms a comparatively lesser potential aquifer. In younger Alluvium ground water generally occurs in confined to semi-confined conditions in the depth range of 11-40 m bgl, while in older Alluvium it occurs under confined conditions below the depth of 40 m.

Deccan Trap Basalt:

The entire district is occupied by Deccan trap basaltic lava flows of Late Cretaceous to Eocene age. The Deccan lava sequence is grouped under Satpura group in the northern part whereas in southern part it is grouped under Sahyadri group. Deccan Trap Basalt forms an important water bearing formation of the district. The Deccan lava sequence is grouped under Satpura group in the northern part whereas in southern part it is grouped under Sahyadri group. In Basalt, ground water occurs both in Vesicular and Massive Basalt as well as inter-flow zones in weathered mantle, fractured zones. In general ground water occurs

under water table conditions in shallow aquifer and semi-confined to confined conditions in deeper aquifer. The unconfined aquifer is developed due to the weathering and jointing of upper flow in Basalt down to depth of 15-20 mbgl. The Principal Aquifer map of Buldhana district is shown in **Fig. 1.9**.

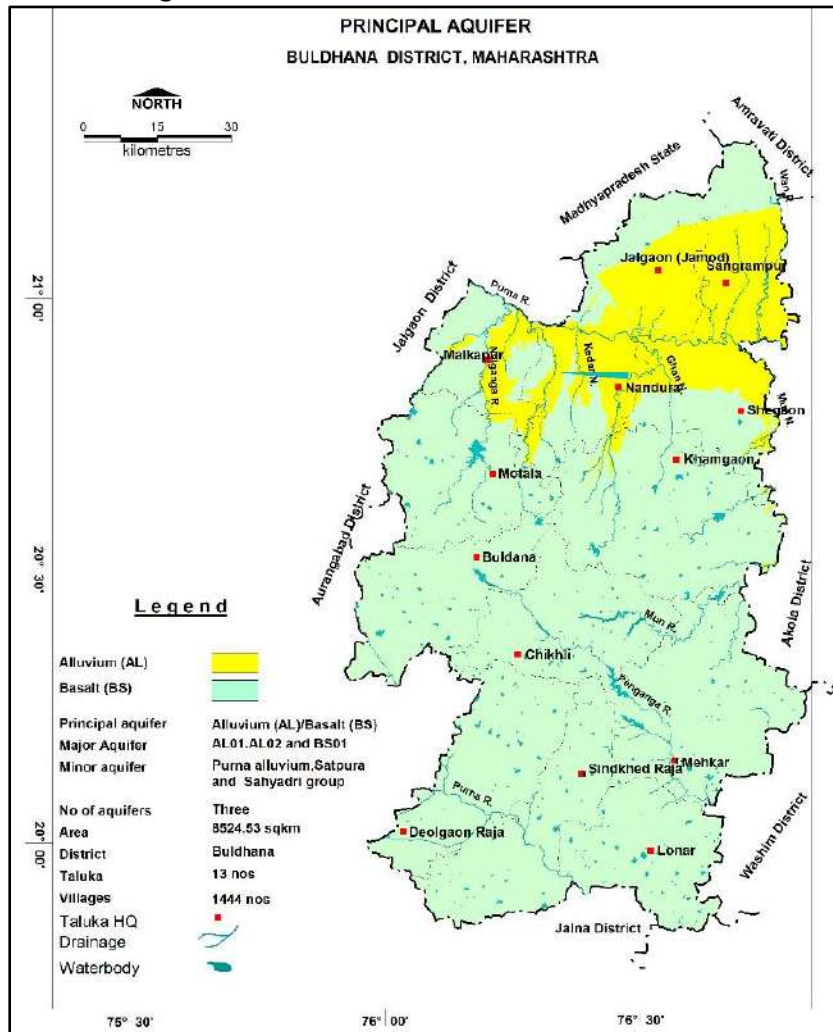


Fig. 1.9: Principal Aquifer Map of Buldhana district

1.6 Soil Infiltration Tests

To estimate the actual rate of infiltration of various soil cover and their impact on recharge to ground water, 6 infiltration tests have been conducted at Dongaon, Sindkhed raja, Deulgaon Mahi, Hiwarkhed, Amdapur and Lonar in various soil types. The data has been analyzed and the salient features of the infiltration tests are presented in **Table 1.6** and the plots of soil infiltration tests are presented in **Fig. 1.10**. The duration of the test ranged from 60 to 110 minutes, the depth of water infiltrated varied from 0.2 cm to 1.9 cm and the final infiltration rate in the area ranged from 1.2 cm/hr at Deulgaon mahi to 11.4 cm/hr at Lonar.

Table 1.6: Salient Features of Infiltration Tests

S. No.	Village	Date	Duration (min)	Water Level (cm agl)	Final Infiltrated Water Depth (cm)	Final Infiltration Rate (cm/hr)
1.	Amdapur	20.12.2018	110	20	0.2	2.4
2.	Deulgaon Mahi	20.12.2018	85	17	0.2	1.2

3.	Dongaon	21.12.2018	85	15	0.4	2.4
4.	Hiwarkhed	20.12.2018	80	20	0.4	2.4
5.	Lonar	21.12.2018	80	17	1.9	11.4
6.	Sindkhed Raja	20.12.2018	60	16	0.3	1.8

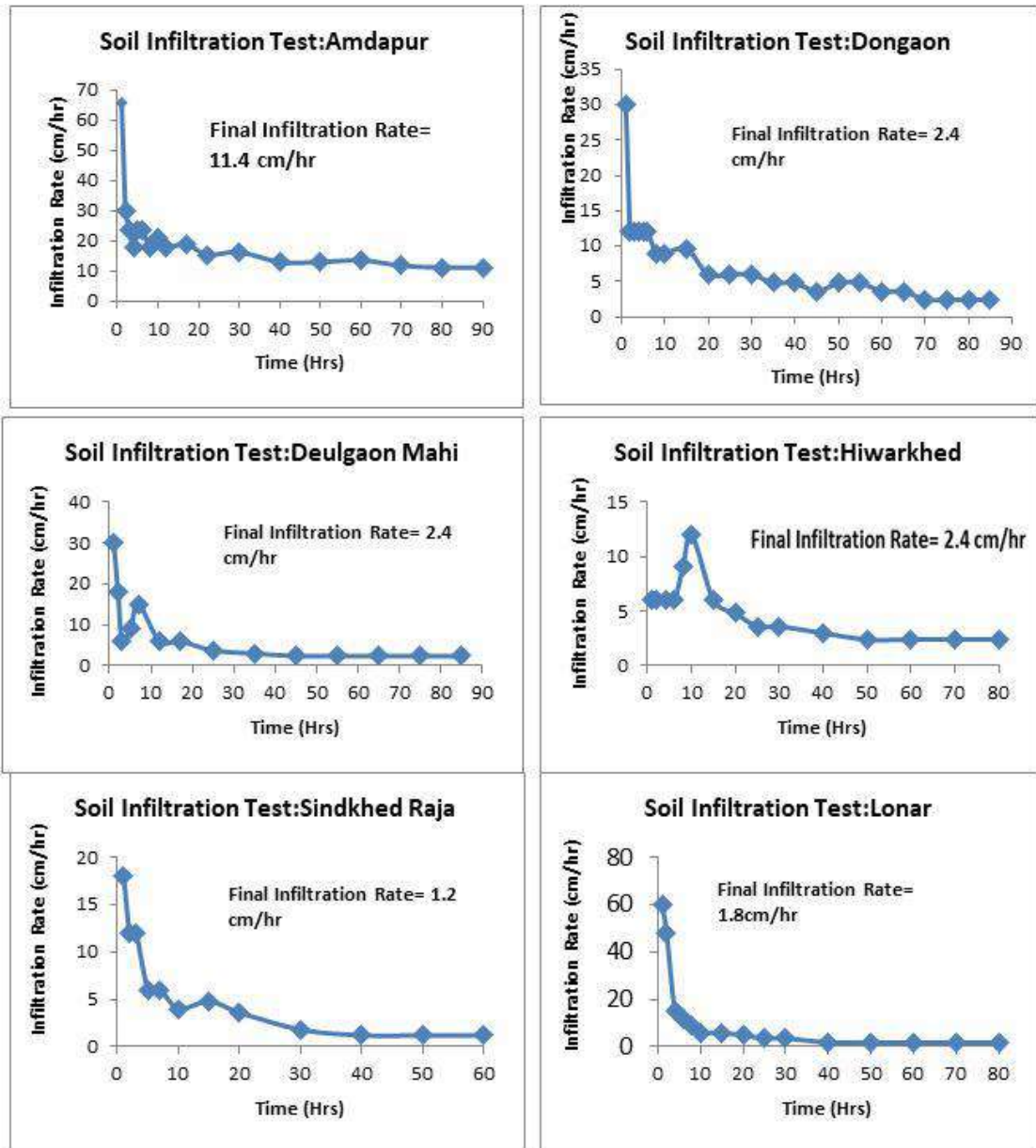


Fig. 1.10: Soil Infiltration Test

2.0 HYDROGEOLOGY

2.1 Major Aquifer System

There are 2 types of aquifer systems exist in the area namely Alluvium and Basalt. The map showing major aquifer systems of Buldhana district is shown in **Fig 2.1**

2.1.1 Alluvium

Alluvium occurs in small areas along banks and flood plains of major rivers like Purna, Painganga and their tributaries. Coarse grained detrital material like sand and gravel

usually occurring as lenses forms good aquifer. The ground water occurs under water table conditions in flood plain deposits near the river banks. Confined conditions are also found wherever the thick clay deposits confine the ground water below it. Ground water exploration in Purna-Painganga Alluvium reveals that the thickness of alluvium is less than 50 m. The yield of the dugwells ranges from 10 to 100 m³/day.

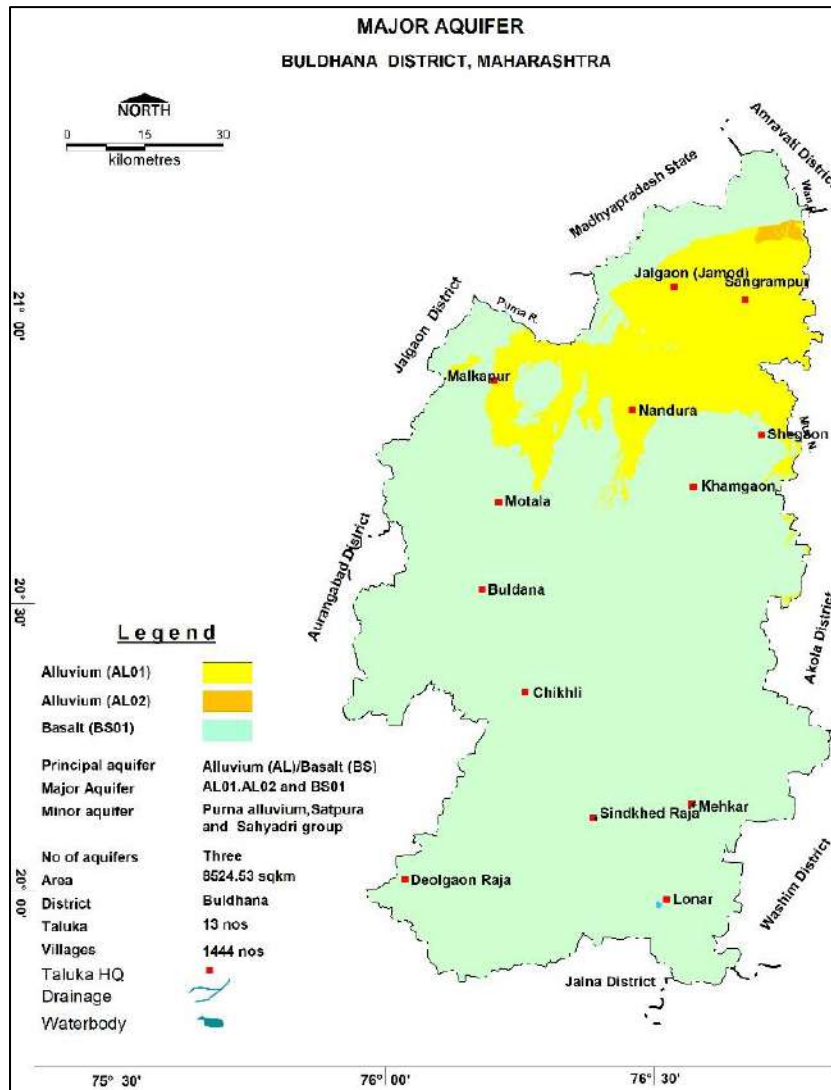


Fig. 2.1: Major Aquifers of Buldhana district.

2.1.2 Basalt

Deccan Trap Basalt of upper Cretaceous to lower Eocene age is the major rock formation in the district covering entire district. Although, Alluvium occurs along the major rivers in the district but it does not form potential aquifer except locally. A map depicting Minor aquifers is presented in **Fig. 2.2** and water table contour map is shown in **Fig. 2.3**.

Deccan basalts are hydro geologically in-homogeneous rocks. The weathered and jointed / fractured parts of the rock constitute the zone of ground water storage and flow. The existence of multiple aquifers is characteristic of basalt and is indicative of wide variation in the joint/fracture pattern and intensity. The yield of wells is function of the permeability and transmissivity of aquifer and it depends upon the degree of weathering, intensity of joints\fractures 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.

Shallow Aquifer is generally tapped by the dug wells of 8 to 30 m depth, water levels range from 3 to 30 m bgl and yield varies from 25 to 75 m³/day. The deeper Aquifer is being tapped by borewells with depth ranging from 45 to 168 m bgl and the water level from 4 to 100 m bgl. Based on Ground Water Exploration, aquifer wise characteristics are given in **Table 2.1**. The depth of occurrence and fractured/granular rock thickness map of Aquifer-I and Aquifer-II is shown in **Fig 2.4** and **Fig 2.5** respectively and the yield potential map of Aquifer-I, Aquifer-II and Aquifer-III is shown in **Fig 2.6**, **Fig 2.7** and **Fig 2.8** respectively.

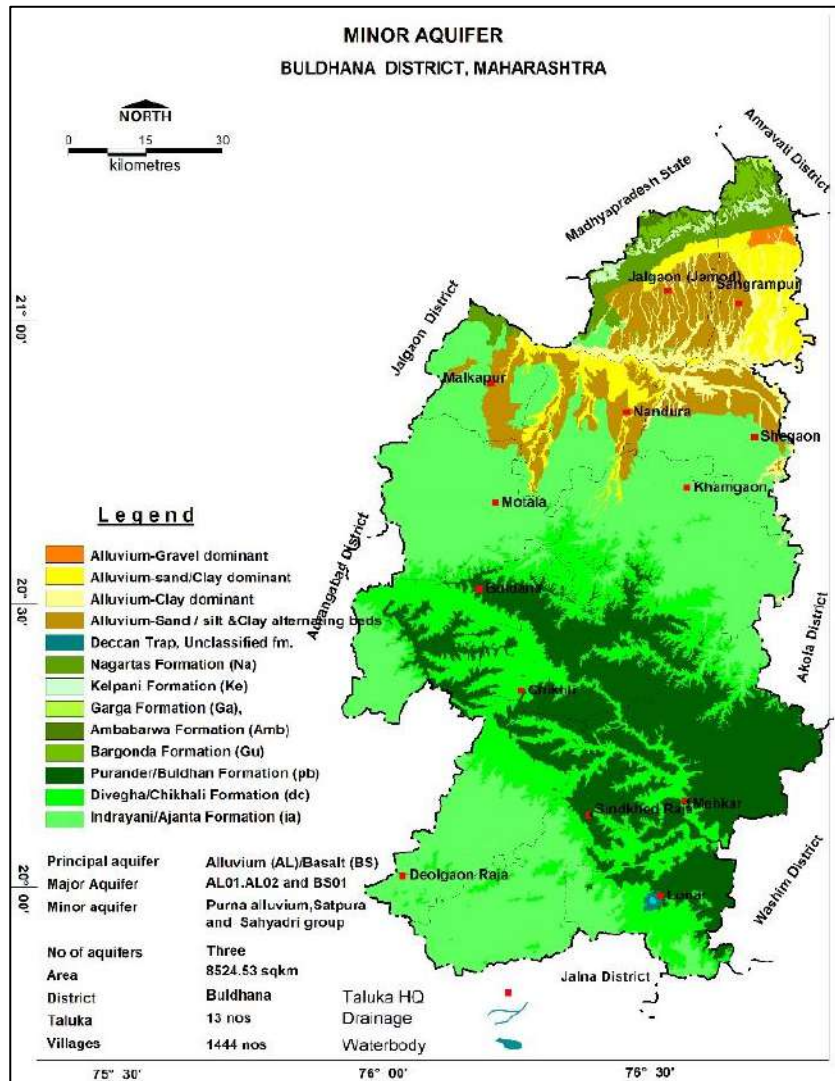


Fig 2.2: Minor Aquifers of Buldhana district.

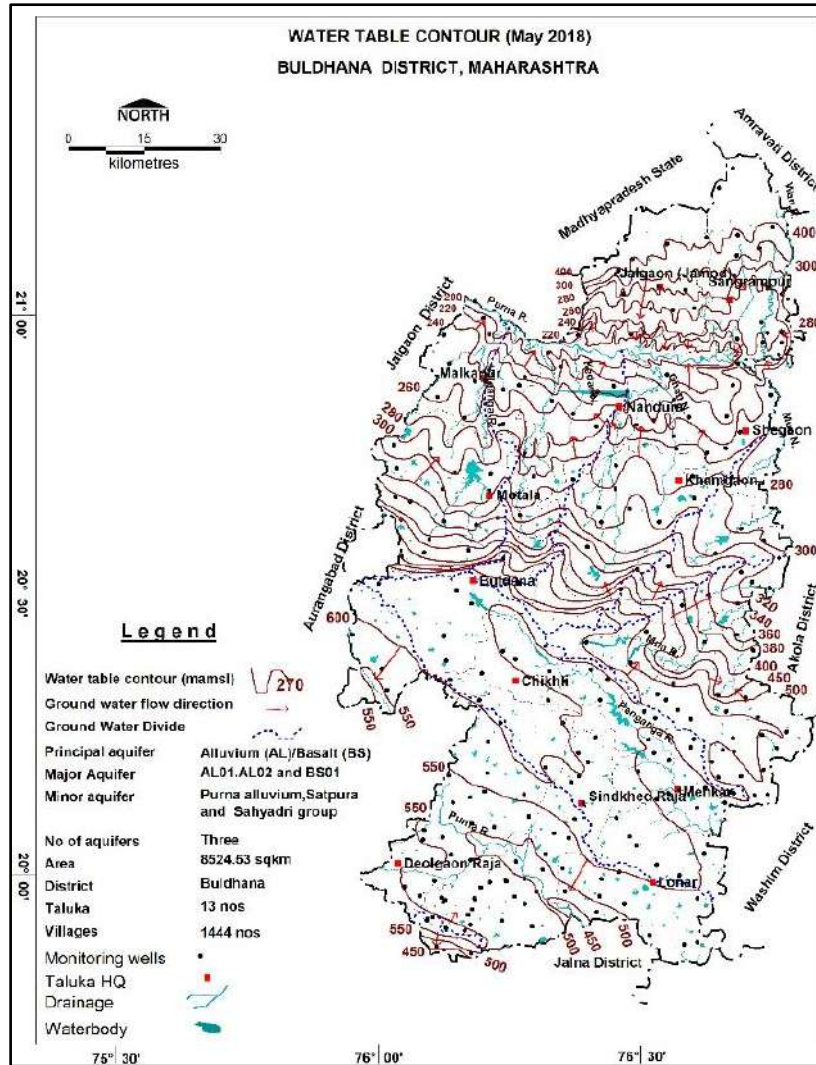


Fig 2.3: Water Table contour

Table 2.1: Aquifer Characteristic of Buldhana district

Major Aquifers	Basalt (Deccan Traps)		Alluvium	Alluvium
Aquifer	Aquifer-I	Aquifer-II	Aquifer-I (AL02)	Aquifer-II (AL02)
Type of Aquifer	Unconfined	Semi-confined	Semi-confined	Semi-confined to confined
Formation	Weathered/Fractured Basalt	Jointed / Fractured Basalt	Alluvium-Sand / silt & Clay	Alluvium-Sand / silt & Clay
Depth of Occurrence (mbgl)	8 to 30	45 to 168	0 to 79	0 to 120
SWL (mbgl)	3.9-30	4- 100	6 to 31.4	19 to 38
Granular/Weathered / Fractured rocks thickness (m)	6 to 25	0.5 to 12	0 to 50	0 to 40
Fractures/granular zone encountered (mbgl)	Upto 35	Upto 182	Upto 78	Upto 110
Yield	25 to 75 m ³ /day	0.2 to 3 lps	10 -100m ³ /day	0.2 to 3.0 lps
Sustainability	1 to 2 hrs	3 to 4 hrs	1 to 5 hrs	
Transmissivity (m ² /day)	30 to 60 m ² /day	25 to 395 m ² /day	10 to 1575 m ² /day	--
Specific Yield / Storativity (Sy/S)	0.2	8.0 x10 ⁻³ to 4.2x 10 ⁻²	10 to 500	--
Suitability for drinking/ irrigation	Suitable for both	Suitable for both, except high EC	Suitable for both	--

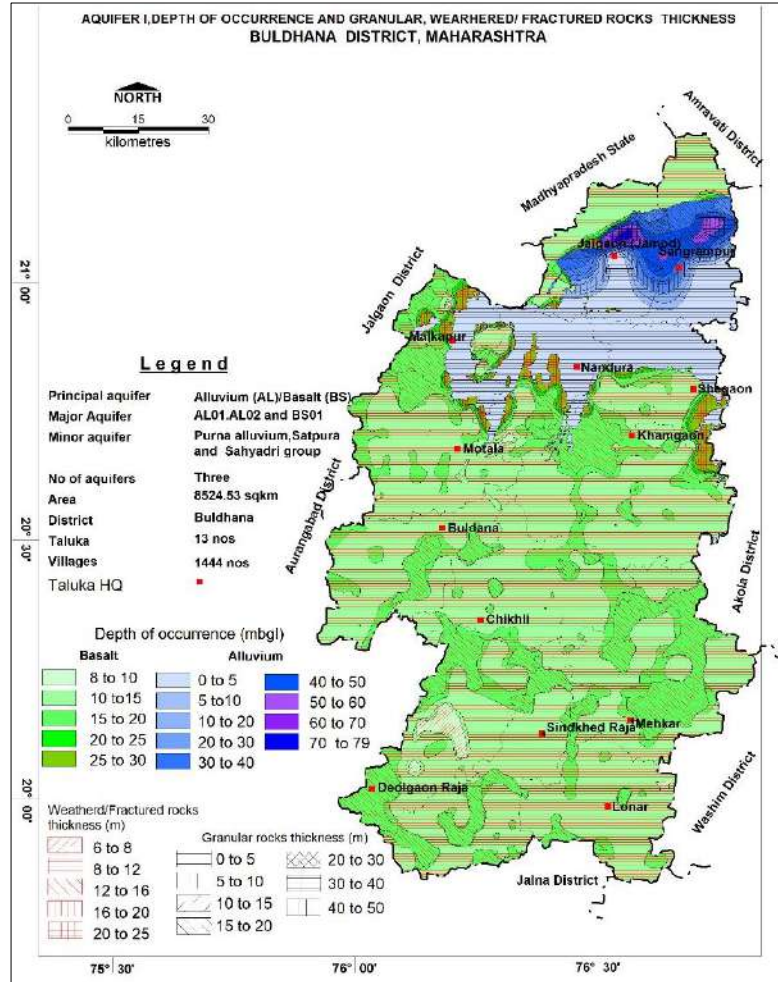


Fig. 2.4: Depth of occurrence and fractured/granular rock thickness of Aquifer-I

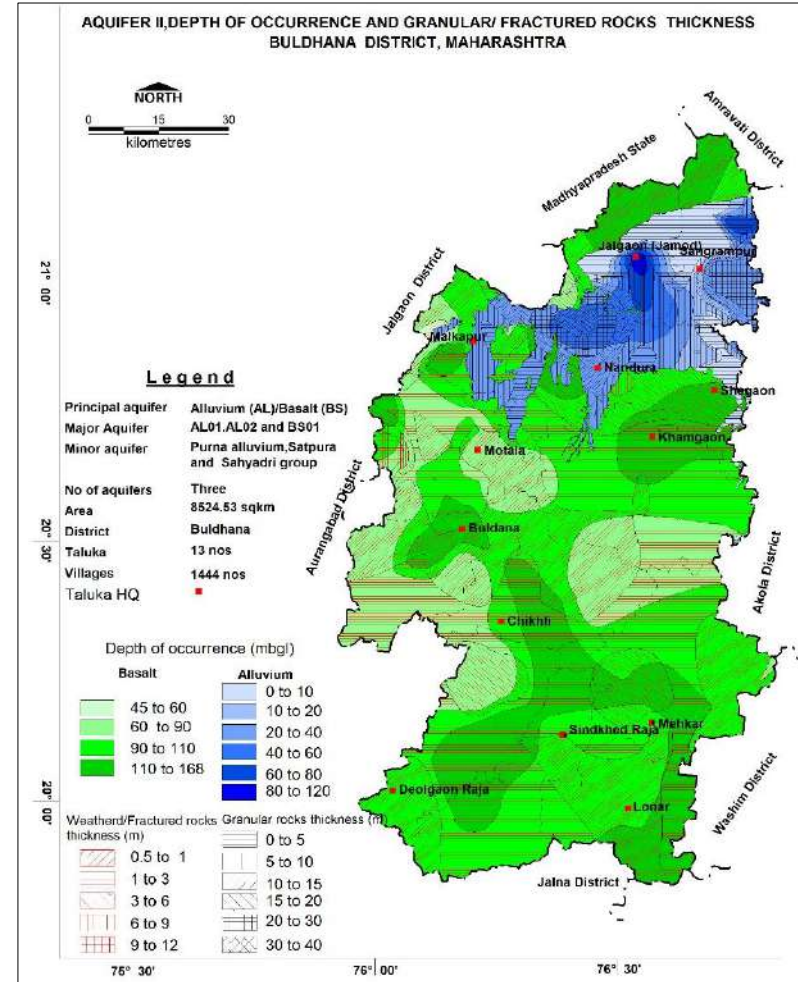


Fig. 2.5: Depth of occurrence and fractured/granular rock thickness of Aquifer-II

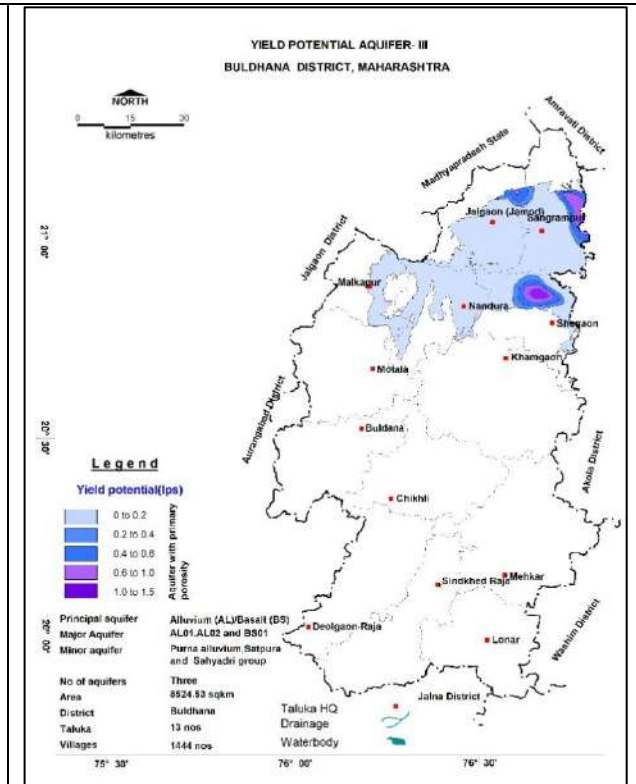
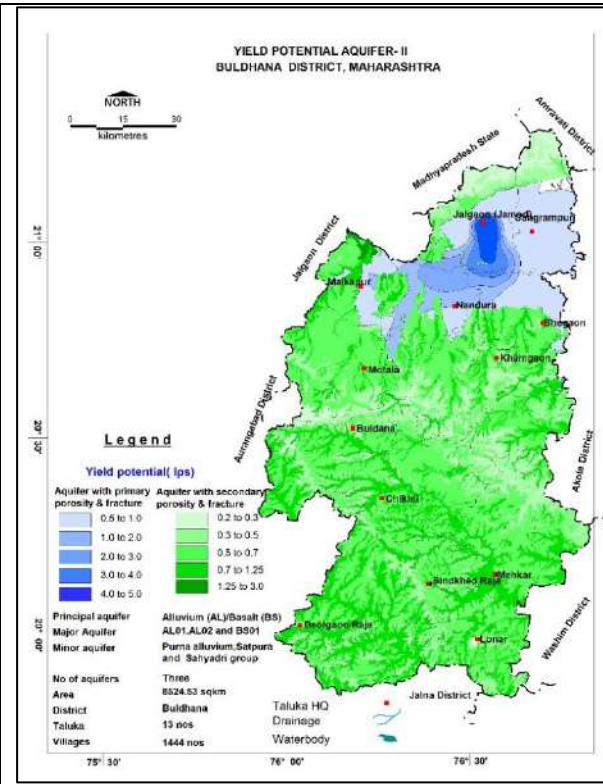
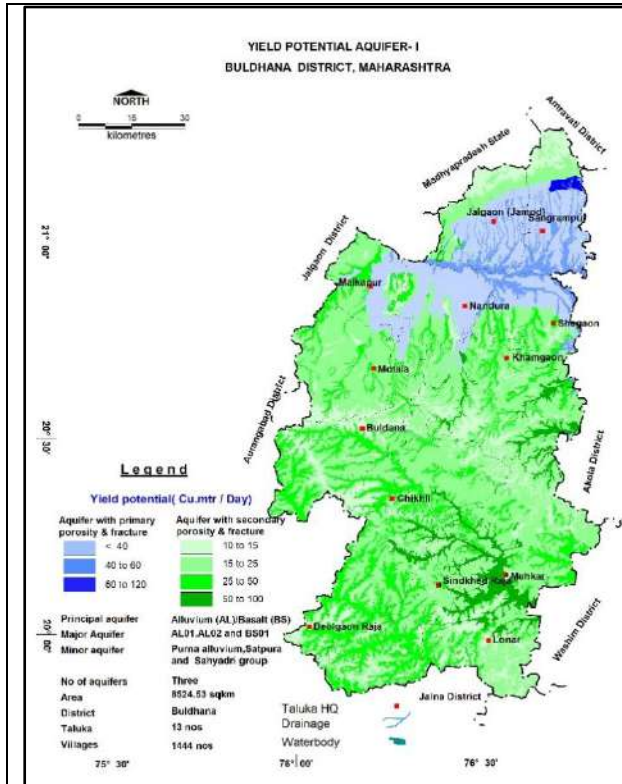


Fig. 2.6: Aquifer-I Yield Potential (Basalt & Alluvium)

Fig. 2.7: Aquifer-II Yield Potential (Basalt)

Fig. 2.8: Aquifer-III Cummulative yield potential (Basalt)

Yield potential	Aquifer I	Aquifer II	Aquifer III
Alluvium	40 to 120 m ³ /day	0.5 to 5 lps	0 to 1.5 lps
Basalt	10 to 100 m ³ /day	0.2 to 3 lps	-

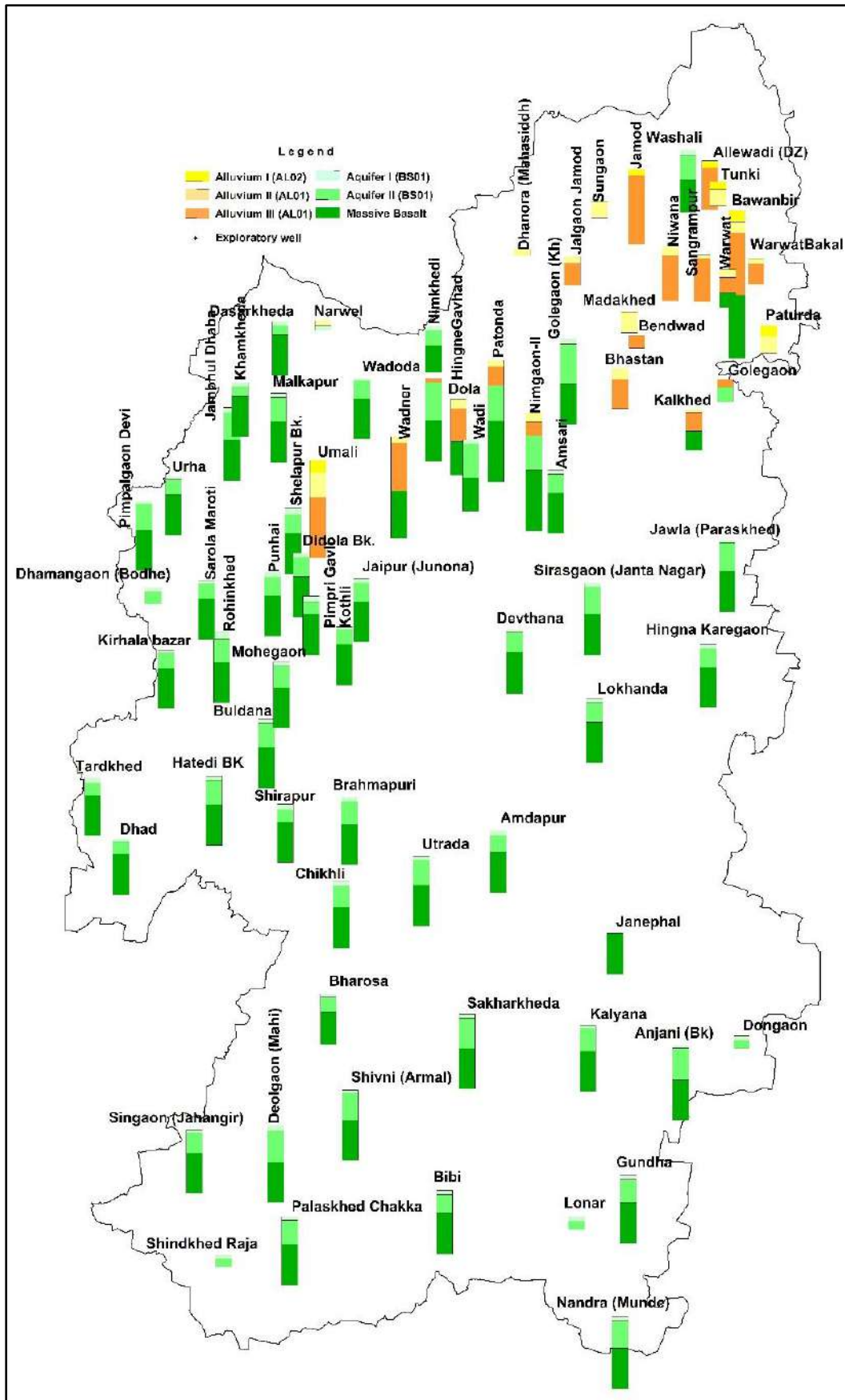


Fig. 2.11: 3D Bar Diagram

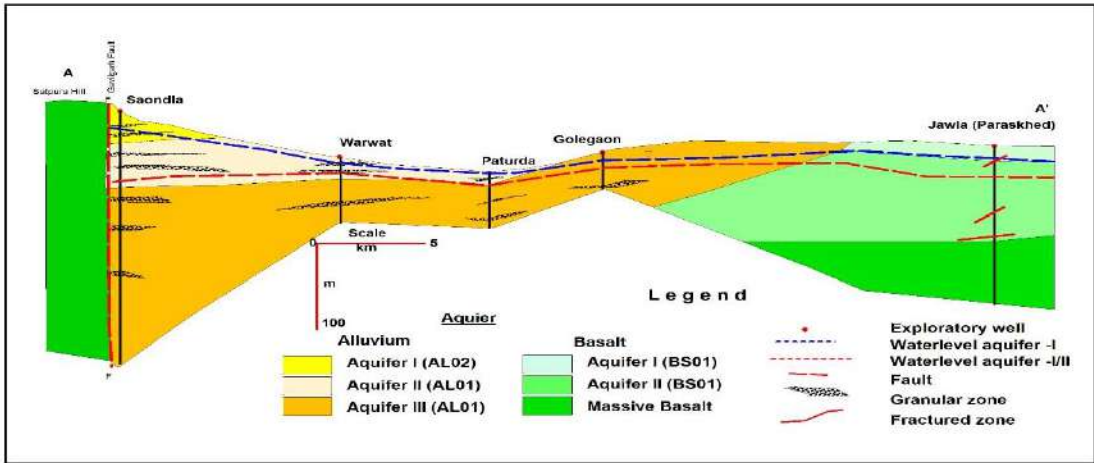


Fig. 2.12 (a): Lithological section along A – A’

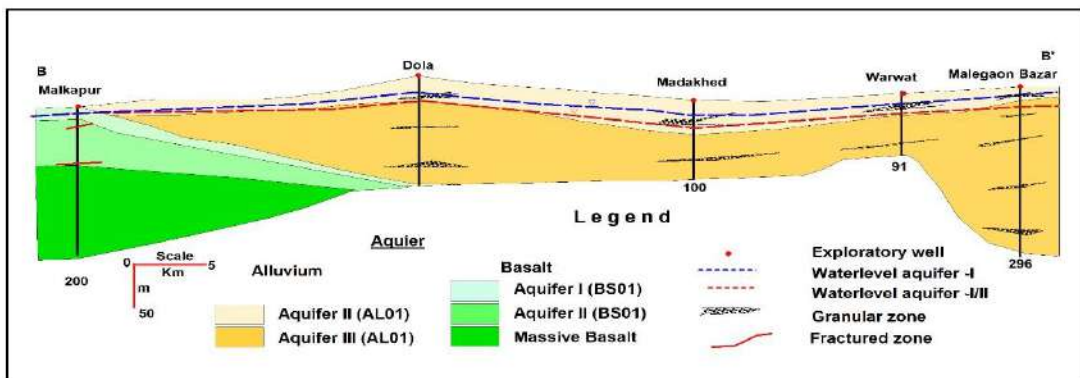


Fig. 2.12 (b): Lithological section along B – B’

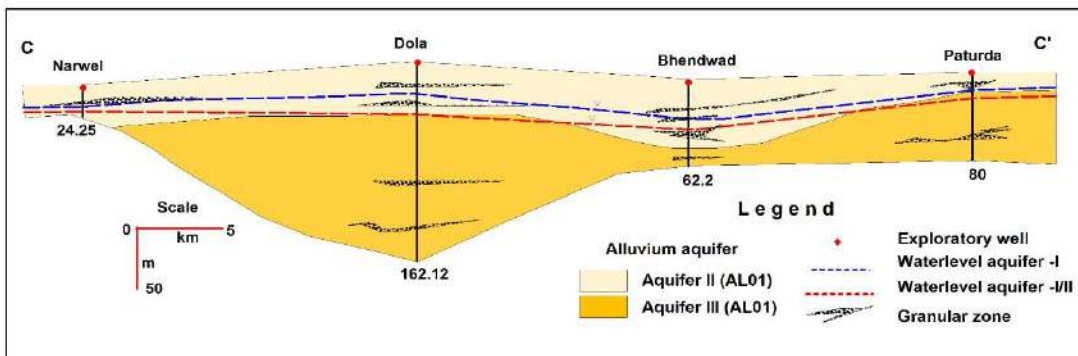


Fig. 2.12 (c): Lithological section along C – C’

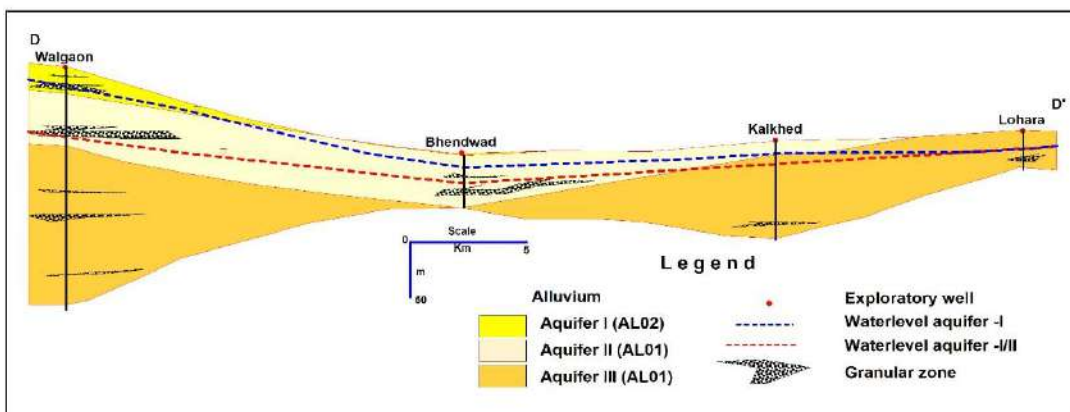


Fig. 2.12(d): Lithological section along D – D’

3.0 WATER LEVEL SCENARIO

3.1 Depth to water level (Aquifer-I /Shallow Aquifer)

Central Ground Water Board periodically monitors 68 Ground Water Monitoring Wells (GMMWs) including 55 dugwells and 13 piezometers in the Buldhana district, four times a year i.e. in January, May (Premonsoon), August and November (Postmonsoon). Apart from this, under NAQUIM study 153 KOW were established and monitored during the year 2018-19. Also, additional 69 well-inventory done under Panchayat level survey in four blocks (Sindhkhed Raja urban -19 well, Saokhed Tejan -7 well, Madani-7 well, Hiware Sable- 6 Well, Dongaon-14 and Aanjani Bk-16 well). These data has been used for preparation of depth to water level maps of the district & panchayat level. Pre-monsoon and post monsoon water levels along with fluctuation during 2018 and long-term water level trends (2009-2018) is presented in **Annexure-V**.

Depth to Water Level – Pre-monsoon (May-2018)

The depth to water levels in Buldhana district during May 2018 range between 3.7 (Sindhkhed Raja) and 24.9 (Dighi, Nadura Block) m bgl. Depth to water levels during premonsoon shows water levels within 10-20 m bgl are observed in almost entire area. The water level > 20 mbgl is observed in Nandura and Sangrampur Block of Alluvium region. The premonsoon depth to water level map is given in **Fig.3.1**.

Depth to Water Level – Post monsoon (Nov-2018)

The depth to water levels in Buldhana district during Nov 2018 range between 2.5 (Sailani, Buldhana Block) and 23.4 (Kalkheda, Shegaon Block) m bgl. Water level ranges between 10-20 m also covers considerable part of Buldhana, Deulgaon Raja, Shegaon, Sangrampur, Lonar Block. Water level less than 10 mbgl observed in Chikhli Block whereas deeper water level in more than 20 m observed in scattered patch in Motala, Buldhana Block. Deepest Water level observed in southern part of Nandura Block. Spatial variation in post monsoon depth to water levels area shown in **Fig. 3.2**.

3.2 Depth to water level (Aquifer-II / Deeper Aquifer)

Premonsoon Depth to Water Level (May-2018)

In Aquifer-II (Deeper Aquifer), the pre-monsoon depth to water levels, in Buldhana District during May 2018, range from 6.3 (Janefal, Ambad block) to 25.19 mbgl (Sonala new, Buldhana block). The depth to water level less than 20 mbgl is observed only in isolated parts of Mehkar and Khamgaon blocks. The major parts of the district show depth to water level between 20 and 30 mbgl. The deeper water level between 30 and 50 mbgl are observed in Motala, Sindhkhed Raja, Deulgao Raja and Sangrampur blocks. The deepest water level (>50 mbgl) has been observed in isolated part of Buldhana and Nadura block of the district. This may be due to overexploitation of ground water. The premonsoon depth to water level for Aquifer -II is given in **Fig. 3.3**.

Postmonsoon Depth to Water Level (Nov.-2018)

In Aquifer-II, the post monsoon depth to water levels in Buldhana District during Nov. 2018 range between 4.8 (Atali, Khamgaon block) and 18.1 mbgl (Dindola Bk Pz, Deulgaon Raja block). Depth to water level less than 20 m bgl has been observed in the small isolated patches in Chikhali and Mehkar blocks. The major part of the district shows deeper water levels ranging between 20 and 40 mbgl. The deepest water level of more than 40 mbgl is observed in the Nadura blocks. The post monsoon depth to water level for Aquifer –II is given in **Fig. 3.4**.

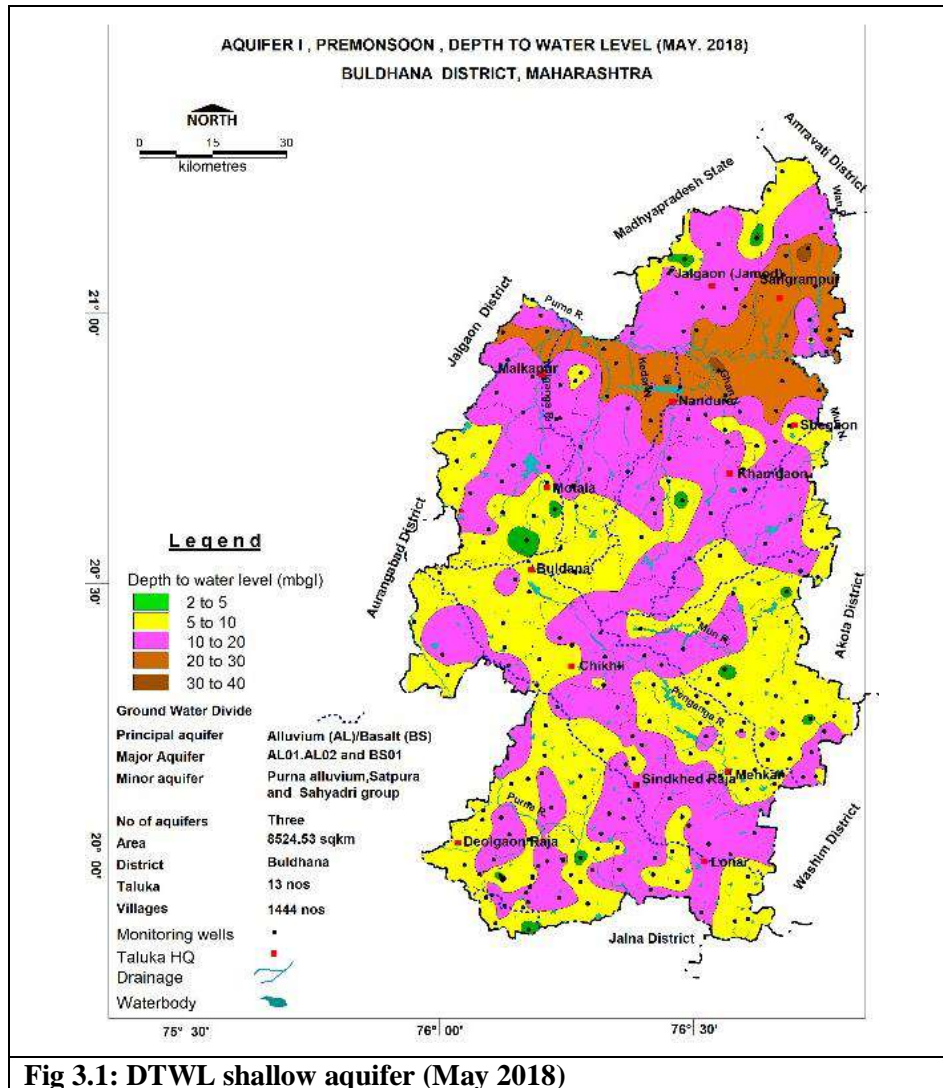


Fig 3.1: DTWL shallow aquifer (May 2018)

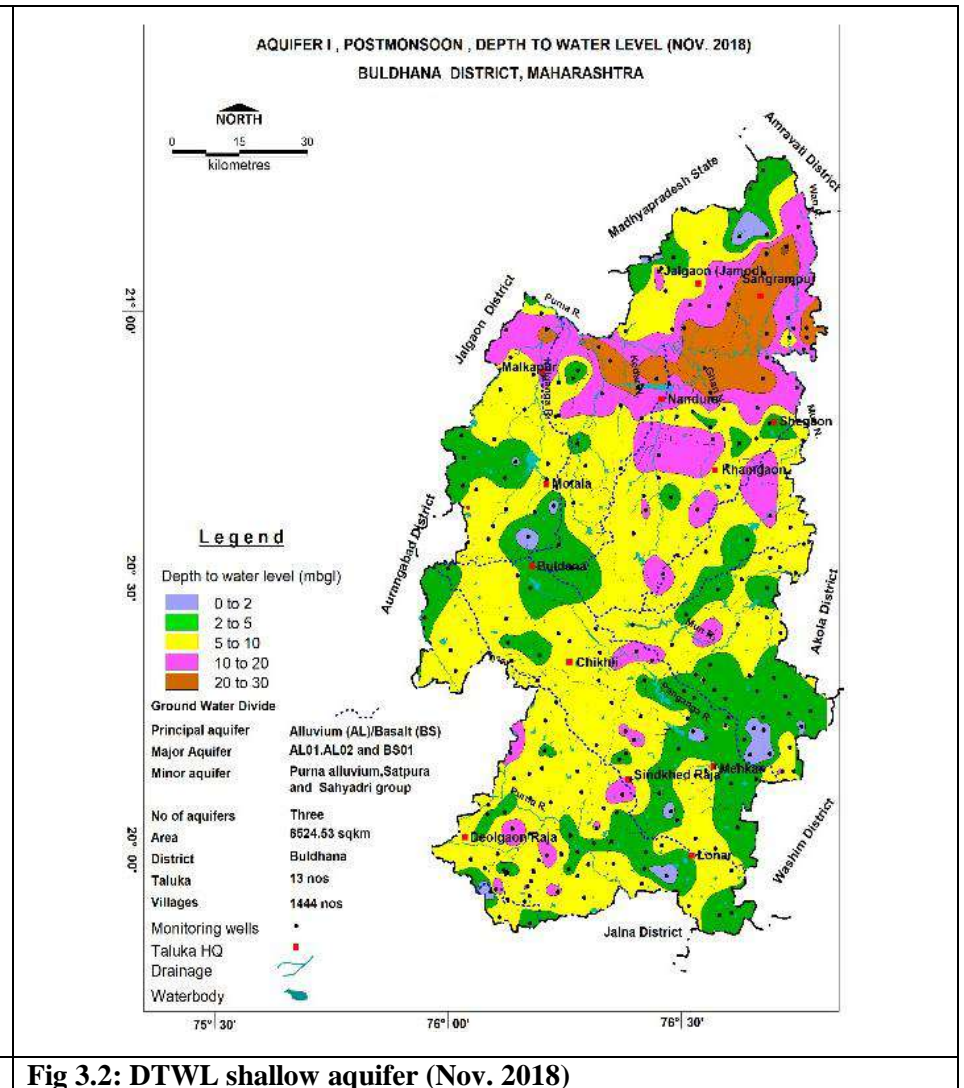


Fig 3.2: DTWL shallow aquifer (Nov. 2018)

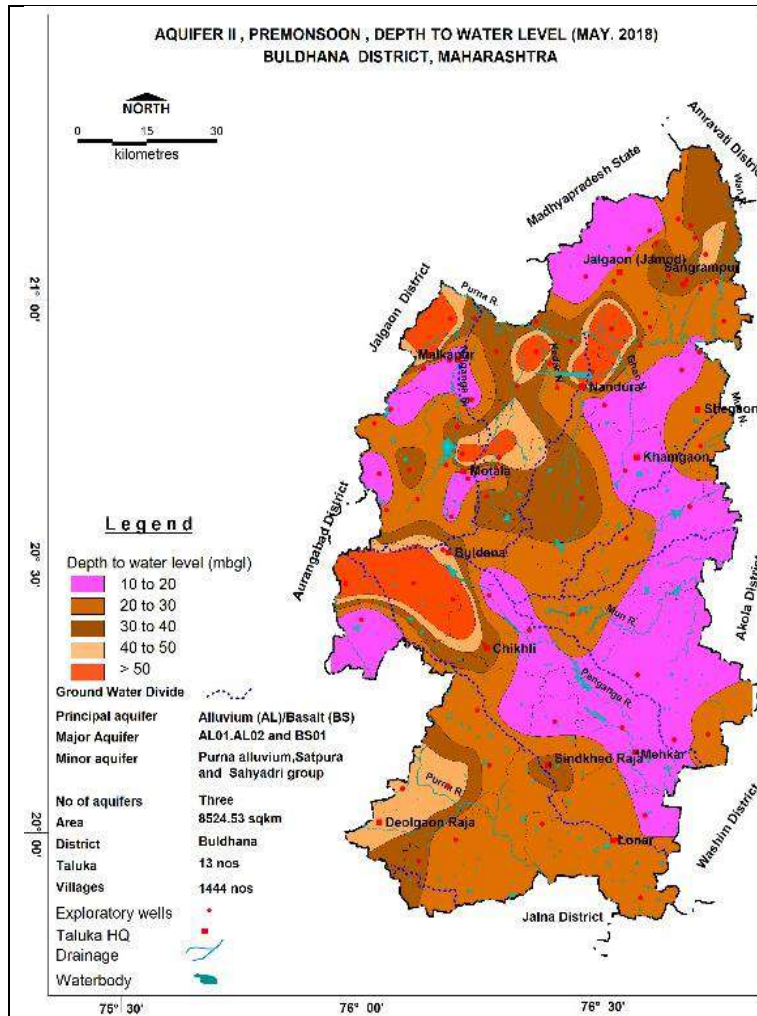


Fig 3.3: DTWL deeper aquifer (May 2018)

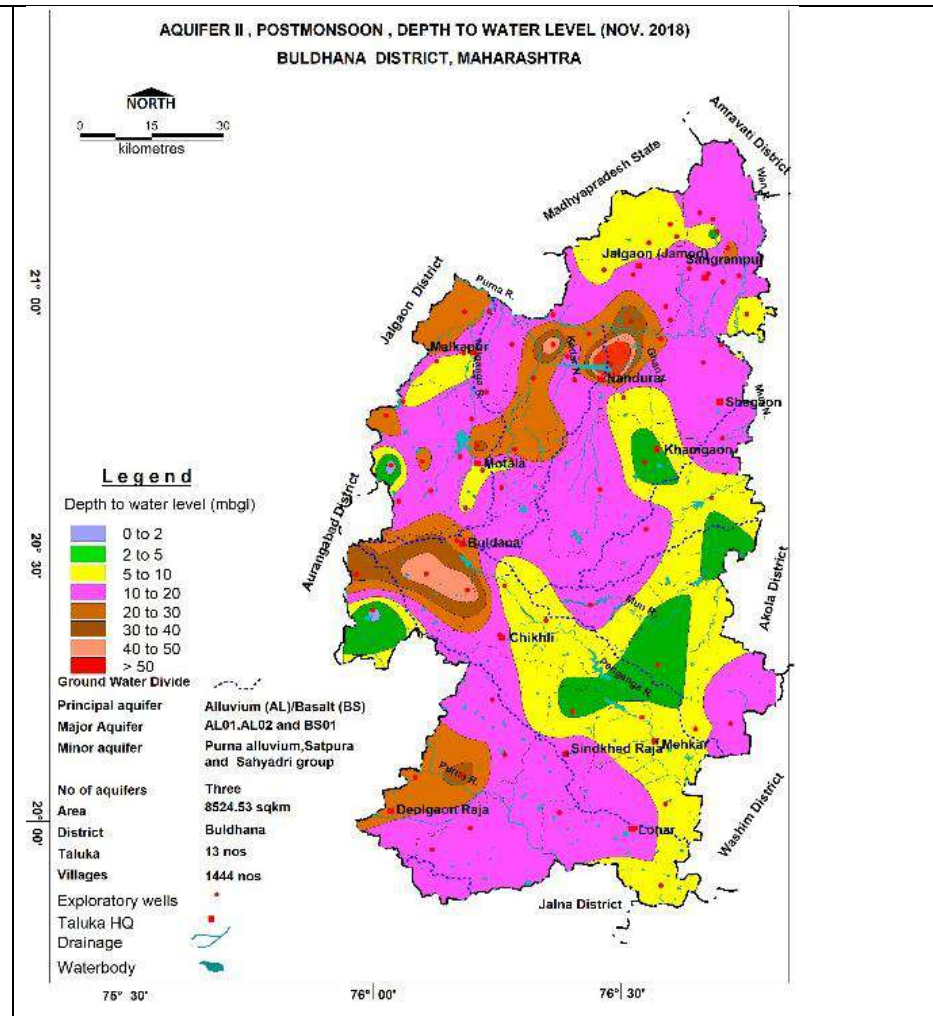
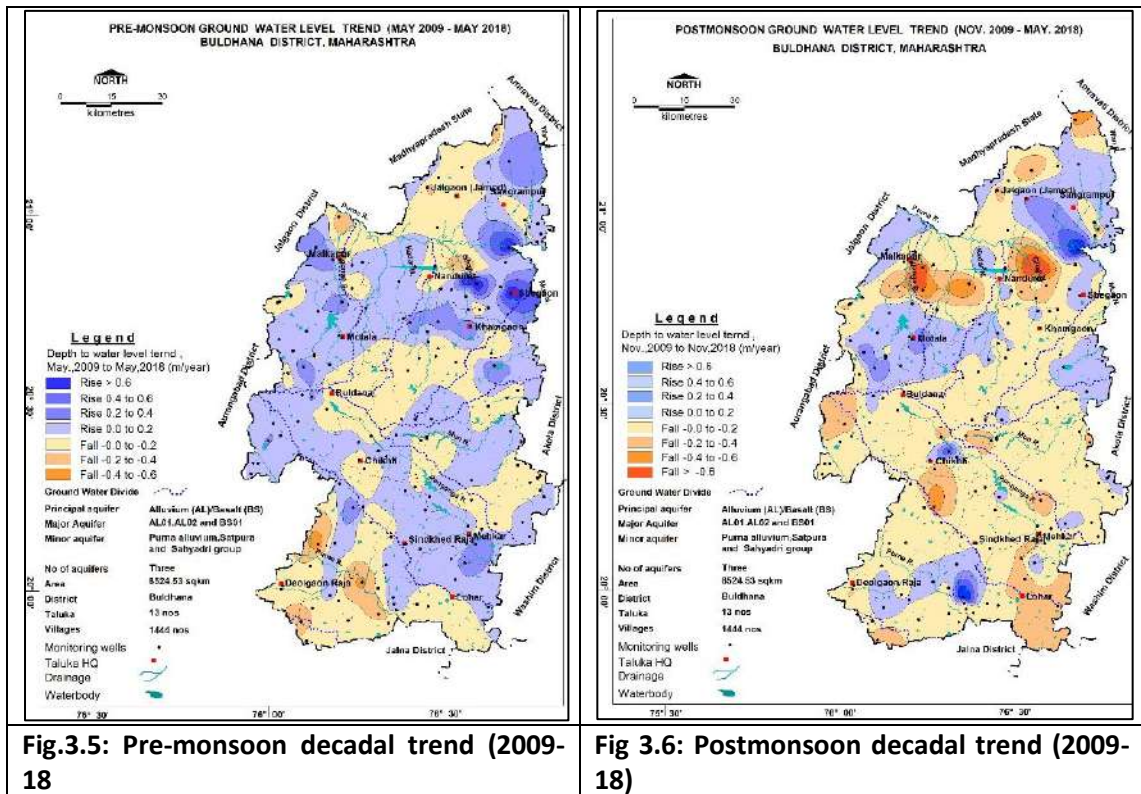


Fig 3.4: DTWL deeper aquifer (Nov. 2018)

3.3 Water Level Trend (2009-2018)

During pre-monsoon, rise in water level trend has been recorded at 67 stations and ranges from 0.006 (Karwand, Chikhali block) to 0.6 m/year (Mendgaon, Deulgaon Raja block) while falling trend was observed in 90 stations varying from 0.0001 (Tandulwadi, Khamgaon block) to 0.8905 m/year (Nimbi, Shegaon block). During pre-monsoon, declining water level trend has been observed in about 2666.98 sq km area covering major part of Buldhana and Deulgaon Raja, Jalgaon Jamod and isolated parts of almost all blocks. Decline more than 0.2 m is observed in 362 sq km area covering central part of Deulgaon raja, sindhkhed Raja, Nandura, Malkapur and Jalgaon jamod blocks (Fig. 3.5).

During post monsoon, rise in water level trend has been recorded at 105 stations and it ranges between 0.002 m/year (Rohana, Khamgaon block) to 0.96 (Belad, Malkapur block) while falling trend was observed in 52 stations varying from Negligible to (Borgaon Kakde, Chikhali block) to 0.8 m/year (Lonar, Lonar block) covering about 7000 sq km area. Decline of more than 0.2 m is observed in 920 sq. km covering parts of the Buldhana, Malkapur, Sindhkhed raja, and Deulgaon Raja blocks and (Fig 3.6).



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 activities, domestic requirements and industrial needs. The analysis of hydrographs show that the annual rising limbs in hydrographs indicate the natural recharge of groundwater regime due to monsoon rainfall, as the monsoon rainfall is the sole source of natural recharge to the ground water regime (Fig. 3.7 a to 3.7 l). However, continuous increase in the groundwater draft is indicated by the recessionary limb.

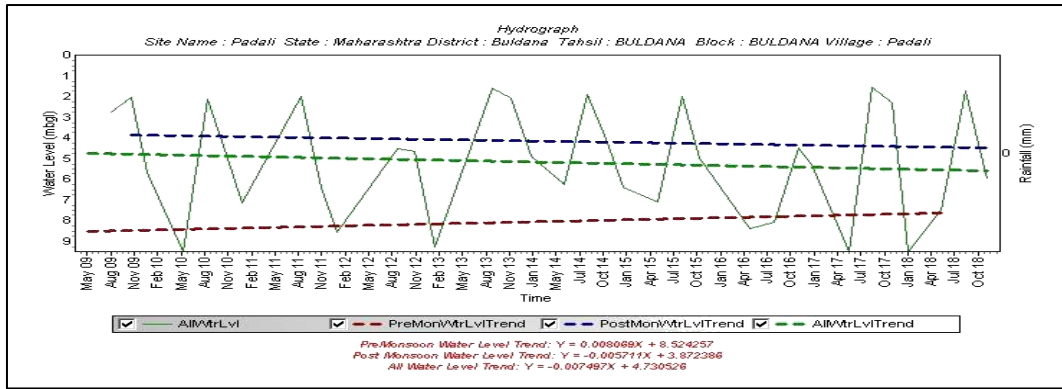


Fig 3.7a : Hydrograph (2009-18), Padli, Buldhana Block, Buldhana District

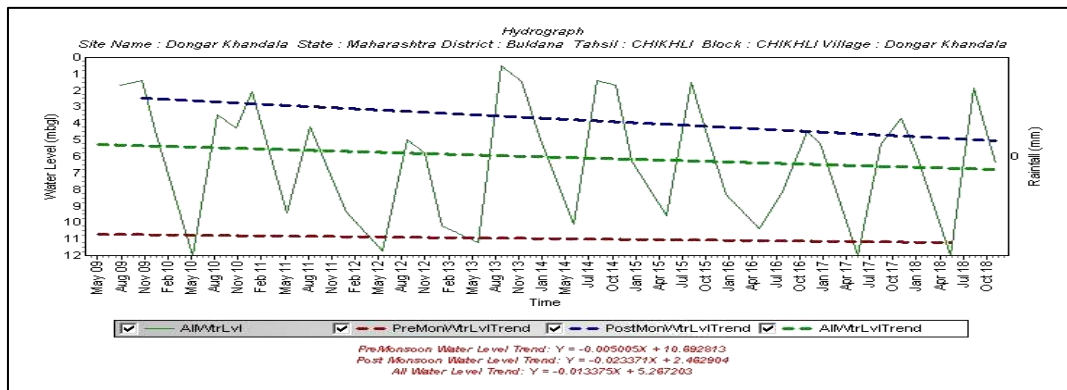


Fig 3.7b : Hydrograph (2009-18), Dongar Khandala, Chikhali Block, Buldhana District

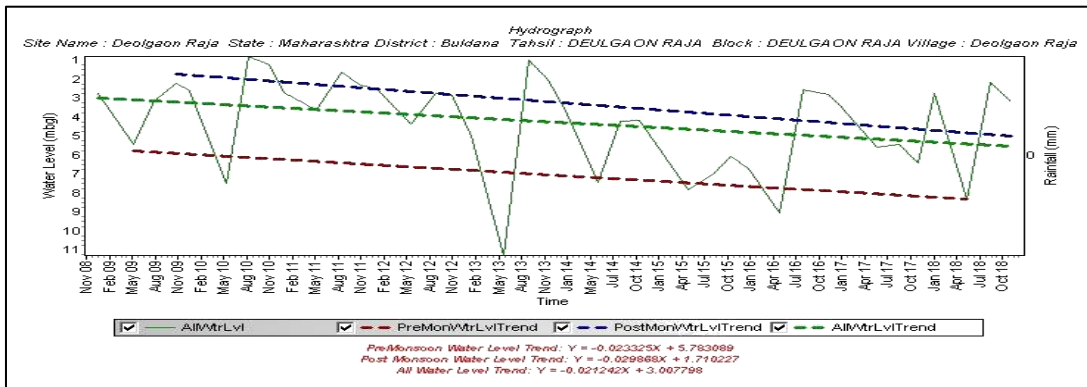


Fig 3.7c : Hydrograph (2009-18), Deulgaon Raja, Deulgaon Raja Block, Buldhana District

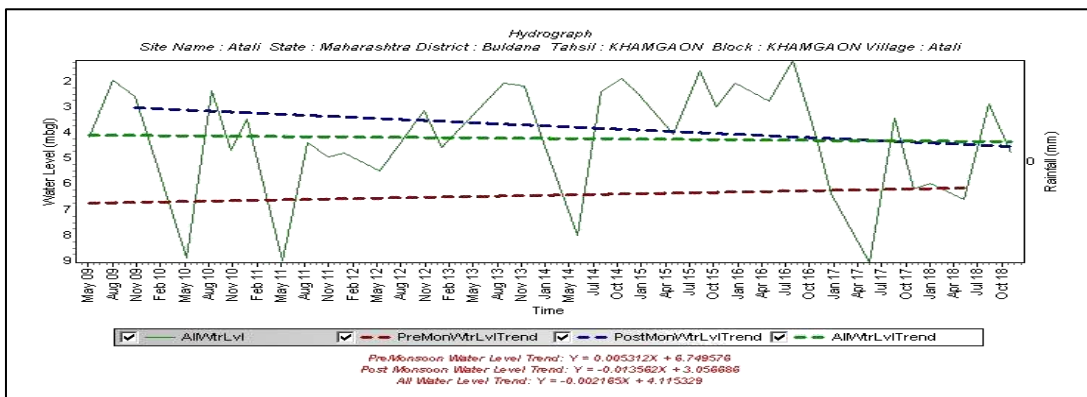


Fig 3.7d : Hydrograph (2009-18), Atali, Khamgaon Block, Buldhana District

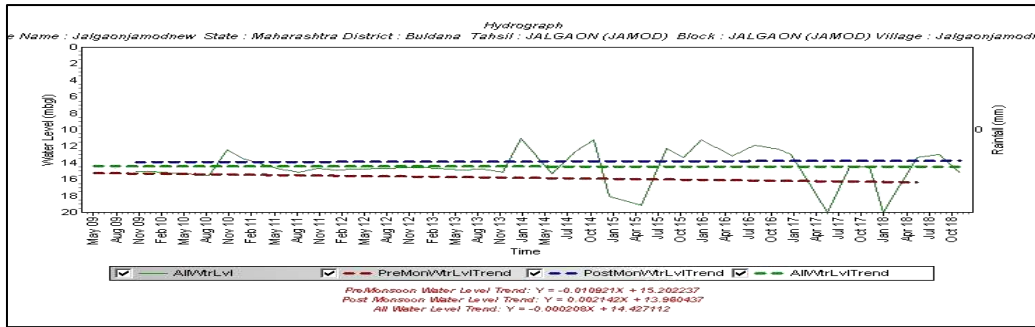


Fig 3.7e : Hydrograph (2009-18), Jalgaon Jamod, Jalgaon Jamod Block, Buldhana District

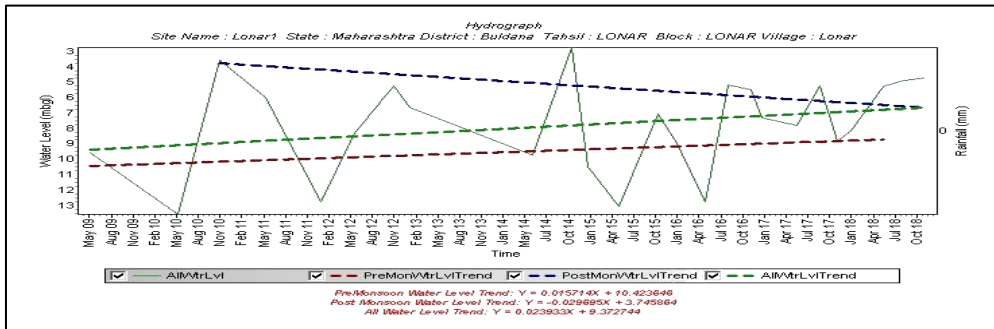


Fig 3.7f : Hydrograph (2009-18), Lonar, Lonar Block, Buldhana District

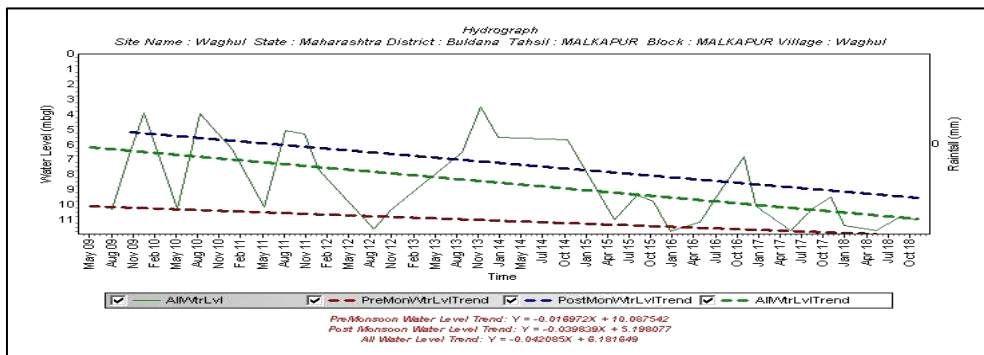


Fig 3.7g : Hydrograph (2009-18), Wagul, Malkapur Block, Buldhana District

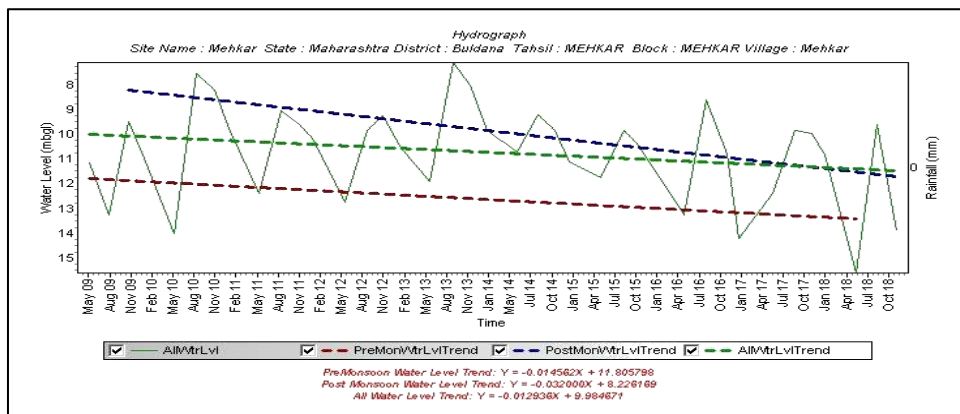


Fig 3.7h : Hydrograph (2009-18), Mehkar, Mehkar Block, Buldhana District

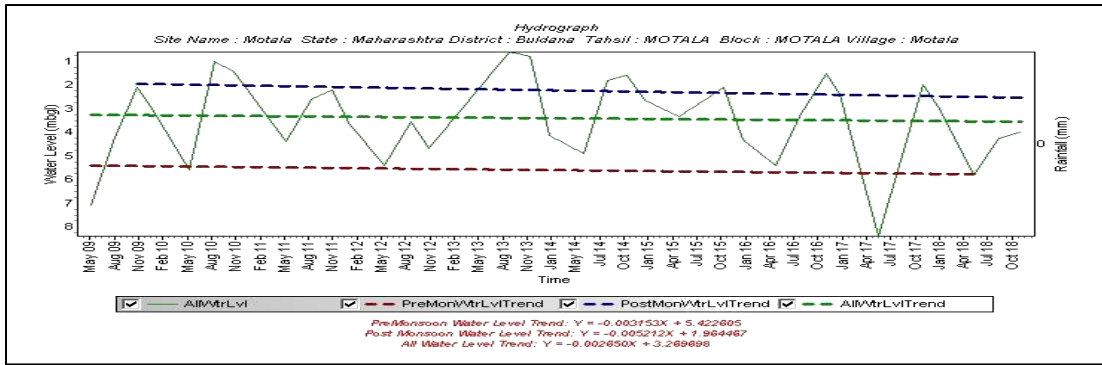


Fig 3.7i : Hydrograph (2009-18), Motala, Motala Block, Buldhana District

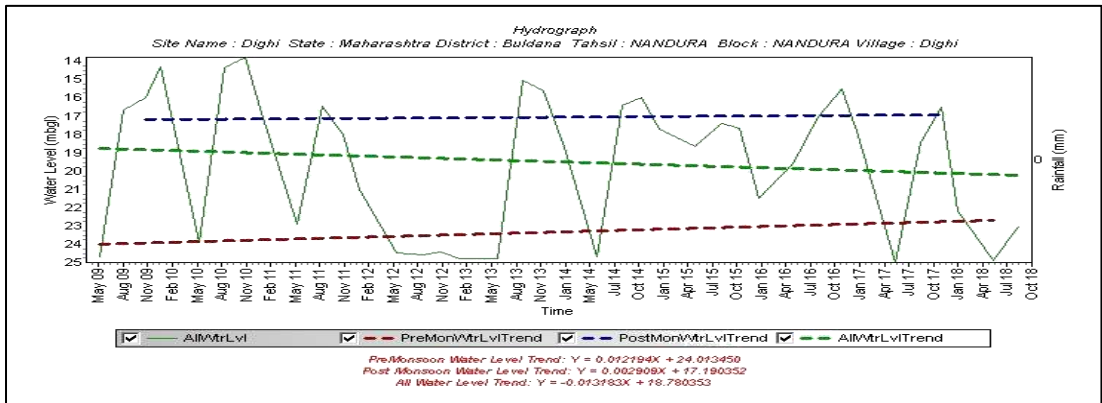


Fig 3.7j : Hydrograph (2009-18), Nadura, Nadura Block, Buldhana District

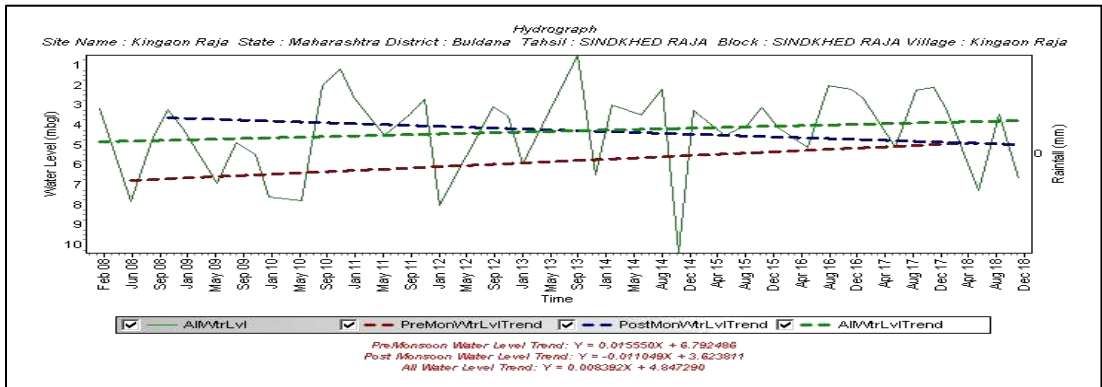


Fig 3.7k: Hydrograph(2009-18), Sindhkhed Raja, Sindhkhed Raja Block, Buldhana District

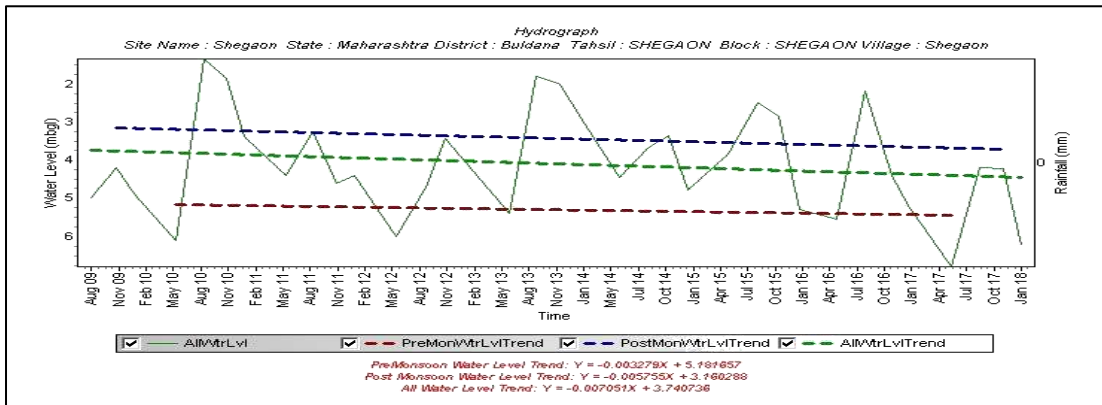


Fig 3.7 l : Hydrograph(2009-18), Shegaon, Shegaon Block, Buldhana District

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. To decipher the ground water quality scenario, 191 samples from aquifer-I / shallow aquifer and 121 from aquifer – II / deeper aquifers have been utilised including monitoring wells/exploratory wells, tubewells/borewells of CGWB and GSDA; data from earlier studies. The aquifer wise ranges of different chemical constituents present in ground water are given in **Table 4.1**. The details of chemical analysis are given in **Annexure VI and VII**.

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

Constituents	Aquifer-I / Shallow aquifer			Aquifer-II / Deeper aquifer		
	Min	Max	Avg	Min	Max	Avg
pH	6.8	9.1	7.4	6.8	9.4	7.8
EC	380	6970	1188	452	9280	1506.9
TDS	215	4182	670.4	135	10110	975
TH	86.7	1632	350.7	40	5350	400.5
Ca	3.2	290.2	74.35	3.2	1160	76.6
Mg	6	311	46.19	4	628	54.8
Na	6	396.9	88.85	10	1855	158.02
K	0.1	145	6.8	0.1	378	14.69
CO ₃	0.03	134.4	1.59	0.2	444	10.3
HCO ₃	11.9	1070.5	294.68	18	1074	251.4
Cl	1.2	966	114.4	5	5747	263.3
SO ₄	2	498	57.47	4	1848	103.1
NO ₃	3	420	49.39	2	580	55.32
F	0.06	3.94	0.68	0.01	11.2	1.18
Fe	0.03	0.5	0.036	0.1	70	1.6

4.1 Electrical Conductivity (EC)

Distribution of Electrical Conductivity in Aquifer-I / Shallow Aquifer:

The concentration of EC in shallow aquifer varies between 380 (Umapur, Jalgaon Jamod block) and 6970 $\mu\text{S}/\text{cm}$ (Hingna Kazi, Malkapur block). Out of 191 samples collected from dug wells, 5 samples are having EC in range of 3000 to 6970 $\mu\text{S}/\text{cm}$ has been observed in small patches of Malkapur nad Shegaon block. The ground water is potable in major block in the district. The distribution of electrical conductivity in aquifer – I / shallow aquifers is shown in **Fig. 4.1**.

Distribution of Electrical Conductivity in Aquifer-II / Deeper Aquifer:

The concentration of EC in deep aquifer varies between 452 (Nandura, Nandura block) and 9280 $\mu\text{S}/\text{cm}$ (Kalkheda, Shegaon block). Out of 121 samples collected from tube wells/bore wells, 8 samples are having EC in range of 3000 to 9280 $\mu\text{S}/\text{cm}$ has been observed in isolated patches in Lonar, Malkapur, Khamgaon and shegaon blocks. The ground water is potable in the the district, except high EC and Nitrate affected areas. The distribution of electrical conductivity in aquifer – II / deeper aquifers is shown in **Fig. 4.2**.

Table 4.2: Aquifer wise Electrical conductivity analytical data

S.No.	EC ($\mu\text{S}/\text{cm}$)	Shallow aquifer		Deeper Aquifer	
		No. of samples	% of samples	No. of samples	% of samples
1	< 250	0	0	0	0
2	>250-750	47	24.6	28	23.1
3	>750-2250	130	68	73	60.3

S.No.	EC ($\mu\text{S/cm}$)	Shallow aquifer		Deeper Aquifer	
		No. of samples	% of samples	No. of samples	% of samples
4	2250-3000	9	4.7	12	9.9
5	3000-5000	4	2	5	4.1
6	>5000	1	0.5	3	2.4
Total samples		191	100	121	100

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. As per BIS (2012) the desirable limit is 45 mg/l. In aquifer – I / shallow aquifer, nitrate concentration varies between 3 to 420 mg/l. Out of 191 samples 58 water samples show the nitrate concentrations exceeding the desirable limit of 45 mg/l (**Fig. 4.1**). The high concentration of Nitrate may be due to domestic waste and sewage in the urban and rural parts of district. In aquifer – II / deeper aquifer, nitrate concentration varies between BDL to 580 mg/l. Out of 121 samples analyzed 39 water samples show nitrate concentration exceeding the desirable limit of 45 mg/l (**Fig. 4.2**). 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.

4.3 Fluoride:

In aquifer – I / shallow aquifer, concentration of fluoride ranges from 0.06 to 3.94 mg/l. out of 191 samples were analyzed, 11 samples show fluoride concentration more than 1.5 mg/l. The highest concentration of fluoride is found in Esoli village, Chikhali block (3.94 mg/l). In aquifer – II / deeper Aquifer, concentration of fluoride ranges from 0.01 to 11.2 mg/l. Out of 121 samples analyzed, 17 samples show fluoride concentration more than 1.5 mg/l. The highest concentration of fluoride is found in Singaon Jahagir village, Deulgaon Raja Block (11.2 mg/l), it may due to the lithological reason only. Aquifer wise nitrate & Fluoride concentration is given in **Table 4.3**.

Table 4.3: Aquifer wise Nitrate and Fluoride concentration

Aquifer	$\text{No}_3 > 45 \text{ mg/l}$		Fluoride $>1 \text{ mg/l}$	
	Total Samples	No. % of samples	Total Samples	No. % of samples
Shallow Aquifer	191	58 / 30.36%	191	11 / 5.75%
Deeper Aquifer	121	39 / 32.23%	121	17 / 14.04%

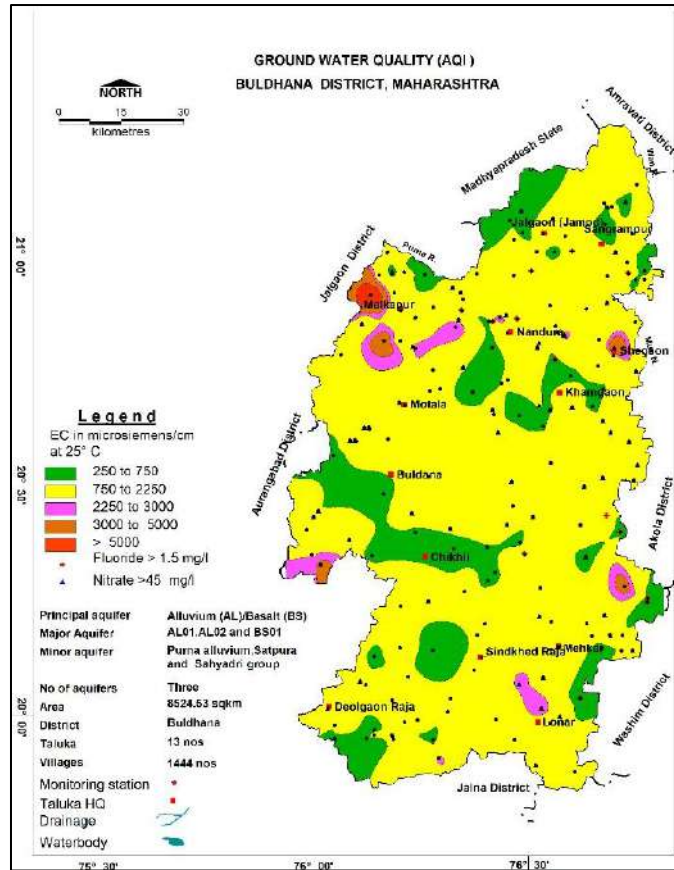


Fig. 4.1: Ground water quality, Aquifer-I / Shallow aquifer

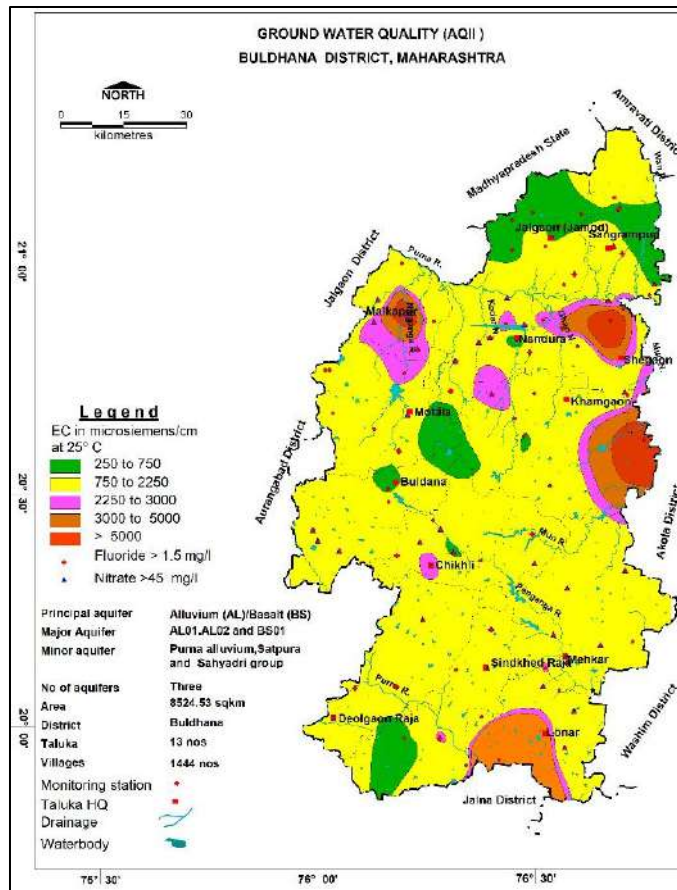


Fig. 4.2: Ground water quality, Aquifer-II / Deeper aquifer

4.4 Suitability of Ground Water for Drinking Purpose

In shallow aquifer, 59.2 % of samples have TDS concentration above the Desirable limit (DL) but below the MPL. The water from such area is not fit for drinking purpose if directly consumed without treatment. It is also seen that about 1 to 30.4 % samples are beyond the maximum permissible limit for the parameters like TH, Ca, Mg, SO₄ and NO₃ indicating that the water is not suitable for drinking purpose. Concentration of Chemical constituents in shallow Aquifer is given in **Table 4.4**.

In Deeper aquifer, 5.8 % samples are having TDS more than maximum permissible limit (MPL) and 64.5 % of samples have TDS concentration above the Desirable limit (DL) but below the MPL. The water from such area is not fit for drinking purpose if directly consumed without treatment. It is also seen that about 2.5 to 32.2 % samples are beyond the maximum permissible limit for the parameters like TDS, TH, Ca, Mg, SO₄, F and NO₃, indicating that the water is not suitable for drinking purpose. Concentration of Chemical constituents in Deeper Aquifer is given in **Table 4.5**.

Table 4.4: Concentration of Chemical constituents in aquifer-I/shallow Aquifer

Parameter	Drinking water Standards (IS-10500-2012)		Total no of ground water samples	Aquifer-I/Shallow aquifer					
	DL	MPL		Samples (<DL)		Samples (DL-MPL)		Samples (>MPL)	
				No	%	No	%	No	%
pH	6.5-8.5	-	191	4	2.1	185	96.9	2	1.0
TDS	500	2000	191	75	39.3	113	59.2	3	1.6
TH	300	600	191	157	82.2	17	8.9	17	8.9
Ca (mg/L)	75	200	191	110	57.6	76	39.8	5	2.6
Mg (mg/L)	30	100	191	72	37.7	109	57.1	10	5.2
Cl (mg/L)	250	1000	191	172	90.1	19	9.9	0	0.0
SO ₄ (mg/L)	200	400	191	186	97.4	3	1.6	2	1.0
NO ₃ (mg/L)	45	No relaxation	191	133	69.6	0	0.0	58	30.4
F (mg/L)	1	1.5	191	157	82.2	23	12.0	11	5.8

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

Table 4.5: Concentration of Chemical constituents in Deeper Aquifer

Parameter	Drinking water Standards (IS-10500-2012)		Total no of ground water samples	Aquifer-II/Deeper aquifer					
	DL	MPL		Samples (<DL)		Samples (DL-MPL)		Samples (>MPL)	
				No	%	No	%	No	%
pH	6.5-8.5	-	121	0	0.0	105	86.8	16	13.2
TDS	500	2000	121	36	29.8	78	64.5	7	5.8
TH	300	600	121	69	57.0	37	30.6	15	12.4
Ca (mg/L)	75	200	121	82	67.8	31	25.6	8	6.6
Mg (mg/L)	30	100	121	44	36.4	64	52.9	13	10.7
Cl (mg/L)	250	1000	121	82	67.8	36	29.8	3	2.5
SO ₄ (mg/L)	200	400	121	108	67.8	6	5.0	7	5.8
NO ₃ (mg/L)	45	No relaxation	121	82	67.8	0	0.0	39	32.2
F (mg/L)	1	1.5	121	78	64.5	26	21.5	17	14.0

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

4.5 Suitability of Ground Water for Irrigation

The quality of Irrigation water affects the productivity, yield and quality of the 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 assess the water

quality and its suitability for irrigation.

Electrical Conductivity (EC)

The amount of dissolved ions in the water is represented by the electrical conductivity. As discussed in 4.1 with reference to Fig 4.2 & 4.3, the classification of water for irrigation based on the EC values is given in **Table 4.6** and discussed as follows: -

Low Salinity Water (EC: 100-250 $\mu\text{S/cm}$): 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 $\mu\text{S/cm}$): 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 $\mu\text{S/cm}$): 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 $\mu\text{S/cm}$): 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 4.6: Classification of Ground water for Irrigation based on EC values

S. No	Water Quality Type	EC in $\mu\text{S/cm}$	Aquifer-I / shallow aquifer		Aquifer-II / Deeper Aquifer	
			No. of Samples	% of samples	No. of samples	% of samples
1	Low Salinity Water	< 250	0	0	0	0
2	Medium Salinity Water	>250-750	48	25.1	28	23.1
3	High Salinity Water	>750-2250	129	67.5	73	60.3
4	Very High Salinity Water	> 2250	14	7.3	20	16.5
Total			191	100	121	100

In aquifer-I/shallow aquifer as well as in aquifer-II/deeper aquifer, maximum numbers of samples fall under the category of medium to high to high salinity type of water. While the areas with very high salinity prevails (>2250 $\mu\text{S/cm}$), very high salt tolerant crops and with proper soil and crop management practices are recommended.

5.0 GROUND WATER RESOURCES

5.1 Ground Water Resources – Aquifer-I

Central Ground Water Board and Ground Water Survey and Development Agency (GSDA) have jointly estimated the ground water resources of Buldhana district based on GEC-97 methodology. Block wise ground water resources are given in **Table 5.1**, and graphical representations of the resources on the map are shown in **Figure-5.1**.

Ground Water Resources estimation was carried out for 7702.23 sq. km. area out of which 566.43 sq. km. is under command and 5830.15 sq. km. is non-command. About 266.28 sq. km. area has poor ground water quality area and that area is not considered for resource estimation. As per the estimation, the net annual ground water availability comes to be 834.37 MCM. The gross draft for all uses is estimated at 610.55 MCM with irrigation

sector being the major consumer having a draft of 578.76 MCM. The domestic and industrial water requirements are worked at 31.78 MCM. The net ground water availability for future irrigation is estimated at 245.55 MCM. The overall stage of ground water development for the district is 71.83 % .Block wise assessments indicate that all the blocks in the district fall under “Safe” category except deulgaon raja and Jalgaon blocks

Table 5.1 Ground water resources, Aquifer-I (Shallow aquifer), Buldhana district (2013)

Administrative Unit	Command / Non-Command / Total	Net Annual Ground Water Availability (ham)	Existing Gross Ground Water Draft for irrigation (ham)	Existing Gross Ground Water Draft for domestic and industrial water supply (ham)	Existing Gross Ground Water Draft for All uses (ham)	Provision for domestic and industrial requirement supply to 2025 (ham)	Net Ground Water Availability for future irrigation development (ham)	Stage of Ground Water Development% /Category
Buldhana	Command	844.89	1242.33	89.50	1331.84			
Buldhana	Non Command	7417.73	5473.33	348.67	5822.00			
Buldhana	Total	8262.62	6715.66	438.17	7153.83	750.56	831.78	86.58/ Safe
Chikhali	Command	553.19	651.79	58.74	710.53			
Chikhali	Non Command	11225.71	7572.70	407.79	7980.49			
Chikhali	Total	11778.90	8224.49	466.53	8691.03	929.00	2676.54	73.78/ Safe
Deulgaon Raja	Command	590.61	720.84	18.04	738.88			
Deulgaon Raja	Non Command	5501.43	3732.77	173.24	3906.00			
Deulgaon Raja	Total	6092.04	4453.61	191.28	4644.88	380.66	1344.21	76.25/ Safe
Jalgaon jamod	Command	182.51	109.65	25.04	134.69			
Jalgaon Jamod	Non Command	6093.46	6226.69	166.48	6393.17			
Jalgaon Jamod	Total	6275.98	6336.34	191.52	6527.87	269.54	861.64	104.01/ Over Exploited
Khamgaon	Command	2275.91	1671.74	108.45	1780.19			
Khamgaon	Non Command	7612.96	3855.84	303.09	4158.94			
Khamgaon	Total	9888.87	5527.59	411.54	5939.13	799.14	3496.75	60.06/ Safe
Lonar	Command	1272.74	1191.84	79.11	1270.94			
Lonar	Non Command	6774.37	3093.01	145.60	3238.62			
Lonar	Total	8047.11	4284.85	224.71	4509.56	443.31	3336.77	56.04/ Safe
Malakapur	Command	1020.21	572.83	67.38	640.21			
Malakapur	Non Command	3976.94	2507.89	125.98	2633.87			
Malakapur	Total	4997.15	3080.71	193.36	3274.08	380.29	1530.75	65.52/ Safe
Mehkar	Command	1686.45	1081.11	74.83	1155.95			
Mehkar	Non Command	9323.92	5320.72	312.13	5632.85			
Mehkar	Total	11010.38	6401.83	386.96	6788.80	789.48	3784.68	61.66/ Safe
Motala	Command	788.45	890.95	87.46	978.42			
Motala	Non Command	4580.31	3004.90	211.98	3216.88			
Motala	Total	5368.77	3895.86	299.45	4195.30	608.57	835.14	78.14/ Semi Critical
Nandura	Command	499.19	533.99	22.85	556.84			
Nandura	Non Command	4218.30	3076.26	140.73	3217.00			
Nandura	Total	4717.50	3610.25	163.58	3773.84	336.12	812.14	80.00/ Safe
Sangrampur	Command	730.86	378.92	27.35	406.27			
Sangrampur	Non Command	5034.59	4250.63	135.49	4386.12			
Sangrampur	Total	5765.45	4629.55	162.84	4792.39	259.89	912.37	83.12/ Safe
Shegaon	Command	147.61	109.67	9.53	119.20			
Shegaon	Non Command	3221.37	1347.04	149.15	1496.19			

Administrative Unit	Command / Non-Command / Total	Net Annual Ground Water Availability (ham)	Existing Gross Ground Water Draft for irrigation (ham)	Existing Gross Ground Water Draft for domestic and industrial water supply (ham)	Existing Gross Ground Water Draft for All uses (ham)	Provision for domestic and industrial requirement supply to 2025 (ham)	Net Ground Water Availability for future irrigation development (ham)	Stage of Ground Water Development% /Category
Shegaon	Total	3368.98	1456.71	158.68	1615.39	322.37	1612.02	47.95/ Safe
S'indkhed Raja	Command	733.99	696.04	49.40	745.44			
S'indkhed Raja	Non Command	8140.48	4965.23	227.91	5193.14			
S'indkhed Raja	Total	8874.47	5661.27	277.31	5938.58	572.96	2520.69	66.92/ Safe

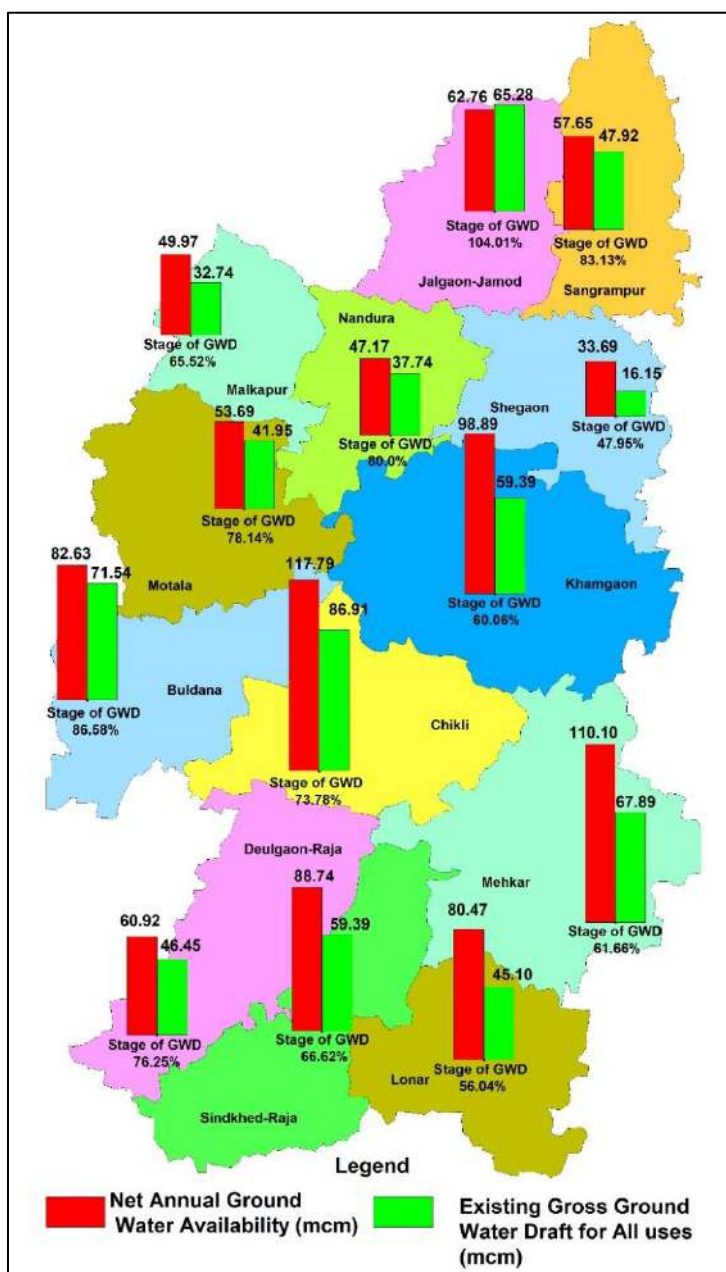


Fig 5.1: Ground Water Resources (2013), Buldhana district

5.2 Ground Water Resources – Aquifer-II and Aquifer-III

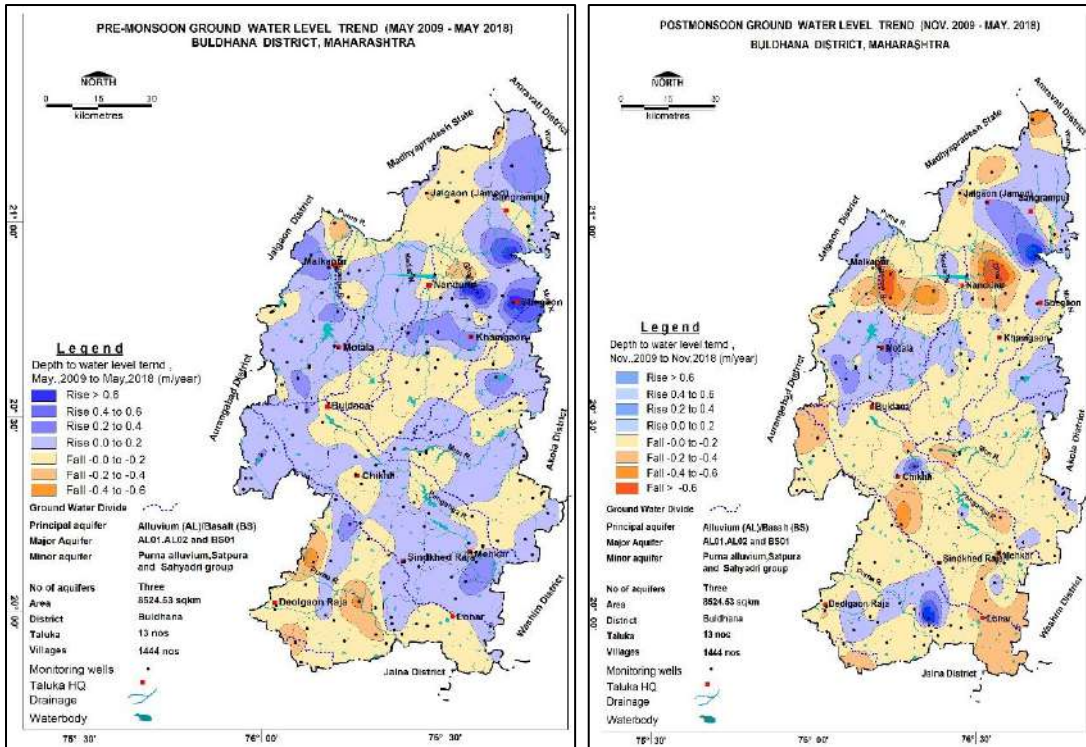
Based on ground water exploration data, the ground water resources of Aquifer-II in Basalt and Alluvium has been estimated as 64.20 mcm and 105.70 mcm respectively. The area covered by basalt aquifer is 8029.67 sq.km. and alluvium aquifer by 1572.10 sq. km. The resources of Aquifer-III for alluvium have been estimated as 129.28 mcm. The area covered is 1551.07 sq. km.

Table 5.2 Ground Water Resources of Aquifer II and Aquifer-III.

Taluka	Mean thickness (m)	Area (sq km)	Piezometer (macl)	SY	S	Resource above confining layer (mcm)	Resource in confining layer (mcm)	Total resource (mcm)
Aquifer II Resources (Basalt)								
Buldhana	0.75 to 2	804.95	15 to 36	0.002	0.00004	0.79	2	2.79
Chikhali	0.75 to 2	1153.13	21 to 22	0.002	0.00004	0.76	5.91	6.67
Deulgaon Raja	0.75 to 4.5	486.54	25 to 36	0.002	0.000036	0.61	2.49	3.10
Jalgaon Jamod	4.5 to 9	258.81	35 to 50	0.002	0.00095	2.54	3.22	5.76
Khamgaon	0.75 to 4.5	1202.8	21 to 35	0.002	0.000038	1.12	4.63	5.75
Lonar	0.75 to 2	714.95	25 to 35	0.002	0.000036	0.72	4.30	5.02
Malakapur	7 to 9	314.39	20 to 45	0.002	0.0001	0.26	5.55	5.81
Mehkar	0.75 to 4.5	1093.39	21 to 36	0.002	0.00013	1.66	4.67	6.33
Motala	0.75 to 10.5	743.71	21 to 36	0.002	0.00018	1.44	3.41	4.85
Nandura	3.5 to 11	190.89	21 to 45	0.002	0.00042	3.49	2.66	6.15
Sangrampur	9 to 11	157.25	20 to 45	0.002	0.0004	1.63	3.35	4.98
Shegaon	4.5 to 5.5	130.37	31 to 35	0.002	0.0004	1.41	1.35	2.76
Sindhkhed Raja	0.75 to 4.5	778.49	20 to 35	0.002	0.0002	1.64	2.59	4.23
TOTAL		8029.67				18.07	46.13	64.20
Aquifer II Resources (Alluvium)								
Jalgaon Jamod	2.5 to 35	353.79	45 to 65	0.005	0.00042	7.98	18.56	26.54
Malakapur	2.5 to 15	136.61	25 to 35	0.005	0.0003	0.13	5.07	5.20
Nandura	2.5 to 35	310.88	25 to 65	0.005	0.00022	4.12	22.22	26.34
Sangrampur	2.5 to 35	456.85	25 to 45	0.005	0.00042	7.84	25.76	33.60
Shegaon	2.5 to 15	313.97	20 to 45	0.005	0.00022	1.96	12.06	14.02
TOTAL		1572.10				22.03	83.67	105.70
Aquifer III Resources (Alluvium)								
Jalgaon Jamod	10 to 45	319.62	70	0.005	0.00003	0.67	16.28	16.95
Malakapur	10	138.61	25	0.005	0.00042	1.47	6.93	8.40
Sangrampur	10 to 45	994.04	45 to 55	0.005	0.00042	22.06	62.79	84.85
Shegaon	25 to 55	98.80	35	0.005	0.00042	1.47	17.61	19.08
TOTAL		1551.07				25.67	103.61	129.28

5.2.1 Declining Water Levels

The ground water exploitation has resulted in decline of water levels over the period of time. In premonsoon season, decline more than 0.20 m/year has been observed in 362 sq km, i.e., 3.78 % area covering parts of Deulgaon Raja, Jalgaon Jamod, Malkapur and Sindhkhed Raja blocks. In post monsoon season, decline of more than 0.20 m/year has been observed in 920 sq km, i.e., 9.62 % covering parts of Malkapur, Lonar, Nandura, Jalgaon Jamod, Shegaon, Deulgaon Raja and Sangrampur Blocks.



Premonsoon Fall of >0.2m in 362 Sq km area.

Postmonsoon Fall of >0.2m in 920 Sq km area

5.2.2 Rainfall and Droughts

Based on the short term rainfall analysis from 1998 to 2018 it is observed that Moderate drought was observed in three year .Based on the long term rainfall analysis from 1957 to 2017 it is observed that all the blocks has experienced declining rainfall trend. Acute droughts have been observed in Shegaon taluka in two year. Severe droughts have been observed in Malkapur and Mehkar blocks from 1 to 3 years during 1917 to 2018 .All the blocks experienced Moderate droughts 2 to 22 times during last 18 years period. Malkapur experience 22 times Drought during 1901 to 201. Thus, Buldhana district is facing frequent droughts since long which is ultimately responsible for less ground water recharge and non-availability of surface & ground water for irrigation.

5.2.3 Over-exploitation

Over exploitation has been observed in Buldhana district over the period of time. The ground water draft has increased from 394 mcm (2004) to 678 mcm (2013). An increased in ground water draft by 171%. As compared to ground water availability, which is 670 MCM (2004) to 944 MCM (2013) with an increase of 141%.

6.0 GROUND WATER MANAGEMENT PLAN

The aquifer 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 and change in cropping pattern.

6.1 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 6.1** gives the block wise volume available for the recharge.

Table 6.1: Area feasible and volume available for Artificial Recharge

Block	Geographical Area (sq. km.)	Area feasible for recharge (sq. km.)	Unsaturated Volume (MCM)
BULDHANA	798.3675	607.48	325.57
CHIKHLI	1137.9044	935.81	410.55
DEULGAON RAJA	476.4554	448.66	607.13
JALGAON JAMOD	617.76	542.18	516
KHAMGAON	1204.7547	960.87	1319.45
LONAR	672.2608	579.12	487.36
MALKAPUR	465.2192	444.72	628.63
MEHKAR	1131.2206	902.85	1308
MOTALA	759.6277	560.18	869.07
NANDURA	540.9396	536.25	381
SANGRAMPUR	575.21	516.27	314
SHEGAON	509.79	509.79	261
SINDKHED RAJA	781.1977	662.97	28.23
TOTAL	9567.27	8524.5	7456

The total unsaturated volume available for artificial recharge is 7456.46 MCM and it ranges from 28.23 MCM in Sindkhed Raja block to 1319.45 MCM in Khamgaon block. The available surplus runoff can be utilized for artificial recharge through construction of percolation tanks and Check dams at suitable sites.

Thus, after taking into consideration all the factors, 56.16 MCM of surplus water can be utilised for recharge, which is given in **Table 6.2**. This surplus water can be utilized for constructing 262 percolation tanks, 482 check dams and 158 Recharge Shaft 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 55.97 MCM/year. The tentative locations of these structures are given in **Fig. 6.1** and details also given in **Annexure VIII and IX**.

The rainwater harvesting in urban areas can be adopted in 25% of the household with 50 sq. km roof area. A total of 4.95 MCM potential can be generated by taking 80% runoff coefficient. However, it is economically not viable & hence, not recommended.

Table 6.2: Proposed Artificial Recharge Structures

Block	Geographical Area (sq. km.)	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 recharge d @ 75 % efficiency (MCM)
					PT	CD	RS	PT	CD	RS	
BULDHANA	798.3675	607.48	325.57	2.46	9	22		1.35	0.495		1.85
CHIKHLI	1137.9044	935.81	410.55	3.09	11	30		1.65	0.675		2.33
DEULGAON RAJA	476.4554	448.66	607.13	4.579	16	46		2.4	1.035		3.44
JALGAON JAMOD	617.76	542.18	516	3.89	35	50	23	5.25	1.125	0.5175	6.89
KHAMGAON	1204.7547	960.87	1319.45	9.9	30	48		4.5	1.08		5.58
LONAR	672.2608	579.12	487.36	3.675	13	36		1.95	0.81		2.76
MALKAPUR	465.2192	444.72	628.63	4.74	28	24	14	4.2	0.54	0.315	5.06
MEHKAR	1131.2206	902.85	1308.47	9.868	20	60		4.2	1.35		5.55
MOTALA	759.6277	560.18	869.07	6.554	23	65		3.45	1.4625		4.91
NANDURA	540.9396	536.25	381	2.875	28	38	20	4.2	0.855	0.45	5.51
SANGRAMPUR	575.21	516.27	314	2.37	23	35	60	3.45	0.7875	2.7	6.94
SHEGAON	509.79	509.79	261	1.97	18	21	41	2.7	0.4725	1.845	5.02
SINDKHED RAJA	781.1977	662.97	28.23	0.213	0	7		0	0.1575		0.16
TOTAL	9567.27	8524.53	7456.46	56.28	262	482	158	39.3	10.84	5.827	55.52

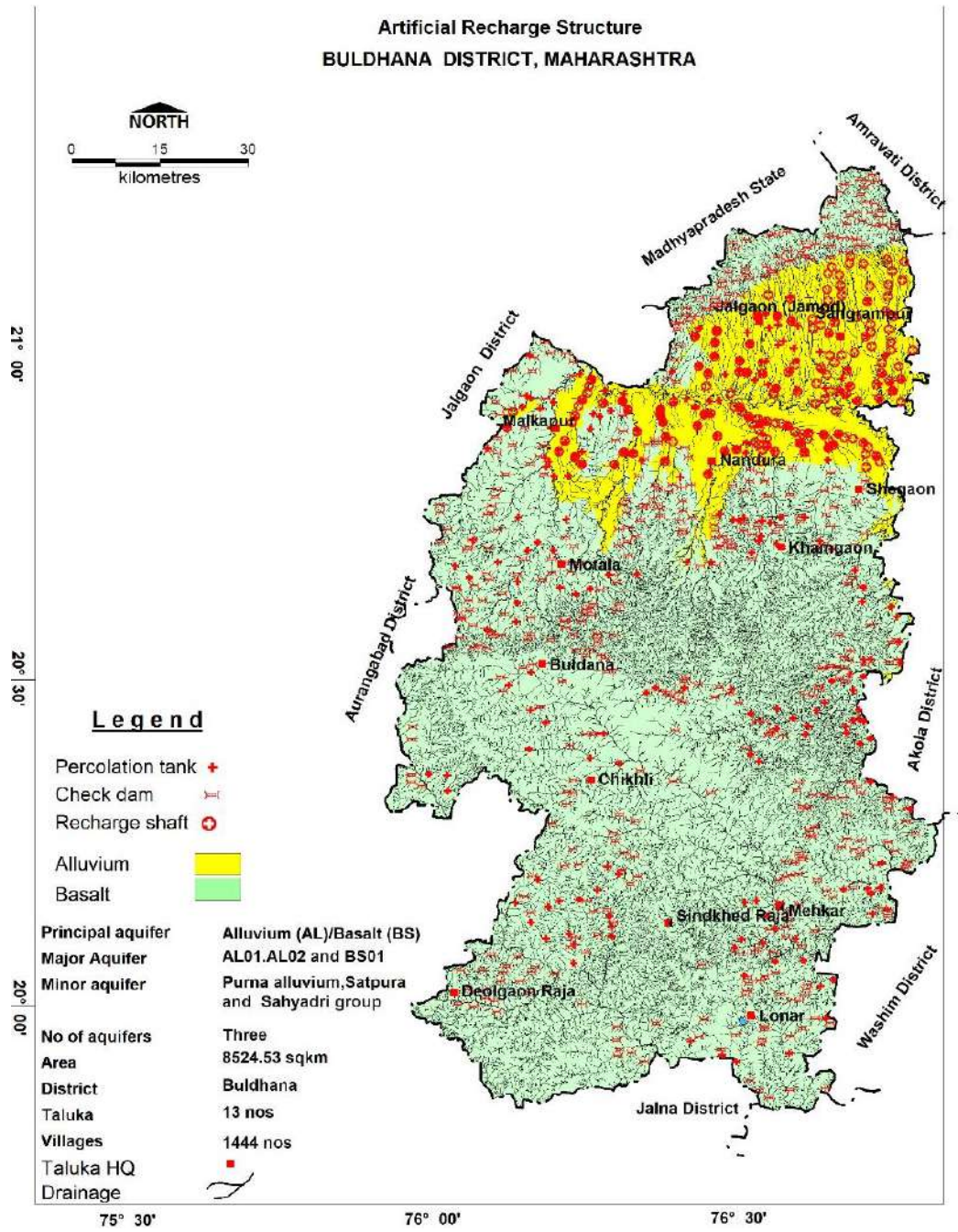


Fig. 6.1: Location of Proposed Artificial Recharge structures

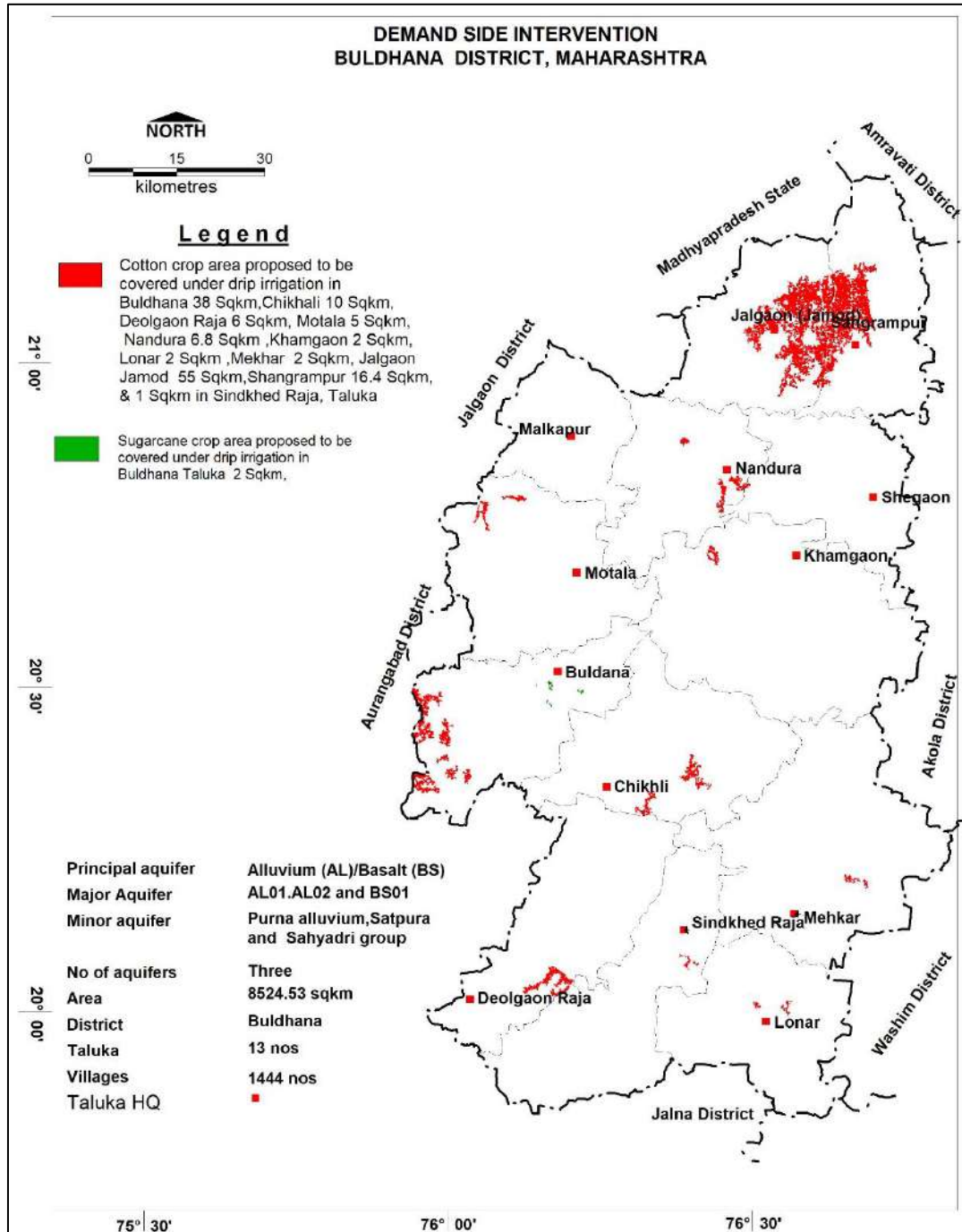


Fig. 6.2: Proposed Demand side intervention, Buldhana district

6.2 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 or change in cropping pattern or both are required to save water. **Fig 6.2** depicts the proposed demand side interventions in the area. The micro-irrigation techniques are proposed to be adopted in 144.2 Sq. Km cotton crop area in entire district by saving a total of 43.8 MCM and 2 sq. km sugarcane area by saving 1.14 MCM as given **Table 6.3**. No change in cropping patterns is proposed in any of the blocks.

Table 6.3: Demand side interventions proposed

Block	MICRO IRRIGATION TECHNIQUES				CROPPING PATTERN CHANGE	
	cotton cropped Area proposed (Sq. Km.)	Volume of Water saved (MCM)	Sugarcane cropped Area proposed (Sq. Km.)	Volume of Water saved (MCM)	Area under Water Intensive crops (Sq. Km.)	Volume of Water saved by change in cropping pattern (MCM)
BULDHANA	38	11.55	2	1.14	Nil	Nil
CHIKHLI	10	3.05	Nil	Nil	Nil	Nil
DEULGAON RAJA	6	1.82	Nil	Nil	Nil	Nil
JALGAON JAMOD	55	16.72	Nil	Nil	Nil	Nil
KHAMGAON	2	0.60	Nil	Nil	Nil	Nil
LONAR	2	0.60	Nil	Nil	Nil	Nil
MEHKAR	2	0.60	Nil	Nil	Nil	Nil
MOTALA	5	1.52	Nil	Nil	Nil	Nil
NANDUR A	6.8	2.06	Nil	Nil	Nil	Nil
SANGRAMPUR	16.4	4.98	Nil	Nil	Nil	Nil
SINDKHE D RAJA	1	0.30	Nil	Nil	Nil	Nil
TOTAL	144.2	43.8	2	1.14	Nil	Nil

6.3 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 blocks as given in the **Table 6.4**.

Table 6.4: Expected benefits after management options

Block	Net Ground water availability (MCM)	Total ground water draft (MCM)	Current Stage of GW Development (%) [(3/2)*100]	Water Recharged by Supply side intervention (MCM)	Ground water resources after supply side management (MCM) (2+5)	Stage of Development after surplus side interventions (%) [(3/6)*100]	Water saving by demand side interventions (MCM)	Ground water Draft after demand side management (MCM) (3-8)	Expected Stage of GW Development after demand side interventions (%) [(9/6)*100]
1	2	3	4	5	6	7	8	9	10
BULDHANA	82.63	71.54	86.58	1.85	84.47	84.69	12.69	58.85	69.67
CHIKHLI	117.79	86.91	73.78	2.32	120.21	72.35	3.05	83.86	69.82
DEULGAON RAJA	69.92	46.45	76.25	3.43	64.36	72.17	1.82	44.63	69.34

Block	Net Ground water availability (MCM)	Total ground water draft (MCM)	Current Stage of GW Development (%) [(3/2)*100]	Water Recharged by Supply side intervention (MCM)	Ground water resources after supply side management (MCM) (2+5)	Stage of Development after supply side interventions (%) [(3/6)*100]	Water saving by demand side interventions (MCM)	Ground water Draft after demand side management (MCM) (3-8)	Expected Stage of GW Development after demand side interventions (%) [(9/6)*100]
JALGAON JAMOD	62.76	65.28	104.01	6.89	69.65	92.72 %	16.72	48.56	69.72
KHAMGAON	98.89	59.39	60.06	5.58	104.47	56.84	0.60	58.79	56.27
LONAR	80.47	45.1	56.04	2.76	83.23	54.18	0.60	44.5	53.46
MALKAPUR	49.97	32.74	65.52	5.05	55.02	59.50	0	32.74	59.50
MEHKAR	110.1	67.89	61.66	5.5	115.65	58.70	0.60	67.29	58.18
MOTALA	53.69	41.95	78.14	4.91	58.60	71.58	1.52	40.43	68.99
NANDURA	47.18	37.74	80	5.05	52.23	72.25	2.06	35.68	68.29
SANGRAMPUR	57.65	47.92	83.12	6.93	64.58	74.19	4.98	42.94	66.47
SHEGAON	33.69	16.15	47.95	5.01	38.70	41.72	0	16.15	41.72
SINDKHED RAJA	88.74	59.39	66.92	0.15	88.89	66.80	0.30	59.09	66.47
Total	944.48	678.44	71.83	55.52	1000	67.84	43.8	633.47	63.35

6.4 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 66.53 MCM volume of ground water generated can bring 102.36 sq km additional area under assured ground water irrigation with average crop water requirement of 0.65 m by constructing 482 check dams, 254 percolation tanks and 158 Recharge Shafts. Map showing additional area proposed to be brought under assured ground water irrigation is shown in Fig 6.3 and the block wise details are given in Table 6.5.

Table 6.5: Block wise additional area under assured GW Irrigation

Block	Expected stage of Development %	Balance GWR available for GW Development after STAGE OF GWD is brought to 70 % (MCM)	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)
BULDHANA	69.67	0.28	0.44
CHIKHLI	69.82	0.21	0.32
DEULGAON RAJA	69.34	0.42	0.65
JALGAON JAMOD	69.72	0.2	0.3
KHAMGAON	56.27	14.34	22.02
LONAR	53.46	13.76	21.18
MALKAPUR	59.50	5.77	8.88
MEHKAR	58.18	13.67	21.03
MOTALA	68.99	0.59	0.91
NANDURA	68.29	0.89	1.37
SANGRAMPUR	66.47	2.27	3.5
SHEGAON	41.72	10.94	16.85
SINDKHED RAJA	66.47	3.14	4.83
Total	63.35	66.53	102.36

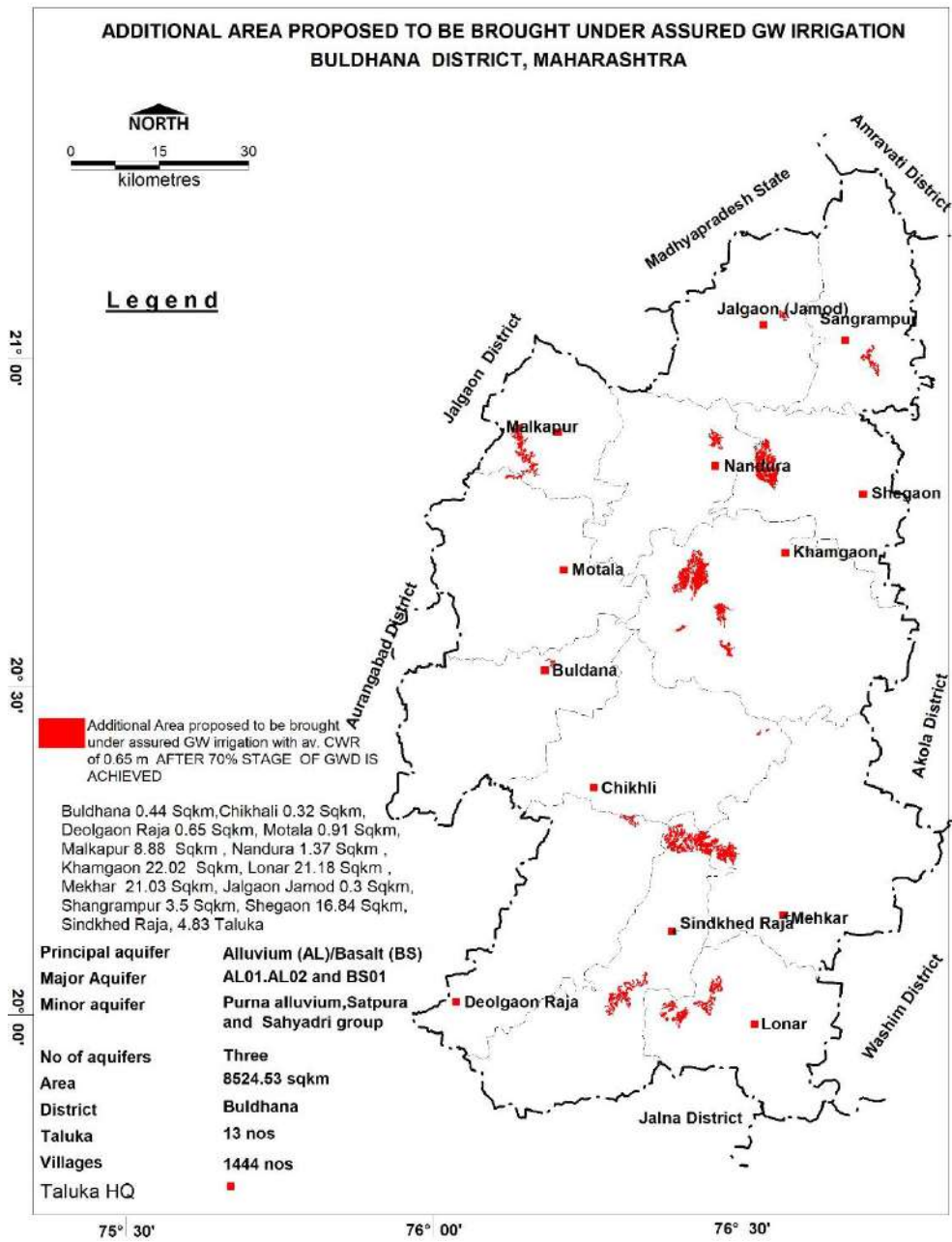


Fig. 6.3: Additional Area Proposed to be bought under Assured GW irrigation.

7.0 SUM UP

The highly diversified occurrence and considerable variations in the availability and utilization of groundwater makes its management a challenging task. Scientific development and management strategy for groundwater has become imperative to avert the looming water crisis. In this context, various issues such as, prioritization of areas for development of groundwater resources vis-a-vis its availability, augmentation of groundwater through rainwater harvesting and artificial recharge, pricing and sectoral allocation of resources and participation of the stakeholders must be considered. In view of the above, the present study area a systematic, economically sound and politically feasible framework for groundwater management is required.

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 preparation of block wise aquifer maps and aquifer management plans of Jalna district.

Buldhana district covering an area of 9567.27 sq km, out of this 1454.84 sq km (15.21 %) is hilly area. Geologically, the area is occupied by Basalt and Purna Alluvium. The Stage of ground water development varies from 47.95 % (Shegaon) to 104.01 % (Jalgaon Jamod). The overall stage of ground water development for the district is 71.83 % (SAFE Category). The area has witnessed declining water level, irregular rainfall and droughts like situation and low yield potential aquifers are the major issues in the district. Declining water level trend of >0.2 m has been observed in 362 sq km during pre-monsoon while it is 920 sq km during post monsoon.

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.

As a part of **Supply Side Management**, a total 254 Percolation tanks, 482 Check dams and 158 recharge shafts are proposed, which will augment ground water resources to the tune of 55.52 MCM (39.3 MCM by Percolation tanks, 10.84 MCM by Check dams and 5.38 recharge shafts).

As a part of **Demand Side Management**, the micro-irrigation techniques are proposed to be adopted in 146.20 Sq. Km area in entire district by saving a total of 44.97 MCM

The **ground water development plan** has been proposed in view of the developing additional ground water resources available after supply side interventions to bring the stage of ground water development up to 70 %. The 66.53 MCM volume of ground water generated can bring 102.35 sq km additional area under assured ground water irrigation with average crop water requirement of 0.65 m.

These interventions also need to be supported by regulation for deeper aquifer and hence it is recommended to regulate/ban deeper tubewells/borewells of more than 60 m depth in these blocks, 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 needs to be aggressively propagated to establish the institutional framework for participatory ground water management.

BLOCK WISE AQUIFER MAPS AND MANAGEMENT PLAN

- I. BULDHANA BLOCK**
- II. CHIKHALI BLOCK**
- III. DEULGAON RAJA
BLOCK**
- IV. KHAMGAON BLOCK**
- V. LONAR BLOCK**
- VI. MEHKAR BLOCK**
- VII. SINDHKHED RAJA
BLOCK**

8.0 AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, BULDHANA BLOCK, BULDHANA DISTRICT, MAHARASHTRA

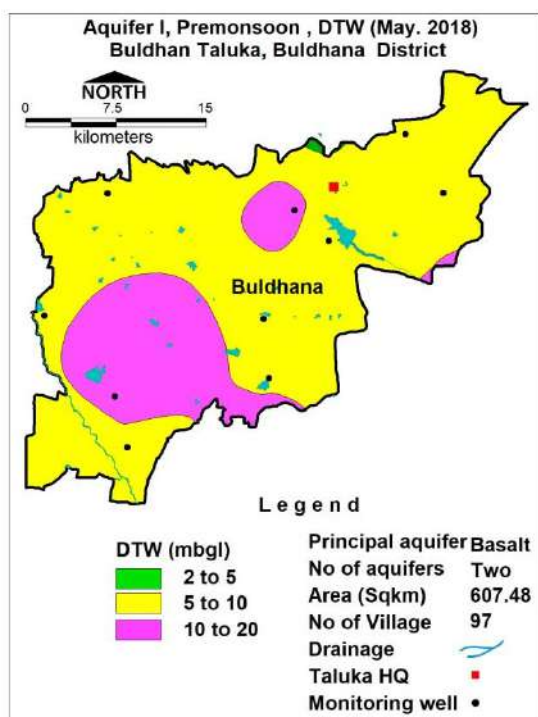
1. SALIENT FEATURE		
1.1 Introduction		
Block Name	Buldhana	
Geographical Area (Sq. Km.)	798.37 Sq. Km.	
Forest Area (Sq. Km)	139.31 Sq. Km.	
Population (2011)	2,86,992	
Climate	Hot and dry	
1.2 Rainfall Analysis		
Normal Rainfall	863.10 mm	
Annual Rainfall (2018)	581.8 mm	
Decadal Average Annual Rainfall (2009-18)	799.78 mm	
Long Term Rainfall Analysis (1998-2018)	Falling Trend 2.090 mm/year. Probability of Normal/Excess Rainfall- 62%/19%. Probability of Drought (Moderate/Severe)-: 19 % Moderate & 0% Severe.	
Rainfall Trend Analysis (1998 To 2018)		
<p>1400 1200 1000 800 600 400 200 0</p> <p>1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018</p> <p>$y = -15.669x + 1036.1$</p>		
EQUATION OF TREND LINE: $Y = -15.669x + 1036.1$		
1.3 Geomorphology, Soil & Geology		
Geomorphic Unit	The Block is divided into 3 units, Ajanta hill range, plateau top and moderately dissected plateau.	
Geology	Purna (Godavari) Alluvium (sand/ silt and clay alternating beds)., Age: Recent to Sub-recent Deccan Traps (Basalt). Age: Late Cretaceous to Eocene	
1.4 Hydrology & Drainage		
Drainage	Tributaries of Godavari river, Purna and Penganga drains the area.	
Hydrology	Major project	NIL
	Medium	NIL
	Minor Irrigation Project (100 to 250 Ha.)	State: 8, Local sector: 2
	Minor Irrigation Project (0 to 100 Ha.)	6 PT, 7 KT Weirs & 5 SB
1.5 Land Use, Agriculture, Irrigation & Cropping Pattern		
Geographical Area	708.37Sq. Km.	
Forest Area	51.14 Sq. Km.	

Cultivable Area		553.02 Sq. Km.
Net Sown Area		517.41 Sq. Km.
Double Cropped Area		127.33 Sq. Km.
Area under Irrigation	Surface Water	53.00 Sq. Km.
	Ground Water (Total Dug wells: Irrigation): 5913	NA
Principal Crops (Reference year 2013-14)	Crop Type	Area (Sq. Km.)
	Cotton	91.56
	Cereals	126.93
	Pulses	177.03
	Oil Seeds	103.01
Horticultural Crops	Citrous fruit	0
	Sugarcane	0
	Others (fruit and vegetables)	12.73

Water Level Behavior

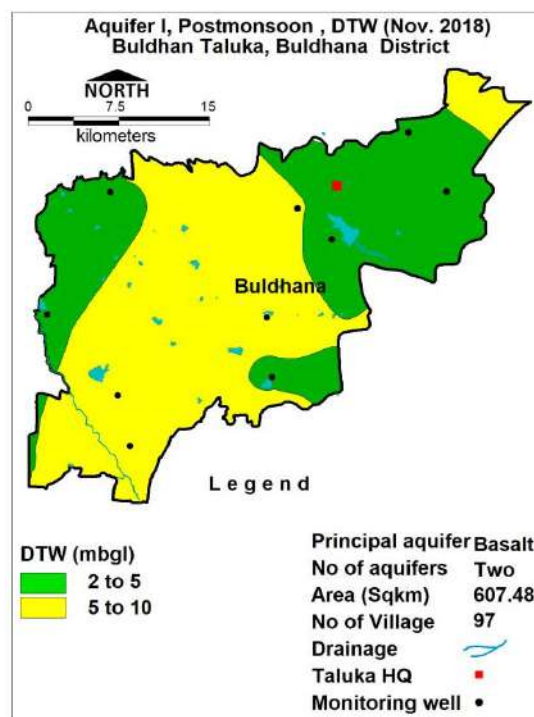
Aquifer-I/Shallow Aquifer

Pre-Monsoon Water Level (May 2018)



Water level less than 10 mbgl is observed in almost entire block, while water level in the range of 10 to 20 mbgl is observed in southern and Western central part.

Post-Monsoon Water Level (Nov. 2018)

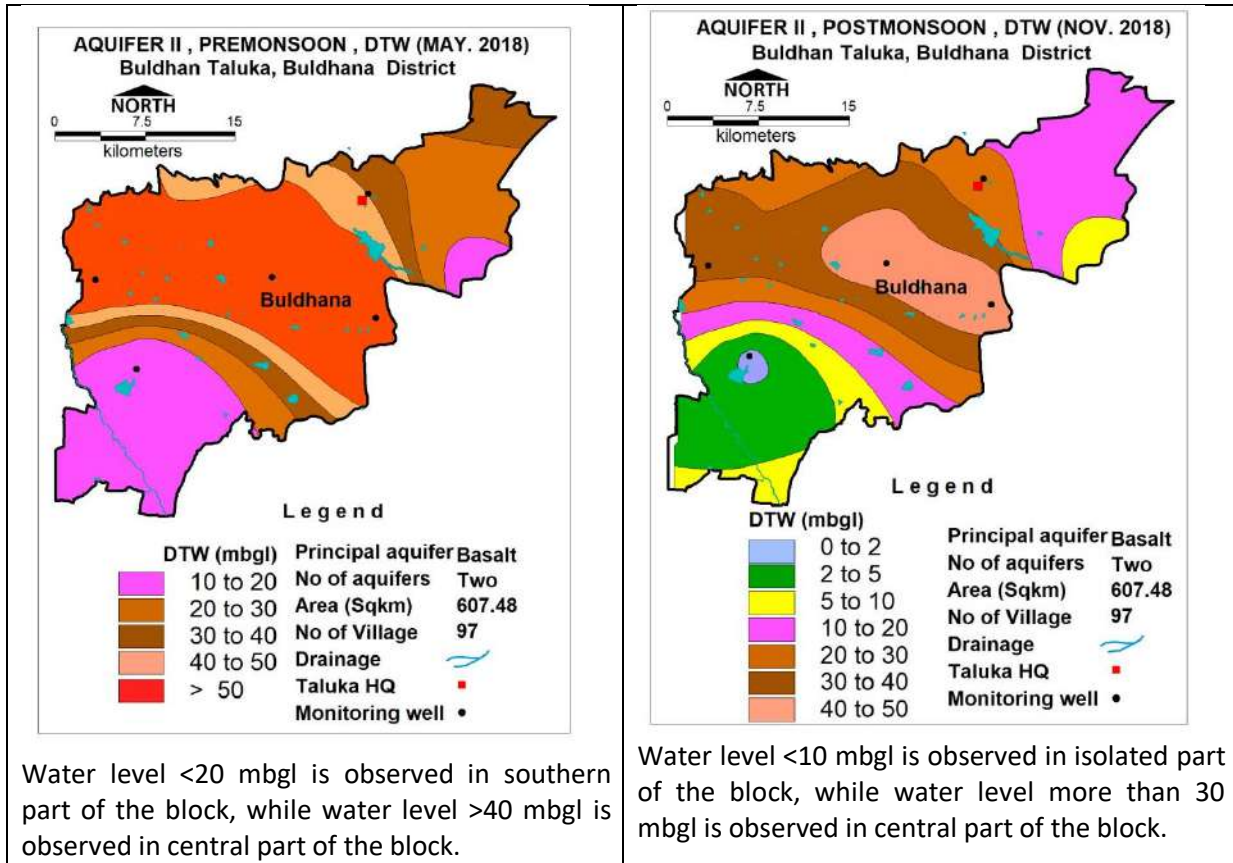


Water Level less than 5 mbgl is observed in north eastern and eastern part and in the western part. Water level in the range between 5 to 10 mbgl is observed in northern, central and southern part.

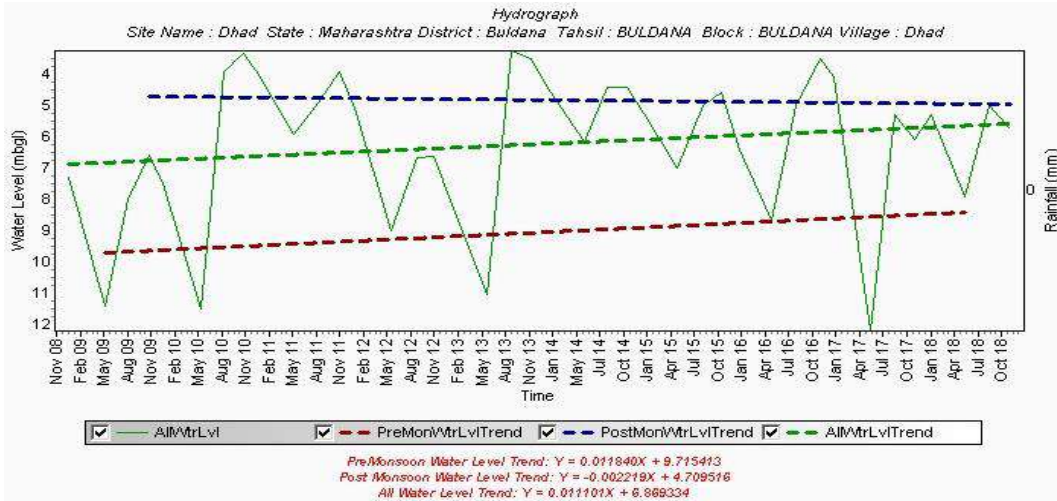
Aquifer-II/Deeper Aquifer

Pre-Monsoon Water Level (May 2018)

Post-Monsoon Water Level (Nov. 2018)



Hydrograph



Hydrograph shows Pre-monsoon rising water level trend @ 0.14 m/year

Hydrograph shows Post-monsoon falling water level trend @ 0.026 m/year

Pre-Monsoon trend

Post-Monsoon trend

Rising 0.0 to 0.4 m/year, Falling 0.0 to 0.2 m/Year

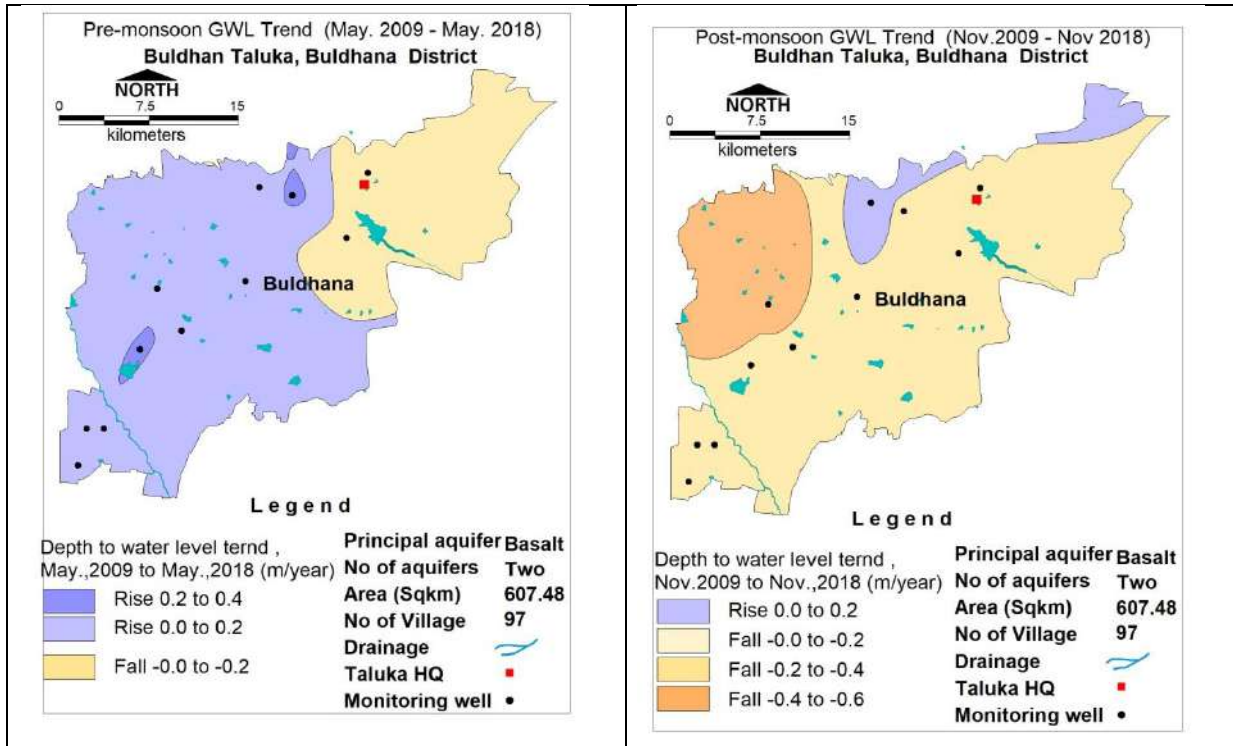
Rising 0.0 to 0.2 m/year, Falling 0.0 to 0.6 m/year

Pre-Monsoon Water Level Trend (2009-2018)

Post-Monsoon Water Level Trend (2009-2018)

Buldhana taluka is showing rising trend in the range to 0.4 m. except north eastern part where falling trend upto 0.2 m is observed.

Almost entire taluka is showing falling trend. Maximum area of taluka is showing falling trend in the range 0.2 to 0.4 m. Falling trend > 0.4 m is observed in western and north western part. Rising trend of < 2 m is observed in isolated patch in the northern part of the taluka.



2. Ground Water Issues

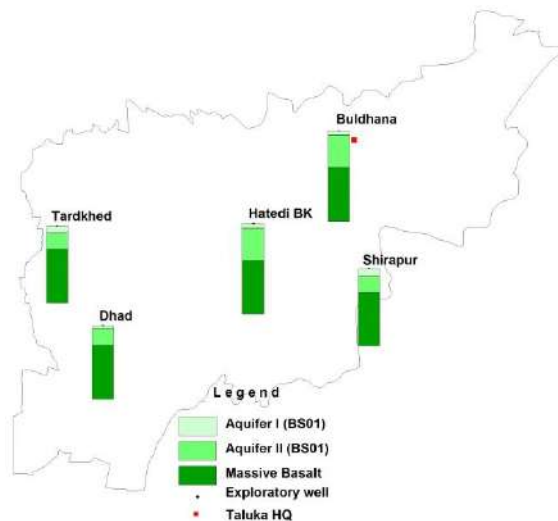
1. Over exploitation
2. Limited aquifer potential
3. Water scarcity in lean period
4. Post Monsoon declining Water Level trend is observed in almost entire block.

3. AQUIFER DISPOSITION

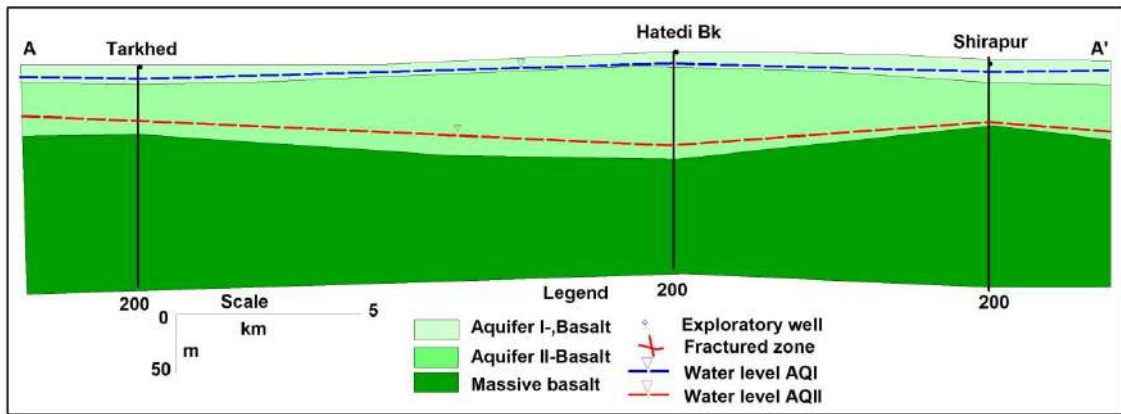
3.1 Number of Aquifers

- Basalt – Aquifer-I (weathered & fractured basalt)
- Basalt – Aquifer-II (Jointed & fractured basalt)

3.2 AQUIFER DISPOSITION



3.3 Cross Sections: Section AA'



3.4 Aquifer Characteristics

Major Aquifers	Basalt (Deccan Traps)	
Type of Aquifer (Phreatic / Semiconfined / Confined)	Aquifer-I (Phreatic)	Aquifer-II (Semi-confined / confined)
Depth of Occurrence (mbgl)	8 to 25	45 to 168
Granular/weathered / fractured rocks thickness (m)	8 to 16	0.5 to 3
Yield (m ³ /day)/lps	10 – 50 m ³ /day	Upto 1.25 lps
Specific yield/Storativity (S)	0.02	0.0000426
Transmissivity (T)	30-80 m ² /day	25-158 m ² /day

4. GROUND WATER QUALITY

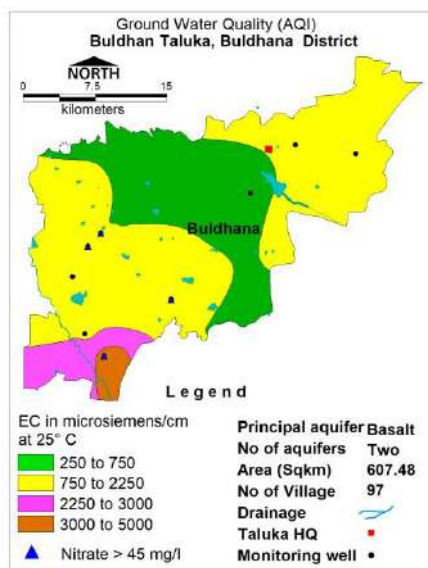
4.1 Aquifer-I/Shallow Aquifer

EC > 2250 $\mu\text{S}/\text{cm}$ has been observed in southern part of block. Few villages are also affected by Nitrate contamination in central part. Overall the ground water is fit for irrigation and domestic purposes.

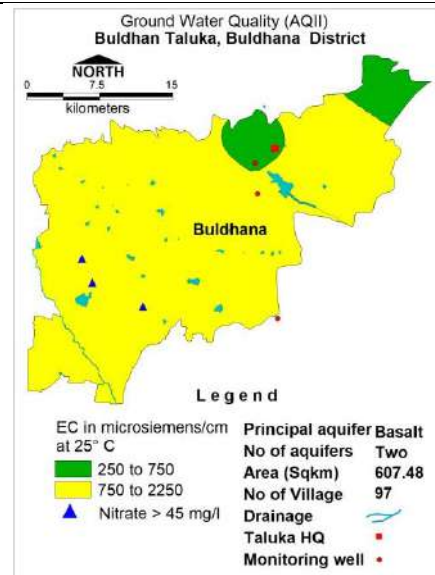
4.2 Aquifer-II/Deeper Aquifer

The ground water quality of deeper aquifer is suitable for irrigation purpose. However, the ground water is fit for drinking purpose with primary treatment.

Aquifer-I/Shallow Aquifer map

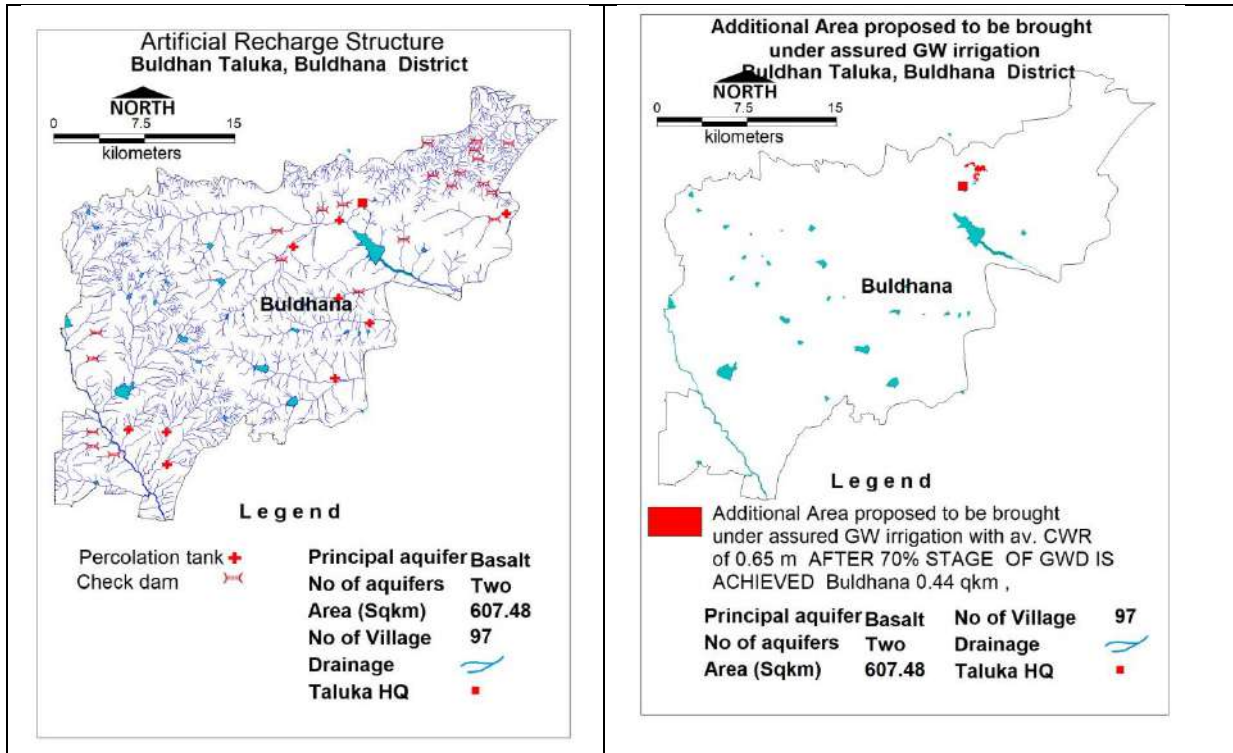


Aquifer-II/Deeper Aquifer map



5. GROUND WATER RESOURCES							
5.1 Aquifer-I/Shallow Aquifer							
Ground Water Recharge Worthy Area (Sq. Km.)							607.48
Total Annual Ground Water Recharge (MCM)							86.97
Natural Discharge (MCM)							4.35
Net Annual Ground Water Availability (MCM)							82.62
Existing Gross Ground Water Draft for irrigation (MCM)							67.16
Existing Gross Ground Water Draft for domestic and industrial water supply(MCM)							4.38
Existing Gross Ground Water Draft for All uses(MCM)							71.54
Provision for domestic and industrial requirement supply to 2025(MCM)							7.50
Net Ground Water Availability for future irrigation development(MCM)							8.32
Stage of Ground Water Development (%)							86.58
Category							SAFE
5.2 Aquifer-II/Deeper Aquifer							
Total Area (Sq. Km.)	Mean aquifer thickness (m)	S	Sy	Piezometric Head (m above confining layer)	Resource above confining layer (mcm)	Resource in aquifer (mcm)	Total Resource (MCM)
489.117	0.75	0.0000426	0.002	15	0.31	0.73	1.05
315.831	2	0.0000426	0.002	36	0.48	1.26	1.75
TOTAL							2.80
6. GROUND WATER RESOURCE MANAGEMENT							
Available Resource (MCM)							82.62
Gross Annual Draft (MCM)							71.54
6.1 Supply Side Management							
SUPPLY (MCM)							
Agricultural Supply -GW							67.16
Agricultural Supply -SW							0.07
Domestic Supply - GW							4.38
Domestic Supply - SW							1.10
Total Supply							72.71
Area of Block (Sq. Km.)							607.48
Area suitable for Artificial recharge (Sq. Km)							607.48
Type of Aquifer							Hard Rock
Area feasible for Artificial Recharge (WL >5mbgl) (Sq. Km.)							Approx 430
Volume of Unsaturated Zone (MCM)							325.57
Average Specific Yield							0.02
Volume of Sub Surface Storage Space available for Artificial Recharge (MCM)							6.51
Surplus water Available (MCM)							2.46
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				9	22		
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)				1.35	0.49		
RTRWH Structures – Urban Areas							
Households to be covered (25% with 50 m ² area)							15200
Total RWH potential (MCM)							0.43

Rainwater harvested / recharged @ 80% runoff co-efficient	0.34
RTRWH is economically not viable and hence not recommended	
6.2 Demand Side Management	
Micro irrigation techniques	
Irrigation Area (sq. km.) proposed for irrigation through drip (Cotton 38, Sugarcane 2)	40
Water Saving by use of drip (MCM)	12.69
Proposed Cropping Pattern change	
Ground water Irrigated area under Water Intensive Crop (sq.km)	Nil
Water Saving by water use efficiency (MCM)	Nil
6.3 EXPECTED BENEFITS	
Net Ground Water Availability (MCM)	82.62
Additional GW resources available after Supply side interventions (MCM)	1.85
Ground Water Availability after Supply side intervention	84.47
Existing Ground Water Draft for All Uses (MCM)	71.54
Stage of Ground Water Development after supply side interventions (%)	84.59
GW draft after Demand Side Interventions (MCM)	58.85
Stage of Ground Water Development after demand side interventions (%)	69.67
Other Interventions Proposed, if any	
Alternate Water Sources Available	Nil
6.4 Development Plan	
Volume of water available for GWD after stage of GWD brought to 70% (ham)	28.45
Proposed Number of DW (@ 1.5 ham for 90% of GWR Available)	17
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 after 70% stage of gwd is achieved	0.44
Regulatory Measures	60m borewells/tube wells
Proposed locations for AR structures	Additional area proposed to be bought under assured GW irrigation



9.0 AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, CHIKHALI BLOCK, BULDHANA DISTRICT, MAHARASHTRA

1. SALIENT FEATURES		
1.1 Introduction		
Block Name	Chikhali	
Geographical Area (Sq. Km.)	1153.89 Sq. Km.	
Hilly Area (Sq. Km)	218.08	
Population (2011)	227432	
Climate	Hot and dry	
Net Annual Ground Water Availability (MCM)	117.78	
Existing Gross Ground Water Draft for All uses (MCM)	82.24	
Provision for domestic and industrial requirement supply to 2025(MCM)	9.29	
Stage of Ground Water Development %	73.78	
Category	SAFE	
1.2 Rainfall Analysis		
Normal Rainfall	780 mm	
Annual Rainfall (2018)	494.1 mm	
Decadal Average Annual Rainfall (2008-17)	665.22 mm	
Short Term Rainfall Analysis (1998-2018)	Insignificantly falling trend -11.77 mm/year. Probability of Normal/Excess Rainfall- 62 % / 19 %. Probability of Drought (Moderate/Severe/Acute)-: 19 % Moderate	
Rainfall Trend Analysis (1998 To 2018)		
1.3. Geomorphology, Soil & Geology		
Geomorphic Unit	Plateau (Moderately Dissected) with weathered thickness ranging from 0 to 5 m.	
Geology	Deccan Traps (Basalt) Age: Late Cretaceous to Eocene	
Soil	Light to Medium BCS consisting mostly of clay and loam.	
1.4. Hydrology & Drainage		
Drainage	Painganga river and its tributaries.	
Hydrology	Major project	None
	Minor Irrigation Project (100-300 Ha.)	11 (Bramhanwada, Dongarshevali, Telhara, Kavhala, Haralkhed, Patoda, Misalwadi, Ancharwadi-1, Katwada,

		Chikhli, Ancharwadi-2, sarangwadi, Kolari)
	Minor Irrigation Project (0-100 Ha.)	State-6; MILS-2 PT-102, KT-34, MI TANK-14,VP-45

1.5. Land Use, Agriculture, Irrigation & Cropping Pattern

Forest Area	92.32 Sq. Km.	
Cultivable Area	766.31 Sq. Km.	
Net Sown Area	639.54 Sq. Km.	
Double Cropped Area	173.14	
Area under Irrigation	Surface Water	1.27 Sq. Km.
	Ground Water	16.71 Sq. Km.
Area under Drip & Sprinkler Irrigation	17.98 Sq. Km. (1798 hac)	
Principal Crops	Crop Type	Area (Sq. Km.) (Reference year 2017-18)
	Cotton	10.97
	Cereals	141.32
	Pulses	407.79
	Oil Seeds	615.93
Horticultural Crops	Sugarcane	0.24
	Others	7.26

1.6. Water Level Behavior

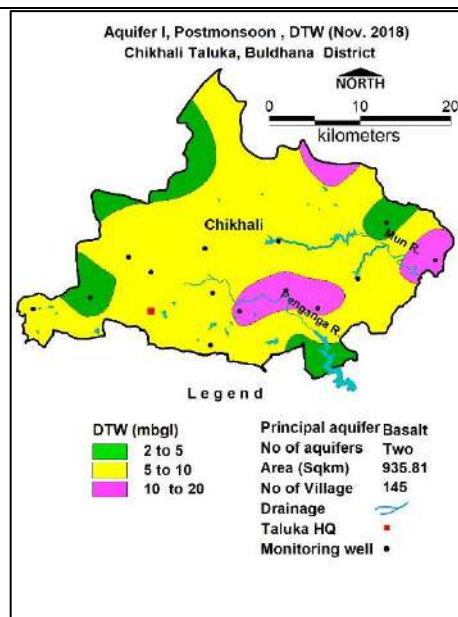
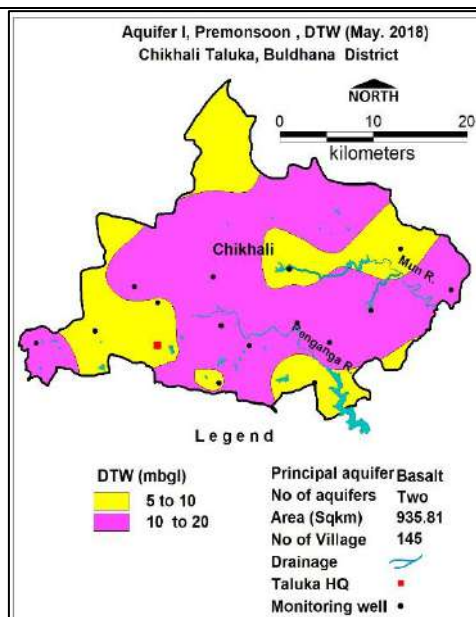
1.6.1 Aquifer-I (Shallow Aquifer)

Pre-Monsoon (May-2018)

DTWL 10 to 20 mbgl is observed in entire block except north-western, eastern parts of the block while water level in the range of 5 to 10 mbgl is observed.

Post-Monsoon (November-2018)

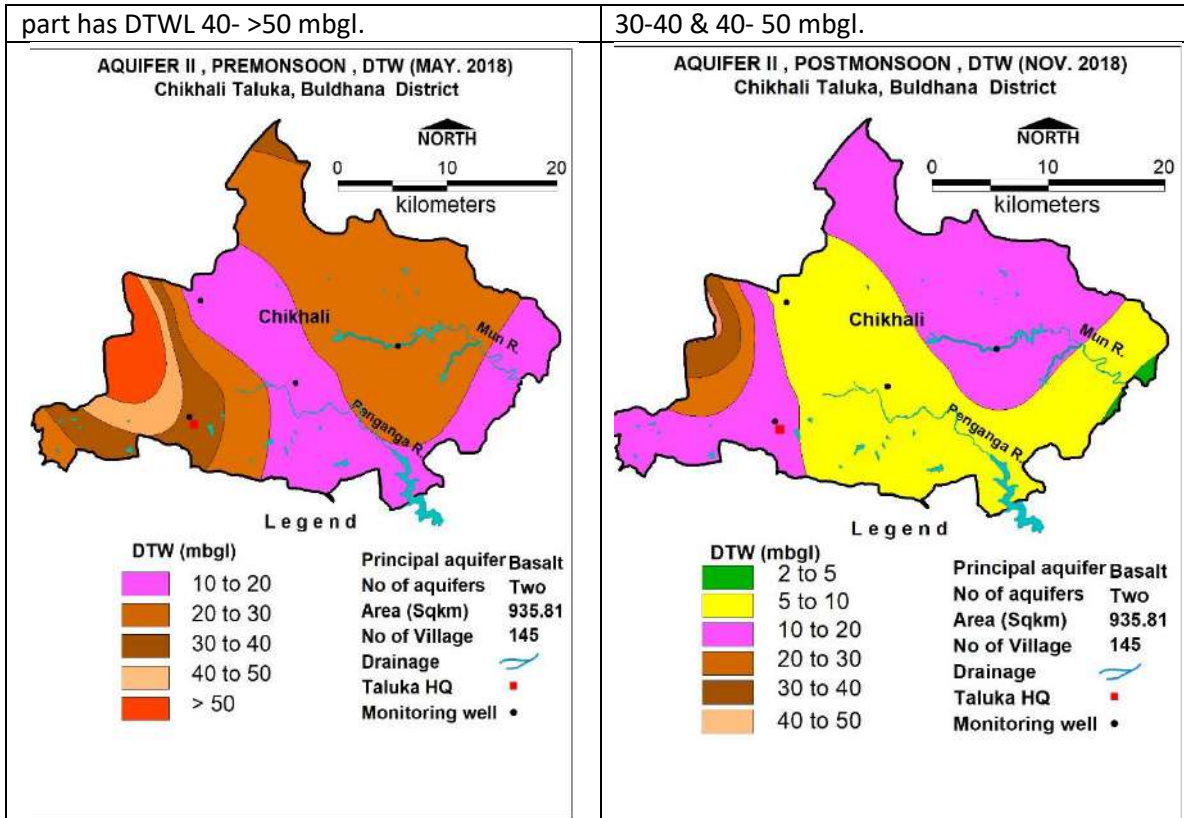
DTWL less than 10 mbgl is observed in entire block. Water level in the range of 10 to 20 mbgl is observed as isolated patches in south eastern end adjacent to Painganga river, Northern arts of the block.



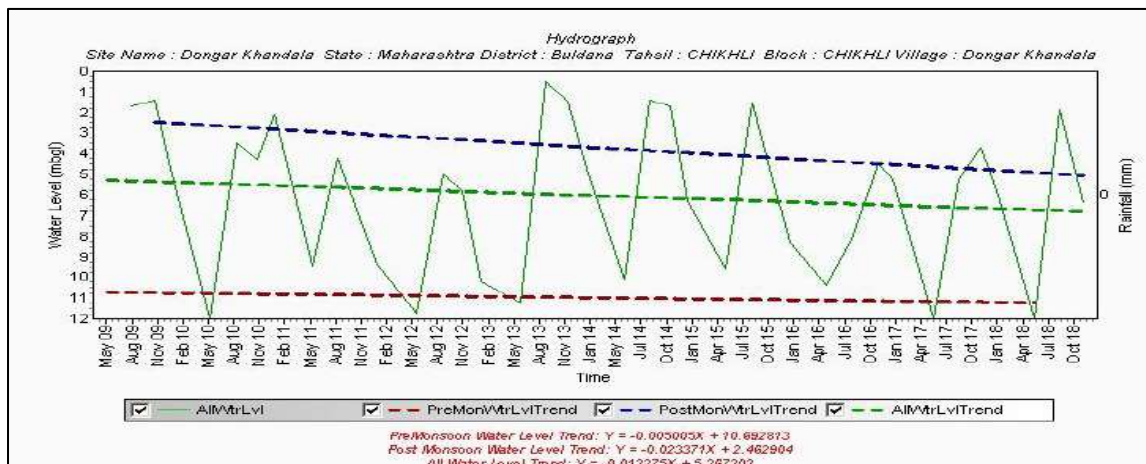
1.6.2 Water Level Behavior – Aquifer-II (Deeper Aquifer)

Pre-Monsoon (May-2018) DTWL 10-20 mbgl is observed in central part .DTWL 20-30 mbgl is observed in northern & north western part engulfing small patch of 30-40 mbgl. Western

Post-Monsoon (November-2018) DTWL 5 - 10 mbgl is observed in central part .DTWL 10-20 mbgl is observed in northern part. Western part observed small patches of DTWL 20-30,



1.7. Hydrographs



Hydrograph shows Pre-monsoon declining water level trend @ 0.00125 to 0.0050 m/year

Hydrograph shows Post- monsoon declining water level trend @ 0.00122 to 0.023 m/year

1.8. Water Level Trend (2009-18)

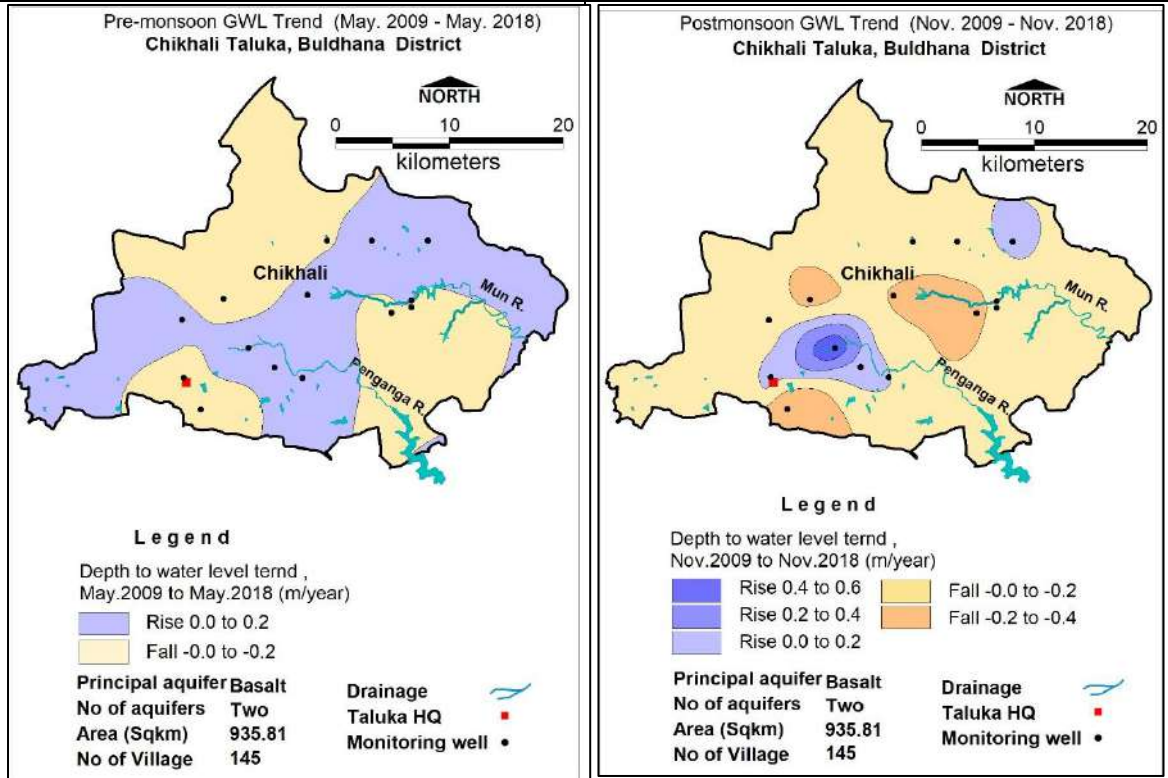
1.8.1 Pre-Monsoon trend
Falling 0.04099 (Shelodi) to 0.1368 (Borgaon wasu) m/year. Rising 0.0061 (Karwad) to 0.130 (Sawana) m/year.

1.8.2 Post-Monsoon trend
Falling 0.0006 (Borgaon Kakde) to 0.4813 (Borgaonwasu)m/year. Rising 0.0310(Karwad) to 0.3522(Khor) m/year;

Northern and southern part shows declining water level trend up to 0.2 m/year (393.48 sq km)while rising trend upto 0.2 observed in

Major part of the block shows falling trend up to 0.2 m/year (723.48 sqkm) while rising trend upto 0.6 m/year has been observed in central

central part of the block (403 sq km).	& northern part of the block (73.19 sqkm). Declining trend 0.2 to 0.4 m/year has been observed in south border area and central part of the block.
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2. Ground Water Issues

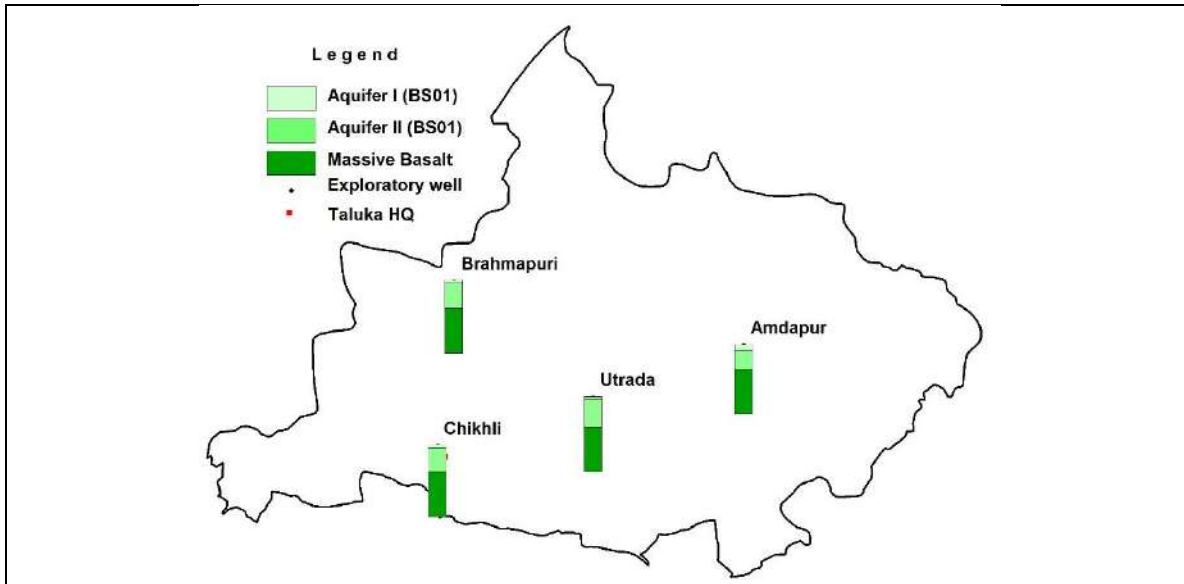
- 5. Declining Water Level trend is observed in 723.48 sq. km. area of the block.
- 6. Overexploitation
- 7. Water scarcity in lean period
- 8. Declining Water Level trend is observed in almost entire block

3. AQUIFER DISPOSITION

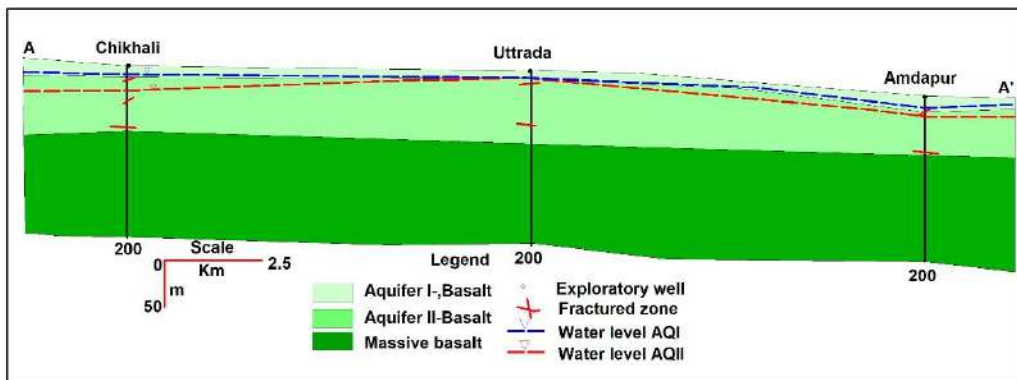
3.1. Number of Aquifers

Basalt –Aquifer-I (Phreatic / Shallow aquifer)
Basalt –Aquifer-II (Semiconfined / confined / Deeper aquifer)

3.2. Lithological Dispoistion



3.3. Cross Sections – Section AA'



3.4. Aquifer Characteristics

Major Aquifers	Basalt (Deccan Traps)	
Type of Aquifer (Phreatic/Semiconfined/Confined)	Basalt –Aquifer-I (Phreatic / Shallow aquifer)	Basalt –Aquifer-II (Semiconfined / confined / Deeper aquifer)
Depth of Occurrence (mbgl)	10 to 25	45 to 168
Weathered/fractured rocks thickness (m)	8 to 16	0.5 to 3
Yield (m ³ /day)/lps	10 to 100 m ³ /day	0.2 tp 3
Specific yield/ Storativity (S)	0.005	0.0000426
Transmissivity (T)	30-80 m ² /day	25-158 m ² /day

4. GROUND WATER QUALITY

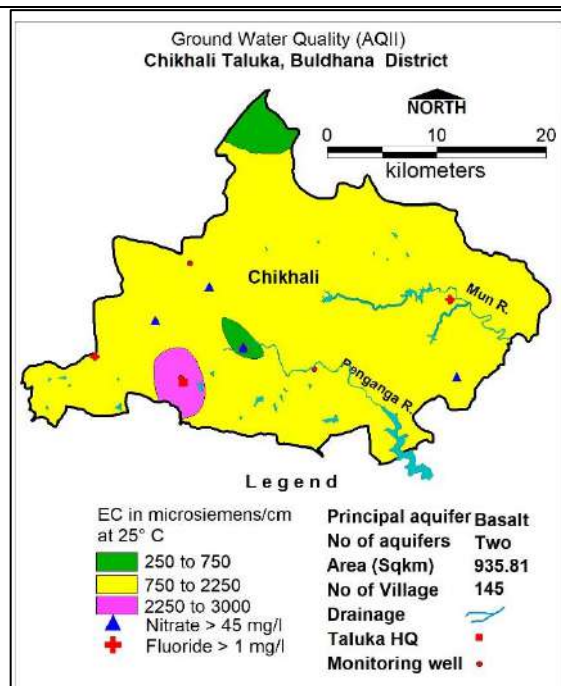
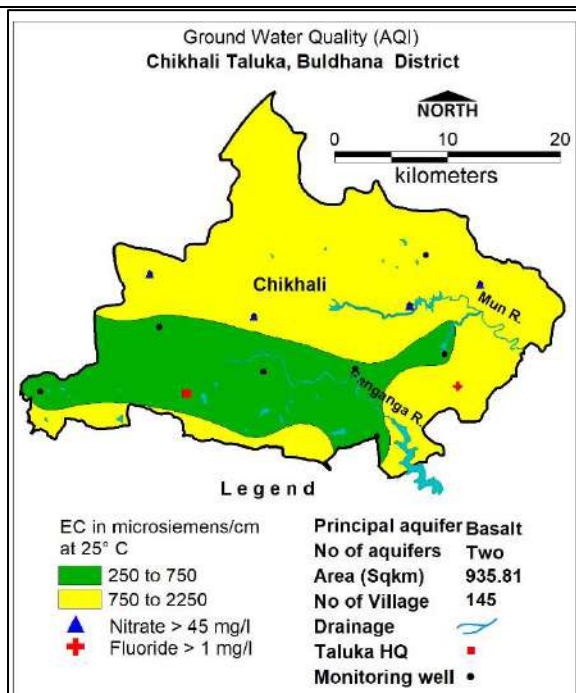
4.1 Phreatic Aquifer (Aquifer-I/ Shallow aquifer)

EC ranging from 250 to 750 $\mu\text{S}/\text{cm}$ has been observed in southern part of block covering about 242.6 sq km along with EC ranging from 750 to 2250 $\mu\text{S}/\text{cm}$ has been observed in major part of block covering about 554 sq km area of the block & ground water is suitable for all purpose. Few villages are also affected by Nitrate contamination.

4.2 Semi-confined/Confined Aquifer (Aquifer II/ Deeper aquifer)

EC ranging from 750 to 2250 $\mu\text{S}/\text{cm}$ has been observed in major part of block covering about 745.3 sq km area of the block & ground water is suitable for all purpose. Ground water becomes brackish towards southern part with EC ranges from 2250 to 300 $\mu\text{S}/\text{cm}$ & ground water is suitable for irrigation purpose with proper salinity control measures. However it is

fit for drinking purpose without treatment. Few villages are also affected by Nitrate contamination.



5. GROUND WATER RESOURCE

5.1 Aquifer-I/ Shallow Phreatic Aquifer (Basalt)

Ground Water Recharge Worthy Area (Sq. Km.)	935.81
Command	23.1600
Non Command	912.65
Total Annual Ground Water Recharge (MCM)	123.98
Natural Discharge (MCM)	6.19
Net Annual Ground Water Availability (MCM)	117.78
Existing Gross Ground Water Draft for irrigation (MCM)	40.54
Existing Gross Ground Water Draft for domestic and industrial water supply(MCM)	82.24
Existing Gross Ground Water Draft for All uses(MCM)	86.91
Provision for domestic and industrial requirement supply to 2025(MCM)	9.29
Net Ground Water Availability for future irrigation development(MCM)	26.76
Stage of Ground Water Development (%)	73.78
Category	SAFE

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

Total Area (Sq. Km.)	Mean aquifer thickness (m)	S	Sy	Piezometric Head (m above confining layer)	Resource above confinig layer (mcm)	Resource in aquifer (mcm)	Total Resource (MCM)
393.45	0.75	0.0000426	0.005	21	0.48	1.26	1.74
443.84	2	0.0000426	0.005	22	0.35	1.47	1.82

6. GROUND WATER RESOURCE

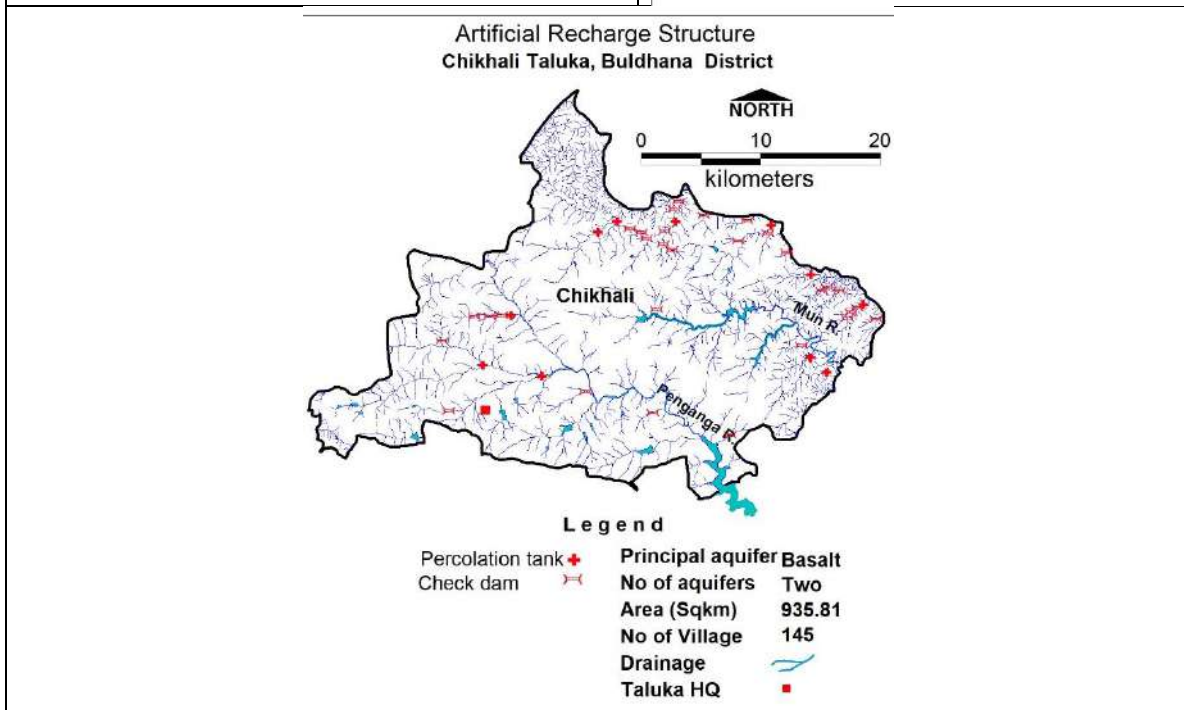
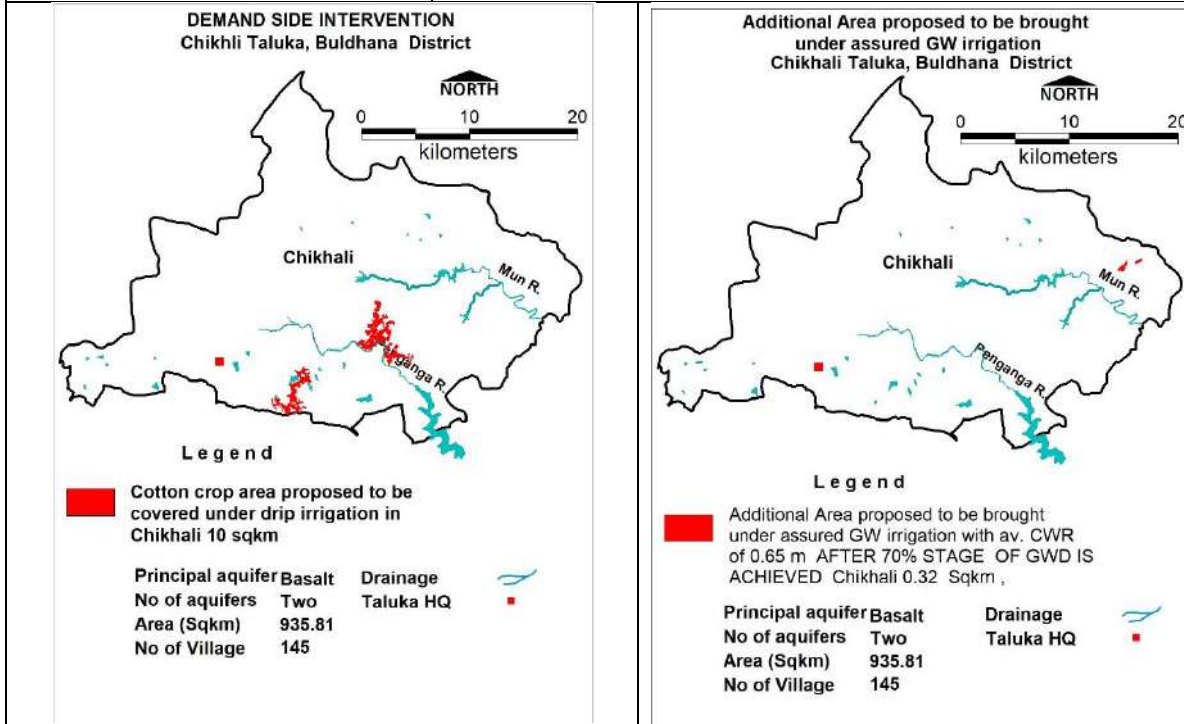
6.1. Supply Side Management

SUPPLY (MCM)

Available Resource (MCM)	117.79	
Gross Annual Draft (MCM)	86.91	
Agricultural Supply –GW	82.24	
Agricultural Supply –SW	1.14	
Domestic Supply – GW	1.92	
Domestic Supply – SW	0.48	
Total Supply	85.78	
Area of Block (Sq. Km.)	935.81	
Area suitable for Artificial recharge (Sq. Km)	205.28	
Type of Aquifer	Hard Rock	
Area feasible for Artificial Recharge (WL >5mbgl) (Sq. Km.)	Approx. 800	
Volume of Unsaturated Zone (MCM)	410.55	
Average Specific Yield	0.20	
Volume of Sub Surface Storage Space available for Artificial Recharge (MCM)	8.21	
Surplus water Available (MCM)	3.09	
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	11	30
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	1.65	0.67
RTRWH Structures – Urban Areas		
Households to be covered (25% with 50 m ² area)	15600	
Total RWH potential (MCM)	0.440	
Rainwater harvested / recharged @ 80% runoff co-efficient	0.352	
RTRWH is economically not viable & hence, not recommended.		
6.2. Demand Side Management		
Micro irrigation techniques		
Micro Irrigation Techniques in Cotton cropped area proposed to be covered under Drip (sq.km.)	10	
Volume of Water expected to be saved (MCM). Surface Flooding req- 2.45 m. Drip Req. – 1.88, WUE- 0.57 m	3.04	
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)	117.78	
Additional GW resources available after Supply side interventions (MCM)	2.33	
Ground Water Availability after Supply side intervention(MCM)	120.11	
Existing Ground Water Draft for All Uses (MCM)	86.91	
Stage of Ground Water Development after Supply side intervention (%)	72.36 %	
GW draft after Demand Side Interventions (MCM)	83.87	
Stage of Ground Water Development after Demand Side interventions (%)	69.83 %	
Other Interventions Proposed, if any		
Alternate Water Sources Available	Nil	
6.4. Development Plan		
Volume of water available for GWD after stage of GWD brought to 70% (ham)	21.05	
Proposed Number of DW (@ 1.5 ham for 90% of GWR Available)	13	
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 after 70% stage of gwd is achieved	0.32
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Regulatory Measures **60m borewells/tube wells**



10.0 AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, DEULGAON RAJA BLOCK, BULDHANA DISTRICT, MAHARASHTRA

1. SALIENT FEATURES																																														
1.1 Introduction																																														
Block Name	Deulgaon Raja																																													
Geographical Area (Sq. Km.)	486.78 Sq. Km.																																													
Hilly Area (Sq. Km)	38.12																																													
Population (2011)	125350																																													
Climate	Hot and dry																																													
Net Annual Ground Water Availability (MCM)	60.92																																													
Existing Gross Ground Water Draft for All uses (MCM)	46.44																																													
Provision for domestic and industrial requirement supply to 2025(MCM)	3.80																																													
Stage of Ground Water Development %	76.25																																													
Category	Safe																																													
1.2 Rainfall Analysis																																														
Normal Rainfall	694.7 mm																																													
Annual Rainfall (2018)	419.3 mm																																													
Decadal Average Annual Rainfall (2009-18)	659.55 mm																																													
Short term Rainfall Analysis (1998-2017)	Insignificantly falling trend -7.78 mm/year. Probability of Rainfall : 67 % Normal rainfall and 19 % Excess rainfall Probability of Drought:- 14 % Moderate Drought																																													
Rainfall Trend Analysis (1998 To 2018)																																														
<table border="1"> <caption>Annual Rainfall Data (1998-2018)</caption> <thead> <tr> <th>Year</th> <th>Rainfall (mm)</th> </tr> </thead> <tbody> <tr><td>1998</td><td>600</td></tr> <tr><td>1999</td><td>900</td></tr> <tr><td>2000</td><td>500</td></tr> <tr><td>2001</td><td>850</td></tr> <tr><td>2002</td><td>700</td></tr> <tr><td>2003</td><td>700</td></tr> <tr><td>2004</td><td>650</td></tr> <tr><td>2005</td><td>700</td></tr> <tr><td>2006</td><td>800</td></tr> <tr><td>2007</td><td>750</td></tr> <tr><td>2008</td><td>750</td></tr> <tr><td>2009</td><td>550</td></tr> <tr><td>2010</td><td>1050</td></tr> <tr><td>2011</td><td>650</td></tr> <tr><td>2012</td><td>550</td></tr> <tr><td>2013</td><td>950</td></tr> <tr><td>2014</td><td>500</td></tr> <tr><td>2015</td><td>600</td></tr> <tr><td>2016</td><td>750</td></tr> <tr><td>2017</td><td>500</td></tr> <tr><td>2018</td><td>420</td></tr> </tbody> </table>			Year	Rainfall (mm)	1998	600	1999	900	2000	500	2001	850	2002	700	2003	700	2004	650	2005	700	2006	800	2007	750	2008	750	2009	550	2010	1050	2011	650	2012	550	2013	950	2014	500	2015	600	2016	750	2017	500	2018	420
Year	Rainfall (mm)																																													
1998	600																																													
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2014	500																																													
2015	600																																													
2016	750																																													
2017	500																																													
2018	420																																													
1.3. Geomorphology, Soil & Geology																																														
Geomorphic Unit	Plateau (Undissected to slightly Dissected) with weathered thickness 1-2 m																																													
Geology	Deccan Traps (Basalt) Age: Upper Cretaceous to Lower Eocene																																													
Soil	Light to Medium BCS consisting mostly of clay and loam																																													
1.4. Hydrology & Drainage																																														
Drainage	Purna river and its left tributaries																																													
Hydrology	Major project	1 Khadakpurna (ongoing)																																												
	Bigger Minor Irrigation Project (100-300 Ha.)	3 (Saokhed bhoi, Shivni Armal, Mendgaon with 1275 sq km total CCA)																																												

	Minor Irrigation Project (0-100 Ha.)	State-56, MILS-2(Andhera ,Pimpalgaon Chilam) PT-20, KT-14, MI tank-4 VP-18
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1.5. Land Use, Agriculture, Irrigation & Cropping Pattern

Forest Area	43.78 Sq. Km.	
Cultivable Area	410.78 Sq. Km.	
Net Sown Area	332.01 Sq. Km.	
Double Cropped Area	141.18 Sq. Km.	
Area under Irrigation	Surface Water	0.25 Sq. Km.
	Ground Water	14.6 Sq. Km.
Area under Drip & Sprinkler Irrigation	14.85 Sq. Km. (1485 hac)	
Principal Crops	Crop Type	Area (Sq. Km.) (Reference year 2017-18)
	Cotton	29.2
	Cereals	85.83
	Pulses	104.13
Horticultural Crops	Oil Seeds	179.59
	Sugarcane	0.38
	Others	5.2

1.6. Water Level Behavior

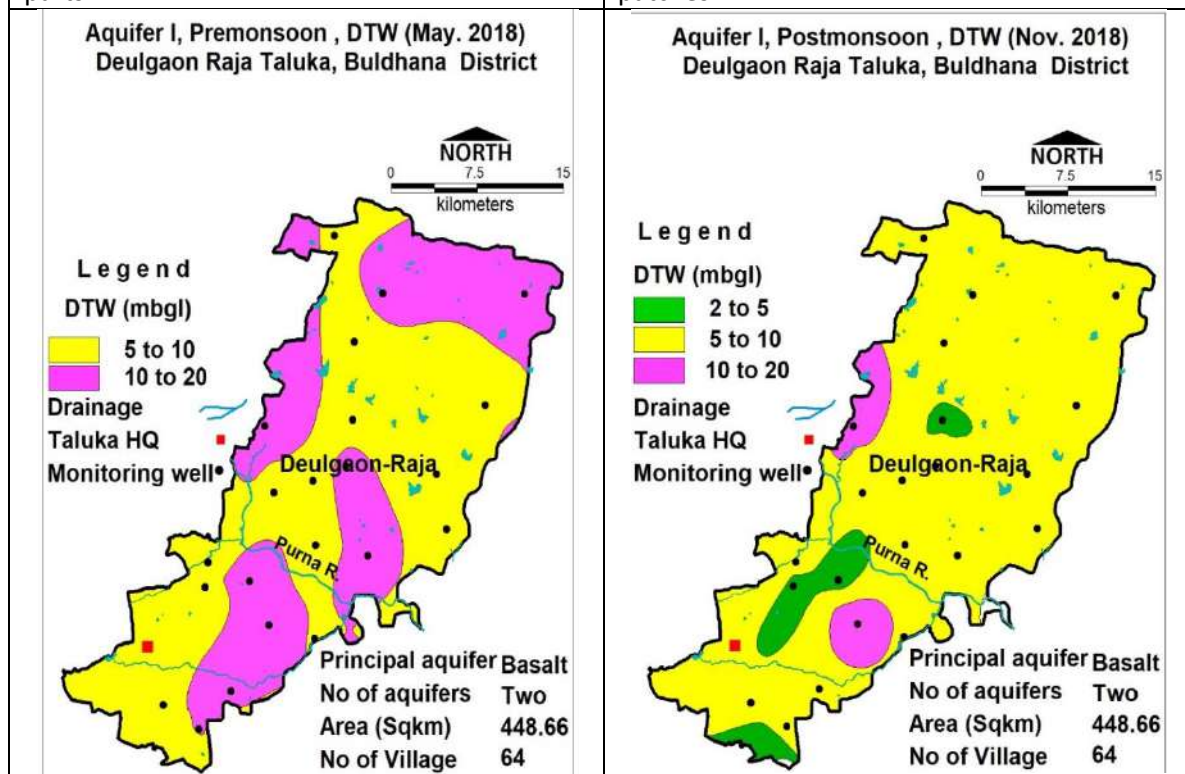
1.6.1 Aquifer-I (Shallow Aquifer)

Pre-Monsoon (May-2018)

DTWL 10 to 20 mbgl is observed in northern, Northeastern & southern parts of the block while water level in the range of 5 to 10 mbgl is observed central & south western parts.

Post-Monsoon (November-2018)

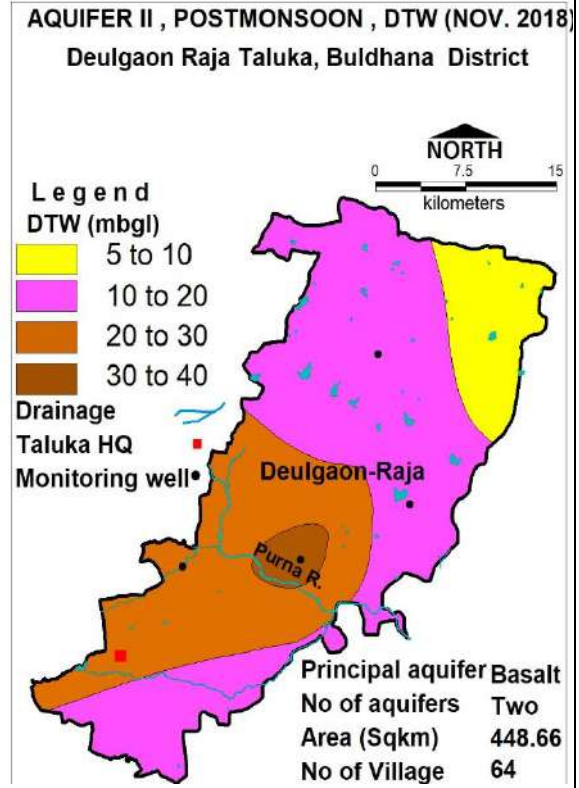
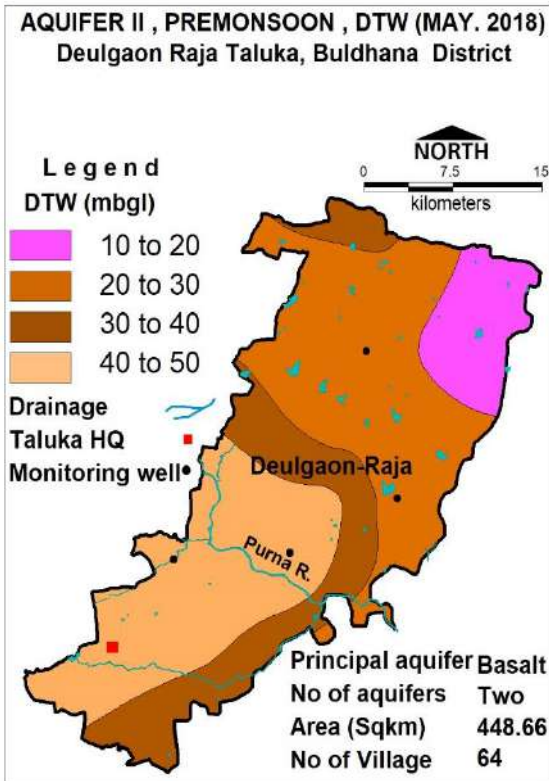
DTWL less than 5- 10 mbgl is observed in entire block except small patches of north western and north eastern part where DTWL ranging 10 to 20 is observed as isolated patches.



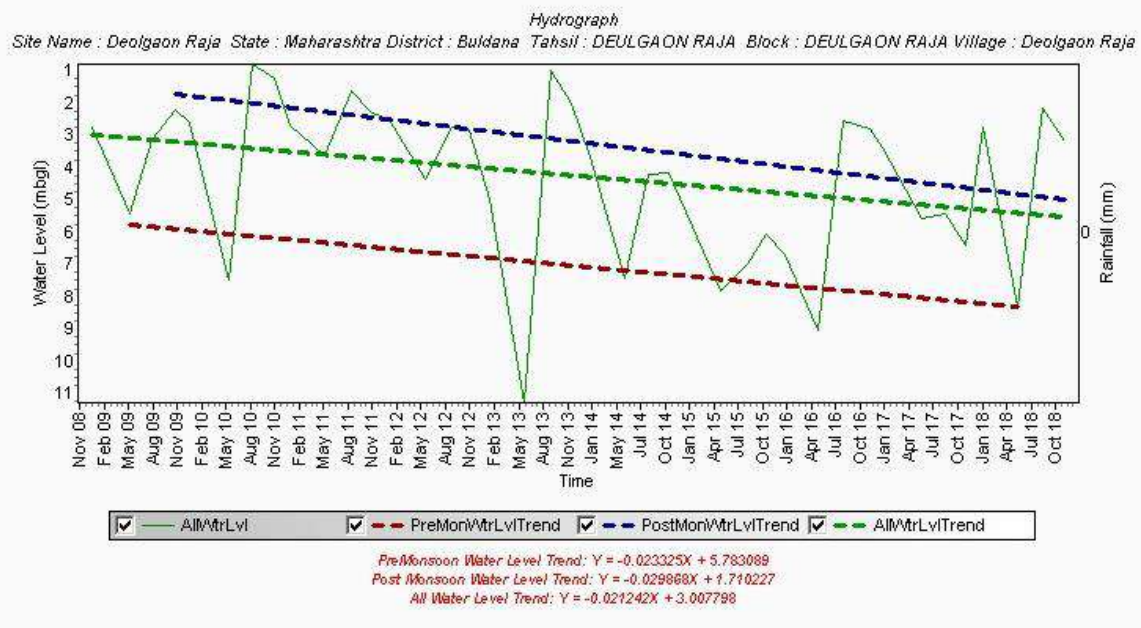
1.6.2 Water Level Behavior - Aquifer-II (Deeper Aquifer)

Pre-Monsoon (May-2018) DTWL 10 to 20 mbgl & 20 TO 30 is observed in northern part of the block while water level in the range of 30 to 40 mbgl is observed central & south western parts. southern part towards purna river has DTWL 40-50 mbgl.

Post-Monsoon (November-2018) DTWL 5-10 & 10-20 mbgl is observed in northern block except northwestern & northeastern part where DTWI is 20 to 30 mbgl while water level in the range of 30 to 40 mbgl is observed in isolated patches of purna river.



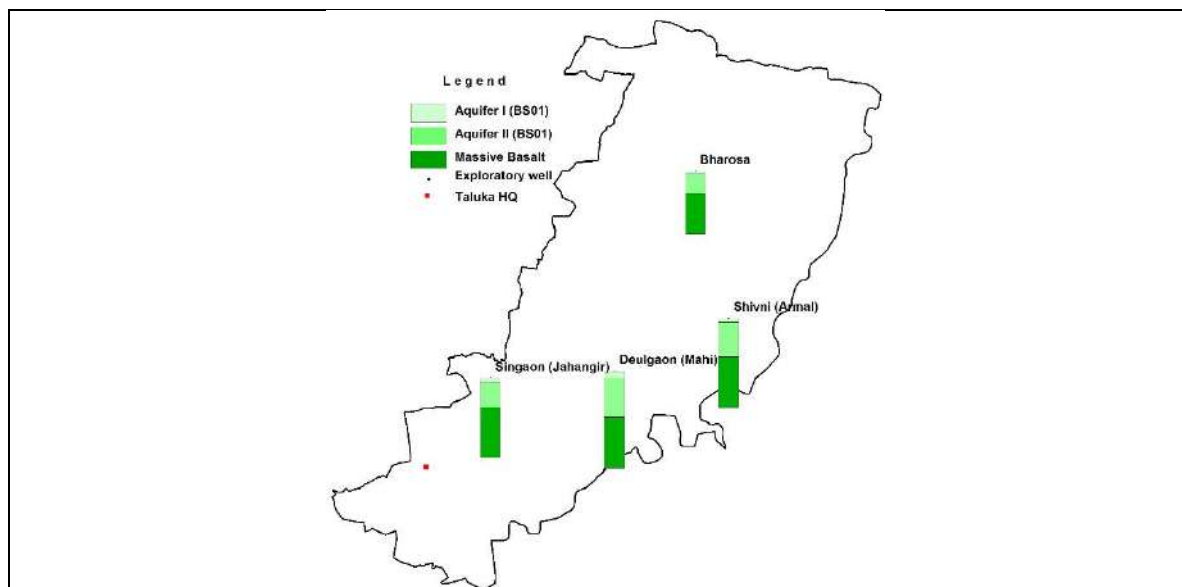
1.7. Hydrographs



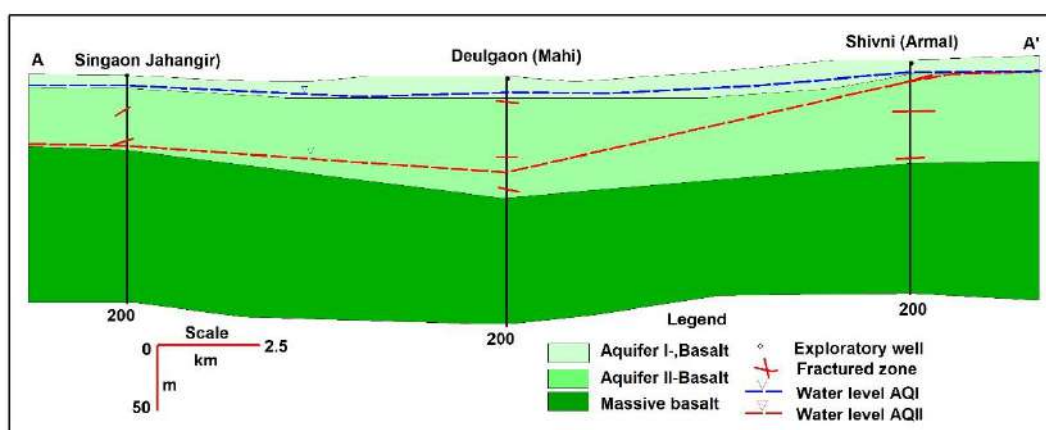
Hydrograph shows Pre-monsoon falling water

Hydrograph shows Post- monsoon falling water

level trend @ 0.0233 m/year.	level trend @ 0.0298 m/year
1.8. Water Level Trend (2009-18)	
1.8.1 Pre-Monsoon trend Rising @ 0.036 to m/year (Pimpalner) to 0.433 Mendgaon; Falling 0.0051 (Mera Khurd) to 0.34 (Bhorsa) m/year.	1.8.2 Post-Monsoon trend Rising 0.0029 (Mehuna) to 0.4879 (Mera Kh.) m/year; Falling 0.0166 (Deulgaon raja) m/year
Declining water level trend up to 0.6 m/year (464 sq km) except rising trend <0.2 mbgl (78 sq km) is observed in North ,Central part of the block.	Major part of the block shows falling trend up to 0.4 m/year (759.4 sq km) while rising trend upto 0.2 m/year (63.40 sq km) has been observed in small patches of southern part of the block.
2. Ground Water Issues	
<ol style="list-style-type: none"> 1. Block shows declining water level trend up to 0.6 m/year observed in 464 sq km during pre-monsoon while in postmonsoon 440 sq km area is experiencing declining trend upto 0.4 m/year. 2. Limited Aquifer Potential 3. Water Scarcity on lean period. 	
3. AQUIFER DISPOSITION	
3.1. Number of Aquifers	Basalt –Aquifer-I (Phreatic / Shallow aquifer) Basalt –Aquifer-II (Semiconfined / confined / Deeper aquifer)
3.2. Lithological Disposition	



3.3. Cross Sections – Section AA'

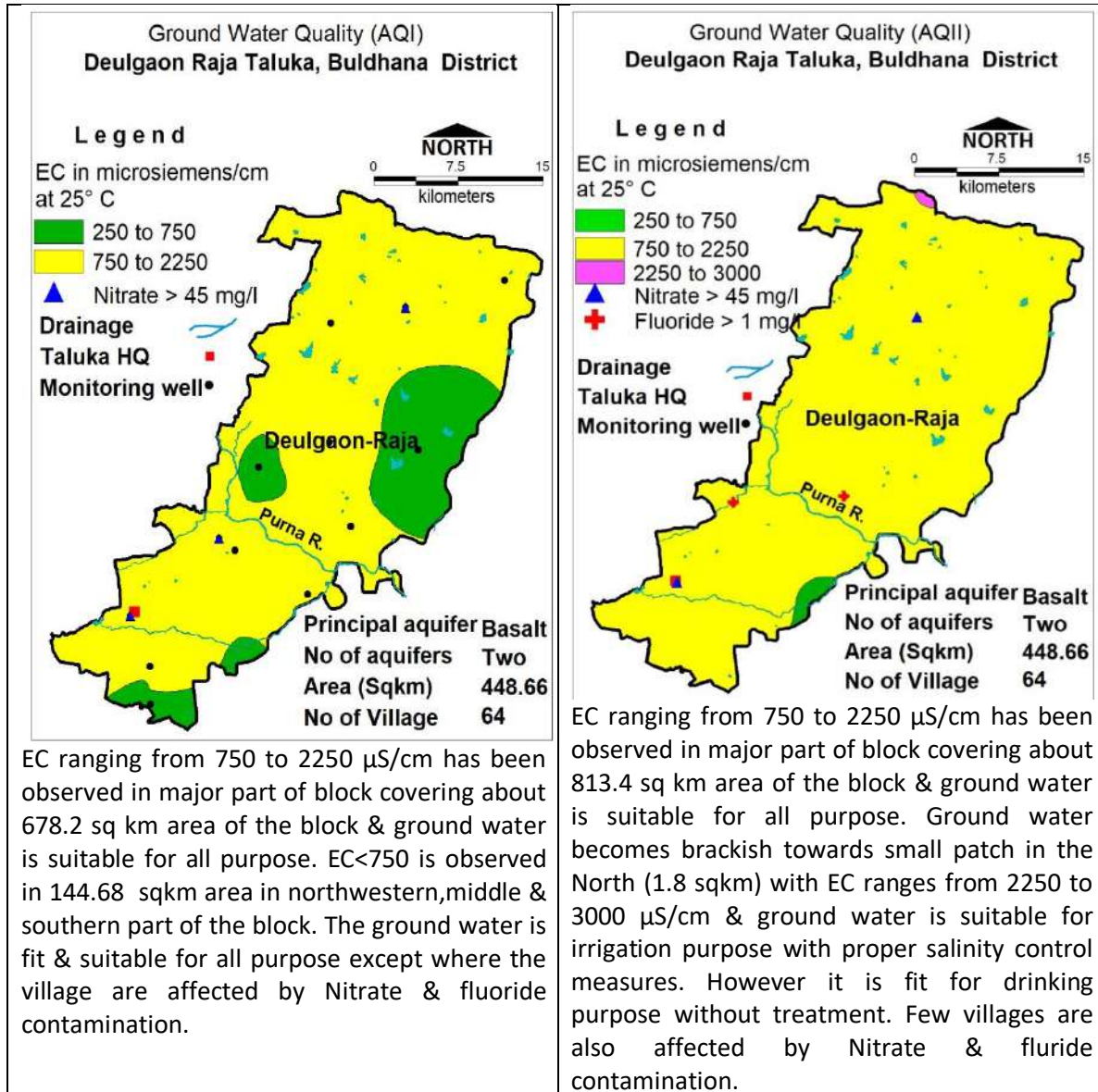


3.4. Aquifer Characteristics

Major Aquifers	Basalt (Deccan Traps)	
Type of Aquifer (Phreatic/Semiconfined/Confined)	Basalt –Aquifer-I (Phreatic / Shallow aquifer)	Basalt –Aquifer-II (Semiconfined / confined / Deeper aquifer)
Depth of Occurrence (m bgl)	8 to 25	60 to 168
Weathered/fractured rocks thickness (m)	6 to 16	0.5 to 6
Yield (m ³ /day)/lps	10 to 100 m ³ /day	0.2 to 1.25
Specific yield/ Storativity (S)	0.002	0.00003 to 0.0000426
Transmissivity (T)	30-80 m ² /day	25-158 m ² /day

4. GROUND WATER QUALITY

4.1 Phreatic Aquifer (Aquifer-I/ Shallow aquifer)	4.2 Semi-confined/Confined Aquifer (Aquifer II/ Deeper aquifer)
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5. GROUND WATER RESOURCE

5.1 Aquifer-I/ Shallow Phreatic Aquifer (Basalt)

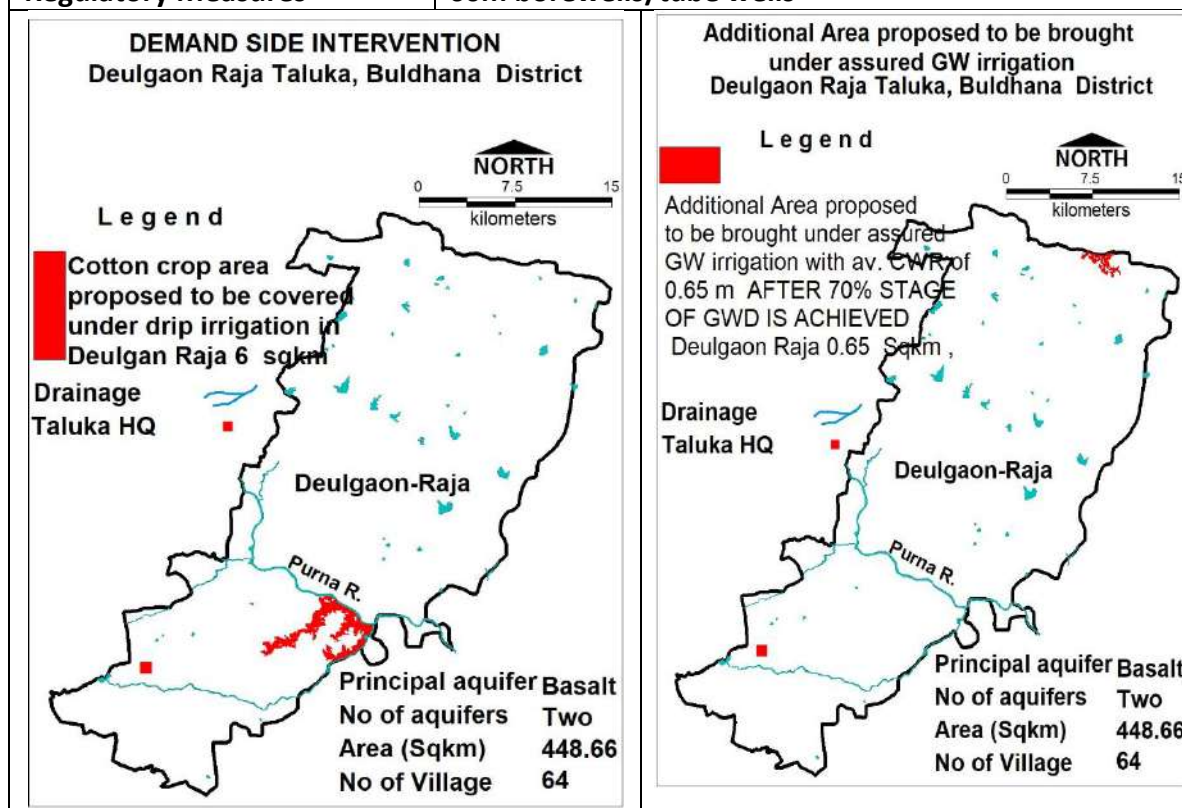
Ground Water Recharge Worthy Area (Sq. Km.)	448.66
Command area	23.89
Non Command	424.77
Total Annual Ground Water Recharge (MCM)	64.12
Natural Discharge (MCM)	3.20
Net Annual Ground Water Availability (MCM)	60.92
Existing Gross Ground Water Draft for irrigation (MCM)	39.99
Existing Gross Ground Water Draft for domestic and industrial water supply(MCM)	44.53
Existing Gross Ground Water Draft for All uses(MCM)	46.44
Provision for domestic and industrial requirement supply to 2025(MCM)	3.80
Net Ground Water Availability for future irrigation development(MCM)	13.44
Stage of Ground Water Development (%)	76.25
Category	SAFE

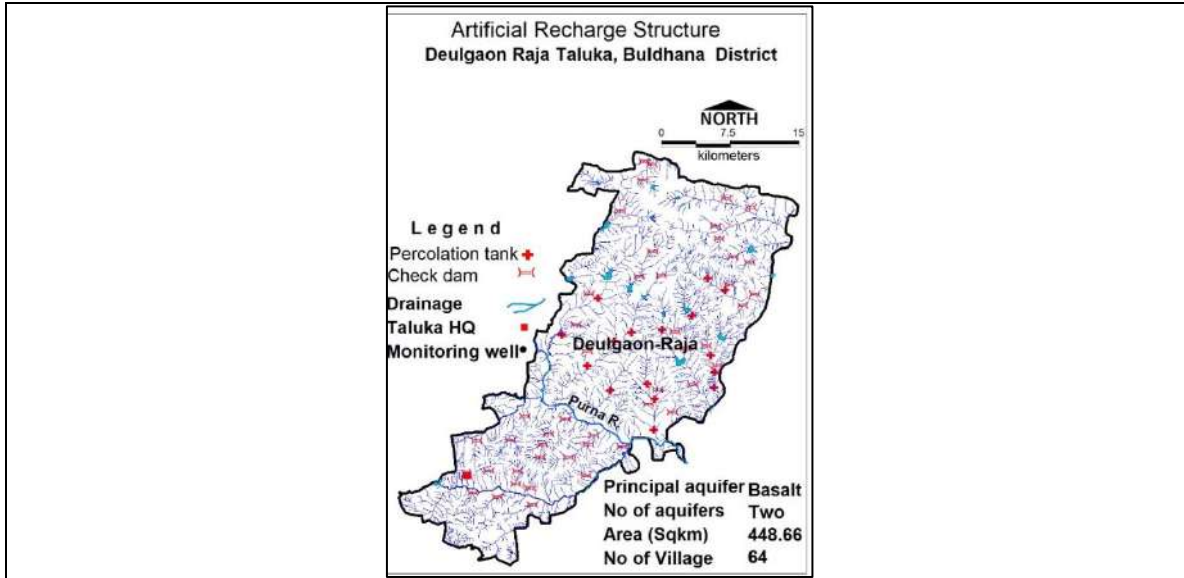
5.2 Aquifer-II Semiconfined/Confined Deeper Aquifer (Basalt)

Mean	Area	Peizo	S	Sy	Resource	Resource in	Total
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aquifer thickness	(Sqkm)	metri c Head (m)			above confinig layer (mcm)	aquifer (mcm)	resource (mcm)
0.75	0.9529	35	0.00003	0.002	0.001	0.001	0.002
0.75	155.62	25	0.00003	0.002	0.11	0.23	0.35
2	143	35	0.0000426	0.002	0.21	0.57	0.78
4.5	186.97	36	0.0000426	0.002	0.28	1.68	1.96
6.0. GROUND WATER RESOURCE ENHANCEMENT							
6.1. Supply Side Management							
SUPPLY (MCM)							
Available Resource (MCM)						60.92	
Gross Annual Draft (MCM)						46.45	
Agricultural Supply –GW						44.94	
Agricultural Supply –SW						0.3	
Domestic Supply – GW						1.91	
Domestic Supply – SW						0.47	
Total Supply						47.22	
Area of Block (Sq. Km.)						486.78	
Area suitable for Artificial recharge (Sq. Km)						448.66	
Type of Aquifer						Hard Rock	
Area feasible for Artificial Recharge (WL >5mbgl) (Sq. Km.)						448.66	
Volume of Unsaturated Zone (MCM)						607.13	
Average Specific Yield						0.20	
Volume of Sub Surface Storage Space available for Artificial Recharge (MCM)						12.14	
Surplus water Available (MCM)						4.5	
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			16		46		
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)			2.4		1.0		
RTRWH Structures – Urban Areas							
Households to be covered (25% with 50 m ² area)						6500	
Total RWH potential (MCM)						0.183	
Rainwater harvested / recharged @ 80% runoff co-efficient						0.146	
RTRWH is economically not viable & hence, not recommended.							
6.2. Demand Side Management							
Micro irrigation techniques							
Cotton crop area (6 sqkm) , 7% area is proposed to be covered under Drip						1	
Volume of Water expected to be saved (MCM). Surface Flooding req- 0.36 m. Drip Req. – 0.24, WUE- 0.12 m						1.824	
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)						60.92	
Existing Ground Water Draft for All Uses (MCM)						46.44	

Present stage of Ground Water Development (%)	76.25 %
Additional GW resources available after Supply side interventions (MCM)	3.43
Ground Water Availability after Supply side intervention(MCM)	64.35
Stage of Ground Water Development after supply side interventions (%)	72.17 %
GW draft after Demand Side Interventions (MCM)	44.62
Stage of Ground Water Development after demand side interventions (%)	69.34 %
Other Interventions Proposed, if any	
Alternate Water Sources Available	Nil
6.4. Development Plan	
Volume of water available for GWD after stage of GWD brought to 70% (ham)	42.25
Proposed Number of DW (@ 1.5 ham for 90% of GWR Available)	25
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 after 70% stage of gwd is achieved	0.65
Regulatory Measures	60m borewells/tube wells





11.0 AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, KHAMGAON BLOCK, BULDHANA DISTRICT, MAHARASHTRA

1. SALIENT FEATURES																																													
1.1 Introduction																																													
Block Name	KHAMGAON																																												
Geographical Area (Sq. Km.)	1202.41 Sq. Km.																																												
Hilly Area (Sq. Km)	241.54																																												
Population (2011)	442557																																												
Climate	Hot and dry																																												
Net Annual Ground Water Availability (MCM)	98.89																																												
Existing Gross Ground Water Draft for All uses (MCM)	59.39																																												
Provision for domestic and industrial requirement supply to 2025(MCM)	7.99																																												
Stage of Ground Water Development %	60.06																																												
Category	Safe																																												
1.1 Rainfall Analysis																																													
Normal Rainfall	656.4 mm																																												
Annual Rainfall (2018)	335.4 mm																																												
Decadal Average Annual Rainfall (2009-18)	659.75 mm																																												
Short Term Rainfall Analysis (1998-2018)	Insignificantly falling trend -5.45 mm/year. Probability of Rainfall : 58% Normal Rainfall; 16 % Excess Rainfall Probability of Drought: 26% Moderate Drought &0% Severe Drought																																												
Rainfall Trend Analysis (1998 To 2018)																																													
<table border="1"> <caption>Annual Rainfall Data (1998-2018)</caption> <thead> <tr> <th>Year</th> <th>Rainfall (mm)</th> </tr> </thead> <tbody> <tr><td>1998</td><td>650</td></tr> <tr><td>1999</td><td>650</td></tr> <tr><td>2000</td><td>650</td></tr> <tr><td>2001</td><td>700</td></tr> <tr><td>2002</td><td>780</td></tr> <tr><td>2003</td><td>480</td></tr> <tr><td>2004</td><td>480</td></tr> <tr><td>2005</td><td>580</td></tr> <tr><td>2006</td><td>1020</td></tr> <tr><td>2007</td><td>650</td></tr> <tr><td>2008</td><td>480</td></tr> <tr><td>2009</td><td>650</td></tr> <tr><td>2010</td><td>980</td></tr> <tr><td>2011</td><td>650</td></tr> <tr><td>2012</td><td>750</td></tr> <tr><td>2013</td><td>820</td></tr> <tr><td>2014</td><td>480</td></tr> <tr><td>2015</td><td>600</td></tr> <tr><td>2016</td><td>720</td></tr> <tr><td>2017</td><td>520</td></tr> <tr><td>2018</td><td>335.4</td></tr> </tbody> </table>		Year	Rainfall (mm)	1998	650	1999	650	2000	650	2001	700	2002	780	2003	480	2004	480	2005	580	2006	1020	2007	650	2008	480	2009	650	2010	980	2011	650	2012	750	2013	820	2014	480	2015	600	2016	720	2017	520	2018	335.4
Year	Rainfall (mm)																																												
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2016	720																																												
2017	520																																												
2018	335.4																																												
1.3. Geomorphology, Soil & Geology																																													
Geomorphic Unit	Alluvial flood Plains of Painganga & its tributaries River Plateau (slightly dissected to weathered plateau)																																												
Geology	Deccan Traps (Basalt) Age: Upper Cretaceous to Lower Eocene																																												
Soil	Light to Medium BCS consisting mostly of clay and loam																																												
1.4. Hydrology & Drainage																																													
Drainage	Paingana river and its tributaries with sub-dendritic to dendritic drainage.																																												
Hydrology	Major project (CCA in Ha)	1 (Jigao Project; Ongoing)																																											
	Medium project	2 (Gyanganga ,Mass)																																											
	Bigger Minor Irrigation Project (100-300 Ha.)	6 (Nimkhed,Pimpalgaon Nath,Fatehpur,Gardgaon ,Pimpali Gavali and botha)																																											
	Minor Irrigation Project (0-100 Ha.)	State-7; MILS-11																																											

		PT-35, KT-1, VP-15, MI-6
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1.5. Land Use, Agriculture, Irrigation & Cropping Pattern

Forest Area	134.53 Sq. Km.	
Cultivable Area	829.22 Sq. Km.	
Net Sown Area	597.79 Sq. Km.	
Double Cropped Area	141.08 Sq.Km.	
Area under Irrigation	Surface Water	7.35 Sq. Km.
	Ground Water	76.5 Sq. Km.
Area under Drip & Sprinkler Irrigation		
Principal Crops	Crop Type	Area (Sq. Km.) (Reference year 2017-18)
	Cotton	247.13
	Cereals	88.7
	Pulses	232
	Oil Seeds	425
Horticultural Crops	Sugarcane	0.15
	Spices	1.15
	Others	32.2

1.6. Water Level Behavior

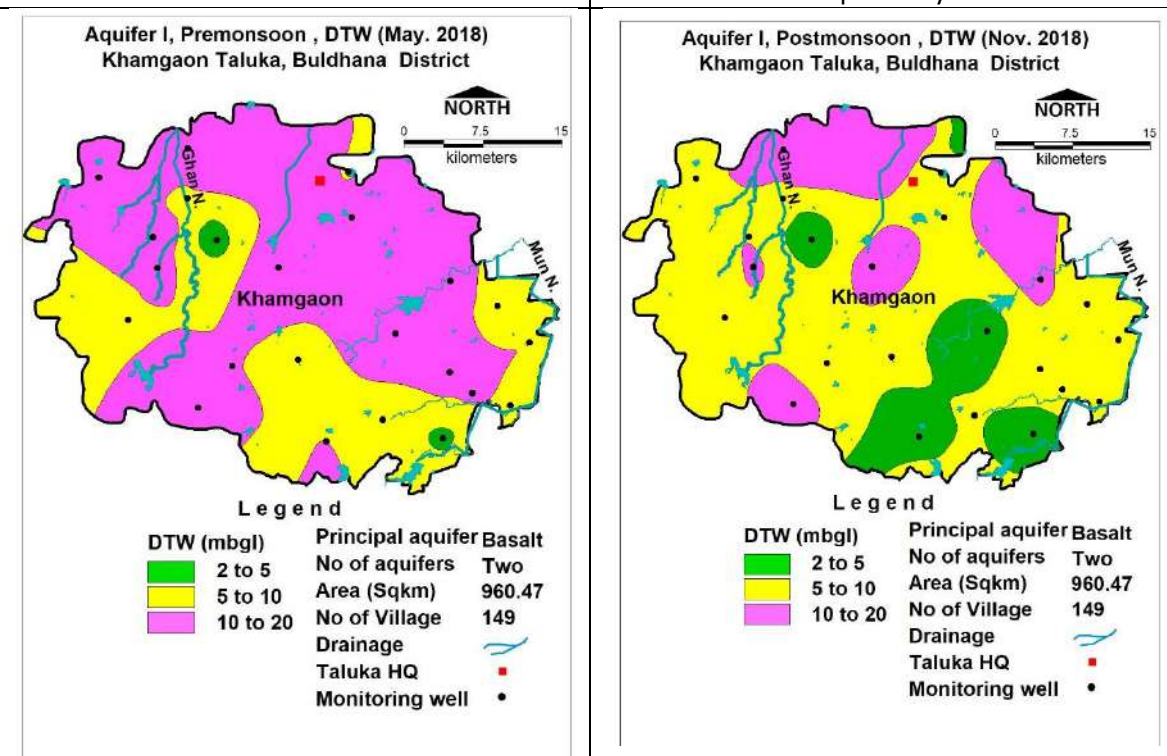
1.6.1 Aquifer-I (Shallow Aquifer)

Pre-Monsoon (May-2017)

DTWL 10 to 20 mbgl is observed in Major block engulfing DTWL patches of 5 to 10 mbgl. Shallow DTWL <5 mbgl is observed as isolated patches at 1 or 2 places.

Post-Monsoon (November-2017)

DTWL 5 to 10 mbgl is observed in major block. Water level in the range of 10 to 20 mbgl observed in Northern part of the block & 2 to 5 mgl is observed only as small isolated patches of southern side respectively.

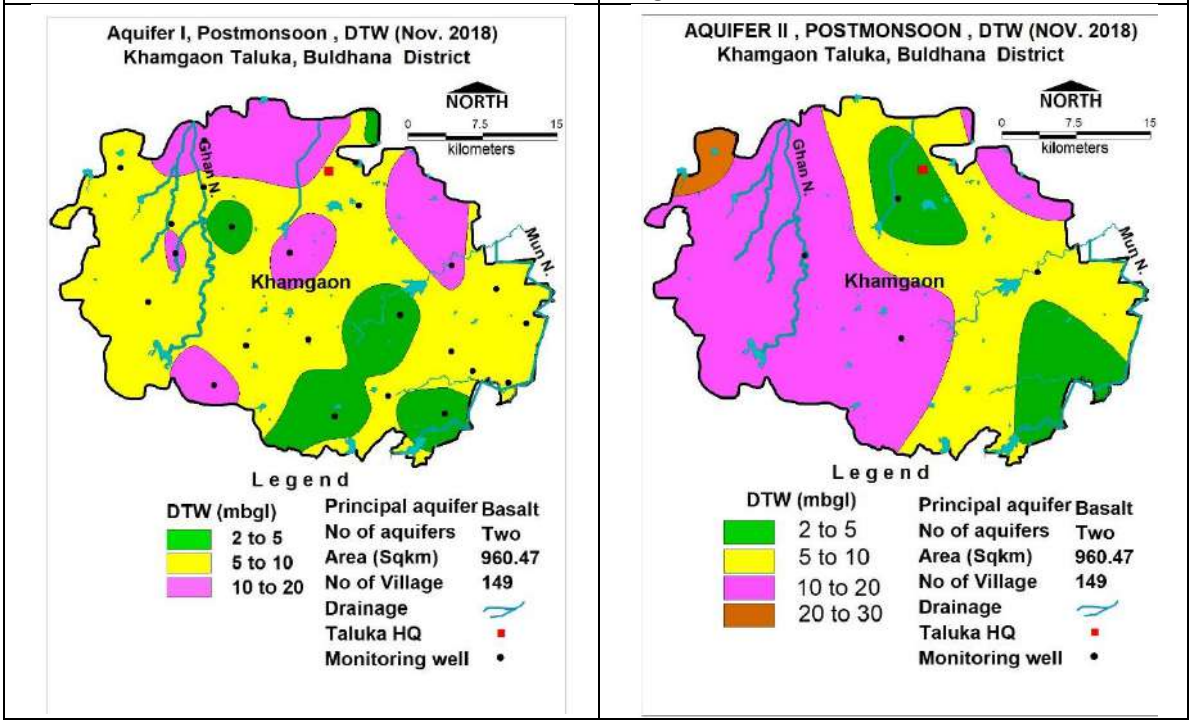


1.6.2 Water Level Behavior - Aquifer-II (Deeper Aquifer)

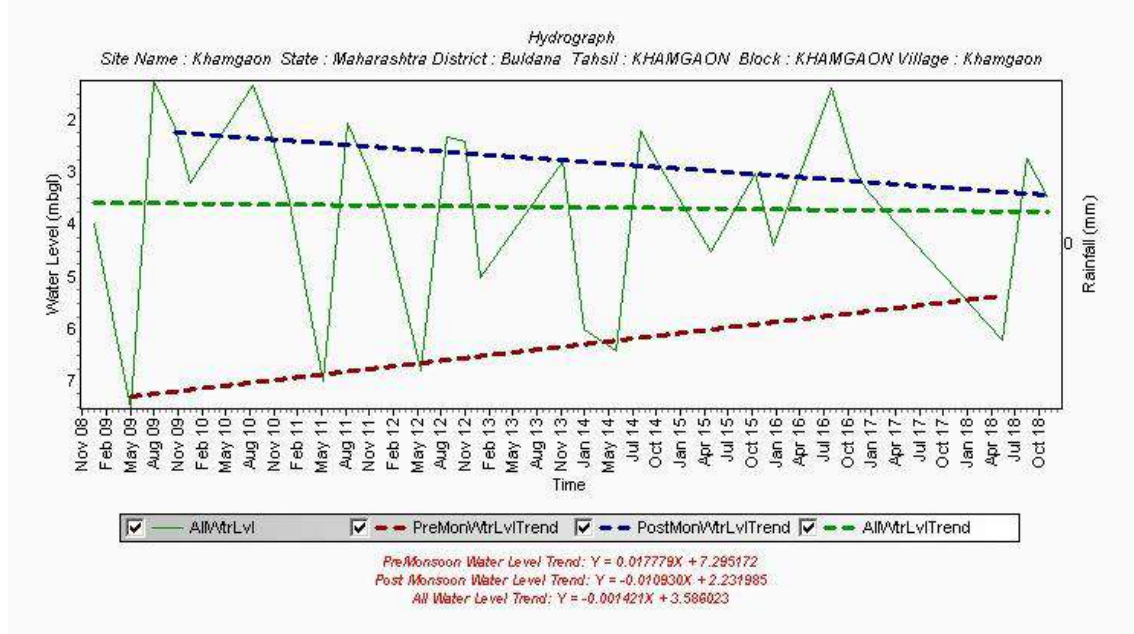
Pre-Monsoon (May-2017) DTWL 5-10 mbgl is observed in major part engulfing small patch of

Post-Monsoon (November-2017) DTWL 10-20 mbgl is observed in half part of block

<p>2-5 mbgl in central & south eastern part. Central & Northwestern Northeastern part has DTWL 10-20 mbgl.</p>	<p>comprising northwestern & southwestern part, engulfing small patch of DTWL < 10 mbgl in North eastern & southeastern part. Northwestern isolated patch has DTWL 20-30 mbgl.</p>
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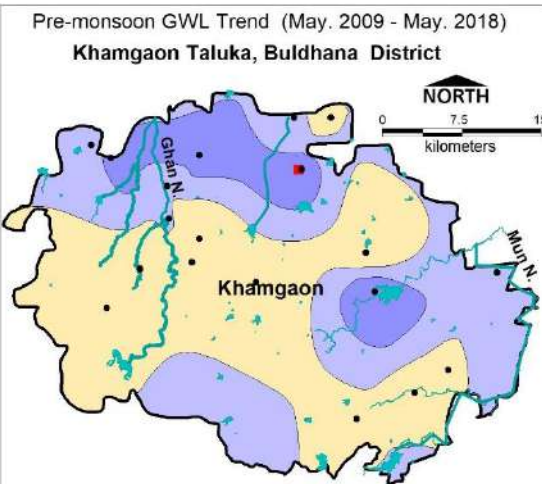
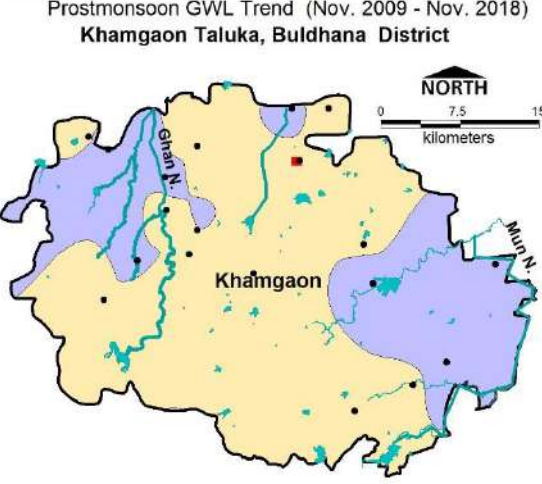
1.7. Hydrographs



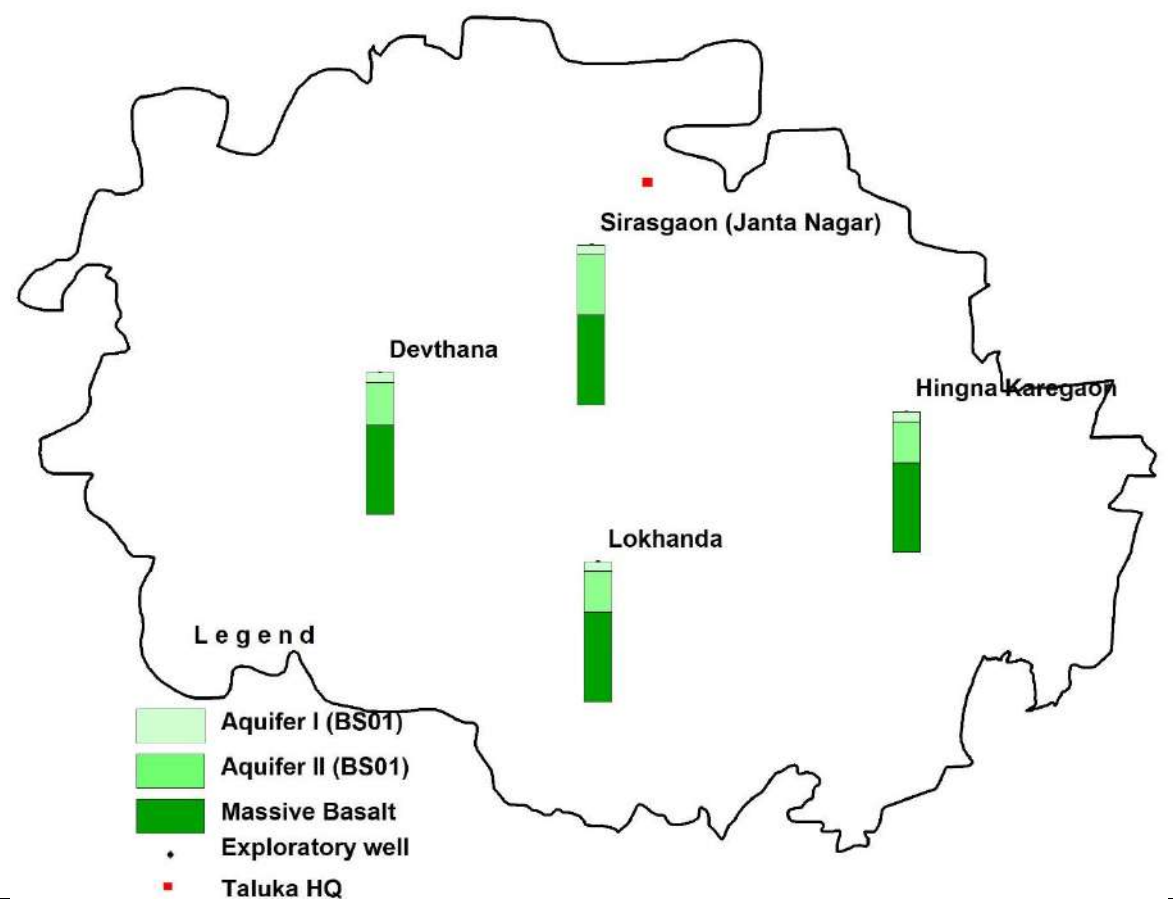
<p>Hydrograph shows Pre-monsoon rising water level trend @ 0.01777 m/year</p>	<p>Hydrograph shows Post- monsoon declining water level trend @ 0.0109 m/year</p>
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1.8. Water Level Trend (2008-18)

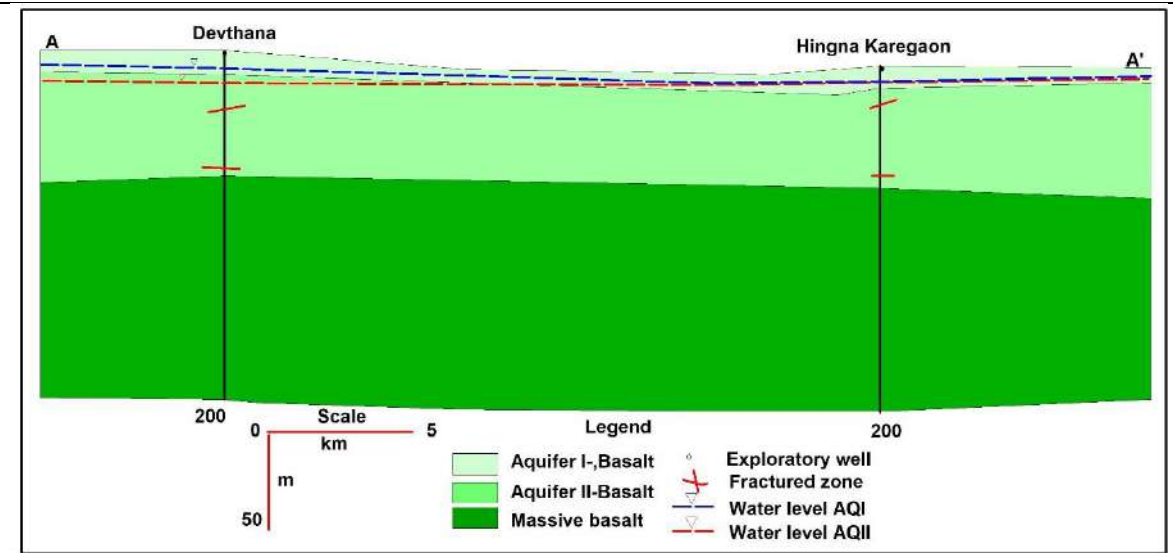
<p>Pre-Monsoon trend Rising 0.02705 (Lakhanwada Bk.) to 0.1957 (Rohana) m/year Falling 0.00172 (Tandulwadi) to 0.3453 (Vihigaon) m/year</p>	<p>Post-Monsoon trend Rising 0.027 (Rohana) to 0.1676 (Hiwarkhed) m/year; Falling 0.03712 (Nandari) to 0.158 (Palshri kh.) m/year</p>
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<p>Rising water level trend up to 0.4 m/year (609.27 sq km) Northern & Eastern apt of the block. Falling trend upto 0.2 m/year has been observed in central part of the block in 592.6 sqkm area.</p>	<p>Major part of the block shows falling trend up to 0.2 m/year (825.9 sq km) while rising trend upto 0.2 m/year (384.37 sq km) has been observed in Northern West & eastern part of the block.</p>																																																								
<p>Pre-monsoon GWL Trend (May. 2009 - May. 2018) Khamgaon Taluka, Buldhana District</p>  <table border="1" data-bbox="247 884 758 1086"> <thead> <tr> <th colspan="2">Legend</th> <th colspan="2">Principal aquifer Basalt</th> </tr> </thead> <tbody> <tr> <td>Dark Blue</td> <td>Rise 0.2 to 0.4</td> <td>No of aquifers</td> <td>Two</td> </tr> <tr> <td>Light Blue</td> <td>Rise 0.0 to 0.2</td> <td>Area (Sqkm)</td> <td>960.47</td> </tr> <tr> <td>Yellow</td> <td>Fall -0.0 to -0.2</td> <td>No of Village</td> <td>149</td> </tr> <tr> <td></td> <td></td> <td>Drainage</td> <td></td> </tr> <tr> <td></td> <td></td> <td>Taluka HQ</td> <td></td> </tr> <tr> <td></td> <td></td> <td>Monitoring well</td> <td></td> </tr> </tbody> </table>	Legend		Principal aquifer Basalt		Dark Blue	Rise 0.2 to 0.4	No of aquifers	Two	Light Blue	Rise 0.0 to 0.2	Area (Sqkm)	960.47	Yellow	Fall -0.0 to -0.2	No of Village	149			Drainage				Taluka HQ				Monitoring well		<p>Postmonsoon GWL Trend (Nov. 2009 - Nov. 2018) Khamgaon Taluka, Buldhana District</p>  <table border="1" data-bbox="837 884 1348 1108"> <thead> <tr> <th colspan="2">Legend</th> <th colspan="2">Principal aquifer Basalt</th> </tr> </thead> <tbody> <tr> <td>Light Blue</td> <td>Rise 0.0 to 0.2</td> <td>No of aquifers</td> <td>Two</td> </tr> <tr> <td>Yellow</td> <td>Fall -0.0 to -0.2</td> <td>Area (Sqkm)</td> <td>960.47</td> </tr> <tr> <td></td> <td></td> <td>No of Village</td> <td>149</td> </tr> <tr> <td></td> <td></td> <td>Drainage</td> <td></td> </tr> <tr> <td></td> <td></td> <td>Taluka HQ</td> <td></td> </tr> <tr> <td></td> <td></td> <td>Monitoring well</td> <td></td> </tr> </tbody> </table>	Legend		Principal aquifer Basalt		Light Blue	Rise 0.0 to 0.2	No of aquifers	Two	Yellow	Fall -0.0 to -0.2	Area (Sqkm)	960.47			No of Village	149			Drainage				Taluka HQ				Monitoring well	
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<p>2. Ground Water Issues</p>																																																									
<ol style="list-style-type: none"> 1. Block shows declining water level trend up to 0.2 m/year observed in 1147 sq km during pre-monsoon while in postmonsoon 559 sqkm area is experiencing declining trend upto 0.2 m/year. 2. Frequent droughts (26% Moderate) which is ultimately responsible for less ground water recharge and non-availability of surface & ground water for irrigation. 3. Less ground water potential basaltic aquifer. 																																																									
<p>3. AQUIFER DISPOSITION</p>																																																									
<p>3.1. Number of Aquifers</p>	<p>Basalt –Aquifer-I (Phreatic / Shallow aquifer) Basalt –Aquifer-II (Semiconfined / confined / Deeper aquifer)</p>																																																								

3.2. Lithological Disposition



3.3. Cross Sections - Section AA'



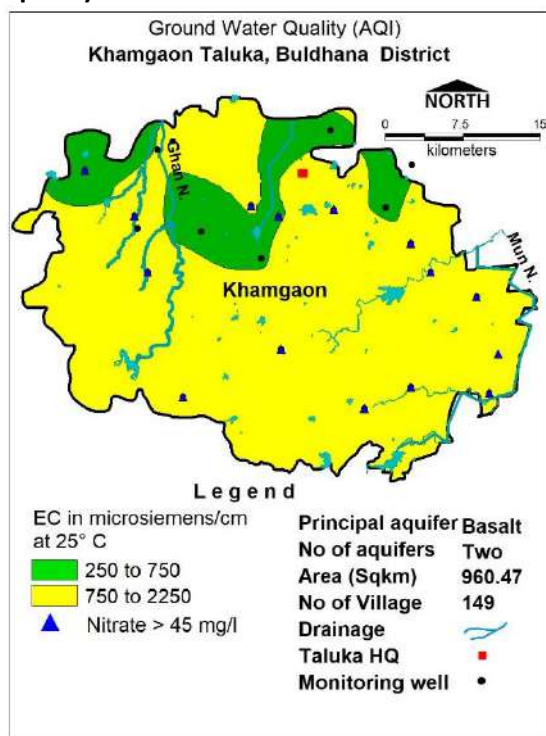
3.4. Aquifer Characteristics

Major Aquifers	Basalt (Deccan Traps)	
	Basalt –Aquifer-I (Phreatic / aquifer)	Basalt –Aquifer-II (Semiconfined / confined / Deeper aquifer)
Type of Aquifer (Phreatic/Semiconfined/Confined)	Basalt –Aquifer-I (Phreatic / aquifer)	Basalt –Aquifer-II (Semiconfined / confined / Deeper aquifer)
Depth of Occurrence (mbgl)	8 to 25	60 to 168
Weathered/fractured rocks thickness (m)	8 to 16	0.5 to 3

Yield m ³ /day/lps	10 to 100 m ³ /day	0.2 to 1.25 lps
Specific yield/ Storativity (S)	0.002	0.00003 to 0.0000426
Transmissivity (T)	30-80 m ² /day	25-158 m ² /day

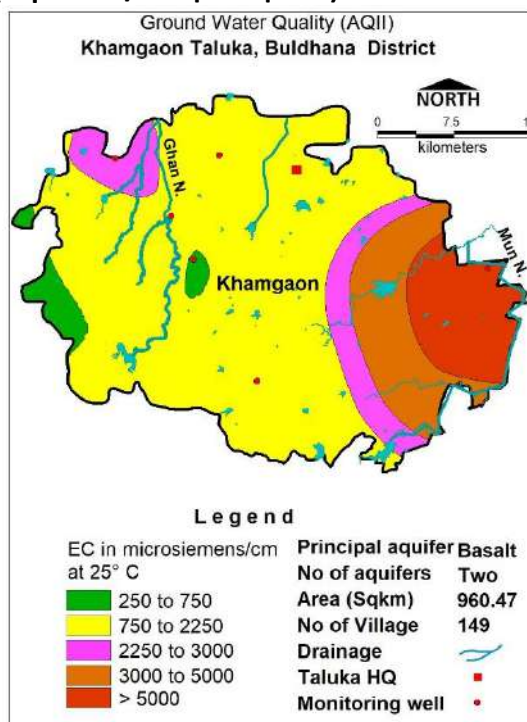
4. GROUND WATER QUALITY

4.1 Phreatic Aquifer (Aquifer-I/ Shallow aquifer)



EC ranging upto 2250 μS/cm has been observed in major part of block covering about 1032 sq km area of the block & ground water is suitable for all purpose. EC ranges from 250 to 750 μS/cm covering an area about 138.89 sq.km & The ground water is suitable for irrigation purpose with proper salinity control measures. However it is fit for drinking purpose without treatment. Few villages are also affected by Nitrate contamination.

4.2 Semi-confined/Confined Aquifer (Aquifer II/ Deeper aquifer)



EC ranging upto 2250 μS/cm has been observed in major part of block covering about 1257 sq km area of the block & ground water is suitable for all purpose. An EC range from 2250 to 3000 μS/cm is observed in 16 sq km area .EC ranging from 3000- 5000 observed in eastern part of the block where water is not suitable for drinking purpose. The ground water is suitable for irrigation purpose with proper salinity control measures. However it is fit for drinking purpose without treatment.

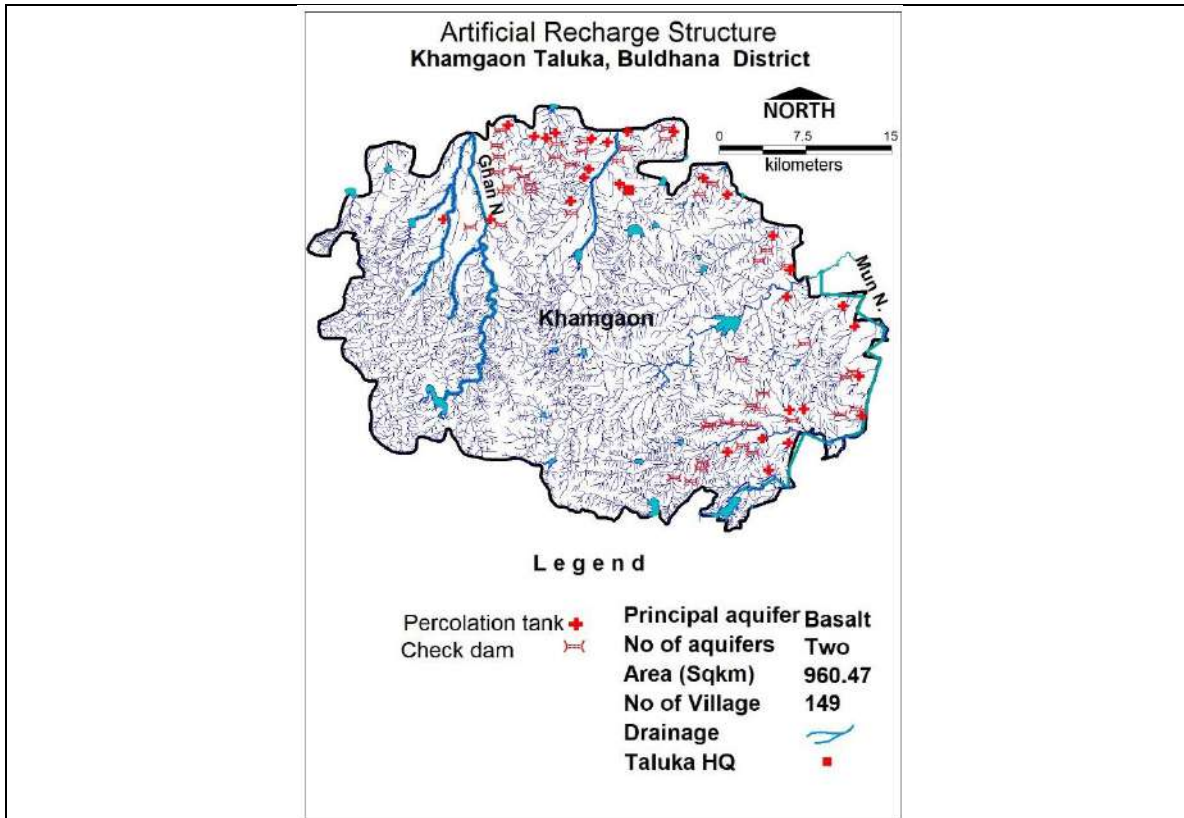
5. GROUND WATER RESOURCE

5.1 Aquifer-I/ Shallow Phreatic Aquifer (Basalt)

Ground Water Recharge Worthy Area (Sq. Km.)	960.87
Command Area	138.74
Non Command Area	822.13
Total Annual Ground Water Recharge (MCM)	104.09
Natural Discharge (MCM)	5.20
Net Annual Ground Water Availability (MCM)	98.89
Existing Gross Ground Water Draft for irrigation (MCM)	55.27
Existing Gross Ground Water Draft for domestic and industrial water supply(MCM)	4.11
Existing Gross Ground Water Draft for All uses(MCM)	59.39
Provision for domestic and industrial requirement supply to 2025(MCM)	7.99

Net Ground Water Availability for future irrigation development(MCM)							34.96
Stage of Ground Water Development (%)							60.06
Category							SAFE
5.2 Aquifer-II Semiconfined/Confined Deeper Aquifer (Basalt)							
Mean aquifer thickness	Area (Sqk m)	Peizometric Head (m)	S	Sy	Resource above confinig layer (mcm)	Resource in aquifer (mcm)	Total resource (mcm)
0.75	204.338	21	0.0000426	0.002	0.182	0.306	0.489
2	930.119	22	0.0000426	0.002	0.871	3.720	4.592
4.5	67.9214	35	0.00003	0.002	0.071	0.611	0.682
TOTAL							5.763
6.0. GROUND WATER RESOURCE ENHANCEMENT							
6.1. Supply Side Management							
SUPPLY (MCM)							
Available Resource (MCM)							98.89
Gross Annual Draft (MCM)							59.39
Agricultural Supply -GW							55.28
Agricultural Supply -SW							6.6
Domestic Supply - GW							1.64
Domestic Supply - SW							1.037
Total Supply							64.557
Area of Block (Sq. Km.)							1202.41
Area suitable for Artificial recharge (Sq. Km)							659.73
Type of Aquifer							Hard Rock
Area feasible for Artificial Recharge (WL >5mbgl) (Sq. Km.)							Approx. 560
Volume of Unsaturated Zone (MCM)							1319.45
Average Specific Yield							0.020
Volume of Sub Surface Storage Space available for Artificial Recharge (MCM)							26.39
Surplus water Available (MCM)							9.95
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			30		48		
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)			4.5		1.08		
RTRWH Structures – Urban Areas							
Households to be covered (25% with 50 m ² area)							17500
Total RWH potential (MCM)							0.4515
Rainwater harvested / recharged @ 80% runoff co-efficient							0.3612
RTRWH is economically not viable & hence, not recommended.							
6.2. Demand Side Management							
Micro irrigation techniques							
Cotton crop area (7), about 2 sqkm area is ground water irrigated, 100 %							2

ground water irrigated (2 sqkm) 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	0.608
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)	98.89
Existing Ground Water Draft for All Uses (MCM)	59.39
Present stage of Ground Water Development (%)	60.06%
Additional GW resources available after Supply side interventions (MCM)	5.58
Ground Water Availability after Supply side intervention(MCM)	104.47
Stage of development after Supply side intervention (%)	56.85
GW draft after Demand Side Interventions (MCM)	58.78
Stage of development after demand side intervention (%)	56.26
Other Interventions Proposed, if any	
Alternate Water Sources Available	Nil
6.4. Development Plan	
Volume of water available for GWD after stage of GWD brought to 70% (ham)	1434.7
Proposed Number of DW (@ 1.5 ham for 90% of GWR Available)	861
Proposed Number of BW (@ 1.5 ham for 10% of GWR Available)	96
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	22.072
Regulatory Measures	60m borewells/tube wells
<p>Additional Area proposed to be brought under assured GW irrigation Khamgaon Taluka, Buldhana District</p> <p>Legend</p> <ul style="list-style-type: none"> Additional Area proposed to be brought under assured GW irrigation with av. CWR of 0.65 m AFTER 70% STAGE OF GWD IS ACHIEVED Khamgaon 22.07 Sqkm , Principal aquifer Basalt No of aquifers Two Area (Sqkm) 960.47 No of Village 149 Drainage Taluka HQ Monitoring well 	<p>DEMAND SIDE INTERVENTION Khamgaon Taluka, Buldhana District</p> <p>Legend</p> <ul style="list-style-type: none"> Cotton crop area proposed to be covered under drip irrigation in Bhamgaon 2 sqkm Principal aquifer Basalt No of aquifers Two Area (Sqkm) 960.47 No of Village 149 Drainage Taluka HQ



12.0 AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, LONAR BLOCK, BULDHANA DISTRICT, MAHARASHTRA

1. SALIENT FEATURES																																													
1.1 Introduction																																													
Block Name	Lonar																																												
Geographical Area (Sq. Km.)	714.11																																												
Hilly Area (Sq. Km)	134.99																																												
Population (2011)	152351																																												
Climate	Hat and dry																																												
Net Annual Ground Water Availability (MCM)	80.47																																												
Existing Gross Ground Water Draft for All uses (MCM)	45.09																																												
Provision for domestic and industrial requirement supply to 2025(MCM)	4.43																																												
Stage of Ground Water Development %	56.04																																												
Category	Safe																																												
1.2 Rainfall Analysis																																													
Normal Rainfall	786.8 mm																																												
Annual Rainfall (2018)	524.4 mm																																												
Decadal Average Annual Rainfall (2009-18)	679.2mm																																												
Short Term Rainfall Analysis (1998-2017)	Significantly falling trend -32.17 mm/year. Probability of Rainfall : 37% Normal Rainfall; 26 % Excess Rainfall Probability of Drought: 37 % Moderate Drought																																												
Rainfall Trend Analysis (1998 To 2017)																																													
<table border="1"> <caption>Annual Rainfall Data (1998-2018)</caption> <thead> <tr> <th>Year</th> <th>Rainfall (mm)</th> </tr> </thead> <tbody> <tr><td>1998</td><td>1600</td></tr> <tr><td>1999</td><td>1000</td></tr> <tr><td>2000</td><td>1000</td></tr> <tr><td>2001</td><td>1150</td></tr> <tr><td>2002</td><td>1000</td></tr> <tr><td>2003</td><td>500</td></tr> <tr><td>2004</td><td>550</td></tr> <tr><td>2005</td><td>750</td></tr> <tr><td>2006</td><td>1100</td></tr> <tr><td>2007</td><td>750</td></tr> <tr><td>2008</td><td>650</td></tr> <tr><td>2009</td><td>750</td></tr> <tr><td>2010</td><td>1150</td></tr> <tr><td>2011</td><td>550</td></tr> <tr><td>2012</td><td>650</td></tr> <tr><td>2013</td><td>950</td></tr> <tr><td>2014</td><td>500</td></tr> <tr><td>2015</td><td>550</td></tr> <tr><td>2016</td><td>650</td></tr> <tr><td>2017</td><td>550</td></tr> <tr><td>2018</td><td>524.4</td></tr> </tbody> </table>		Year	Rainfall (mm)	1998	1600	1999	1000	2000	1000	2001	1150	2002	1000	2003	500	2004	550	2005	750	2006	1100	2007	750	2008	650	2009	750	2010	1150	2011	550	2012	650	2013	950	2014	500	2015	550	2016	650	2017	550	2018	524.4
Year	Rainfall (mm)																																												
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1.3. Geomorphology & Geology																																													
Geomorphic Unit	Alluvial flood Plains of Purna & its tributaries River Plateau (slightly dissected to weathered plateau) with weathered thickness ranging from 0 to 2 m.																																												
Geology	Deccan Traps (Basalt) Age: Late Cretaceous to Eocene																																												
Soil	Light to Medium BCS consisting mostly of clay and loam																																												
1.4. Hydrology & Drainage																																													
Drainage	Painganga & Purna river and their tributaries with sub-dendritic to dendritic drainage.																																												
Hydrology	Major project (CCA in Ha)	0																																											
	Medium project (CCA in Ha)	0																																											
	Bigger Minor Irrigation Project (100-300 Ha.) (CCA in Ha)	13																																											

Minor Irrigation Project (0-100 Ha.) (CCA in Ha)	State-8; MILS-1 PT-33, KT-2, VP-10, MI-4
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1.5. Land Use, Agriculture, Irrigation & Cropping Pattern

Forest Area	14.46 Sq. Km.	
Cultivable Area	644.85 Sq. Km.	
Net Sown Area	494.41 Sq. Km.	
Double Cropped Area	150.44 Sq. Km	
Area under Irrigation	Surface Water	2.8 Sq. Km. 280 ha
	Ground Water	5.57 Sq. Km. 557 ha.
Area under Drip & Sprinkler Irrigation	none	
Principal Crops	Crop Type	Area (Sq. Km.) (Reference year 2016-17)
	Cotton	77.29
	Cereals	184.69
	Pulses	311.26
	Oil Seeds	50.33
Horticultural Crops	Sugarcane	0.96
	Others	4.11

1.6. Water Level Behavior

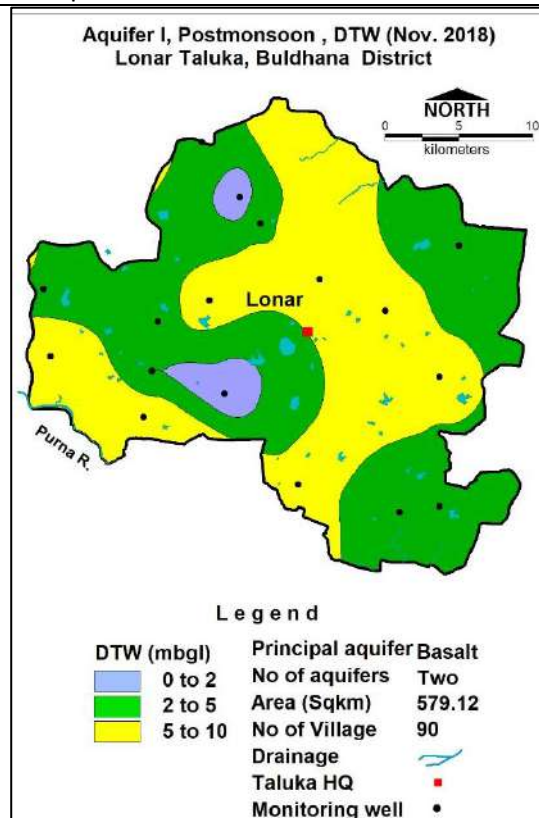
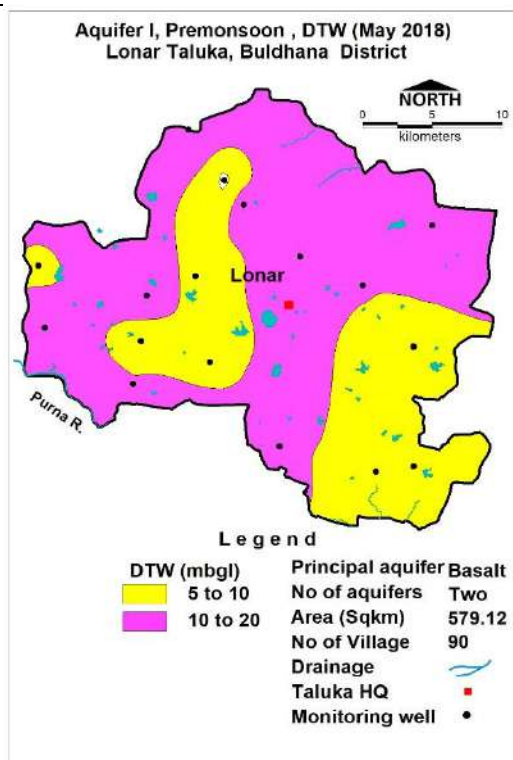
1.6.1 Aquifer-I (Shallow Aquifer)

Pre-Monsoon (May-2018)

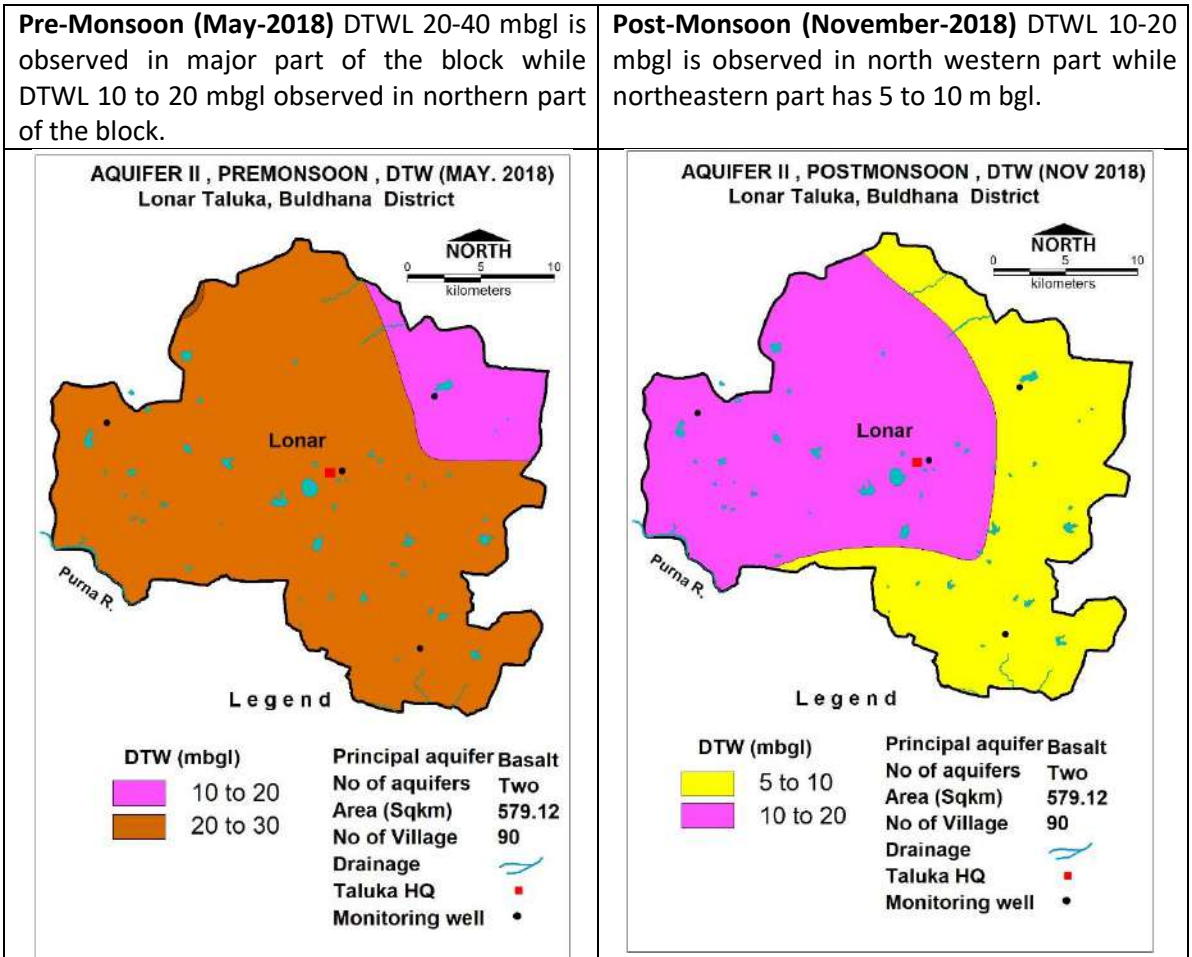
DTWL 10 to 20 mbgl is observed in major area while DTWL 5 to 10 mbgl observed in Central and northeastern part.

Post-Monsoon (November-2018)

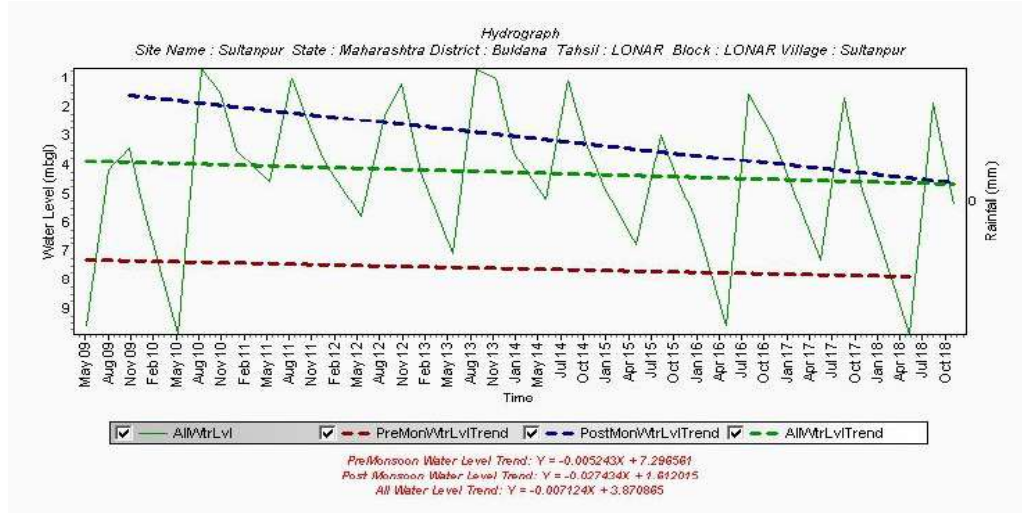
DTWL 5 to 10 mbgl is observed in central parts of the block while water level in the range of 2 to 5 mbgl is observed northeastern & North western parts. DTWL 0 to 2 mbgl is observed in small patches.



1.6.2 Water Level Behavior - Aquifer-II (Deeper Aquifer)



1.7. Hydrographs



Hydrograph shows Pre-monsoon declining water level trend @ 0.052 m/year

Hydrograph shows Post- monsoon declining water level trend @ 0.027 m/year

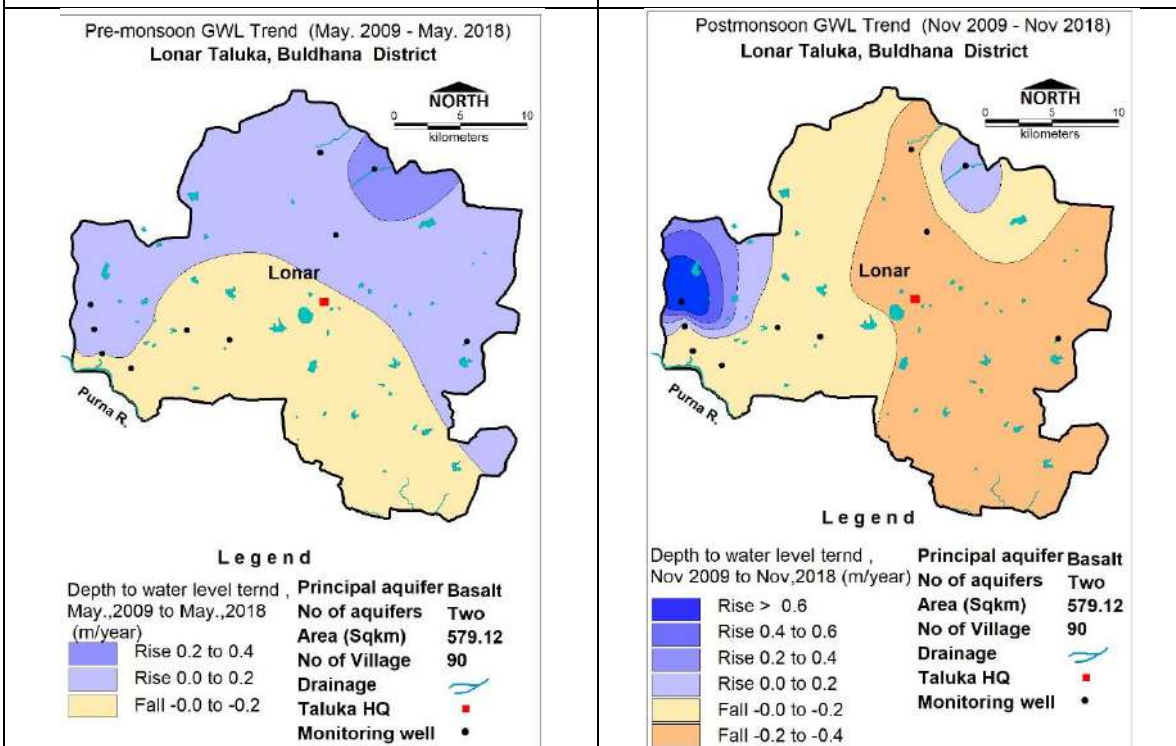
1.8. Water Level Trend (2009-18)

Pre-Monsoon trend
Rising 0.006 (Savargao teli) to 0.11 (dhayfal) m/year
Falling 0.02 (Wadhav) to 0.30 (Borkhedi) m/year

Post-Monsoon trend
Rising 0.015 (Borkhedi) to 0.843 (Lonar) m/year;
Falling 0.144 (Borkhedi) to 0.843 (Lonar) m/year

Rising water level trend up to 0.4 m/year (318 sq km) in Northern part while Falling trend upto 0.2 m/year has been observed in southern part in 771 sqkm area.

Major part of the block shows falling trend up to 0.4 m/year (595.6 sq km) while rising trend upto 0.6 m/year (47.2 sq km) has been observed in western & northern part of the block.



2. Ground Water Issues

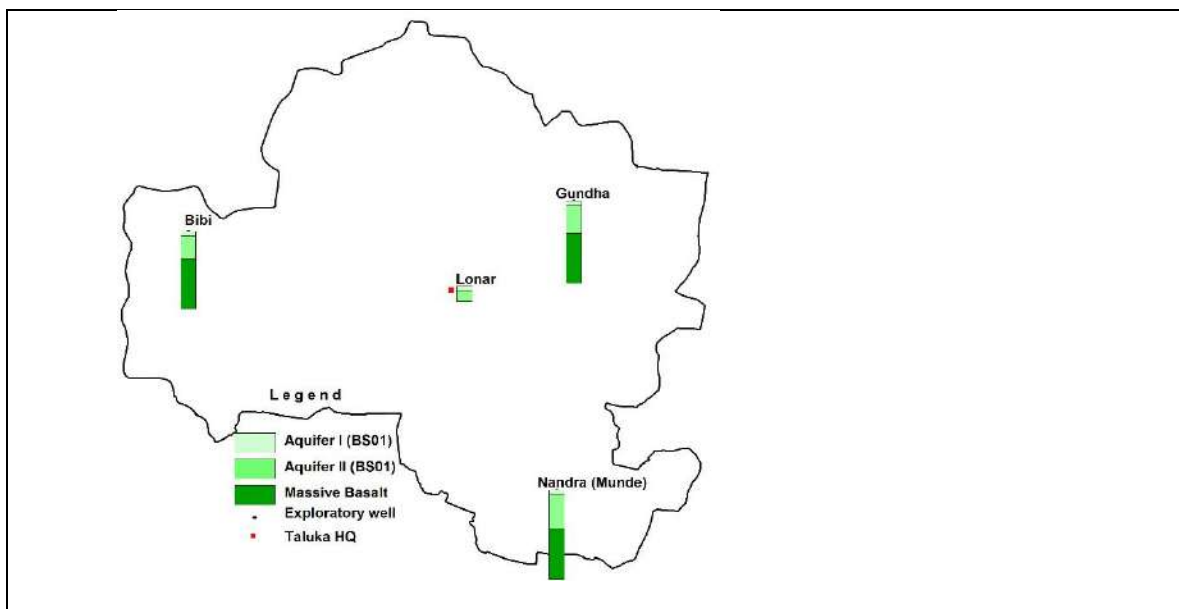
1. Block shows declining water level trend up to 0.2 m/year observed in 771 sq km during pre-monsoon while in postmonsoon 595.6 sq km area is experiencing declining trend upto 0.4 m/year.
2. Over exploitation
3. Water scarcity on lean period
4. Normal Probability of Rainfall is only 50% coupled with frequent droughts (37% Moderate) which is ultimately responsible for less ground water recharge and non-availability of surface & ground water for irrigation.
5. Less ground water potential basaltic aquifer.

3. AQUIFER DISPOSITION

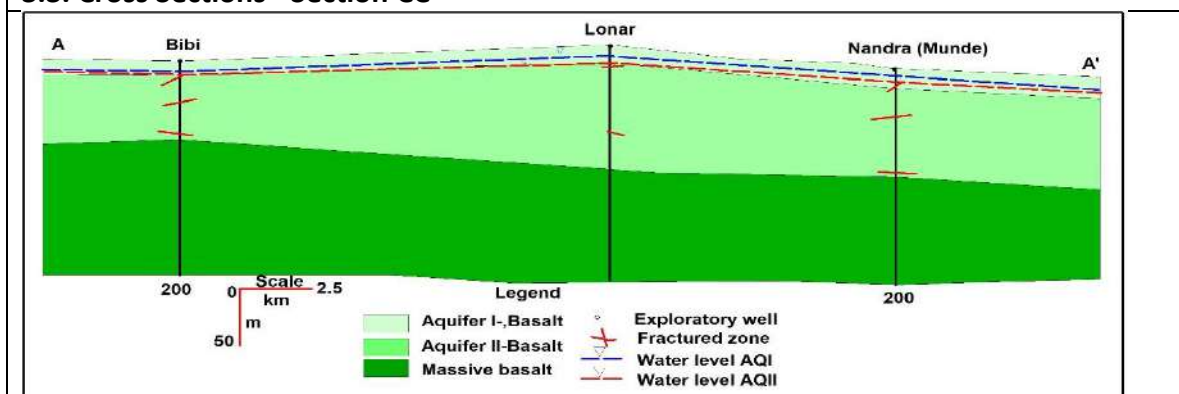
3.1. Number of Aquifers

Basalt –Aquifer-I (Phreatic / Shallow aquifer)
Basalt –Aquifer-II (Semiconfined / confined / Deeper aquifer)

5.1 Lithological Dispositoin



3.3. Cross Sections - Section CC'



3.4. Aquifer Characteristics

Major Aquifers	Basalt (Deccan Traps)	
Type of Aquifer (Phreatic/Semiconfined/Confined)	Basalt –Aquifer-I (Phreatic / Shallow aquifer)	Basalt –Aquifer-II (Semiconfined / confined / Deeper aquifer)
Depth of Occurrence (mbgl)	8 to 20	90 to 168
Weathered/fractured rocks thickness (m)	8 to 16	0.5 to 3
Yield m ³ /day/lps	10 to 100	0.3 to 1.35
Specific yield/ Storativity (S)	0.005	0.00003 to 0.0000426
Transmissivity (T)	30-80 m ² /day	25-158 m ² /day

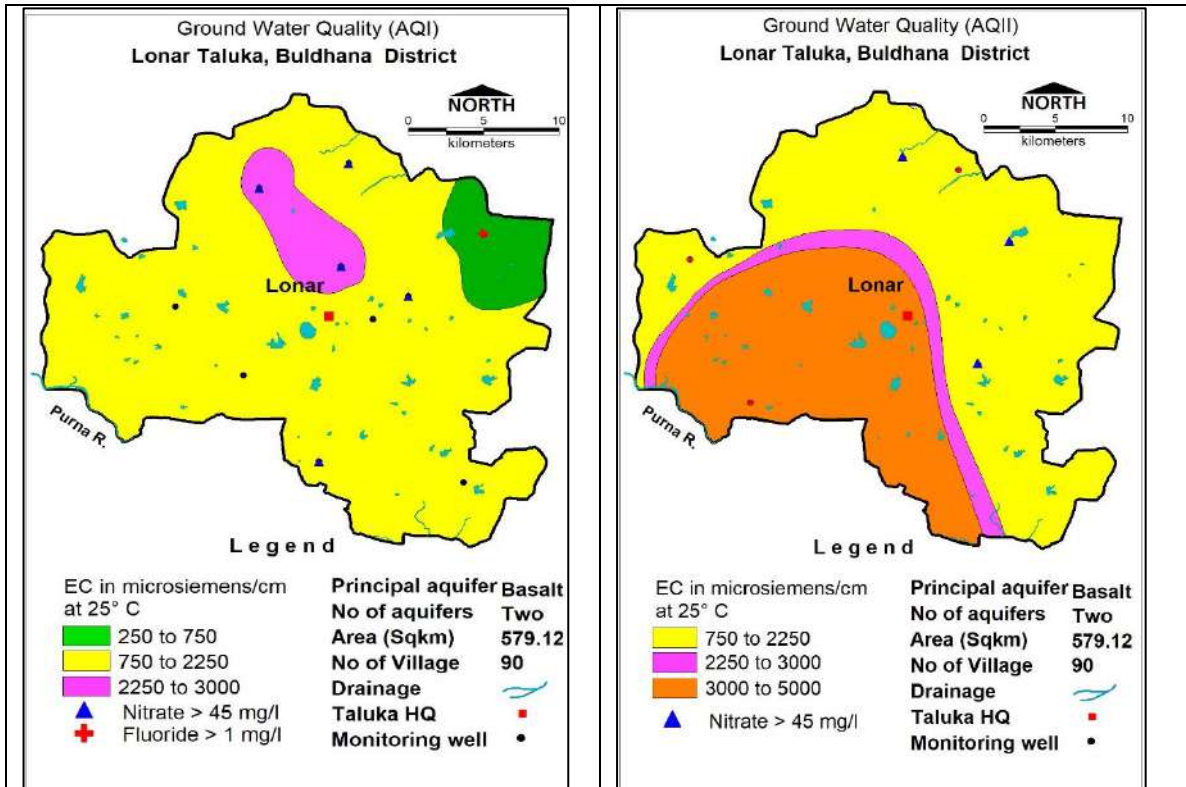
4. GROUND WATER QUALITY

4.1 Phreatic Aquifer (Aquifer-I/ Shallow aquifer)

EC ranging upto 2250 $\mu\text{S}/\text{cm}$ has been observed in entire block including major part(948 sq km) has EC ranging 250 to 750 $\mu\text{S}/\text{cm}$ while EC ranging upto 3000 $\mu\text{S}/\text{cm}$. The ground water is suitable for all purpose. Few villages are also affected by nitrate & fluoride contamination.

4.2 Semi-confined/Confined Aquifer (Aquifer II/ Deeper aquifer)

EC ranging upto 2250 $\mu\text{S}/\text{cm}$ has been observed in entire block including northern part(974 sq km) has EC ranging 3000-5000 $\mu\text{S}/\text{cm}$ observed during southern while has EC ranging upto 2250 -3000 $\mu\text{S}/\text{cm}$ observed in central part. The ground water is suitable for all purpose. Few villages are also affected by fluoride contamination.



5. GROUND WATER RESOURCE

5.1 Aquifer-I/ Shallow Phreatic Aquifer (Basalt)

Ground Water Recharge Worthy Area (Sq. Km.)	579.12
Command Area	60.55
Non command	518.57
Total Annual Ground Water Recharge (MCM)	84.70
Natural Discharge (MCM)	4.23
Net Annual Ground Water Availability (MCM)	80.47
Existing Gross Ground Water Draft for irrigation (MCM)	42.84
Existing Gross Ground Water Draft for domestic and industrial water supply(MCM)	2.24
Existing Gross Ground Water Draft for All uses (MCM)	44.09
Provision for domestic and industrial requirement supply to 2025(MCM)	4.43
Net Ground Water Availability for future irrigation development(MCM)	33.36
Stage of Ground Water Development (%)	56.04
Category	SAFE

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

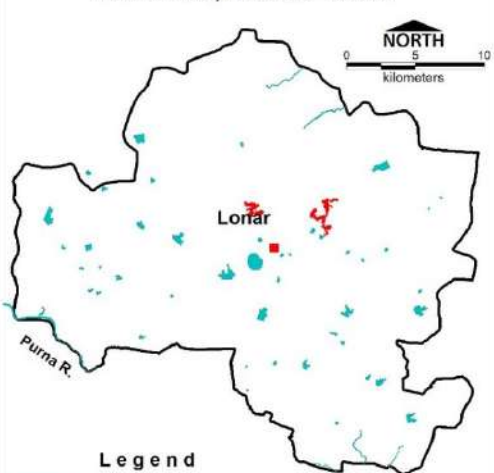
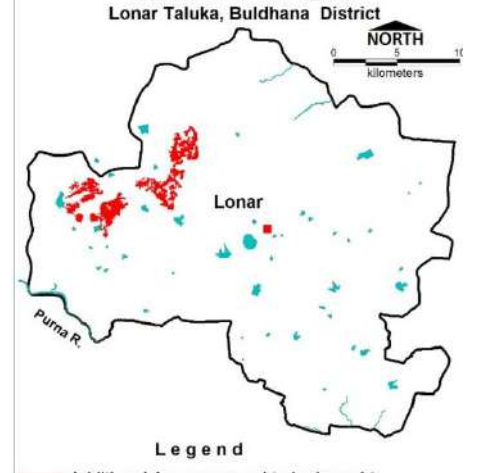
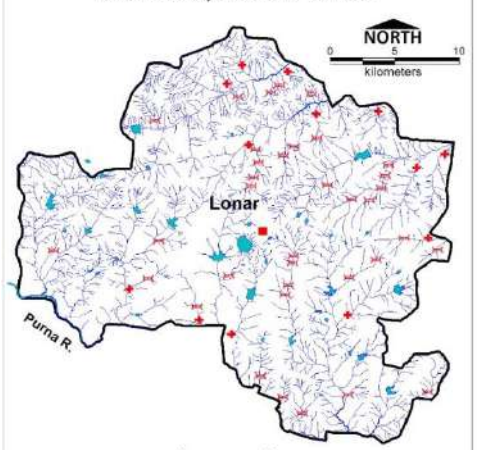
Mean aquifer thickness	Area (Sqkm)	Peizometric Head (m)	S	Sy	Resource above confinig layer (mcm)	Resourc e in aquifer (mcm)	Total resource (mcm)
0.75	455.721	25	0.00003	0.005	0.341	1.708	2.050
2	259.231	35	0.0000426	0.005	0.386	2.592	2.978
TOTAL							5.028

6.0. GROUND WATER RESOURCE ENHANCEMENT

6.1. Supply Side Management

SUPPLY (MCM)

Available Resource (MCM)	80.47	
Gross Annual Draft (MCM)	45.09	
Agricultural Supply -GW	42.85	
Agricultural Supply -SW	2.5	
Domestic Supply - GW	1.64	
Domestic Supply - SW	0.56	
Total Supply	91.3025	
Area of Block (Sq. Km.)	714.11	
Area suitable for Artificial recharge (Sq. Km)	579.12	
Type of Aquifer	Hard rock	
Area feasible for Artificial Recharge (WL >5mbgl) (Sq. Km.)	243.68	
Volume of Unsaturated Zone (MCM)	487.36	
Average Specific Yield	0.20	
Volume of Sub Surface Storage Space available for Artificial Recharge (MCM)	9.75	
Surplus water Available (MCM)	3.6	
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	13	36
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	1.95	0.81
RTRWH Structures – Urban Areas		
Households to be covered (25% with 50 m ² area)	8200	
Total RWH potential (MCM)	0.211	
Rainwater harvested / recharged @ 80% runoff co-efficient	0.169	
RTRWH is economically not viable & hence, not recommended.		
6.2. Demand Side Management		
Micro irrigation techniques		
Cotton crop area (48.58), 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	0.608	
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)	80.47	
Existing Ground Water Draft for All Uses (MCM)	45.09	
Present stage of Ground Water Development (%)	56.04	
Additional GW resources available after Supply side interventions (MCM)	2.76	
Ground Water Availability after Supply side intervention(MCM)	83.23	
Stage of development after Supply side intervention (%)	54.17	
GW draft after Demand Side Interventions (MCM)	44.48	
Stage of development after demand side intervention (%)	53.44	
Other Interventions Proposed, if any		
Alternate Water Sources Available	Nil	
6.4 Development Plan		
Volume of water available for GWD after stage of GWD brought to 70% (MCM)	1376.9	
Proposed Number of DW (@ 1.5 ham for 90% of GWR Available)	826	

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 after 70% stage of gwd is achieved	21.18
Regulatory Measures	60m borewells/tube wells
<p>DEMAND SIDE INTERVENTION Lonar Taluka, Buldhana District</p>  <p>Legend</p> <p>■ Cotton crop area proposed to be covered under drip irrigation in Lonar 2 sqkm</p> <p>Principal aquifer Basalt Drainage No of aquifers Two Taluka HQ Area (Sqkm) 579.12 No of Village 90</p>	<p>Additional Area proposed to be brought under assured GW irrigation Lonar Taluka, Buldhana District</p>  <p>Legend</p> <p>■ Additional Area proposed to be brought under assured GW irrigation with av. CWR of 0.65 m AFTER 70% STAGE OF GWD IS ACHIEVED Lonar 21.18 Sqkm</p> <p>Principal aquifer Basalt Drainage No of aquifers Two Taluka HQ Area (Sqkm) 579.12 No of Village 90</p>
<p>Artificial Recharge Structure Lonar Taluka, Buldhana District</p>  <p>Legend</p> <p>Percolation tank + Check dam</p> <p>Principal aquifer Basalt No of aquifers Two Area (Sqkm) 579.12 No of Village 90 Drainage Taluka HQ Monitoring well</p>	

13.0 AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, MEHKAR BLOCK, BULDHANA DISTRICT, MAHARASHTRA

1. SALIENT FEATURES																																													
1.1 Introduction																																													
Block Name	Mehkar																																												
Geographical Area (Sq. Km.)	1093.33																																												
Hilly Area (Sq. Km)	190.48																																												
Population (2011)	268316																																												
Climate	Hot and dry																																												
Net Annual Ground Water Availability (MCM)	110.10																																												
Existing Gross Ground Water Draft for All uses (MCM)	67.88																																												
Provision for domestic and industrial requirement supply to 2025(MCM)	7.89																																												
Stage of Ground Water Development %	61.66																																												
Category	Safe																																												
1.2 Rainfall Analysis																																													
Normal Rainfall	849.8 mm																																												
Annual Rainfall (2018)	624.4 mm																																												
Decadal Average Annual Rainfall (2009-18)	761.55 mm																																												
Short Term Rainfall Analysis (1998-2018)	Significantly falling trend -11.79 mm/year. Probability of Rainfall : 61 % Normal Rainfall; 18 % Excess Rainfall Probability of Drought: 8% Moderate Drought & 3% Severe Drought																																												
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Geomorphic Unit	Alluvial flood Plains of Painganga & its tributaries River Plateau (slightly dissected to weathered plateau) with weathered thickness ranging from 2 to 5 m.																																												
Geology	Deccan Traps (Basalt) Age: Late Cretaceous to Eocene																																												
Soil	Light to Medium BCS consisting mostly of clay and loam.																																												
1.4. Hydrology & Drainage																																													
Drainage	Painganga river and its tributaries with sub-dendritic to dendritic drainage.																																												
Hydrology	Major project (CCA in Ha)	1 Paintakli project (ongoing)																																											
	Medium project	1 Koradi Project																																											
	Bigger Minor Irrigation Project (100-300 Ha.) (CCA in Ha)	9(GHANWATPUR,SAVANGIMAL-1,SAVANGIMAL-2,PALASHI,KALMESHWAR,PANGARKHED SAN,CHAIGAO,SONATI BORI ,DURGBORI)																																											

Minor Irrigation Project (0-100 Ha.) (CCA in Ha)	State-4; MILS-1 PT-38, KT-11, VP-32, MIS-12
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1.5. Land Use, Agriculture, Irrigation & Cropping Pattern

Forest Area	105.68 Sq. Km.	
Cultivable Area	817.67 Sq. Km.	
Net Sown Area	664.30 Sq. Km.	
Double Cropped Area	177.63	
Area under Irrigation	Surface Water	2.17 Sq. Km.
	Ground Water	12.17 Sq. Km.
Area under Drip & Sprinkler Irrigation	NONE	
Principal Crops	Crop Type	Area (Sq. Km.) (Reference year 2016-17)
	Cotton	64.35
	Cereals	200.58
	Pulses	273.49
	Oil Seeds	99.71
Horticultural Crops	Sugarcane	1.60
	Spices	4.94
	Others	3.31

1.6 Water Level Behavior

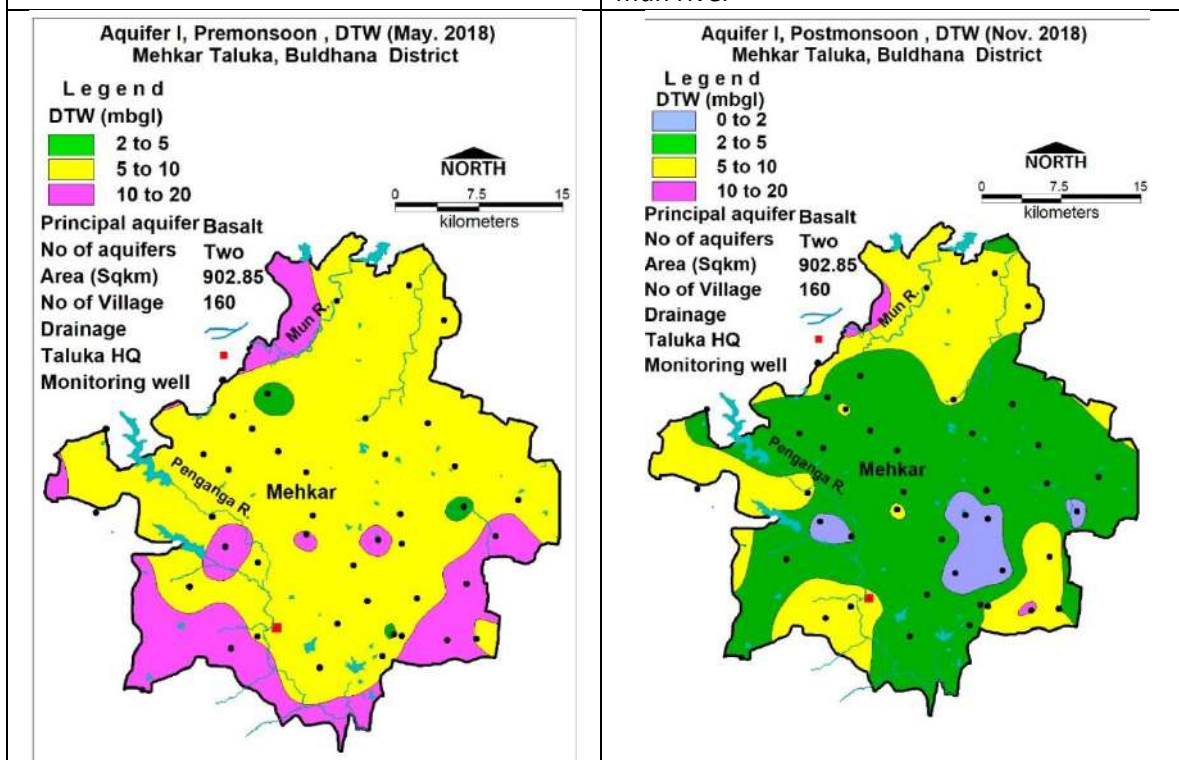
1.6.1 Aquifer-I (Shallow Aquifer)

Pre-Monsoon (May-2017)

Major portion of the block observed DTWL 5 to 10 mbgl while DTWL 10 to 20 bgl is observed in isolated patches of Northern, Southern, Central, part.

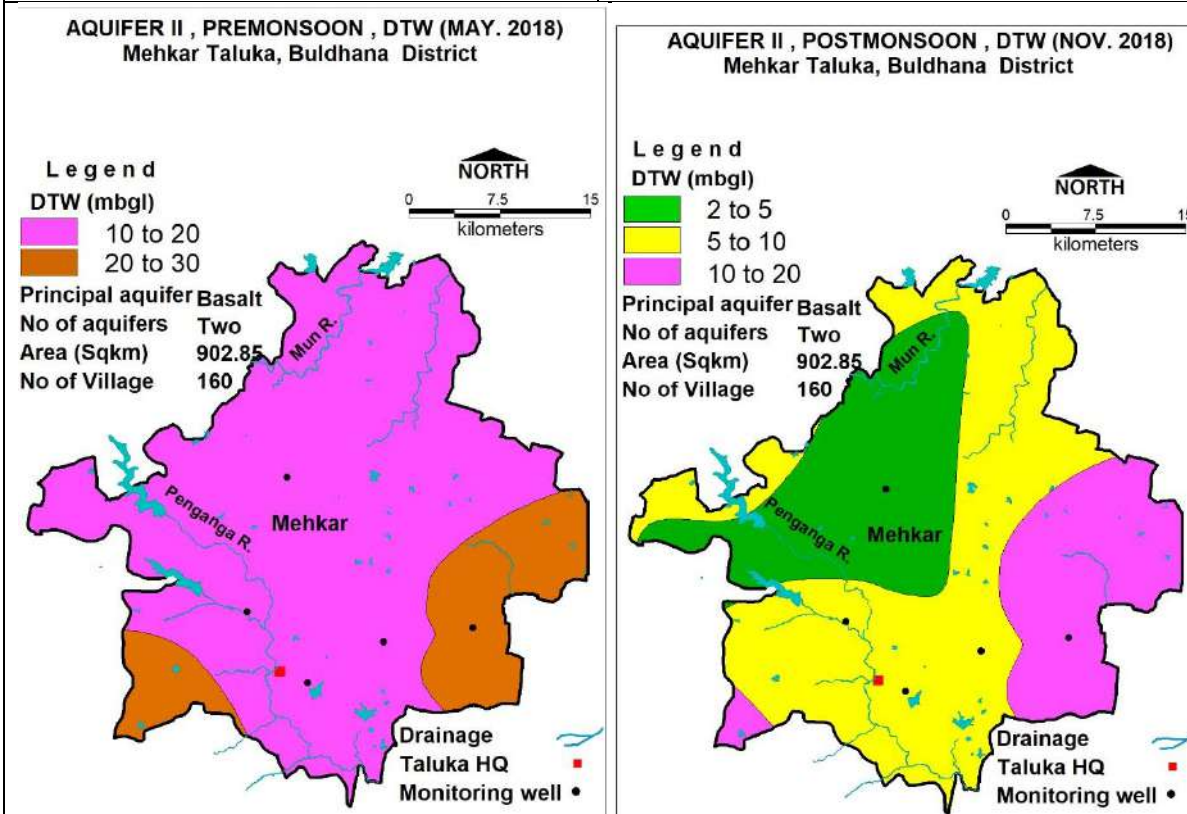
Post-Monsoon (November-2017)

Major portion of the block observed DTWL less than 5 mbgl is observed in major part. DTWL of 5 to 10 mbgl is observed as isolated patches in northern, southern south western, eastern part of the block. DTWL observed in small patches of north western part of the block towards mun river

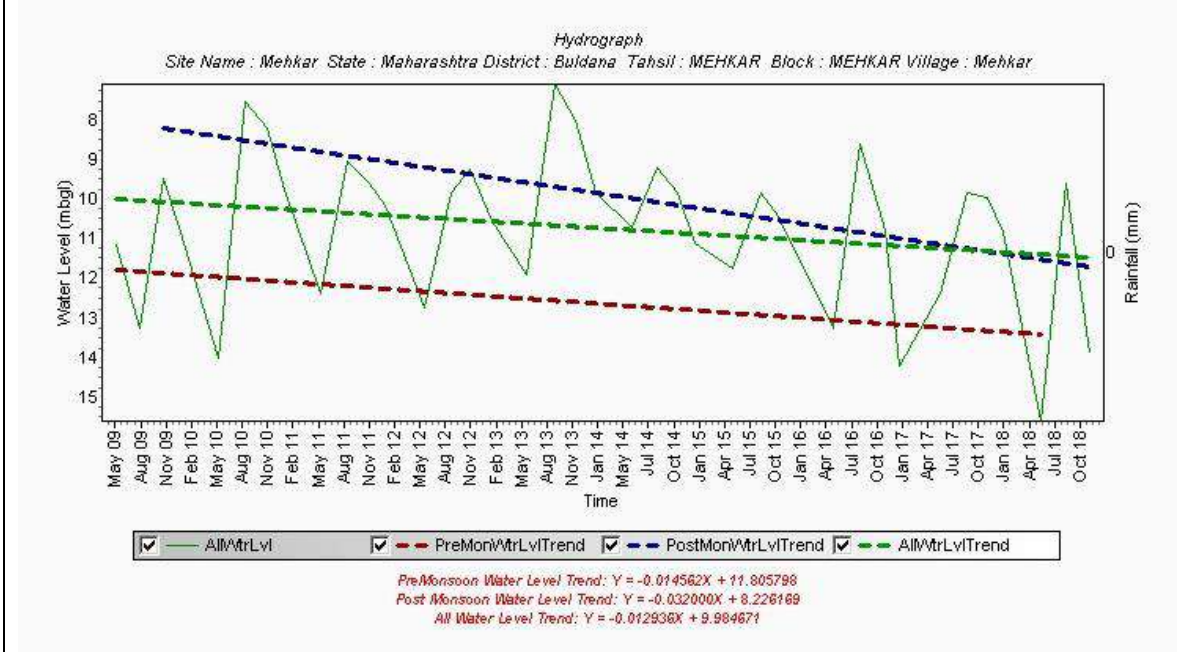


1.6.2 Water Level Behavior - Aquifer-II (Deeper Aquifer)

<p>Pre-Monsoon (May-2017) DTWL 10-20 mbgl is observed in major part. DTWL 20-30 mbgl is observed in isolated patches of NE and southern part .</p>	<p>Post-Monsoon (November-2017) DTWL 10-20 mbgl is observed in eastern part. DTWL 5-10 mbgl is observed in central part engulfing a DTWL of 2 to 5 m bgl in North Western.</p>
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1.7. Hydrographs

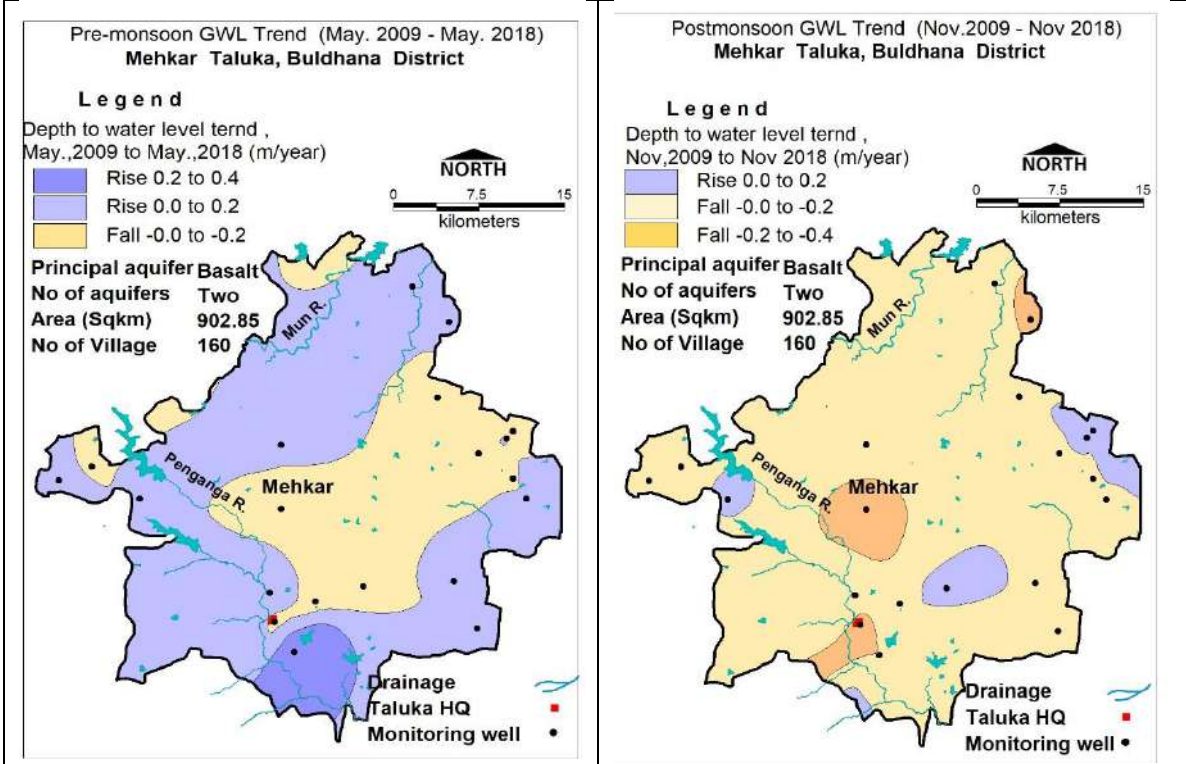


Hydrograph shows Pre-monsoon falling water level trend @ 0.014 m/year	Hydrograph shows Post- monsoon falling water level trend @ 0.032 m/year
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1.8. Water Level Trend (2009-18)

1.8.1 Pre-Monsoon trend	1.8.2 Post-Monsoon trend
--------------------------------	---------------------------------

Rising 0.0195 (Lavhala) to 0.159 (Uddhava) m/year, Falling 0.018 (Rajgad) to 0.162 (Pratpgadh) m/year	Rising 0.009 (Degaon) to 0.336 (Naigaon Dattapur) m/year; Falling 0.0108 (Gajarkhed) to 0.078 (Rajgad) m/year
Area shows falling trend upto 0.2 m/year central part covering 417 sq km area. Rising water level trend up to 0.4 m/year (275 sq km) is observed in Major part of the block.	Major area shows falling trend upto 0.4 m/year has been observed in rest part in 1046.2 sq km area in N & W part. Rising water level trend up to 0.4 m/year (254 sq km) in isolated patches of central NorthEastern & southern part.



2. Ground Water Issues

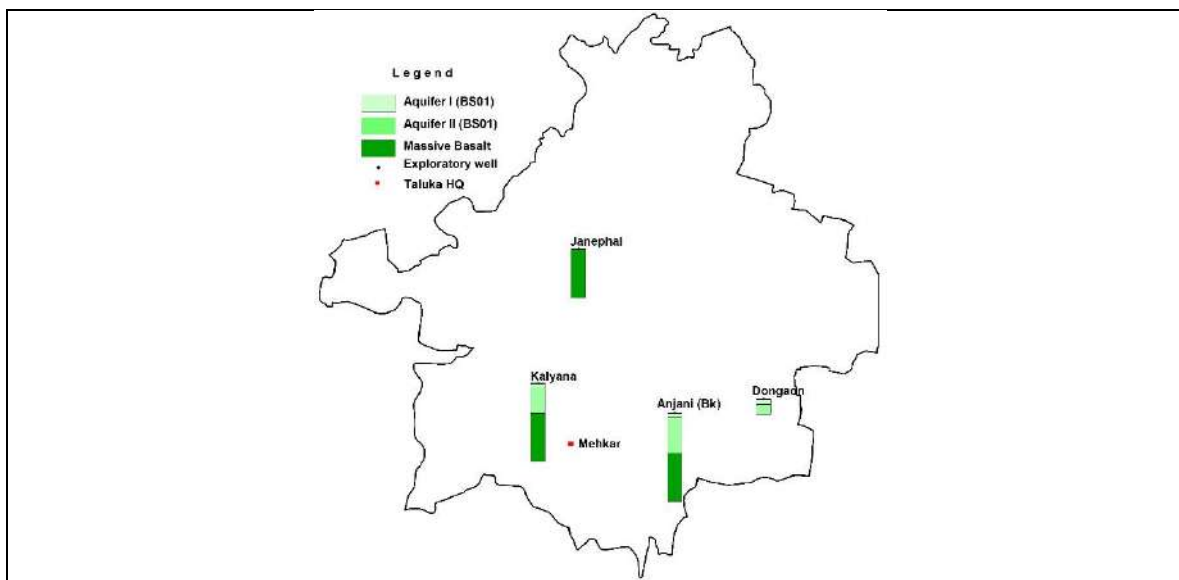
1. Block shows declining water level trend up to 0.4 m/year observed in postmonsoon in 1042.2 sqkm area .
2. Over exploitation
3. Water scarcity on lean period
4. Normal Probability of Rainfall is only 61% coupled with frequent droughts (3 % sever & 18% Moderate) which is ultimately responsible for less ground water recharge and non-availability of surface & ground water for irrigation.
5. Less ground water potential basaltic aquifer.

3. AQUIFER DISPOSITION

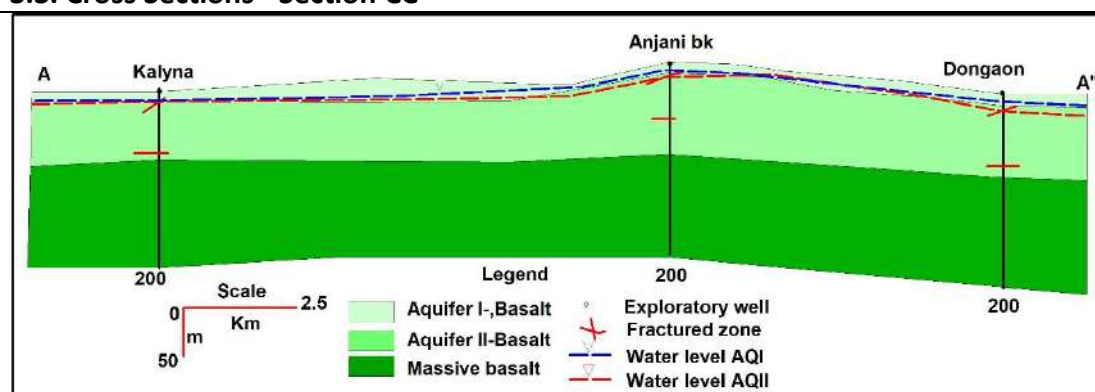
3.1. Number of Aquifers

Basalt –Aquifer-I (Phreatic / Shallow aquifer)
Basalt –Aquifer-II (Semiconfined / confined / Deeper aquifer)

3.2. Lithological Disposition



3.3. Cross Sections - Section CC'

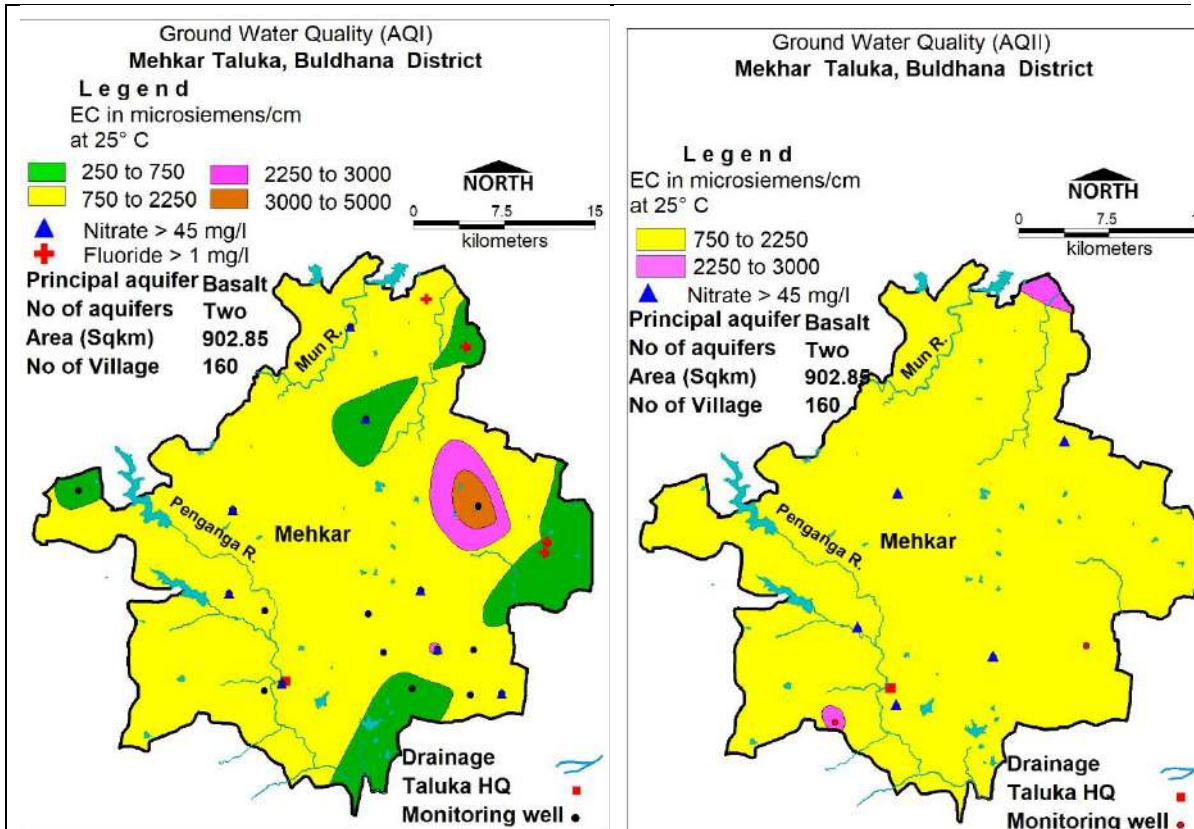


3.4. Aquifer Characteristics

Major Aquifers	Basalt (Deccan Traps)	
Type of Aquifer (Phreatic/Semiconfined/Confined)	Basalt –Aquifer-I (Phreatic / Shallow aquifer)	Basalt –Aquifer-II (Semiconfined / confined / Deeper aquifer)
Depth of Occurrence (mbgl)	10 to 20	60 to 168
Weathered/fractured rocks thickness (m)	8 to 16	0.5 to 6
Yield (m ³ /day/lps)	10 to 100	0.2 to 1.25
Specific yield/ Storativity (S)	0.002	0.00046 to 0.0000426
Transmissivity (T)	30-80 m ² /day	25-158 m ² /day

4. GROUND WATER QUALITY

4.1 Phreatic Aquifer (Aquifer-I/ Shallow aquifer)	4.2 Semi-confined/Confined Aquifer (Aquifer II/ Deeper aquifer)
--	--



EC ranging upto 750-2250 $\mu\text{S}/\text{cm}$ has been observed in major part (926.9 sq km) & EC ranging 250 to 750 $\mu\text{S}/\text{cm}$ (168 sq km) in a isolated patches of northern and western part. The ground water is suitable for all purpose. About 43 sq km has EC ranging upto 5000 $\mu\text{S}/\text{cm}$ Ground water is suitable for irrigation purpose with proper salinity control measures. However the water from such area is not fit for drinking purpose without treatment. Few villages are also affected by nitrate & Fluoride contamination.

EC ranging upto 2250 $\mu\text{S}/\text{cm}$ has been observed in major part (1110 sq km) except EC ranging 2250 to 3000 $\mu\text{S}/\text{cm}$ in very small patches of 10 sq.km. The ground water is suitable for all purpose. Few villages are also affected by Nitrate contamination.

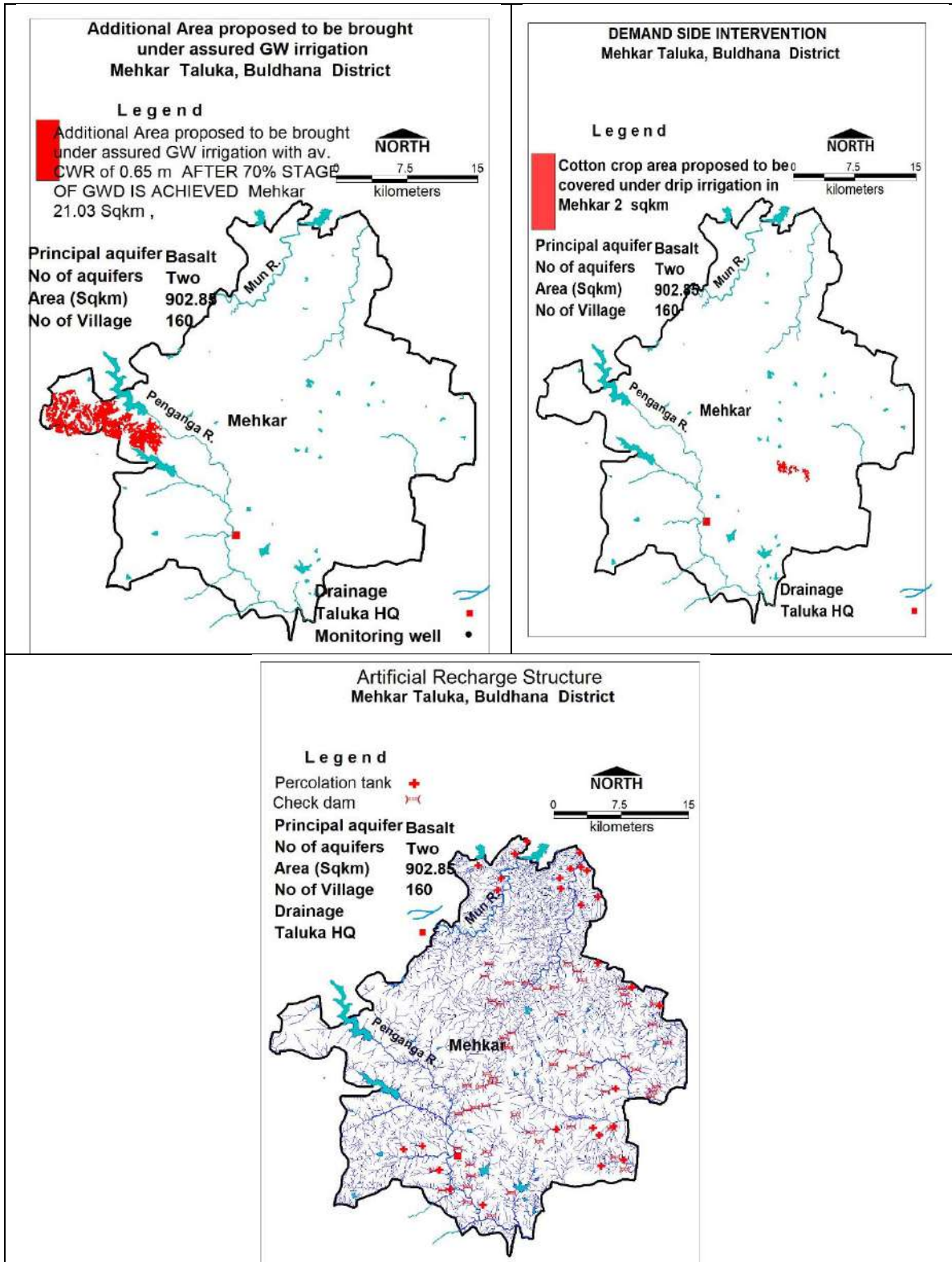
5. GROUND WATER RESOURCE

5.1 Aquifer-I/ Shallow Phreatic Aquifer (Basalt)

Ground Water Recharge Worthy Area (Sq. Km.)	902.85
Command Area	102.23
Non command Area	800.62
Total Annual Ground Water Recharge (MCM)	115.89
Natural Discharge (MCM)	5.79
Net Annual Ground Water Availability (MCM)	110.10
Existing Gross Ground Water Draft for irrigation (MCM)	64.01
Existing Gross Ground Water Draft for domestic and industrial water supply(MCM)	3.86
Existing Gross Ground Water Draft for All uses(MCM)	67.88
Provision for domestic and industrial requirement supply to 2025(MCM)	7.89

Net Ground Water Availability for future irrigation development(MCM)							37.84
Stage of Ground Water Development (%)							61.66
Category							SAFE
5.2 Aquifer-II Semiconfined/Confined Deeper Aquifer (Basalt)							
Mean aquifer thickness	Area (Sqkm)	Peizometric Head (m)	S	Sy	Resource above confinig layer (mcm)	Resource in aquifer (mcm)	Total resource (mcm)
0.75	45.04	25	0.0000 3	0.002	0.033	0.067	0.101
0.75	206.13	35	0.0000 3	0.002	0.216	0.309	0.525
0.75	9.05	25	0.0000 3	0.002	0.006	0.013	0.020
2	384.87	35	0.0000 426	0.002	0.573	1.539	2.113
4.5	4.92	36	0.0004 26	0.002	0.075	0.044	0.119
4.5	33.57	21	0.0004 26	0.002	0.300	0.302	0.602
7.5	20.83	22	0.0004 26	0.002	0.195	0.312	0.507
10.5	39.27	35	0.0000 3	0.002	0.041	0.824	0.866
TOTAL							4.85
6.0. GROUND WATER RESOURCE ENHANCEMENT							
6.1. Supply Side Management							
SUPPLY (MCM)							
Available Resource (MCM)							110.1
Gross Annual Draft (MCM)							67.89
Agricultural Supply -GW							64.02
Agricultural Supply -SW							2
Domestic Supply - GW							3.87
Domestic Supply - SW							0.96
Total Supply							57.385
Area of Block (Sq. Km.)							1093.33
Area suitable for Artificial recharge (Sq. Km)							654.23
Type of Aquifer							Hard rock
Area feasible for Artificial Recharge (WL >5mbgl) (Sq. Km.)							654.23
Volume of Unsaturated Zone (MCM)							1308.47
Average Specific Yield							0.02
Volume of Sub Surface Storage Space available for Artificial Recharge (MCM)							26.17
Surplus water Available (MCM)							9.86
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			28		60		
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)			4.2		1.35		

RTRWH Structures – Urban Areas	
Households to be covered (25% with 50 m ² area)	13000
Total RWH potential (MCM)	0.335
Rainwater harvested / recharged @ 80% runoff co-efficient	0.268
RTRWH is economically not viable & hence, not recommended.	
6.2. Demand Side Management	
Micro irrigation techniques	
Cotton crop area (6), 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	0.608
Proposed Cropping Pattern change	
Irrigated area under Water Intensive Crop(ha)	Not proposed
Water Saving by Change in Cropping Pattern	Nil
6.4. Expected Benefits	
Net Ground Water Availability (MCM)	110.10
Existing Ground Water Draft for All Uses (MCM)	67.88
Present stage of Ground Water Development (%)	61.66 %
Additional GW resources available after Supply side interventions (MCM)	5.55
Ground Water Availability after Supply side intervention(MCM)	115.65
Stage of Ground Water Development after supply side interventions (%)	58.69
GW draft after Demand Side Interventions (MCM)	67.27
Stage of Ground Water Development after supply side interventions (%)	58.16
Other Interventions Proposed, if any	
Alternate Water Sources Available	Nil
6.4. Development Plan	
Volume of water available for GWD after stage of GWD brought to 70% (ham)	1367.3
Proposed Number of DW (@ 1.5 ham for 90% of GWR Available)	820
Proposed Number of BW (@ 1.5 ham for 10% of GWR Available)	91
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	21.035
Regulatory Measures	60m borewells/tube wells



14.0 AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, SINDKHED RAJA BLOCK, BULDHANA DISTRICT, MAHARASHTRA

1. SALIENT FEATURES																																													
1.1 Introduction																																													
Block Name	Sindhkhed Raja																																												
Geographical Area (Sq. Km.)	778.19																																												
Hilly Area (Sq. Km)	115.22																																												
Population (2011)	176303																																												
Climate	Hot and dry																																												
Net Annual Ground Water Availability (MCM)	88.74																																												
Existing Gross Ground Water Draft for All uses (MCM)	59.38																																												
Provision for domestic and industrial requirement supply to 2025(MCM)	5.72																																												
Stage of Ground Water Development %	66.92																																												
Category	Safe																																												
1.2 Rainfall Analysis																																													
Normal Rainfall	804.3 mm																																												
Annual Rainfall (2018)	491 mm																																												
Decadal Average Annual Rainfall (2009-18)	695.14 mm																																												
Short Term Rainfall Analysis (1998-2018)	Significantly rising trend -20 mm/year. Probability of Rainfall : 57 % Normal Rainfall; 19 % Excess Rainfall Probability of Drought: 10% Moderate Drought & 3% Severe Drought																																												
Rainfall Trend Analysis (1998 To 2018)																																													
<table border="1"> <caption>Annual Rainfall Data (1998-2018)</caption> <thead> <tr> <th>Year</th> <th>Rainfall (mm)</th> </tr> </thead> <tbody> <tr><td>1998</td><td>900</td></tr> <tr><td>1999</td><td>1050</td></tr> <tr><td>2000</td><td>550</td></tr> <tr><td>2001</td><td>950</td></tr> <tr><td>2002</td><td>1300</td></tr> <tr><td>2003</td><td>900</td></tr> <tr><td>2004</td><td>850</td></tr> <tr><td>2005</td><td>800</td></tr> <tr><td>2006</td><td>1000</td></tr> <tr><td>2007</td><td>680</td></tr> <tr><td>2008</td><td>650</td></tr> <tr><td>2009</td><td>580</td></tr> <tr><td>2010</td><td>1100</td></tr> <tr><td>2011</td><td>750</td></tr> <tr><td>2012</td><td>480</td></tr> <tr><td>2013</td><td>880</td></tr> <tr><td>2014</td><td>500</td></tr> <tr><td>2015</td><td>620</td></tr> <tr><td>2016</td><td>820</td></tr> <tr><td>2017</td><td>620</td></tr> <tr><td>2018</td><td>480</td></tr> </tbody> </table>		Year	Rainfall (mm)	1998	900	1999	1050	2000	550	2001	950	2002	1300	2003	900	2004	850	2005	800	2006	1000	2007	680	2008	650	2009	580	2010	1100	2011	750	2012	480	2013	880	2014	500	2015	620	2016	820	2017	620	2018	480
Year	Rainfall (mm)																																												
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2014	500																																												
2015	620																																												
2016	820																																												
2017	620																																												
2018	480																																												
1.3. Geomorphology, Soil & Geology																																													
Geomorphhic Unit	Alluvial flood Plains of Painganga river & its tributaries streams. Plateau (slightly dissected to weathered plateau) with weathered thickness ranging from 0 to 2 m.																																												
Geology	Deccan Traps (Basalt) Age: Late Cretaceous to Eocene																																												
Soil	Light to Medium BCS consisting mostly of clay and loam																																												
1.4. Hydrology & Drainage																																													
Drainage	Painganga river and its tributaries with sub-dendritic to dendritic drainage.																																												
Hydrology	Major project	1 Khadkpurna Project																																											
	Bigger Minor Irrigation Project (100-300 Ha.)	7(VIDRUPA,MANDWA,PIMPARK HED,TANDULWADI,JAGDARI,																																											

		KESHVSHIVANI ,GARKHED)
	Minor Irrigation Project (0-100 Ha.)	State-8; MILS-2 PT-85, KT-25, VP-29, MIS-11

1.5. Land Use, Agriculture, Irrigation & Cropping Pattern

Forest Area	40.33 Sq. Km.	
Cultivable Area	705.79 Sq. Km.	
Net Sown Area	601.49 Sq. Km.	
Double Cropped Area	145.36	
Area under Irrigation	Surface Water	0 Sq. Km.
	Ground Water	14.58 Sq. Km.
Area under Drip & Sprinkler Irrigation	Nil	
Principal Crops	Crop Type	Area (Sq. Km.) (Reference year 2016-17)
	Cotton	124.18
	Cereals	163.05
	Pulses	230.43
	Oil Seeds	56.60
Horticultural Crops	Sugarcane	1.31
	Spices	5.28
	Others	4.94

1.6. Water Level Behavior

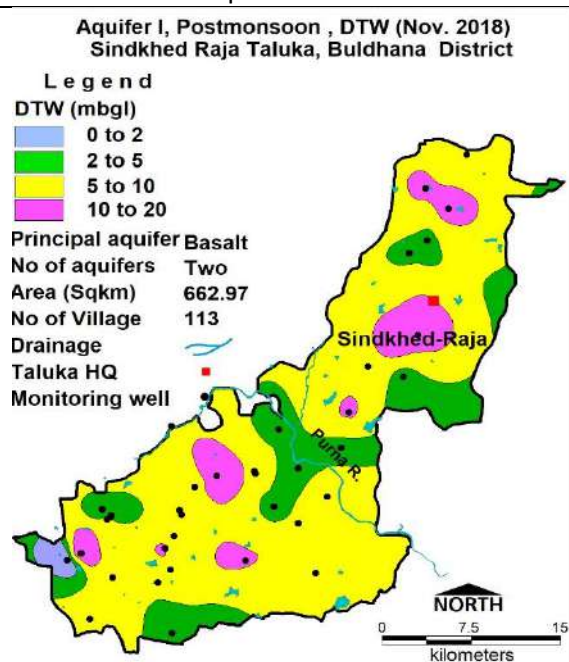
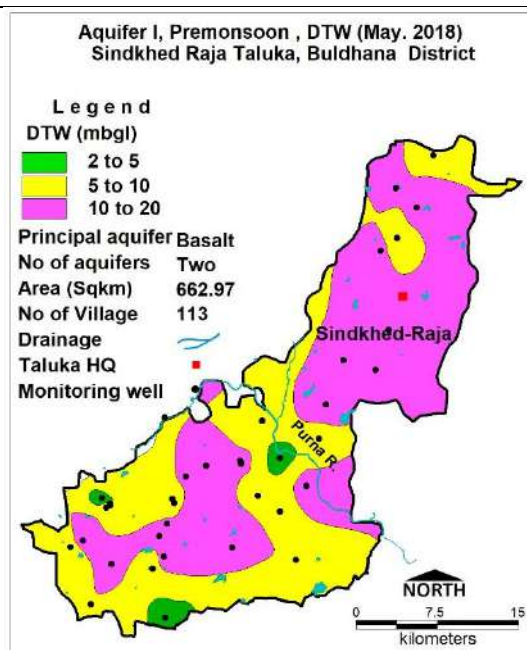
1.6.1 Aquifer-I (Shallow Aquifer)

Pre-Monsoon (May-2018)

Major area is showing DTWL 10 to 20 bgl engulfing isolated patch of DTWL 5 to 10 mbgl in central & southern part.

Post-Monsoon (November-2018)

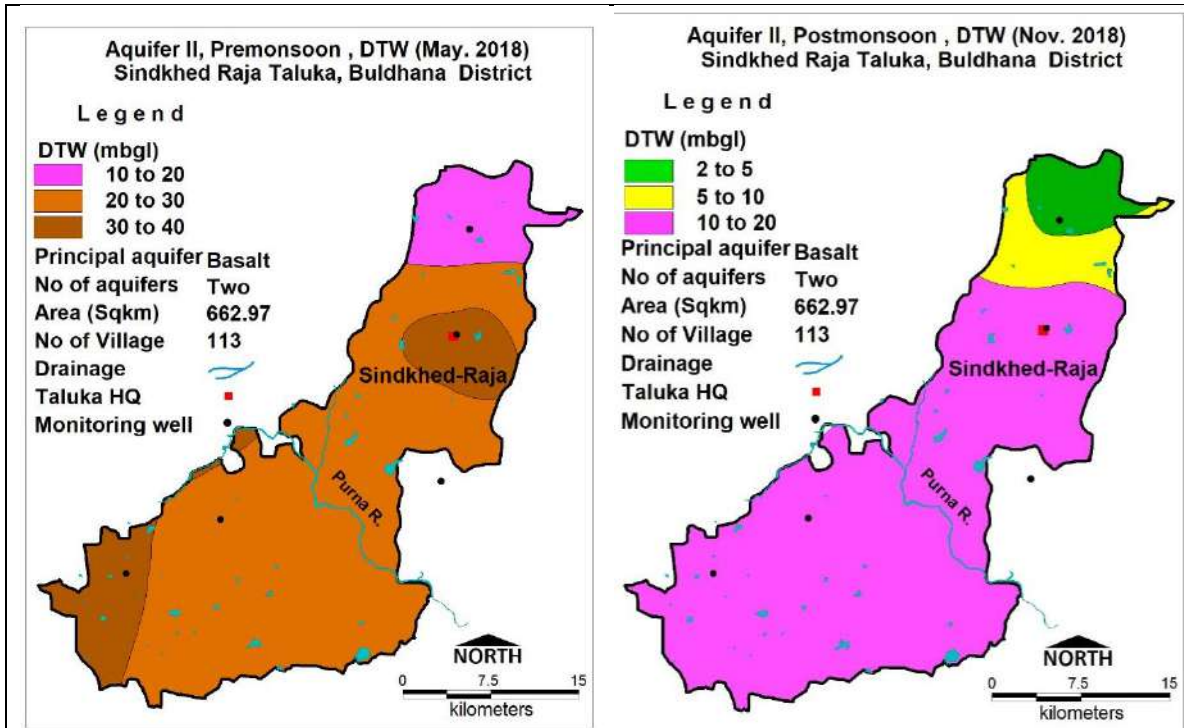
DTWL less than 5- 10 mbgl is observed in major part of the block engulfing isolated patch of DTWL 10-20. Area with DTWL >5 observed in small patches of the block .



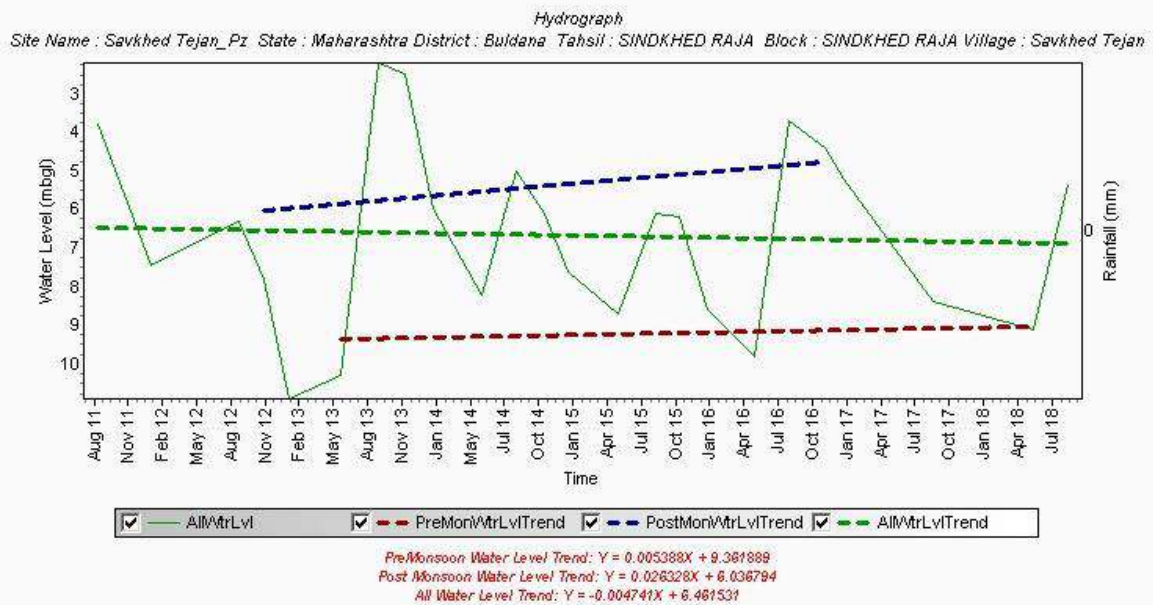
1.6.2 Water Level Behavior - Aquifer-II (Deeper Aquifer)

Pre-Monsoon (May-2018) DTWL 20-30 mbgl is observed in major part, with 10-20 m bgl DTWL in northern part. DTWL > 30 mbgl is observed in CentRal & southern part of the block.

Post-Monsoon (November-2018) DTWL 10-20 mbgl is observed in major part. DTWL < 10 mbgl is observed in northern part



1.7. Hydrographs



Hydrograph shows Pre-monsoon rising water level trend @ 0.053 m/year.

Hydrograph shows Post- monsoon rising water level trend @ 0.026 m/year

1.8. Water level Trend (2009-18)

Pre-Monsoon trend

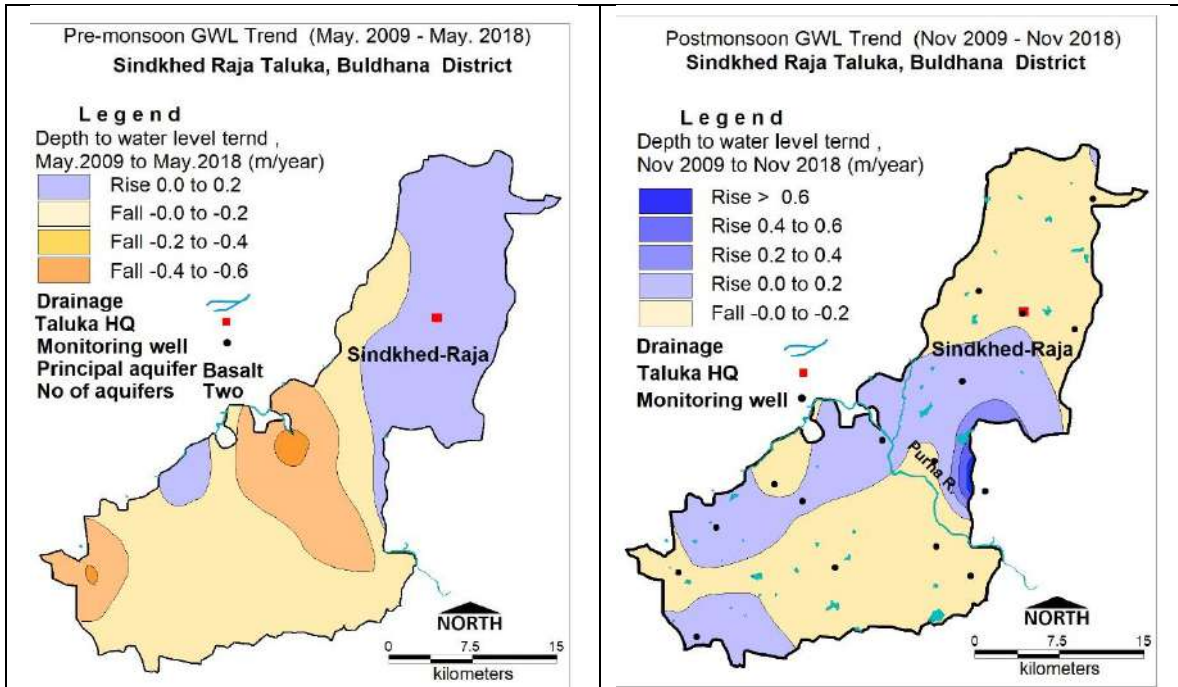
Rising 0.0099 (Nagazari Bk.) m/year to 0.422 (Hiwarkhed), Falling 0.029 (Malkapur pangra) to 0.148 (Rajegaon) m/year

Southern part of the area shows falling trend upto 0.6 m/year covering 1019 sq km area. While Rising water level trend up to 0.2 m/year (29 sq km) is observed in Northern part.

Post-Monsoon trend

Rising 0.008 (Shendurjana) to 0.308 (Dawargaon) m/year; Falling 0.009 (Palaskhed chakka) to 0.125(Sindkhed Raja) m/year

rising water level trend of > 0.6 m/year (251.5 sq km) in Northern & southern part. Falling trend upto 0.2 m/year has been observed in central part of the block covering 500.4 sq km .



2. Ground Water Issues

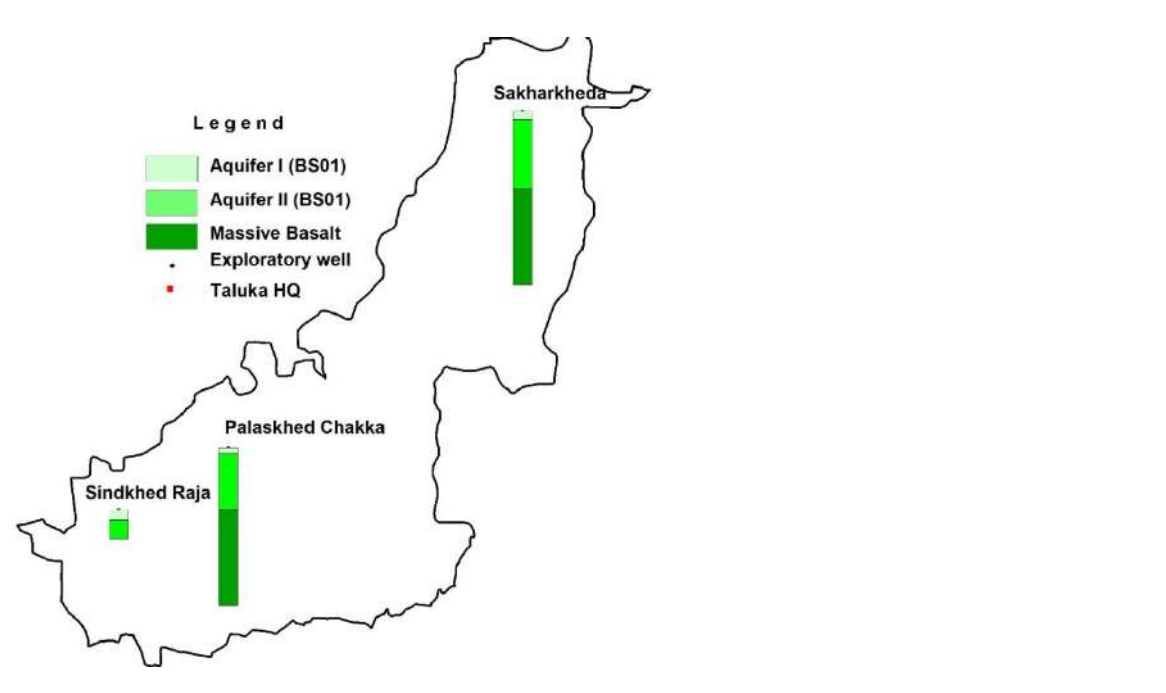
1. Block shows declining water level trend up to 0.6 m/year observed during pre-monsoon while in postmonsoon area is experiencing declining trend upto 0.2 m/year.
2. Water scarcity on lean period
3. Frequent droughts (24 % Moderate) which is ultimately responsible for less ground water recharge and non-availability of surface & ground water for irrigation.
4. Less ground water potential basaltic aquifer.

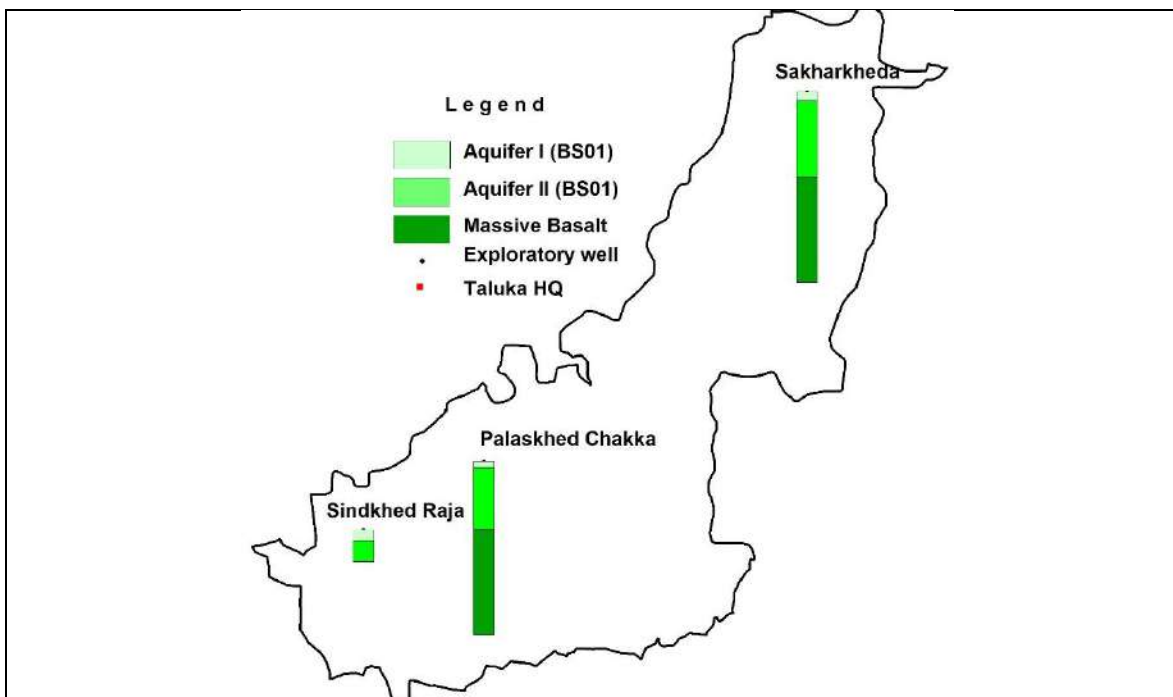
3. AQUIFER DISPOSITION

3.1. Number of Aquifers

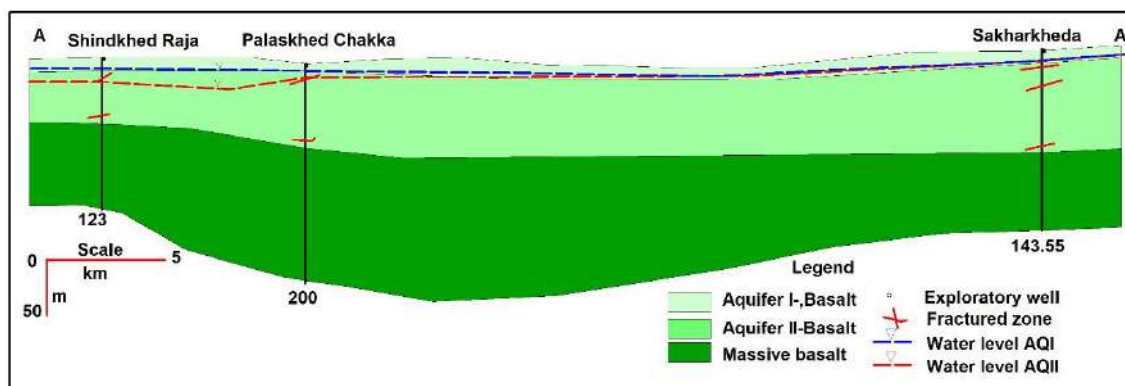
Basalt –Aquifer-I (Phreatic / Shallow aquifer)
 Basalt –Aquifer-II (Semiconfined / confined / Deeper aquifer)

3.2. Bar Diagram





3.3. Cross Sections - Section AA'

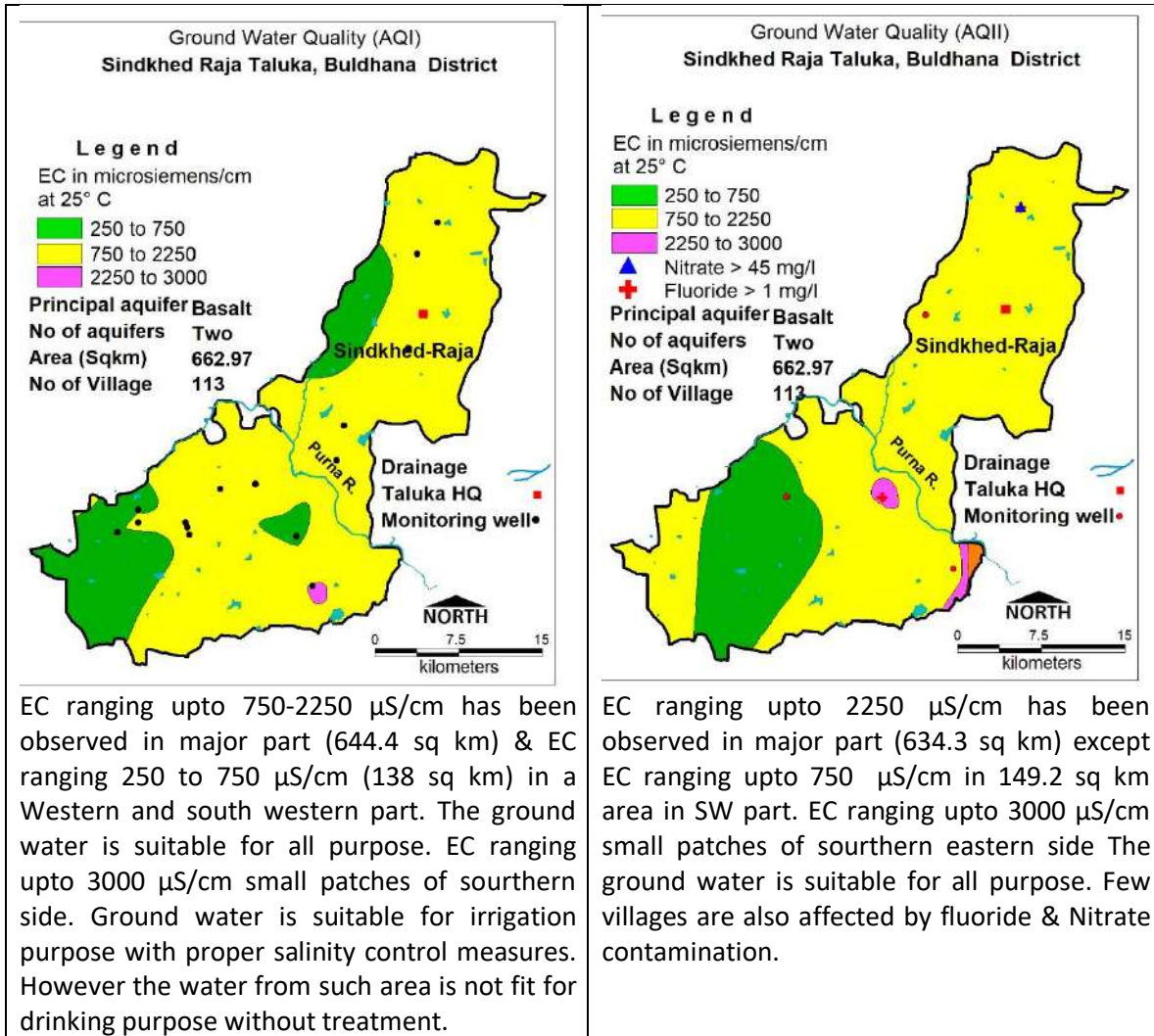


3.4. Aquifer Characteristics

Major Aquifers	Basalt (Deccan Traps)	
Type of Aquifer (Phreatic/Semiconfined/Confined)	Basalt –Aquifer-I (Phreatic / Shallow aquifer)	Basalt –Aquifer-II (Semiconfined / confined / Deeper aquifer)
Depth of Occurrence (mbgl)	10 to 20	90 to 168
Weathered/fractured rocks thickness (m)	8 to 16	0.5 to 6
Yield (m ³ /day/lps)	10 to 100	0.2 to 1.25
Specific yield/ Storativity (S)	0.002	0.000426 to 0.0000426
Transmissivity (T)	30-80 m ² /day	25-158 m ² /day

4. GROUND WATER QUALITY

4.1 Phreatic Aquifer (Aquifer-I/ Shallow aquifer)	4.2 Semi-confined/Confined Aquifer (Aquifer II/ Deeper aquifer)
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5. GROUND WATER RESOURCE & EXTRACTION

5.1 Aquifer-I/ Shallow Phreatic Aquifer (Basalt)

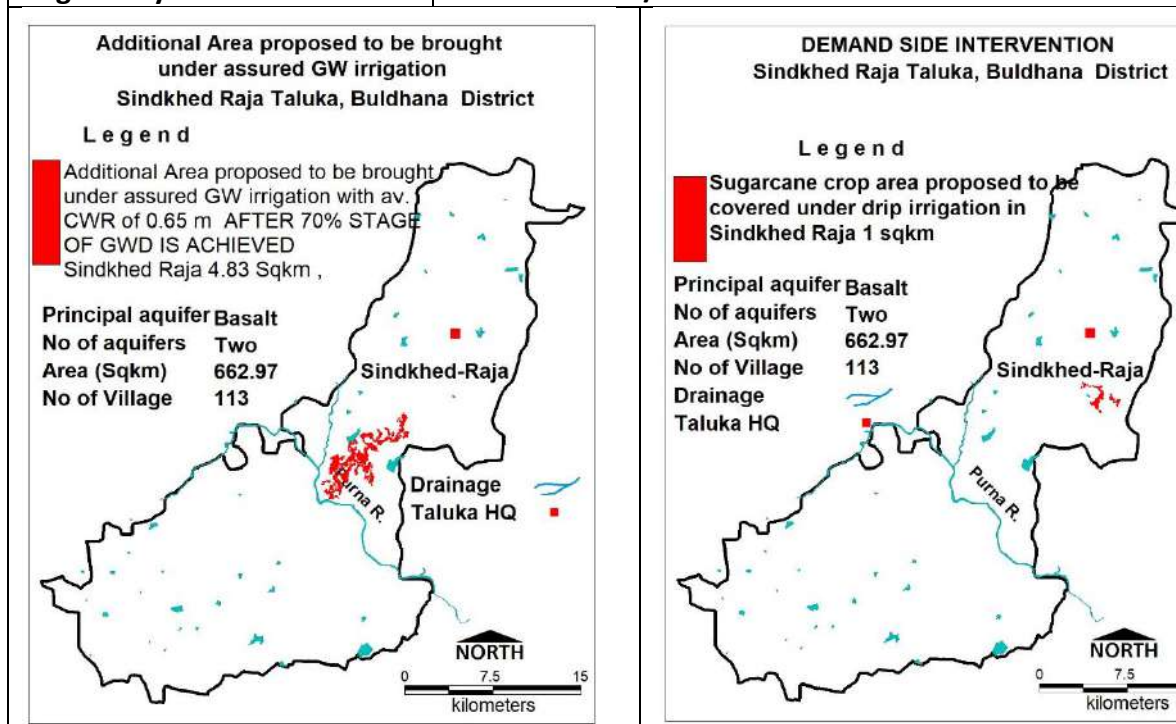
Ground Water Recharge Worthy Area (Sq. Km.)	662.97
Command area	37.93
Non Command area	625.04
Total Annual Ground Water Recharge (MCM)	93.41
Natural Discharge (MCM)	46.7
Net Annual Ground Water Availability (MCM)	88.74
Existing Gross Ground Water Draft for irrigation (MCM)	56.61
Existing Gross Ground Water Draft for domestic and industrial water supply(MCM)	2.77
Existing Gross Ground Water Draft for All uses(MCM)	59.38
Provision for domestic and industrial requirement supply to 2025(MCM)	5.72
Net Ground Water Availability for future irrigation development(MCM)	25.20
Stage of Ground Water Development (%)	66.92 %
Category	SAFE

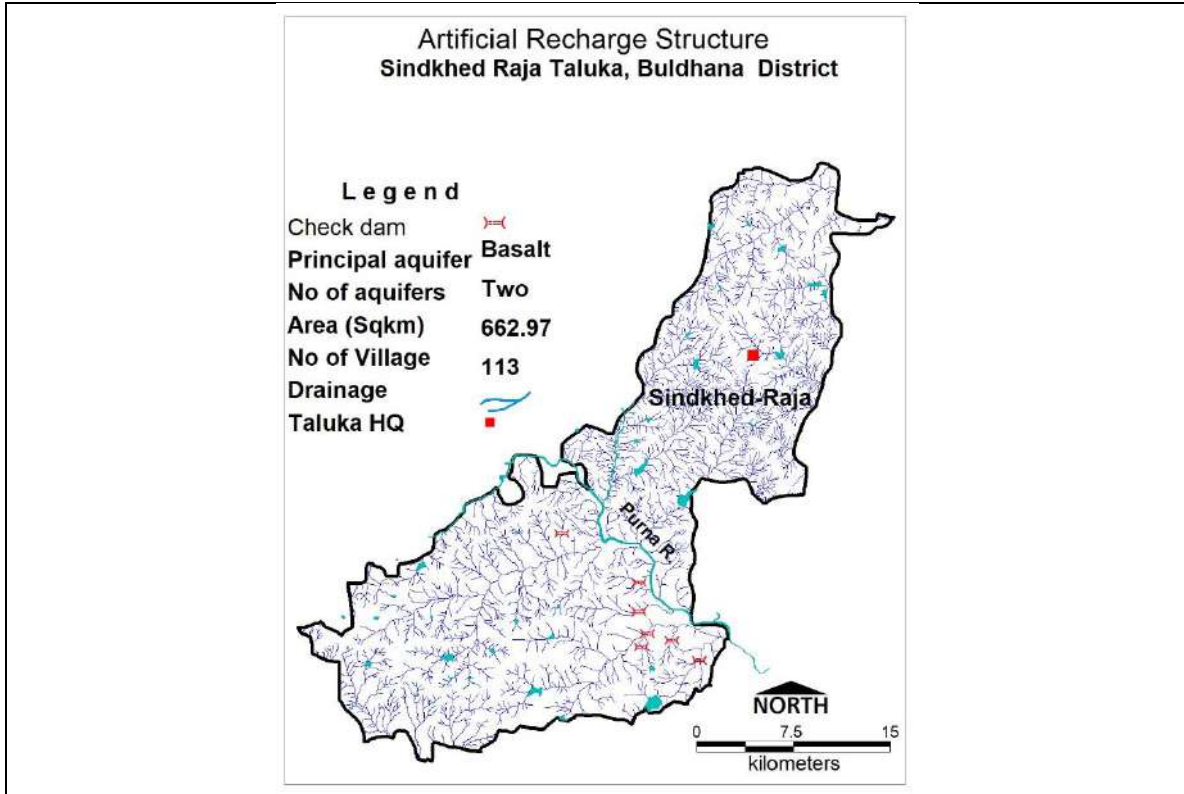
5.1 Aquifer-II Semiconfined/Confined Deeper Aquifer (Basalt)

Mean aquifer thickness	Area (Sqkm)	Peizometric Head (m)	S	Sy	Resource above confini	Resource in aquifer (mcm)	Total resource (mcm)

					g layer (mcm)			
0.75	96.90	25	0.000 03	0.002	0.072	0.145	0.218	
0.75	70.51	35	0.000 426	0.002	1.051	0.105	1.157	
2	602.91	20	0.000 0426	0.002	0.513	2.411	2.925	
4.5	8.16	25	0.000 3732	0.002	0.076	0.073	0.149	
Total							4.45	
6.0. GROUND WATER RESOURCE ENHANCEMENT								
6.1. Supply Side Management								
SUPPLY (MCM)								
Available Resource (MCM)							88.74	
Gross Annual Draft (MCM)							59.39	
Agricultural Supply -GW							56.61	
Agricultural Supply -SW							0	
Domestic Supply - GW							2.77	
Domestic Supply - SW							0.69	
Total Supply							60.07	
Area of Block (Sq. Km.)							778.19	
Area suitable for Artificial recharge (Sq. Km)							662.97	
Type of Aquifer							Hard rock	
Area feasible for Artificial Recharge (WL >5mbgl) (Sq. Km.)							Approx. 600	
Volume of Unsaturated Zone (MCM)							28.23	
Average Specific Yield							0.020	
Volume of Sub Surface Storage Space available for Artificial Recharge (MCM)							0.56	
Surplus water Available (MCM)							0.21	
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			0		7			
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)			0		0.15			
RTRWH Structures – Urban Areas								
Households to be covered (25% with 50 m ² area)							9500	
Total RWH potential (MCM)							0.245	
Rainwater harvested / recharged @ 80% runoff co-efficient							0.196	
RTRWH is economically not viable & hence, not recommended.								
6.2. Demand Side Management								
Micro irrigation techniques								
Cotton crop area (4) , 1% area is proposed to be covered under Drip							1	
Volume of Water expected to be saved (MCM). Surface Flooding req- 0.36 m. Drip Req. - 0.24, WUE- 0.12 m							0.34	
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)	88.74
Existing Ground Water Draft for All Uses (MCM)	59.38
Present stage of Ground Water Development (%)	66.92 %
Additional GW resources available after Supply side interventions (MCM)	0.15
Ground Water Availability after Supply side intervention(MCM)	88.89
Stage of development after Supply side intervention (%)	66.80
GW draft after Demand Side Interventions (MCM)	59.04
Stage of development after Demend side intervention (%)	66.42
Other Interventions Proposed, if any	
Alternate Water Sources Available	Nil
6.4. Development Plan	
Volume of water available for GWD after stage of GWD brought to 70% (ham)	314.22
Proposed Number of DW (@ 1.5 ham for 90% of GWR Available)	189
Proposed Number of BW (@ 1.5 ham for 10% of GWR Available)	21
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	4.83
Regulatory Measures	60m borewells/tube wells





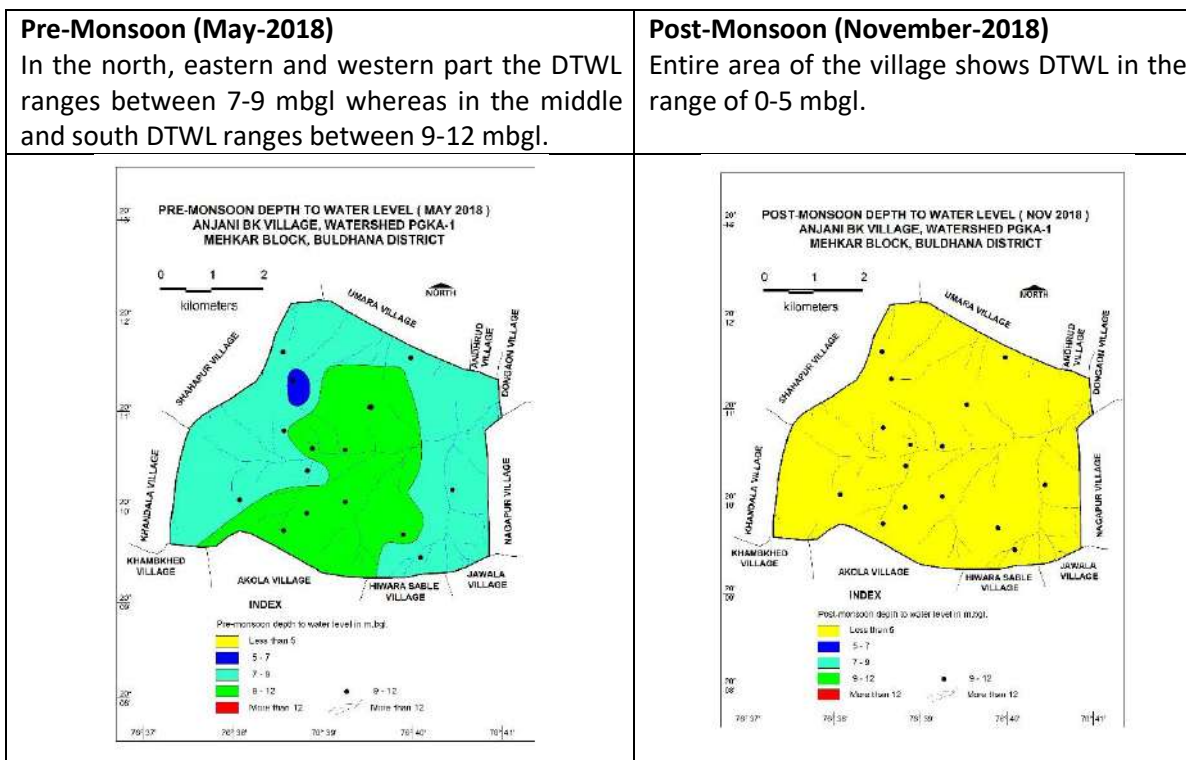
PANCHAYAT LEVEL

AQUIFER MAPS AND MANAGEMENT PLAN

- I. **Village Anjani Budruk**, Watershed PGKA-1, Mehkar Block
- II. **Village Dongaon**, Watershed PGKA -1, Mehkar Block
- III. **Village Hiwara Sable**, Watersheds PGKA-1 & PG-1, Mehkar Block
- IV. **Village Madani**, Watersheds PGKA-1, Mehkar Block
- V. **Village Sindkhed Raja**, Watersheds GPP-1, Sindkhed Raja Block
- VI. **Village Saokhed Tejan**, Watershed GPP-1, Sindkhed Raja Block

15.0 PANCHAYAT LEVEL AQUIFER MANAGEMENT PLAN, VILLAGE ANJANI BUDRUK, WATERSHED PGKA-1, MEHKAR BLOCK, BULDHANA DISTRICT, MAHARASHTRA

1. SALIENT FEATURES			
1.1 Introduction			
Village Name	ANJANI BUDRUK		
Geographical Area (Sq. Km.)	24.42		
Hilly Area (Sq. Km.)	Nil		
Population (Current year -2018)	7350		
Climate	Hot and dry		
Normal Rainfall (mm)	850		
Average Rainfall (mm) 2009-18	880		
1.2. Geomorphology, Soil & Geology			
Geomorphic Unit	Plateau (slightly dissected to moderately dissected).		
Geology	Deccan Traps (Basalt) Age: Late Cretaceous to Eocene		
Soil	Soil mostly consisting of clay moderately deep 25 to 50 cm and clayey very deep more than 100 cm thick.		
1.3. Hydrology & Drainage			
Watershed	PGKA-1		
Drainage	Godavari basin; with dendritic to sub-dendritic drainage pattern. 1 st Order Stream – 26.86 km 2 nd Order Stream – 6.70 km 3 rd Order Stream – 6.01 km		
Irrigation Project (Major/Medium/Minor etc)	Nil		
WC structures (PT / KT / CD / FP etc.)	14-CD, 01- other AR		
1.4. Land Use, Agriculture, Irrigation & Cropping Pattern			
Specifics			Area
Forest Area	Nil		
Cultivable Area	2400 ha		
Net Sown Area	2300 ha		
Double Cropped Area	Nil		
Irrigation Dug wells	150		
Irrigation Bore wells	250		
Area under Drip & Sprinkler Irrigation	Nil		
Area under Irrigation	Surface Water	Nil	
	Ground Water	1475 ha	
Principal Crops	Soyabean	1500 ha	kharif
	Pulses (<i>Tur</i>)	200 ha	kharif
	Pulses (<i>Udad</i>)	200 ha	kharif
	Pulses (<i>Moong</i>)	200 ha	kharif
	Wheat	550 ha	Rabi
	Cotton	200 ha	Kharib
	Gram	750 ha	Rabi
	Jawar	50 ha	Rabi
	Other	130 ha	Rabi
1.5. Water Level Behavior : Aquifer-I (Shallow Aquifer)			
In the village, 17 KOW were established to decipher the water level scenario.			



2. Ground Water Issues

1. Non-availability of surface water for irrigation.
2. Less ground water potential basaltic aquifer.
3. Water stress situation during lean period (March to June)

3. AQUIFER DISPOSITION

3.1. Number of Aquifers Basalt –Aquifer-I (Phreatic / Shallow aquifer)

3.2. Aquifer Characteristics

Major Aquifers	Basalt (Deccan Traps)
Type of Aquifer	Basalt –Aquifer-I (Phreatic / Shallow aquifer)
Static Water Level (mbgl)	7.00
Depth of Occurrence (mbgl)	14.00-35.00
weathered thickness (m)	0- 14.00
Yield	< 10 – 200 m ³ /day
Specific yield (Sy)	0.02 (norms)

4. GROUND WATER QUALITY: Phreatic Aquifer (Aquifer-I/ Shallow aquifer)

Ec is ranges from 1335 to 2324, NO₃ is ranges from 28 to 100, and Fluoride is ranges from 0.42 to 0.72.

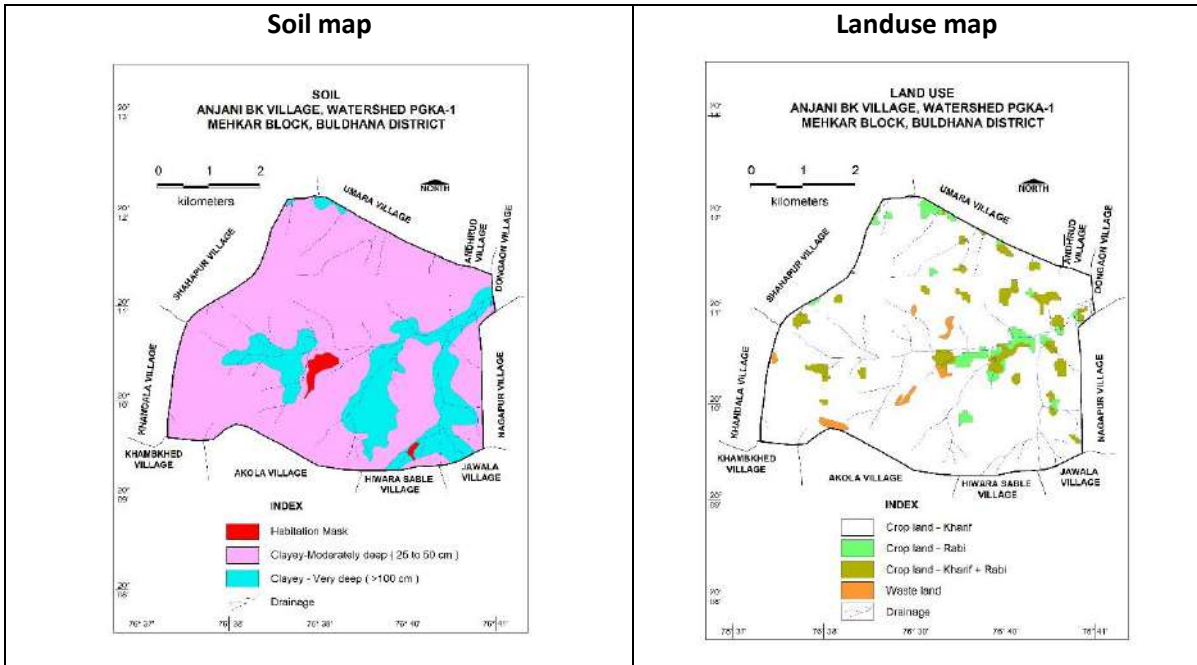
5.0. GROUND WATER RESOURCE MANAGEMENT

5.1. Supply Side Management

SUPPLY (MCM)

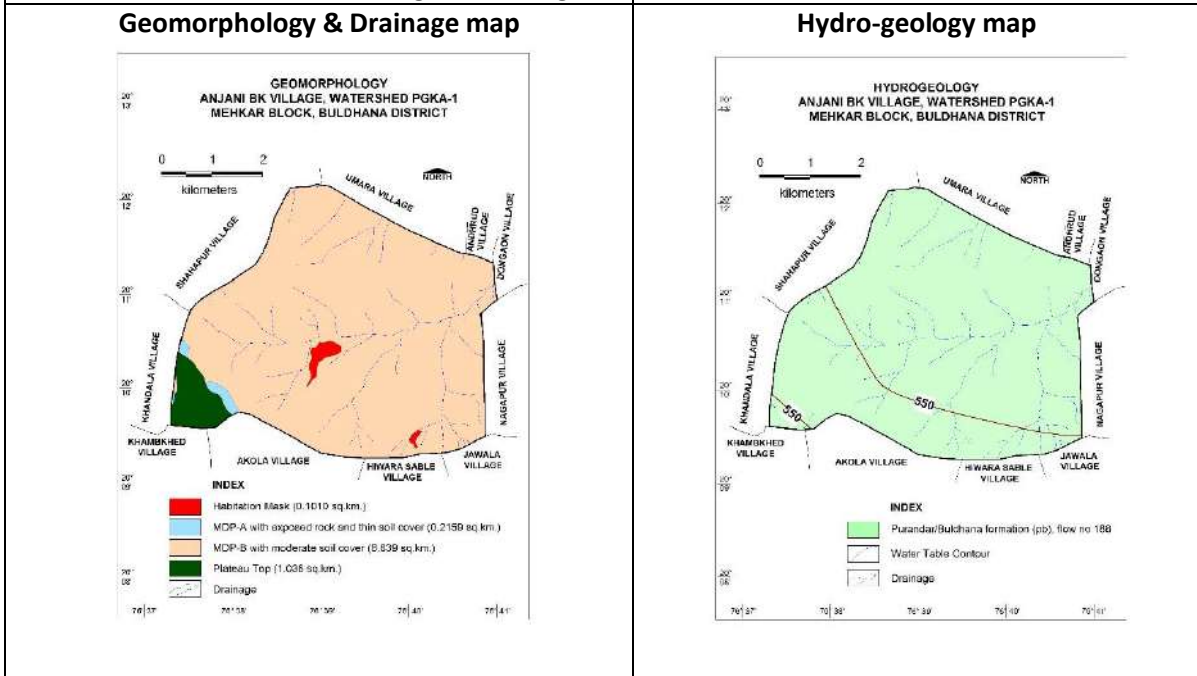
Available Resource (MCM)	8.4068
Agricultural Supply –GW	5.8761
Agricultural Supply -SW	0
Domestic Supply - GW	0.1818
Domestic Supply - SW	0
Non agriculture use (MCM)	0.186813
Total GW availability (MCM)	2.1621
Area of village (Sq. Km.)	24.42
Area suitable for Artificial recharge (sq km)	24.42

Type of Aquifer	Hard rock
Area feasible for Artificial Recharge (WL >5mbgl) (Sq. Km.)	0
Volume of Unsaturated Zone (MCM)	0
Average Specific Yield	0.02
Volume of Sub Surface Storage Space available for Artificial Recharge (MCM)	0
Surplus runoff considered for planning (MCM) @ 100%	46.7027
Proposed AR Structures (Check Dam (@ Rs.30 lakh, Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM))	0
Proposed AR Structures Gabbion	0
Proposed AR Structures Other	0
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	0
Specific Recommendations - Segment wise Nala desilting, deepening and widening upto 3 m depth or upto weathered rock considering the local hydrogeological condition without disturbing the ecology/aquifer/environmental flow of nala.	2.542
RTRWH Structures	
Households to be covered (Pakka House only)	11
Total RWH potential (MCM) (25% with 50 m2 area)	0.0000499
Rainwater harvested / recharged @ 80% runoff co-efficient (MCM)	0.0000400
RTRWH is economically not viable & hence not Recommended	
6.2. Demand Side Management	
Micro irrigation techniques	
Area is proposed to be covered under Drip	Not proposed
Volume of Water expected to be saved (MCM). Surface Flooding req- 0.36 m. Drip Req. - 0.24, WUE- 0.12 m	
Proposed Cropping Pattern change	
Irrigated area under Water Intensive Crop(ha)	Not proposed
Water Saving by Change in Cropping Pattern	
6.3. Expected Benefits	
Net Ground Water Availability (MCM)	8.4068
Additional GW resources available after Supply side interventions (MCM)	1.9065
Ground Water Availability after Supply side intervention(MCM)	10.3133
Existing Ground Water Draft for All Uses (MCM)	6.2447
GW draft after Demand Side Interventions (MCM)	0
Present stage of Ground Water Development (%)	74.28
Expected Stage of Ground Water Development after supply side interventions (%)	60.55
Other Interventions Proposed, if any	
Alternate Water Sources Available	Nil
6.4. Development Plan	
Volume of water available forFuture planning (MCM)	2.1621
Proposed Number of DW (@ 1.5 ham for 90% of GWR Available)	Nil
Proposed Number of BW (@ 1 ham for 10% of GWR Available)	Nil
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	Nil



In the village major area is covered by Clayey moderately deep soil of the thickness 25-50 cm covering 19.43 sq.km area whereas clayey soil of thickness more than 100 cm along the drainage.

In the village major cultivable land is under Kharif cropping pattern covering most of the area.



Major part of the village shows moderately dissected plateau with soil cover having area of 22.89 sq. km

Entire village is covered by Deccan trap Basalt with Purandar/ Buldhana formation

Panchayat Level Aquifer Management Plan

Village – Anjani Bk, Mehkar Taluka, Buldhana District

Aquifer (Prominent Lithology)	Current Scenario	Geology / Basalt flow	Geomorphology	GW quality	Aquifer Management Plan
Aquifer I (Basalt- Weathered and fractures)	2200 ha cultivable land by GW, 11 CD, 14 kolapuri bandare, 50 DW(d), 150 DW (i), Pre monsoon DTWL~ 5-17 m bgl. Post monsoon DTWL~ 157 m bgl.	DT Basalt (Buldana / Purandargarh Formation)	Plateau (slightly dissected to moderately dissected) with weathered thickness ranging from 0 to 14 m. BCS-25 to 50 cm.	Good; All parameters are within MPL except Nitrate contamination	<ol style="list-style-type: none"> 1. Deeping of 2nd & 3rd order stream. 2. Desilting of existing water conservation and artificial recharge structures. 3. The GW should be used for irrigation purpose.
Aquifer II (Basalt- Jointed & Fractures)	240 BW(i), Nil BW (d), HP-Nil DTWL~ 15-35 m bgl.	As above	--		<ol style="list-style-type: none"> 1. The GW should be used for drinking purpose. 2. BW should not be drilled down below the red bole.

Note: DW(d)= Dug well Domestic; DW (i)= Dug Well Irrigation; BW(d)= Bore Well Domestic; BW(i)= Bore Well Irrigation

16.0 PANCHAYAT LEVEL AQUIFER MANAGEMENT PLAN, VILLAGE DONGAON, WATERSHED PGKA-1, MEHKAR BLOCK, BULDHANA DISTRICT, MAHARASHTRA

1. SALIENT FEATURES			
1.1 Introduction			
Village Name	DONGAON		
Geographical Area (Sq. Km.)	37.58		
Hilly Area (Sq. Km.)	Nil		
Population (Current year -2018)	21350		
Climate	Monsoon Sub-Tropical		
Normal Rainfall (mm)	624.4		
Average Rainfall (mm) 2009-18	890		
1.2. Geomorphology, Soil & Geology			
Geomorphic Unit	Plateau (slightly dissected to moderately dissected).		
Geology	Deccan Traps (Basalt) Age: Late Cretaceous to Eocene		
Soil	Soil mostly consisting of clay >100 cm and clay moderately deep 25-50 cm thick.		
1.3. Hydrology & Drainage			
Watershed	PGKA-1		
Drainage	Godavari basin; dendritic to sub-dendritic drainage pattern. 1 st Order Stream – 41.54 km 2 nd Order Stream – 28.49 km 3 rd Order Stream – 7.36 km		
Irrigation Project (Major/Medium/Minor etc.)	Nil		
WC structures (PT / KT / CD / FP etc.)	04-CD, 100-other AR		
1.4. Land Use, Agriculture, Irrigation & Cropping Pattern			
Specifics		Area	
Forest Area		Nil	
Cultivable Area		3750 ha	
Net Sown Area		3500 ha	
Double Cropped Area		Nil	
Irrigation Dug wells		350	
Irrigation Bore wells		250	
Area under Drip & Sprinkler Irrigation		Nil	
Area under Irrigation	Surface Water	Nil	
	Ground Water	890 ha	
Principal Crops	Soyabean	2693 ha	Kharif
	Pulses (<i>Tur</i>)	300ha	Kharif
	Pulses (<i>Udad</i>)	300ha	Kharif
	Pulses (<i>Moong</i>)	215ha	Kharif
	Turmeric	0ha	

	Cotton	0 ha	
	Wheat	70 ha	Rabi
	Gram	800 ha	Rabi

1.5. Water Level Behavior : Aquifer-I (Shallow Aquifer)

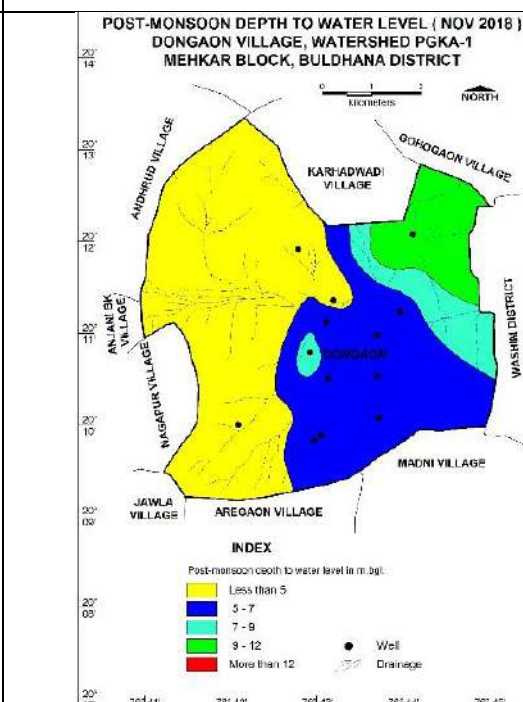
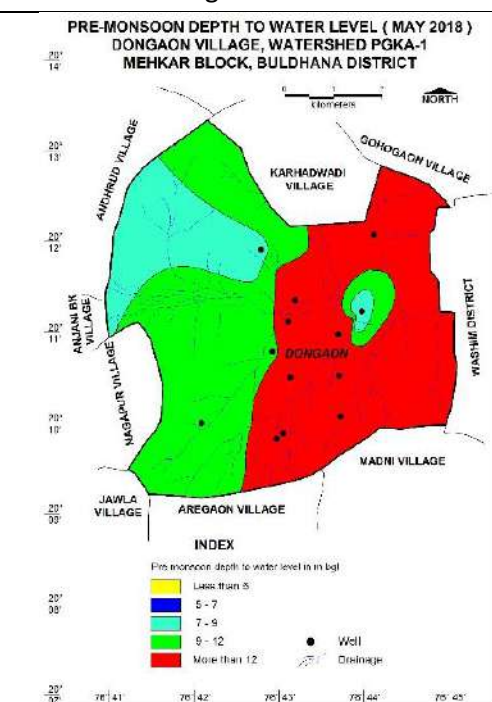
In the village, 15 KOW were established to decipher the water level scenario.

Pre-Monsoon (May-2018)

In the north-east and south-east part the DTWL ranges between more than 12 mbgl except small patch of the DTWL 7-12 mbgl is observed in village. In the south-west DTWL ranges between 9-12 mbgl where as north western portion DTWL ranges between 7-9 mbgl.

Post-Monsoon (November-2018)

Entire area of eastern part of village shows DTWL is less than 5 mbgl. In the south eastern part DTWL ranging 5-7 mbgl is observed and in north eastern part DTWL ranging 7-12 mbgl



2. Ground Water Issues

1. Non-availability of surface water for irrigation.
2. Less ground water potential basaltic aquifer.
3. Water stress situation during lean period (March to June).

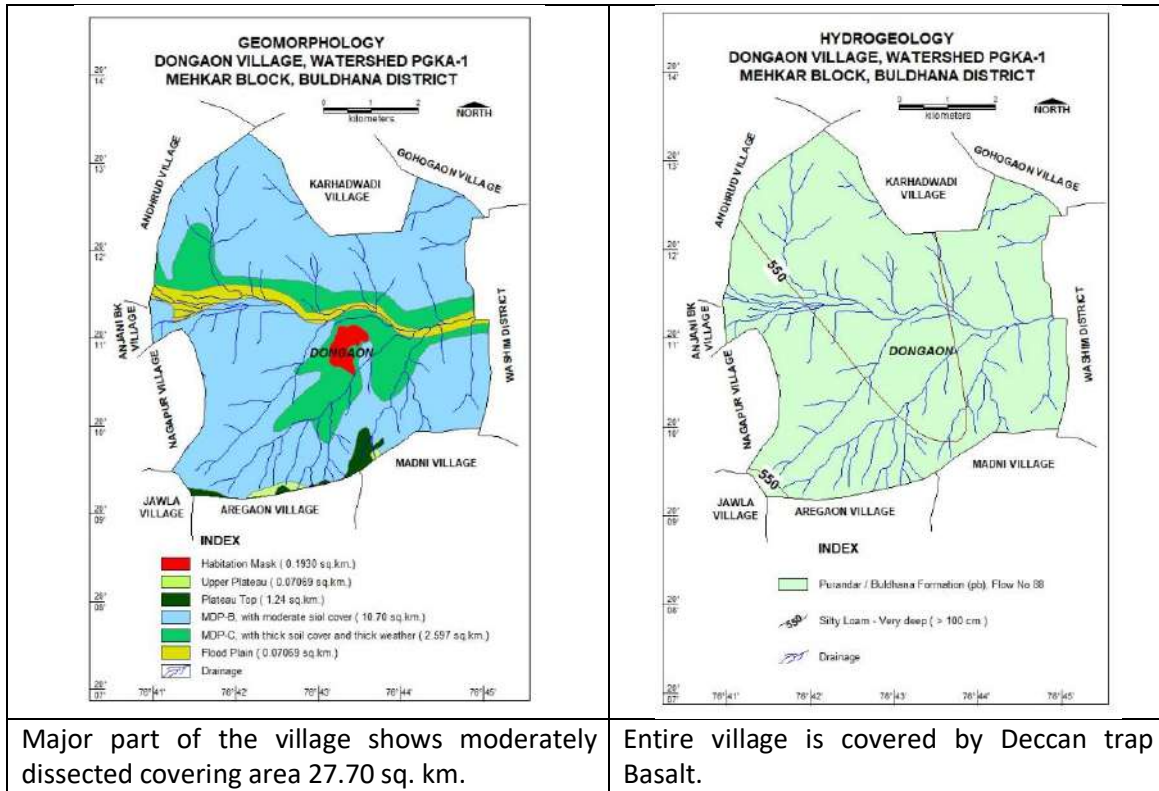
3. AQUIFER DISPOSITION

3.1. Number of Aquifers	Basalt –Aquifer-I (Phreatic / Shallow aquifer)
3.2. Aquifer Characteristics	
Major Aquifers	Basalt (Deccan Traps)
Type of Aquifer	Basalt –Aquifer-I (Phreatic / Shallow aquifer)
Static Water Level (mbgl)	7.00
Depth of Occurrence (mbgl)	10.00-35.00
weathered thickness (m)	0- 14.00
Yield	10 – 200 m ³ /day

Specific yield (Sy)	0.02 (norms)
4. GROUND WATER QUALITY: Phreatic Aquifer (Aquifer-I/ Shallow aquifer)	
In the village of Dongaon, 14 nos Kow established Ec is ranges 335 to 1675. One water sample collected for the chemical analysis. During the analysis EC is 801, NO ₃ is 28 and Fluoride is 52.	
5.0. GROUND WATER RESOURCE MANAGEMENT	
5.1. Supply Side Management	
SUPPLY (MCM)	
Available Resource (MCM)	12.9382
Agricultural Supply –GW	4.3876
Agricultural Supply -SW	0
Domestic Supply - GW	0.5084
Domestic Supply - SW	0
Non agriculture use (MCM)	0.287487
Total GW availability (MCM)	7.7546
Area of village (Sq. Km.)	37.58
Area suitable for Artificial recharge (sq km)	37.58
Type of Aquifer	Hard rock
Area feasible for Artificial Recharge (WL >5mbgl) (Sq. Km.)	0
Volume of Unsaturated Zone (MCM)	0
Average Specific Yield	0.02
Volume of Sub Surface Storage Space available for Artificial Recharge (MCM)	0
Surplus runoff considered for planning (MCM) @ 100%	71.8686
Proposed AR Structures (Check Dam (@ Rs.30 lakh, Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM))	0
Proposed AR Structures Gabbion	0
Proposed AR Structures Other	0
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	0
Specific Recommendations - Segment wise Nala desilting, deepening and widening upto 3 m depth or upto weathered rock considering the local hydrogeological condition without disturbing the ecology/aquifer/environmental flow of nala.	
RTRWH Structures	
Households to be covered (Pakka House only)	2600
Total RWH potential (MCM) (25% with 50 m2 area)	0.0000499
Rainwater harvested / recharged @ 80% runoff co-efficient (MCM)	0.0000400
RTRWH is economically not viable & hence not Recommended	
6.2. Demand Side Management	
Micro irrigation techniques	
Area is proposed to be covered under Drip	Not proposed
Volume of Water expected to be saved (MCM). Surface Flooding req- 0.36 m. Drip Req. - 0.24, WUE- 0.12 m	
Proposed Cropping Pattern change	
Irrigated area under Water Intensive Crop(ha)	Not proposed
Water Saving by Change in Cropping Pattern	
6.3. Expected Benefits	
Net Ground Water Availability (MCM)	12.9382

Additional GW resources available after Supply side interventions (MCM)	0
Ground Water Availability after Supply side intervention(MCM)	12.9382
Existing Ground Water Draft for All Uses (MCM)	5.1836
GW draft after Demand Side Interventions (MCM)	0
Present stage of Ground Water Development (%)	40.06
Expected Stage of Ground Water Development after supply side interventions (%)	55.52
Other Interventions Proposed, if any	
Alternate Water Sources Available	Nil
6.4. Development Plan	
Volume of water available for Future planning (MCM)	7.7546
Proposed Number of DW (@ 1.5 ham for 90% of GWR Available)	100
Proposed Number of BW (@ 1 ham for 10% of GWR Available)	50
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	

<p>Soil map</p>	<p>Landuse map</p>
In the village major area consisting mostly of clay >100 cm and clay moderately deep 25-50 cm thick.	In the village major cultivable land is under Kharif cropping pattern
Geomorphology & Drainage map	Hydro-geology map



Major part of the village shows moderately dissected covering area 27.70 sq. km.

Entire village is covered by Deccan trap Basalt.

Panchayat Level Aquifer Management Plan

Village – Dongaon, Mehkar Taluka, Buldhana District

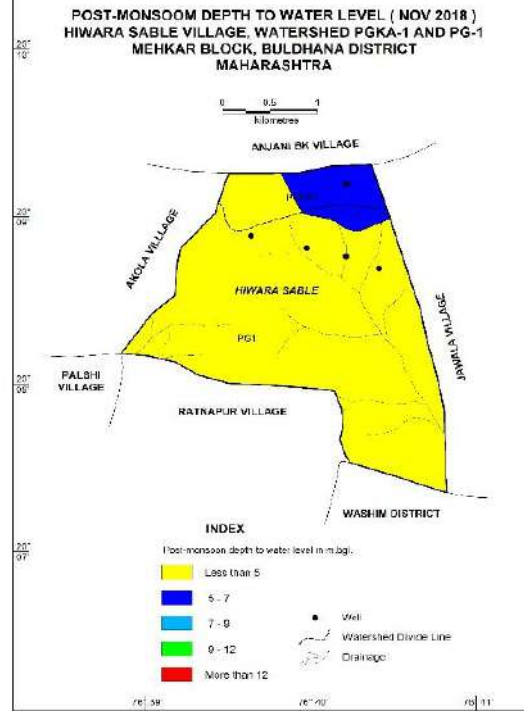
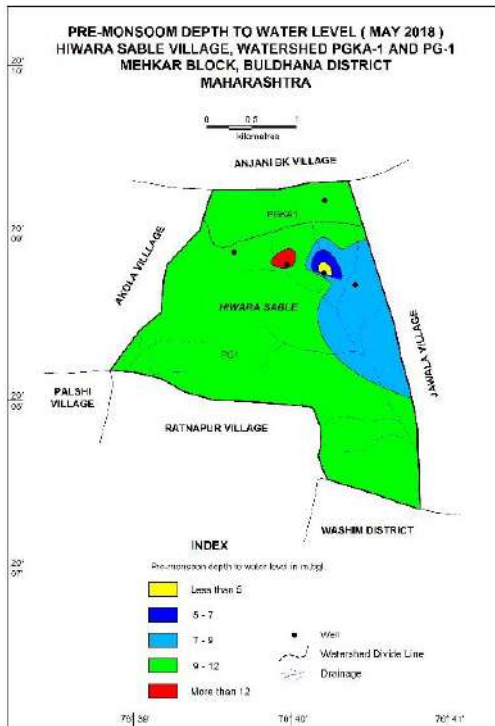
Aquifer (Prominent Lithology)	Current Scenario	Geology / Basalt flow	Geomorphology	GW quality	Recommendations for Aquifer Development					Aquifer Management Plan
					Type	Zones/Depth to be tapped	HP of pump to be lowered	Pumping Hours	Yield (Cu. m / Day)	
Aquifer I (Basalt- Weathered and fractures)	3400 ha cultivable land by GW, 4 CD, 540 DW(d), 350 DW (i), Pre monsoon DTWL~ 7-30 m bgl. Post monsoon DTWL~ 3-11 m bgl.	DT Basalt (Buldana / Purandargarh Formation)	Plateau (slightly dissected to moderately dissected) with weathered thickness ranging from 0 to 14 m. BCS-25 to 50 cm.	Good; All parameters are within MPL.	Dug well	Depth Range of Zones : 6 – 15 m	3 to 5	1 to 4	< 10 – 200 m ³ /day Or 0.7 ham/year	<ol style="list-style-type: none"> 1. Construction of 100 nos dug wells and 50 nos bore wells. 2. Desilting of existing water conservation and artificial recharge structures. 3. The GW should be used for irrigation purpose.
Aquifer II (Basalt- Jointed & Fractures)	250 BW(i), Nil BW (d), HP- Nil DTWL~ 15-35 m bgl.	As above	--	-	Bore well	Depth : 60 m	3 to 5	1 to 3	0.14-2.16 lps	<ol style="list-style-type: none"> 1. The GW should be used for drinking purpose. 2. BW should not be drilled down below the red bole.

Note: DW(d)= Dug well Domestic; DW (i)= Dug Well Irrigation; BW(d)= Bore Well Domestic; BW(i)= Bore Well Irrigation

17.0 PANCHAYAT LEVEL AQUIFER MANAGEMENT PLAN, VILLAGE HIWARA SABLE, WATERSHEDS PGKA-1 AND PG-1, MEHKAR BLOCK, BULDHANA DISTRICT, MAHARASHTRA

1. SALIENT FEATURES		
1.1 Introduction		
Village Name	Hiwara Sable	
Geographical Area (Sq. Km.)	6.769	
Hilly Area (Sq. Km.)	Nil	
Population (Current year -2018)	1108	
Climate	Monsoon Sub-Tropical	
Normal Rainfall (mm)	624.4	
Average Rainfall (mm) 2009-18	890	
1.2. Geomorphology, Soil & Geology		
Geomorphic Unit	Plateau (slightly dissected to moderately dissected).	
Geology	Deccan Traps (Basalt) Age: Late Cretaceous to Eocene	
Soil	Soil mostly consisting of clay 25 to 50 cm and clay very deep >100 cm thick.	
1.3. Hydrology & Drainage		
Watershed	PGKA-1 and PG-1	
Drainage	Godavari basin; with dendritic to sub-dendritic drainage pattern. 1 st Order Stream – 12.32 km 2 nd Order Stream - 2.96 km 3 rd Order Stream - 1.44 km	
Irrigation Project (Major/Medium/Minor etc.)	Nil	
WC structures (PT / KT / CD / FP etc.)	05-CD, 01-PT	
1.4. Land Use, Agriculture, Irrigation & Cropping Pattern		
	Specifics	Area
Forest Area		Nil
Cultivable Area		560 ha
Net Sown Area		548.16 ha
Double Cropped Area		Nil
Irrigation Dug wells		130
Irrigation Bore wells		15
Area under Drip & Sprinkler Irrigation		Nil
Area under Irrigation	Surface Water	Nil
	Ground Water	10 ha
Principal Crops	Soyabean	298.16 ha
	Pulses (<i>Tur</i>)	0 ha
	Pulses (<i>Udad</i>)	0 ha
	Pulses (<i>Moong</i>)	0 ha
	Turmeric	0 ha
	Cotton	250 ha
	Citrous fruit	0 ha
Other	10ha	
1.5. Water Level Behavior : Aquifer-I (Shallow Aquifer)		
In the village, 06 KOW were established to decipher the water level scenario.		
Pre-Monsoon (May-2018)	Post-Monsoon (November-2018)	
Entire area of the village DTWL ranges between 9-12 mbgl except in the eastern	Entire area of the village shows DTWL in the range of 0-5 mbgl except in the north-eastern part DTWL	

part of village where DTWL ranges between 7-9 mbgl. ranging 5-7 mbgl is observed.



2. Ground Water Issues

1. Non-availability of surface water for irrigation.
2. Less ground water potential basaltic aquifer.
3. Water stress situation during lean period (March to June)

3. AQUIFER DISPOSITION

3.1. Number of Aquifers Basalt –Aquifer-I (Phreatic / Shallow aquifer)

3.2. Aquifer Characteristics

Major Aquifers	Basalt (Deccan Traps)
Type of Aquifer	Basalt –Aquifer-I (Phreatic / Shallow aquifer)
Static Water Level (mbgl)	7.00
Depth of Occurrence (mbgl)	6.00-13.00
weathered thickness (m)	0- 6.00
Yield	10 – 200 m ³ /day
Specific yield (Sy)	0.02 (norms)

4. GROUND WATER QUALITY: Phreatic Aquifer (Aquifer-I/ Shallow aquifer)

In the village of Hiwara Sable, 6 nos Kow established Ec is ranges 303 to 1770. One water sample collected for the chemical analysis. During the analysis EC is 406 NO₃ is 10 and Fluoride is 0.4.

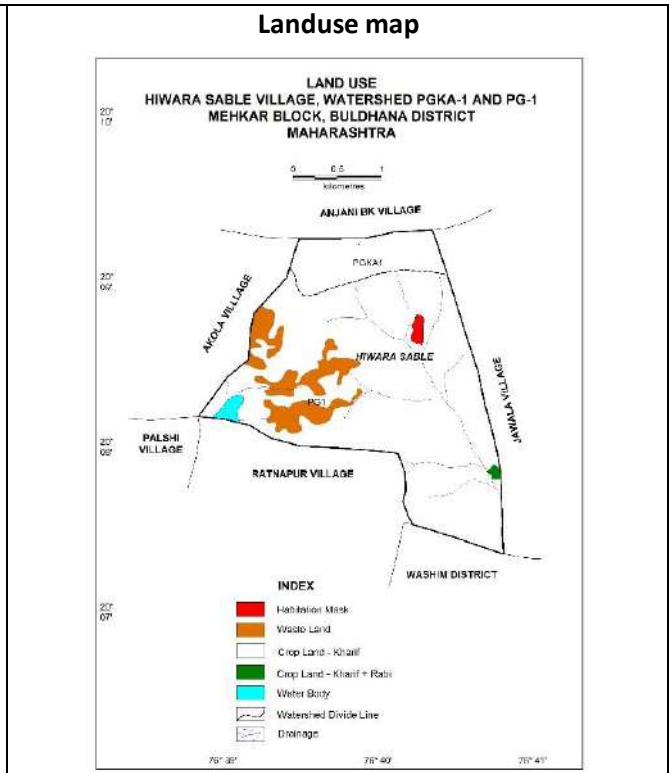
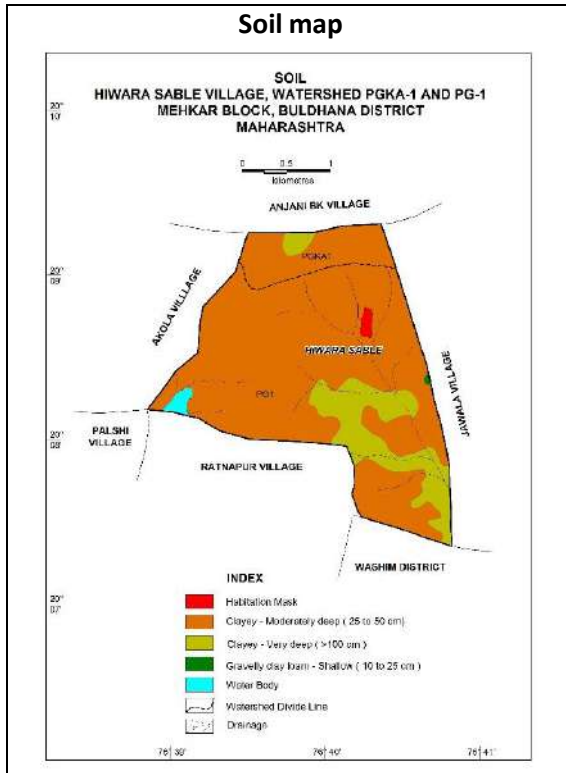
5.0. GROUND WATER RESOURCE MANAGEMENT

5.1. Supply Side Management

SUPPLY (MCM)

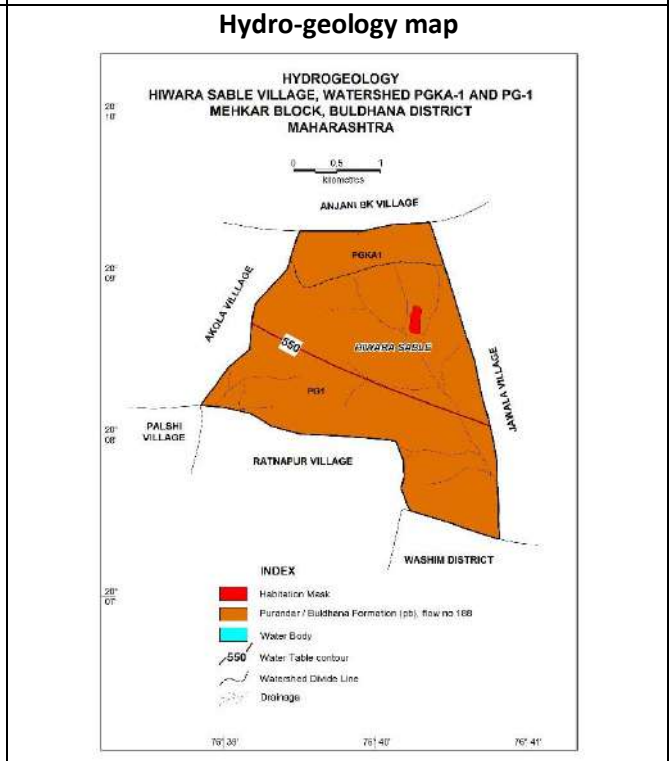
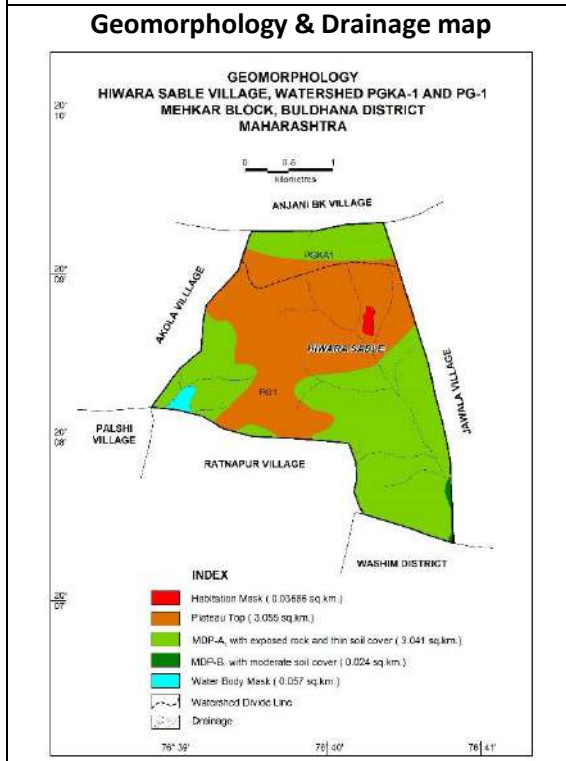
Available Resource (MCM)	2.3343
Agricultural Supply –GW	0.3931
Agricultural Supply -SW	0
Domestic Supply - GW	0.0301
Domestic Supply - SW	0
Non agriculture use (MCM)	0.05178285
Total GW availability (MCM)	1.8593

Area of village (Sq. Km.)	6.769
Area suitable for Artificial recharge (sq km)	6.77
Type of Aquifer	Hard rock
Area feasible for Artificial Recharge (WL >5mbgl) (Sq. Km.)	0
Volume of Unsaturated Zone (MCM)	0
Average Specific Yield	0.02
Volume of Sub Surface Storage Space available for Artificial Recharge (MCM)	0
Surplus runoff considered for planning (MCM) @ 100%	12.9356
Proposed AR Structures (Check Dam (@ Rs.30 lakh, Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM))	0
Proposed AR Structures Gabbion	0
Proposed AR Structures Other	0
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	0
Specific Recommendations - Segment wise Nala desilting, deepening and widening upto 3 m depth or upto weathered rock considering the local hydrogeological condition without disturbing the ecology/aquifer/environmental flow of nala.	
RTRWH Structures	
Households to be covered (Pakka House only)	130
Total RWH potential (MCM) (25% with 50 m2 area)	0.0000499
Rainwater harvested / recharged @ 80% runoff co-efficient (MCM)	0.0000400
<i>RTRWH is economically not viable & hence not Recommended</i>	
6.2. Demand Side Management	
Micro irrigation techniques	
Area is proposed to be covered under Drip	Not proposed
Volume of Water expected to be saved (MCM). Surface Flooding req- 0.36 m. Drip Req. - 0.24, WUE- 0.12 m	
Proposed Cropping Pattern change	
Irrigated area under Water Intensive Crop(ha)	Not proposed
Water Saving by Change in Cropping Pattern	
6.3. Expected Benefits	
Net Ground Water Availability (MCM)	2.3343
Additional GW resources available after Supply side interventions (MCM)	0
Ground Water Availability after Supply side intervention(MCM)	2.3343
Existing Ground Water Draft for All Uses (MCM)	0.4750
GW draft after Demand Side Interventions (MCM)	0
Present stage of Ground Water Development (%)	20.35
Expected Stage of Ground Water Development after interventions (%)	52.91
Other Interventions Proposed, if any	
Alternate Water Sources Available	Nil
6.4. Development Plan	
Volume of water available for Future planning (MCM)	1.8593
Proposed Number of DW (@ 1.5 ham for 90% of GWR Available)	35
Proposed Number of BW (@ 1 ham for 10% of GWR Available)	25
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	



In the village major area is covered by Clay moderately deep 25-50 cm soil covering 5.673 sq.km area whereas south eastern part clay soil with thickness > 100 cm is observed.

In the village major cultivable land is under Kharif cropping pattern.



Major part of the village moderately dissected plateau is observed and middle portion of village is covered by plateau top.

Entire village is covered by Deccan trap of Purnadar/ Buldhana formation.

Panchayat Level Aquifer Management Plan

Village – Hiwara Sable, Mehkar Taluka, Buldhana District

Aquifer (Prominent Lithology)	Current Scenario	Geology / Basalt flow	Geomorphology	GW quality	Recommendations for Aquifer Development					Aquifer Management Plan
					Type	Zones/Depth to be tapped	HP of pump to be lowered	Pumping Hours	Yield (Cu. m / Day)	
Aquifer I (Basalt- Weathered and fractures)	548.16 ha cultivable land by GW, 5 CD, 1 PT, 6 FP, 3 DW(d), 130 DW (i), Pre monsoon DTWL~ 4-13 m bgl. Post monsoon DTWL~ 1-8 m bgl.	DT Basalt (Buldana / Purandargarh Formation)	Plateau (slightly dissected to moderately dissected) with weathered thickness ranging from 0 to 6 m. BCS-25 to 100 cm.	Good; All parameters are within MPL	Dug well	Depth Range of Zones : 6 – 15 m	3 to 5	1 to 4	< 10 – 200 m ³ /day Or 0.7 ham/year	1. Construction of 35 nos dug wells and 25 nos bore wells 2. Desilting of existing water conservation and artificial recharge structures. 3. The GW should be used for irrigation purpose.
Aquifer II (Basalt- Jointed & Fractures)	15 BW(i), Nil BW (d), HP-Nil DTWL~ 15-35 m bgl.	As above	--	.NA	Bore well	Depth : 60 m	3 to 5	1 to 3	0.14-2.16 lps	1. The GW should be used for drinking purpose. 2. BW should not be drilled down below the red bole.

Note: DW(d)= Dug well Domestic; DW (i)= Dug Well Irrigation; BW(d)= Bore Well Domestic; BW(i)= Bore Well Irrigation

18.0 PANCHAYAT LEVEL AQUIFER MANAGEMENT PLAN, VILLAGE MADANI, WATERSHEDS PGKA-1, MEHKAR BLOCK, BULDHANA DISTRICT, MAHARASHTRA

1. SALIENT FEATURES		
1.1 Introduction		
Village Name	Madani	
Geographical Area (Sq. Km.)	15.44	
Hilly Area (Sq. Km.)	Nil	
Population (Current year -2018)	2869	
Climate	Monsoon Sub-Tropical	
Normal Rainfall (mm) (624.4	
Average Rainfall (mm) 2009-18	890	
1.2. Geomorphology, Soil & Geology		
Geomorphic Unit	Plateau (slightly dissected to moderately dissected).	
Geology	Deccan Traps (Basalt) Age: Late Cretaceous to Eocene	
Soil	Soil mostly consisting of clay >100 cm and clay moderately deep 25-50 cm thick.	
1.3. Hydrology & Drainage		
Watershed	PGKA-1	
Drainage	Godavari basin; dendritic to sub-dendritic drainage pattern. 1 st Order Stream - 24.87 km 2 nd Order Stream - 13.22km 3 rd Order Stream - 3.87 km	
Irrigation Project (Major/Medium/Minor etc.)	Nil	
WC structures (PT / KT / CD / FP etc.)	02-CD, 5-PT	
1.4. Land Use, Agriculture, Irrigation & Cropping Pattern		
	Specifics	Area
Forest Area		Nil
Cultivable Area		1111.28 ha
Net Sown Area		1343.25 ha
Double Cropped Area		Nil
Irrigation Dug wells		160
Irrigation Bore wells		273
Area under Drip & Sprinkler Irrigation		Nil
Area under Irrigation	Surface Water	Nil
	Ground Water	862 ha
Principal Crops (Reference year 2018)	Soyabean	600 ha Kharif
	Pulses (<i>Tur</i>)	150 ha Kharif
	Pulses (<i>Udad</i>)	150 ha Kharif
	Pulses (<i>Moong</i>)	178 ha Kharif

	Gram	700 ha Rabi
	Jawar	132 ha Rabi

1.5. Water Level Behavior : Aquifer-I (Shallow Aquifer)

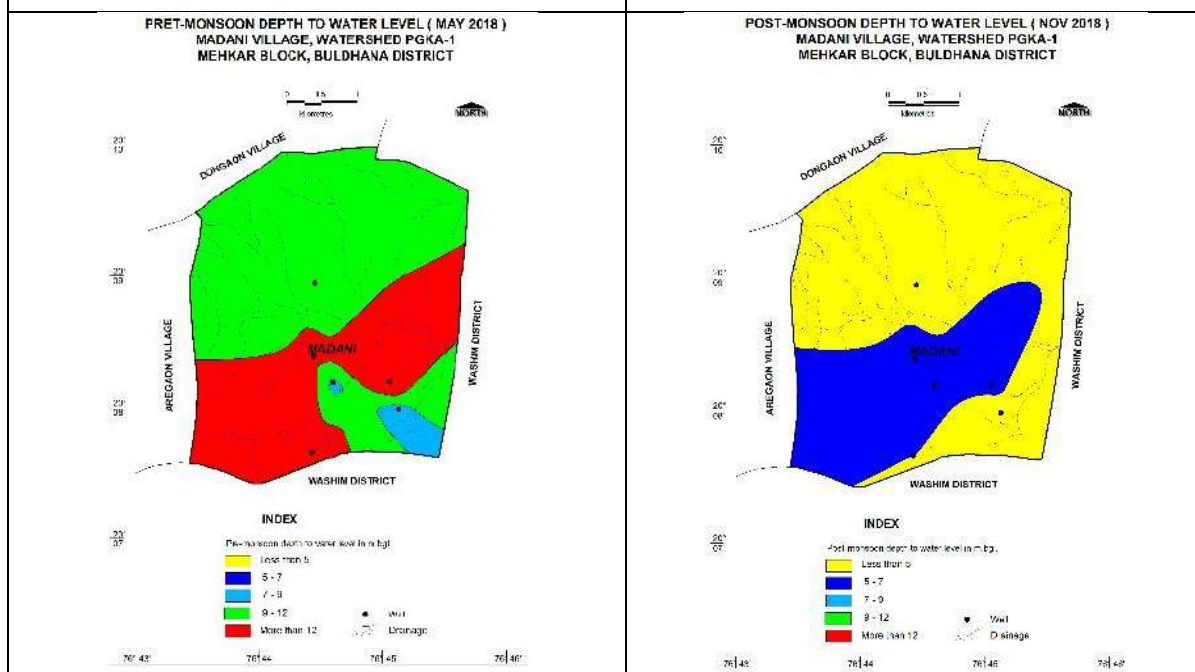
In the village, 08 KOW were established to decipher the water level scenario.

Pre-Monsoon (May-2018)

In the north, and south-east part the DTWL ranges between 9-12 mbgl whereas in the south, south-east and eastern DTWL more than 12 mbgl. A small isolated patch of the DTWL 7-9mbgl is observed in the south-eastern part of village.

Post-Monsoon (November-2018)

Entire area of the village shows DTWL in the range of 0-5 mbgl except in the South-western and middle part of village DTWL ranging 5-7 mbgl is observed.



2. Ground Water Issues

1. Non-availability of surface water for irrigation.
2. Less ground water potential of basaltic aquifer.
3. Water stress situation during lean period (March to June)

3. AQUIFER DISPOSITION

3.1. Number of Aquifers Basalt –Aquifer-I (Phreatic / Shallow aquifer)

3.2. Aquifer Characteristics

Major Aquifers	Basalt (Deccan Traps)
Type of Aquifer	Basalt –Aquifer-I (Phreatic / Shallow aquifer)
Static Water Level (mbgl)	7.00
Depth of Occurrence (mbgl)	8.00-22.00
weathered thickness (m)	0- 8.00
Yield	10 – 200 m ³ /day
Specific yield (Sy)	0.02 (norms)

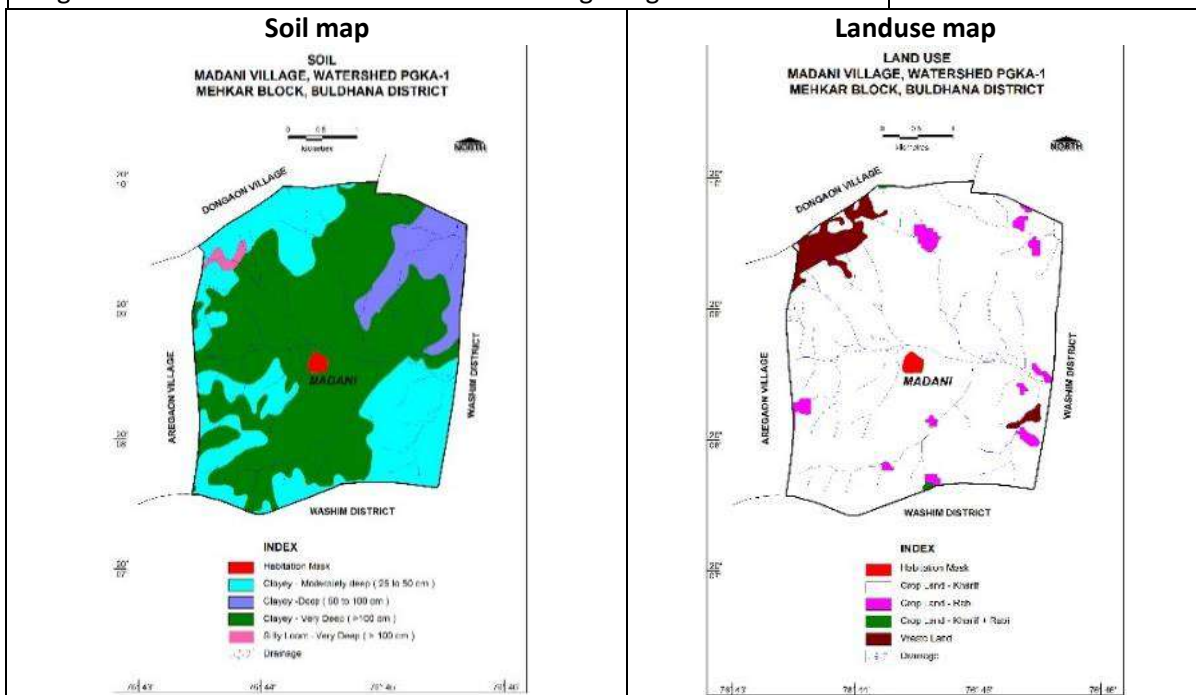
4. GROUND WATER QUALITY: Phreatic Aquifer (Aquifer-I/ Shallow aquifer)

In the village of Madani, 8 nos Kow established Ec is ranges 813 to 1351. One water sample collected for the chemical analysis. During the analysis EC is 1227 NO ₃ is 62 and Fluoride is 1.1.	
5.0. GROUND WATER RESOURCE MANAGEMENT	
5.1. Supply Side Management	
SUPPLY (MCM)	
Available Resource (MCM)	5.3352
Agricultural Supply –GW	2.3935
Agricultural Supply -SW	0
Domestic Supply - GW	0.0677
Domestic Supply - SW	0
Non agriculture use (MCM)	0.118116
Total GW availability (MCM)	2.7559
Area of village (Sq. Km.)	15.44
Area suitable for Artificial recharge (sq km)	15.44
Type of Aquifer	Hard rock
Area feasible for Artificial Recharge (WL >5mbgl) (Sq. Km.)	0
Volume of Unsaturated Zone (MCM)	0
Average Specific Yield	0.02
Volume of Sub Surface Storage Space available for Artificial Recharge (MCM)	0
Surplus runoff considered for planning (MCM) @ 100%	29.4789
Proposed AR Structures (Check Dam (@ Rs.30 lakh, Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM))	0
Proposed AR Structures Gabbion	0
Proposed AR Structures Other	0
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	0
Specific Recommendations - Segment wise Nala desilting, deepening and widening upto 3 m depth or upto weathered rock considering the local hydrogeological condition without disturbing the ecology/aquifer/environmental flow of nala.	
RTRWH Structures	
Households to be covered (Pakka House only)	212
Total RWH potential (MCM) (25% with 50 m2 area)	0.0000499
Rainwater harvested / recharged @ 80% runoff co-efficient (MCM)	0.0000400
However, RTRWH is economically not viable & not Recommended	
6.2. Demand Side Management	
Micro irrigation techniques	
Area is proposed to be covered under Drip	Not proposed
Volume of Water expected to be saved (MCM). Surface Flooding req- 0.36 m. Drip Req. - 0.24, WUE- 0.12 m	--
Proposed Cropping Pattern change	
Irrigated area under Water Intensive Crop(ha)	Not proposed
Water Saving by Change in Cropping Pattern	--
6.3. Expected Benefits	
Net Ground Water Availability (MCM)	5.3352
Additional GW resources available after Supply side interventions (MCM)	0

Ground Water Availability after Supply side intervention(MCM)	5.3352
Existing Ground Water Draft for All Uses (MCM)	2.5794
GW draft after Demand Side Interventions (MCM)	0
Present stage of Ground Water Development (%)	48.35
Expected Stage of Ground Water Development after interventions (%)	53.97
Other Interventions Proposed, if any	
Alternate Water Sources Available	Nil

6.4. Development Plan

Volume of water available for Future planning (MCM)	2.7559
Proposed Number of DW (@ 1.5 ham for 90% of GWR Available)	15
Proposed Number of BW (@ 1 ham for 10% of GWR Available)	5
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	

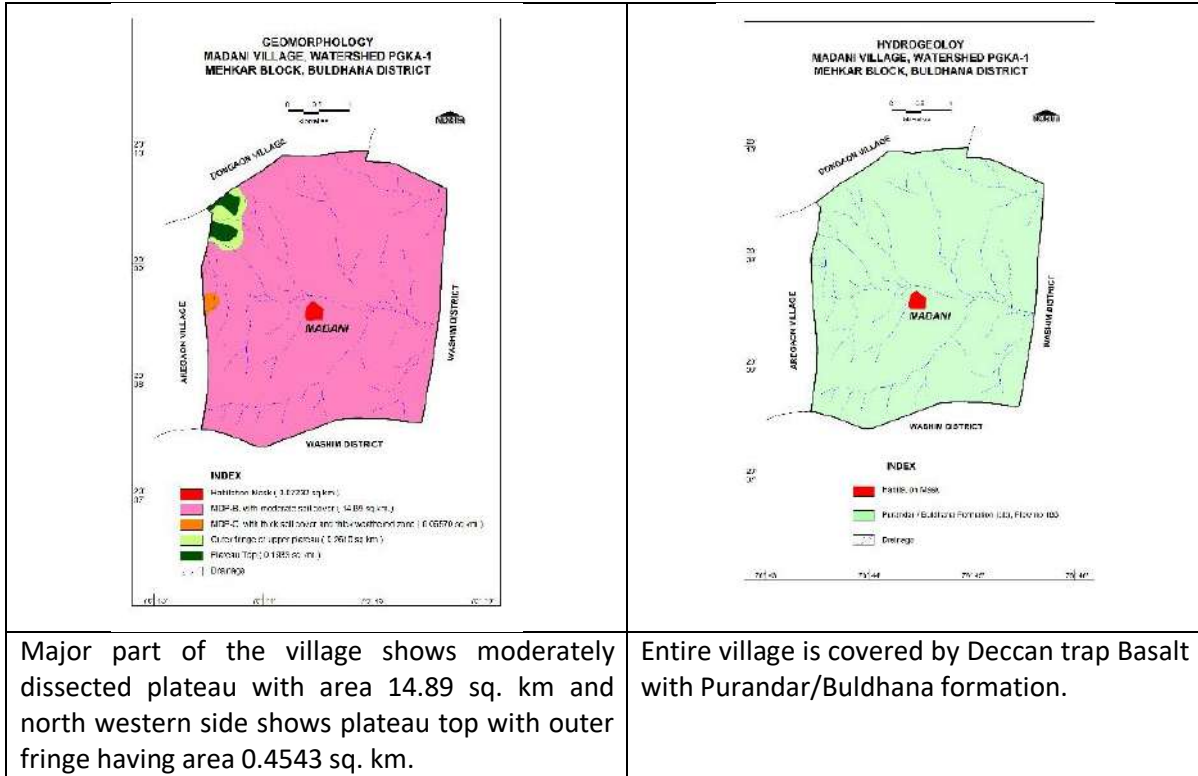


In the village major area is covered by Clayey soil of the thickness >100 cm covering 9.006 sq.km area whereas in some parts such as in South east and eastern side clayey soil with moderately deep is observed with a thickness 25 to 50cm. Similarly north east part covered by clay with thickness 50 to 100 cm. Small patch of silty loam soil is observed at north western side of village.

In the village major cultivable land is under Kharif cropping pattern. Small patches of land under Rabi crops.

Geomorphology & Drainage map

Hydro-geology map



Panchayat Level Aquifer Management Plan

Village – Madani, Mehkar Taluka, Buldhana District

Aquifer (Prominent Lithology)	Current Scenario	Geology / Basalt flow	Geomorphology	GW quality	Recommendations for Aquifer Development					Aquifer Management Plan
					Type	Zones/Depth to be tapped	HP of pump to be lowered	Pumping Hours	Yield (Cu. m / Day)	
Aquifer I (Basalt- Weathered and fractures)	1111.28 ha cultivable land by GW, 2 CD, 5 PT, 2 DW(d), 160 DW (i), Pre monsoon DTWL~ 8-16 m bgl. Post monsoon DTWL~ 2-7 m bgl.	DT Basalt (Buldana / Purandargarh Formation)	Moderately dissected plateau with weathered thickness ranging from 0 to 8 m. BCS->100 cm.	Good; All parameters are within MPL.	Dug well	Depth Range of Zones : 6 – 15 m	3 to 5	1 to 4	< 10 – 200 m ³ /day Or 0.7 ham/year	<ol style="list-style-type: none"> 1. Construction of 15 nos Dug wells and 5 nos bore well. 2. Desilting of existing water conservation and artificial recharge structures. 3. The GW should be used for irrigation purpose.
Aquifer II (Basalt- Jointed & Fractures)	273 BW(i), Nil BW (d), HP-Nil DTWL~ 15-35 m bgl.	As above	--	.	Bore well	Depth : 60 m	3 to 5	1 to 3	0.14-2.16 lps	<ol style="list-style-type: none"> 1. The GW should be used for drinking purpose.

Note: DW(d)= Dug well Domestic; DW (i)= Dug Well Irrigation; BW(d)= Bore Well Domestic; BW(i)= Bore Well Irrigation

19.0 PANCHAYAT LEVEL AQUIFER MANAGEMENT PLAN, SINDKHED RAJA, WATERSHEDS GPP-1, SINDKHED RAJA BLOCK, BULDHANA DISTRICT, MAHARASHTRA

1. SALIENT FEATURES		
1.1 Introduction		
Village Name	Sindkhed Raja	
Geographical Area (Sq. Km.)	47.83	
Hilly Area (Sq. Km.)	Nil	
Population (Current year -2018)	20000	
Climate	Monsoon Sub-Tropical	
Normal Rainfall (mm)	804	
Average Rainfall (mm) 2009-18	640	
1.2. Geomorphology, Soil & Geology		
Geomorphic Unit	Plateau (slightly dissected to moderately dissected).	
Geology	Deccan Traps (Basalt) Age: Late Cretaceous to Eocene	
Soil	Soil mostly consisting of gravelly clay loam 10 -25 cm, clay >100 cm and clay moderately deep 25-50 cm thick.	
1.3. Hydrology & Drainage		
Watershed	GPP-1	
Drainage	Godavari basin; dendritic to sub-dendritic drainage pattern. 1 st Order Stream – 48.23 km 2 nd Order Stream – 23.39 km 3 rd Order Stream – 6.25 km	
Irrigation Project (Major/Medium/Minor etc)	Nil	
WC structures (PT / KT / CD / FP etc.)	41-CD, 03-PT, other AR-72	
1.4. Land Use, Agriculture, Irrigation & Cropping Pattern		
Specifics		Area
Forest Area		738.6 ha
Cultivable Area		3654ha
Net Sown Area		3654 ha
Double Cropped Area		Nil
Irrigation Dug wells		21
Irrigation Bore wells		40
Area under Drip & Sprinkler Irrigation		Nil
Area under Irrigation	Surface Water	Nil
	Ground Water	184 ha
Principal Crops	Soyabean	1000 ha Kharib
	Pulses (<i>Tur</i>)	200 ha Kharib
	Pulses (<i>Udad</i>)	200 ha Kharib

	Pulses (<i>Moong</i>)	218 ha Kharib
	Wheat	184 ha Rabi
	Cotton	2000 ha Kharib
	Citrous fruit	0 ha
	Other	0 ha

1.5. Water Level Behavior : Aquifer-I (Shallow Aquifer)

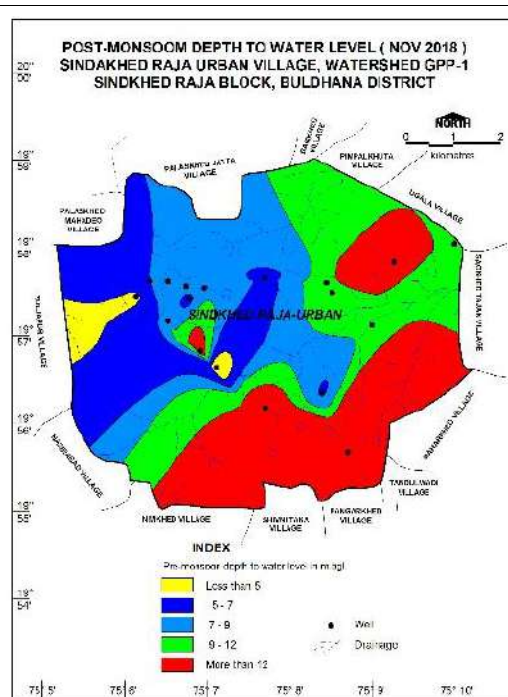
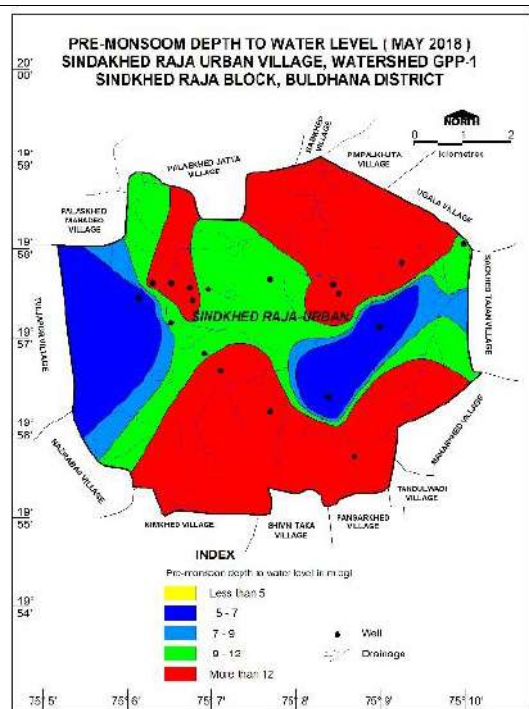
In the village, 22 KOW were established to decipher the water level scenario.

Pre-Monsoon (May-2018)

In the north-east and south part the DTWL is more than 12 mbgl whereas in the western and eastern part DTWL ranges between 5-7 mbgl. In the middle village DTWL ranges between 9-12 mbgl.

Post-Monsoon (November-2018)

In the southern part village shows DTWL is more than 12 mbgl. In the eastern and north eastern portion the DTWL 9-12 mbgl is observed except small isolated patch. In the western and middle portion of village DTWL is 5-9 mbgl except small patch having DTWL 9-12 mbgl.



2. Ground Water Issues

1. Non-availability of surface water for irrigation.
2. Less ground water potential basaltic aquifer.
3. Water stress situation during lean period (March to June)

3. AQUIFER DISPOSITION

3.1. Number of Aquifers

Basalt –Aquifer-I (Phreatic / Shallow aquifer)

3.2. Aquifer Characteristics

Major Aquifers

Basalt (Deccan Traps)

Type of Aquifer

Basalt –Aquifer-I (Phreatic / Shallow aquifer)

Static Water Level (mbgl)

7.00

Depth of Occurrence (mbgl)

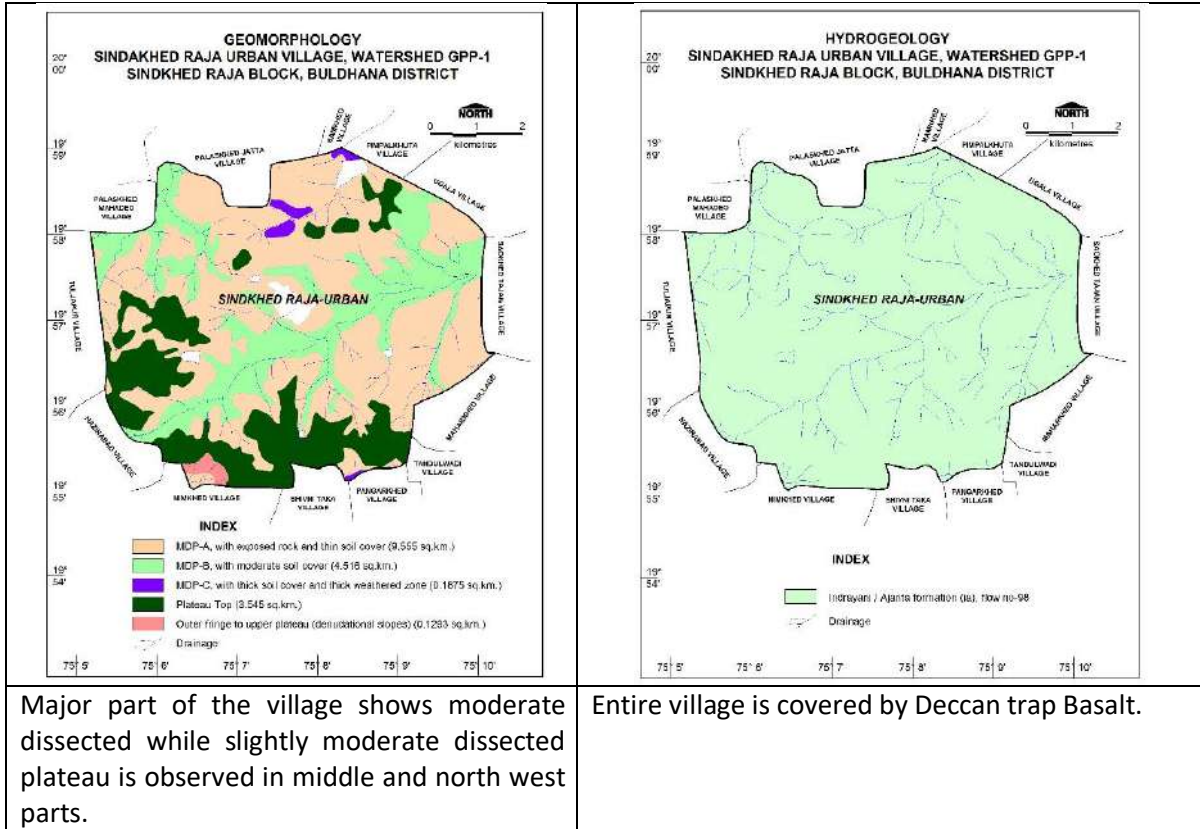
10.00-25.00

weathered thickness (m)	0- 8.00
Yield	10 – 200 m ³ /day
Specific yield (Sy)	0.02 (norms)
4. GROUND WATER QUALITY: Phreatic Aquifer (Aquifer-I/ Shallow aquifer)	
In the village of Sindkhed Raja, 23 nos Kow established Ec is ranges 440 to 1946. Three water samples collected for the chemical analysis. During the analysis EC is ranges 408 to 1636 NO ₃ is ranges from 10 to 40 and Fluoride is 0.12 to 0.87.	
5.0. GROUND WATER RESOURCE MANAGEMENT	
5.1. Supply Side Management	
SUPPLY (MCM)	
Available Resource (MCM)	12.4109
Agricultural Supply –GW	3.3347
Agricultural Supply -SW	0
Domestic Supply - GW	0.4621
Domestic Supply - SW	0
Non agriculture use (MCM)	0.2755008
Total GW availability (MCM)	8.3386
Area of village (Sq. Km.)	47.83
Area suitable for Artificial recharge (sq km)	47.83
Type of Aquifer	Hard rock
Area feasible for Artificial Recharge (WL >5mbgl) (Sq. Km.)	0
Volume of Unsaturated Zone (MCM)	0
Average Specific Yield	0.02
Volume of Sub Surface Storage Space available for Artificial Recharge (MCM)	0
Surplus runoff considered for planning (MCM) @ 100%	68.8418
Proposed AR Structures (Check Dam (@ Rs.30 lakh, Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM))	0
Proposed AR Structures Gabbion	0
Proposed AR Structures Other	0
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	0
Specific Recommendations	-
Segment wise Nala desilting, deepening and widening upto 3 m depth or upto weathered rock considering the local hydrogeological condition without disturbing the ecology/aquifer/environmental flow of nala.	
RTRWH Structures	
Households to be covered (Pakka House only)	2250
Total RWH potential (MCM) (25% with 50 m ² area)	0.0000499
Rainwater harvested / recharged @ 80% runoff co-efficient (MCM)	0.0000400
However, RTRWH is economically not viable & not Recommended	
6.2. Demand Side Management	
Micro irrigation techniques	
Area is proposed to be covered under Drip	Not proposed
Volume of Water expected to be saved (MCM). Surface Flooding req- 0.36 m. Drip Req. - 0.24, WUE- 0.12 m	
Proposed Cropping Pattern change	
Irrigated area under Water Intensive Crop(ha)	Not proposed
Water Saving by Change in Cropping Pattern	

6.3. Expected Benefits	
Net Ground Water Availability (MCM)	12.4109
Additional GW resources available after Supply side interventions (MCM)	0
Ground Water Availability after Supply side intervention(MCM)	12.4109
Existing Ground Water Draft for All Uses (MCM)	4.0723
GW draft after Demand Side Interventions (MCM)	0
Present stage of Ground Water Development (%)	32.81
Expected Stage of Ground Water Development after interventions (%)	49.13
Other Interventions Proposed, if any	
Alternate Water Sources Available	Nil

6.4. Development Plan	
Volume of water available for Future planning (MCM)	8.3386
Proposed Number of DW (@ 1.5 ham for 90% of GWR Available)	95
Proposed Number of BW (@ 1 ham for 10% of GWR Available)	60
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	

Soil map	Land use map
<p>SOIL SINDKHEDE RAJA URBAN VILLAGE, WATERSHED GPP-1 SINDKHEDE RAJA BLOCK, BULDHANA DISTRICT</p> <p>INDEX</p> <ul style="list-style-type: none"> Clayey-moderately deep (25 to 50 cm) Clayey-very deep (>100 cm) Gravelly clay loam - shallow (10 to 25 cm) Gravelly sandy loam - shallow (10 to 25 cm) Gravelly clay loam - shallow (10 to 25 cm) Drainage 	<p>SOIL SINDKHEDE RAJA URBAN VILLAGE, WATERSHED GPP-1 SINDKHEDE RAJA BLOCK, BULDHANA DISTRICT</p> <p>INDEX</p> <ul style="list-style-type: none"> Forest Crop land - Kharif + Rabi Waste land Current fallow Drainage Crop land - Kharif Crop land - Rabi
<p>In the village major area is covered by gravelly clay loam soil of the thickness 10 to 25 cm covering 12.00 sq.km area and clay soil having thickness 25-50cm covering area 11.32 sq. km whereas clay soil along the drainage having thickness more than 100 cm and area is 11.38 sq. km.</p>	<p>In the village major cultivable land is under Kharif and Rabi cropping pattern covering 15.83sq.km.</p>
Geomorphology & Drainage map	Hydro-geology map



Panchayat Level Aquifer Management Plan

Village –Sindkhed Raja, Sindkhed Raja Taluka, Buldhana District

Aquifer (Prominent Lithology)	Current Scenario	Geology / Basalt flow	Geomorphology	GW quality	Recommendations for Aquifer Development					Aquifer Management Plan
					Type	Zones/Depth to be tapped	HP of pump to be lowered	Pumping Hours	Yield (Cu. m / Day)	
Aquifer I (Basalt- Weathered and fractures)	3654 ha cultivable land by GW, 41 CD, 3 PT, 1 PWS scheme, 31 DW(d), 21 DW (i), Pre monsoon DTWL~ 3- 24 m bgl. Post monsoon DTWL~ 2-20 m bgl.	DT Basalt (Indrayani/ Ajanta formation)	Plateau (dissected to moderately dissected) with weathered thickness ranging from 0 to 7 m.	Good; All parameters are within MPL	Dug well	Depth Range of Zones : 6 – 15 m	3 to 5	1 to 4	< 10 – 200 m ³ /day Or 0.7 ham/year	<ol style="list-style-type: none"> 1. Construction of dug wells and bore wells. 2. Desilting of existing water conservation and artificial recharge structures. 3. The GW should be used for irrigation purpose.
Aquifer II (Basalt- Jointed & Fractures)	40 BW(i), Nil BW (d), HP-Nil DTWL~ 15-35 m bgl.	As above	--	Good; All parameters are within MPL.	Bore well	Depth : 60 m	3 to 5	1 to 3	0.14-2.16 lps	<ol style="list-style-type: none"> 1. The GW should be used for drinking purpose. 2. BW should not be drilled down below the red bole.

Note: DW(d)= Dug well Domestic; DW (i)= Dug Well Irrigation; BW(d)= Bore Well Domestic; BW(i)= Bore Well Irrigation

20.0 PANCHAYAT LEVEL AQUIFER MANAGEMENT PLAN, VILLAGE SAOKHED TEJAN, WATERSHED GPP-1, SINDKHED RAJA BLOCK, BULDHANA DISTRICT, MAHARASHTRA

1. SALIENT FEATURES		
1.1 Introduction		
Village Name	Saokhed Tejan	
Geographical Area (Sq. Km.)	9.95	
Hilly Area (Sq. Km.)	Nil	
Population (Current year -2018)	2659	
Climate	Monsoon Sub-Tropical	
Normal Rainfall (mm)	804	
Annual Rainfall (mm) 2009-18	640	
1.2. Geomorphology, Soil & Geology		
Geomorphic Unit	Plateau (slightly dissected to moderately dissected).	
Geology	Deccan Traps (Basalt) Age: Late Cretaceous to Eocene	
Soil	Soil mostly consisting of clay >100 cm, gravelly clay loam 25-50 cm and silty loam >100 cm thick.	
1.3. Hydrology & Drainage		
Watershed	GPP-1	
Drainage	Godavari basin; parallel to sub parallel drainage pattern. 1 st Order Stream – 10.93 km 2 nd Order Stream – 5.43 km 3 rd Order Stream – 4.57 km	
Irrigation Project (Major/Medium/Minor etc.)	Nil	
WC structures (PT / KT / CD / FP etc.)	07-CD, 4- other AR	
1.4. Land Use, Agriculture, Irrigation & Cropping Pattern		
	Specifics	Area
Forest Area		12.1 ha
Cultivable Area		855 ha
Net Sown Area		910 ha
Double Cropped Area		Nil
Irrigation Dug wells		277
Irrigation Bore wells		11
Area under Drip & Sprinkler Irrigation		Nil
Area under Irrigation	Surface Water	Nil
	Ground Water	120 ha
Principal Crops	Soyabean	300 ha Kharib
	Pulses (<i>Tur</i>)	30 ha Kharib
	Pulses (<i>Udad</i>)	30 ha Kharib
	Pulses (<i>Moong</i>)	30 ha Kharib

	Wheat	40 ha Rabi
	Cotton	400 ha Kharib
	Jawar	30 ha Rabi
	Maise	50 ha Rabi

1.5. Water Level Behavior : Aquifer-I (Shallow Aquifer)

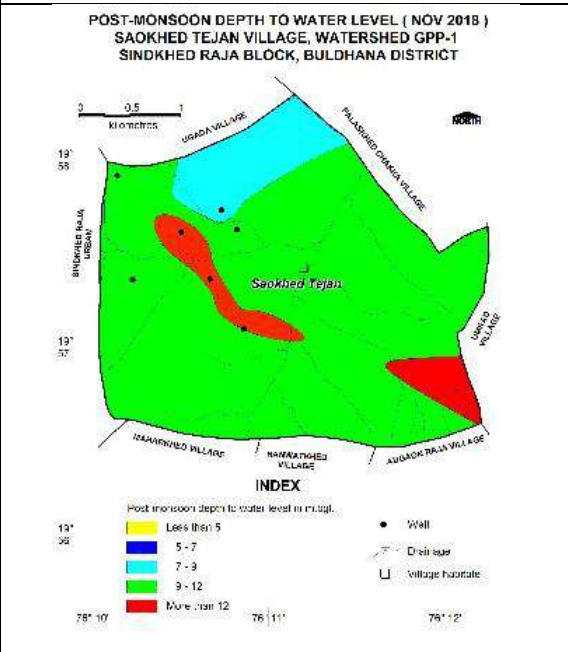
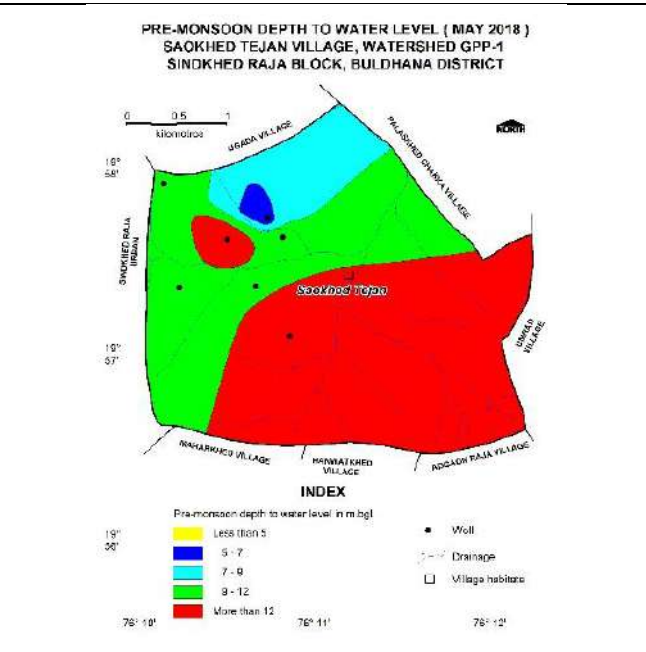
In the village, 8 KOW were established to decipher the water level scenario.

Pre-Monsoon (May-2018)

In the South, south-east part the DTWL more than 12 mbgl whereas in the east and north east part DTWL ranges between 9-12 mbgl and north part DTWL ranges between 7-9 mbgl.

Post-Monsoon (November-2018)

Entire area of the village shows DTWL in the range of 9-12 mbgl except in the northern part and small patch. Northern part of village DTWL in the ranges 7-9 mbgl.



2. Ground Water Issues

1. Non-availability of surface water for irrigation.
2. Less ground water potential basaltic aquifer.
3. Water stress situation during lean period (March to June)

3. AQUIFER DISPOSITION

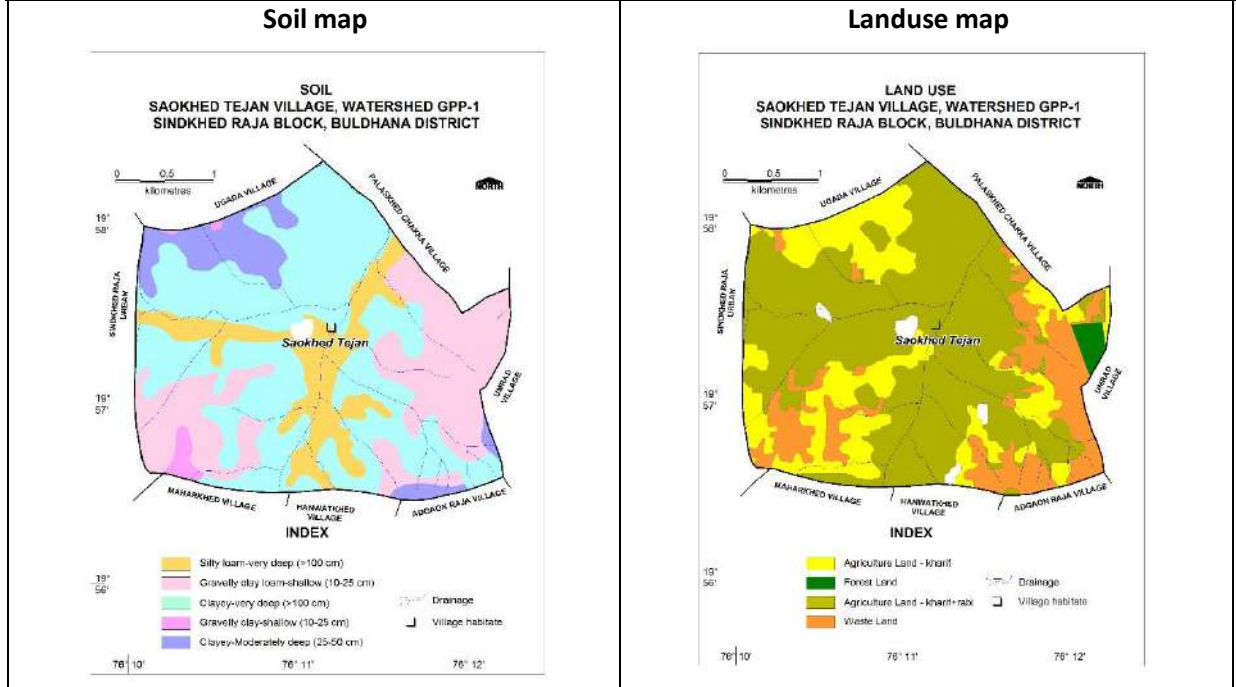
3.1. Number of Aquifers	Basalt –Aquifer-I (Phreatic / Shallow aquifer)
3.2. Aquifer Characteristics	
Major Aquifers	Basalt (Deccan Traps)
Type of Aquifer	Basalt –Aquifer-I (Phreatic / Shallow aquifer)
Static Water Level (mbgl)	6.63
Depth of Occurrence (mbgl)	5.00-15.00 m
weathered thickness (m)	0- 6 m
Yield	10 to 200 m ³ /day
Specific yield (Sy)	0.02 (norms)

4. GROUND WATER QUALITY: Phreatic Aquifer (Aquifer-I/ Shallow aquifer)

In the village of Saokhed tejan , 8 nos KOW established . Three nos water samples collected for

chemical analysis. During the analysis Ec is ranges from 408 to 1675, NO ³ is ranges from 10 to 39, Flouride is ranges 0.10 to 0.87	
5.0. GROUND WATER RESOURCE MANAGEMENT	
5.1. Supply Side Management	
SUPPLY (MCM)	
Available Resource (MCM)	2.5951
Agricultural Supply –GW	1.0445
Agricultural Supply -SW	0
Domestic Supply - GW	0.0736
Domestic Supply - SW	0
Non agriculture use (MCM)	0.057312
Total GW availability (MCM)	1.4197
Area of village (Sq. Km.)	9.95
Area suitable for Artificial recharge (sq km)	9.95
Type of Aquifer	Hard rock
Area feasible for Artificial Recharge (WL >5mbgl) (Sq. Km.)	0
Volume of Unsaturated Zone (MCM)	0
Average Specific Yield	0.02
Volume of Sub Surface Storage Space available for Artificial Recharge (MCM)	0
Surplus runoff considered for planning (MCM) @ 100%	14.2878
Proposed AR Structures (Check Dam (@ Rs.30 lakh, Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM))	0
Proposed AR Structures Gabbion	0
Proposed AR Structures Other	0
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	0
Specific Recommendations - Segment wise Nala desilting, deepening and widening upto 3 m depth or upto weathered rock considering the local hydrogeological condition without disturbing the ecology/aquifer/environmental flow of nala.	
RTRWH Structures	
Households to be covered (Pakka House only)	350
Total RWH potential (MCM) (25% with 50 m2 area)	0.0000499
Rainwater harvested / recharged @ 80% runoff co-efficient (MCM)	0.0000400
However, RTRWH is economically not viable & not Recommended	
6.2. Demand Side Management	
Micro irrigation techniques	
Area is proposed to be covered under Drip	Not proposed
Volume of Water expected to be saved (MCM). Surface Flooding req- 0.36 m. Drip Req. - 0.24, WUE- 0.12 m	
Proposed Cropping Pattern change	
Irrigated area under Water Intensive Crop(ha)	Not proposed
Water Saving by Change in Cropping Pattern	
6.3. Expected Benefits	
Net Ground Water Availability (MCM)	2.5951
Additional GW resources available after Supply side interventions (MCM)	0
Ground Water Availability after Supply side intervention(MCM)	2.5951
Existing Ground Water Draft for All Uses (MCM)	1.1754
GW draft after Demand Side Interventions (MCM)	0

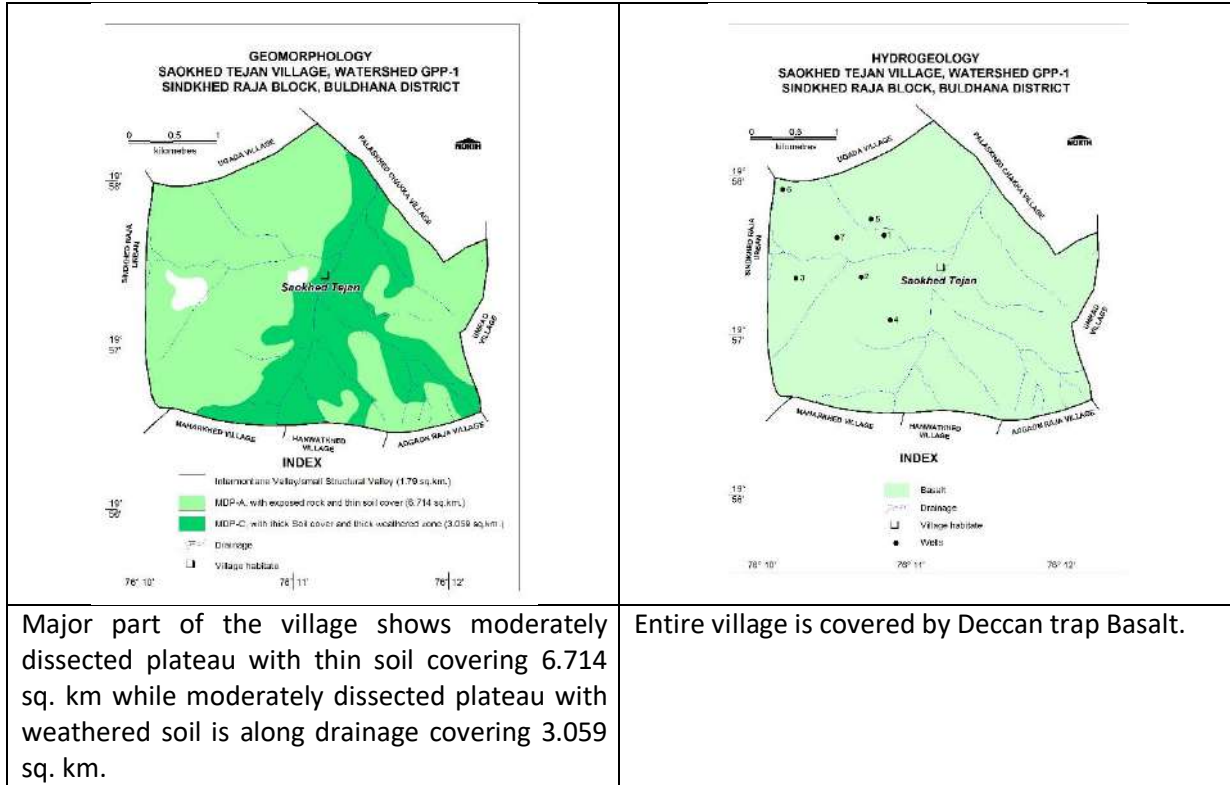
Present stage of Ground Water Development (%)	45.29
Expected Stage of Ground Water Development after interventions (%)	57.05
Other Interventions Proposed, if any	
Alternate Water Sources Available	Nil
6.4. Development Plan	
Volume of water available for Future planning (MCM)	1.4197
Proposed Number of DW (@ 1.5 ham for 90% of GWR Available)	17
Proposed Number of BW (@ 1 ham for 10% of GWR Available)	5
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	



In the village major area is covered by Clayey soil of the thickness >100 cm covering 4.891 sq.km area whereas in some parts such as in north eastern and south western side gravelly clay loam soil is observed with a thickness 10-25cm. Similarly in northwest and small area in south clayey soil is observed of the thickness 25-50 cm. Gravelly clay loam of shallow thickness is observed along the drainage covering area 2.691 sq. km

In the village major cultivable land is under Kharif and rabi cropping pattern covering 5.772 sq.km. 2.272 sq.km area is under kharif crops.

Geomorphology & Drainage map	Hydro-geology map
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Panchayat Level Aquifer Management Plan

Village – Saokhed Tejan, Sindkhed Raja Taluka, Buldhana District

Aquifer (Prominent Lithology)	Current Scenario	Geology / Basalt flow	Geomorphology	GW quality	Recommendations for Aquifer Development				Aquifer Management Plan
					Zones/Depth to be tapped	HP of pump to be lowered	Pumping Hours	Yield (Cu. m / Day)	
Aquifer I (Basalt- Weathered and fractures)	855 ha cultivable land, 7 CD, 1 PT, 1 PWS scheme, 3 DW(d), 277 DW (i), Pre monsoon DTWL~ 9.80 to 14.46m bgl. Post monsoon DTWL~ 7.60 to 13.00 m bgl.	DT Basalt Flow-II	village 6.71 sq.km area covered by exposed rock and thin soil.	Good; All parameters are within MPL except Nitrate contamination	Depth Range of Zones : 6 – 15 m	3 to 5	1 to 4	< 10 – 200 m ³ /day Or 0.7 ham/year	4. Construction of 17 nos dug well and 5 nos bore wells. 5. Desilting of existing water conservation and artificial recharge structures. 6. The GW should be used for irrigation purpose. 7. RRR
Aquifer II (Basalt- Jointed & Fractures)	11 BW(i) Nil BW (d) DTWL~ 15-35 m bgl.	DT Basalt	--	Good; All parameters are within MPL.	Depth : 60 m	3 to 5	1 to 3	0.14-2.16 lps	1. The GW should be used for drinking purpose. 8. BW should not be drilled down below the red bole.

Note: DW(d)= Dug well Domestic; DW (i)= Dug Well Irrigation; BW(d)= Bore Well Domestic; BW(i)= Bore Well Irrigation

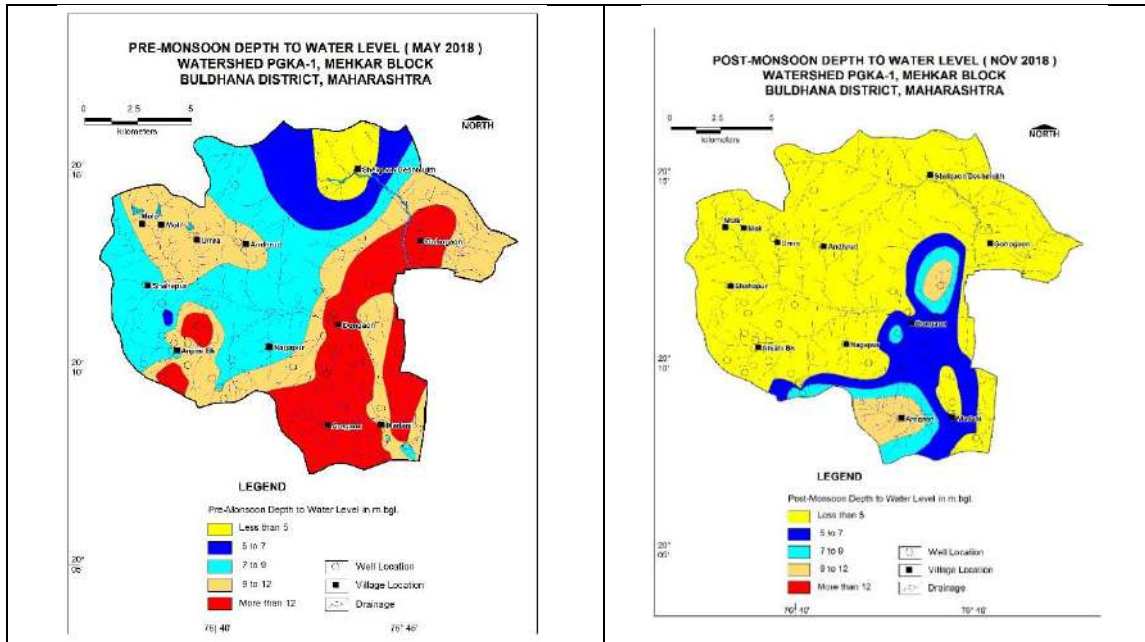
I NTERVENTION FOR AQUIFER REJUVENATION

A. PGKA-1 WATERSHED, MEHKAR BLOCK

B. GPP-1 WATERSHED, SINDKHED RAJA BLOCK

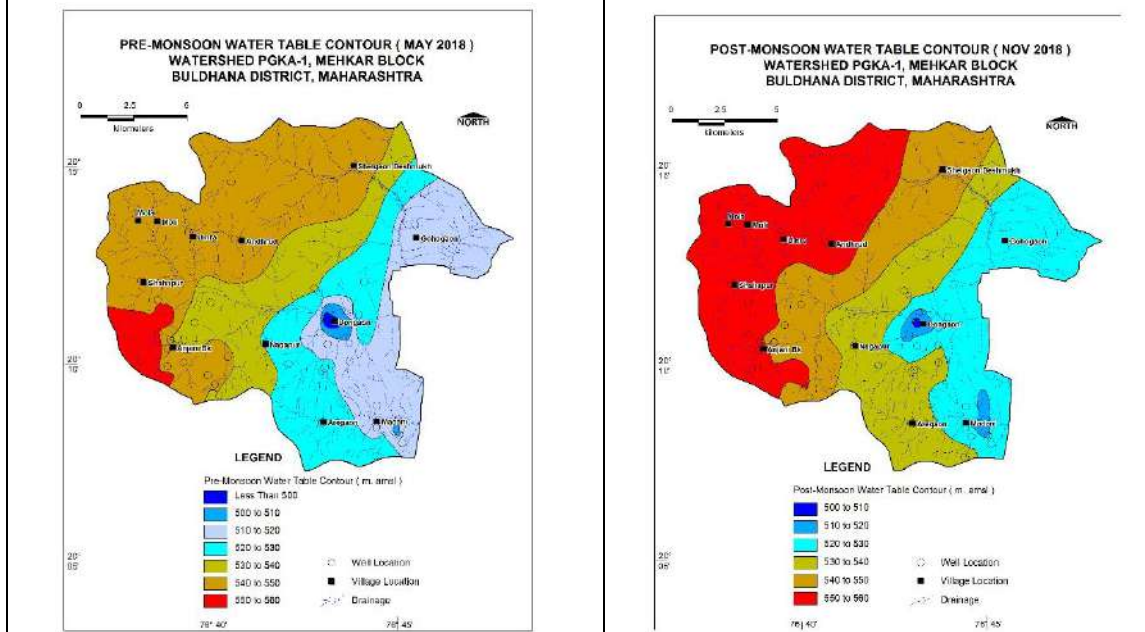
21.0 INTERVENTION FOR AQUIFER REJUVENATION OF PGKA-1 WATERSHED, MEHKAR BLOCK, BULDHANA DISTRICT, MAHARASHTRA

1. SALIENT FEATURES	
1.1 Introduction	
Watershed with Area (Sq. Km.)	PGKA-1 (185.40 sq. Km)
Climate	Arid to semi arid
Normal Rainfall (mm) of nearest rain gauge station	850
Annual Rainfall (mm) 2009-18 of nearest rain gauge station	890
1.2. Geomorphology, Soil & Geology	
Geomorphic Unit	Major part of the watershed PGKA-1 shows moderately dissected plateau covering area 158.08 sq. km.
Geology	Deccan Traps (Basalt) Age: Late Cretaceous to Eocene
Soil	Soil consisting mostly of clay moderately deep with thickness 25 to 50 cm.
1.3. Hydrology & Drainage	
Watershed	PGKA-1
Drainage	The area is drained by Kanch and Utavali rivers are the tributaries of Penganga river of Godavari basin with sub-dendritic to dendritic drainage.
Irrigation Project (Major / Medium / Minor etc.)	Nil
1.4. Land Use	
	Specifics
	Area (Sq. Km.)
Forest Area	Nil
Cultivable Area -Kharif	154.94
Cultivable Area -Rabi	11.19
Double Cropped Area	10.76
Waste land	5.914
Water body	0.750
Habitation mask	1.847
1.5. Water Level Behavior : Aquifer-I (Shallow Aquifer)	
Pre-Monsoon (May-2018) During the pre-monsoon study 49 nos KOW establish in PGKA-1 watershed of Mehkar taluka. Middle portion of the water shed DTWL is ranges from 7-9 mbgl. In the North portion DTWL is less than 7 mbgl. In the western portion DTWL is ranges from 7 to 12 mbgl. DTWL in the eastern and southern part of watershed is more than 12 mbgl except small patch having DTWL is 7 to 9 mbgl, The flow direction in pre monsoon is NW to SE.	Post-Monsoon (November-2018) Major area of watershed PGKA-1 Mehkar taluka DTWL in post monsoon is less than 5 mbgl whereas the southern portion DTWL is ranges from 5 to 9 mbgl except small patch having DTWL is ranges from 9-12mbgl. The flow direction in post monsoon is NW to SE.
Pre monsoon Depth to water level map	Post monsoon Depth to water level map



Pre monsoon Depth to water table map

Post monsoon Depth to water table map



2. Ground Water Issues		
<ol style="list-style-type: none"> 1. Declining water level. 2. Non-availability of surface water for irrigation. 3. Less ground water potential in basaltic aquifer. 		
3. AQUIFER DISPOSITION		
3.1. Number of Aquifers	Basalt –Aquifer-I (Phreatic / Shallow aquifer)	
3.2. Aquifer Characteristics		
Major Aquifers	Basalt (Deccan Traps)	
Type of Aquifer (Phreatic/Semiconfined/Confined)	Basalt –Aquifer-I (Phreatic / Shallow aquifer)	Aquifer-II
Static Water Level (mbgl)	6.00	18.00-30
Depth of Occurrence (mbgl)	3 to 27.00	11-16 & 145-150

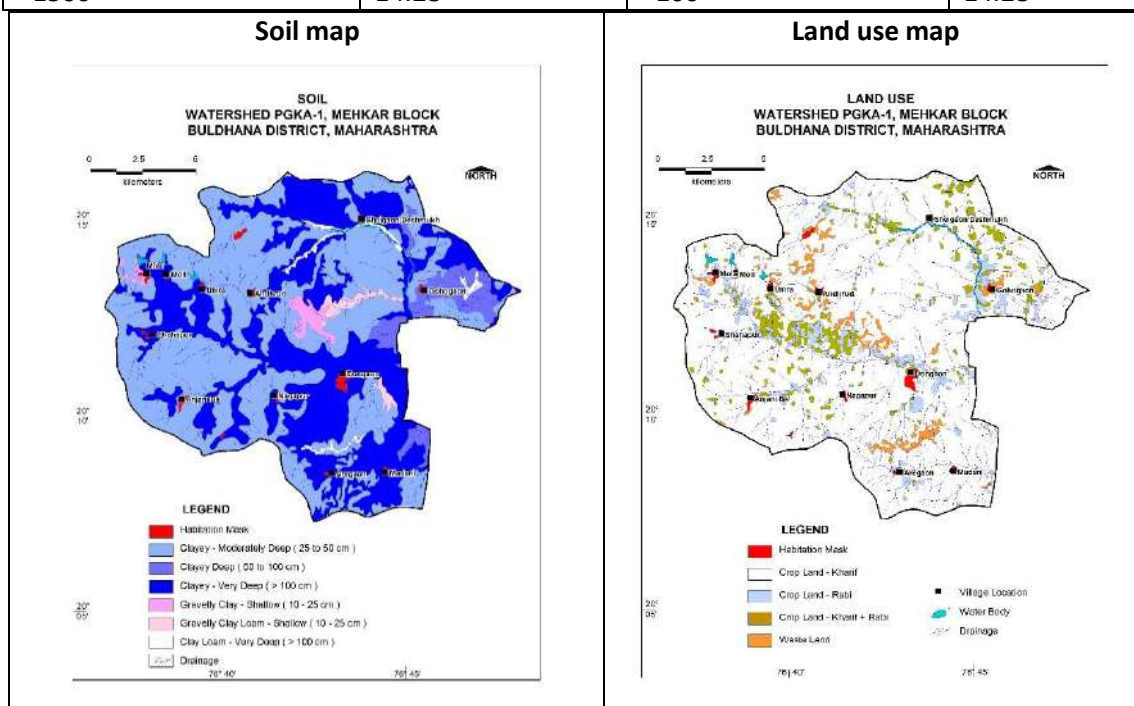
weathered/fractured rocks thickness (m)	0 to 8	0 to 17.5
Yield	Upto 100 m ³ /day	Upto to 1.5 lps
Specific yield/ Storativity (S)	0.02 (norms)	-
Transmissivity (T)	-	-

4. GROUND WATER QUALITY: Phreatic Aquifer (Aquifer-I/ Shallow aquifer)

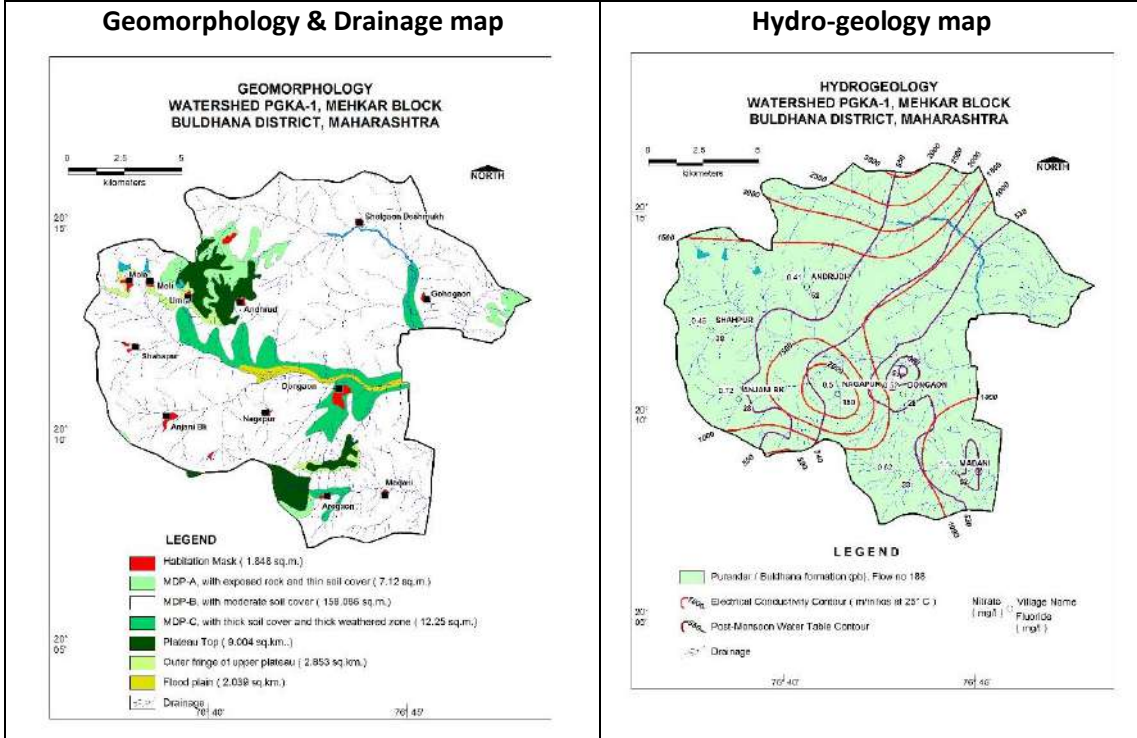
During the pre-monsoon study 49 nos. KOW established and 7 nos. water samples collected from dug wells. Analyzed the water samples from chemical lab and results are given below.

Parameters	Units	Result in Range	BIS Drinking Water Standards IS- 10500-2012	
			Desirable Limits	Maximum Permissible Limits
pH		7.2-7.9	6.5	8.5
EC	m/mhos at 25° C	711-2324		
TDS	mg/l	424-1230	500	2000
Total hardness	''	158-760	200	600
Ca	''	45-202	75	200
Mg	''	9-61	30	100
Na	''	73-233	-	-
K	''	1.7-6.3	-	-
CO ₃	''	0		
HCO ₃	''	190-595		
Cl	''	26-232	250	1000
SO ₄	''	27-89	200	400
NO ₃	''	28-150	45	No Relaxation
F	''	0.41-1.1	1.0	1.5

EC Range	Percentage	NO ₃ Range	Percentage
< 1000	28.57	<45	57.15
1000 to 1500	57.15	45 to 100	28.57
>1500	14.28	>100	14.28



<p>In PGKA-1 watershed major area consisting mostly of clayey moderately deep 25 to 50 cm and clayey deep > 100 cm thick.</p>	<p>In PGKA-1 watershed major cultivable land is under Kharif cropping pattern having area 154.95 sq. km and double crops having area 10.76 sq.km covered all along the major drainage.</p>
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<p>Major part of the PGKA-1 watershed shows moderately dissected plateau covering area 158.08 sq. km with plateau top having area 9.004 sq.km. Outer fringe of upper plateau covering area 2.853 sq. km and flood plain covering area 2.039 sq. km</p>	<p>Entire watershed of PGKA-1 are covered by Deccan trap Basalt. Ec is ranges from 1000 to 3000 m/mhos. NO3 is ranges from 0 to 190 mg/l and fluoride is ranges from 0.24 to 2.67 mg/l.</p>
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Intervention of Aquifer Rejuvenation of PGKA-1 watershed, Mehkar taluka	
Supply Side Management	
SUPPLY (MCM)	
Available Resource (MCM)	15.9200
Agricultural Supply –GW	13.6900
Agricultural Supply -SW	0
Domestic Supply - GW	0.5800
Total Draft (MCM)	14.2700
Balance GW availability (MCM)	1.6500
Present stage of Ground Water Development (%)	89.64
Area of watershed (Sq. Km.)	185.4
Area suitable for Artificial recharge (sq km) (C=4.35, NC=148.02)	152.37
Type of Aquifer	Hard rock

Volume of water required to bring SOD (upto 70%) (MCM)	4.47
Average Specific Yield	0.02
Proposed AR Structures (90 Check Dam Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM)	2.025
Proposed AR Structures (10 Percolation tank Av. Gross Capacity-100 TCM * 2 fillings = 200TCM))	1.5
total Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	3.525
RTRWH Structures	
Households to be covered (Pakka House only)	0
Total RWH potential (MCM) (25% with 50 m2 area)	0
Rainwater harvested / recharged @ 80% runoff co-efficient (MCM)	0
<i>RTRWH is economically not viable & hence not Recommended</i>	
Expected Benefits	
Net Ground Water Availability (MCM)	15.9200
Additional GW resources available after Supply side interventions (MCM)	3.525
Ground Water Availability after Supply side intervention(MCM)	19.4450
Existing Ground Water Draft for All Uses (MCM)	14.2700
GW draft after Demand Side Interventions (MCM)	0
Present stage of Ground Water Development (%)	89.64
Expected Stage of Ground Water Development after supply side interventions (%)	73.39
Other Interventions Proposed, if any	
Alternate Water Sources Available	Nil
No Demand side intervention proposed	

22.0 INTERVENTION FOR AQUIFER REJUVENATION OF GPP-1 WATERSHED, SINDKHED RAJA BLOCK, BULDHANA DISTRICT, MAHARASHTRA

1. SALIENT FEATURES	
1.1 Introduction	
Watershed with Area (Sq. Km.)	GPP-1 (188 sq. Km)
Climate	Sub-Tropical to arid
Normal Rainfall (mm) of nearest rain gauge station	804.3
Annual Rainfall (mm) 2009-18 of nearest rain gauge station	640
1.2. Geomorphology, Soil & Geology	
Geomorphic Unit	Major part of the watershed shows moderately dissected plateau covering area
Geology	Deccan Traps (Basalt) Age: Late Cretaceous to Eocene
Soil	Soil consisting mostly of clay very deep > 100 cm and gravel clay 10 to 25 cm cm thick.
1.3. Hydrology & Drainage	
Watershed	GPP-1
Drainage	The area is drained by Patalganga river is a tributary of Purna river of Godavari basin. The drainage pattern is sub-dendritic to dendritic.
1.4. Land Use	
Specifics	Area (Sq. Km.)
Forest Area	11.33
Cultivable Area- Kharif	56.13
Cultivable Area- Rabi	4.76
Double Cropped Area	69.96
Waste land	45.82
1.5. Water Level Behavior : Aquifer-I (Shallow Aquifer)	
Pre-Monsoon (May-2018) During the pre-monsoon study 39 nos KOW establish in GPP-1 water shed of Sindkhed Raja taluka. Western and North western portion of the water shed DTWL is more than 9 mbgl. Middle portion DTWL ranges between 5-9 mbgl. In the northern portion DTWL is less than 5 mbgl. The flow direction in pre monsoon is SW to NE.	Post-Monsoon (November-2018) In GPP-1 area of Sindkhed Raja taluka DTWL in eastern part DTWL is 9-12 mbgl whereas some patches having DTWL is more than 12 mbgl. In the middle portion of watershed DTWL is 5 to 9 mbgl. In the north eastern portion of water shed DTWL is less than 5 mbgl. The flow direction in post monsoon is SW to NE.

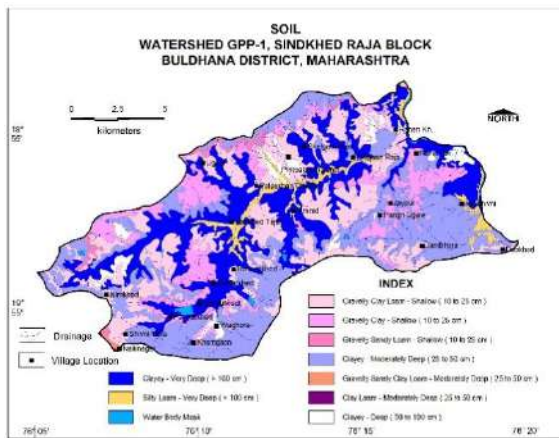
<p>Some Pre monsoon Depth to water level map</p> <p>PRE-MONSOON DEPTH TO WATER LEVEL (MAY 2018) WATERSHED GPP-1, SINDKHED RAJA BLOCK BULDHANA DISTRICT, MAHARASHTRA</p> <p>INDEX Depth to Water Level in mbgl.</p> <ul style="list-style-type: none"> Less than 5 5 to 7 7 to 9 9 to 12 More than 12 		<p>Post monsoon Depth to water level map</p> <p>POST-MONSOON DEPTH TO WATER LEVEL (NOV 2018) WATERSHED GPP-1, SINDKHED RAJA BLOCK BULDHANA DISTRICT, MAHARASHTRA</p> <p>INDEX Depth to Water Level in mbgl.</p> <ul style="list-style-type: none"> Less than 3 5 to 7 7 to 9 9 to 12 More than 12 	
<p>Pre monsoon Depth to water table map</p> <p>PRE-MONSOON WATER TABLE CONTOUR (MAY 2018) WATERSHED GPP-1, SINDKHED RAJA BLOCK BULDHANA DISTRICT, MAHARASHTRA</p> <p>INDEX Water Table Contour in meter</p> <ul style="list-style-type: none"> Less than 500 500 to 510 510 to 520 520 to 530 530 to 540 540 to 550 More than 550 		<p>Post monsoon Depth to water table map</p> <p>POST-MONSOON WATER TABLE CONTOUR (NOV 2018) WATERSHED GPP-1, SINDKHED RAJA BLOCK BULDHANA DISTRICT, MAHARASHTRA</p> <p>INDEX Water Table Contour in meter</p> <ul style="list-style-type: none"> Less than 500 500 to 510 510 to 520 520 to 530 530 to 540 540 to 550 More than 550 	
<p>2. Ground Water Issues</p> <ol style="list-style-type: none"> Declining water level. Non-availability of surface water for irrigation. Less ground water potential in basaltic aquifer. 			
<p>3. AQUIFER DISPOSITION</p>			
<p>3.1. Number of Aquifers</p>		<p>Basalt –Aquifer-I (Phreatic / Shallow aquifer)</p>	
<p>3.2. Aquifer Characteristics</p>			
<p>Major Aquifers</p>		<p>Basalt (Deccan Traps)</p>	
<p>Type of Aquifer (Phreatic/Semiconfined/Confined)</p>		<p>Basalt –Aquifer-I (Phreatic / Shallow aquifer)</p>	<p>Aquifer-II</p>
<p>Static Water Level (mbgl)</p>		<p>7.00</p>	<p>23-32</p>
<p>Depth of Occurrence (mbgl)</p>		<p>3 to 17.00</p>	<p>11 to 13.5 & 113 to 117</p>
<p>weathered/fractured rocks thickness (m)</p>		<p>0 to 9</p>	<p>0 to 15</p>
<p>Yield</p>		<p>Upto 100 m³/day</p>	<p>Upto 1.50 lps</p>
<p>Specific yield/ Storativity (S)</p>		<p>0.02 (norm)</p>	<p>-</p>
<p>Transmissivity (T)</p>		<p>-</p>	<p>-</p>
<p>4. GROUND WATER QUALITY: Phreatic Aquifer (Aquifer-I/ Shallow aquifer)</p>			

During the pre-monsoon study 39 nos. KOW established and 11 nos. water samples collected from wells. Analyzed the water samples from chemical lab and results are given below.

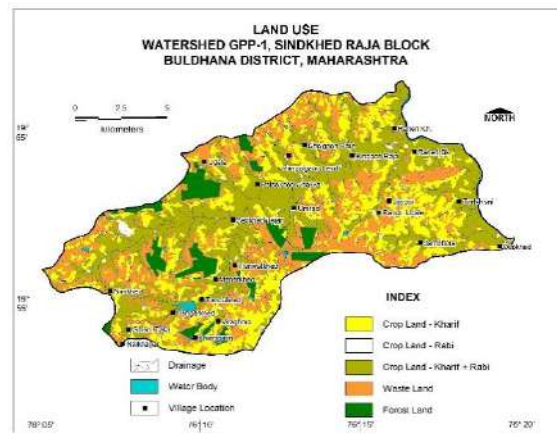
Parameters	Units	Result in Range	BIS Drinking Water Standards IS- 10500-2012	
			Desirable Limits	Maximum Permissible Limits
pH		7.4-8.3	6.5	8.5
EC	m/mhos at 25° C	408-1675		
TDS	mg/l	216-888	500	2000
Total hardness	mg/l	209-765	200	600
Ca	mg/l	20-157	75	200
Mg	mg/l	22-89	30	100
Na	mg/l	12-119	-	-
K	mg/l	0.3-5.3	-	-
CO ₃	mg/l	0 -12		
HCO ₃	mg/l	172-613		
Cl	mg/l	16-215	250	1000
SO ₄	mg/l	21-61	200	400
NO ₃	mg/l	4-40	45	No Relaxation
F	mg/l	0.1-0.87	1.0	1.5

EC Range	Percentage	No ₃ Range	Percentage
< 1000	72.72	<45	100
1000 to 1500	9.10	45 to 100	0
>1500	18.18	>100	0

Soil map



Land use map

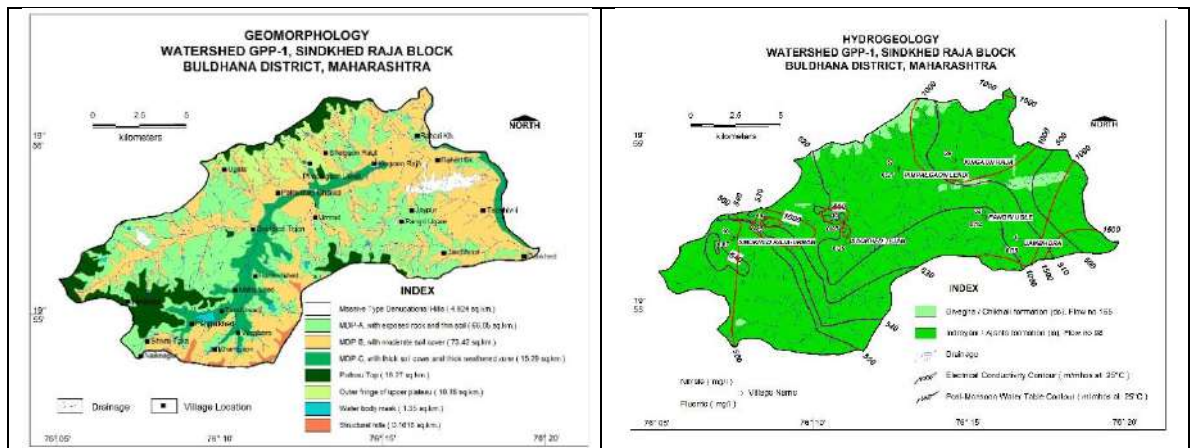


In GPP-1 watershed major area consisting mostly of clayey very deep > 100 cm and gravelly clay 10 to 25 cm thick.

In GPP-1 watershed major cultivable land is under double cropping pattern i.e both kharif and Rabi crop land having area 69.96 sq. km. and rabi crop land having 4.765 sq. km area.

Geomorphology & Drainage map

Hydro-geology map



Major part of the watershed GPP-1 shows moderately dissected plateau with soil covering area 73.42 sq. km and plateau top covering area 16.27 sq. km.

Entire watershed GPP-1 is covered by Deccan trap Basalt. Ec is ranges from 408 to 2255 m/ mhos and No3 is ranges from to 40 mg/l. Fluoride is ranges from 0.06 to 1.11 mg/l.

5. Intervention of Aquifer Rejuvenation of GPP-1 watershed, Sindkhed Raja taluka Supply Side Management

Available Resource (MCM)	22.1400
Agricultural Supply –GW	17.6100
Agricultural Supply -SW	0
Domestic Supply - GW	0.6500
Total Draft (MCM)	18.2600
Balance GW availability (MCM)	3.8800
Present stage of Ground Water Development (%)	82.48
Area of watershed (Sq. Km.)	188
Area suitable for Artificial recharge (sq km) (C=4.35, NC=148.02)	152.37
Type of Aquifer	Hard rock
Volume of water required to bring SOD (upto 70%) (MCM)	3.95
Average Specific Yield	0.02
Proposed AR Structures (90 Check Dam Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM)	2.025
Proposed AR Structures (10 Percolation tank Av. Gross Capacity-100 TCM * 2 fillings = 200TCM))	1.5
total Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	3.525
RTRWH Structures	
Households to be covered (Pakka House only)	0
Total RWH potential (MCM) (25% with 50 m2 area)	0
Rainwater harvested / recharged @ 80% runoff co-efficient (MCM)	0
RTRWH is economically not viable & not Recommended	

Expected Benefits	
Net Ground Water Availability (MCM)	22.1400
Additional GW resources available after Supply side interventions (MCM)	3.525
Ground Water Availability after Supply side intervention(MCM)	25.6650
Existing Ground Water Draft for All Uses (MCM)	18.2600
GW draft after Demand Side Interventions (MCM)	0
Present stage of Ground Water Development (%)	82.48
Expected Stage of Ground Water Development after interventions (%)	71.15
Other Interventions Proposed, if any	
Alternate Water Sources Available	Nil
No Demand side intervention proposed	

ANNEXURES

Annexure-I: Salient Features of Ground Water Exploration, Buldhana District

Sr.No	Taluka	Village	xLong	yLat	Altitude	Year	Type of well	Aquifer	Drilling depth	Const_ depth	Casing	AQ_Zones	Pre_SWL	Post_SWL	PYT_Discharge	AQI	AQII	EC
1	Buldana	Dhad	76	20.3986	578.6	2001-02	EW	JFB	200	-	5.5	8 -11 ,60 -62	11	1.75	-	0	0	
2	Buldana	Urha	76.061	20.7934	298.4	2001-02	EW	FWVB	200	-	5.55	20151201	17	9.8	-	0	0	
3	Buldhana	Hatedi BK	76.1081	20.4673	635.4	2017-18	EW		200	23.7		32-35	75	45	Traces	0	0	
4	Buldhana	Shirapur	76.1912	20.4367	628.8	2017-18	EW		200	25.5		Nil	75	45	dry	0	0	
5	Buldhana	Tardkhed	75.9673	20.4656	614.2	2017-18	EW		200	26		Nil	65	32	dry	0	0	
6	Chikhali	Isoli	76.49125	20.35203		2017-2018	EW	FMB	200		17.5	22-23	24.5		0.1			
7	Chikhali	Karwand	76.37639	20.45642		2017-2018	EW		200		17.5							
8	Chikli	Amdapur	76.4394	20.4083	545.9	2002-03	EW	JMB	200	-	4.7	25 - ,82 -	25	12	-	0	0	
9	Chikli	Brahmapuri	76.2661	20.4444	586.9	2001-02	EW	FWB	200	-	12.32	13 -18	17	8.1	0.78	0	0	
10	Chikli	Buldana	76.1852	20.5299	650.1	2001-02	EW	JFB	200	-	5.5	37 -40	42.8	28	-	0	0	
11	Chikli	Chikhli	76.2564	20.3522	598.6	2001-02	EW	JWMB	200	-	5.5	14.5 -16.5	38	10.6	-	0	0	
12	Chikli	Chikhli	76.2564	20.3522	598.6	2011-12	Pz		40	8.4			38	26	Traces	0	0	
13	Chikli	Chikhli	76.2564	20.3522	598.6	2011-12	Pz		40	4.4			34	15	0.38	0	0	
14	Chikli	Sakharkheda	76.4	20.2083	568.1	2001-02	OW	FVB	19.55	-	5.6	13.3 -17	16	4.67	4.43	0	0	
15	Chikli	Utrada	76.3494	20.3792	595.8	2001-02	EW		200	-	5.5		18	7	-	0	0	
16	Deulgaon Raja	Umbarkhed	76.07756	20.01711		2017-2018	EW	FMB	200		17.5	182-184	35.4		0.025			
17	Deulgaon-Raja	Bharosa	76.2417	20.2292	614.9	2002-03	EW	B	160	-	8	10 - ,42.75 -	21	12.4	2.16	0	0	
18	Deulgaon-Raja	Chikhli	76.2564	20.3522	598.6	2011-12	Pz		40	13.8			29	16.4	2.64	0	0	
19	Deulgaon-Raja	Deolgaon (Mahi)	76.18	20.0867	524.1	2002-03	EW	JAB& JMB	200	-	6.4	70 -72 ,153 -	50	32	-	0	0	
20	Deulgaon-Raja	Shivni (Armal)	76.2667	20.125	531	2002-03	EW	JAB	200	-	6.3	-13	28	15	-	0	0	
21	Deulgaon-Raja	Singaon (Jahangir)	76.0858	20.0819	528.8	2002-03	EW		200	-	6.2	31.4 - ,97 -	50	27	-	0	0	
22	Jalgaon Jamod	Dhanora (Mahasiddh)	76.4667	21.0417	302				34.46	20	20		12	9		33	0	
23	Jalgaon Jamod	Jalgaon Jamod	76.5399	21.0482	293.065				108.6	107	76		25	15		0	91	
24	Jalgaon Jamod	Jamod	76.5998	21.1281	355.88	1985-86	EW		341.41	36	22	7.7 -12.5 ,19.5 -20.7 ,28 -29 ,22.5 -25 ,29.3 -30.2 ,33.5 -	11	8.3	8.96	28.5	0	

Sr.No	Taluka	Village	xLong	yLat	Altitude	Year	Type of well	Aquifer	Drilling depth	Const_ depth	Casing	AQ_Zones	Pre_SWL	Post_SWL	PYT_Discharge	AQI	AQII	EC
												35.4 ,98.15 -103						
25	Jalgaon Jamod	Sungaon	76.5568	21.0938	319.5	1993-94	PZ		77.66	50	-	32.5 -37 ,54.5 -58.5	19	7	2	77.66	0	
26	JalgaonJamod	Golegaon (Kh)	76.5204	20.9441	247.7	2016-17	EW	FMB	200	38.2		181.50 to 184.60 ,193.00 to 196.80	75	35	4.43	0	0	
27	Jalgaon-Jamod	Bhendwad	76.6004	20.9472	250.4	1985-86	EW	Gravel	62.2	61	17.5	17.4 -21 ,21.95 -23.47	27	15.28	0.92	0	0	
28	Jalgaon-Jamod	Bhendwad	76.6004	20.9476	250.9	1985-86	OW	Gravel	62	61.5	17.5		32	15.3	-	0	0	
29	Jalgaon-Jamod	Jalgaon Jamod	76.525	21.0333	286	1984-85	EW	Gravel	108.6	107.25	70	74 -76 ,87.5 -106	25	15	-	0	0	
30	Jalgaon-Jamod	Jalgaon Jamod	76.525	21.0333	286	1984-85	OW	Gravel	108.3	107	76		25	15	-	0	0	
31	Jalgaon-Jamod	Jalgaon-Jamod	76.5389	21.0528	302.4	2008-09	Pz	Alluvium	113		113		25	15	0.13	0	0	
32	Jalgaon-Jamod	Jalgaon-Jamod	76.5389	21.0528	302.4	2008-09	EW	Alluvium	65		65		25	15	1	0	0	
33	Jalgaon-Jamod	Jamod	76.6069	21.1042	350.3	1985-86	OW	Gravel	34.4	32	22		31	9.66	-	0	0	
34	Jalgaon-Jamod	Madakhed	76.5911	20.9731	261.1	2008-09	Pz	Alluvium	100		23		21	15		0	0	
35	Jalgaon-Jamod	Nimkhedi	76.3638	20.9549	323	2000-01	EW	W F MB	135.45	135.45	5.8	9 -17 ,67 -70	35.45	18	4.43	0	0	
36	Jalgaon-Jamod	Nimkhedi	76.3634	20.9552	323	2000-01	OW	W F MB	130.35	130.35	9	12 -14.5 ,61 -65	35.64	18	6.81	0	0	
37	Jalgaon-Jamod	Nimkhedi	76.365	20.9545	323	2000-01	OW	W F MB	19.55	19.55	5.6	13.5 -17.5	21	10.5	-	0	0	
38	Khamgaon	Devthana	76.4583	20.6267	330.2	2000-01	EW	Boulder & FVB	153.75	153.75	13.5	10.3 -13 ,89 -93	35	17	3.77	0	0	
39	Khamgaon	Devthana	76.4583	20.6267	330.2	2000-01	OW		200	200	17.5		35	17	-	0	0	
40	Khamgaon	Hingna Karegaon	76.6833	20.6111	309.4	2000-01	EW	FJVB	200	200	5.82	8 -10.1	17	5.23	0.78	0	0	
41	Khamgaon	Lokhanda	76.5514	20.5514	379.6	2000-01	EW		200	200	5.7		24	14	-	0	0	
42	Khamgaon	Sirasgaon (Janta Nagar)	76.5486	20.6778	313.4	2000-01	EW	FMB	200	200	5.6		15	3.04	-	0	0	
43	Khamgaon	Atali	76.64408	20.55475		2017-2018	EW		200		17.5		Dry					
44	Khamgaon	Tandulwadi	76.45136	20.68897		2017-	EW		200		17.5							

Sr.No	Taluka	Village	xLong	yLat	Altitude	Year	Type of well	Aquifer	Drilling depth	Const_ depth	Casing	AQ_Zones	Pre_SWL	Post_SWL	PYT_Discharge	AQI	AQII	EC
						2018												
45	Khamgaon	Wazar	76.4925	20.54583		2017-2018	EW	FMB	200		17.5	103-104	7.5		0.14			
46	Lonar	Bibi	76.3767	20.0158	542	2001-02	EW	JVB	200	-	5.7	42 -46	25	11	-	0	0	
47	Lonar	Gundha	76.5903	20.0319	550.3	2001-02	EW	JFMB	200	-	5.7	15.5 -16.5	19	8.2	-	0	0	
48	Lonar	Lonar	76.5299	19.9864	590	2011-12	Pz		40	4.4			27	15.4	Traces	0	0	
49	Lonar	Nandra (Munde)	76.5809	19.8778	488.4	2002-03	EW		200	-	5		25	8	-	0	0	
50	Lonar	Shindkhed Raja	76.1199	19.9453	555	2011-12	Pz		40	2.4			32	12.8	Traces	0	0	
51	Malkapur	Dasarkheda	76.1853	20.9628	246.7	2016-17	EW	-	200	30		No productive Zone Encountered	55	27		0	0	
52	Malkapur	Jambhul Dhaba	76.1297	20.8692	265.9	2002-03	EW	JFVB	200	-	-	15 -,27 -	15	5.66	-	0	0	
53	Malkapur	Khamkheda	76.1387	20.8966	251.1	2016-17	EW	-	200	30		No productive Zone Encountered	55	25		0	0	
54	Malkapur	Malkapur	76.1835	20.8845	253	2001-02	EW	JWMB	200	-	11	20141201	14	9.45	-	0	0	
55	Malkapur	Malkapur	76.1837	20.8848	253	2011-12	Pz		40	9.05			14.2	9	traces	0	0	
56	Malkapur	Narwel	76.235	20.9633	235	1997-98	PZ		24.25	22.25	22.25	18 -21.75	31	19.2	0.56	0	22	
57	Malkapur	Umali	76.2292	20.8111	268.3	2008-09	Pz		300.3		3.5		18	11		0	0	
58	Malkapur	Wadoda	76.2803	20.9011	244.5	2016-17	EW	FB	200	20		7.60 to 10.60	32	17	Traces	0	0	
59	Mehkar	Anjani (Bk)	76.6514	20.1736	554.4	2001-02	EW	JFVB & JFMB	200	-	5.7	11 -12 ,145 -150	18	6.2	1.37	0	0	
60	Mehkar	Dongaon	76.7219	20.1839	532.4	2011-12	Pz		40	5.7			21	13.6	Traces	0	0	
61	Mehkar	Janephal	76.575	20.2958	547	2001-02	EW	J F MB	200	-	5.7	5.5 -7.5	12	2.08	-	0	0	
62	Mehkar	Kalyana	76.5431	20.1958	537.1	2001-02	EW	J F VB & J F MB	200	-	5.7	7 -13.5 ,83 -89 ,161 -163 ,108 -111	18	6.04	3.77	0	0	
63	Mehkar	Kalyana	76.5431	20.1958	537.1	2001-02	OW	J F VB & J F MB	200	-	5	7 -13.5 ,72 -75	18	6.04	3.77	0	0	
64	Mehkar	Mehkar	76.5909	20.1432	556.6	2011-12	Pz		40	4.4			21	5.5	Traces	0	0	
65	Mehkar	Deulgaon Sakarsha	76.68225	20.4325		2017-2018	EW		200		17.5		Dry					
66	Mehkar	Pangarkhed	76.77617	20.25325		2017-2018	EW	FMB	200		17.5	15-16	30.5		traces			
67	Motala	Dhamangaon (Bodhe)	76.0375	20.6728	369.3	2002-03	EW	J AB & J MB	61.1	-	6.4	25 -,43 -48	13	1.2	1.2	0	0	
68	Motala	Dhamangaon (Bodhe)	76.0375	20.6728	369.3	2002-03	OW	J AB & J MB	60.2	-	6	15 -18 ,35 -	15	1.14	1.14	0	0	

Sr.No	Taluka	Village	xLong	yLat	Altitude	Year	Type of well	Aquifer	Drilling depth	Const_ depth	Casing	AQ_Zones	Pre_SWL	Post_SWL	PYT_Discharge	AQI	AQII	EC
69	Motala	Didola Bk.	76.21	20.71	334	2013-14	EW	WAB,FMB	200		20.3	35.00-38.1, 86.80-86.90	59.2	32	Traces	0	0	
70	Motala	Jaipur (Junona)	76.28	20.6828	327.3	2013-14	EW	AB	200		18	19.80 - 22.80	19	9	0.024	0	0	
71	Motala	Kirhala bazar	76.0527	20.6043	432.7	2013-14	EW	WAB	200		21	12.20-15.20	21	13	Traces	0	0	
72	Motala	Kothli	76.26	20.63	362	2013-14	EW	WAB	200		12.5	9.10 -12.00	33.65	18	Traces	0	0	
73	Motala	Mohegaon	76.1872	20.5917	405	2001-02	EW	F W Basalt	200	-	5.8	21 -22 ,101 -104	18.54	9	2.7	0	0	
74	Motala	Motala	76.2104	20.6801	325.7	2011-12	Pz		40	5.4		17	4.55	Traces	0	0		
75	Motala	Motala	76.21	20.68	326	2013-14	EW	-	200		18	-	17	4.55	Dry	0	0	
76	Motala	Pimpalgaon Devi	76.0272	20.7667	315	2002-03	EW	J MB	200	-	10	98 -125	29.07	29.07	-	0	0	
77	Motala	Pimpri Gavli	76.2121	20.6626	336.2	2013-14	EW	FAB	200		12	25.90-28.90	17	8.05	Traces	0	0	
78	Motala	Punhai	76.1764	20.6889	325.2	2001-02	EW		200	-	5.8		21	12	-	0	0	
79	Motala	Rohinkhed	76.1173	20.624	360.4	2013-14	EW	FWB,FAB	200		13	9.10 - 10.00 32.00-35.00	26.97	17	0.78	0	0	
80	Motala	Sarola Maroti	76.1	20.68	352	2013-14	EW	WAB	200		14	10.60-13.50	35	21	Traces	0	0	
81	Motala	Shelapur Bk.	76.2	20.76	282	2013-14	EW	WAB	200		20.5	32.00 35.00	32	18	1.37	0	0	
82	Nandura	HingneGavhad	76.3639	20.9011	239.7	2016-17	EW	FB	200	20		180.60 – 190.60	75	45	Traces	0	0	
83	Nandura	Nimgaon-I	76.4764	20.8633	256	2007-08	EW	Alluvium	36.5		34.4		30	21	2.5	0	0	
84	Nandura	Nimgaon-II	76.4764	20.8633	256	2007-08	EW		301		65		70	70	2.16	0	0	
85	Nandura	Patonda	76.4361	20.9208	239.6	2008-09	EW		301		30		35	21	2.15	0	0	
86	Nandura	Shemba Bk	76.2861	20.7028	316.3	2002-03	EW	J MB	200	-	6.5	90 -94	50	26	-	0	0	
87	Nandura	Wadi	76.3972	20.8347	257.9	2000-01	EW	W F MB	168	168	11.7	17 -19.5 ,53 -56 ,167 -168 ,90 -92	24.71	15	12.18	0	0	
88	Nandura	Wadi	76.3972	20.8347	257.9	2000-01	OW	W F MB	26.65	26.65	11.75	13 -15	24.71	15	0.78	0	0	
89	Nandura	Wadi	76.3972	20.8347	257.9	2001-02	OW	F W Basalt	74.45	-	11.6	33 -38	24.71	15	-	0	0	
90	Nandura	Wadner	76.3239	20.8375	266.4		EW		235.78		19		40	23	0.037	0	31.39	
91	Sangrampur	Allewadi	76.6833	21.1383	368.3	1985-86	EW	Gravel	102.86	97.5	25	19.2 -21.35 ,29.9 - 32.9 ,70.4 -72.5 ,53.35 -55.75 ,87.5 - 89.9	37	15.65	1.26	0	0	
92	Sangrampur	Allewadi	76.6833	21.1383	368.3	1985-86	OW	Gravel	100	98	43		37	15.35	1.5	0	0	
93	Sangrampur	Allewadi (DZ)	76.6833	21.1383	373.015				209	304.23	305	73,83 -85.5 ,88.5 - 91.5 ,207 -209 ,189 - 191 ,300 -302	38	16.65	2	32	0	
94	Sangrampur	Bawanbir	76.7167	21.0833	309		EW		311.2	-	-		45	21		51.82	0	
95	Sangrampur	Bhendwad	76.5667	20.95	241.1				62.2	61	17.5	17.4 -21 ,21.95 - 23.47	27	15.28		0	60	

Sr.No	Taluka	Village	xLong	yLat	Altitude	Year	Type of well	Aquifer	Drilling depth	Const_ depth	Casing	AQ_Zones	Pre_SWL	Post_SWL	PYT_Discharge	AQI	AQII	EC
96	Sangrampur	Golegaon	76.7028	20.9	280				71.7	70.5	23	15.84 -17.68 ,23.16 - 24.46	18	11		0	0	
97	Sangrampur	Niwana	76.6375	21.0444	294	1997-98	PZ		50.31	18	18	9 -16.5	35	17		50.31	0	
98	Sangrampur	Niwana	76.639	21.0443	296		EW	Clay	220.21	-	-		35	17	-	0	0	
99	Sangrampur	Paturda	76.7541	20.958	256.9	1991-92	PZ	Gravel	80	63	-	15.28 -18.28 ,47.16 - 50.61	28	6.1	1.5	0	0	
100	Sangrampur	Sangrampur	76.6767	21.0347	287.6	1984-85	EW	Gravel	215	209	201	8.5 -11 ,14 -15 ,201 - 204 ,172 -174	32	18	-	0	0	
101	Sangrampur	Sangrampur	76.6768	21.0347	287.6	2008-09	Pz	Alluvium	100		23		32	10.39	0.383	0	0	
102	Sangrampur	Tunki	76.6947	21.115	345.4	1991-92	PZ	Sand/ Gravel	80	50	-	6 -35 ,40 -42	21	3.57	10	0	0	
103	Sangrampur	Tunki	76.6947	21.115	345.4	2008-09	Pz	Alluvium	70		37		21	6.35	12.14	0	0	
104	Sangrampur	Warwat (Bakal)	76.7392	21.0314	282.7	1997-98	PZ		43.93	37	37	15 -22 ,28 -30.5	29	17.06	4.43	0	0	
105	Sangrampur	WarwatBakal	76.739	21.031	282.2	2016-17	EW	Medium to coarse sand	100	25		18.90 to 25.00	29	17.06	0.014	0	0	
106	Sangrampur	Washali	76.6597	21.15	413.1	2000-01	EW	F MB	160	160	5.6	48 -53 ,92 -96	28	12	5.94	0	0	
107	Sangrampur	Washali	76.6597	21.15	413.1	2000-01	OW		123.25	123.25	5.6	33 -37 ,50 -53 ,92 -98 ,80 -92 ,108 -117	28	12	5.94	0	0	
108	Shegaon	Amsari	76.5051	20.8009	263.1	2000-01	EW	F MB	158.5	158.5	11	19.5 -23 ,80 -83 ,156 -158.5 ,92 -95	15	6.42	12.18	0	0	
109	Shegaon	Amsari	76.5049	20.8011	263.1	2000-01	OW		56.15	56.15	2.5		15	6.42	-	0	0	
110	Shegaon	Amsari	76.5049	20.8008	263.1	2000-01	OW	F VB	200	200	50	19 -22 ,92 -95	15	7.85	-	0	0	
111	Shegaon	Bhastan	76.5811	20.9117	239.1	2007-08	EW		148.1		52		29	20.93	7.73	0	0	
112	Shegaon	Javla (Palaskhed)	76.7056	20.7245	278.5	2016-17	EW	WB,FB	200	20		10 to 13,90-93	24	17.06	Traces	0	0	
113	Shegaon	Jawla (Paraskhed)	76.7056	20.7245	278.5	2000-01	EW	F VB	200	200	5.75	15.5 -18 ,140 -141.5	24	17.06	3.17	0	0	
114	Shegaon	Jawla (Paraskhed)	76.7056	20.7245	278.5	2000-01	OW	F MB	200	200	5.7	16.5 -19	24	17.06	2.64	0	0	
115	Sindkhed-Raja	Palaskhed Chakka	76.1967	19.9864	537.9	2001-02	EW	J F VB	200	-	5.7	11 -13.5 ,113 -117	23	12	3.17	0	0	
116	Sindkhed-Raja	Sakharkheda	76.4	20.2083	568.1	2001-02	EW	F VB	141.55	-	5.7	9 -15 ,108 -110	16	4.83	10.98	0	0	
117	Sindkhed-Raja	Sakharkheda	76.4	20.2083	568.1	2001-02	OW	F VB	143.55	-	13.87	9 -12 ,141 -143.55	16	4.63	10.98	0	0	
118	Sindkhed-Raja	Shindkhed Raja	76.3894	20.1281	599.5	2011-12	Pz		40	5.4			32	12.8	0.14	0	0	
119	Sindkhed-Raja	Shindkhed	76.1199	19.9453	555	2011-12	Pz		40	9.4			32	12.8	0.14	0	0	

Sr.No	Taluka	Village	xLong	yLat	Altitude	Year	Type of well	Aquifer	Drilling depth	Const_ depth	Casing	AQ_Zones	Pre_SWL	Post_SWL	PYT_Discharge	AQI	AQII	EC
		Raja																
120	Sindkhed-Raja	Shindkhed Raja	76.1199	19.9453	555	2011-12	Pz		40	14.7			32	12.8	Traces	0	0	

Annexure-II: Details of GW monitoring wells and KOWs in Buldhana district.

Sl. No.	Taluka	Site name	Toposheet	Latitude	Longitude	Altitude(m a msl)	Depth (m bgl)	Geology	Aquifer	Diamesion (m)	D.T.W.(m bgl)	D.T.W.(Pre - 2018)(m bgl)	Fluctuation	EC (Pre - 2018)(micromhos)	EC (Post - 2018)(micromhos)
1	Chikli	Mungsari		20.31194	76.32353		15	Basalt	FMB	6	9.9	7.3	2.6	1180	860
2	Chikli	Patoda		20.16494	76.36711		15	Basalt	FMB	10	12.2	4.5	7.7	1080	900
3	Chikli	Naigaon Bk.		20.31235	76.4221		10	Basalt	FMB	14	6.45	4.4	2.05	900	530
4	Chikli	Walti		20.38483	76.26068		10	Basalt	FMB	8	9.8	8	1.8	1400	1280
5	Chikli	Hatni		20.39951	76.23718		12	Basalt	FMB	8	11.2	6.2	5	880	780
6	Chikli	Malshemba		20.3481	76.13601		16	Basalt	FMB	10	14.8	9.2	5.6	840	600
7	Chikli	Waghapur		20.35912	76.19669		6.2	Basalt	FMB	8	5.7	3.4	2.3	1100	840
8	Chikli	Sawarkheda Naik		20.41545	76.39602		12	Basalt	FMB	8	9.1	6.8	2.3	980	740
9	Chikli	Andhai		20.40825	76.31783		15	Basalt	FAB	8	13.1	6.4	6.7	1100	800
10	Chikli	Anvi		20.36402	76.32585		12	Basalt	FMB	10	11.8	8.4	3.4	700	680
11	Chikli	Borgaon Kakre		20.34571	76.3549		13	Basalt	FMB	10	11.9	10.4	1.5	730	580
12	Chikli	Karatwadi		20.36654	76.40387		16	Basalt	FMB	6	14.5	11.8	2.7	880	790
13	Chikli	Mangrul		20.34879	76.43729		16	Basalt	FMB	8	15.6	10.5	5.1	800	1000
14	Chikli	Haralkhed		20.37801	76.47998		16	Basalt	FMB	10	14	9.4	4.6	700	590
15	Chikli	Kinhni Naik		20.39655	76.56216		22	Basalt	FMB	12	19.4	13.3	6.1	650	680
16	Chikli	Asola Naik		20.43386	76.51012		10	Basalt	FMB	8	5.9	4	1.9	1130	700
17	Deulgaon-Raja	Bhokar	55D3-3C	20.31183	76.19239		11.5	Basalt	FMB	6.5	9.3	7.8	1.5	650	530
18	Deulgaon-Raja	MALAGI	55D3-3C	20.27097	76.23258		10.7	Basalt	FAB	7	10.7	13	-2.3	820	990
19	Deulgaon-Raja	DEULGAO DHANGAR	55D3-1C	20.23661	76.209		8.3	Basalt	FMB	5.2	8.3	8.1	0.2	940	1271
20	Deulgaon-Raja	MANGRUL	55D8-2A	20.17697	76.13408		13.5	Basalt	FMB	6.3	12.9	14.5	-1.6	816	1050
21	Deulgaon-Raja	ANCHALWADI	55D4-1C	20.18114	76.20764		10	Basalt	FMB	2	7.4	4.5	2.9	1540	1962
22	Deulgaon-Raja	PIMPARI AANDHLE	55D4-2C	20.14825	76.20197		11.69	Basalt	FMB	5	6.9	7.9	-1	1140	1497
23	Deulgaon-Raja	MENDGAON	55D8-2A	20.14253	76.27756		10	Basalt	FMB	6	6.6	5.5	1.1	490	1274
24	Deulgaon-Raja	Mera Bk.	55D8-1A	20.1915	76.31828		9.2	Basalt	FMB	4.5	7.8	7.5	0.3	2058	2584
25	Deulgaon-Raja	AMBASHI	55D7-3B	20.27064	76.35103		12.8	Basalt	FMB	7	12.8	8.4	4.4	1003	938
26	Deulgaon-Raja	Chinchkhed	55D4-2B	20.12914	76.14183		7.9	Basalt	FAB	7.5	7.1	5.3	1.8	680	560
27	Deulgaon-Raja	Dodra	55D4-2C	20.13775	76.17447		12.19	Basalt	FAB	2.5	6.8	5.2	1.6	2050	2300
28	Deulgaon-Raja	DEULGAO MAHI	55D4-1C	20.09178	76.17672		11.19	Basalt	FMB	7.5	7.6	6	1.6	1150	1450
29	Deulgaon-Raja	PADLI SHINDE	55D8-2A	20.10347	76.28611		9.1	Basalt	FAB	7.2	7.2	6.1	1.1	560	905
30	Deulgaon-Raja	SARAMBA	55D4-3C	20.08428	76.22042		12	Basalt	FAB	5.5	12	5.5	6.5	780	568
31	Deulgaon-Raja	MEHUNA	55D4-3B	20.0665	76.12178		19.69	Basalt	FAB	3	2.9	3.8	-0.9	1003	1335
32	Deulgaon-Raja	PANGRI PR	55D4-3A	20.06231	76.08442		8.4	Basalt	FAB	4	7.6	4.2	3.4	1573	1467
33	Deulgaon-Raja	SINGAON		20.07967	76.08683		10.5	Basalt	FAB	4	6.2	6	0.2	1000	932

Sl. No.	Taluka	Site name	Toposheet	Latitude	Longitude	Altitude(m a msl)	Depth (m bgl)	Geology	Aquifer	Diamesion (m)	D.T.W.(m bgl)	D.T.W.(Pre - 2018)(m bgl)	Fluctuation	EC (Pre - 2018)(micromhos)	EC (Post - 2018)(micromhos)
		JAHAGIR20													
34	Deulgaon-Raja	GIROLI KHURD		19.9785	76.04958		9.8	Basalt	FMB	7.5	9.3	5.3	4	1100	1630
35	Deulgaon-Raja	TULIJAPUR		19.96142	76.07917		10.4	Basalt	FMB	3	10.1	7.3	2.8	1760	1250
36	Deulgaon-Raja	ALAND		20.03511	76.138		15.24	Basalt	FMB	6	7	14.2	-7.2	1284	622
37	Deulgaon-Raja	PIMPALGAON BK		20.02561	76.17575		10.3	Basalt	FMB	4.3	9.6	9.3	0.3	1030	1407
38	Khamgaon	Wazar		20.54583	76.4925		13	Basalt	FMB	10	10.2	6.3	3.9	980	690
39	Khamgaon	Nagjhari Bk.		20.51014	76.46144		18	Basalt	FAB	10	16.7	12	4.7	1130	980
40	Khamgaon	Fattehpur		20.48171	76.57806		12	Basalt	FMB	10	10	4.4	5.6	930	830
41	Khamgaon	Lakhanwada		20.5	76.62944		10	Basalt	FMB	3	6.6	5.2	1.4	1280	1050
42	Khamgaon	Lokhanda		20.55137	76.55232		10	Basalt	FMB	8	6.7	5.5	1.2	500	1000
43	Khamgaon	Antraj		20.63003	76.53441		18	Basalt	WB	4	15.6	11.8	3.8	900	730
44	Khamgaon	Bhota Koli		20.5856	76.39769		13	Basalt	FMB	6	9	8	1	1100	700
45	Khamgaon	Rohana		20.65342	76.47838		8	Basalt	FMB	4.5	4	3	1	800	640
46	Khamgaon	Rahud		20.73153	76.45202		25	Basalt	FMB	4.5	19	16.8	2.2	860	780
47	Khamgaon	Tandulwadi		20.68918	76.45136		11	Basalt	FMB	3	8	7	1	1090	800
48	Khamgaon	Umbara		20.70666	76.37076		15	Basalt	FAB	5	13	8.4	4.6	900	640
49	Khamgaon	Dhoravgaon		20.656	76.41996		16	Basalt	FAB	4	14.3	9.9	4.4	1100	900
50	Khamgaon	Kokta		20.76139	76.56764		21	Basalt	FMB	6	20	16	4	1300	1200
51	Khamgaon	Jaipur Londhe		20.71189	76.59815		12	Basalt	FMB	5	9.5	5.9	3.6	920	790
52	Khamgaon	Karegaon		20.61839	76.69091		13	Basalt	FMB	10	12	11.3	0.7	1300	1400
53	Khamgaon	Palshi Bk.		20.59711	76.73383		10	Basalt	FAB	3.5	8.7	6.2	2.5	1520	1250
54	Khamgaon	Loni Gurav		20.5662	76.76324		11	Basalt	FAB	4	10	9.5	0.5	600	720
55	Khamgaon	Shahpur		20.51227	76.74555		8.8	Basalt	FAB	3	8.6	7.2	1.4	460	580
56	Khamgaon	Kanchanapur		20.52292	76.71126		11.5	Basalt	FAB	6	11.2	10	1.2	1400	1480
57	Khamgaon	Adgaon		20.54063	76.69059		12	Basalt	FMB	6	11.9	9.2	2.7	1200	1150
58	Khamgaon	Sherla Nemane		20.4843	76.68442		7	Basalt	FMB	2.5	4.7	2.4	2.3	680	500
59	Khamgaon	Atali		20.57377	76.64132		19	Basalt	FMB	6	16	3.5	12.5	1000	960
60	Khamgaon	Awar		20.62935	76.42413		12	Basalt	FMB	6	11.7	10.5	1.2	1130	1100
61	Khamgaon	Tembhurna		20.67265	76.60134		18	Basalt	FMB	4	15.1	9.2	5.9	1600	1200
62	Lonar	Kingaon Jattu	56 A/5	19.97003	76.35483	498	13.5	Basalt	FMB	7.68	13.06	6.8	6.26	1395	1480
63	Lonar	Bidkhed	56 A/5	19.96125	76.42106	527	9.5	Basalt	FMB	6	5.46	2	3.46	820	1230
64	Lonar	Chorpangra	55 D/8	20.01139	76.35053	538	9.65	Basalt	FMB	3.75	9	3.85	5.15	1028	1660
65	Lonar	Hatta	56 A/5	19.99144	76.42467	543	16.2	Basalt	FMB	4.5	15.1	4.1	11	768	1840
66	Lonar	Shindi	55D/8	20.00442	76.45825	563	9.5	Basalt	FMB	5.5	8.2	6.2	2	726	790
67	Lonar	Anjani Kh	55 D/8	20.06764	76.47814	551	6.72	Basalt	FMB	5.3	4.56	0.7	3.86	2176	2050
68	Lonar	Udanapur	55 D/8	20.05142	76.49142	591	12.5	Basalt	FMB	4.7	12	4.8	7.2	2487	1270
69	Lonar	Shivni Pisa	55 D/8	20.10128	76.45339	552	22	Basalt	FMB	6	18.3	4.2	14.1	949	1020

Sl. No.	Taluka	Site name	Toposheet	Latitude	Longitude	Altitude(m a msl)	Depth (m bgl)	Geology	Aquifer	Diamesion (m)	D.T.W.(m bgl)	D.T.W.(Pre - 2018)(m bgl)	Fluctuation	EC (Pre - 2018)(micromhos)	EC (Post - 2018)(micromhos)
70	Lonar	Shara	55 D/12	20.01731	76.53003		13.6	Basalt	FMB	3	11.5	5.85	5.65	2397	2880
71	Lonar	Chincholi	56 A/5	19.9475	76.46803		13.27	Basalt	FMB	6.05	9.4	1	8.4	1219	1240
72	Lonar	Kasari	56 A/5	19.93283	76.41558		11.7	Basalt	FMB	8.4	10.5	7.3	3.2	780	630
73	Lonar	Khurampur	56 A/9	19.89147	76.51586		11.93	Basalt	FMB	3	11.6	5.8	5.8	1202	1980
74	Lonar	Nandra	56 A/9	19.87464	76.58206		8.32	Basalt	FMB	7.7	5.15	3.5	1.65	388	400
75	Lonar	Gandari	56 A/9	19.87853	76.60775		5.65	Basalt	FMB	3.56	5.4	3.3	2.1	1032	933
76	Lonar	Kundaras	56 A/9	19.95769	76.60775		11.5	Basalt	FMB	3	8.05	5.55	2.5	673	603
77	Lonar	Paraskhed	56 A/9	19.99814	76.57292		12	Basalt	FMB	4	10.2	6.6	3.6	1571	2208
78	Lonar	Bagulkhed	55 D/12	20.038	76.62064		17.45	Basalt	FMB	3	14.2	3.45	10.75	562	1350
79	Mehkar	Jaitala	55 D/12	20.13464	76.52997	540	17	Basalt	FMB	5.75	14.75	8.7	6.05	1031	905
80	Mehkar	Sarangpur	55 D/12	20.14475	76.5525	522	13.53	Basalt	FMB	10	9.33	6.15	3.18	1210	1140
81	Mehkar	Shubhanpur	55 D/8	20.18467	76.49408	543	8.98	Basalt	FMB	7.97	8.67	3.5	5.17	1303	1020
82	Mehkar	Bramhapuri	55 D/12	20.24128	76.51344	556	7.5	Basalt	FMB	4	7	5.5	1.5	1264	1440
83	Mehkar	Nandra	55 D/8	20.21719	76.525	562	17.48	Basalt	FMB	5.1	15.87	1.15	14.72	1156	980
84	Mehkar	Mandawa	55 D/11	20.41589	76.62119	401	12.48	Basalt	FMB	4.56	8.65	6.24	2.41	1589	1370
85	Mehkar	Mohana Kh	55 D/12	20.2425	76.60058	401	7.63	Basalt	FMB	3.15	5.9	4.3	1.6	941	813
86	Mehkar	Naigaon	55 D/11	20.40031	76.71342	395	11.85	Basalt	FMB	3.15	8.82	5.3	3.52	1273	1013
87	Mehkar	Deulgaon Sakarsha	55 D/11	20.42839	76.68325	358	8.5	Basalt	FMB	4	7.62	5.95	1.67	1261	1490
88	Mehkar	Ghatbori	55 D/11	20.31672	76.69933	497	7.35	Basalt	FMB	4.9	6.95	3.3	3.65	1365	2300
89	Mehkar	Kanaka Bk	55 D/11	20.28197	76.72283	534	8.7	Basalt	FMB	6	8.02	3.1	4.92	3012	3600
90	Mehkar	Loni Gawali	55 D/12	20.24358	76.67569		11.3	Basalt	FMB	3.15	7.73	2.5	5.23	1683	1350
91	Mehkar	Bhosa	55 D/11	20.29189	76.66281		10.47	Basalt	FMB	2.7	5.12	3.15	1.97	503	478
92	Mehkar	Andrudh	55 D/12	20.21947	76.677		12.5	Basalt	FMB	5	9.4	1.6	7.8	1116	1970
93	Mehkar	Anjani Bk	55 D/12	20.17303	76.64722		9.5	Basalt	FMB	3.15	7.72	0.94	6.78	1289	2272
94	Mehkar	Khamkhed	55 D/12	20.15464	76.62186		7.5	Basalt	FMB	3.2	7.4	3.1	4.3	1291	1910
95	Mehkar	Sukri	55 D/12	20.11922	76.60647		13.74	Basalt	FMB	4	8.1	3.45	4.65	1289	1980
96	Mehkar	Nagapur	55 D/12	20.17528	76.69028		7.3	Basalt	FMB	2.65	7.1	1.2	5.9	2147	2240
97	Mehkar	Shelgaon Deshmukh	55 D/11	20.24953	76.73033		5.22	Basalt	FMB	1.75	4.4	2.8	1.6	2724	5250
98	Mehkar	Gohagaon	55 D/16	20.22572	76.75792		19.22	Basalt	FMB	5.7	12.37	1.5	10.87	723	890
99	Mehkar	Pangarkhed	55 D/16	20.25472	76.77747		14.03	Basalt	FMB	6.2	9	4.56	4.44	735	790
100	Mehkar	Aregaon	55 D/12	20.14156	76.71639		27.07	Basalt	FMB	6.12	19.45	10.45	9	896	693
101	Mehkar	Ratnapur	55 D/11	20.12858	76.66025		10.8	Basalt	FMB	3	7.5	4.3	3.2	1458	1256
102	Mehkar	Jawala	55 D/12	20.14486	76.67692		11.58	Basalt	FMB	6.1	8.6	5.3	3.3	612	593
103	Mehkar	Kambarkhed	55 D/12	20.20433	76.55297		10.35	Basalt	FMB	3.75	8.2	1.95	6.25	1186	1660
104	Mehkar	Karimbeshwar	55 D/12	20.29189	76.50622		6.83	Basalt	FMB	2.75	5.85	3	2.85	1892	1360
105	Mehkar	Sula	55 D/11	20.27933	76.52772		6.3	Basalt	FMB	1	6.22	2.95	3.27	1677	1578
106	Mehkar	Mel Janori	55 D/11	20.32075	76.64575		7.1	Basalt	FMB	4	dry	5.1	#VALUE!	976	813
107	Mehkar	Janephal	55 D/11	20.29408	76.57067		8.23	Basalt	FMB	8	7.12	3.32	3.8	1313	1360

Sl. No.	Taluka	Site name	Toposheet	Latitude	Longitude	Altitude(m a msl)	Depth (m bgl)	Geology	Aquifer	Diamesion (m)	D.T.W.(m bgl)	D.T.W.(Pre - 2018)(m bgl)	Fluctuation	EC (Pre - 2018)(micromhos)	EC (Post - 2018)(micromhos)
108	Mehkar	Mundephal	55 D/11	20.31242	76.54797		10.07	Basalt	FMB	3.62	6.87	5.17	1.7	815	1670
109	Mehkar	Hiwara Kh	55 D/11	20.32275	76.53144		7.22	Basalt	FMB	1.33	6.93	4.83	2.1	1042	1255
110	Mehkar	Pardi	55 D/11	20.34097	76.56139		4.55	Basalt	FMB	3	4.15	2	2.15	3302	1290
111	Mehkar	Marotipeth	55 D/11	20.27747	76.59456		6.3	Basalt	FMB	3	dry	2.3	#VALUE!		1575
112	Mehkar	Moli	55 D/12	20.22714	76.59456		9.42	Basalt	FMB	3	dry	5.2	#VALUE!		833
113	Mehkar	Umara	55 D/12	20.22239	76.65644		10.8	Basalt	FMB	3	dry	1.05	#VALUE!		660
114	Mehkar	Shahpur	55 D/12	20.20167	76.63525		13.32	Basalt	FMB	6.13	8.48	3.1	5.38	1313	1580
115	Mehkar	Hiwara Sable	55 D/12	20.14606	76.67019		7.58	Basalt	FMB	3	4.3	2.6	1.7	303	1770
116	Mehkar	Madani	55 D/12	20.14267	76.74147		10.32	Basalt	FMB	5	9.8	5	4.8	1239	1351
117	Mehkar	Dongaon	55 D/12	20.18722	76.73283		20.72	Basalt	FMB	5.46	11.05	7.8	3.25	1012	970
118	Sindkhed-R	saodad		20.24461	76.4135		8.2	Basalt	FMB	5.2	6.1	6.3	-0.2	650	892
119	Sindkhed-R	Ratali		20.21722	76.38028		11.6	Basalt	FMB	8	7.3	10.4	-3.1	570	744
120	Sindkhed-R	Sakharkherda		20.20072	76.39908		17.1	Basalt	FMB	6	13.9	12	1.9	1690	1809
121	Sindkhed-R	tandulwadi		20.17536	46.38183		8.6	Basalt	FMB	4	5.9	3.9	2	740	1171
122	Sindkhed-R	Ambewadi		20.09892	76.37433		14.6	Basalt	FMB	10	12	13.8	-1.8	780	878
123	Sindkhed-R	Malkapur Pangra		20.07383	76.33411		15.2	Basalt	FMB	6	14	8.9	5.1	580	1027
124	Sindkhed-R	Jhotinga		20.06539	76.36275		15.9	Basalt	FMB	8	15.2	4	11.2	950	877
125	Sindkhed-R	wardadil Kh		20.03653	76.3185		14.1	Basalt	FMB	7	13.8	10.3	3.5	770	630
126	Sindkhed-R	Raheri Bk		19.99203	76.27792		5.9	Basalt	FMB	2.5	3.5	2.65	0.85	1540	1941
127	Sindkhed-R	Hiwarkhed Purna		20.02306	76.26211		7.15	Basalt	FMB	3	3.9	4.2	-0.3	540	1458
128	Sindkhed-R	Kingaon Raja		19.98953	76.24244		13	Basalt	FMB	4	11.4	9.1	2.3	1140	1376
129	Sindkhed-R	Palaskhed Chakka		19.97661	76.19458		11.7	Basalt	FMB	5	10.3	7	3.3	1073	1305
130	Sindkhed-R	Pimpalgaon lendi		19.98547	76.21214		15.1	Basalt	FMB	7	14.1	13.4	0.7	935	1017
131	Sindkhed-R	Tadshivani		19.96881	76.30097		11.49	Basalt	FMB	6	7.4	9.3	-1.9	670	1019
132	Sindkhed-R	Jambhora		19.94744	76.27792		11.1	Basalt	FMB	2	6.7	5.8	0.9	1540	1847
133	Sindkhed-R	Pangri ugle		19.96053	76.2585		8.2	Basalt	FMB	3	7.7	3.8	3.9	2680	2388
134	Sindkhed-R	Pimpalkhed Bk.		19.91753	76.23561		17.5	Basalt	FMB	9.6	14.8	10.3	4.5	890	730
135	Sindkhed-R	waghora		19.90981	76.17486		12.19	Basalt	FMB	5	6.4	8.7	-2.3	1650	2048
136	Sindkhed-R	Khamgaon		19.89992	76.16486		11.7	Basalt	FMB	2.5	6.7	5.6	1.1	1033	938
137	Sindkhed-R	Maharkhed		19.92728	76.17078		10.9	Basalt	FMB	3	9.6	10.3	-0.7	855	1119
138	Sindkhed-R	Shivani Taka		19.90386	76.12819		13.2	Basalt	FMB	4	11.9	7.1	4.8	2500	2318
139	Sindkhed-R	Sindkhed-Raja Urban		19.9525	76.12722		12.71	Basalt	FMB	1	10.4	9	1.4	1900	2354
140	Sindkhed-R	Sindkhed-Raja Urban		19.95056	76.12389		14.3	Basalt	FMB	6	3.9	2.4	1.5	1031	1175
141	Sindkhed-R	Sindkhed-Raja Urban		19.95867	76.12008		14	Basalt	FMB	10	3.3	3	0.3	500	450
142	Sindkhed-R	Sindkhed-Raja		19.95417	76.12722		12.19	Basalt	FMB	5	5	4	1	1270	2149

Sl. No.	Taluka	Site name	Toposheet	Latitude	Longitude	Altitude(m a msl)	Depth (m bgl)	Geology	Aquifer	Diameter (m)	D.T.W.(m bgl)	D.T.W.(Pre - 2018)(m bgl)	Fluctuation	EC (Pre - 2018)(micromhos)	EC (Post - 2018)(micromhos)
		Urban													
143	Sindkhed-R	Nimkhed		19.92306	76.10306		15.6	Basalt	FMB	7	14.6	14.9	-0.3	410	632
144	Sindkhed-R	Saokhed Tejan		19.95803	76.18231		11.69	Basalt	FMB	2	5.1	6.8	-1.7	2250	2491
145	Sindkhed-R	Saokhed Tejan		19.95436	76.18389		16.76	Basalt	FMB	5	6.8	6.5	0.3	553	643
146	Sindkhed-R	Hanvantkhed		19.93742	76.17783		13	Basalt	FMB	5	10.2	8.3	1.9	740	658
147	Sindkhed-R	Khairkhed		19.90708	76.29186		9	Basalt	FMB	5	8.5	5.5	3	1150	930
148	Sindkhed-R	Shelu		19.85903	76.17628		4.7	Basalt	FMB	1	3.5	3.6	-0.1	970	1080
149	Sindkhed-R	Dawargaon		19.87031	76.11022		10.5	Basalt	FMB	1.5	9.7	8.8	0.9	870	851
150	Sindkhed-R	Najirabad		19.91778	76.09181		9.4	Basalt	FMB	2	5.4	0.5	4.9	580	1315
151	Sindkhed-R	Kingaon Raja		19.98747	76.24339		11.2	Basalt	FMB	4	10.8	7.5	3.3	1800	1233
152	Sindkhed-R	Dusarbeed		20.00836	76.31239		14.74	Basalt	FMB	4	6.8	3.7	3.1	900	1338
153	Sindkhed-Raja	Plaskhed Zalte		19.98831	76.10622		13.1	Basalt	FMB	1.5	12.8	6.9	5.9	1290	1579

Annexure-III: Key observation well of Panchayat Level

Sl. No.	Taluka	Site name	Toposheet	Latitude	Longitude	Altitude (m a msl)	Depth(m bgl)	Geology	Aquifer	Diameter (m)	D.T.W.(pre 2018 m bgl)	D.T.W.(Post - 2018)(m bgl)	Fluctuation	EC (Pre - 2018)(micromhos)	EC (Post - 2018)(micromhos)
1	Mehkar	Anjani Bk-1	55 D/12	20.18414	76.65897	552	19.38	Basalt	Unconfined	6.28	17.35	2.7	14.65	928	973
2	Mehkar	Anjani Bk-2	55 D/12	20.19269	76.66642	545	13.75	Basalt	Unconfined	5.94	8.05	1.6	6.45	652	673
3	Mehkar	Anjani Bk	55 D/12	20.17303	76.64722	557	9.5	Basalt	Unconfined	3.15	7.72	0.94	6.78	1289	2272
4	Mehkar	Anjani Bk-3	55 D/12	20.17661	76.65428	549	10.9	Basalt	Unconfined	7.6	10.4	2.15	8.25	1913	1219
5	Mehkar	Anjani Bk-4	55 D/12	20.16561	76.64711	560	17.68	Basalt	Unconfined	3.68	14.33	4.5	9.83	830	788
6	Mehkar	Anjani Bk-5	55 D/12	20.1675	76.65428	551	12.5	Basalt	Unconfined	7.5	9.93	0.98	8.95	829	813
7	Mehkar	Anjani Bk-6	55 D/12	20.16258	76.64283	564	15.55	Basalt	Unconfined	7.95	12.8	3.7	9.1	836	1030
8	Mehkar	Anjani Bk-7	55 D/12	20.16789	76.63461	565	11	Basalt	Unconfined	5.75	8.5	3.9	4.6	603	780
9	Mehkar	Anjani Bk-8	55 D/12	20.17997	76.64289	559	15	Basalt	Unconfined	6.7	7.3	2.05	5.25	840	730
10	Mehkar	Anjani Bk-9	55 D/12	20.16964	76.67411	549	10	Basalt	Unconfined	6.5	7.89	1.4	6.49	1145	905
11	Mehkar	Anjani Bk-10	55 D/12	20.15789	76.66822	554		Basalt	Unconfined		8	1.2	6.8	856	747
12	Mehkar	Anjani Bk-11	55 D/12	20.16186	76.665	557	12	Basalt	Unconfined	7	10.12	3.7	6.42	896	774
13	Mehkar	Anjani Bk-12	55 D/12	20.17689	76.64817	552	15	Basalt	Unconfined	7.9	12	1.8	10.2	930	930
14	Mehkar	Anjani Bk-13	55 D/12	20.18881	76.6445	563	10	Basalt	Unconfined	6.6	5.3	4.7	0.6	856	670
15	Mehkar	Anjani Bk-14	55 D/12	20.19372	76.64269	557	10	Basalt	Unconfined	6.1	8.94	1.7	7.24	978	840
16	Mehkar	Anjani Bk-15	55 D/12	20.17997	76.64289	559	15	Basalt	Unconfined	6.7	10.48	2.05	8.43	925	730
17	Mehkar	Dongaon-1	55 D/12	20.18533	76.71847	513	23.08	Basalt	Unconfined	5	19.25	5.65	13.6	1095	948
18	Mehkar	Dongaon-2	55 D/12	20.18928	76.71981	524	22	Basalt	Unconfined	7	19.8	4.6	15.2	841	933
19	Mehkar	Dongaon-3	55 D/12	20.16472	76.71753	538	20.03	Basalt	Unconfined	6.23	13.08	5.6	7.48	896	922
20	Mehkar	Dongaon-4	55 D/12	20.16378	76.71614	536	17.83	Basalt	Unconfined	7.45	12.75	5.7	7.05	987	935
21	Mehkar	Dongaon-5	55 D/12	20.17506	76.71889	532	25.27	Basalt	Unconfined	6.77	20.12	6.4	13.72	835	1440
22	Mehkar	Dongaon-6	55 D/12	20.183	76.72831	528	28.65	Basalt	Unconfined	2.75	26.75	7	19.75	1318	1220
23	Mehkar	Dongaon-7	55 D/12	20.17536	76.72844	535	27.6	Basalt	Unconfined	3	23.9	5.5	18.4	747	1160
24	Mehkar	Dongaon-8	55 D/12	20.16789	76.72867	540	35	Basalt	Unconfined	6.25	29.59	6.4	23.19	335	820
25	Mehkar	Dongaon-9	55 D/12	20.18722	76.73283	532	10	Basalt	Unconfined	3	7.52	5.9	1.62	1675	1547
26	Mehkar	Dongaon-10	55 D/12	20.17981	76.71536	525	20.72	Basalt	Unconfined	5.46	10.75	7.5	3.25	1012	970
27	Mehkar	Dongaon-11	56 D/12	20.16664	76.70142	538	15	Basalt	Unconfined	10.5	12.47	3	9.47	1047	813
28	Mehkar	Dongaon-12	57 D/12	20.16664	76.70142	540	8.6	Basalt	Unconfined	5.5	7.48	3.7	3.78	926	839
29	Mehkar	Dongaon-13	58 D/12	20.19861	76.71308	539	10	Basalt	Unconfined	4	8.9	3.9	5	913	840
30	Mehkar	Dongaon-14	59 D/12	20.20131	76.73528	540	17	Basalt	Unconfined	6	15.42	11	4.42	995	834
31	Mehkar	Madani-1	55 D/12	20.13656	76.75094	525	22.7	Basalt	Unconfined	5.47	15.85	6.3	9.55	941	915
32	Mehkar	Madani-2	55 D/12	20.13981	76.74064	529	21.25	Basalt	Unconfined	3.67	12.85	5.8	7.05	1026	1070
33	Mehkar	Madani-3	55 D/12	20.14267	76.74147	525	10.32	Basalt	Unconfined	5	9.8	5	4.8	1239	1351
34	Mehkar	Madani-4	55 D/12	20.14908	76.74086	526	11.3	Basalt	Unconfined	5	9.7	4.1	5.6	883	910
35	Mehkar	Madani-5	56 D/12	20.13306	76.75214	527	10	Basalt	Unconfined	6	8.47	2.4	6.07	1014	980
36	Mehkar	Madani-6	57 D/12	20.13644	76.74325	529	10	Basalt	Unconfined	7.3	8.79	6.2	2.59	1347	1290

Sl. No.	Taluka	Site name	Toposheet	Latitude	Longitude	Altitude (m a msl)	Depth(m bgl)	Geology	Aquifer	Diameter (m)	D.T.W.(pre 2018 m bgl)	D.T.W.(Post - 2018)(m bgl)	Fluctuation	EC (Pre - 2018)(micromhos)	EC (Post - 2018)(micromhos)
37	Mehkar	Madani-7	58 D/12	20.12767	76.74047	538	17	Basalt	Unconfined	5	13.7	5	8.7	973	815
38	Mehkar	Hiware Sable-1	55 D/12	20.14483	76.6735	571	11.55	Basalt	Unconfined	5.85	8.22	2.7	5.52	683	740
39	Mehkar	Hiware Sable-2	55 D/12	20.14686	76.66622	571	12.7	Basalt	Unconfined	3	12.5	0.9	11.6	684	808
40	Mehkar	Hiware Sable-3	55 D/12	20.15325	76.67028	549	12	Basalt	Unconfined	6	10.9	7.7	3.2	876	720
41	Mehkar	Hiware Sable-4	55 D/12	20.13169	76.66122	556	10	Basalt	Unconfined	6	8.9	5.05	3.85	749	625
42	Mehkar	Hiware Sable-5	55 D/12	20.14811	76.66064	548	12	Basalt	Unconfined	6	10.25	2	8.25	643	429
43	Mehkar	Hiwara Sable	55 D/12	20.14606	76.67019	560	7.58		Unconfined	3	4.3	2.6	1.7	303	1770
44	Sindkhed raja	Sindkhed raja- Urban-1	56A1-2B	19.95325	77.10686	572	13	Basalt	Unconfined	4	6.7	4.5	2.2	1000	685
45	Sindkhed raja	Sindkhed raja- Urban-2	56A1-2B	19.96003	76.14061	542	14.5	Basalt	Unconfined	3.1	13.5	11.4	2.1	1400	1309
46	Sindkhed raja	Sindkhed raja- Urban-3	56A1-2B	19.95822	76.14181	540	18.5	Basalt	Unconfined	0.7	17.3	11.2	6.1	1590	1966
47	Sindkhed raja	Sindkhed raja- Urban-4	56A1-2B	19.96403	76.15422	540	25.3	Basalt	Unconfined	5.8	23.5	14.9	8.6	800	776
48	Sindkhed raja	Sindkhed raja- Urban-5	56A1-2B	19.94392	76.11844	551	15.3	Basalt	Unconfined	10.5	13.6	3.4	10.2	1050	503
49	Sindkhed raja	Sindkhed raja- Urban-6	56A1-2B	19.94708	76.11519	552	14.2	Basalt	Unconfined	7.2	10	13.8	-3.8	740	829
50	Sindkhed raja	Sindkhed raja- Urban-7	56A1-2B	19.95706	76.11289	565	19	Basalt	Unconfined	7	14.5	6.7	7.8	890	466
51	Sindkhed raja	Sindkhed raja- Urban-8	56A1-2B	19.95936	76.11231	566	23.9	Basalt	Unconfined	5	18.1	8	10.1	600	1034
52	Sindkhed raja	Sindkhed raja- Urban-9	56A1-2B	19.95283	76.10864	554	10.8	Basalt	Unconfined	7.5	10	7.6	2.4	490	521
53	Sindkhed raja	Sindkhed raja- Urban-10	56A1-2B	19.95908	76.11608	559	10	Basalt	Unconfined	2	9.2	8.9	0.3	940	957
54	Sindkhed raja	Sindkhed raja- Urban-11	56A1-2B	19.96028	76.10503	558	14.6	Basalt	Unconfined	5.5	13.3	6.9	6.4	890	1478
55	Sindkhed raja	Sindkhed raja- Urban-12	56A1-2B	19.96028	76.10861	627	17.5	Basalt	Unconfined	5.3	13.3	8.9	4.4	1097	1120
56	Sindkhed raja	Sindkhed raja- Urban-13	56A1-2B	19.95744	76.10225	604	5.6	Basalt	Unconfined	7	4.1	4.9	-0.8	470	579
57	Sindkhed raja	Sindkhed raja- Urban-14	56A1-2B	19.96744	76.16642	534	13.3	Basalt	Unconfined	4	11	10.9	0.1	540	638
58	Sindkhed raja	Saokhed Tejan-1	56A1-1C	19.96044	76.18033	529	15	Basalt	Unconfined	7	11.1	10.7	0.4	936	1055
59	Sindkhed raja	Saokhed Tejan-2	56A1-1C	19.95606	76.17781	535	13.21	Basalt	Unconfined	4	10.4	12.1	-1.7	960	1359
60	Sindkhed raja	Saokhed Tejan-3	56A1-1C	19.95597	76.1705	533	10.1	Basalt	Unconfined	5	9.8	9.3	0.5	1122	1468

Sl. No.	Taluka	Site name	Toposheet	Latitude	Longitude	Altitude (m a msl)	Depth(m bgl)	Geology	Aquifer	Diameter (m)	D.T.W.(pre 2018 m bgl)	D.T.W.(Post - 2018)(m bgl)	Fluctuation	EC (Pre - 2018)(micromhos)	EC (Post - 2018)(micromhos)
61	Sindkhed raja	Saokhed Tejan-4	56A1-1C	19.95161	76.18103	533	14.74	Basalt	Unconfined	5	13.4	12	1.4	760	976
62	Sindkhed raja	Saokhed Tejan-5	56A1-1C	19.96217	76.17889	528	7.8	Basalt	Unconfined	3	6.2	7.6	-1.4	1150	1430
63	Sindkhed raja	Saokhed Tejan-6	56A1-1C	19.96525	76.16903	528	15.24	Basalt	Unconfined	5	10.5	10.4	0.1	810	1050
64	Sindkhed raja	Saokhed Tejan-7	56A1-1C	19.96022	76.17508	547	15	Basalt	Unconfined	4	14.46	13	1.46	630	976
65	Sindkhed raja	Sindkhed raja- Urban-15	56A1	19.96094	76.12819	537	12	Basalt	Unconfined	6.5	10	6.8	3.2	1289	1196
66	Sindkhed raja	Sindkhed raja- Urban-16	56A1	19.93628	76.12828	562	18	Basalt	Unconfined	6.5	17.5	15.4	2.1	845	614
67	Sindkhed raja	Sindkhed raja- Urban-17	56A1	19.92794	76.14492	591	22	Basalt	Unconfined	7	21.8	19.3	2.5	860	630
68	Sindkhed raja	Sindkhed raja- Urban-18	56A1	19.93911	76.13978	567	8	Basalt	Unconfined	6	Dry	6.9	6.9		757
69	Sindkhed raja	Sindkhed raja- Urban-19	56A1	19.95197	76.14978	544	10		Unconfined	7.7	Dry	9.5	9.5		1946

Annexure-IV: Water Level of Ground water monitoring wells (2018) with long term trend (2009-2018)

Sr.No	Taluka	Village	Y	X	Depth	Year	Premonsoon water level (m bgl)	Postmonsoon water level (m bgl)	Pre trend (m/year)		Post trend (m/year)	
									Rise (m)	Fall (m)	Rise (m)	Fall (m)
1	BULDANA	Buldana	20.5333	76.1833	7.66	2018	7	2.3	0.19892		0.052707	
2	BULDANA	Chikhala	20.4514	76.0847	7.81	2018	7.5	3.8		-0.0291	0.011607	
3	BULDANA	Dattapur	20.5222	76.0958	10	2018	9.2	1.4		-0.01987		-0.06572
4	BULDANA	Deulghat	20.5161	76.1222	8.7	2018	7.5	2.7		-0.22217	0.019206	
5	BULDANA	Dhad	20.4	76	11.4	2018	9.4	4.9		-0.25702	0.07313	
6	BULDANA	Dhalsawangi	20.4139	76.0333	9.65	2018	8.2	6.1		-0.05824	0.140773	0.140773
7	BULDANA	Jamathi	20.4458	76.0139	5.9	2018	5.8	3.2		-0.07842	0.297371	
8	BULDANA	Jamb	20.3125	75.95	11.75	2018	10.2	5.8		-0.09277		-0.01888
9	BULDANA	Mhasla Bk.	20.3403	75.9708	13.9	2018	12	6.6		-0.10565	0.116738	
10	BULDANA	Mondhala	20.3403	75.9569	14	2018	13.8	6.3		-0.08069	0.102253	
11	BULDANA	Nandrakoli	20.4842	76.1661	11	2018	8.8	3	0.061709		0.028755	
12	CHIKHLI	Amdapur	20.4111	76.45	9.81	2018	8.8	3.4		-0.04334	0.094964	
13	CHIKHLI	Amdapur 1	20.4056	76.45	9.81	2018	9.4	4	0.089895		0.051203	
14	CHIKHLI	Borgaon Kakade	20.35	76.3583	10.3	2018	8.8	1		-0.06016		-0.0006
15	CHIKHLI	Borgaon Wasu	20.3736	76.3125	8.61	2018	7.6	0.1		-0.13684		-0.48136
16	CHIKHLI	Chikhli	20.35	76.2583	16.8	2018	7	0.4	0.089619			-0.0268
17	CHIKHLI	Hatni	20.3958	76.2567	6.5	2018	6.5	0.8		-0.05708	0.037931	
18	CHIKHLI	Hatni	20.4014	76.4333	9	2018	6.1	4.4	0.02		0.333908	
19	CHIKHLI	Karwand	20.4583	76.3792	4.5	2018	4.5	0.6	0.006175		0.031035	
20	CHIKHLI	Khor	20.325	76.2722	14.9	2018	14.4	10	0.079726		0.352299	
21	CHIKHLI	Sawna	20.4125	76.2917	12.31	2018	12.2	9.5	0.130274		0.231034	
22	CHIKHLI	Shelodi	20.4153	76.3625	8.5	2018	7.5	4		-0.04099	0.214368	
23	CHIKHLI	Takarkhed Helga	20.4583	76.4167	9	2018	8.9	1.1		-0.06003	0.041092	
24	CHIKHLI	Undri	20.4583	76.4639	5.85	2018	5.8	2.2		-0.10914		-0.01034
25	CHIKHLI	Utrada	20.3583	76.3347	7.2	2018	7.2	1.4		-0.06664		-0.11924
26	DEULGAON RAJA	Bharosa	20.2222	76.2417	17.5	2018	14.3	11		-0.34282	0.052291	
27	DEULGAON RAJA	Deulgaon Mahi	20.0875	76.1764	12.2	2018	8.2	1.3		-0.06686	0.029802	
28	DEULGAON RAJA	Deulgaon Raja	20.0139	76.0403	9.5	2018	7	1.5	0.141994			-0.01663

Sr.No	Taluka	Village	Y	X	Depth	Year	Premonsoon water level (m bgl)	Postmonsoon water level (m bgl)	Pre trend (m/year)		Post trend (m/year)	
									Rise (m)	Fall (m)	Rise (m)	Fall (m)
29	DEULGAON RAJA	Gunjala	20.1833	76.2917	8.7	2018	8.7	2.9	0.126034		0.12952	
30	DEULGAON RAJA	Konad	20.0139	76.0403	8.61	2018	8.6	5	0.045323		0.098207	
31	DEULGAON RAJA	Mehuna	20.0667	76.1194	9.61	2018	9.6	5	0.12122		0.002988	
32	DEULGAON RAJA	Mendgaon	20.125	76.1417	10.7	2018	10.4	4.1	0.433977		0.166733	
33	DEULGAON RAJA	Mera Kh.	20.225	76.2694	12.7	2018	12.7	6.3		-0.0051	0.487948	
34	DEULGAON RAJA	Pimpalner	20.0042	76.0361	11.61	2018	11.6	6.2	0.036777		0.208566	
35	DEULGAON RAJA	Waki Kh.	20.1278	76.1889	9.2	2018	8.7	4.5		-0.08902	0.073729	
36	DEULGAON RAJA	Yewata	20.2861	76.2028	9	2018	9	4.1		-0.00579	0.184661	
37	JALGAON JAMOD	Chalthana Kh.	21.1278	76.55	15	2018	15	9.1	0.037145		0.365405	
38	JALGAON JAMOD	Hanwatkhed	21.0736	76.4514	0	2018	18	14.5	0.216667		0.256667	
39	JALGAON JAMOD	Jalgaon Jamod	21.0514	76.5333	15.2	2018	16	8.1	0.067052			-0.20106
40	JALGAON JAMOD	Khandvi	20.9667	76.4811	13.7	2018	13.7	9.5	0.010019		0.088564	
41	JALGAON JAMOD	Raipur	21.0958	76.4333	10	2018	5.5	1.9		-0.08574		-0.13378
42	JALGAON JAMOD	Sonapali	21.1389	76.625	5	2018	4.1	0.9		-0.05453	0.020612	
43	JALGAON JAMOD	Umapur	21.1	76.4833	3.41	2018	3.4	2	0.156652		0.11194	
44	KHAMGAON	Ambetakali	20.5139	76.6778	9.9	2018	8.1	5	0.112752		0.05765	
45	KHAMGAON	Awar	20.6333	76.6333	9.5	2018	6.9	3.3	0.134093		0.03477	
46	KHAMGAON	Borjawala	20.725	76.3833	13.15	2018	9.5	3.2		-0.07867	0.008317	
47	KHAMGAON	Bothakaji	20.5333	76.7083	8.4	2018	7.7	2.2	0.052557			-0.15068

Sr.No	Taluka	Village	Y	X	Depth	Year	Premonsoon water level (m bgl)	Postmonsoon water level (m bgl)	Pre trend (m/year)		Post trend (m/year)	
									Rise (m)	Fall (m)	Rise (m)	Fall (m)
48	KHAMGAON	Bothakoli	20.5861	76.3972	10.7	2018	9.8	5.5	0.112988		0.024324	
49	KHAMGAON	Divthana	20.625	76.475	12	2018	12	10	0.078018		0.045946	
50	KHAMGAON	Hiwarkhed	20.6083	76.5333	9.5	2018	9.5	5.3	0.123416		0.167568	
51	KHAMGAON	Jalaka Bhadang	20.7167	76.4819	9.81	2018	8.9	4.9		-0.27992	0.097297	
52	KHAMGAON	Jaypur Lande	20.7486	76.6014	12.61	2018	10.4	5	0.145484		0.165017	
53	KHAMGAON	Khamgaon	20.7042	76.575	19.5	2018	11.3	3.9		-0.25323	0.069932	
54	KHAMGAON	Koka	20.7486	76.5681	13.81	2018	13.35	5.4		-0.08112		-0.09865
55	KHAMGAON	Lakhanwada Bk.	20.4917	76.625	8.7	2018	8.1	4.3	0.027053		0.132432	
56	KHAMGAON	Nandri	20.6194	76.4278	13.81	2018	13.3	8.9	0.131292			-0.03716
57	KHAMGAON	Nimkawala	20.6625	76.4542	16.1	2018	16	14		-0.01602	0.109459	
58	KHAMGAON	Nipana	20.7139	76.4014	13	2018	9.1	3.9		-0.29408		-0.08784
59	KHAMGAON	Palshi Kh.	20.6167	76.7528	9.9	2018	9.9	4.9		-0.12584		-0.15811
60	KHAMGAON	Rohana	20.6453	76.4819	9.65	2018	9.6	5.5	0.19565		0.002703	
61	KHAMGAON	Tandulwadi	20.6903	76.4528	10	2018	9.5	5.2		-0.00172		-0.12973
62	KHAMGAON	Vihigaon	20.6	76.6417	12.5	2018	11.5	4.9		-0.34528		-0.14932
63	LONAR	Bhumrala	19.9403	76.3833	9.61	2018	9.5	3.5	0.015949		0.111066	
64	LONAR	Bibkhed	19.9658	76.4236	10.31	2018	8.9	1.6	0.051548		0.106011	
65	LONAR	Borkhedi	20.075	76.5583	8.5	2018	7	1		-0.30599		-0.14454
66	LONAR	Dhayfal	19.9597	76.4542	11.4	2018	9.6	4.2	0.119314		0.175956	
67	LONAR	Kingaon Jatu	19.9667	76.3569	13.11	2018	11.4	5		-0.19791	0.065301	
68	LONAR	Lonar	19.9833	76.3542	23.6	2018	21.7	9.8		-0.15933		-0.84373
69	LONAR	Sawargaon Teli	19.95	76.3625	8.5	2018	8.1	3.3	0.006662		0.015574	
70	LONAR	Shara	20.0306	76.5306	13.61	2018	11.8	4		-0.04743	0.264754	
71	LONAR	Sultanpur	20.0861	76.5194	10.7	2018	8.25	3.3		-0.08671	0.219945	
72	LONAR	Wadhav	19.9583	76.625	12.75	2018	11.7	4.8		-0.02117	0.261475	
73	MALKAPUR	Belad	20.8667	76.2375	14.8	2018	12	6.5		-0.06667	0.967167	
74	MALKAPUR	Dasarkhed	20.8819	76.1833	17.9	2018	12.2	5.1		-0.29103	0.046781	
75	MALKAPUR	Dudhalgaon Bk.	21.025	76.1833	15.4	2018	8.6	3.6	0.047917			-0.0691
76	MALKAPUR	Hingana Kazi	20.9139	76.1347	14.2	2018	11.8	8				-0.18112
77	MALKAPUR	Malkapur	20.8806	76.2042	16.9	2018	16.9	12.5	0.05641		0.372961	
78	MALKAPUR	Morkhed Bk.	20.8167	76.1639	14.7	2018	11	8.9		-0.16474	0.397854	
79	MALKAPUR	Nimkhed	20.7528	76.2778	10.86	2018	10.6	4.1		-0.03453	0.076395	
80	MALKAPUR	Umali	20.8056	76.2375	13.11	2018	10.6	10.1	0.091667		0.596137	
81	MALKAPUR	Waghola	20.9958	76.2	12.6	2018	12.5	9.3	0.256667			-0.04769

Sr.No	Taluka	Village	Y	X	Depth	Year	Premonsoon water level (m bgl)	Postmonsoon water level (m bgl)	Pre trend (m/year)		Post trend (m/year)	
									Rise (m)	Fall (m)	Rise (m)	Fall (m)
82	MALKAPUR	Waghud	20.875	76.2681	11	2018	9.2	4.1		-0.03438	0.152361	
83	MEHKAR	Anjani Bk.	20.1792	76.6458	11.81	2018	11.8	2.8	0.125828			-0.03391
84	MEHKAR	Chinchala	20.3069	76.7722	14.61	2018	14.5	8.9	0.086178			-0.064
85	MEHKAR	Degaon	20.2514	76.7833	13	2018	5.2	0.1		-0.18	0.009067	
86	MEHKAR	Deulgaon Sakarasha	20.4264	76.6875	10.9	2018	9.7	5.9		-0.05511	0.118046	
87	MEHKAR	Dongaon	20.1833	76.7222	13.5	2018	13.2	10.4		-0.11131	0.012842	
88	MEHKAR	Gajarkhed	20.2514	76.4569	9.11	2018	5.8	0.1		-0.02711		-0.01089
89	MEHKAR	Gawandhala	20.1736	76.5667	11.61	2018	11.3	3.4		-0.16851	0.059211	
90	MEHKAR	Janefal	20.2958	76.5764	8	2018	7.4	2.2		-0.03913	0.043182	
91	MEHKAR	Khandala	20.1667	76.6056	6.81	2018	6.8	0.8	0.057618		0.039234	
92	MEHKAR	Lavhala	20.2778	76.4167	7.91	2018	6.3	3.1	0.019509		0.031758	
93	MEHKAR	Madani	20.1444	76.7417	7	2018	5.5	1.1		-0.07879	0.162321	
94	MEHKAR	Malkhed	20.2667	76.3889	7.41	2018	6.6	2.4		-0.0861	0.088333	
95	MEHKAR	Mehkar	20.15	76.5708	15.31	2018	10.9	4.5	0.030956		0.253333	
96	MEHKAR	Naigaon Dattapur	20.2431	76.5764	7.91	2018	7.9	6	0.104778		0.336667	
97	MEHKAR	Naigaon Deshmukh	20.3972	76.7181	11.7	2018	11.2	6.3		-0.06972	0.266667	
98	MEHKAR	Partapur	20.125	76.5875	11.5	2018	8	2.3		-0.36258	0.198333	
99	MEHKAR	Rajgad	20.3014	76.7667	8.9	2018	6.5	0.4		-0.01864		-0.07833
100	MEHKAR	Tembharkhed	20.3347	76.7083	8.31	2018	6.4	0.9	0.04179		0.017969	
101	MEHKAR	Uddhava	20.2681	76.7722	6	2018	6	1.5	0.159489		0.096354	
102	MEHKAR	Vishvi	20.2889	76.7431	12.5	2018	12.5	3.6	0.111547		0.045833	
103	MOTALA	Dhamangaon	20.67	76.03	0	2018	0	0		-0.06208		-0.01037
104	MOTALA	Hanwatkhed	20.5806	76.0556	0	2018	0	0	0.017576		0.147273	
105	MOTALA	Motala	20.675	76.2083	0	2018	0	0		-0.08394		-0.25939
106	MOTALA	Motala	20.68	76.2	0	2018	0	0		-0.01943		-0.01224
107	MOTALA	Panhera	20.6389	76.0694	0	2018	0	0		-0.11939		-0.3303
108	MOTALA	Pimpalgaon Devi	20.7667	76.025	0	2018	0	0	0.027879		0.213939	
109	MOTALA	Pimpalgaon Devi	20.77	76.03	0	2018	0	0		-0.01251		-0.01111
110	MOTALA	Pimpri Gawali	20.7444	76.1417	0	2018	0	0		-0.19727		-0.12182

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									Rise (m)	Fall (m)	Rise (m)	Fall (m)
111	MOTALA	Rajur	20.6028	76.1736	0	2018	0	0		-0.05588		-0.11364
112	MOTALA	Rohinkhed	20.625	76.1306	0	2018	0	0	0.040606			-0.20242
113	MOTALA	Rohinkhed	20.63	76.13	0	2018	0	0		-0.01951	0.009738	
114	MOTALA	Sarola (Maroti)	20.6917	76.1083	0	2018	0	0		-0.19333		-0.01773
115	MOTALA	Shelapur Bk.	20.7694	76.2083	0	2018	0	0		-0.24667		-0.04348
116	MOTALA	Ubalkhed	20.5972	76.1	0	2018	0	0		-0.30385		-0.30439
117	MOTALA	Urha	20.7861	76.0639	0	2018	0	0	0.087879		0.080758	
118	NANDURA	Isapur	20.8625	76.4167	17.21	2018	17.05	13.8		-0.04391		-0.08755
119	NANDURA	Naigaon	20.8236	76.3708	12.81	2018	12.6	9.6		-0.01969		0.465
120	NANDURA	Nimgaon	20.8639	76.4736	27	2018	26.5	18.3	0.178125			0.176824
121	SANGRAMPUR	Alewadi	21.1431	76.6847	22.8	2018	14.9	1.5		-0.33557		-0.10455
122	SANGRAMPUR	Ambabarwa 2	21.2278	76.6486	4.1	2018	3.7	1.9	0.257328			-0.135
123	SANGRAMPUR	Ambabarwa 1	21.2278	76.6486	6.2	2018	5.8	2.7	0.325			-0.26
124	SANGRAMPUR	Awar	20.9772	76.7667	16.4	2018	15	9.1		-0.1482		-0.15492
125	SANGRAMPUR	Chunkhedi	21.2625	76.675	5.2	2018	5	2.5		-0.01879	0.425	
126	SANGRAMPUR	Deulgaon	20.9681	76.7417	27.15	2018	21.3	17.2		-0.18	0.417857	
127	SANGRAMPUR	Durgadiatya	20.9875	76.7292	12.5	2018	12.5	12	0.13738		0.164628	
128	SANGRAMPUR	Kodri	20.95	76.775	17	2018	15	9.3		-0.18		-0.18053
129	SANGRAMPUR	Paturda Bk.	20.9514	76.7319	9.2	2018	9	4.9	0.03815			0.116489
130	SANGRAMPUR	Takali Panchgavhan	20.9292	76.7625	16.5	2018	16.5	15.7	0			-0.10106
131	SHEGAON	Alasna	20.8089	76.6597	17.11	2018	15	11.1		-0.17331		-0.00875
132	SHEGAON	Amsari	20.8042	76.4903	11.31	2018	11.25	8.7		-0.00506		-0.01915
133	SHEGAON	Jalamb	20.8181	76.5917	20.4	2018	11.7	6.9		-0.69085	0.275	
134	SHEGAON	Kalkhed	20.875	76.675	24	2018	21.8	23.7		-0.03476	0.0375	
135	SHEGAON	Lanjud	20.8014	76.5208	11.9	2018	10.1	7.9		-0.16616	0.302394	
136	SHEGAON	Lasura Bk.	20.7542	76.625	7.5	2018	6.4	3.3		-0.04024	0.063165	
137	SHEGAON	Manasgaon	20.9139	76.6847	24.71	2018	21	16.7		-0.69793		-0.75692
138	SHEGAON	Matargaon Bk.	20.8583	76.5639	17.2	2018	17.1	12.6	0.260366		0.81	
139	SHEGAON	Nimbi	20.8361	76.5667	17.5	2018	13.5	16		-0.89055	0.011968	
140	SHEGAON	Pahurjira	20.7833	76.5625	11.3	2018	5.2	3.9		-0.02308	0.260904	
141	SHEGAON	Shegaon	20.7917	76.6889	12.7	2018	4.8	2.4		-0.71098		-0.16237
142	SHEGAON	Shrishetra Nagzari	20.7597	76.7611	12.81	2018	8.1	5.1		-0.42552	0.178457	

Sr.No	Taluka	Village	Y	X	Depth	Year	Premonsoon water level (m bgl)	Postmonsoon water level (m bgl)	Pre trend (m/year)		Post trend (m/year)	
									Rise (m)	Fall (m)	Rise (m)	Fall (m)
143	SINDKHED RAJA	Changefal	19.9153	76.3417	9.2	2018	9.2	3.5	0.171462		0.17229	
144	SINDKHED RAJA	Dawargaon	19.8667	76.1083	12	2018	11.2	3.5	0.08231		0.308042	
145	SINDKHED RAJA	Dusarbid	20.0069	76.3111	7.1	2018	7.1	0.8	0.157604		0.01479	
146	SINDKHED RAJA	Garkhed	19.9222	76.2264	10.9	2018	8	2.8	0.036137		0.096678	
147	SINDKHED RAJA	Hiwarkhed	20.0236	76.2667	9.5	2018	9.5	1.5	0.422402			-0.03367
148	SINDKHED RAJA	Jafrabad	20.2167	76.4458	10	2018	9.4	1.5		-0.0293	0.022115	0.022115
149	SINDKHED RAJA	Malkapur Pangra	20.0708	76.3347	7	2018	7	0.8		-0.02073		-0.08759
150	SINDKHED RAJA	Nagazari Bk.	20.1431	76.3486	7.41	2018	7.4	5.3	0.009973		0.167738	
151	SINDKHED RAJA	Nazirabad	19.9181	76.0931	9.61	2018	9.4	1	0.411346		0.041084	
152	SINDKHED RAJA	Palaskhed Chakka	19.975	76.1986	10.5	2018	10.5	3	0.118977			-0.00909
153	SINDKHED RAJA	Rajegaon	20.1125	76.4306	11.5	2018	10.7	2.4		-0.14876	0.036014	
154	SINDKHED RAJA	Rumhana	19.9389	76.3125	17	2018	11	3.1	0.285397		0.161888	
155	SINDKHED RAJA	Shendurjan	20.125	76.3861	7.81	2018	7.8	2.4		-0.06042	0.008566	
156	SINDKHED RAJA	Sindkhed Raja	19.9542	76.125	11.5	2018	10.4	1.4	0.174461			-0.1257
157	SINDKHED RAJA	Waghora	19.9889	76.175	11.11	2018	10.9	3		-0.07698	0.018357	

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

SN	Agency	Taluka	Village	pH	EC	TDS	TH	Ca	Mg	Na	K	CO3	HCO3	Cl	SO4	NO3	F	Fe
1	CGWB	Buldhana	Borkhed	7.6	854	0	398.4	99.6	72.6	34.7	0.7	0	366	33.4	41	32	0.32	0
2	CGWB	Buldhana	Chandol	7.6	3142	0	1115.5	184.3	226.3	155.9	9.3	0	639.3	475.5	70	420	0.35	0
3	CGWB	Buldhana	Dongar Khandala	0	2032	943	625	136.272	69.2664	61.1	1.02	0	225.7	138.255	49	378	0.09	0
4	CGWB	Buldhana	Sailani	0	1060	493	360	84.168	36.456	73.38	1.35	0	189.1	170.16	40	119	0.11	0
5	GSDA	Buldhana	Buldhana	7.2	1798	1079	364	52	56.862	103	7	0	82.96	192	49	29	0.9	0.1
6	GSDA	Buldhana	Dattapur	7.4	1589	953	408	64	60.264	92	17	0	68.32	232	22	0	1.2	0.1
7	GSDA	Buldhana	Dhad	7.6	1240	806	480	153.6	23.328	98	0.3	0	270.84	200	28	100	0.8	0.3
8	GSDA	Buldhana	Jamathi	7.9	761	456	224	6.4	50.544	45	5	0.29616	39.6641	54	12	76	0.8	0.1
9	GSDA	Buldhana	Mhasla Bk.	7	2070	1242	604	66.4	106.434	121	15	0	58.56	372	38	13.8	1.7	0.1
10	GSDA	Buldhana	Mondhala	7.7	768	504	156	23.6	23.571	116	9	9.6	58.56	106	34	0	0.7	0.1
11	GSDA	Buldhana	Nandra Koli	9.1	610	390	336	52.8	49.572	156	2.2	27.0225	228.348	208	13	4	0.9	0.5
12	CGWB	Buldhana	Garadgaon	8	718	380	306	26.573	57.1144	64.02	1.29	0	315.217	45.9078	46	56	0.34	0
13	CGWB	Buldhana	Pahurjira	7.6	460	243	193.8	26.573	30.38	35.66	1.29	0	208.162	21.0927	52	4	0.24	0
14	CGWB	Chikhli	ESOLI EW-CHIKHLI	7.6	1827	970	627.3	67.4546	109.368	147	1.16	0	832.65	197.279	15	8	3.94	0
15	CGWB	Chikhli	Andhai	7.7	780	413	204	51.102	18.228	76.86	1.62	0	267.637	28.5373	36	76	0.87	0
16	CGWB	Chikhli	Anwi	7.6	637	337	270.3	71.5428	21.8736	22.72	1.93	0	249.795	13.6482	20	42	0.4	0
17	CGWB	Chikhli	AsolaNaik	7.6	953	505	382.5	87.8954	38.8864	33.24	2.75	0	350.903	23.5742	67	47	0.33	0
18	CGWB	Chikhli	Haralkhed	7.7	547	290	204	53.1461	17.0128	32.22	4.1	0	178.425	33.5003	41	10	0.42	0
19	CGWB	Chikhli	Hatni	7.5	646	342	255	63.3665	23.0888	35.76	1.78	0	291.428	16.1298	21	19	0.42	0
20	CGWB	Chikhli	Karatwadi	7.7	741	393	183.6	53.1461	12.152	85.63	1.13	0	237.9	60.7968	32	13	0.74	0
21	CGWB	Chikhli	Malshemba	7.5	670	355	275.4	69.4987	24.304	21.14	2.96	0	237.9	28.5373	40	44	0.26	0
22	CGWB	Chikhli	Naigaon Bk.	7.5	715	379	311.1	87.8954	21.8736	24.74	5.97	0	208.162	45.9078	47	23	0.28	0
23	CGWB	Deulgaon raja	Datala-1	7.6	1387	735	306	91.9836	18.228	156.2	5.84	0	154.635	239.465	174	3	0.83	0
24	CGWB	Deulgaon raja	Deolgaon Raja	7.4	1736	920	688.5	153.306	72.912	93.58	2.09	0	404.43	162.538	170	160	0.33	0
25	CGWB	Deulgaon raja	Ambashi	7.6	962	510	367.2	67.4546	47.3928	81	2.23	0	457.958	112.908	32	25	0.52	0
26	CGWB	Deulgaon raja	Chinchkhed	7.8	670	355	255	73.5869	17.0128	35	0.62	0	315.217	23.5742	12	11	0.35	0
27	CGWB	Deulgaon raja	Giroli Kh.	7.6	1287	682	576.3	96.0718	80.2032	114	0.6	0	612.593	152.612	35	39	0.18	0
28	CGWB	Deulgaon raja	Mehuna	7.9	993	524	428.4	47.0138	74.1272	52	0.59	0	529.327	85.6118	2	25	0.77	0
29	CGWB	Deulgaon raja	Mendgaon	7.8	508	269	173.4	40.8816	17.0128	53	1.13	0	285.48	26.0558	0	9	0.49	0
30	CGWB	Deulgaon raja	Pangri Ugle	8.2	506	268	260.1	40.8816	37.6712	26	0.98	0	267.637	31.0188	23	33	0.12	0
31	CGWB	Deulgaon raja	Pimpri Andhale	7.8	1188	630	540.6	79.7191	81.4184	21	18.39	0	612.593	70.7228	0	17	0.18	0
32	CGWB	Deulgaon raja	Saramba	7.9	815	433	362.1	65.4106	47.3928	62	0.38	0	428.22	73.2043	10	30	0.55	0
33	CGWB	Jalgaon jamod	Khandvi	8.2	1128	733	360	57.6	52.488	92	0.6	19.2	507.52	44	15	0	1.4	0.1
34	CGWB	Jalgaon Jamod	Adol Kh.	7.8	873	558.72	199.2	89.64	26.6231	70.09	1.39	0	170.8	59.1129	126	42	0.722	0
35	CGWB	Jalgaon Jamod	Golegaon Kh.	8	1460	934.4	94.62	54.78	9.68112	346.5	0.85	0	497.76	51.4025	245	22	1.79	0
36	CGWB	Jalgaon Jamod	Wadsingi	7.8	663	424.32	139.44	59.76	19.3622	74.4	0.56	0	219.6	17.9909	49	41	0.867	0
37	CGWB	Jalgaon Jamod	Takli Khati	7.9	757	484.48	124.5	54.78	16.942	110.7	0.63	0	244	38.5519	64	27	0.942	0

38	CGWB	Jalgaon Jamod	Borala Buzurg	8	994	636.16	94.62	24.9	16.942	219.8	0.39	0	366	33.4116	124	35	1.76	0
39	CGWB	Jalgaon Jamod	Dhanora	7.8	1200	768	253.98	114.54	33.8839	91.37	11.14	0	239.12	79.6739	103	11	0.576	0
40	CGWB	Jalgaon Jamod	Kherda Buzurg	7.8	1066	682.24	239.04	114.54	30.2535	81.67	1.05	0	244	89.9544	22	43	0.53	0
41	CGWB	Jalgaon jamod	Jalgaon	7.8	1256	803	556	102.4	72.9	254	2.3	0	63.44	440	50	14.9	1.07	0.1
42	CGWB	Jalgaon jamod	Raipur	7.2	500	330	164	19.2	28.188	25	3	0.148747	99.8433	70	5	0	0.9	0.1
43	CGWB	Jalgaon Jamod	Hanuwantkhed	7.6	581	371.84	134.46	94.62	9.68112	40.09	1.46	0	136.64	17.9909	72	43	0.888	0
44	CGWB	Jalgaon jamod	Umapur	7.5	380	250	108	16	16.524	29	6	0.237052	79.7471	30	6	59	0.9	0.1
45	CGWB	Khamgaon	Godhnapur	7.8	754	400	341.7	47.0138	53.4688	44.25	2.54	0	339.007	43.4262	28	70	0.39	0
46	CGWB	Khamgaon	Ambe Takli	7.6	1095	580	464.1	47.0138	82.6336	78.36	1.25	0	362.798	100.501	65	130	0.37	0
47	CGWB	Khamgaon	Antraj	7.7	730	386	306	49.0579	43.7472	41.6	1.22	0	261.69	35.9818	37	44	0.75	0
48	CGWB	Khamgaon	Jaipur Londe	7.7	703	372	295.8	75.631	25.5192	22.05	2.75	0	327.113	13.6482	41	18	0.39	0
49	CGWB	Khamgaon	Nagjhari Bk.	7.4	930	492	402.9	98.1158	37.6712	39.29	3.28	0	321.165	50.8708	40	47	0.58	0
50	CGWB	Khamgaon	Karegaon	7.6	1174	623	408	79.7191	49.8232	63.26	1.19	0	344.955	70.7228	46	80	0.47	0
51	CGWB	Khamgaon	Dhoravgaon	7.5	880	466	321.3	71.5428	34.0256	55.29	2.58	0	362.798	31.0188	30	40	0.72	0
52	CGWB	Khamgaon	Lakhanwada	7.6	1072	601	397.8	77.675	48.608	66.06	1.15	0	315.217	65.7597	61	66	0.53	0
53	CGWB	Khamgaon	Lokhanda	7.5	1181	625	484.5	81.7632	66.836	46.64	2.5	0	327.113	50.8708	87	90	0.66	0
54	CGWB	Khamgaon	Palsi Bk.	8.1	1408	746	351.9	51.102	53.4688	139.6	3.39	0	434.168	75.6858	64	124	1.1	0
55	CGWB	Khamgaon	Rahud	7.7	782	414	244.8	40.8816	34.0256	56.42	2.44	0	309.27	28.5373	26	32	1.2	0
56	CGWB	Khamgaon	Rohana	7.6	648	343	300.9	71.5428	29.1648	16.34	1.18	0	309.27	18.6113	17	20	0.59	0
57	CGWB	Khamgaon	Shahpur	7.5	841	445	336.6	79.7191	32.8104	36.41	1.44	0	297.375	45.9078	30	47	0.76	0
58	CGWB	Khamgaon	Tembhurna	7.4	1601	849	525.3	106.292	61.9752	84.26	3.25	0	309.27	107.945	87	94	0.58	0
59	CGWB	Khamgaon	Umbara	7.7	675	357	306	61.3224	36.456	18.27	1.3	0	237.9	23.5742	33	45	0.52	0
60	CGWB	Khamgaon	WAZAR	7.3	872	462	341.7	34.7494	60.76	53	0.92	0	374.693	75.6858	27	20	0.5	0
61	CGWB	Lonar	Gandari	7.8	1115	559	499.8	120.601	47.3928	28.5	49.38	0	588.803	33.5003	67	15	0.24	0
62	CGWB	Lonar	Khurampur	7.3	1333	706	453.9	85.8514	57.1144	94.48	1.41	0	356.85	98.0192	71	94	0.27	0
63	CGWB	Lonar	Chincholi	7.5	1226	649	504.9	112.424	53.4688	34.43	9.25	0	237.9	105.464	142	32	0.47	0
64	CGWB	Lonar	Hatta	7.5	756	400	311.1	79.7191	26.7344	30.61	1.32	0	279.533	23.5742	31	42	0.47	0
65	CGWB	Lonar	Paraskhed	7.3	1462	776	428.4	120.601	30.38	99.49	1.31	0	237.9	145.168	80	74	1.36	0
66	CGWB	Lonar	Bugulkhed	7.7	536	284	204	22.4849	35.2408	37.18	3.18	0	77.3175	70.7228	30	17	3.57	0
67	CGWB	Lonar	Anjanj Kh	7.9	2324	1230	591.6	114.468	72.912	209.4	57.44	0	719.648	199.761	72	100	0.42	0
68	CGWB	Lonar	Lonar1	7.9	1505	798	464.1	83.8073	60.76	161	24.94	0	505.538	150.131	160	42	0.72	0
69	CGWB	Malkapur	Umali	6.9	2510	1506	488	61.6	81.162	125	17	0	73.2	388	19	0	1.4	0.1
70	CGWB	Malkapur	Umadi	7.4	1360	870.4	308.76	169.32	33.8839	56.9	3.6	0	244	105.375	110	45	0.255	0
71	CGWB	Malkapur	Morkhed Kh.	8.2	3640	2184	380	12.8	84.564	175	18	0	146.4	420	46	0	1	0.1
72	CGWB	Malkapur	Jambhul Dhaba	7.7	955	611.2	204.18	129.48	18.1521	81.3	1.4	0	214.72	71.9635	57	46	0.664	0
73	CGWB	Malkapur	Belad	7.4	741	474	432	75.2	59.292	57	0.1	0.480515	203.507	164	7.5	0	0.8	0.2
74	CGWB	Malkapur	Malkapur	7.7	940	601.6	124.5	44.82	19.3622	35.5	8.29	0	97.6	102.805	12	8	0.384	0
75	CGWB	Malkapur	Wadoda	7.7	1061	679.04	199.2	94.62	25.4129	117.7	26.6	0	278.16	84.8141	176	7	0.412	0
76	CGWB	Malkapur	Hingana Kazi	7.5	6970	4182	1220	82	246.645	185	19	0	48.8	966	50	7	1.2	0.1
77	CGWB	Malkapur	Malkapur	9.1	1594	1036	116	12.8	20.412	356	0.5	134.4	570.96	92	26	6	1.2	0.2
78	CGWB	Malkapur	Wivra	7.6	1479	946.56	323.7	169.32	37.5143	89.2	3.63	0	268.4	177.339	89	36	0.598	0

79	CGWB	Malkapur	Mahaswadi	7.8	1119	716.16	258.96	119.52	33.8839	67.9	0.87	0	195.2	118.226	94	44	0.481	0
80	CGWB	Malkapur	Dasarkhed	8.4	610	400	340	50	52.245	49	1	5.09492	215.78	50	115	64	0.9	0.3
81	CGWB	Malkapur	Dudhalgaon	8	896	573	260	60.8	26.244	26	0.5	0	141.52	38	71	5	0.3	0.3
82	CGWB	Mehkar	Shara	7.1	2490	1320	856.8	282.083	36.456	45.31	31.36	0	565.013	192.316	33	190	0.24	0
83	CGWB	Mehkar	Aregaon	7.6	813	431	158.1	44.9698	10.9368	102.2	1.68	0	356.85	26.0558	28	33	0.62	0
84	CGWB	Mehkar	Madani	7.5	1227	649	255	87.8954	8.5064	165.9	2.55	0	416.325	70.7228	73	62	1.1	0
85	CGWB	Mehkar	Sarangpur	8.1	1286	681	183.6	28.6171	26.7344	250.6	2.76	0	559.065	80.6487	43	20	1.3	0
86	CGWB	Mehkar	Hiwara Sable	7.5	406	215	163.2	47.0138	10.9368	11.48	5.01	0	124.898	16.1298	50	10	0.44	0
87	CGWB	Mehkar	Anjani Bk	7.2	1335	707	392.7	143.086	8.5064	179.4	6.34	0	452.01	105.464	89	28	0.72	0
88	CGWB	Mehkar	Dongaon	7.6	801	424	229.5	77.675	8.5064	72.89	3.26	0	333.06	26.0558	27	28	0.52	0
89	CGWB	Mehkar	Nagapur	7.3	2314	1225	759.9	202.364	60.76	157.9	6.33	0	594.75	232.02	82	150	0.5	0
90	CGWB	Mehkar	Shahpur	7.4	1334	707	193.8	59.2783	10.9368	232.5	4.05	0	190.32	202.242	70	38	0.45	0
91	CGWB	Mehkar	Kambarkhed	7.3	1244	660	530.4	151.262	36.456	20.35	2.39	0	297.375	120.353	73	39	0.45	0
92	CGWB	Mehkar	Nandra	7.3	1175	584	402.9	130.821	18.228	70.1	2.77	0	220.058	135.242	77	52	0.52	0
93	CGWB	Mehkar	Andrudh	7.3	1044	553	367.2	98.1158	29.1648	75	5.33	0	303.322	73.2043	67	62	0.41	0
94	CGWB	Mehkar	Pangarkhed	7.9	467	246	198.9	14.3086	38.8864	6	0.39	0	184.373	23.5742	0	34	2.67	0
95	CGWB	Mehkar	Pangarkhed	7.5	711	377	285.6	81.7632	19.4432	31.35	1.17	0	279.533	16.1298	33	41	1.6	0
96	CGWB	Mehkar	Sula	7.1	1779	942	693.6	177.835	59.5448	68.15	7.35	0	404.43	115.39	85	170	0.43	0
97	CGWB	Mehkar	Kanaka Bk	7.3	3353	1778	1035.3	290.259	74.1272	197.4	19.18	0	648.278	480.17	80	14	0.34	0
98	CGWB	Mehkar	Naigaon	7.5	722	382	86.7	24.529	6.076	124.1	2.28	0	154.635	70.7228	67	0	2	0
99	CGWB	Mehkar	Mandawa	7.3	1645	872	540.6	138.997	46.1776	120.8	2.1	0	469.853	102.982	56	92	0.57	0
100	CGWB	Mehkar	Mehkar	7.2	1908	1011	673.2	179.879	53.4688	146.5	11.55	0	380.64	264.28	190	90	0.2	0
101	GSDA	Motala	Dhamangaon Badhe	7.3	852	559	104	14.8	16.281	93	6	0	82.96	108	31	74	1	0.1
102	GSDA	Motala	Hanvatkhed	7.4	625	411	116	17.2	17.739	16	2	0.197842	83.7896	32	5	4	0.8	0.1
103	GSDA	Motala	Motala	7.1	1727	1133	280	35.2	46.656	295	12	0	87.84	280	95	4.3	1	0.1
104	GSDA	Motala	Nimkhed	7	1535	921	332	52	49.086	95	11	0	63.44	216	16	13	0.8	0.1
105	GSDA	Motala	Rajur	7	1177	771	380	42.8	66.339	81	11	0	97.6	156	45	0	0.5	0.1
106	CGWB	Motala	Rohinkhed	0	2301	1083	560	72.144	92.3552	188	83.98	0	244	354.5	49	383	0.09	0
107	GSDA	Motala	Rohinkhed	6.9	2060	1236	380	74.8	46.899	165	7	0	82.96	310	32	23	0.7	0.1
108	GSDA	Motala	Sarola Maroti	7	1013	664	184	28.8	27.216	119	12	0	79.3	134	35	54	0.9	0.1
109	CGWB	Motala	Ubalkhed	0	1097	513	460	50.1	81.4184	53.6	1.22	0	341.6	106.35	50	139	0.11	0
110	GSDA	Motala	Ubalkhed	7.97	1492	1014	628	40.32	128.11	134	0.2	24	439.2	252	87.4	7.9	0.42	0.3
111	GSDA	Motala	Urha/liha	8.4	1548	1027	620	32	131.22	115	7	24	131.76	270	71	7	0.6	0.3
112	CGWB	Nandura	Shemba	8	1043	625	232	19.6	44.469	71	4	0	48.8	94	7	5	0.7	0.1
113	CGWB	Nandura	Phuli	7.6	796	509.44	164.34	69.72	22.9927	91.08	1.65	0	195.2	38.5519	160	42	1.04	0
114	CGWB	Nandura	Mahalungi	7.3	753	451	385	17.6	82.863	45	2	0.104815	55.8852	162	5	70	1.2	0.1
115	CGWB	Nandura	Malegaon	7.5	608	389.12	164.34	109.56	13.3115	28.73	1.27	0	204.96	15.4207	28	42	0.452	0
116	CGWB	Nandura	Wadner	7.9	2495	1596.8	239.04	79.68	38.7245	55.8	0.97	0	317.2	79.6739	24	13	0.925	0
117	CGWB	Nandura	Isabpur	7.5	1252	751	182	11.2	37.422	75	4	0	63.44	70	14	14	1.5	0.1
118	CGWB	Nandura	Matond	7.6	698	446.72	154.38	94.62	14.5217	54.2	1.15	0	185.44	64.2531	39	16	0.795	0
119	CGWB	Nandura	Nimgaon	7.4	1188	712	260	14	54.675	37	4	0	78.08	58	7	3.1	2.4	0.1

120	CGWB	Nandura	Alampur	7.7	2970	1782	184	12.8	36.936	157	26	0	170.8	158	11	39	0.8	0.1
121	CGWB	Nandura	Alampur	8	1080	691.2	129.48	49.8	19.3622	218.2	2.43	0	390.4	46.2622	136	45	1.02	0
122	CGWB	Nandura	Chandur Biswa	7.4	930	610	152	9.6	31.104	52	9	0	136.64	96	6	6	1.5	0.1
123	CGWB	Nandura	Hingonegavhan	7.7	868	555.52	119.52	54.78	15.7318	169.7	0.51	0	297.68	33.4116	110	28	0.711	0
124	CGWB	Nandura	Kharkhundi	7.54	1436	919	484	35.2	96.228	294	145	24	375.76	584	31.96	75	0.43	0.2
125	CGWB	Nandura	Sawargaon Nehu	7.8	1074	687.36	129.48	9.96	29.0434	188.02	1.09	0	287.92	84.8141	81	45	0.731	0
126	CGWB	Nandura nandura	Nandura-1	7.7	1655	877	525.3	59.2783	89.9248	186.9	7.05	0	487.695	254.354	82	31	0.24	0
127	CGWB	Sangrampur	Khiroda	8.25	1552	1020	316	99.2	16.524	154	0.5	0	732	46	23	78	0.6	0.2
128	CGWB	Sangrampur	Patorda Kh	7.5	592	355	140	21.2	21.141	15	2	0.035518	11.9487	104	19	0	0.7	0.1
129	CGWB	Sangrampur	Kodri	7.6	1017	650.88	184.26	89.64	22.9927	139.32	7.96	0	370.88	43.6921	51	22	0.56	0
130	CGWB	Sangrampur	Warwat	7.9	1146	733.44	149.4	69.72	19.3622	219.86	0.63	0	453.84	43.6921	101	12	0.95	0
131	CGWB	Sangrampur	Patorda Bk	7.7	1870	1220	140	3.2	32.076	156	16	9.6	258.64	180	33	17	3.1	0.1
132	CGWB	Sangrampur	Awar	7.7	648	414.72	124.5	69.72	13.3115	83.35	1.09	0	209.84	35.9817	40	7	0.25	0
133	CGWB	Sangrampur	Awar	7.6	562	337	140	20.8	21.384	17	2	0.104317	27.8758	102	15	6	0.9	0.1
134	CGWB	Sangrampur	Durgadaitya	8	1016	660	304	62.4	35.964	119	0.3	0	536.8	68	3.8	3	0.6	0.3
135	CGWB	Sangrampur	Tunki	8.3	984	590	160	4.8	35.964	35	5	0	34.16	28	10	21	0.8	0.1
136	CGWB	Sangrampur	Warwant Bakal	8.3	769	505	412	67.2	59.292	104	0.3	0	756.4	26	12	88	0.7	0.2
137	CGWB	Sangrampur	Katel	7.9	885	566.4	139.44	54.78	20.5724	143.52	0.66	0	312.32	38.5519	67	30	0.71	0
138	CGWB	Sangrampur	Jasi	7.7	671	429.44	169.32	89.64	19.3622	52.48	0.48	0	234.24	23.1311	11	35	0.53	0
139	CGWB	Sangrampur	Tunki Kh.	7.6	585	374.4	154.38	74.7	19.3622	29.77	0.39	0	195.2	23.1311	19	34	0.25	0
140	CGWB	Sangrampur	Tunki	7.13	884	566	278	44.4	40.581	50	44	14.4	234.24	65	24	11.8	1.4	0.2
141	CGWB	Sangrampur	Alewadi	7.4	810	486	240	8.8	52.974	52	3	0.131885	55.8556	76	9	13.2	0.8	0.1
142	CGWB	Sangrampur	Sonola	7.6	584	373.76	154.38	79.68	18.1521	35.37	0.41	0	185.44	15.4207	13	48	0.26	0
143	CGWB	Sangrampur	Pingali Jahangir	7.9	856	547.84	199.2	139.44	14.5217	76.49	1.11	0	322.08	28.2714	18	34	0.66	0
144	CGWB	Shegaon	Tintrav	7.7	733	469.12	199.2	119.52	19.3622	31.94	0.52	0	165.92	43.6921	48	25	0.37	0
145	CGWB	Shegaon	Nagzari Bk	7.1	2000	1200	396	16.4	86.265	115	11	0	63.44	264	32	46	0.8	0.1
146	CGWB	Shegaon	Chinchali Karfarma	7.5	997	638.08	263.94	134.46	31.4636	43.94	0.57	0	170.8	100.235	88	42	0.53	0
147	CGWB	Shegaon	Pahurgira	7.3	690	414	328	27.2	63.18	41	5	0.157232	83.8328	130	10	35	1.6	0.1
148	CGWB	Shegaon	Shegaon	8	1364	896	560	148.8	45.684	62	0.4	0	253.76	186	139	29	0.8	0.1
149	CGWB	Shegaon	Lanjud	7	1040	624	390	36.8	72.414	82	12	0	87.84	178	10	82	1	0.1
150	CGWB	Shegaon	Lanjud	7.6	995	636.8	258.96	139.44	29.0434	396.9	0.98	0	429.44	53.9726	498	47	0.356	0
151	CGWB	Shegaon	Alsane	7.6	775	496	159.36	99.6	14.5217	52.55	1.84	0	156.16	56.5427	35	41	0.554	0
152	CGWB	Shegaon	Nimbi	7.4	2020	1212	536	32.4	110.565	110	13	0	39.04	344	55	40	1.1	0.1
153	CGWB	Shegaon	Matargaon Bk.	7.9	1098	702.72	164.34	69.72	22.9927	193.08	1.03	0	322.08	77.1038	132	42	0.708	0
154	CGWB	Shegaon	Jhadegaon	7.8	1050	672	159.36	89.64	16.942	165.4	0.87	0	297.68	82.244	64	44	0.51	0
155	CGWB	Shegaon	Dolarkhed	8.2	1555	995.2	114.54	34.86	19.3622	34.99	0.62	0	53.68	74.5336	32	44	0.801	0
156	CGWB	Shegaon	Shegaon	7.6	4653	2465	1632	130.821	311.091	95	9.29	0	374.693	740.728	450	74	0.26	0
157	CGWB	Sindkhed raja	Ambewadi	7.7	845	447	413.1	85.8514	47.3928	19	0.28	0	374.693	78.1672	38	39	0.06	0
158	CGWB	Sindkhed raja	Dusarbeed	7.6	971	515	377.4	75.631	44.9624	91	0.67	0	493.643	63.2783	20	31	0.13	0
159	CGWB	Sindkhed raja	Jambhora	8.3	484	256	229.5	20.4408	42.532	22	1.16	11.7	172.477	43.4262	61	4	0.75	0
160	CGWB	Sindkhed raja	Jambhora	7.5	641	339	331.5	81.7632	30.38	19	0.32	0	344.955	23.5742	22	29	0.1	0

161	CGWB	Sindkhed raja	Khairkhed	6.8	2255	1195	816	216.672	65.6208	129	0.44	0	1070.55	182.39	33	40	0.15	0
162	CGWB	Sindkhed raja	Kingaon Raja	7.8	1258	665	535.5	122.645	54.684	38	0.55	0	582.855	88.0933	32	39	0.14	0
163	CGWB	Sindkhed raja	Pimpalgaon Lendi	7.7	887	471	408	87.8954	44.9624	12	0.61	0	249.795	85.6118	39	37	0.27	0
164	CGWB	Sindkhed raja	Sakhar Kherda	7.8	1899	1003	596.7	128.777	65.6208	130	1.16	0	731.543	212.168	29	32	0.17	0
165	CGWB	Sindkhed raja	saokhed tejan	7.8	820	435	408	91.9836	42.532	29	0.82	0	428.22	35.9818	39	39	0.26	0
166	CGWB	Sindkhed raja	Saokhed Tejan	7.4	1675	888	433.5	136.953	21.8736	119	5.25	0	612.593	130.279	43	39	0.1	0
167	CGWB	Sindkhed raja	Sindkhed Raja-Urban	8.2	408	216	209.1	32.7053	30.38	18	1.04	0	249.795	16.1298	21	10	0.87	0
168	CGWB	Sindkhed raja	Sindkhed Raja-Urban	8.2	506	268	209.1	40.8816	25.5192	26	0.98	0	267.637	-3.72225	23	33	0.12	0
169	CGWB	Sindkhed raja	Sindkhed-R	8	1636	864	765	157.394	88.7096	16	0.62	0	588.803	214.65	26	40	0.15	0
170	CGWB	Sindkhed raja	Tadshivni	7.8	723	383	331.5	65.4106	40.1016	21	0.72	0	374.693	31.0188	20	6	0.18	0
171	CGWB	Sindkhed raja	Tadshivni	8.3	484	256	229.5	20.4408	42.532	22	1.16	0	255.743	1.24075	61	4	0.75	0
172	CGWB	Sindkhed raja	Tandulwadi	7.8	809	429	321.3	65.4106	37.6712	14	5.02	0	321.165	48.3893	38	25	0.12	0
173	CGWB	Sindkhed raja	Wardadil Kh.	7.9	810	429	377.4	57.2342	55.8992	15	0.16	0	422.272	23.5742	9	39	1.11	0
174	CGWB	Sindkhed raja	Saokhed Tejan	8.2	408	408	209.1	32.7053	30.38	18	1.04	0	249.795	-3.72225	21	10	0.87	0
175	CGWB	Sindkhed raja	Sindkhed Raja	7.7	525	278	249.9	77.675	13.3672	18.97	9.07	0	202.215	38.4633	70	5	0.16	0
176	CGWB	Sindkhed raja	Mera Khurd	7.6	910	482	377.4	65.4106	51.0384	66.21	2.32	0	356.85	60.7968	46	64	0.33	0
177	CGWB		Sultanpur	7.4	1807	957	499.8	75.631	74.1272	185.6	12.34	0	356.85	194.798	200	84	0.26	0
178	CGWB		Sungaon-1	7.8	1114	622	489.6	116.513	47.3928	52.32	5.22	0	297.375	107.945	62	170	0.2	0
179	CGWB		Pimpalgaon Raja	8	752	399	153	30.6612	18.228	101.6	2.68	0	279.533	50.8708	33	30	0.32	0
180	CGWB		Rohinkhed	7.9	855	453	357	57.2342	51.0384	68.5	7.3	0	339.007	68.2413	40	64	0.35	0
181	CGWB		Kelwad	7.4	1390	736	459	102.204	48.608	84.97	36.08	0	297.375	182.39	84	78	0.21	0
182	CGWB		Nandri	7.8	1008	534	351.9	26.573	68.0512	83.91	0.96	0	392.535	80.6487	33	72	0.5	0
183	CGWB		Rohna	7.8	1153	652	372.3	44.9698	61.9752	71.24	1.73	0	267.637	107.945	23	160	0.43	0
184	CGWB		Loni	7.7	682	361	229.5	44.9698	27.9496	48.71	35.13	0	243.848	78.1672	52	17	0.25	0
185	CGWB		Motala	7.7	1523	807	535.5	36.7934	105.722	85.8	1.67	0	356.85	120.353	106	120	0.39	0
186	CGWB		Amdapur	7.5	1084	574	392.7	44.9698	66.836	62.66	9.25	0	243.848	95.5378	74	130	0.19	0
187	CGWB		Warwand	7.7	615	357	260.1	55.1902	29.1648	53.55	1.95	0	267.637	53.3522	30	47	0.4	0
188	CGWB		Jalamb	7.6	2325	1232	1014.9	204.408	120.305	118.7	2.35	0	297.375	294.058	340	350	0.29	0
189	CGWB		Undri	7.9	1021	541	229.5	55.1902	21.8736	162.5	3.93	0	594.75	28.5373	46	35	0.6	0
190	CGWB		Ubalkhed	7.6	1219	646	535.5	87.8954	75.3424	60.41	2.15	0	368.745	90.5747	74	170	0.35	0
191	CGWB		Janephal	7.5	1680	890	515.1	71.5428	80.2032	85.2	93.91	0	457.958	165.02	150	100	0.12	0

Annexure VI: Chemical analysis of ground water samples, Aquifer- II / Deeper aquifers

SN	Agency	Taluka	Village	pH	EC	TDS	TH	Ca	Mg	Na	K	CO3	HCO3	Cl	SO4	NO3	F	Fe
1	EW2017	Sangrampur	Warwat Bakal(Taluka-Sangrampur)	7.4	1267	669	189	31	27	121	6.5	0	77	216	102	2	3.8	0
2	GSDA	Buldhana	Birsingpur	7.5	2320	1593	100	12.8	16.5	345	19	0	34.2	628	15	30	0.8	0.1
3	GSDA	Buldhana	Nandra Koli	7.2	2160	1420	376	32	71.9	377	46	0	102.5	386	60	0	0.2	0.1
4	GSDA	Buldhana	Sagwan	7.8	583	313	344	65.6	43.7	46	1.6	2.8	477.1	16	18	35	1.22	0.1
5	GSDA	Buldhana	Warud	8.2	1287	823	352	60.8	48.6	34	4.5	9.6	248.9	16	71	85	0.48	0.1
6	GSDA	Chikhali	Borgaon Vasu	7.4	630	416	124	19.2	18.5	30	4	0.2	87.8	56	6	65	2.1	0.1
7	GSDA	Chikhali	Chikhali	6.8	1270	839	400	62.4	59.3	85	4	0	102.5	168	62	82	0.3	0.1
8	GSDA	Chikhali	Hatani	7.7	1492	922	92	12.8	14.6	45	7	0	112.2	42	12	76	0.8	0.1
9	GSDA	Chikhali	Palaskhed Jayanti	8.2	820	533	396	44	69.5	107	1	0	141.5	230	38	79	0.1	0.1
10	GSDA	Deulgaon raja	Deulgaon raja	8.6	822	540	220	35.2	32.1	39	2	14.4	141.5	60	42	39.42	0.3	0.2
11	GSDA	Deulgaon raja	Deulgaon Raja	8.29	1460	934.4	452	72.4	65.9	276	7.4	7.2	245.2	568	74.44	64.2	0.1	0.2
12	GSDA	Jalgaon jamod	Kuwardev	8.1	974	633	492	78.8	71.7	30	0.6	0	327	88	15	55	1.1	0.1
13	GSDA	Khamgaon	Divthana	7.6	732	439	360	44.8	60.3	52	3	0.2	59.8	158	20	10	1.2	0.1
14	GSDA	Khamgaon	Jalka Bhadag	7	1222	733	248	19.2	48.6	76	4	0	73.2	78	6	42	1	0.1
15	GSDA	Khamgaon	Nimkawada	7.4	2000	1200	604	42.8	120.8	118	15	0	73.2	446	16	7	1	0.1
16	GSDA	Khamgaon	Nipana	7.6	2690	1614	296	9.6	66.1	165	22	0	73.2	256	10	59	1.3	0.1
17	GSDA	Khamgaon	Palashi Kh	7.8	6530	4179	2000	257.6	329.5	190	0	4.8	536.8	910	171	4	1.2	0.1
18	GSDA	Lonar	Bibi	7.5	1078	708	220	40	29.2	30	1.3	0	230.6	43	14	22.15	0.5	0.2
19	GSDA	Lonar	Borkhedi	8.3	1120	717	524	92.8	71	230	23	81.6	463.6	415	17	9	0.5	0.1
20	GSDA	Lonar	Pimplner	8	1233	809	570	162	40.1	43	0.2	0	364.8	153	86	77	0.5	0.1
21	GSDA	Lonar	Sultanpur	7.7	1590	1018	488	84.8	67.1	194	0.6	9.6	330.6	424	19	77	0.5	0.1
22	GSDA	Malkapur	Waghola	8.72	797	541	188	30	27.5	45.5	1.9	9.6	224.5	12	39.1	21.7	0.76	0.2
23	GSDA	Malkapur	Waghul	7.2	1703	1089	416	66.4	60.8	41.6	0.1	24	136.6	50	32	0	1	0.2
24	GSDA	Mehkar	Dongaon	8.5	751	496	170	22	27.9	91	5.8	7	236.8	85	15	22	0.5	0.1
25	GSDA	Mehkar	Tembhurchhed	7.8	1010	646	496	88	67.1	40.3	3.1	0	73.2	260	22	81	1	0.2
26	GSDA	Motala	Dhamangaon Badhe	8.6	1154	738	424	86.4	50.5	61	4.3	14.4	436.8	16	52	18	0.65	0.5
27	GSDA	Motala	Pimplgaon devi	7.3	882	579	272	32	46.7	49	5	0	83	5	112	16	0.8	0.1
28	GSDA	Motala	Shelapur Bk	7.2	1338	802	448	44.8	81.6	81	8	0	87.8	290	23	77	1.2	0.1
29	GSDA	Nandura	Alampur	7.7	2970	1782	184	12.8	36.9	157	26	0	170.8	158	11	39	0.8	0.1
30	GSDA	Nandura	Fulli	8	1370	900	40	3.2	7.8	134	31	19.2	117.1	16	7	30	2.4	0.1
31	GSDA	Nandura	Kokalwadi	8.34	1379	937	268	35.84	43.4	371	1.5	9.6	214.7	480	121.9	78	2.22	0.2
32	GSDA	Nandura	Naigaon	7.2	2130	1278	532	63.2	90.9	85	7	0	58.6	374	23	105	1.3	0.1
33	GSDA	Nandura	Nandura	7.7	452	271	280	4.8	65.1	13	2	0.2	39.8	22	10	15.5	1.1	0.1
34	GSDA	Nandura	Narkhed	7.5	2430	1600	840	41.6	178.8	125	30	0	126.9	634	11	13.7	0.5	0.1
35	GSDA	Sangrampur	Kodri	7.9	678	406	88	12.8	13.6	39	7	0.3	39.7	54	27	82	1.1	0.1

SN	Agency	Taluka	Village	pH	EC	TDS	TH	Ca	Mg	Na	K	CO3	HCO3	Cl	SO4	NO3	F	Fe
36	GSDA	Sangrampur	Rohinkhidki	8.33	619	406	190	62	8.5	17.3	0.3	3.8	191.1	18	24	33	0.1	0.2
37	GSDA	Sangrampur	Takli	7.4	1476	880	244	21.6	46.2	85	11	0	43.9	134	8	0	1	0.1
38	GSDA	Shegaon	Bhongaon	8.4	1494	982	340	56	48.6	148	0.4	39.6	355	181	42	63	0.1	0.2
39	GSDA	Shegaon	Jalamb	7.6	1090	654	248	6.4	56.4	35	8	0	34.2	36	5	20	0.9	0.1
40	GSDA	Shegaon	Jawala Bk.	7.2	1970	1182	288	12.8	62.2	58	5	0	48.8	82	5	11.8	1.2	0.1
41	GSDA	Shegaon	Kalkhed	8.2	9280	6100	1780	156.8	337.3	1200	0.7	0	414.8	2050	1848	26.1	0.8	0.1
42	GSDA	Shegaon	Manasgaon	8	523	344	144	43.2	8.7	120	0.8	2	210	54	39	15	0.7	0.2
43	GSDA	Shegaon	Matargaon Bk	7.3	3130	1878	740	20.8	167.2	93	10	0	63.4	596	23	10	1.3	0.1
44	GSDA	Shegaon	Pahurpurna	8.1	3650	2372	300	57.6	37.9	835	1	0	917.4	868	162	49	1	0.2
45	GSDA	Shegaon	Tiwan Bk.	7.5	1074	706	424	67.2	62.2	32	0.2	0	283	84	69	33.2	1.1	0.3
46	GSDA	Shindkhed raja	Changefal	7.3	1825	1200	676	108	98.7	94	0.3	0	414.8	194	86	23	0.7	0.1
47	GSDA	Shindkhed raja	Palaskhed Chakka	7.5	582	303	236	57.6	22.4	80	0.3	0.5	179.5	30	19	5.8	0.7	0.2
48	GSDA	Shindkhed raja	Whagora	7.8	751	135	336	75.2	36	13	5.7	0.9	155	50	17	23	0.9	0.2
49	GWE	Sangrampur	Sangrampur	7.6	1825	1010	200	30	30	304	2.7	0	348	415	200	BDL	BDL	0
50	GWE	Sangrampur	Allewadi (DZ)	7.9	680	380	140	30	16	84	2	0	262	60	40	BDL	BDL	0
51	GWE	Sangrampur	Allewadi	8	600	335	195	18	36	49	0.1	0	323	28	5	BDL	BDL	0
52	GWE	Sangrampur	Allewadi	8	1700	1170	220	22	40	373	0.1	0	1074	53	65	BDL	BDL	0
53	GWE	Jalgaon-Jamod	Jamod	7.9	590	295	214	64	18	29	0.1	0	329	18	BDL	BDL	BDL	0
54	GWE	Jalgaon-Jamod	BheNAwad	6.9	1150	635	175	32	23	171	0.5	0	275	74	30	BDL	BDL	0
55	GWE	Jalgaon-Jamod	BheNAwad	8.6	1050	580	110	12	19	220	0.1	24	531	78	10	BDL	BDL	0
56	GWE	Shegaon	Golegaon	8	3300	2370	1020	128	170	453	1.2	0	500	567	800	BDL	BDL	0
57	GWE	Jalgaon-Jamod	Sungaon	8.9	570	300	160	16	29	53	8	18	207	39	20	15	BDL	0
58	GWE	Jalgaon-Jamod	Nimkhedi	7.7	650	322	280	16	58	21	1	0	336	7	12	39	0.01	0
59	GWE	Jalgaon-Jamod	Nimkhedi	7.7	580	291	220	16	44	29	1	0	329	11	7	18	0.57	0
60	GWE	Jalgaon-Jamod	Nimkhedi	7.6	700	343	295	28	55	22	1.5	0	366	14	7	32	0.47	0
61	GWE	Nandura	Wadi	8.2	850	505	350	48	60	38	0.6	0	171	106	68	101	0.82	0
62	GWE	Nandura	Wadi	7.2	2000	1263	385	144	6	290	1	0	31	408	395	BDL	3.9	0
63	GWE	Shegaon	Amsari	7.4	990	500	375	106	27	48	1	0	433	39	36	23	1	0
64	GWE	Shegaon	Amsari	7.4	1130	610	230	86	4	130	2	0	195	270	11	10	2	0
65	GWE	Shegaon	Amsari	7.3	1150	660	295	90	17	126	1	0	425	142	12	19	1.57	0
66	GWE	Shegaon	Jawla (Paraskhed)	7.2	1090	603	420	106	38	55	0.1	0	354	106	44	76	1.05	0
67	GWE	Shegaon	Jawla (Paraskhed)	7.5	1310	735	495	132	40	68	0.4	0	366	152	56	103	0.99	0
68	GWE	Malkapur	Malkapur	8.6	6400	4165	595	182	34	1150	20	444	811	1060	287	580	1.38	0
69	GWE	Nandura	Wadi	7.5	670	365	220	32	34	48	1.5	0	220	85	27	29	0.66	0
70	GWE	Motala	Mohegaon	8.3	840	518	80	20	7	161	0.5	0	171	145	94	4	2.6	0
71	GWE	Chikli	Brahmapuri	7.8	950	510	265	50	34	72	19	0	256	131	57	22	0.39	0
72	GWE	Buldana	Dhad	7.3	790	422	330	74	35	30	1	0	232	60	30	75	0.87	0
73	GWE	Buldana	Urha	8.5	940	509	320	38	43	69	4	30	201	92	35	96	1.07	0

SN	Agency	Taluka	Village	pH	EC	TDS	TH	Ca	Mg	Na	K	CO3	HCO3	Cl	SO4	NO3	F	Fe
74	GWE	Chikli	Buldana	7.4	830	469	75	24	4	150	2	0	110	163	64	5	2.07	0
75	GWE	Chikli	Chikhli	7.2	2700	1247	1135	264	115	52	2.7	0	500	451	69	43	0.32	0
76	GWE	Mehkar	Janephal	8.4	930	548	390	88	41	35	1	12	67	145	39	153	0.29	0
77	GWE	Sindkhed-Raja	Sakharkheda	8.1	1430	865	580	128	63	59	6.4	0	98	234	60	265	0.36	0
78	GWE	Sindkhed-Raja	Sakharkheda	7.5	2000	1128	630	184	41	135	7.5	0	525	273	90	132	3.5	0
79	GWE	Sindkhed-Raja	Sakharkheda	7.6	2200	1298	855	254	53	73	7.3	0	390	284	83	348	0.25	0
80	GWE	Mehkar	Kalyana	7.4	880	463	315	70	34	36	1	0	305	74	24	72	0.4	0
81	GWE	Mehkar	Kalyana	7.6	790	468	305	66	34	39	1.1	0	372	67	22	53	0.79	0
82	GWE	Mehkar	Anjani (Bk)	7.5	1620	952	545	94	75	97	7.5	0	317	161	91	247	0.63	0
83	GWE	Lonar	GuNAha	8.1	1170	743	150	36	15	193	4	0	171	163	88	158	0.84	0
84	GWE	Lonar	Bibi	8.1	810	442	55	10	7	145	3	0	360	46	28	23	0.69	0
85	GWE	Sindkhed-Raja	Palaskhed Chakka	7.3	2300	1459	245	84	9	416	4	0	73	404	490	6	9.6	0
86	GWE	Malkapur	Jambhul Dhaba	7.8	2700	1632	970	210	108	160	10	0	281	440	176	387	0.55	0
87	GWE	Motala	Pimpalgaon Devi	7.8	800	420	255	36	40	67	1.2	0	336	50	18	40	0.8	0
88	GWE	Deulgaon-Raja	Bharosa	7.4	1070	594	440	104	44	33	1.6	0	360	67	57	107	0.27	0
89	GWE	Deulgaon-Raja	Deolgaon (Mahi)	7.5	1120	681	115	36	6	203	3	0	67	259	127	9	4.76	0
90	GWE	Deulgaon-Raja	Singaoon (Jahangir)	8.2	1010	615	75	20	6	195	6	0	134	202	99	9	11.2	0
91	GWE	Chikli	Medsing	7.5	1500	887	120	42	4	287	3	0	171	323	140	2	9.8	0
92	GWE	lonar	Kasari	7	4900	10110	5350	1106	628	1855	10	0	43	5747	728	14	1.27	0
93	GWE	Sangrapur	Tunki	7.9	530	273	205	38	27	26	106	0	281	11	6	22	0.38	0
94	GWE	Sangrapur	Sangrapur	7.8	1120	665	245	34	39	128	10	0	305	106	125	70	0.54	0
95	GWE	Jalgaon-Jamod	Madakhed	7.1	2090	1310	280	96	10	330	28	0	116	383	390	12	2.7	0
96	GWE	Nandura	PatoNA	8.7	1880	1022	165	10	34	347	14	120	696	71	51	27	1.02	0
97	GWE	Malkapur	Umali	7.4	2550	1604	410	148	10	378	28	0	31	550	422	49	4.1	0
98	GWE	Jalgaon-Jamod	Jalgaon Jamod	9.4	580	310	115	12	21	74	4.5	30	128	92	4	8.6	0.18	0
99	GWE	Motala	Jalgaon Jamod	8.6	560	307	115	24	13	74	0.3	18	159	82	4	12	0.42	0
100	GWE	Motala	Sholapur Bk	7.5	2332	1516	875	120	140	NA	NA	0	256	372	97	22	0.44	0
101	GWE	Motala	Rohankhed	8	1634	713	700	48	141	23	0.1	0	104	312	308	7	1.3	0
102	GWE	Achalpur	BeNAwad	8.6	530	260	160	14	30	44	5	30	116	60	34	BDL	BDL	0
103	GWE	Nandura	Nimgaon EW-2	7.8	2620	1546	440	140	22	394	6	0	49	766	189	3.6	0.64	0
104	GWE	Nandura	Nimgaon EW-1	8.4	1250	722	340	30	64	121	13	24	214	170	59	134	0.36	0
105		Achalpur	Bendwad	8.55	530	260	160	14	30	44	5	30	116	60	34	0	0	0
106		Jalgaon-Jamod	Bhendwad	8.56	1050	580	110	12	19	220	0	24	531	78	10	0	0	0
107		Jalgaon-Jamod	Bhendwad	6.88	1150	635	175	32	23	171	0.5	0	275	74	30	0	0	0
108		Jalgaon-Jamod	Jalgaon Jamod	7.32	2400	1536	0	0	0	0	0	0	0	0	0	0	0	0
109		Jalgaon-Jamod	Jalgaon-Jamod	8.6	560	307	NA	115	24	13	74	0.3	18	159	82	4	0.42	12
110		Jalgaon-Jamod	Jalgaon-Jamod	9.4	580	310	NA	115	12	21	74	4.5	30	128	92	4	0.18	8.6

SN	Agency	Taluka	Village	pH	EC	TDS	TH	Ca	Mg	Na	K	CO3	HCO3	Cl	SO4	NO3	F	Fe
111		Jalgaon-Jamod	Jamod	7.94	590	295	0	64	18	29	0	0	329	18	0	0	0	0
112		Jalgaon-Jamod	Sungaon	8.86	570	300	160	16	29	53	8	18	207	39	20	15	0	0.3
113		Malkapur	Umali	7.4	2550	1604	NA	410	148	10	378	28	Nil	31	550	422	4.1	49
114		Nandura	Patonda	8.7	1880	1022	NA	165	10	34	347	14	120	696	71	51	1.02	27
115		Sangrampur	Allewadi	8.03	600	335	195	18	36	49	0	0	323	28	5	0	0	0
116		Sangrampur	Allewadi	8.03	1700	1170	220	22	40	373	0	0	1074	53	65	0	0	0
117		Sangrampur	Allewadi (DZ)	7.92	680	380	140	30	16	84	1.95	0	262	60	40	0	0	0
118		Sangrampur	Sangrampur	7.8	1120	665	NA	245	34	39	128	10	Nil	305	106	125	0.54	70
119		Sangrampur	Sangrampur	7.57	1825	1010	200	30	30	304	2.73	0	348	415	200	0	0	0
120		Sangrampur	Tunki	7.9	530	273	NA	205	38	27	26	106	Nil	281	11	6	0.38	22
121		Shegaon	Golegaon	8.02	3300	2370	1020	128	170	453	1.2	0	500	567	800	0	0	0

Annexure VII: Location of proposed Percolation tanks in Buldhana district

SN	Village	Taluka	X	Y	Struture
1	Chandol	Buldana	76.0253	20.3291	Percolation tank
2	Gondhankhed	Buldana	76.2952	20.5161	Percolation tank
3	Kolwad	Buldana	76.1622	20.5113	Percolation tank
4	Mhasla Kh.	Buldana	75.9946	20.3548	Percolation tank
5	Raipur	Buldana	76.159	20.3932	Percolation tank
6	Ruikhed	Buldana	76.0247	20.353	Percolation tank
7	Sakhali Bk.	Buldana	76.1615	20.4531	Percolation tank
8	Shirpur	Buldana	76.1865	20.4345	Percolation tank
9	Tandulwadi	Buldana	76.1257	20.4915	Percolation tank
10	Borgaon Wasu	Chikli	76.3064	20.3708	Percolation tank
11	Harni	Chikli	76.4139	20.4874	Percolation tank
12	Isoli	Chikli	76.5221	20.3849	Percolation tank
13	Jamdari	Chikli	76.5224	20.4475	Percolation tank
14	Kinhi naik	Chikli	76.5647	20.4249	Percolation tank
15	Mungi	Chikli	76.5352	20.3738	Percolation tank
16	Palaskhed Jayanti	Chikli	76.2587	20.3791	Percolation tank
17	Sawna	Chikli	76.2813	20.4167	Percolation tank
18	Shrikrishna Nagar	Chikli	76.3666	20.4874	Percolation tank
19	Shrikrishna Nagar	Chikli	76.3512	20.4795	Percolation tank
20	Undri	Chikli	76.4907	20.4848	Percolation tank
21	Andhera	Deulgaon-Raja	76.2408	20.162	Percolation tank
22	Andhera	Deulgaon-Raja	76.2713	20.1765	Percolation tank
23	Antri Khedekar	Deulgaon-Raja	76.2879	20.2127	Percolation tank
24	Baigaon Pr Malkapur	Deulgaon-Raja	76.1621	20.1267	Percolation tank
25	Deulgaon Mahi	Deulgaon-Raja	76.1866	20.1022	Percolation tank
26	Dhotra N.Pr.Malkapur	Deulgaon-Raja	76.2249	20.109	Percolation tank
27	Digras Bk.	Deulgaon-Raja	76.2318	20.0639	Percolation tank
28	Isrul	Deulgaon-Raja	76.1358	20.1573	Percolation tank
29	Mendgaon	Deulgaon-Raja	76.291	20.1367	Percolation tank
30	Mera Bk.	Deulgaon-Raja	76.3064	20.2012	Percolation tank
31	Pimpri Andhale	Deulgaon-Raja	76.2085	20.1597	Percolation tank
32	Pimpri Andhale	Deulgaon-Raja	76.1907	20.1508	Percolation tank
33	Saokhed	Deulgaon-Raja	76.2948	20.1052	Percolation tank
34	Saokhed	Deulgaon-Raja	76.2951	20.1205	Percolation tank
35	Shelgaon Atol	Deulgaon-Raja	76.1734	20.193	Percolation tank
36	Sura	Deulgaon-Raja	76.2324	20.094	Percolation tank
37	Akola Kh.	JALGAON (JAMOD)	76.4806	20.9685	Percolation tank
38	Asalgaon	JALGAON (JAMOD)	76.4622	20.9971	Percolation tank
39	Asalgaon	JALGAON (JAMOD)	76.4641	21.018	Percolation tank
40	Bhendwad Kh.	JALGAON (JAMOD)	76.5508	20.953	Percolation tank
41	Borala Bk.	JALGAON (JAMOD)	76.5973	20.9896	Percolation tank
42	Chavra	JALGAON (JAMOD)	76.5639	20.9482	Percolation tank
43	Dhanora	JALGAON (JAMOD)	76.4673	21.0367	Percolation tank
44	Gadagaon Kh.	JALGAON (JAMOD)	76.5032	20.974	Percolation tank
45	Golegaon Bk.	JALGAON (JAMOD)	76.4703	20.9283	Percolation tank
46	Hingna Pr.balapur	JALGAON (JAMOD)	76.4319	20.9169	Percolation tank
47	JALGAON (JAMOD) (MA-	JALGAON (JAMOD)	76.5214	21.0154	Percolation tank
48	JALGAON (JAMOD) (MA-	JALGAON (JAMOD)	76.5168	21.0332	Percolation tank
49	JALGAON (JAMOD) (MA-	JALGAON (JAMOD)	76.5527	21.0402	Percolation tank
50	Khandvi	JALGAON (JAMOD)	76.4524	20.9709	Percolation tank
51	Khel Paraskar	JALGAON (JAMOD)	76.5877	21.0868	Percolation tank
52	Kherda Bk.	JALGAON (JAMOD)	76.5933	21.0088	Percolation tank
53	Kherda Bk.	JALGAON (JAMOD)	76.5994	21.0432	Percolation tank
54	Kherda Bk.	JALGAON (JAMOD)	76.59	21.0511	Percolation tank
55	Kherda Kh.	JALGAON (JAMOD)	76.576	21.0197	Percolation tank
56	Kolkhed Pr.jamod	JALGAON (JAMOD)	76.5476	21.062	Percolation tank

SN	Village	Taluka	X	Y	Struture
57	Kurangad Bk.	JALGAON (JAMOD)	76.5289	20.9596	Percolation tank
58	Kurangad Bk.	JALGAON (JAMOD)	76.5434	20.9696	Percolation tank
59	Nimbhora Bk.	JALGAON (JAMOD)	76.5676	21.0136	Percolation tank
60	Palaskhed	JALGAON (JAMOD)	76.5858	20.9727	Percolation tank
61	Palshi Supo	JALGAON (JAMOD)	76.4319	21.0276	Percolation tank
62	Palshi Supo	JALGAON (JAMOD)	76.4384	21.0398	Percolation tank
63	Palshi Vaidya	JALGAON (JAMOD)	76.3936	20.9731	Percolation tank
64	Parasharampur	JALGAON (JAMOD)	76.5476	20.9892	Percolation tank
65	Pimpalgaon Kale	JALGAON (JAMOD)	76.4373	20.9814	Percolation tank
66	Sawargaon	JALGAON (JAMOD)	76.5051	20.9896	Percolation tank
67	Sawargaon	JALGAON (JAMOD)	76.5163	20.972	Percolation tank
68	Sungaon	JALGAON (JAMOD)	76.5658	21.0589	Percolation tank
69	Sungaon	JALGAON (JAMOD)	76.534	21.0585	Percolation tank
70	Taroda Kh.	JALGAON (JAMOD)	76.5396	20.9875	Percolation tank
71	Taroda Jamod	JALGAON (JAMOD)	76.5672	21.045	Percolation tank
72	Adgaon	Khamgaon	76.7075	20.5303	Percolation tank
73	Ambetakli	Khamgaon	76.685	20.508	Percolation tank
74	Ambikapur	Khamgaon	76.708	20.6405	Percolation tank
75	Ambikapur	Khamgaon	76.7052	20.6195	Percolation tank
76	Bhalegaon	Khamgaon	76.4175	20.6804	Percolation tank
77	Bothakaji	Khamgaon	76.7198	20.5311	Percolation tank
78	Chinchpur	Khamgaon	76.5657	20.4554	Percolation tank
79	Dudha	Khamgaon	76.6557	20.4976	Percolation tank
80	Ghatpuri	Khamgaon	76.5352	20.7131	Percolation tank
81	Jaipur londe	Khamgaon	76.6108	20.7491	Percolation tank
82	Kadamapur	Khamgaon	76.7622	20.5964	Percolation tank
83	Kanchanpur	Khamgaon	76.7068	20.5046	Percolation tank
84	Khamgaon-Urban	Khamgaon	76.5652	20.7082	Percolation tank
85	Khutpuri	Khamgaon	76.524	20.6944	Percolation tank
86	Kokta	Khamgaon	76.5715	20.7491	Percolation tank
87	Kolori	Khamgaon	76.6938	20.6675	Percolation tank
88	Kurha	Khamgaon	76.4936	20.7454	Percolation tank
89	Loni gurav	Khamgaon	76.7659	20.5574	Percolation tank
90	Makta	Khamgaon	76.555	20.7406	Percolation tank
91	Palshi Bk.	Khamgaon	76.7524	20.6121	Percolation tank
92	Parkhed	Khamgaon	76.5036	20.7442	Percolation tank
93	Parkhed	Khamgaon	76.511	20.7483	Percolation tank
94	Sawargaon Kh.	Khamgaon	76.4571	20.6804	Percolation tank
95	Shahapur	Khamgaon	76.768	20.5261	Percolation tank
96	Shelodi	Khamgaon	76.6352	20.7128	Percolation tank
97	Shelodi	Khamgaon	76.6557	20.6998	Percolation tank
98	Shirla Neman	Khamgaon	76.6901	20.4836	Percolation tank
99	Sutala Bk.	Khamgaon	76.5415	20.7437	Percolation tank
100	Sutala Bk.	Khamgaon	76.5392	20.7196	Percolation tank
101	Wakud	Khamgaon	76.4715	20.7543	Percolation tank
102	Ajispur	Lonar	76.4992	19.9126	Percolation tank
103	Bhanapur	Lonar	76.4961	20.0879	Percolation tank
104	Bibkhed	Lonar	76.4233	19.9444	Percolation tank
105	Borkhedi	Lonar	76.5625	20.0667	Percolation tank
106	Dabha	Lonar	76.6368	20.029	Percolation tank
107	Deulgaon Waisa	Lonar	76.5857	19.9261	Percolation tank
108	Gunjkhed	Lonar	76.6578	20.0387	Percolation tank
109	Kaulkhed	Lonar	76.6456	19.9798	Percolation tank
110	Mohotkhed	Lonar	76.6083	20.0685	Percolation tank
111	Parada Pr.Lonar	Lonar	76.4754	19.9226	Percolation tank
112	Sultanpur	Lonar	76.5073	20.1009	Percolation tank
113	Sultanpur	Lonar	76.5412	20.0964	Percolation tank
114	Tandulwadi	Lonar	76.512	20.0452	Percolation tank
115	Anurabad	MALKAPUR	76.2348	20.902	Percolation tank

SN	Village	Taluka	X	Y	Struture
116	Balad Pr. Malkapur	MALKAPUR	76.2069	20.8516	Percolation tank
117	Bhalegaon	MALKAPUR	76.1479	20.9182	Percolation tank
118	Chinchkhed	Malkapur	76.0914	20.8556	Percolation tank
119	Datala	MALKAPUR	76.1869	20.8266	Percolation tank
120	Datala	MALKAPUR	76.1997	20.812	Percolation tank
121	Gahukhed	MALKAPUR	76.2459	20.8308	Percolation tank
122	Ghirni	MALKAPUR	76.2348	20.8422	Percolation tank
123	Harsoda	MALKAPUR	76.2832	20.9249	Percolation tank
124	Harsoda	MALKAPUR	76.2832	20.9437	Percolation tank
125	Hingana Nagpur	MALKAPUR	76.2615	20.9613	Percolation tank
126	Khamkhed Pr.malkapur	MALKAPUR	76.1234	20.888	Percolation tank
127	Khaparkhed	MALKAPUR	76.2186	20.8646	Percolation tank
128	Lahe Kh.	MALKAPUR	76.1986	20.9255	Percolation tank
129	MALKAPUR (MA-2)	MALKAPUR	76.1952	20.8864	Percolation tank
130	Narwel	MALKAPUR	76.2426	20.9691	Percolation tank
131	Nimbari	MALKAPUR	76.1852	20.8407	Percolation tank
132	Nimbari	MALKAPUR	76.1919	20.8344	Percolation tank
133	Nimboli	Malkapur	76.1768	20.9162	Percolation tank
134	Panhera Pr.Malkapur	Malkapur	76.2641	20.9079	Percolation tank
135	Rangaon	Malkapur	76.1553	20.9359	Percolation tank
136	Rantham	MALKAPUR	76.1597	20.9982	Percolation tank
137	Shivni	MALKAPUR	76.1613	20.9327	Percolation tank
138	Umali	MALKAPUR	76.2236	20.812	Percolation tank
139	Wadoda	MALKAPUR	76.2598	20.8849	Percolation tank
140	Wadoda	MALKAPUR	76.2749	20.9041	Percolation tank
141	Waghud	MALKAPUR	76.2454	20.85	Percolation tank
142	Zodga	MALKAPUR	76.247	20.9281	Percolation tank
143	Anjani bk.	Mehkar	76.6745	20.1773	Percolation tank
144	Aregaon	Mehkar	76.7224	20.1404	Percolation tank
145	Bartala	Mehkar	76.5319	20.1604	Percolation tank
146	Chaingaon	Mehkar	76.5122	20.1574	Percolation tank
147	Chinchala	Mehkar	76.7847	20.3006	Percolation tank
148	Deulgaon Sakarsha	Mehkar	76.6901	20.4374	Percolation tank
149	Deulgaon Sakarsha	Mehkar	76.6994	20.4533	Percolation tank
150	Deulgaon Sakarsha	Mehkar	76.701	20.4012	Percolation tank
151	Deulgaon Sakarsha	Mehkar	76.6796	20.4175	Percolation tank
152	Deulgaon Sakarsha	Mehkar	76.6784	20.428	Percolation tank
153	Deulgaon Sakarsha	Mehkar	76.7075	20.4354	Percolation tank
154	Deulgaon Sakarsha	Mehkar	76.7008	20.4389	Percolation tank
155	Dongaon	Mehkar	76.7356	20.1805	Percolation tank
156	Dongaon	Mehkar	76.7138	20.1788	Percolation tank
157	Dongaon	Mehkar	76.7201	20.1712	Percolation tank
158	Ganpur	Mehkar	76.5615	20.1171	Percolation tank
159	Gohogaon	Mehkar	76.7377	20.2183	Percolation tank
160	Madani	Mehkar	76.7466	20.1467	Percolation tank
161	Mandwa (Forest)	Mehkar	76.6305	20.4524	Percolation tank
162	Mandwa (Forest)	Mehkar	76.6436	20.4646	Percolation tank
163	Mandwa (Forest)	Mehkar	76.6124	20.4159	Percolation tank
164	Mandwa (Forest)	Mehkar	76.6161	20.4281	Percolation tank
165	Mohana Bk.	Mehkar	76.5915	20.4406	Percolation tank
166	Naigaon Deshmukh	Mehkar	76.7189	20.4095	Percolation tank
167	Rajgad	Mehkar	76.7554	20.3191	Percolation tank
168	Sarangpur	Mehkar	76.5505	20.1367	Percolation tank
169	Sukali	Mehkar	76.5966	20.1018	Percolation tank
170	Tembharkhed	Mehkar	76.7187	20.3433	Percolation tank
171	Chinchpur	MOTALA	76.1731	20.7107	Percolation Tank
172	Dhamangaon Badhe	MOTALA	76.0372	20.6742	Percolation Tank
173	Dhamangaon Deshmukh	MOTALA	76.2895	20.6604	Percolation Tank
174	Didola Bk	MOTALA	76.1986	20.6985	Percolation Tank

SN	Village	Taluka	X	Y	Struture
175	Gugali	MOTALA	76.0667	20.7138	Percolation Tank
176	Gugali	MOTALA	76.0667	20.7138	Percolation Tank
177	Hanwatkhed	MOTALA	76.1563	20.6982	Percolation Tank
178	Ibrahimpur	MOTALA	76.2097	20.641	Percolation Tank
179	Isalwadi	MOTALA	76.3358	20.6614	Percolation Tank
180	Isalwadi	MOTALA	76.3358	20.6614	Percolation Tank
181	Kajampur	MOTALA	76.259	20.6394	Percolation Tank
182	Kinhola	MOTALA	76.0612	20.6562	Percolation Tank
183	Kinhola	MOTALA	76.0612	20.6562	Percolation Tank
184	Nalkund	MOTALA	76.0909	20.5763	Percolation Tank
185	Pimpri Gawali	MOTALA	76.1409	20.7493	Percolation Tank
186	Rahera	MOTALA	76.1373	20.5883	Percolation Tank
187	Rahera	MOTALA	76.1373	20.5883	Percolation Tank
188	Rohinkhed	MOTALA	76.1399	20.6507	Percolation Tank
189	Sarola (maroti)	MOTALA	76.108	20.6803	Percolation Tank
190	Shahapur	MOTALA	76.1394	20.6179	Percolation Tank
191	Shahapur	MOTALA	76.1394	20.6179	Percolation Tank
192	Shirwa	MOTALA	76.2358	20.6311	Percolation Tank
193	Talkhed	MOTALA	76.2201	20.7461	Percolation Tank
194	Avdha Bk.	NANDURA	76.5143	20.8482	Percolation tank
195	Avdha Bk.	NANDURA	76.4993	20.8534	Percolation tank
196	Belad Pr. Jalgaon	Nandura	76.455	20.9271	Percolation tank
197	Belad Pr.jalgaon	NANDURA	76.4464	20.9075	Percolation tank
198	Chandur Biswa	NANDURA	76.3378	20.8815	Percolation tank
199	Hingna Pr.balapur	NANDURA	76.4318	20.9187	Percolation tank
200	Jigaon	NANDURA	76.3751	20.9158	Percolation tank
201	Jigaon	NANDURA	76.3734	20.907	Percolation tank
202	Khumgaon	NANDURA	76.3851	20.8727	Percolation tank
203	Mamulwadi	NANDURA	76.3796	20.8955	Percolation tank
204	Modha	NANDURA	76.4358	20.8903	Percolation tank
205	Mominabad	NANDURA	76.3211	20.9143	Percolation tank
206	Naigaon	NANDURA	76.3439	20.8362	Percolation tank
207	Nandura Kh.rural	NANDURA	76.4536	20.8165	Percolation tank
208	Narakhed	NANDURA	76.5154	20.8638	Percolation tank
209	Narayanpur	NANDURA	76.4798	20.8508	Percolation tank
210	Nimgaon	NANDURA	76.467	20.8737	Percolation tank
211	Palsoda	NANDURA	76.3968	20.9257	Percolation tank
212	Palsoda	Nandura	76.4172	20.9315	Percolation tank
213	Pimprikoli	NANDURA	76.3144	20.9387	Percolation tank
214	Sawargaon Nehu	NANDURA	76.3116	20.9278	Percolation tank
215	Wadali	NANDURA	76.4068	20.8113	Percolation tank
216	Wadgaon Dighi	NANDURA	76.2927	20.913	Percolation tank
217	Wadi Pr.wadner	NANDURA	76.3812	20.8368	Percolation tank
218	Wadner	NANDURA	76.3155	20.8487	Percolation tank
219	Wadner	NANDURA	76.3294	20.8477	Percolation tank
220	Wadner	NANDURA	76.3005	20.8305	Percolation tank
221	Yerali	NANDURA	76.4564	20.9075	Percolation tank
222	Awar	SANGRAMPUR	76.7704	20.9604	Percolation tank
223	Bawanbir	SANGRAMPUR	76.7148	21.0816	Percolation tank
224	Chondi	SANGRAMPUR	76.6379	20.976	Percolation tank
225	Deulgaon	SANGRAMPUR	76.732	20.9297	Percolation tank
226	Dhamangaon	SANGRAMPUR	76.6513	21.0312	Percolation tank
227	Jastgaon	SANGRAMPUR	76.683	20.9511	Percolation tank
228	Jastgaon	SANGRAMPUR	76.6819	20.9765	Percolation tank
229	Jastgaon	SANGRAMPUR	76.6724	20.9625	Percolation tank
230	Kavthal	SANGRAMPUR	76.5975	20.9439	Percolation tank
231	Khalad Bk.	SANGRAMPUR	76.7454	21.0645	Percolation tank
232	Khalad Kh.	SANGRAMPUR	76.7576	21.0603	Percolation tank
233	Khel Thorat Paturda	SANGRAMPUR	76.732	20.9542	Percolation tank

SN	Village	Taluka	X	Y	Struture
234	Khiroda	SANGRAMPUR	76.6958	20.9271	Percolation tank
235	Kumbarkhed	SANGRAMPUR	76.6446	20.9474	Percolation tank
236	Nirod	SANGRAMPUR	76.6362	21.0031	Percolation tank
237	Paturda Kh.	SANGRAMPUR	76.7554	20.9433	Percolation tank
238	Paturda Kh.	SANGRAMPUR	76.7521	20.9563	Percolation tank
239	Sawali	SANGRAMPUR	76.6802	20.9365	Percolation tank
240	Sawali	SANGRAMPUR	76.6697	20.9443	Percolation tank
241	Wankhed	SANGRAMPUR	76.7398	20.9693	Percolation tank
242	Wankhed	SANGRAMPUR	76.7431	20.9984	Percolation tank
243	Warwat Bakal	SANGRAMPUR	76.7125	21.028	Percolation tank
244	Zashi	SANGRAMPUR	76.6591	21.052	Percolation tank
245	Adsul	SHEGAON	76.7092	20.8637	Percolation tank
246	Bhongaon	SHEGAON	76.6168	20.8798	Percolation tank
247	Bhota	SHEGAON	76.5037	20.9183	Percolation tank
248	Chinchkhed	SHEGAON	76.5828	20.8892	Percolation tank
249	Hingna Bhota	SHEGAON	76.5193	20.9027	Percolation tank
250	Janori	SHEGAON	76.649	20.8559	Percolation tank
251	Janori	SHEGAON	76.649	20.8372	Percolation tank
252	Kalkhed	SHEGAON	76.6669	20.8762	Percolation tank
253	Kalkhed	SHEGAON	76.6585	20.8611	Percolation tank
254	Kathora	SHEGAON	76.5472	20.8959	Percolation tank
255	Kathora	SHEGAON	76.5382	20.8928	Percolation tank
256	Manegaon	SHEGAON	76.7287	20.8434	Percolation tank
257	Matargaon Bk.	SHEGAON	76.5499	20.8585	Percolation tank
258	Matargaon Bk.	SHEGAON	76.5605	20.8507	Percolation tank
259	Taroda Tarodi	SHEGAON	76.6039	20.8632	Percolation tank
260	Taroda Tarodi	SHEGAON	76.6117	20.8496	Percolation tank
261	Waradh	SHEGAON	76.5405	20.8777	Percolation tank
262	Yeulkhed	SHEGAON	76.6413	20.8762	Percolation tank

Annexure VIII: Location of proposed check dam in Buldhana district

SN	Village	Taluka	X	Y	Structures
1	Borkhed	Buldana	76.2773	20.5384	Checkdam
2	Borkhed	Buldana	76.2582	20.5463	Checkdam
3	Borkhed	Buldana	76.2517	20.5371	Checkdam
4	Borkhed	Buldana	76.2724	20.5574	Checkdam
5	Borkhed	Buldana	76.2699	20.5642	Checkdam
6	Borkhed	Buldana	76.2713	20.5703	Checkdam
7	Borkhed	Buldana	76.2326	20.5685	Checkdam
8	Borkhed	Buldana	76.2368	20.5449	Checkdam
9	Buldhana-Urban	Buldana	76.1649	20.523	Checkdam
10	Deulghat	Buldana	76.1126	20.5034	Checkdam
11	Dhamangaon	Buldana	75.9686	20.4273	Checkdam
12	Domrul	Buldana	75.966	20.4079	Checkdam
13	Gondhankhed	Buldana	76.2855	20.5123	Checkdam
14	Ismailpur	Buldana	76.1163	20.4821	Checkdam
15	Kolwad	Buldana	76.1489	20.519	Checkdam
16	Mhasla Bk.	Buldana	75.9828	20.3362	Checkdam
17	Mondhala	Buldana	75.9658	20.3429	Checkdam
18	Paldhag	Buldana	76.2973	20.5689	Checkdam
19	pimparkhed	Buldana	76.2836	20.5319	Checkdam
20	Pokhari	Buldana	76.2133	20.4968	Checkdam
21	Sakhali Bk.	Buldana	76.1777	20.4578	Checkdam
22	Satgaon	Buldana	75.9658	20.3534	Checkdam
23	Dewadari	Chikli	76.3953	20.3436	Checkdam
24	Dhuma	Chikli	76.5153	20.3942	Checkdam
25	Girola	Chikli	76.252	20.416	Checkdam
26	Harni	Chikli	76.4125	20.4973	Checkdam
27	Harni	Chikli	76.4162	20.5028	Checkdam
28	Harni	Chikli	76.4037	20.4705	Checkdam
29	Harni	Chikli	76.4051	20.4805	Checkdam
30	Harni	Chikli	76.4365	20.4921	Checkdam
31	Hatni	Chikli	76.2259	20.3977	Checkdam
32	Hiwara Naik	Chikli	76.5312	20.4352	Checkdam
33	Hiwara Naik	Chikli	76.5353	20.4382	Checkdam
34	Hiwara Naik	Chikli	76.5453	20.4352	Checkdam
35	Kawhala	Chikli	76.3983	20.4215	Checkdam
36	Kinhi naik	Chikli	76.5521	20.4147	Checkdam
37	Kinhi naik	Chikli	76.5551	20.4193	Checkdam
38	Kinhi naik	Chikli	76.5595	20.4228	Checkdam
39	Kinhi naik	Chikli	76.5749	20.414	Checkdam
40	Kinhi Sawadad	Chikli	76.4879	20.479	Checkdam
41	Kusumbi	Chikli	76.5032	20.4646	Checkdam
42	Peth	Chikli	76.3413	20.3593	Checkdam
43	Sawarkhed Bk.	Chikli	76.4576	20.3266	Checkdam
44	Sawna	Chikli	76.2738	20.4169	Checkdam
45	Sawna	Chikli	76.2641	20.4164	Checkdam
46	Shrikrishna Nagar	Chikli	76.3904	20.4751	Checkdam
47	Shrikrishna Nagar	Chikli	76.3862	20.4797	Checkdam
48	Shrikrishna Nagar	Chikli	76.3771	20.4821	Checkdam
49	Takarkhed Helga	Chikli	76.4106	20.4664	Checkdam
50	Tambulwadi	Chikli	76.2315	20.3449	Checkdam
51	Undri	Chikli	76.4639	20.4731	Checkdam
52	Vairagad	Chikli	76.4709	20.4884	Checkdam
53	Andhera	Deulgaon-Raja	76.254	20.1602	Checkdam
54	Baigaon Pr. Kherda	Deulgaon-Raja	76.2866	20.1467	Checkdam
55	Bharosa	Deulgaon-Raja	76.2396	20.2157	Checkdam
56	Bharosa	Deulgaon-Raja	76.2164	20.2144	Checkdam

SN	Village	Taluka	X	Y	Structures
57	Bharosa	Deulgaon-Raja	76.2308	20.2393	Checkdam
58	Chandanpur	Deulgaon-Raja	76.3317	20.2284	Checkdam
59	Chandhai Pr.Chikhali	Deulgaon-Raja	76.2219	20.3281	Checkdam
60	Chandhai Pr.Chikhali	Deulgaon-Raja	76.2299	20.325	Checkdam
61	Dagadwadi	Deulgaon-Raja	76.1159	20.0492	Checkdam
62	Dagadwadi	Deulgaon-Raja	76.1131	20.0369	Checkdam
63	Dodra	Deulgaon-Raja	76.1624	20.141	Checkdam
64	Gargundi	Deulgaon-Raja	76.0968	20.0772	Checkdam
65	Jambhora	Deulgaon-Raja	76.0684	19.9976	Checkdam
66	Jawalkhed	Deulgaon-Raja	76.1028	20.0063	Checkdam
67	Jawalkhed	Deulgaon-Raja	76.0875	20.0103	Checkdam
68	Jawalkhed	Deulgaon-Raja	76.0893	20.0234	Checkdam
69	Kawathal	Deulgaon-Raja	76.315	20.2337	Checkdam
70	Khairav	Deulgaon-Raja	76.3331	20.2826	Checkdam
71	Kolara	Deulgaon-Raja	76.3071	20.2914	Checkdam
72	Kumbhari	Deulgaon-Raja	76.0596	20.0238	Checkdam
73	Mangraj Kh.	Deulgaon-Raja	76.1503	20.1672	Checkdam
74	Mehuna	Deulgaon-Raja	76.1396	20.0741	Checkdam
75	Mehuna	Deulgaon-Raja	76.1219	20.0597	Checkdam
76	Mendgaon	Deulgaon-Raja	76.2978	20.127	Checkdam
77	Mera Bk.	Deulgaon-Raja	76.3373	20.1974	Checkdam
78	Mera Bk.	Deulgaon-Raja	76.3108	20.2066	Checkdam
79	Mera Bk.	Deulgaon-Raja	76.3248	20.186	Checkdam
80	Nagangaon	Deulgaon-Raja	76.2513	20.0811	Checkdam
81	Nimgaon Guru	Deulgaon-Raja	76.1689	20.0584	Checkdam
82	Nimgaon Guru	Deulgaon-Raja	76.1638	20.0496	Checkdam
83	Nimgaon Guru	Deulgaon-Raja	76.1991	20.0474	Checkdam
84	Padali Shinde Pr.Mal	Deulgaon-Raja	76.2727	20.1082	Checkdam
85	Palaskhed jatta	Deulgaon-Raja	76.1052	19.9897	Checkdam
86	Palasrke Daulat	Deulgaon-Raja	76.2201	20.3093	Checkdam
87	Pangri Pr.Japharabad	Deulgaon-Raja	76.0824	20.0536	Checkdam
88	Pimpalgaon Bk.	Deulgaon-Raja	76.161	20.019	Checkdam
89	Pimpalgaon chilamkha	Deulgaon-Raja	76.047	20.0527	Checkdam
90	Pimpalner	Deulgaon-Raja	76.0428	20.002	Checkdam
91	Rohana	Deulgaon-Raja	76.1428	20.0369	Checkdam
92	Rohoda	Deulgaon-Raja	76.3001	20.252	Checkdam
93	Rohoda	Deulgaon-Raja	76.2964	20.2643	Checkdam
94	Shelgaon Atol	Deulgaon-Raja	76.1643	20.1978	Checkdam
95	Shivni [Armal]	Deulgaon-Raja	76.2647	20.144	Checkdam
96	Sura	Deulgaon-Raja	76.2359	20.1034	Checkdam
97	Sura	Deulgaon-Raja	76.2261	20.089	Checkdam
98	Yewata	Deulgaon-Raja	76.1973	20.2787	Checkdam
99	Adol kh.	JALGAON (JAMOD)	76.3857	20.9627	Checkdam
100	Ambabari	JALGAON (JAMOD)	76.6115	21.15	Checkdam
101	Ambabari	JALGAON (JAMOD)	76.6054	21.1556	Checkdam
102	Asaldari	JALGAON (JAMOD)	76.6148	21.1635	Checkdam
103	Asaldari	JALGAON (JAMOD)	76.6124	21.1713	Checkdam
104	Bhingara	JALGAON (JAMOD)	76.5145	21.1225	Checkdam
105	Bhingara	JALGAON (JAMOD)	76.494	21.1713	Checkdam
106	Bhingara	JALGAON (JAMOD)	76.4963	21.1604	Checkdam
107	Bhingara	JALGAON (JAMOD)	76.5159	21.1757	Checkdam
108	Bhingara	JALGAON (JAMOD)	76.5135	21.1304	Checkdam
109	Chalthana Kh.	JALGAON (JAMOD)	76.5845	21.1434	Checkdam
110	Chalthana Kh.	JALGAON (JAMOD)	76.5723	21.1391	Checkdam
111	Gorad Pr.jamod	JALGAON (JAMOD)	76.5457	21.1199	Checkdam
112	Hanwantkhed	JALGAON (JAMOD)	76.4746	21.0707	Checkdam
113	Hanwantkhed	JALGAON (JAMOD)	76.4613	21.0707	Checkdam
114	Hanwantkhed	JALGAON (JAMOD)	76.4622	21.0768	Checkdam
115	Hanwantkhed	JALGAON (JAMOD)	76.4492	21.0694	Checkdam

SN	Village	Taluka	X	Y	Structures
116	Hanwantkhed	JALGAON (JAMOD)	76.4646	21.086	Checkdam
117	Hanwantkhed	JALGAON (JAMOD)	76.4737	21.0768	Checkdam
118	Hashampur	JALGAON (JAMOD)	76.4207	21.0503	Checkdam
119	Hashampur	JALGAON (JAMOD)	76.4153	21.0601	Checkdam
120	Hashampur	JALGAON (JAMOD)	76.4251	21.0578	Checkdam
121	Islampur	JALGAON (JAMOD)	76.4048	21.0485	Checkdam
122	Islampur	JALGAON (JAMOD)	76.3981	21.0466	Checkdam
123	Islampur	JALGAON (JAMOD)	76.4016	21.0379	Checkdam
124	Kahupatta	JALGAON (JAMOD)	76.5201	21.1151	Checkdam
125	Karanwadi	JALGAON (JAMOD)	76.3965	20.9914	Checkdam
126	Karanwadi	JALGAON (JAMOD)	76.4039	21.0119	Checkdam
127	Khel-Shivpur(Jamod)	JALGAON (JAMOD)	76.6208	21.1456	Checkdam
128	Khel-Shivpur(Jamod)	JALGAON (JAMOD)	76.5901	21.1443	Checkdam
129	Kuvardeo	JALGAON (JAMOD)	76.5826	21.1578	Checkdam
130	Kuvardeo	JALGAON (JAMOD)	76.5551	21.1826	Checkdam
131	Kuvardeo	JALGAON (JAMOD)	76.5635	21.1844	Checkdam
132	Kuvardeo	JALGAON (JAMOD)	76.5817	21.1892	Checkdam
133	Kuvardeo	JALGAON (JAMOD)	76.5667	21.1495	Checkdam
134	Pimpalgaon Kale	JALGAON (JAMOD)	76.4011	20.9575	Checkdam
135	Raipur	JALGAON (JAMOD)	76.4389	21.0868	Checkdam
136	Raipur	JALGAON (JAMOD)	76.4179	21.0716	Checkdam
137	Rajura Bk.	JALGAON (JAMOD)	76.4874	21.0812	Checkdam
138	Sungaon	JALGAON (JAMOD)	76.5481	21.1347	Checkdam
139	Sungaon	JALGAON (JAMOD)	76.5569	21.1282	Checkdam
140	Sungaon	JALGAON (JAMOD)	76.5593	21.1233	Checkdam
141	Umapur	JALGAON (JAMOD)	76.486	21.0921	Checkdam
142	Umapur	JALGAON (JAMOD)	76.4748	21.1021	Checkdam
143	Umapur	JALGAON (JAMOD)	76.4753	21.1117	Checkdam
144	Umapur	JALGAON (JAMOD)	76.486	21.126	Checkdam
145	Wadgaongad	JALGAON (JAMOD)	76.437	21.0581	Checkdam
146	Wayal	JALGAON (JAMOD)	76.5055	21.0902	Checkdam
147	Wayal	JALGAON (JAMOD)	76.4977	21.1125	Checkdam
148	Wayal	JALGAON (JAMOD)	76.5074	21.0708	Checkdam
149	Ambetakli	Khamgaon	76.6831	20.5311	Checkdam
150	Ambetakli	Khamgaon	76.6759	20.5344	Checkdam
151	Ambetakli	Khamgaon	76.6761	20.5187	Checkdam
152	Ambetakli	Khamgaon	76.6682	20.5028	Checkdam
153	Ambikapur	Khamgaon	76.7057	20.6438	Checkdam
154	Asa	Khamgaon	76.6635	20.5198	Checkdam
155	Belura	Khamgaon	76.4679	20.7022	Checkdam
156	Bori	Khamgaon	76.6856	20.5433	Checkdam
157	Dastapur	Khamgaon	76.755	20.5562	Checkdam
158	Dastapur	Khamgaon	76.7603	20.5608	Checkdam
159	Deulkhed	Khamgaon	76.7503	20.527	Checkdam
160	Gawandhala	Khamgaon	76.654	20.5207	Checkdam
161	Gawandhala	Khamgaon	76.641	20.5189	Checkdam
162	Gawandhala	Khamgaon	76.6386	20.5172	Checkdam
163	Jaipur londe	Khamgaon	76.6035	20.7431	Checkdam
164	Jaipur londe	Khamgaon	76.6051	20.7518	Checkdam
165	Jalaka Bhadang	Khamgaon	76.4721	20.7061	Checkdam
166	Jalaka Bhadang	Khamgaon	76.4911	20.7022	Checkdam
167	Jalaka Bhadang	Khamgaon	76.4902	20.7074	Checkdam
168	Jalaka Bhadang	Khamgaon	76.4846	20.7137	Checkdam
169	Jalaka Bhadang	Khamgaon	76.4779	20.72	Checkdam
170	Kanchanpur	Khamgaon	76.7098	20.5226	Checkdam
171	Karegaon Kh.	Khamgaon	76.7201	20.583	Checkdam
172	Khutpuri	Khamgaon	76.5249	20.6848	Checkdam
173	Kolori	Khamgaon	76.6819	20.6475	Checkdam
174	Kolori	Khamgaon	76.6884	20.656	Checkdam

SN	Village	Taluka	X	Y	Structures
175	Lakhanwada Bk.	Khamgaon	76.6335	20.4845	Checkdam
176	Lakhanwada Bk.	Khamgaon	76.6345	20.4891	Checkdam
177	Lakhanwada Bk.	Khamgaon	76.6252	20.4747	Checkdam
178	Lakhanwada Bk.	Khamgaon	76.6112	20.4775	Checkdam
179	Parkhed	Khamgaon	76.5125	20.7394	Checkdam
180	Parkhed	Khamgaon	76.5111	20.7289	Checkdam
181	Pedka	Khamgaon	76.6668	20.5695	Checkdam
182	Poraj	Khamgaon	76.44	20.6743	Checkdam
183	Rahud	Khamgaon	76.4634	20.7178	Checkdam
184	Rahud	Khamgaon	76.4641	20.7294	Checkdam
185	Rahud	Khamgaon	76.4623	20.7381	Checkdam
186	Shahapur	Khamgaon	76.7631	20.5311	Checkdam
187	Shelodi	Khamgaon	76.6324	20.7002	Checkdam
188	Shelodi	Khamgaon	76.6428	20.7083	Checkdam
189	Shirla Nemane	Khamgaon	76.6766	20.4971	Checkdam
190	Sutala Bk.	Khamgaon	76.5244	20.7231	Checkdam
191	Sutala Bk.	Khamgaon	76.5335	20.7342	Checkdam
192	Sutala Bk.	Khamgaon	76.536	20.7414	Checkdam
193	Sutala Kh.	Khamgaon	76.5635	20.7263	Checkdam
194	Tandulwani	Khamgaon	76.4653	20.6761	Checkdam
195	Wadi	Khamgaon	76.5702	20.7353	Checkdam
196	Wakud	Khamgaon	76.4651	20.7505	Checkdam
197	Bagulkhed	Lonar	76.6161	20.031	Checkdam
198	Borkhedi	Lonar	76.5591	20.0808	Checkdam
199	Deulgaon Kundpal	Lonar	76.4974	19.9538	Checkdam
200	Dhad	Lonar	76.5521	19.8573	Checkdam
201	Dhayphal	Lonar	76.4376	19.9518	Checkdam
202	Gandhari	Lonar	76.5861	19.87	Checkdam
203	Gundha	Lonar	76.5709	20.0172	Checkdam
204	Hirdav	Lonar	76.5886	20.0071	Checkdam
205	Hirdav	Lonar	76.6017	20.0067	Checkdam
206	Hirdav	Lonar	76.6107	20.0152	Checkdam
207	Jafrabad	Lonar	76.6135	20.0237	Checkdam
208	Jambul	Lonar	76.5868	19.9522	Checkdam
209	Kaulkhed	Lonar	76.6524	19.9719	Checkdam
210	Khalegaon	Lonar	76.4427	20.062	Checkdam
211	Khurampur	Lonar	76.5377	19.8687	Checkdam
212	Khurampur	Lonar	76.5209	19.8836	Checkdam
213	Kingaon jatu	Lonar	76.3674	19.9713	Checkdam
214	Kundlas	Lonar	76.5456	19.9675	Checkdam
215	Kundlas	Lonar	76.5447	19.9625	Checkdam
216	Kundlas	Lonar	76.5414	19.9468	Checkdam
217	Madhi	Lonar	76.6452	19.8722	Checkdam
218	Pangradola	Lonar	76.5391	19.9404	Checkdam
219	Parda Pr.Lonar	Lonar	76.4739	19.9319	Checkdam
220	Pimpalkhuta	Lonar	76.516	20.0226	Checkdam
221	Pimpalkhuta	Lonar	76.5139	20.0165	Checkdam
222	Sultanpur	Lonar	76.5288	20.0817	Checkdam
223	Sultanpur	Lonar	76.5351	20.0869	Checkdam
224	Sultanpur	Lonar	76.5042	20.0791	Checkdam
225	Tambola	Lonar	76.4453	19.9778	Checkdam
226	Tandulwadi	Lonar	76.5193	20.0331	Checkdam
227	Tandulwadi	Lonar	76.5172	20.0419	Checkdam
228	Wadhav	Lonar	76.6275	19.9798	Checkdam
229	Wadhav	Lonar	76.6068	19.9645	Checkdam
230	Weni	Lonar	76.5628	20.0502	Checkdam
231	Weni	Lonar	76.5458	20.0441	Checkdam
232	Weni	Lonar	76.5381	20.0377	Checkdam
233	Aland	MALKAPUR	76.1062	20.8482	Checkdam

SN	Village	Taluka	X	Y	Structures
234	Chinchol	MALKAPUR	76.2191	21.0008	Checkdam
235	Deodhaba	MALKAPUR	76.1225	20.9149	Checkdam
236	Deodhaba	MALKAPUR	76.1038	20.9262	Checkdam
237	Dudhalgaon	MALKAPUR	76.1607	20.8308	Checkdam
238	Dudhalgaon Kh.	MALKAPUR	76.1845	21.0178	Checkdam
239	Gaulkhed	MALKAPUR	76.1071	20.8709	Checkdam
240	Harankhed	MALKAPUR	76.094	20.8512	Checkdam
241	Jalalabad	MALKAPUR	76.1519	20.887	Checkdam
242	Jambhuldhaba	MALKAPUR	76.1318	20.8604	Checkdam
243	Khadki	MALKAPUR	76.1108	20.9066	Checkdam
244	Khokodi	MALKAPUR	76.1822	20.8587	Checkdam
245	Khokodi	MALKAPUR	76.1766	20.8434	Checkdam
246	Korwad	MALKAPUR	76.2312	20.989	Checkdam
247	Lahe Kh.	MALKAPUR	76.1864	20.9315	Checkdam
248	Malkapur (Rural)	MALKAPUR	76.1645	20.9031	Checkdam
249	Morkhed Bk.	MALKAPUR	76.1831	20.8155	Checkdam
250	Narwel	MALKAPUR	76.2307	20.9672	Checkdam
251	Rangaon	MALKAPUR	76.1486	20.9363	Checkdam
252	Rantham	MALKAPUR	76.1668	20.9947	Checkdam
253	Talaswada	MALKAPUR	76.199	20.9428	Checkdam
254	Tighra Pr.Malkapur	MALKAPUR	76.1314	20.9742	Checkdam
255	Wagholda	MALKAPUR	76.1934	21.0025	Checkdam
256	Wiwara	MALKAPUR	76.1645	20.9738	Checkdam
257	Andhrudi	Mehkar	76.7012	20.2313	Checkdam
258	Anjani bk.	Mehkar	76.6568	20.1656	Checkdam
259	Anjani bk.	Mehkar	76.6473	20.1745	Checkdam
260	Antri Deshmukh	Mehkar	76.5802	20.1047	Checkdam
261	Bardapur	Mehkar	76.6063	20.2236	Checkdam
262	Belgaon	Mehkar	76.7808	20.2201	Checkdam
263	Belgaon	Mehkar	76.7773	20.2151	Checkdam
264	Belgaon	Mehkar	76.775	20.2101	Checkdam
265	Chinchala	Mehkar	76.7796	20.3024	Checkdam
266	Degaon	Mehkar	76.7927	20.2642	Checkdam
267	Dongaon	Mehkar	76.7338	20.1774	Checkdam
268	Drugbori	Mehkar	76.6726	20.3189	Checkdam
269	Ganpur	Mehkar	76.5533	20.1165	Checkdam
270	Ghatbori	Mehkar	76.7024	20.3266	Checkdam
271	Ghonsar	Mehkar	76.5795	20.2208	Checkdam
272	Gomedhar	Mehkar	76.5984	20.3301	Checkdam
273	Gomedhar	Mehkar	76.603	20.3425	Checkdam
274	Januna	Mehkar	76.7775	20.2821	Checkdam
275	Karhadwadi (nv)	Mehkar	76.7273	20.2151	Checkdam
276	Lawana	Mehkar	76.6235	20.2587	Checkdam
277	Lawana	Mehkar	76.6198	20.2611	Checkdam
278	Lawana	Mehkar	76.6191	20.2685	Checkdam
279	Loni Gavali	Mehkar	76.6915	20.2389	Checkdam
280	Loni Gavali	Mehkar	76.6715	20.2424	Checkdam
281	Loni Gavali	Mehkar	76.681	20.2552	Checkdam
282	Loni Kale	Mehkar	76.6245	20.3233	Checkdam
283	Madani	Mehkar	76.7373	20.1495	Checkdam
284	Madani	Mehkar	76.7475	20.1375	Checkdam
285	Malegaon	Mehkar	76.6149	20.3017	Checkdam
286	Malkhed	Mehkar	76.6058	20.091	Checkdam
287	Mehekar-Urban	Mehkar	76.5693	20.158	Checkdam
288	Mehekar-Urban	Mehkar	76.5828	20.1423	Checkdam
289	Mehekar-Urban	Mehkar	76.6012	20.1545	Checkdam
290	Mel Janori	Mehkar	76.654	20.3181	Checkdam
291	Mel Janori	Mehkar	76.6421	20.3233	Checkdam
292	Nagapur	Mehkar	76.6905	20.18	Checkdam

SN	Village	Taluka	X	Y	Structures
293	Nageshwadi (n.v.)	Mehkar	76.697	20.3353	Checkdam
294	Nageshwadi (n.v.)	Mehkar	76.6875	20.3431	Checkdam
295	Nimba	Mehkar	76.6063	20.3056	Checkdam
296	Pangarkhed	Mehkar	76.7592	20.2369	Checkdam
297	Partapur	Mehkar	76.5837	20.1314	Checkdam
298	Pimpri Mali	Mehkar	76.6	20.2009	Checkdam
299	Rajgad	Mehkar	76.7496	20.3021	Checkdam
300	Rajgad	Mehkar	76.7475	20.312	Checkdam
301	Rajgad	Mehkar	76.7452	20.3181	Checkdam
302	Ratnapur	Mehkar	76.627	20.2736	Checkdam
303	Sabra	Mehkar	76.5877	20.199	Checkdam
304	Sabra	Mehkar	76.5798	20.1966	Checkdam
305	Sabra	Mehkar	76.5702	20.1929	Checkdam
306	Sarangpur	Mehkar	76.544	20.1359	Checkdam
307	Shahapur	Mehkar	76.6312	20.1918	Checkdam
308	Shelgaon Deshmukh	Mehkar	76.7096	20.2382	Checkdam
309	Shelgaon Deshmukh	Mehkar	76.7045	20.2524	Checkdam
310	Shelgaon Deshmukh	Mehkar	76.748	20.2496	Checkdam
311	Shendla	Mehkar	76.6012	20.233	Checkdam
312	Shendla	Mehkar	76.6075	20.2278	Checkdam
313	Shendla	Mehkar	76.5954	20.2199	Checkdam
314	Sukali	Mehkar	76.5802	20.1196	Checkdam
315	Ukli	Mehkar	76.6268	20.1139	Checkdam
316	Warud	Mehkar	76.6803	20.2921	Checkdam
317	Advahir	MOTALA	76.2327	20.7049	Checkdam
318	Antri	MOTALA	76.1808	20.653	Checkdam
319	Avha Yunuspur	MOTALA	76.1066	20.7926	Checkdam
320	Avha Yunuspur	MOTALA	76.1032	20.7809	Checkdam
321	Borakhedi	MOTALA	76.1961	20.664	Checkdam
322	Dabha	MOTALA	76.0972	20.5724	Checkdam
323	Dabha	MOTALA	76.0996	20.5664	Checkdam
324	Dabha	MOTALA	76.1143	20.5686	Checkdam
325	Dhamangaon Deshmukh	MOTALA	76.3018	20.6496	Checkdam
326	Dhamangaon Deshmukh	MOTALA	76.2974	20.66	Checkdam
327	Didola Kh.	MOTALA	76.2189	20.7181	Checkdam
328	Gugali	MOTALA	76.0653	20.7153	Checkdam
329	Gulbheli	MOTALA	76.1199	20.6005	Checkdam
330	Hanwatkhed	MOTALA	76.0451	20.5647	Checkdam
331	Hanwatkhed	MOTALA	76.0284	20.5501	Checkdam
332	Hanwatkhed	MOTALA	76.1482	20.6849	Checkdam
333	Kajampur	MOTALA	76.2634	20.6157	Checkdam
334	Kalegaon pr rohinkhe	MOTALA	76.0933	20.6541	Checkdam
335	Khadki	MOTALA	76.1559	20.5614	Checkdam
336	Khadki	MOTALA	76.162	20.5692	Checkdam
337	Khairkhed	MOTALA	76.2194	20.5789	Checkdam
338	Khamkhed Pr.Rajur	MOTALA	76.1617	20.595	Checkdam
339	Khandwa	MOTALA	76.0388	20.6387	Checkdam
340	Khandwa	MOTALA	76.0391	20.6425	Checkdam
341	Khedi	MOTALA	76.0598	20.6209	Checkdam
342	Kolhi Gawali	MOTALA	76.0964	20.7565	Checkdam
343	Kolhi Gawali	MOTALA	76.0911	20.754	Checkdam
344	Korhala	MOTALA	76.0469	20.5955	Checkdam
345	Korhala	MOTALA	76.0435	20.6021	Checkdam
346	Korhala	MOTALA	76.0486	20.5919	Checkdam
347	Korhala	MOTALA	76.0614	20.6074	Checkdam
348	Kothali	MOTALA	76.2747	20.6379	Checkdam
349	Kurha	MOTALA	76.0667	20.5837	Checkdam
350	Lidhora Pr.Malkapur	MOTALA	76.1958	20.6851	Checkdam
351	Longhat	MOTALA	76.302	20.6071	Checkdam

SN	Village	Taluka	X	Y	Structures
352	Mohegaon	MOTALA	76.1943	20.5611	Checkdam
353	Motala-Urban	MOTALA	76.2175	20.681	Checkdam
354	Nalkund	MOTALA	76.0889	20.5489	Checkdam
355	Nalkund	MOTALA	76.0761	20.5525	Checkdam
356	Nalkund	MOTALA	76.0682	20.5491	Checkdam
357	Nimkhed	MOTALA	76.3069	20.6166	Checkdam
358	Nipana	MOTALA	76.1206	20.8145	Checkdam
359	Panhera khedi	MOTALA	76.0689	20.6445	Checkdam
360	Pimpalgaon	MOTALA	76.0126	20.7562	Checkdam
361	Pophali	MOTALA	76.1065	20.7305	Checkdam
362	Ridhora Khandopant	MOTALA	76.0607	20.7034	Checkdam
363	Ridhora Khandopant	MOTALA	76.0578	20.6992	Checkdam
364	Rohinkhed	MOTALA	76.0828	20.6214	Checkdam
365	Rohinkhed	MOTALA	76.1149	20.6322	Checkdam
366	Sahastramuli	MOTALA	76.2189	20.5907	Checkdam
367	Sahastramuli	MOTALA	76.2159	20.5889	Checkdam
368	Sinkhed	MOTALA	76.0244	20.7306	Checkdam
369	Sonbarad Pr. Malkapur	MOTALA	76.0136	20.7119	Checkdam
370	Takli Pr.Malkapur	MOTALA	76.0984	20.7675	Checkdam
371	Tapovan	MOTALA	76.0887	20.6625	Checkdam
372	Taroda	MOTALA	76.2588	20.6107	Checkdam
373	Taroda	MOTALA	76.2532	20.6067	Checkdam
374	Taroda	MOTALA	76.2607	20.6001	Checkdam
375	Taroda	MOTALA	76.2491	20.5997	Checkdam
376	Taroda	MOTALA	76.2457	20.5888	Checkdam
377	Wadgaon mahalungi	MOTALA	76.0126	20.7682	Checkdam
378	Wadgaon pr rohinkhed	MOTALA	76.1397	20.6618	Checkdam
379	Wadi	MOTALA	76.0912	20.7022	Checkdam
380	Warud	MOTALA	76.2286	20.6661	Checkdam
381	Warud	MOTALA	76.2409	20.6785	Checkdam
382	Barafgaon	NANDURA	76.4053	20.745	Checkdam
383	Bhilvadi	NANDURA	76.3712	20.8633	Checkdam
384	Chandur Biswa	NANDURA	76.3651	20.8685	Checkdam
385	Dahigaon	NANDURA	76.4146	20.8563	Checkdam
386	Dighi	NANDURA	76.3539	20.8606	Checkdam
387	Gondankhed	NANDURA	76.4202	20.8419	Checkdam
388	Gosing	NANDURA	76.3213	20.6905	Checkdam
389	Jawala Bazar	NANDURA	76.3185	20.7559	Checkdam
390	Khadatgaon	NANDURA	76.4267	20.7494	Checkdam
391	Khadatgaon	NANDURA	76.4113	20.7603	Checkdam
392	Khaira	NANDURA	76.3334	20.7197	Checkdam
393	Khaira	NANDURA	76.3213	20.7337	Checkdam
394	Khaira	NANDURA	76.3063	20.731	Checkdam
395	Khandala	NANDURA	76.3875	20.7891	Checkdam
396	Lonwadi Pr.Nandura	NANDURA	76.4109	20.7747	Checkdam
397	Lonwadi Pr.Nandura	NANDURA	76.409	20.7947	Checkdam
398	Mahalungi pr wadner	NANDURA	76.374	20.7515	Checkdam
399	Mahalungi pr wadner	NANDURA	76.3717	20.7625	Checkdam
400	Malegaon Pr.P.Raja	NANDURA	76.4249	20.7995	Checkdam
401	Mendhali	NANDURA	76.3185	20.776	Checkdam
402	Mendhali	NANDURA	76.3143	20.7686	Checkdam
403	Mominabad	NANDURA	76.3124	20.906	Checkdam
404	Muramba	NANDURA	76.4118	20.7293	Checkdam
405	Muramba	NANDURA	76.4095	20.7245	Checkdam
406	Phuli	NANDURA	76.3054	20.7066	Checkdam
407	Phuli	NANDURA	76.3199	20.7114	Checkdam
408	Pota	NANDURA	76.3511	20.7686	Checkdam
409	Pota	NANDURA	76.3455	20.7642	Checkdam
410	Potali	NANDURA	76.3703	20.793	Checkdam

SN	Village	Taluka	X	Y	Structures
411	Potali	NANDURA	76.3656	20.7982	Checkdam
412	Shelgaon Mukund	NANDURA	76.3936	20.7995	Checkdam
413	Sirsodi	NANDURA	76.3133	20.882	Checkdam
414	Tarwadi	NANDURA	76.3423	20.7446	Checkdam
415	Vitali	NANDURA	76.3012	20.8676	Checkdam
416	Wadi Pr.Malkapur	NANDURA	76.3707	20.7699	Checkdam
417	Wadi Pr.Malkapur	NANDURA	76.3623	20.7786	Checkdam
418	Wadner	NANDURA	76.3474	20.8393	Checkdam
419	Wadner	NANDURA	76.3399	20.8126	Checkdam
420	Alewadi	SANGRAMPUR	76.689	21.177	Checkdam
421	Ambabarwa	SANGRAMPUR	76.6423	21.2097	Checkdam
422	Chunkhedi	SANGRAMPUR	76.7272	21.2314	Checkdam
423	Chunkhedi	SANGRAMPUR	76.6969	21.1765	Checkdam
424	Chunkhedi	SANGRAMPUR	76.6848	21.2127	Checkdam
425	Chunkhedi	SANGRAMPUR	76.7039	21.2689	Checkdam
426	Chunkhedi	SANGRAMPUR	76.7216	21.2754	Checkdam
427	Chunkhedi	SANGRAMPUR	76.6974	21.2171	Checkdam
428	Chunkhedi	SANGRAMPUR	76.7025	21.2454	Checkdam
429	Chunkhedi	SANGRAMPUR	76.7114	21.2332	Checkdam
430	Chunkhedi	SANGRAMPUR	76.7081	21.2558	Checkdam
431	Chunkhedi	SANGRAMPUR	76.6764	21.2606	Checkdam
432	Chunkhedi	SANGRAMPUR	76.6698	21.2489	Checkdam
433	Chunkhedi	SANGRAMPUR	76.6558	21.2319	Checkdam
434	Chunkhedi	SANGRAMPUR	76.7305	21.265	Checkdam
435	Chunkhedi	SANGRAMPUR	76.7062	21.2053	Checkdam
436	Chunkhedi	SANGRAMPUR	76.7202	21.2184	Checkdam
437	Chunkhedi	SANGRAMPUR	76.6726	21.1779	Checkdam
438	Chunkhedi	SANGRAMPUR	76.7174	21.2654	Checkdam
439	Chunkhedi	SANGRAMPUR	76.7268	21.1979	Checkdam
440	Chunkhedi	SANGRAMPUR	76.7328	21.2105	Checkdam
441	Chunkhedi	SANGRAMPUR	76.6806	21.1996	Checkdam
442	Kamod	SANGRAMPUR	76.7585	21.1757	Checkdam
443	Kille Pimpaldol	SANGRAMPUR	76.6502	21.1822	Checkdam
444	Kille Pimpaldol	SANGRAMPUR	76.6586	21.1792	Checkdam
445	Kille Pimpaldol	SANGRAMPUR	76.6302	21.1691	Checkdam
446	Ladnapur	SANGRAMPUR	76.6736	21.1561	Checkdam
447	Rohin Khindki	SANGRAMPUR	76.7384	21.1988	Checkdam
448	Salwan	SANGRAMPUR	76.7548	21.1918	Checkdam
449	Salwan	SANGRAMPUR	76.737	21.2201	Checkdam
450	Salwan	SANGRAMPUR	76.759	21.1996	Checkdam
451	Saykhed	SANGRAMPUR	76.6983	21.1648	Checkdam
452	Saykhed	SANGRAMPUR	76.7109	21.167	Checkdam
453	Wasali	SANGRAMPUR	76.6549	21.1648	Checkdam
454	Wasali	SANGRAMPUR	76.6526	21.1487	Checkdam
455	Amsari	SHEGAON	76.492	20.7973	Checkdam
456	Gaigaon Bk.	SHEGAON	76.6535	20.7367	Checkdam
457	Jalamb	SHEGAON	76.5868	20.7838	Checkdam
458	Jalamb	SHEGAON	76.5905	20.8248	Checkdam
459	Jawala palaskhed	SHEGAON	76.7086	20.7245	Checkdam
460	Kherda	SHEGAON	76.6428	20.7908	Checkdam
461	Lanjud	SHEGAON	76.5378	20.8183	Checkdam
462	Lanjud	SHEGAON	76.521	20.8043	Checkdam
463	Lanjud	SHEGAON	76.5214	20.8231	Checkdam
464	Lanjud	SHEGAON	76.5121	20.7886	Checkdam
465	Lanjud	SHEGAON	76.5457	20.8052	Checkdam
466	Lasura Bk.	SHEGAON	76.647	20.7537	Checkdam
467	Pahurjira	SHEGAON	76.5499	20.7821	Checkdam
468	Sawarna	SHEGAON	76.6582	20.7651	Checkdam
469	Shegaon-Urban	SHEGAON	76.6638	20.7952	Checkdam

SN	Village	Taluka	X	Y	Structures
470	Shegaon-Urban	SHEGAON	76.7053	20.7917	Checkdam
471	Shegaon-Urban	SHEGAON	76.7104	20.8048	Checkdam
472	Shegaon-Urban	SHEGAON	76.6946	20.7734	Checkdam
473	Takali Hat	SHEGAON	76.625	20.7742	Checkdam
474	Tintrav	SHEGAON	76.6932	20.7075	Checkdam
475	Tivhan Bk.	SHEGAON	76.654	20.8174	Checkdam
476	Changefal	Sindkhed-Raja	76.3475	19.9128	Checkdam
477	Jambhora	Sindkhed-Raja	76.3024	19.9465	Checkdam
478	Kingaon Raja	Sindkhed-Raja	76.2452	20.0011	Checkdam
479	Rumhana	Sindkhed-Raja	76.3085	19.9316	Checkdam
480	Soyandeo	Sindkhed-Raja	76.3043	19.922	Checkdam
481	Tadshivni	Sindkhed-Raja	76.3024	19.967	Checkdam
482	Tandulwadi	Sindkhed-Raja	76.3271	19.9268	Checkdam

Annexure IX: Location of proposed recharge shaft in Buldhana district

SN	Village	Taluka	X	Y	Structures
1	Asalgaon	JALGAON (JAMOD)	76.4634	20.9963	Recharge Shaft
2	Asalgaon	JALGAON (JAMOD)	76.4641	21.018	Recharge Shaft
3	Bhendwad Bk.	JALGAON (JAMOD)	76.5597	20.9391	Recharge Shaft
4	Dhanora	JALGAON (JAMOD)	76.4673	21.0354	Recharge Shaft
5	Dhanora	JALGAON (JAMOD)	76.4673	21.0367	Recharge Shaft
6	Gadagaon Kh.	JALGAON (JAMOD)	76.504	20.9729	Recharge Shaft
7	Kajegaon	JALGAON (JAMOD)	76.5948	20.9833	Recharge Shaft
8	Khandvi	JALGAON (JAMOD)	76.4528	20.9698	Recharge Shaft
9	Khel Paraskar	JALGAON (JAMOD)	76.5881	21.0853	Recharge Shaft
10	Kherda Bk.	JALGAON (JAMOD)	76.5892	21.051	Recharge Shaft
11	Manegaon	JALGAON (JAMOD)	76.4494	20.9506	Recharge Shaft
12	Palaskhed	JALGAON (JAMOD)	76.5842	20.9724	Recharge Shaft
13	Satali	JALGAON (JAMOD)	76.4895	20.9401	Recharge Shaft
14	Sungaon	JALGAON (JAMOD)	76.5513	21.091	Recharge Shaft
15	Asalgaon	Jalgaon-Jamod	76.5046	20.9895	Recharge Shaft
16	Gadegaon Kh.	Jalgaon-Jamod	76.5165	20.972	Recharge Shaft
17	Jalgaon-Urban	Jalgaon-Jamod	76.5336	21.0586	Recharge Shaft
18	Kurangad Bk.	Jalgaon-Jamod	76.5419	20.97	Recharge Shaft
19	Nav kh.	Jalgaon-Jamod	76.4313	21.0273	Recharge Shaft
20	Nimbhora Kh.	Jalgaon-Jamod	76.5641	20.9478	Recharge Shaft
21	Pimpalgaon Kale	Jalgaon-Jamod	76.4374	20.9813	Recharge Shaft
22	Takli Khati	Jalgaon-Jamod	76.5212	21.0154	Recharge Shaft
23	Taroda Tulja	Jalgaon-Jamod	76.5659	21.0588	Recharge Shaft
24	Anurabad	MALKAPUR	76.2349	20.905	Recharge Shaft
25	Anurabad	MALKAPUR	76.2296	20.8949	Recharge Shaft
26	Balad Pr. Malkapur	MALKAPUR	76.2083	20.8509	Recharge Shaft
27	Gahukhed	MALKAPUR	76.2455	20.8307	Recharge Shaft
28	Ghirni	MALKAPUR	76.2349	20.842	Recharge Shaft
29	Harsoda	MALKAPUR	76.2809	20.9251	Recharge Shaft
30	Hingana Kazi	MALKAPUR	76.133	20.9114	Recharge Shaft
31	Hingana Nagpur	MALKAPUR	76.2614	20.9608	Recharge Shaft
32	Khamkhed Pr.malkapur	MALKAPUR	76.1234	20.8873	Recharge Shaft
33	Khaparkhed	MALKAPUR	76.2182	20.8669	Recharge Shaft
34	Zodga	MALKAPUR	76.2462	20.9297	Recharge Shaft
35	Zodga	MALKAPUR	76.2554	20.9408	Recharge Shaft
36	Zodga	MALKAPUR	76.2579	20.9511	Recharge Shaft
37	Zodga	MALKAPUR	76.2402	20.9203	Recharge Shaft
38	Belad Pr.jalgaon	NANDURA	76.4468	20.9078	Recharge Shaft
39	Chandur Biswa	NANDURA	76.3361	20.8811	Recharge Shaft
40	Isabpur	NANDURA	76.3952	20.8655	Recharge Shaft
41	Jigaon	NANDURA	76.3746	20.9147	Recharge Shaft
42	Jigaon	NANDURA	76.3743	20.9074	Recharge Shaft
43	Khumgaon	NANDURA	76.3838	20.8734	Recharge Shaft
44	Mamulwadi	NANDURA	76.3789	20.8955	Recharge Shaft
45	Modha	NANDURA	76.4359	20.8903	Recharge Shaft
46	Mominabad	NANDURA	76.3212	20.9149	Recharge Shaft
47	Nandura Kh.rural	NANDURA	76.4532	20.8159	Recharge Shaft
48	Narakhed	NANDURA	76.4995	20.8536	Recharge Shaft
49	Nimgaon	NANDURA	76.4684	20.8737	Recharge Shaft
50	Nimgaon	NANDURA	76.4797	20.8512	Recharge Shaft
51	Palsoda	NANDURA	76.3962	20.927	Recharge Shaft
52	Sawargaon Nehu	NANDURA	76.312	20.9278	Recharge Shaft
53	Wadi Pr.wadner	NANDURA	76.3828	20.8357	Recharge Shaft
54	Wadner	NANDURA	76.2993	20.8311	Recharge Shaft
55	Wadner	NANDURA	76.3145	20.8496	Recharge Shaft
56	Wadner	NANDURA	76.3297	20.8479	Recharge Shaft

SN	Village	Taluka	X	Y	Structures
57	Yerali	NANDURA	76.4567	20.9091	Recharge Shaft
58	Alewadi	SANGRAMPUR	76.6861	21.1504	Recharge Shaft
59	Banoda Eklara	SANGRAMPUR	76.719	21.0463	Recharge Shaft
60	Banoda Eklara	SANGRAMPUR	76.7201	21.0343	Recharge Shaft
61	Bawanbir	SANGRAMPUR	76.714	21.0812	Recharge Shaft
62	Bhon	SANGRAMPUR	76.6443	20.9313	Recharge Shaft
63	Bhon	SANGRAMPUR	76.6538	20.9427	Recharge Shaft
64	Bodkha	SANGRAMPUR	76.6717	20.9989	Recharge Shaft
65	Bodkha	SANGRAMPUR	76.66	20.9875	Recharge Shaft
66	Chondi	SANGRAMPUR	76.6377	20.9792	Recharge Shaft
67	Dhamangaon	SANGRAMPUR	76.6505	21.0322	Recharge Shaft
68	Kakanwada Kh.	SANGRAMPUR	76.7491	21.0385	Recharge Shaft
69	Kakoda	SANGRAMPUR	76.6483	20.9682	Recharge Shaft
70	Kathargaon	SANGRAMPUR	76.6928	21.0026	Recharge Shaft
71	Kavthal	SANGRAMPUR	76.6287	20.9245	Recharge Shaft
72	Khalad Bk.	SANGRAMPUR	76.7441	21.0661	Recharge Shaft
73	Khel Dalavi Paturda	SANGRAMPUR	76.733	20.9329	Recharge Shaft
74	Khel Thorat Paturda	SANGRAMPUR	76.7291	20.9537	Recharge Shaft
75	Khiroda	SANGRAMPUR	76.6984	20.9277	Recharge Shaft
76	Kolad	SANGRAMPUR	76.7569	21.0588	Recharge Shaft
77	Ladnapur	SANGRAMPUR	76.6683	21.1217	Recharge Shaft
78	Ladnapur	SANGRAMPUR	76.6717	21.0905	Recharge Shaft
79	Ladnapur	SANGRAMPUR	76.6483	21.0994	Recharge Shaft
80	Ladnapur	SANGRAMPUR	76.67	21.1056	Recharge Shaft
81	Lohagaon Bk.	SANGRAMPUR	76.6494	21.0822	Recharge Shaft
82	Marod	SANGRAMPUR	76.6438	21.0692	Recharge Shaft
83	Mominabad	SANGRAMPUR	76.7525	21.0187	Recharge Shaft
84	Nirod	SANGRAMPUR	76.6527	20.9984	Recharge Shaft
85	Paturda Kh.	SANGRAMPUR	76.7558	20.9433	Recharge Shaft
86	Paturda Kh.	SANGRAMPUR	76.7692	20.962	Recharge Shaft
87	Paturda Kh.	SANGRAMPUR	76.7508	20.9584	Recharge Shaft
88	Pesoda	SANGRAMPUR	76.5992	20.9427	Recharge Shaft
89	Pingli Kh.	SANGRAMPUR	76.7458	21.1452	Recharge Shaft
90	Pingli Kh.	SANGRAMPUR	76.7748	21.142	Recharge Shaft
91	Rajpur	SANGRAMPUR	76.6237	21.0541	Recharge Shaft
92	Ringanwadi	SANGRAMPUR	76.7213	21.012	Recharge Shaft
93	Sagoda	SANGRAMPUR	76.7709	21.1139	Recharge Shaft
94	Sawala	SANGRAMPUR	76.6248	21.0395	Recharge Shaft
95	Sawala	SANGRAMPUR	76.6371	21.0447	Recharge Shaft
96	Sawali	SANGRAMPUR	76.6678	20.9438	Recharge Shaft
97	Sawali	SANGRAMPUR	76.6789	20.9396	Recharge Shaft
98	Saykhed	SANGRAMPUR	76.7079	21.1389	Recharge Shaft
99	Saykhed	SANGRAMPUR	76.6845	21.1394	Recharge Shaft
100	Sonala	SANGRAMPUR	76.7541	21.1275	Recharge Shaft
101	Sonala	SANGRAMPUR	76.7179	21.1046	Recharge Shaft
102	Sonala	SANGRAMPUR	76.7475	21.0884	Recharge Shaft
103	Sonala	SANGRAMPUR	76.7486	21.1067	Recharge Shaft
104	Takali Panchgavhan	SANGRAMPUR	76.7692	20.9266	Recharge Shaft
105	Takleshwar	SANGRAMPUR	76.6304	20.9552	Recharge Shaft
106	Umara	SANGRAMPUR	76.6962	21.0577	Recharge Shaft
107	Wankhed	SANGRAMPUR	76.738	20.9865	Recharge Shaft
108	Wankhed	SANGRAMPUR	76.7525	21.0068	Recharge Shaft
109	Wankhed	SANGRAMPUR	76.7658	20.9813	Recharge Shaft
110	Wankhed	SANGRAMPUR	76.738	20.9708	Recharge Shaft
111	Warwat Bakal	SANGRAMPUR	76.7112	21.027	Recharge Shaft
112	Warwat Khanderao	SANGRAMPUR	76.6856	20.9506	Recharge Shaft
113	Wasali	SANGRAMPUR	76.6494	21.1238	Recharge Shaft
114	Wasali	SANGRAMPUR	76.6561	21.1337	Recharge Shaft
115	Wastagaon	SANGRAMPUR	76.6806	20.9745	Recharge Shaft

SN	Village	Taluka	X	Y	Structures
116	Zashi	SANGRAMPUR	76.6611	21.0494	Recharge Shaft
117	Zashi	SANGRAMPUR	76.7881	21.0068	Recharge Shaft
118	Adsul	SHEGAON	76.708	20.864	Recharge Shaft
119	Bhastan	SHEGAON	76.5636	20.8941	Recharge Shaft
120	Bhongaon	SHEGAON	76.6174	20.8785	Recharge Shaft
121	Bhongaon	SHEGAON	76.5958	20.8808	Recharge Shaft
122	Bhongaon	SHEGAON	76.6029	20.8719	Recharge Shaft
123	Bhongaon	SHEGAON	76.6071	20.8769	Recharge Shaft
124	Bhota	SHEGAON	76.5045	20.9182	Recharge Shaft
125	Bhota	SHEGAON	76.5087	20.9113	Recharge Shaft
126	Chinchkhed	SHEGAON	76.5838	20.8894	Recharge Shaft
127	Chinchkhed	SHEGAON	76.5724	20.8936	Recharge Shaft
128	Dolarkhed	SHEGAON	76.5363	20.884	Recharge Shaft
129	Dondwada	SHEGAON	76.5363	20.8615	Recharge Shaft
130	Dondwada	SHEGAON	76.5303	20.8648	Recharge Shaft
131	Golegaon Bk.	SHEGAON	76.6903	20.8703	Recharge Shaft
132	Hingna Bhota	SHEGAON	76.5197	20.9037	Recharge Shaft
133	Janori	SHEGAON	76.6499	20.8559	Recharge Shaft
134	Kalkhed	SHEGAON	76.6584	20.8605	Recharge Shaft
135	Kalkhed	SHEGAON	76.6765	20.8714	Recharge Shaft
136	Kalwad	SHEGAON	76.525	20.8937	Recharge Shaft
137	Kalwad	SHEGAON	76.5339	20.9012	Recharge Shaft
138	Kathora	SHEGAON	76.5378	20.8937	Recharge Shaft
139	Kathora	SHEGAON	76.5498	20.8967	Recharge Shaft
140	Manegaon	SHEGAON	76.7285	20.8438	Recharge Shaft
141	Manegaon	SHEGAON	76.7341	20.8349	Recharge Shaft
142	Matargaon Bk.	SHEGAON	76.5487	20.8593	Recharge Shaft
143	Matargaon Bk.	SHEGAON	76.5629	20.8507	Recharge Shaft
144	Matargaon Bk.	SHEGAON	76.5487	20.8703	Recharge Shaft
145	Matargaon Bk.	SHEGAON	76.5427	20.8532	Recharge Shaft
146	Matargaon Kh.	SHEGAON	76.5395	20.8354	Recharge Shaft
147	Pahurpurna	SHEGAON	76.6666	20.8775	Recharge Shaft
148	Pahurpurna	SHEGAON	76.6627	20.9123	Recharge Shaft
149	Roti	SHEGAON	76.4957	20.9189	Recharge Shaft
150	Roti	SHEGAON	76.4957	20.9189	Recharge Shaft
151	SHEGAON	SHEGAON	76.7119	20.8266	Recharge Shaft
152	Taroda Tarodi	SHEGAON	76.6032	20.863	Recharge Shaft
153	Taroda Tarodi	SHEGAON	76.611	20.8494	Recharge Shaft
154	Taroda Tarodi	SHEGAON	76.616	20.8696	Recharge Shaft
155	Yeulkhed	SHEGAON	76.6421	20.8762	Recharge Shaft
156	Yeulkhed	SHEGAON	76.6506	20.8673	Recharge Shaft
157	Zadegaon	SHEGAON	76.7108	20.8464	Recharge Shaft
158	Zadegaon	SHEGAON	76.7161	20.8567	Recharge Shaft