



केंद्रीय भूमि जल बोर्ड

जल संसाधन, नदी विकास और गंगा संरक्षण मंत्रालय

भारत सरकार

Central Ground Water Board

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

Report

on

AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN

**Ambegaon, Baramati, Indapur, Jannar and
Purandar Taluka**

Pune District, Maharashtra

मध्यक्षेत्र, नागपुर
Central Region, Nagpur

AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, AMBEGAON, BARAMATI, INDAPUR, JANNAR AND PURANDAR BLOCKS, PUNE DISTRICT, MAHARASHTRA

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PUNE DISTRICT AT A GLANCE

1. GENERAL INFORMATION			
	Geographical Area	:	15642 sq. km
	Administrative Divisions (As on 31/03/2012)	:	Taluka- 14; Pune City, Haveli, Khed, Ambegaon, Junnar, Shirur, Daund, Indapur, Baramati, Purandhar, Bhor, Velhe, Mulsi and Maval
	Towns / Villages /Grampanchayat	:	19 / 1877 / 1407
	Population (Census, 2011)	:	94,29,408
	Average Annual Rainfall	:	468mm to 4659 mm
2. GEOMORPHOLOGY			
	Major Physiographic unit	:	Western Ghats, Foot Hills, Central Plateau and Eastern Plains
	Major Drainage	:	Krishna River Basin (Bhima-Ghod, Mula-Mutha & Nira)
3. LAND USE (2010-11)			
	Forest Area	:	1846.10 sq. km.
	Net Area Sown	:	9920 sq. km.
	Cultivable Area	:	10576 sq. km.
4. SOIL TYPE			
	Medium to deep black soil and deep brown to red soil (Regur).		
5. PRINCIPAL CROPS (2010-11)			
	Sugarcane	:	660 sq. km.
	Cereals	:	7430 sq. km.
	Oil Seeds	:	710 sq. km.
	Pulses	:	930 sq. km.
6. IRRIGATION BY DIFFERENT SOURCES (2006-07)			
	Structure	Nos.	Potential Created (ha)
	Dugwells	:	129745 145550
	Tubewells/Borewells	:	7986
	Surface Flow Schemes	:	11907
	Lift Irrigation Schemes	:	1954
	Net Irrigated Area	:	3,20,00 ha
7. GROUND WATER MONITORING WELLS (As on 31/05/2018)			
	Dugwells	:	42
	Piezometers	:	1
8. GEOLOGY			
	Upper Cretaceous-Lower Eocene	:	Basalt (Deccan Traps)
9. HYDROGEOLOGY			
	Water Bearing Formation	:	Basalt- Weathered/fractured/ jointed vesicular/massive, under phreatic and semi-confined to confined conditions. Alluvium- Sand and Gravel, under semi-confined to confined conditions.
	Pre-monsoon Depth to Water Level	:	0.90 to30.35 m bgl

	(May-2017)		
	Post-monsoon Depth to Water Level (Nov.-2017)	:	Ground level to 25.2 m bgl
	Pre-monsoon Water Level Trend (2008-201)	:	Rise: 0.0001 to 0.750 m/year Fall: 0.0116 to 0.42 m/year
	Post-monsoon Water Level Trend (2008-2017)	:	Rise: 0.0012 to 1.588 m/year Fall: 0.0028 to 0.6992 m/year
10. GROUND WATER EXPLORATION (2017)			
	Wells Drilled	:	EW-87, OW-39
	Depth Range	:	2.5 to 201.30 m bgl
	Discharge	:	Negligible to 30.62 lps
11. GROUND WATER QUALITY			
	Good and suitable for drinking and irrigation purposes. However localized Nitrate Contamination is observed.		
	Type of Water	:	Basalt- Ca-HCO ₃ and Ca-Cl
12. DYNAMIC GROUND WATER RESOURCES (2013)			
	Net Annual GW availability	:	1740.09 MCM
	Total Draft (Irrigation + Domestic)	:	1285.39 MCM
	Net GW availability for future irrigation	:	442.34 MCM
	Stage of GW Development	:	73.87%
13. AWARENESS AND TRAINING ACTIVITY			
A	Mass Awareness Programme	:	Yet to be taken up
B	Water Management Training Programme	:	1
C	Training programme on aquifer management	:	1
14. ARTIFICIAL RECHARGE & RAINWATER HARVESTING			
	Projects completed	:	Nil
	Projects under technical guidance	:	Nil
15. GROUND WATER CONTROL & REGULATION			
	Over-Exploited Taluka	:	Nil
	Semi-Critical Taluka	:	Baramati and Purandar
	Notified Taluka	:	Nil
16. MAJOR GROUND WATER PROBLEMS AND ISSUES			
	<p>About 50 % area of Pune district is falling under 'Rain Shadow' zone. Long term rain fall data analysis reveals that eastern, southern, south-eastern, central and north-central part area of district around Indapur, Baramati, Jujuri, Daund, Talegaon, Dhamdhare, Alandi, Shirur and Bhor covering about 50% geographical area experiences drought conditions. Therefore, these areas are classified as Drought Prone Areas. Decadal pre-monsoon water level trend (2008-17) reveals that by and large, during pre-monsoon periods 65 % of the area and during post monsoon period, 68 % of the area is showing fall in water levels. Falling trend of water level is observed in major parts of Pune City, Haveli, Khed, Junnar, Daund, Indapur, Baramati, Purandhar, Bhor, Velhe, Mulsi and Maval Talukas of the district.</p>		

AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, AMBEGAON, BARAMATI, INDAPUR, JANNAR AND PURANDAR BLOCKS, PUNE DISTRICT, MAHARASHTRA

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AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, AMBEGAON, BARAMATI, INDAPUR, JANNAR AND PURANDAR BLOCKS, PUNE DISTRICT, MAHARASHTRA

1.0 Introduction

1.1 About the area

Pune is the second largest district of Maharashtra State in respect of area. The district has a geographical area of 15642 sq. km., which is 5.08% of the total area of State. It is situated in the western part of the State and lies between north latitude 17°54' and 19°24' and east longitudes 73°29' and 75°10' and falls in parts of Survey of India degree sheets 47-E, 47-F, 47-I, 47-J, 47-K, 47-N and 47-O. It is bounded by Ahmadnagar district in the north and east, Satara and Solapur districts in south and south east respectively and Thane and Raigarh districts in North West and west respectively. For administrative convenience it is divided in 14 talukas namely Pune City, Haveli, Khed, Ambegaon, Junnar, Shirur, Daund, Indapur, Baramati, Purandhar, Bhor, Velhe, Mulsi and Maval.

The district headquarters is located at Pune City. The population of the district is 94, 29,408 as per 2011 census with density of 603 persons/sq.km. There are 19 towns and 1877 villages in the district, out of which 18 villages are not habited. The district has 13 Panchayat Samitis, 11 Nagar Parishads, 2 Municipal Corporation and 1407 Gram Panchayats. National Highway No.4 (Mumbai-Bangalore, National Highway No.9 (Pune-Solapur- Hyderabad) and National Highway No. 50 (Pune-Nashik) passes through the district. Also, Mumbai - Pune Expressway connects Mumbai and Pune, pass through the Khandala and Lonavala. The urban areas of Pune District are well-connected to a major Indian cities like Mumbai, Bhusaval, Howrah, Patna, Nizamabad, Manmad, Delhi and Jammu via a dense railway network. Pune railway division is one of the five railway divisions of Central Railway (India) Zone of Indian Railways.

As per land use details (2014-15), the forest cover area of the district is 1846.10 sq.km, which is about 11.43% of total geographic area of the district. The gross cultivable area of district is 10576 sq. km whereas net sown area is 9920 sq.km (2010-11).

Since 1964, Central Ground Water Board has taken up several studies in the district. Keeping in view the current demand and supply and futuristic requirement of water, Central Ground Water Board has initiated the National Aquifer Mapping Programme (NAQUIM) in country during XII five-year plan, with a priority to study Over-exploited, Critical and Semi-Critical talukas. Hence, Pune district has been taken up to carry out detailed hydrogeological investigations in the year 2016-17. Pune district is categorized as safe as per Ground Water Resources Estimation as on March 2013. Two Talukas namely Baramati and Purandhar are categorized as "Semi-Critical" where stage of ground water development is computed as 95.37% and 92.10 % respectively, while rest of the Talukas are categorized as "Safe". The Administrative and Index map of the study area is presented in **Fig.1.1 a & 1.1b**.

Ground water exploratory drilling in the district has been taken up in different phases since 1994. 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 14 exploratory wells and 5 observation wells have been constructed during 2015-16 and 7 exploratory wells and 3 observation wells have been constructed during 2017-18. A total of 88 EW, 40 OW and 3 Piezometers have been constructed till March 2018. Salient Features of Ground Water Exploration are given in **Annexure – I**.



Fig 1.1a: Index map, Pune District

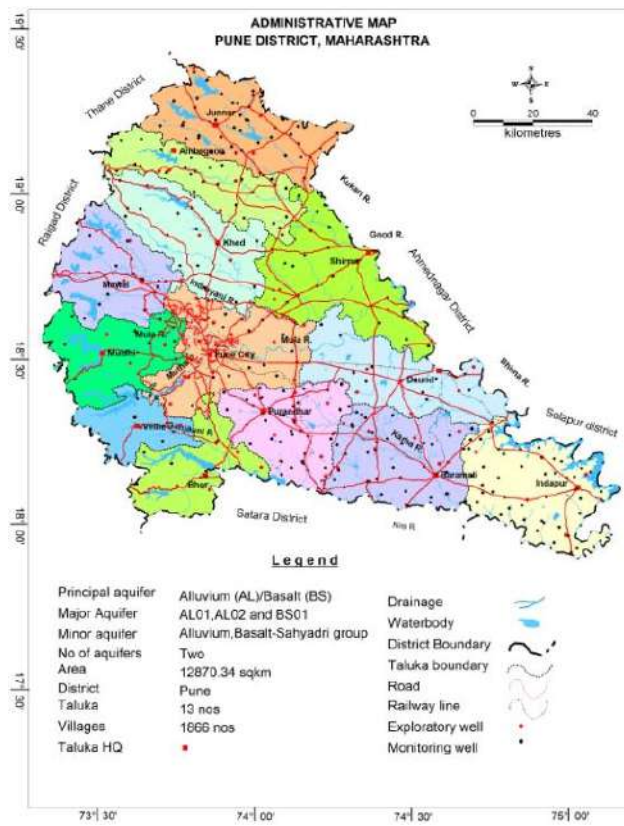


Fig 1.1b: Administrative map, Pune District

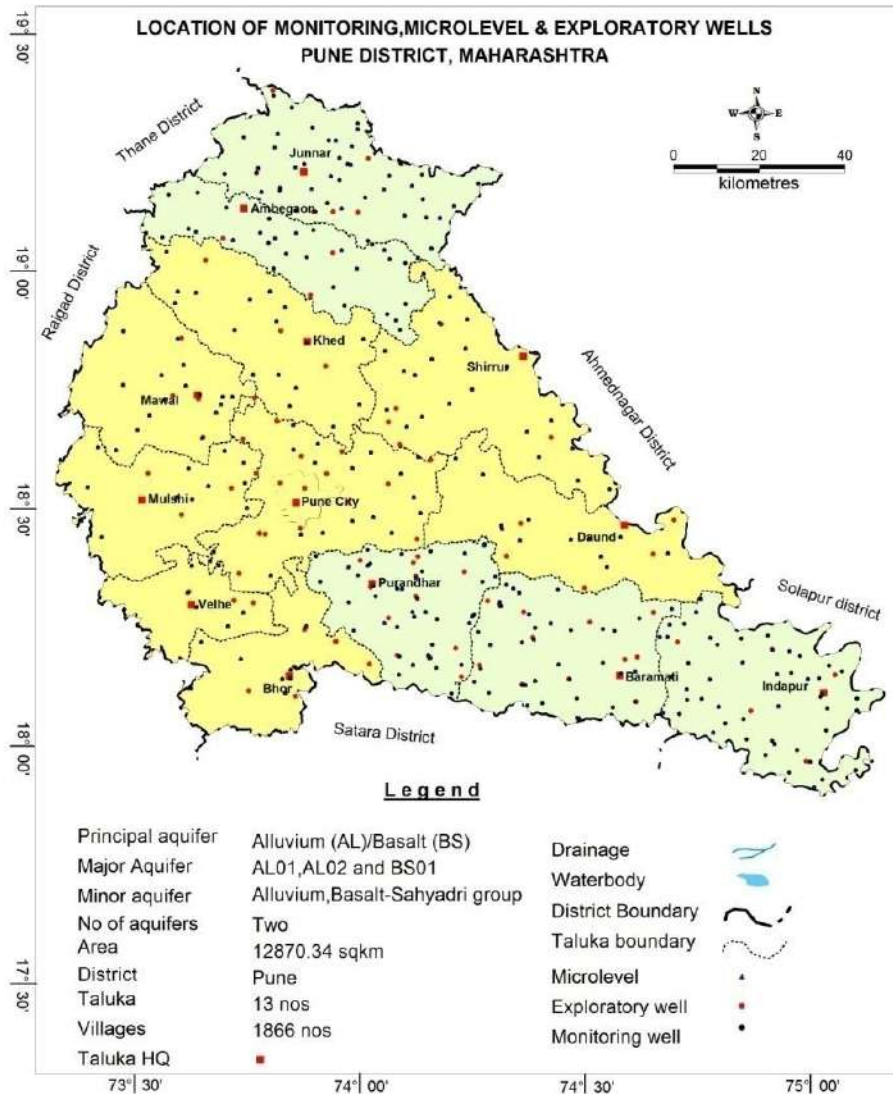


Fig 1.2: Locations of Existing Exploratory wells and Ground Water Monitoring Wells

1.2 Physiography, Drainage and Soil Types

The district forms part of Western Ghat and Deccan Plateau. Physiographically the district can be divided in to four major characteristic land forms (**Figure 1.3**) namely; (1) the hills and Ghats - Pune stands on the leeward side of the Western Ghats. The western belt stretching from 16 to 31 km east of Sahayadri is an extremely rugged country cut by deep valleys, divided and crossed by hill ranges. (2) The foot hills or the region of denudational origin with a series of small hills stretch in to valleys and large spurs from Plateaux (3) The Plateau or High Level Plateau (>900 mamsl) and Middle Level Plateau (600-900 mamsl)- the central belt extending for about 30 km east of western belt across the tract whose eastern belt is roughly marked by a line drawn from Pabal in the north to south up to Purandhar through Pune and the eastern belt with a rolling topography and low hills sinking slowly in to the plains with relatively broader valleys and (4) The Plains or Older Flood Plain (513-560 mamsl), The western part of the area is occupied by hills, the central part by hillocks and the eastern part by nearly plain terrain with few isolated mounds, dissected by valleys of Karha River and other tributaries of Nira River. The heights of the hillocks vary between 100 to 150 m above the ground level. The minimum elevation in the area is 516 m above mean sea level and the maximum being 1403 m above m.s.l. (Torna, Velhe taluka).

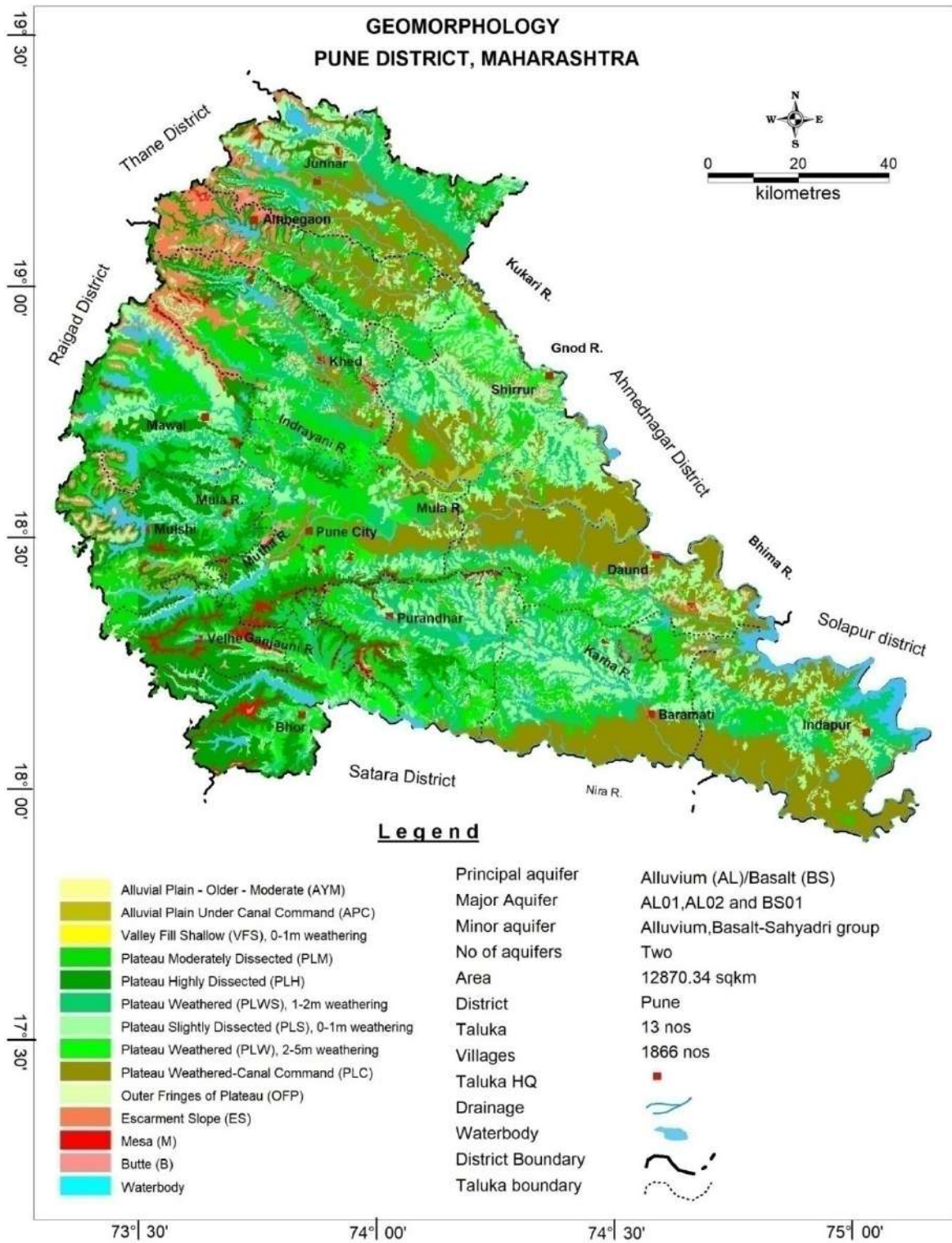


Fig 1.3: Geomorphology, Pune district

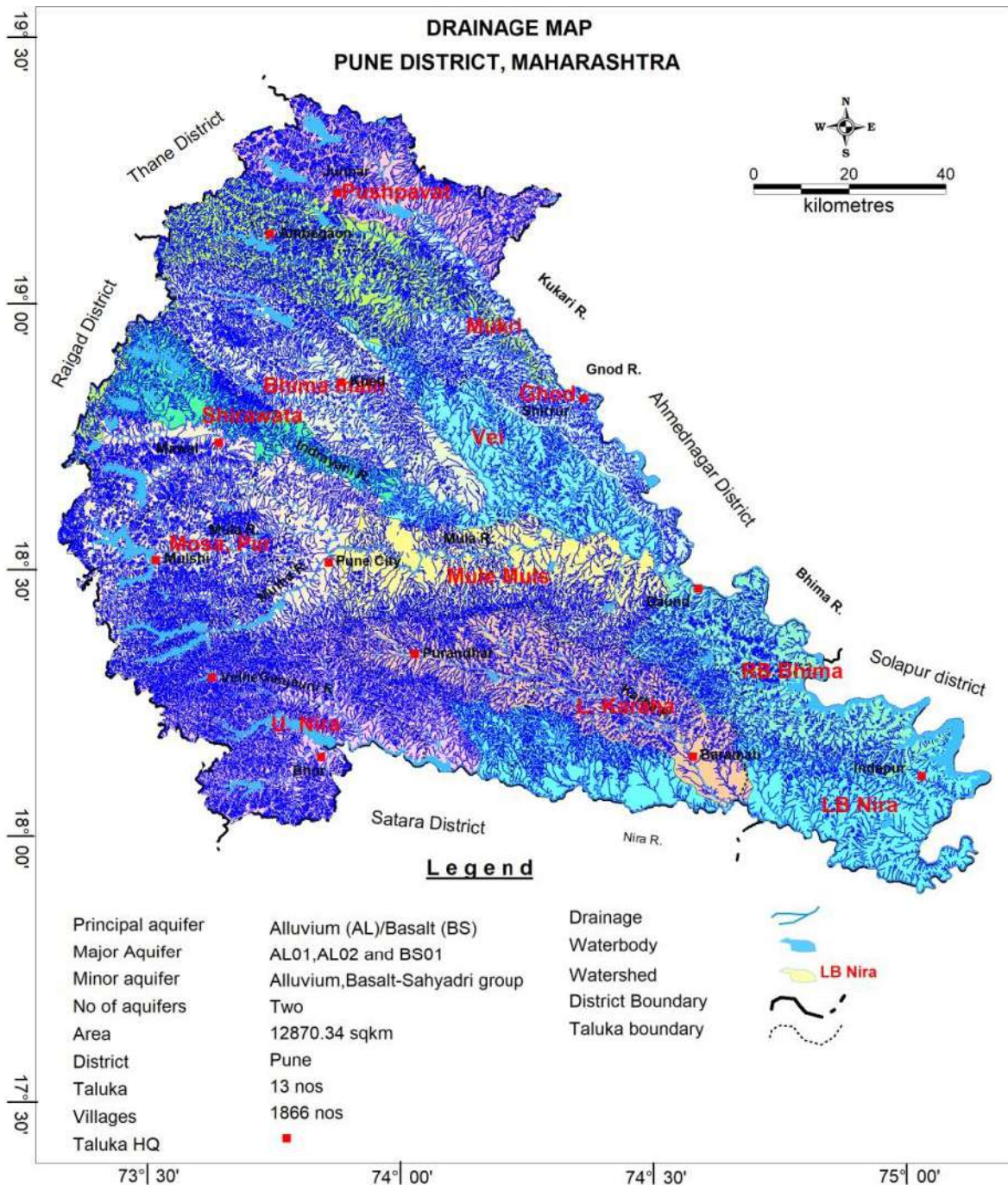


Fig 1.4: Drainage, Pune District

The district comes under Krishna River Basin and is drained by River Bhima and its tributaries (**Figure 1.4**). Bhima, the main tributary of Krishna rises in the Sahyadri mountains (Bhima Shankar Hill) in the district and flows east. The tributaries of Bhima are Pushpavati, Krushnavati, Kukadi river, Meena, Ghod River, Bhama, Andhra, Indrayani river, Pavna River, Mula river, Mutha river, Ambi, Mose, Shivganga, Kanandi, Gunjavni, Welvandi river, Nira river, Karha river, and Velu. The district has three major drainage systems namely (i) The Bhima-Ghod River System in northern, north-eastern and eastern part, of which Bhima River has a total length of about 355 km and Ghod river has a drainage of about 196 km. (ii) Mula-Mutha River System covering the central part and having total length of 242 km in the district. (iii) Nira River system covering south, south-east and eastern part and has total length of about 231 km in the district. At least one river flows through each taluka. All the rivers mostly have semi-dendritic drainage pattern and the drainage density is quite high. These rivers are flooded in the rainy season and are dry in the summer season.

Based on geomorphological setting and drainage pattern the district is divided into 71 watersheds.

The soils of Pune district are the product of weathering of basalts controlled by climate. In general they are clayey loam in texture and fairly high in calcium carbonate, high porosity but moderate to low permeability, thus having low to moderate infiltration capacity. Based on physical characteristics the soils of the area have been classified into three major groups: Medium black soil, Red Sandy soils and Shallow black soils. The black soil in layers of several feet deep is found in eastern parts, i.e. Khed, Shirur, Daund, and Purandar talukas and the whole of Baramati and Indapur Talukas. This soil is suitable for Rabi crops such as wheat, gram, jowar, and sugarcane, as it retains moisture for a long time. The brown soil is shallower and coarser than black soil and is found in western parts, i.e. Shirur, Daund, and Purandar Talukas. The red soil is found in Junnar and Ambegaon Talukas and small part of Khed Taluka. Bajara, groundnut and chilies are grown in this soil. Soil suitable for paddy is available in Maval, Mulsi, Bhore, Velhe and western parts of Khed, Ambegaon and Junnar Talukas.

1.3 Climate and Rainfall

The climate of Pune district is characterized by hot tropical climate with moderate summer, mild winter season and general dryness throughout the year except during the south-west monsoon season, i.e., June to September. Temperature varies from 6.8 degree centigrade as minimum to 40 degrees centigrade. As per Agro-climatic Zones of the Agriculture Department, major part of Pune district falls under 'Assured Rainfall Zone'. The average rainfall is about 1000 mm. The drought prone areas in the extreme east receive rainfall of 500 to 600 mm. Taluka falling in the highest rainfall intensity zone (rainfall >1000 mm) are Velhe, Mulshi and Maval (**Figure 1.5**). Physiography of this area shows a hilly and undulating terrain, with altitude ranging between 100 and 500 m above MSL. Taluka falling in the moderate rainfall intensity zone (rainfall between 500 and 1000 mm) is Bhore, Ambegaon, Junnar, Khed, Haveli, Pune city and Purandar. Talukas with the lowest rainfall intensity, the dry and semi-arid zone (rainfall < 500 mm) are Shirur, Daund, Indapur and Baramati. The decline in the amount of rainfall towards the East is due to the Sahyadrian mountainous zone, which creates a rain shadow region hardly 100 km east of the divide. The Average annual rainfall (2007-2017) of the district is 959.63 mm spread over 30 to 90 rainy days. Long term rainfall analysis (1901-2015) and annual rainfall data of last ten years is given in **Table 1.1 and 1.2**.

- I. Based on long term rainfall analysis it is observed that:
- II. The normal annual rainfall in the district varies between 477.4 mm in Daund taluka and 2531.8 mm in Velhe taluka.
- III. The coefficient of variation of the annual rainfall from the normal rainfall has been observed between 28% and 58%.
- IV. The percentage of probability of receiving excess rainfall varies from 15 % at Maval taluka to 23 % at Baramati taluka.

Table 1.1: Long-term rainfall analysis

Taluka	Period	No of Years	Normal Rainfall	Std. Deviation	Coefficient of Variation	Rainfall Trend / Slope (mm/year)	Departures - Number of Years (% of Total Years)						
							Positive	Negative	Droughts			Normal & Excess R/F	
									Moderate	Severe	Acute	Normal	Excess
Ambegaon	1998 - 2017	20	794 mm	230 mm	29 %	3.499 mm/year	11 (55%)	9 (45%)	3 (15%)	1 (5%)	0 (0%)	12 (60%)	4 (20%)
Baramati	1901 - 2017	110	494.9 mm	170 mm	34 %	0.949 mm/year	49 (45%)	61 (55%)	20 (18%)	4(4%)	1(10%)	60 (54%)	25 (23%)
Bhore	1901 - 2017	104	1072 mm	302 mm	28 %	4.478 mm/year	44 (42%)	60 (58%)	16 (15%)	2(2%)	0 (0%)	66 (64%)	20 (19%)
Daund	1901 - 2017	111	477.4 mm	230 mm	29 %	149 mm/year	53 (48%)	58 (52%)	25 (23%)	3(3%)	0 (0%)	60 (53%)	23 (21%)
Haveli	1998 - 2017	20	762.2 mm	304 mm	40 %	17.081 mm/year	10 (50%)	10 (50%)	7 (35%)	1 (5%)	1 (1%)	48 (54%)	19 (21%)

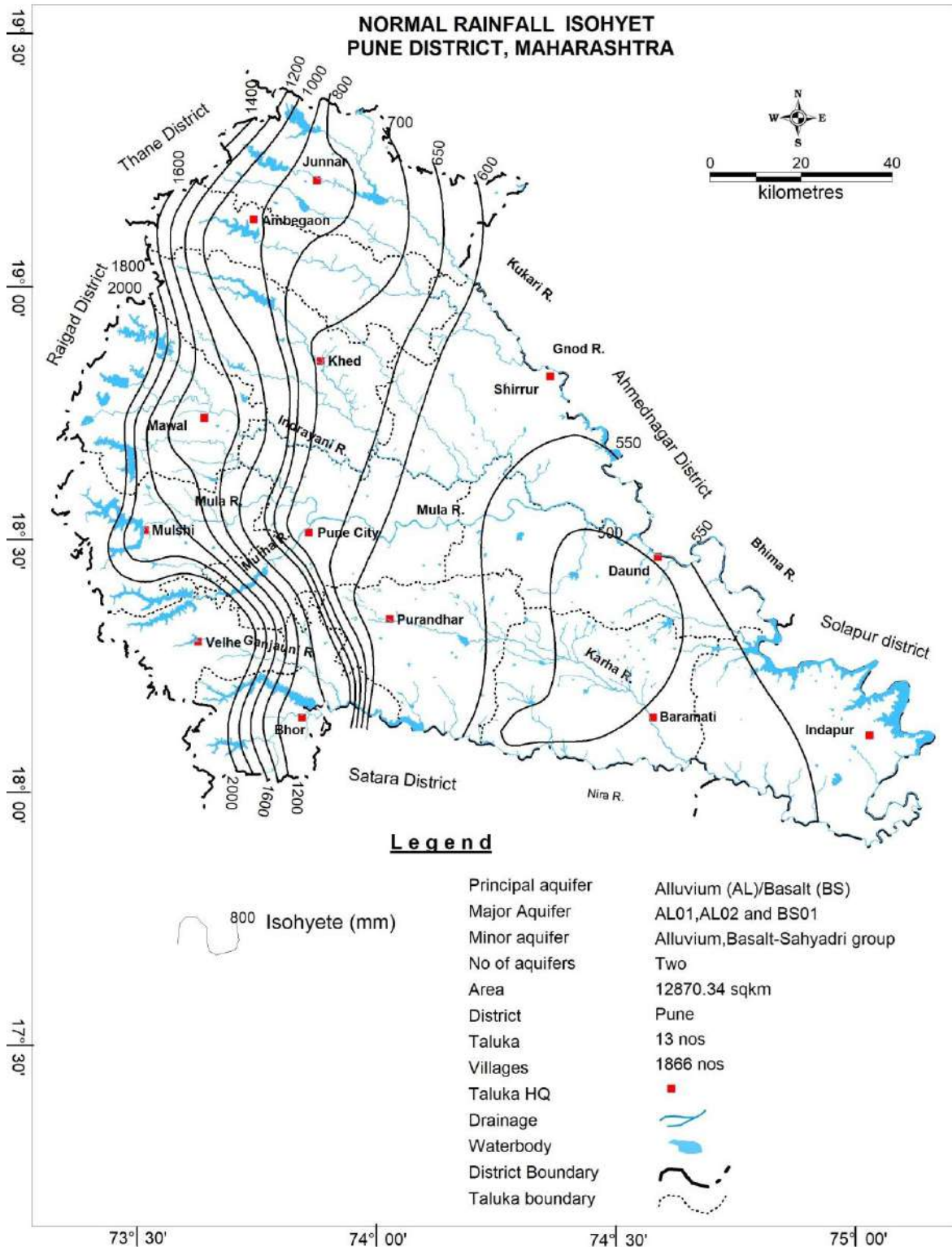


Fig 1.5: Average Annual Rainfall

1.4 Geology

Geologically, the area is divided into following two parts i.e., Deccan Trap and Older Alluvium formation. The generalized geological sequence occurring in the Basin is given in **Table 1.3**.

Table 1.3: Generalized Geological sequence, Pune district

Age	Group	Sub-groups	Formation	Thickness in meters	Lithology
Quaternary (Recent to Sub-Recent) (> 1 million years)			Alluvium		Sand, silt and clay.
Upper Cretaceous to Eocene (30-60 million years)	North Sahyadri	Diveghat	Purandargad	300	Deccan Trap basalt with inter- trappeans. : Simple flows, aphyric to plagioclase microphyric
			Diveghat	350	Deccan Trap basalt with inter- trappeans. : Simple/ Aa flows, aphyric
		Lonavala	Karla	250	Deccan Trap basalt with inter- trappeans. : Fine grained, aphyric, pahoehoe flows
			Indrayani	125	Deccan Trap basalt with inter- trappeans. :a thick succession of 'Aa' flows - Aphyric to sparsely phyric flows
		Kalsubai	Upper and Lower Ratangarh	250	Deccan Trap basalt : compound pahoehoe flows Megacryst lava flow

1.4.1 Alluvium:

Alluvium, belonging to the Quaternary period forms a very productive aquifer in the district. The alluvial deposits are restricted as narrow belts along the banks of major river courses like Bhima and their tributaries. The alluvium occurs in patches in paleo depressions. These shallow alluvium deposits comprise of loose or semi-consolidated medium to coarse grained sands, gravels, fine silt with admixture of clays resting directly on the massive, weathered or amygdaloidal zones of the basaltic lava flows.

1.4.2 Deccan Trap Basalt:

Almost the entire district is underlain by Deccan Volcanic Basalts belonging to Sahyadri Group of Upper Cretaceous to Eocene age, comprises of various lava flows, which can be classified in the field into two types as simple and compound flows. The compound flows occur at lower elevations whereas the simple flows are confined to the elevation above 680 m. The compound flows although vesicular and amygdaloidal in nature, hard and compact in their middle sections. They are fractured and jointed, and show moderate degree of weathering at places. Each individual lava flow consists of lower massive part becoming vesicular /amygdaloidal towards top, ranges in their individual thickness from a few centimeters to tens of meters. The flows have wide variation in colour and texture especially when they are amygdaloidal in nature with secondary mineral infillings such as Zeolites, calcite, and Agate and Chalcedony etc. The red /green/black bole beds constituting the marker horizons separating the two flows were discontinuous and generally inconsistent. The basalts are intruded by dykes and are found commonly in pahoehoe flows in the area. The dykes vary in thickness from one or two meters to as much as 10 meters and extend for long distances. The dykes display the joints parallel to the walls, at right angle to the walls besides horizontal ones, with chilled margins. The dykes act as barrier or as water conduits / pathways for the movement of

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

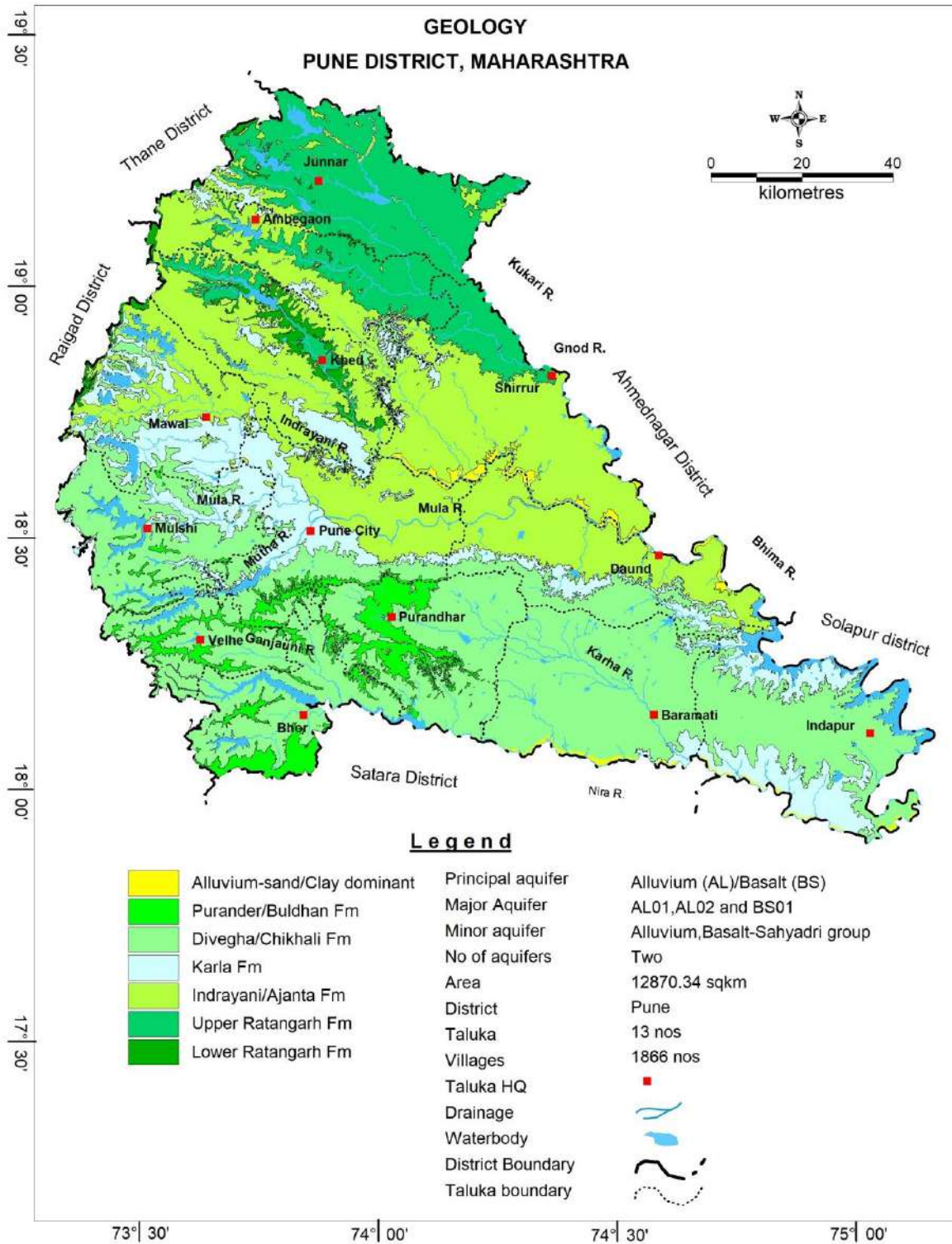


Fig 1.5: Geological Map

The oldest Lower Ratangarh Formation comprising of two compound pahoehoe flows is restricted to the western boundary of the district while the Upper Ratangarh Formation consisting only of compound pahoehoe flows is restricted to the northwestern parts of Ghod valley and in the central part in the Bhima valley.

Indrayani Formation is characterized by the presence of compact, massive, porphyritic

basalt. The phenocrysts are embedded in fine-grained groundmass. This formation is classified as Khandala Formation of Lonavala sub group based on geochemical consideration. Indrayani Formation lava flows are, generally jointed and highly weathered, occupy the low-lying flat plain areas and give rise to moderate to good aquifers.

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

Diveghat Formation, overlying the Karla Formation is exposed on the hills and along the hill slopes above 700 m from msl. It comprises mainly of simple flows of 'aa' type that are aphyric. The lava flows of this formation are characterized by presence of vesicular, plagioclase basalt with medium-grained groundmass. From hydrogeological view point these flows occur on the hilly terrain and therefore not potential for groundwater.

Purandargad is the youngest formation characterized by the presence of aphyric to plagioclase microphyric basalt with the phenociysts embedded in a fine-grained groundmass. From hydrogeological point of view this formation is not very significant as it occupies the hills and hill slopes. This formation is not potential for the development of groundwater resources as it forms the runoff zone.

2.0 Hydrogeology

2.1 Major Aquifer Systems

Alluvium and Basalt aquifers are the main aquifers in the district. Two aquifer Systems in Basalt and one shallow aquifer in Alluvium (limited to river banks) are found to be prevailing in the district (**Figure 2.1**).

Deccan Trap Basalt of upper Cretaceous to lower Eocene age is the major rock formation in the district, whereas only a very narrow belt confined to the banks of rivers is underlain by Recent Alluvium. A map depicting hydrogeological features is presented in **Figure 2.2**.

In Alluvial deposits, inter pore spaces constitutes the potential water bearing zones and prevalence of sand and gravels renders them a high degree of porosity and permeability and make them a potential ground water reservoir. However, alluvium occurrence is restricted to narrow belts along the banks of major river courses and has limited depth. The older Alluvium, which is more clayey with thin horizons of sand and silt, forms a comparatively lesser potential aquifer. Ground water in Alluvium occurs mostly under water table and also under semi-confined to confined conditions in certain places. Shallow Aquifer occurs from 2 to 32 m bgl depth with shallow water levels. The yield varies from 50-300 m³/day.

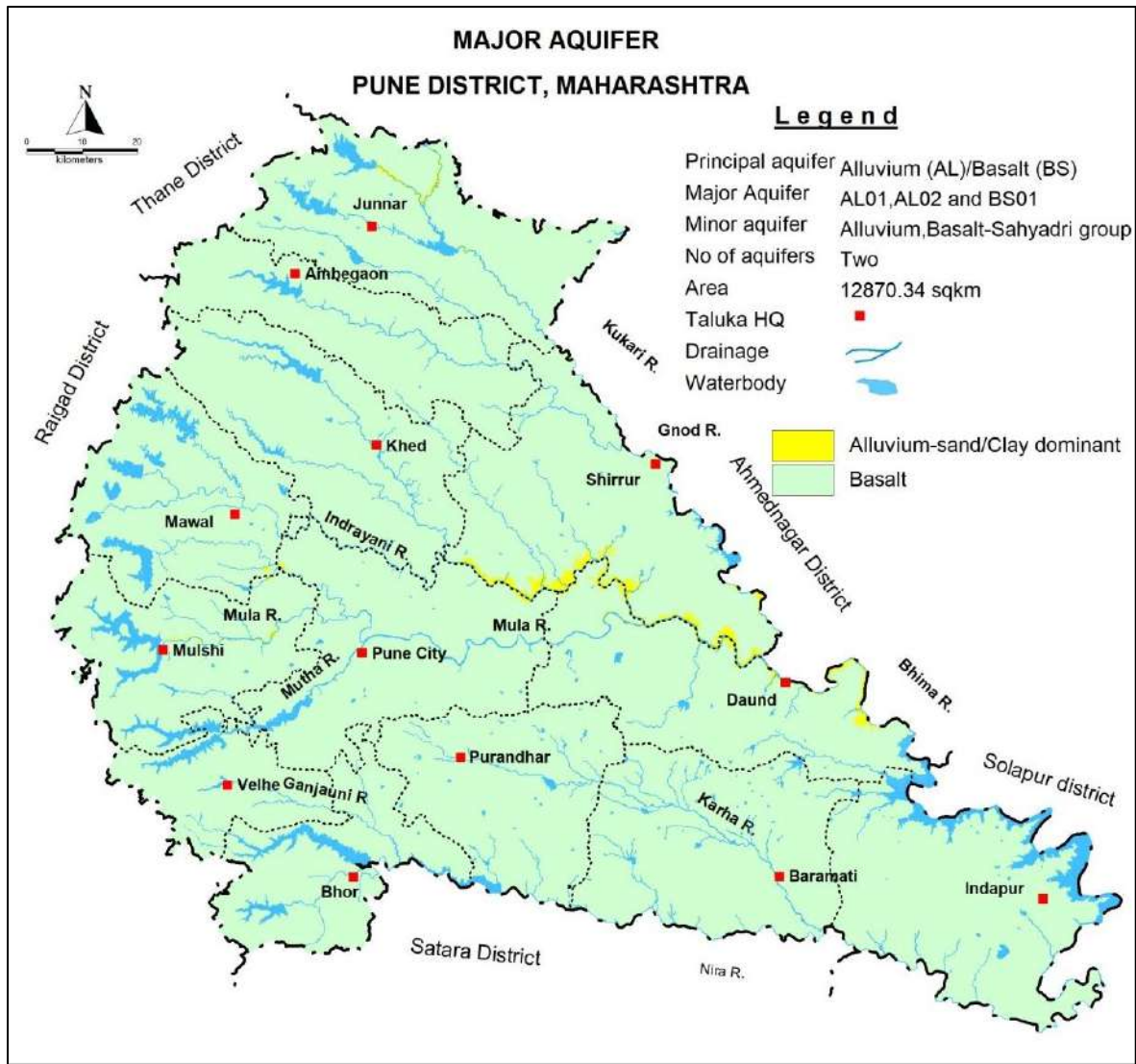


Fig 2.1: Major Aquifers

Deccan basalts are hydrogeologically in-homogeneous rocks. The weathered and jointed / fractured parts of the rock, as also permeable inter-flow beds constitute the zone of ground water storage and flow. The existence of multiple aquifers is characteristic of basalt and exhibits wide variation in the joint/fracture intensity. The yields of well is function of the permeability and transmissivity of aquifer and it depends upon the degree of weathering and topographic setting of the aquifer. Due to wide variation in secondary openings, the potential areas for ground water are generally localized. In general, ground water occurs under phreatic/unconfined to semi-confined conditions in basalts. Two Aquifer system has been delineated: Aquifer I from 9 to 30 m (Weathered /Jointed Basalt); and Aquifer II from 48 to 175 m (Jointed/fractured basalt). Shallow Aquifer generally tapped by the dug wells of 9 to 30 m depth, have water levels ranging from 2.1 to 25.0 m bgl and yield varies from 10 to 100 m³/day. The deeper Aquifer is being tapped by borewells with depth ranging from 50 to 180 m bgl and the water level from 6 to 45 m bgl. Based on Ground Water Exploration, Aquifer wise characteristics are given **Table 2.1**. Maps depicting Aquifer wise yield potential are shown in **Figure. 2.3**.

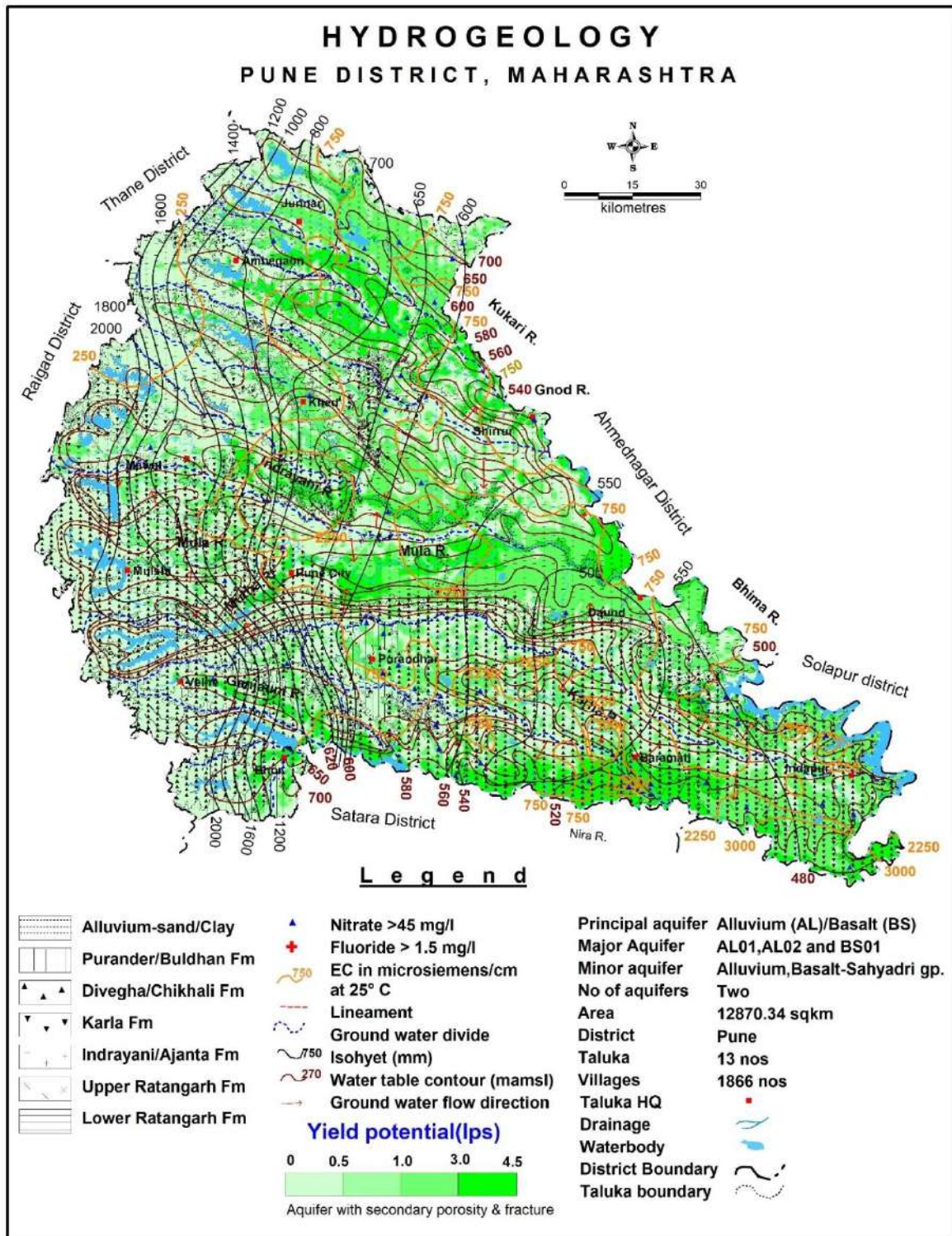


Fig 2.2- Hydrogeology

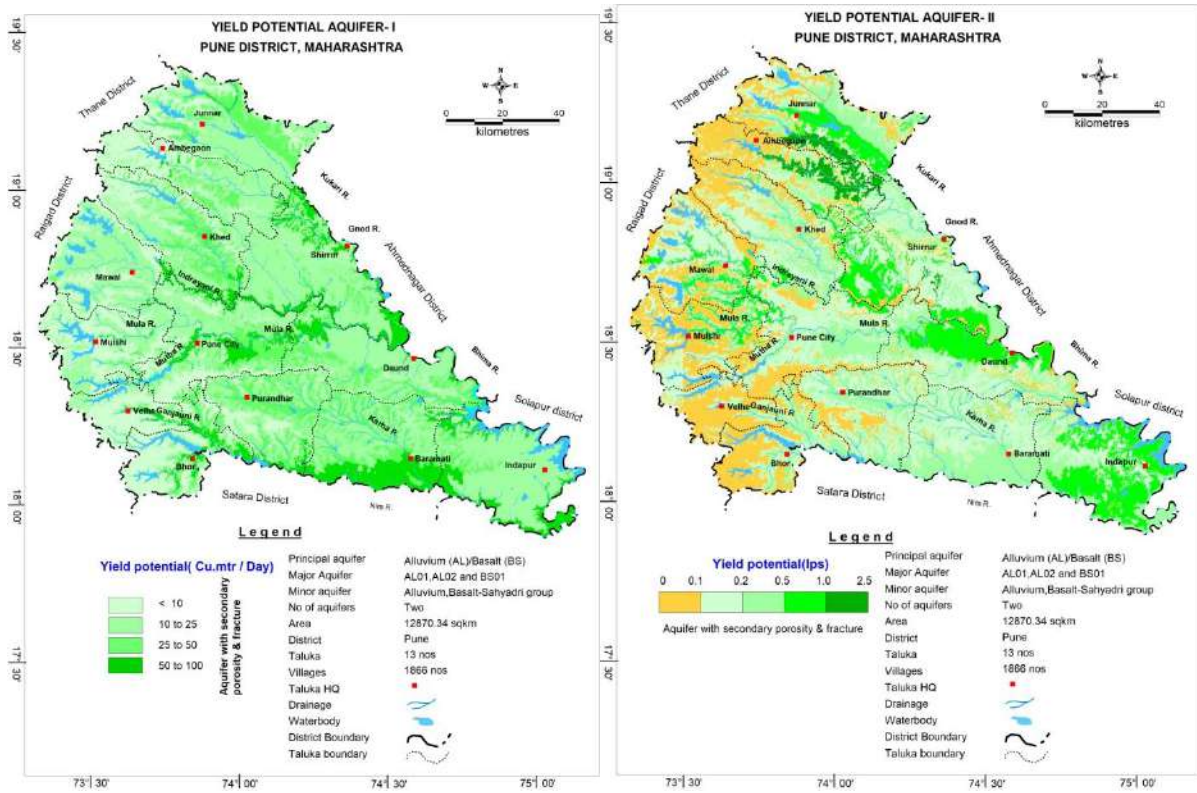


Fig 2.3: Aquifer wise yield potential

Table 2.1: Aquifer Characteristic of Pune district

Aquifer	Formation	Depth range (mbgl)	SWL (mbgl)	Thickness (m)	Fractures Zones encountered (m bgl)	Yield	Sustainability	Aquifer parameter (Transmissivity)	Sy/S	Suitability for drinking / irrigation
Aquifer-I	Deccan Trap-Weathered/ Fractured Basalt	9 to 30	2.1 to 30.0	Upto 30	5 to 22	10 to 100 m ³ /day	1 to 3 Hours	5.0 to 55	0.019-0.028	Yes, suitable for both except nitrate, fluoride and high EC in some pockets.
Aquifer-II	Jointed/ Fractured Basalt	48 to 175	9.0 to 70	Upto 175	0.5 to 12	Upto 2.5 lps	0.5 to 3 Hours	25 to 250	1.20 x 10 ⁻⁴ . 3.57 x 10 ⁻⁴	Yes, suitable for both, except High EC

2.2 Aquifer Parameters

Aquifer parameters are available from ground water exploration carried out in the area of the district as well as from the pumping tests carried out on dugwells in Basaltic and Alluvial terrain. For aquifer-I, the specific capacity of the wells tapping Deccan Trap Basalt ranges between 1.7 to 18.9 lpm/m of draw down, the permeability range from 12 to 65 m/day and the transmissivity ranges from 5.0 to 55 m²/day. The specific yield ranges from 0.019 to 0.028. During the pumping tests conducted on the exploratory wells tapping aquifer-II, the transmissivity was found to vary from 18 to 89 m²/day. The storage coefficient varied between 0.00034 to 6.37 x 10⁻⁴.

2.3 3-D and 2-D Aquifer Disposition

Based on the existing data, aquifer disposition in 3D, Fence diagram, and several hydrogeological sections have been prepared along section lines shown in **Figure 2.4, 2.5 and 2.6a** to **2.6d** understand the subsurface disposition of aquifer system.

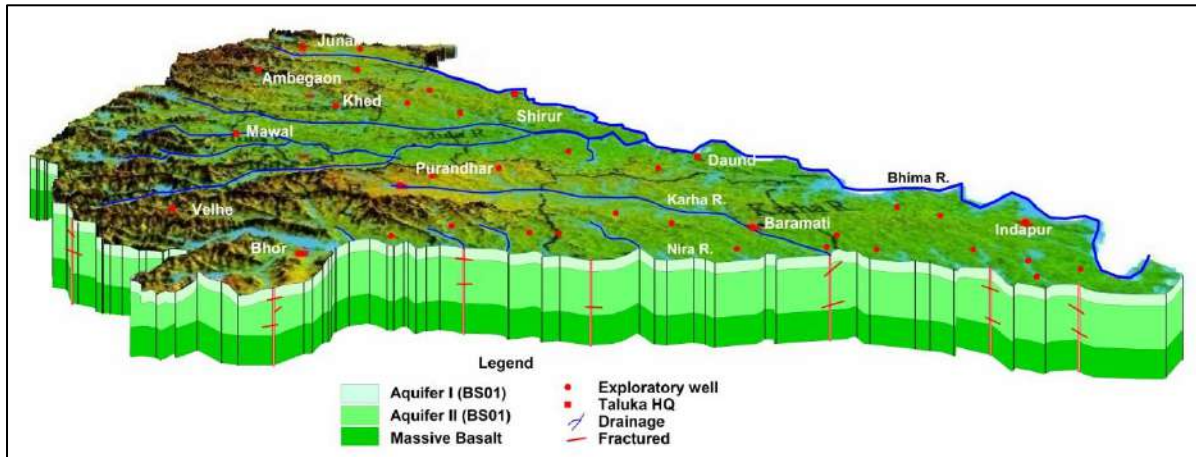


Fig. 2.4 a: 3D Aquifer Disposition

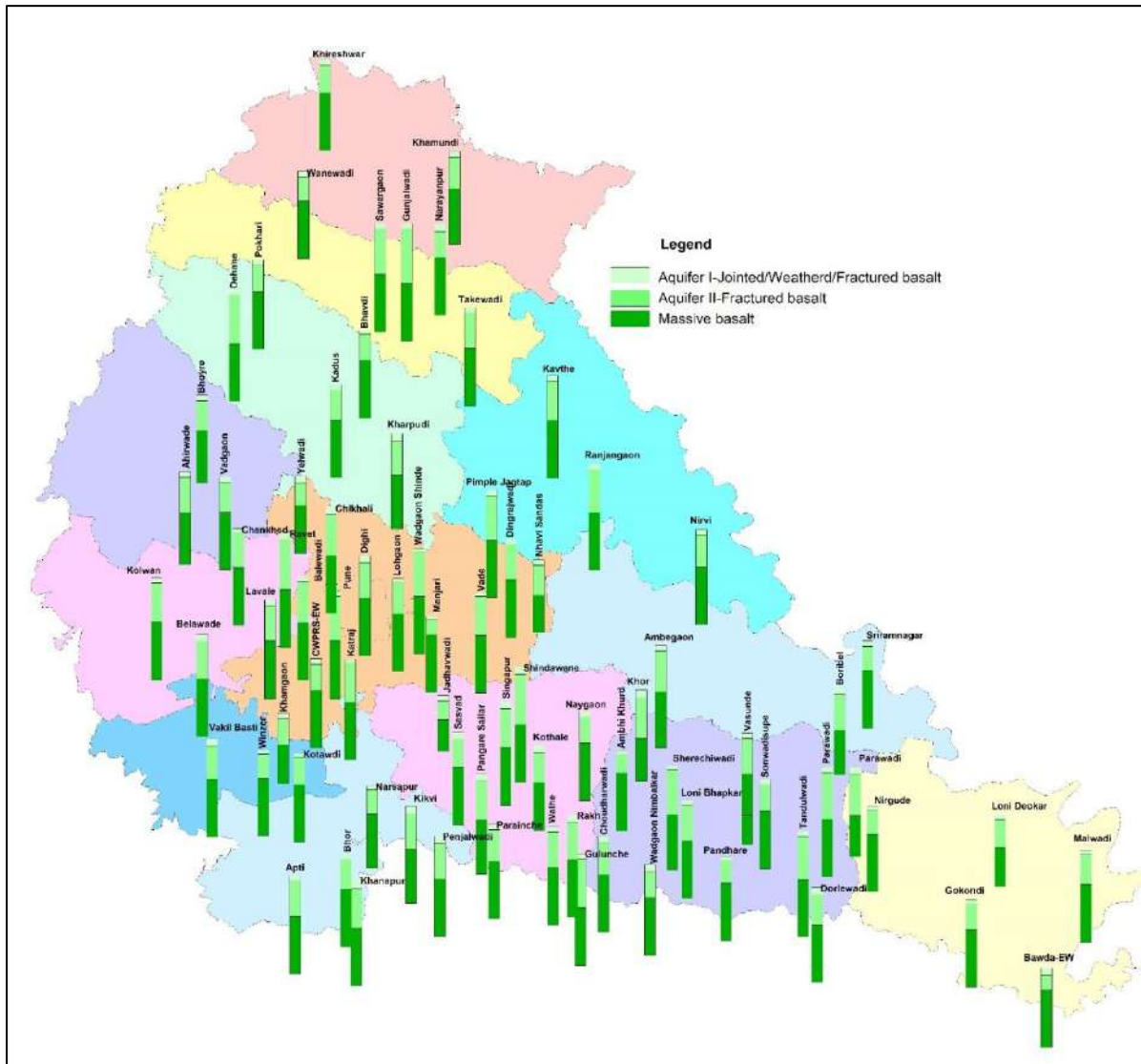


Fig. 2.4 b: Depth-wise Aquifer Disposition

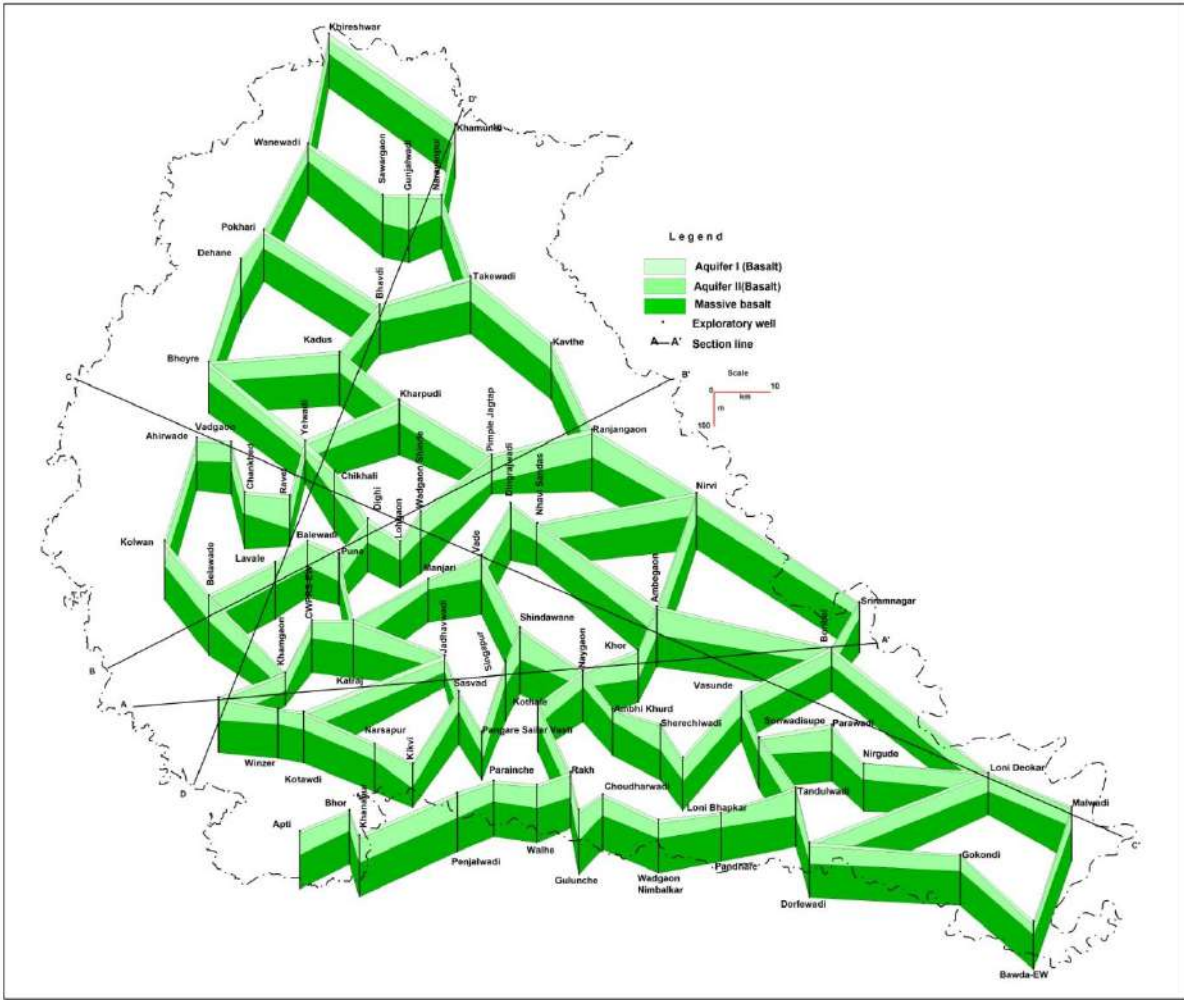


Fig. 2.5: 3D Fence Diagram

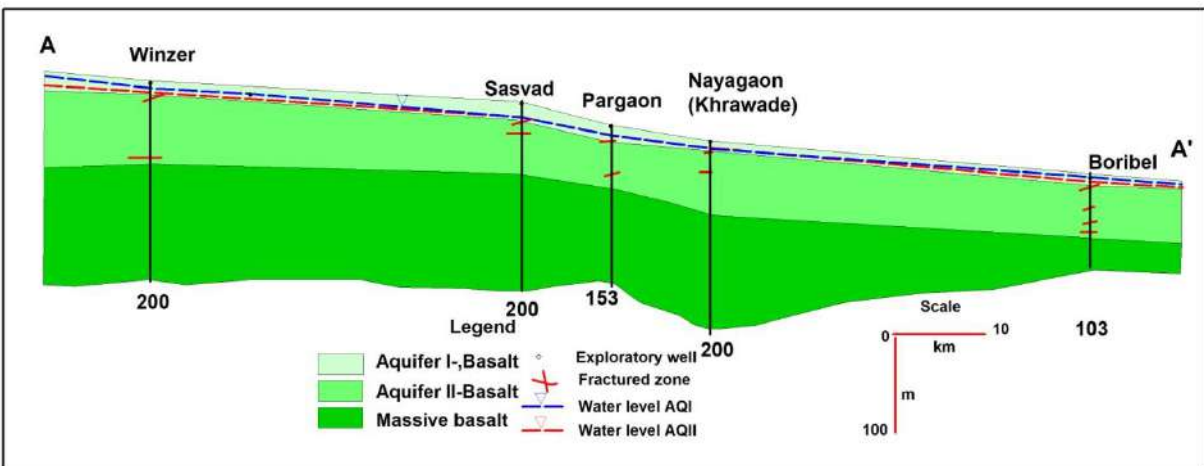


Fig. 2.6 (a): Lithological section A-A'

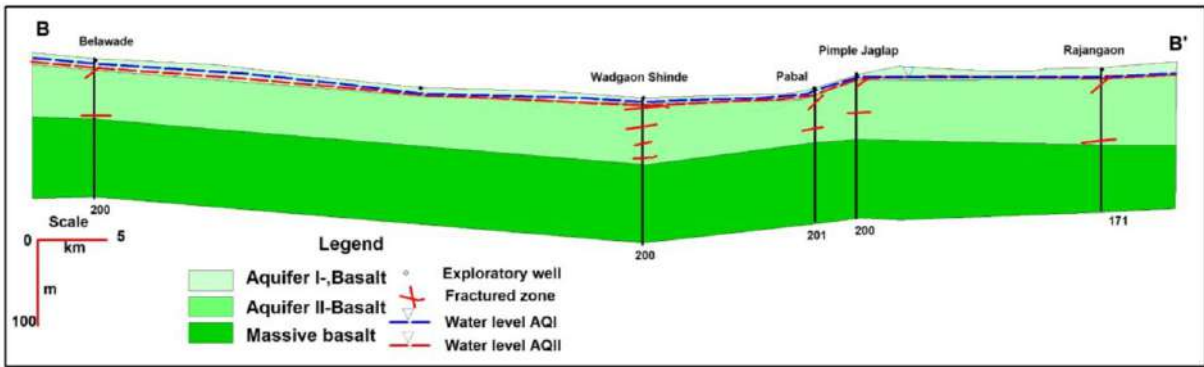


Fig. 2.6 (b): Lithological section B-B'

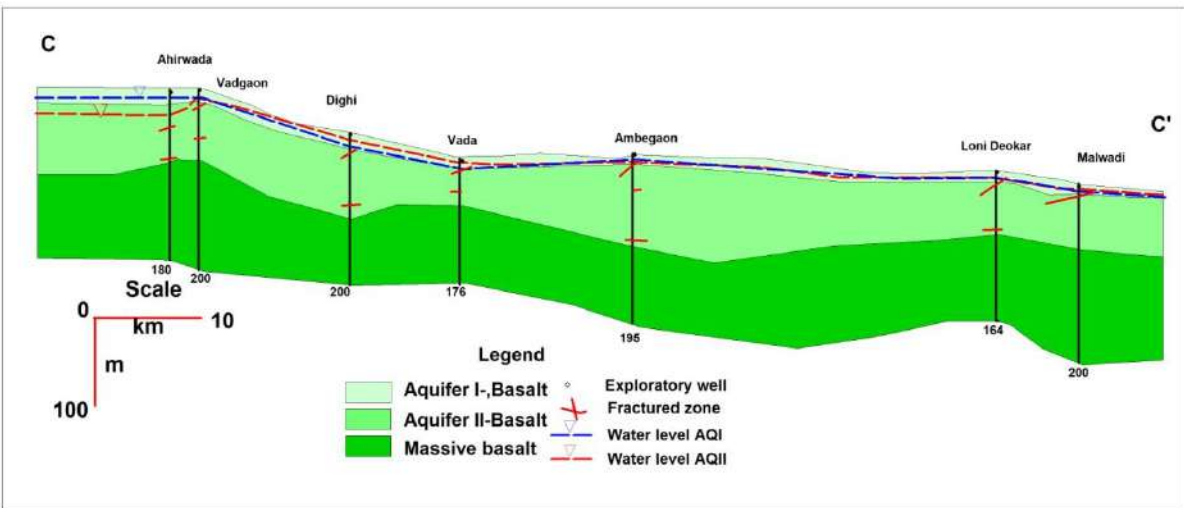


Fig. 2.6(c): Lithological section C-C'

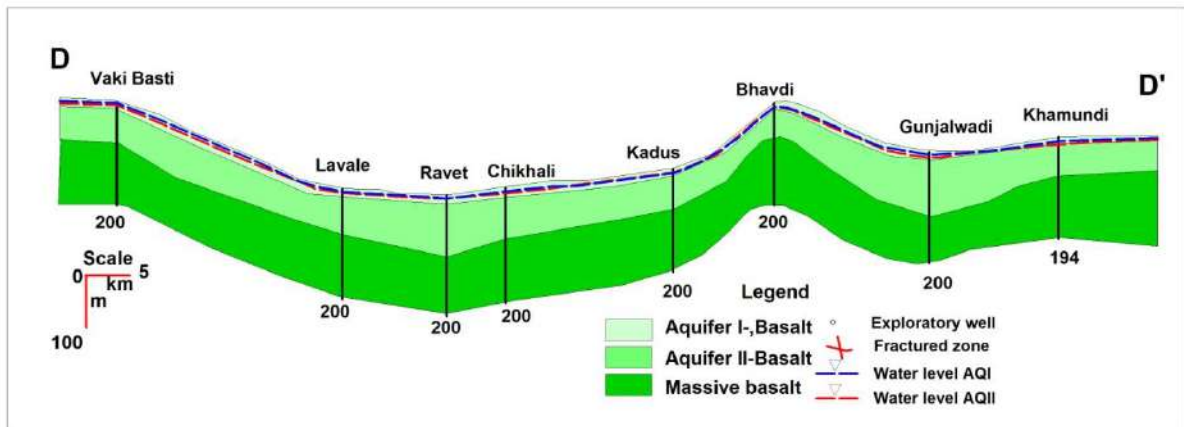


Fig. 2.6 (d): Lithological section D-D'

3.0 Water Level Scenario

In Pune District, the water table varies from 480 m amsl in south-eastern part of the area to about 700 m amsl in Northwest of study area, near river Bhima. The overall ground water movement in the area is from west to southeast and tends to flow towards surface drainages. It has been observed that the ground water flow direction follows the drainage and topography of the area. This indicates the topographic control for the ground water movement.

3.1 Depth to water level (Shallow Aquifer-I)

Central Ground Water Board periodically monitors 47 Ground Water monitoring wells in Pune district, four times a year i.e. in January, May (Premonsoon), August and November (Postmonsoon). Apart from this under NAQUIM study; 31 KOW were established and monitored during the year 2016 and 70 KOW were also established and monitored during the year 2017. These data have been used for preparation of depth to water level maps of the district. Pre-monsoon and post monsoon water levels along with fluctuation during 2017 and long-term water level trends (2008-2017) are given in **Annexure-II**.

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

The depth to water levels in Pune district during May 2017 ranges between 0.9 (Jambhul, Mawal taluka) and 30.35 mbgl (Pargaon, Purandhar taluka). Water levels between 5 and 10 m bgl are observed in major parts of the district. Shallow water levels within 5 m bgl are observed in western part of the district covering parts of Bhor, Mulshi and Maval talukas and in small patches in central part of the district. The depth to water level between 10 to 20 mbgl has been observed in Haveli, Khed, Ambegaon, Junnar, Shirur, Daund, Indapur, Baramati, Purandhar and Bhor talukas. Deeper water levels of more than 20 m bgl are observed in isolated patches in Purandhar taluka. The premonsoon depth to water level map is depicted in **Fig 3.1(a)**.

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

The depth to water levels in Pune district during Nov. 2017 ranges between ground level (Kondhawale, Tamhini Bk and Viseghar, Mulshi taluka, Vadgaon Mawal, Mawal taluka and Ambhu, Khed taluka) and 25.2 mbgl (Pargaon, Purandhar taluka). Water levels between 0 and 5 m bgl are observed in major parts of the district. Very shallow water levels within 2 m bgl are observed in western part of the district covering parts of Bhor, Velhe, Mulsi, Maval, Khed and Haveli talukas and Pune City, and in small patches in other parts of the district. Shallow water levels ranging between 2 and 5 m bgl as also in the range between 5 and 10 m bgl are observed in central, northern and eastern part of the district covering parts of Ambegaon, Junnar, Shirur, Daund, Indapur, Baramati, Purandhar, and Haveli talukas and Pune City. The depth to water level between 10 to 20 mbgl has been observed in small patches in Haveli, Ambegaon, Junnar, Shirur, Indapur, Baramati and Purandhar talukas. Spatial variation in post monsoon depth to water levels is shown in **Fig 3.1 (b)**.

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

It is observed that rise in water level has been observed in entire district in the range of 0.2 to 13.5 m. Decline in water level was observed only in five isolated wells in the District, namely Khalad, Purandhar taluka and Dhakale, Baramati taluka, which is due to low rainfall and pumping for irrigation during monsoon and insignificant decline in wells in Jambhul, Induri and Kadadhe in Maval taluka.

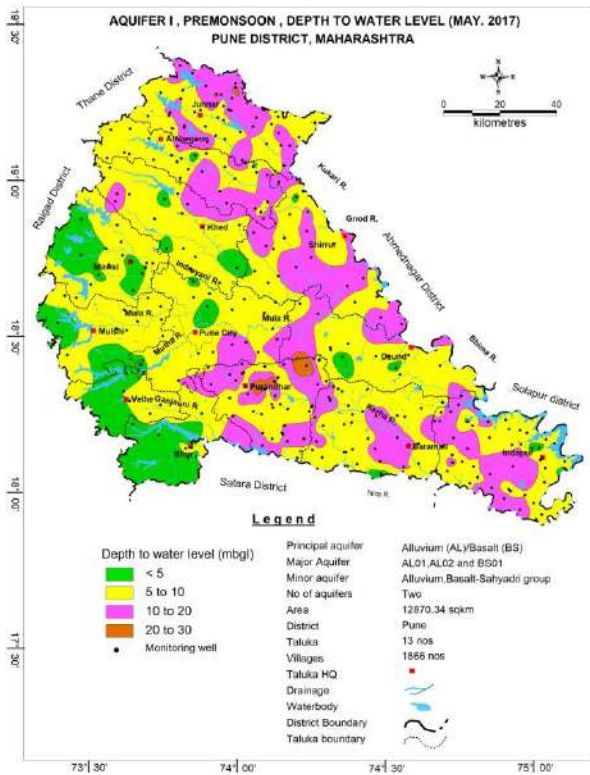


Fig 3.1 (a): DTWL shallow aquifer (May 2016)

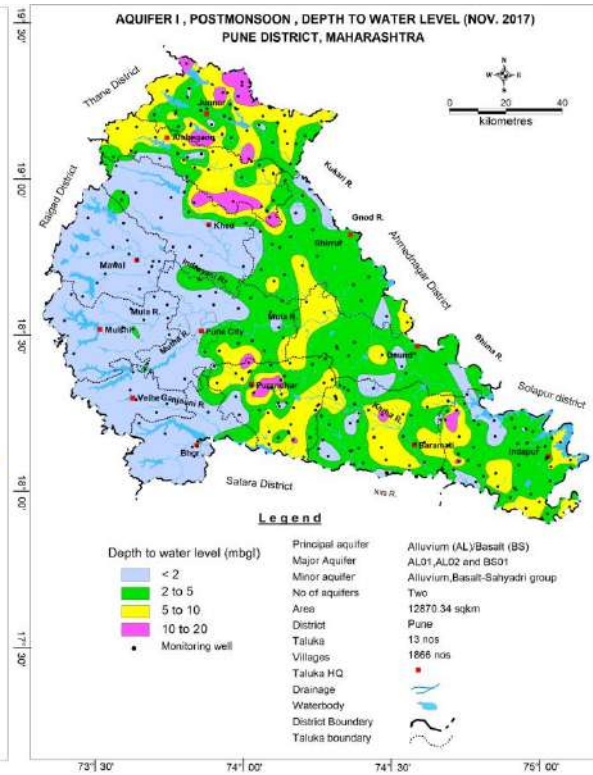


Fig 3.1 (b): DTWL shallow aquifer (Nov. 2016)

3.2 Depth to water level (Deeper Aquifer-II)

3.2.1 Premonsoon Depth to Water Level (May-2017)

In Deeper Aquifer-II, the pre-monsoon depth to water levels, in Pune District during May 2017, range from 9.00 (Sherechiwadi, Wadgaon Nimbalkar, Baramati Taluka, CWPRS, Lohgaon, Haveli Taluka, and Lavale, Mulshi Taluka) to 70.00 mbgl (Ambhi Khurd, Pandhare, Baramati Taluka and Parainche, Purandhar Taluka). A major part of Pune District shows depth to water level between 10 and 20 mbgl. The depth to water level less than 10 mbgl is observed only in isolated wells in Sherechiwadi, Wadgaon Nimbalkar, Baramati Taluka, CWPRS, Lohgaon, Haveli Taluka, and Lavale, Mulshi Taluka. Deeper water level between 20 and 30 mbgl are observed in major parts of Pune City, Haveli, Khed, Ambegaon, Junnar, Shirur, Daund, Indapur, Baramati, Purandhar, Bhore, Velhe and Maval talukas. The deepest water level (>30 mbgl) has been observed in parts of Shirur, Baramati, Purandhar and Khed talukas and in isolated patches in other talukas of the district. The premonsoon depth to water level for Aquifer –II is given in **Fig. 3.2 (a)** and the details are presented in **Annexure I**.

3.2.2 Postmonsoon Depth to Water Level (Nov.-2017)

In Aquifer-II, the post monsoon depth to water levels in Pune District during Nov. 2017 range between 1.50 (Singapur, Purandhar taluka) and 45.00 mbgl (Ambhi Khurd, Pandhare, Baramati Taluka and Parainche, PurandharTaluka). Major parts of the District show depth to water level between 5 and 20 mbgl. Depth to water level less than 5 m bgl has been observed in patches in Haveli, Shirur, Daund, Indapur, Baramati, Purandhar, Mulsi and Maval talukas. The deepest water level of more than 20 mbgl is observed in small patches in Haveli, Shirur, Daund, Indapur, Baramati, Purandhar, Velhei and Maval talukas. The post monsoon depth to water level for Aquifer –II is given in **Fig. 3.2 (b)**.

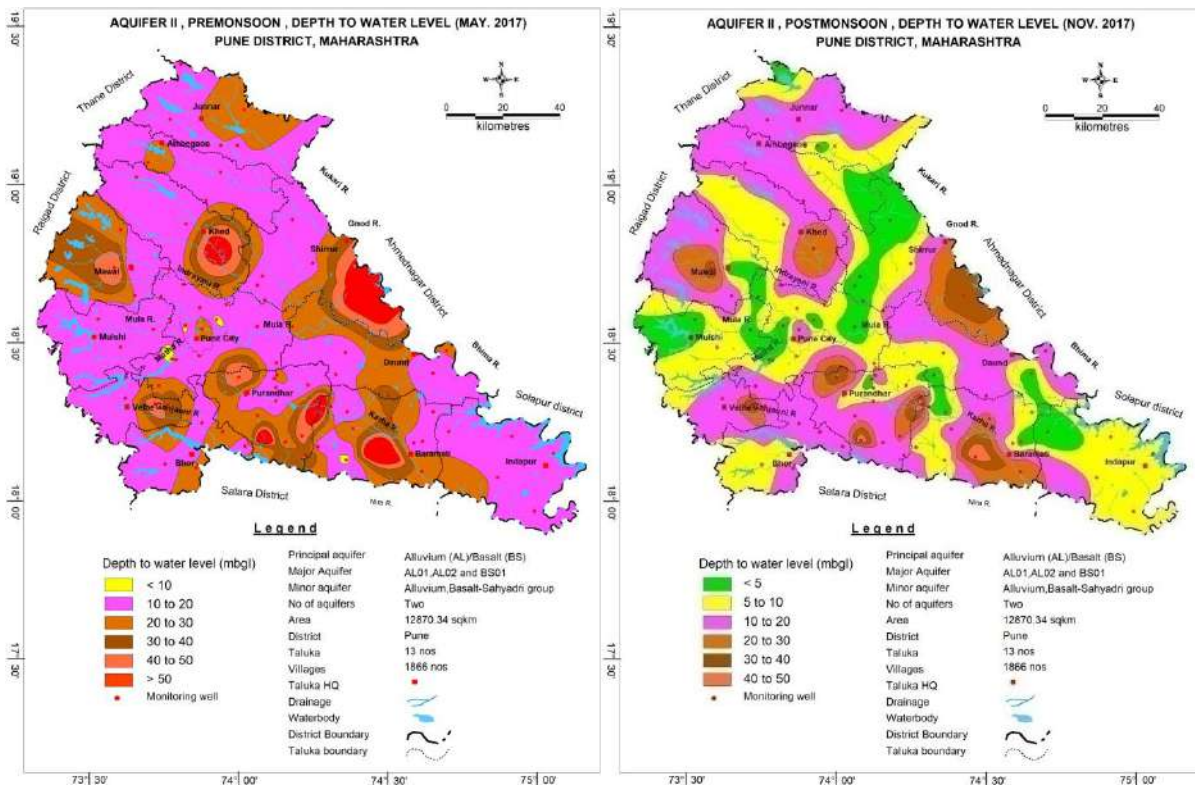


Fig 3.2(a): DTWL deeper aquifer (May 2017) **Fig 3.2(b): DTWL deeper aquifer (Nov. 2017)**

3.3 Water Level Trend (2008-2017)

In Pune district, pre-monsoon rise in water levels trend has been recorded at 144 stations (out of 202 stations considered for computing trend) and ranges from 0.0001 (Reda, Indapur taluka) to 0.750 m/year (Walhe, Purandhar taluka) while falling trend was observed in 58 stations varying from 0.0116 (Supe, Baramati taluka) to 0.42 m/year (Thakursai, Mawal taluka). During pre-monsoon, declining water level trend has been observed in about 10110 sq km area during 2008-17, i.e., 65% of the area. Significant decline more than 0.20 m/year has been observed in 3300 sq km, i.e., 21 % area covering part of Purandhar, Baramati, Indapur, Haveli and Daund talukas and isolated parts of Khed, Shirur, Junnar and Mulshi talukas. Rise in water level trend has been observed in western and central part of the district covering major parts of Bhore, Velhe, Maval, Mulshi, Haveli, Khed, Daund, Ambegaon and Junnar talukas. (Fig 3.3 a)

Post monsoon rise in water levels trend has been recorded at 159 stations and it ranges between 0.0012 (Padali, Junnar taluka) to 1.588 m/year (Pargaon, Purandhar taluka) while falling trend was observed in 43 stations varying from 0.0028 (Baramati Rural, Baramati taluka) to 0.6992 m/year (Belhe, Junnar taluka). Declining water level trend has been observed in about 10700 sq km area during 2008-17, i.e., 68 % of the area. Significant decline more than 0.20 m/year has been observed in 1395 sq km, i.e., 8.9 % area covering patches in part of Purandhar, Baramati and Khed talukas. Rise in water level trend has been observed in northern, western and central part of the district covering major part of Bhore, Velhe, Maval, Mulshi, Haveli, Khed, Daund, Ambegaon and Junnar talukas (Fig 3.3 b).

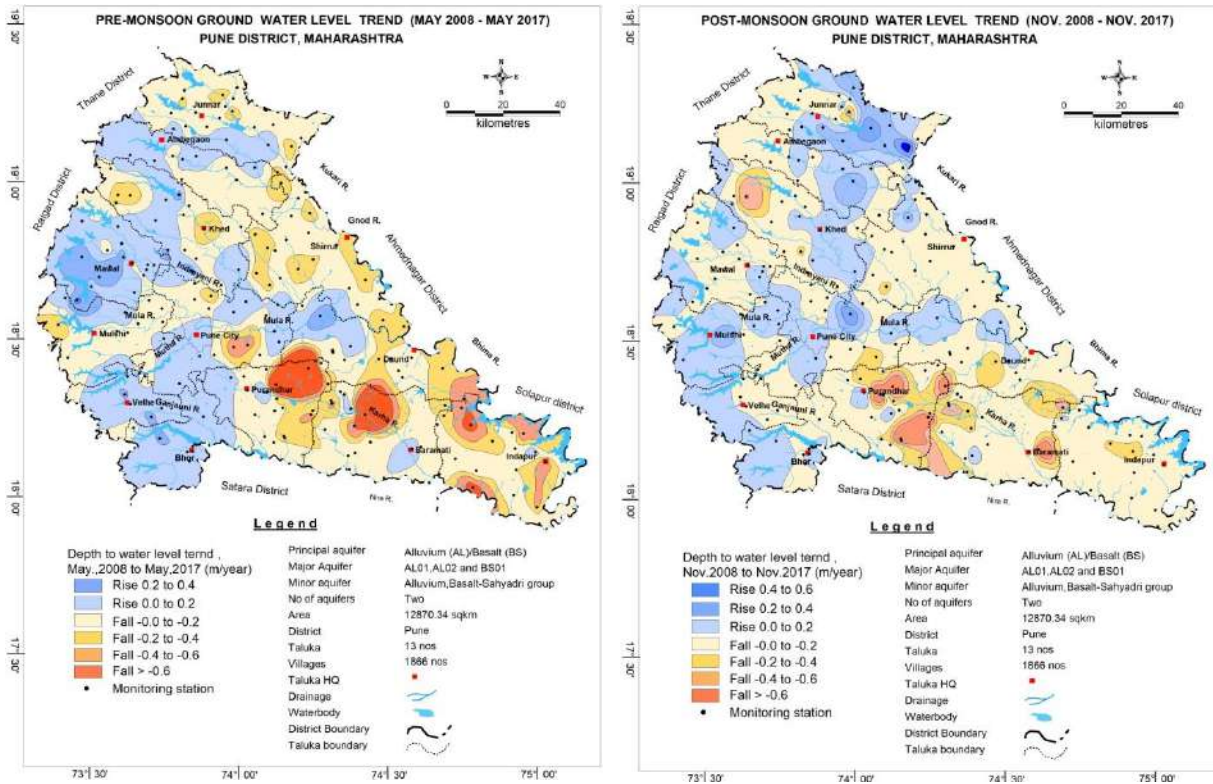


Fig 3.3 (a):Pre-monsoon decadal trend (2008-17) Fall @ >0.2m/year (3300 Sq km)

Fig 3.3 (b): Postmonsoon decadal trend (2008-17) Fall @ >0.2m/year (1395 sq km)

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, artificial recharge, canal seepage and withdrawal of groundwater for various agricultural activity, domestic requirements and industrial needs. In general, the annual rising limbs the hydrographs indicate the natural recharge of groundwater regime due to monsoon rainfall, as the monsoon rainfall is the main natural source of water for recharge to the ground water regime. However, continuous increase in the groundwater draft is indicated by the recessionary limb. The analysis of hydrographs (Fig. 3.4a to 3.4f) show rising trends of water levels during the premonsoon and postmonsoon periods, inspite of the fact that Ambegaon, Indapur, Junnar, Baramati and Purandhar talukas of Pune district have stage of ground water development higher than 80%. This is partly due to 'above average' rainfall during 2017 and partly due to seepage from canals and percolation from rain water harvesting structures, that are increasingly becoming popular in the district.

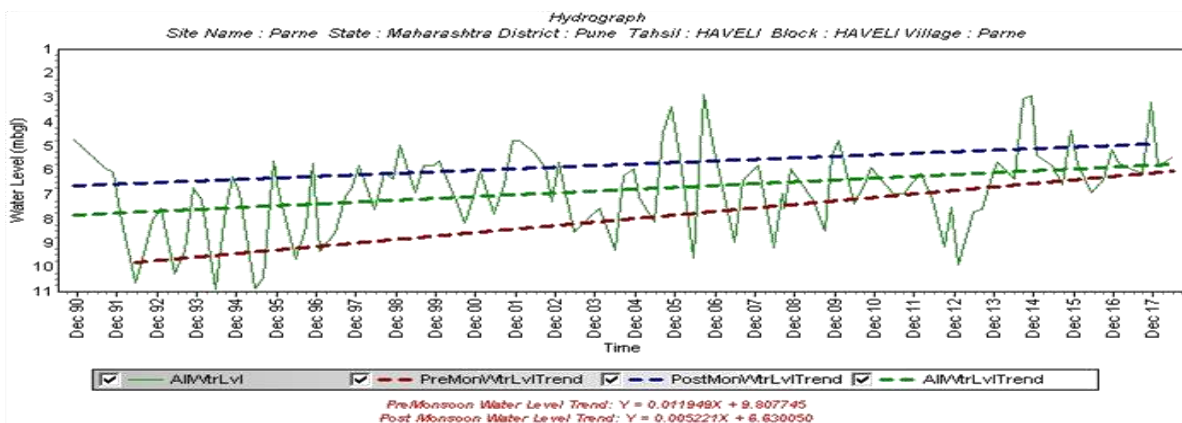


Fig 3.4a: Hydrograph (1990-2017), Parne, Haveli Taluka

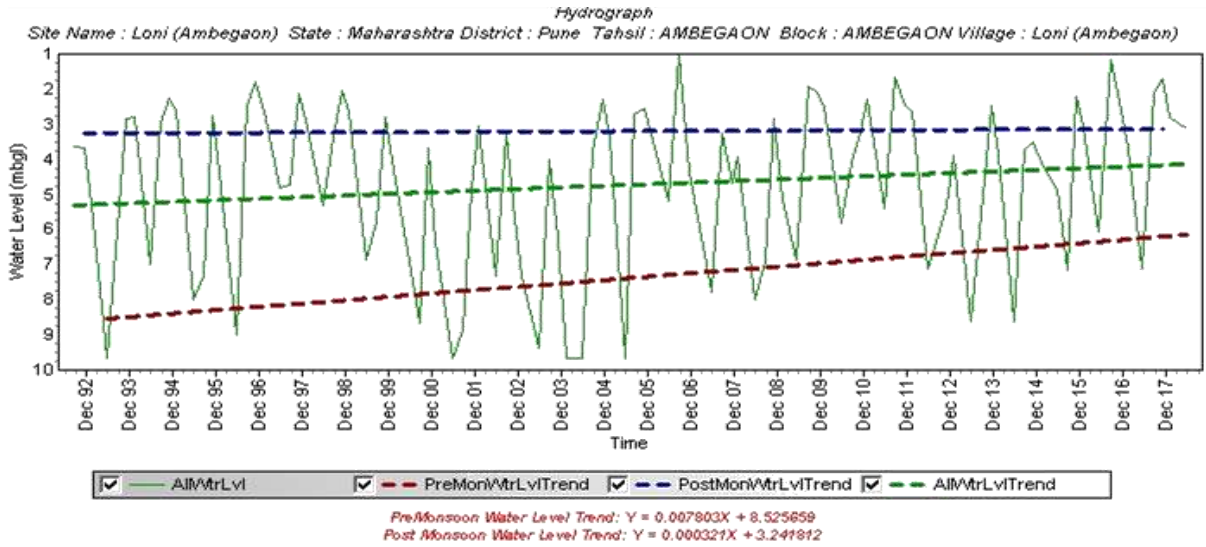


Fig. 3.4b: Hydrograph (1992-2017), Loni, Ambegaon Taluka

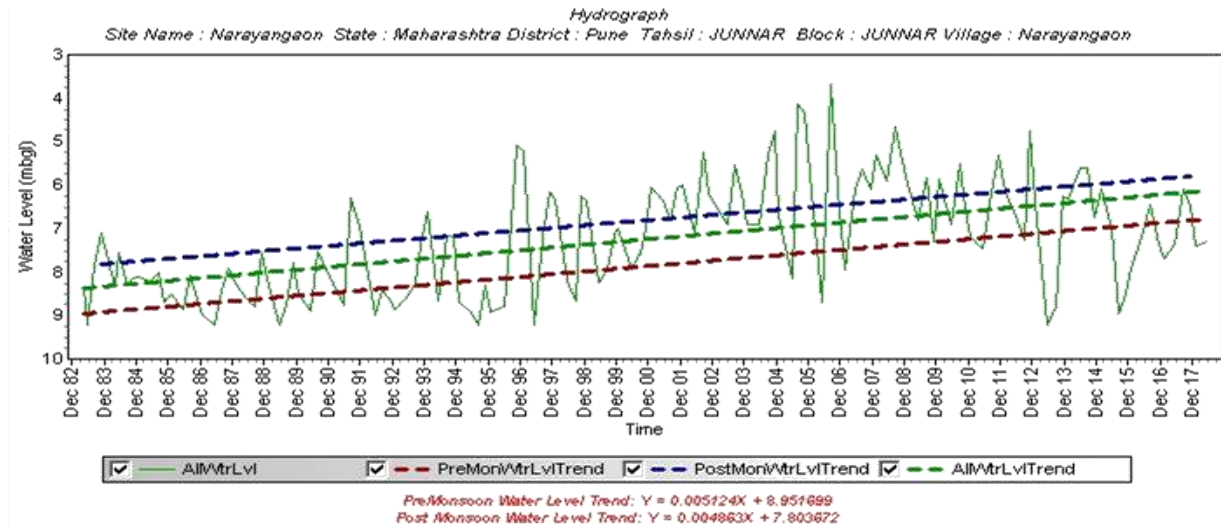


Fig. 3.4c: Hydrograph (1982-2017), Narayangaon, Junnar Taluka

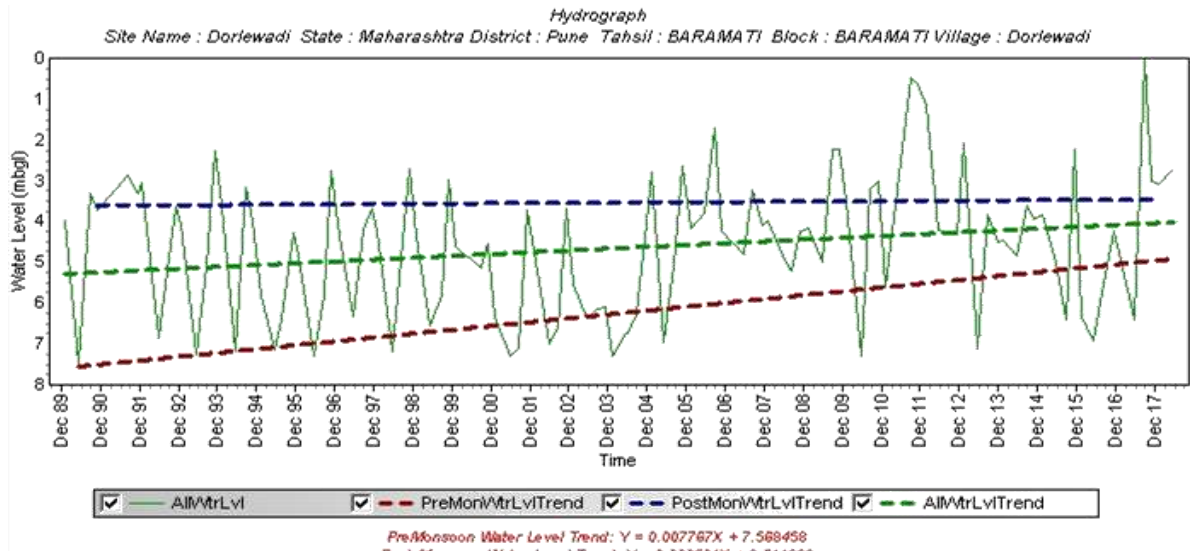


Fig. 3.4d: Hydrograph (1989-2017), Dorlewadi, Baramati Taluka

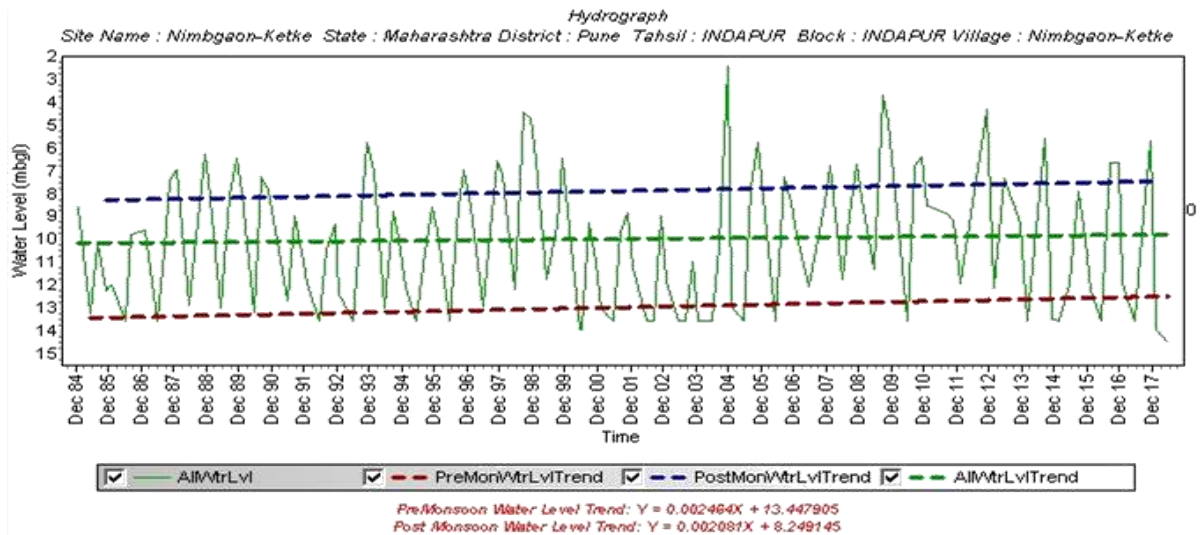


Fig. 3.4e: Hydrograph (1984-2017), Nimbgaon Ketke, Indapur Taluka

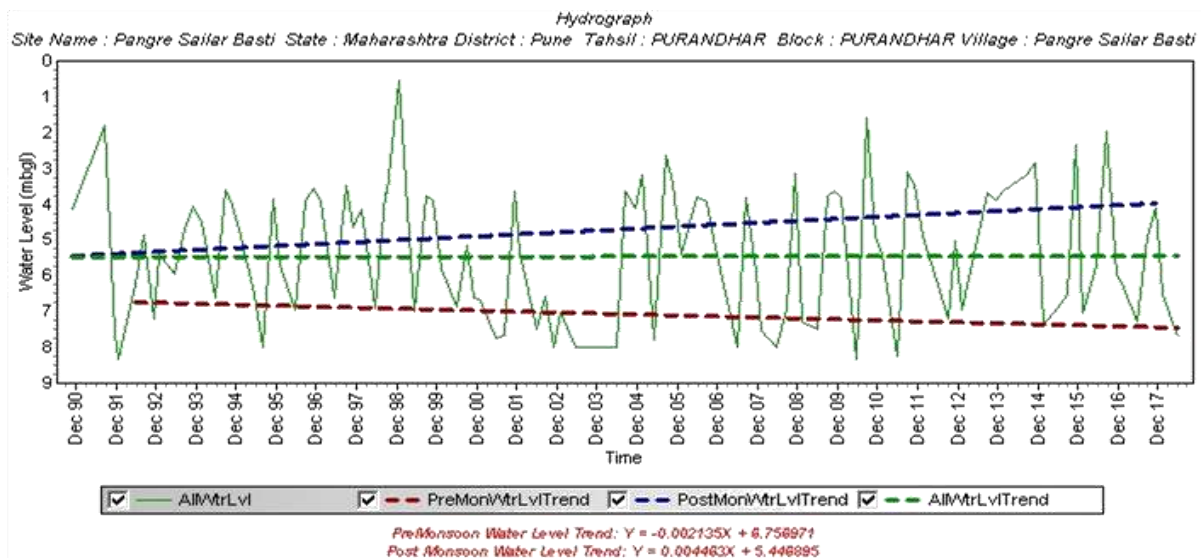


Fig. 3.4f: Hydrograph (2007-16), Pangre Sailar Basti, Purandhar Taluka, Pune district

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 and identified additional locations, 111 for shallow and 15 for deeper aquifers. Ground water quality data of 178 monitoring wells of CGWB and GSDA representing shallow aquifer have been utilised to decipher the quality scenario of shallow aquifer. 102 exploratory wells tubewells / borewells of CGWB and GSDA representing deeper aquifer have been utilised to decipher the quality scenario of deeper aquifer. The aquifer wise ranges of different chemical constituents present in ground water are given in **Table 4.1**. The details of water quality analysis for Aquifer-I (shallow aquifer) are given in **Annexure V** and for Aquifer-II (deeper aquifer) are given in **Annexure VI**.

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

Constituents	Aquifer-I (Shallow aquifer)		Aquifer-II (Deeper aquifer)	
	Min	Max	Min	Max
pH	7.0	11.1	7	9.3

Constituents	Aquifer-I (Shallow aquifer)		Aquifer-II (Deeper aquifer)	
	Min	Max	Min	Max
EC	80	6980	86	8200
TDS	51	4467	55	6000
TH	80	6090	20	1950
Calcium	3.2	926.3	3.2	377
Magnesium	2.3	280.8	0.5	246
Potassium	0.07	68	0	569
Sodium	3.2	1023.5	8	713
Bi-carbonate	2.9	697.8	19.4	390.4
Chloride	2.57	1439.3	14	1148
Sulphate	1	1287	1	908
Nitrate	0.1	366	0.1	2070
Iron	0	1.1	0	2.2
Fluoride	0.03	2.89	0.10	4.27

4.1 Electrical Conductivity (EC)

4.1.1 Distribution of Electrical Conductivity in Aquifer-I (Shallow Aquifer):

The concentration of EC in shallow aquifer varies between 80 (Pawan Maval (Malavali), Mavaltaluka) and 6980 $\mu\text{S}/\text{cm}$ (Morgaon, Baramati taluka). Out of 178 samples collected from dug wells, 37 samples are having EC below 500 $\mu\text{S}/\text{cm}$. Western part of the district shows EC less than 750 $\mu\text{S}/\text{cm}$. Major part of rest of the district shows EC in the range of 750-2250 $\mu\text{S}/\text{cm}$. Only 9 samples are having EC in range of 3000 to 7500 $\mu\text{S}/\text{cm}$, observed in isolated locations of Daund, Baramati, Indapur, Haveli and Purandhar talukas. The ground water is potable in southern and south-east part of district. The distribution of electrical conductivity in shallow aquifers is shown in Fig. 4.1 (a) and analytical data is presented in Table 4.2.

4.1.2 Distribution of Electrical Conductivity in Aquifer-II (Deeper Aquifer):

The concentration of EC in deep aquifer varies between 86 (Kadus, Khed taluka) and 8200 $\mu\text{S}/\text{cm}$ (Sonwadisupe, Baramati taluka). Out of 102 samples collected from tube wells/bore wells, 91 samples are having EC less than 2250 $\mu\text{S}/\text{cm}$ and only 3 sample show very high EC more than 3000 $\mu\text{S}/\text{cm}$. It is observed that the concentration of high EC more than 3000 has been observed in isolated wells in Nhavi Sanaas, Haveli taluka and Kadus, Khed taluka. The ground water is potable in major parts of the district. The distribution of electrical conductivity in deeper aquifers is shown in Fig. 4.1 (b) and analytical data is presented in Table 4.2.

Table 4.2: Aquifer wise Electrical conductivity data

Sl. No.	EC ($\mu\text{S}/\text{cm}$)	Aquifer-I (Shallow aquifer)		Aquifer-II (Deeper aquifer)	
		No. of samples	% of samples	No. of samples	% of samples
1	< 250	8	4.49	4	3.92
2	>250-750	74	41.57	38	37.25
3	>750-2250	78	43.82	49	48.04
4	2250-3000	9	5.06	8	7.84
5	3000-7500	9	5.06	2	1.96
6	>7500	0	0	1	0.98
Total samples		178		102	

4.2 Nitrate:

Nitrogen in the form of dissolved nitrate nutrient for vegetation, and the element is essential to all life. The major contribution in ground water is from sewage, waste disposal, nitrate fertilizer and decaying of organic matter. In Pune district, nitrate concentration varies between 0.1 to 366 mg/l (Bhadalwadi, Indapur Taluka). As per BIS (2012) the desirable limit is 45 mg/l. In shallow

aquifer, 178 samples were analysed, out of this 49 water samples show the nitrate concentration exceeded the desirable limit of 45 mg/l. The high concentration of Nitrate may be due to domestic waste and sewage in the urban and rural parts of district. In deeper aquifer, nitrate concentration varies between 0.1 to 2070 mg/l (Sonwadisupe, Baramati Taluka). 102 wells analysed, out of this 18 water samples show that the nitrate concentration exceeded the desirable limit of 45 mg/l. The deeper aquifer in the area is also affected by nitrate contamination. It may be due to percolation of nitrate contaminants from the ground surface as there are no other reasons for nitrate contamination in deeper aquifers. Aquifer wise nitrate concentration is given in **Table 4.3**.

4.3 Fluoride:

In Aquifer – I (shallow aquifer), concentration of fluoride ranges from 0.03 to 2.89 mg/l. Out of 178 samples analyzed, only 15 samples show fluoride concentration more than 1 mg/l. In shallow aquifer, the highest concentration of fluoride is found in Medad village, Baramati taluka (2.89 mg/l). In Deeper Aquifer, concentration of fluoride ranges from 0.10 to 4.27 mg/l. Out of 87 samples analysed, only 10 samples show fluoride concentration more than 1 mg/l. In Aquifer – II (Deeper aquifer), the highest concentration of fluoride is found in Waghapur village, Purandhar taluka (4.27 mg/l). Fluoride concentration more than permissible limit is observed in ground water samples from deeper aquifer at Khamunai, Junnar taluka, Aпти, Bhor taluka, Nhavi Sanaas, Haveli taluka, Sonwadisupe, Baramati taluka and Waghapur, Purandhar taluka and ground water from deeper aquifer may be used with caution for drinking water. This high concentration of fluoride may be due to the lithological reason only. Aquifer wise fluoride concentration is given in **Table 4.3**.

Table 4.3: Aquifer wise nitrate and Fluoride concentration in Pune district

Taluka	No ₃ > 45 mg/l		Fluoride >1 mg/l	
	No of samples Aquifer – I (Shallow Aquifer)	No of samples Aquifer – I (Deeper Aquifer)	No of samples Aquifer – I Shallow Aquifer)	No of samples Aquifer – I (Deeper Aquifer)
Pune City	1			
Haveli	4	2	3	3
Mulshi	1			
Bhor				1
Maval				
Velhe	1			
Junnar	9	3	2	1
Khed	1			1
Ambegaon	5	1	2	
Shirur	1	3	5	
Baramati	5	4	1	2
Indapur	10	1	2	1
Daund	1			
Purandhar	10	4		1
Grand Total	49	18	15	10

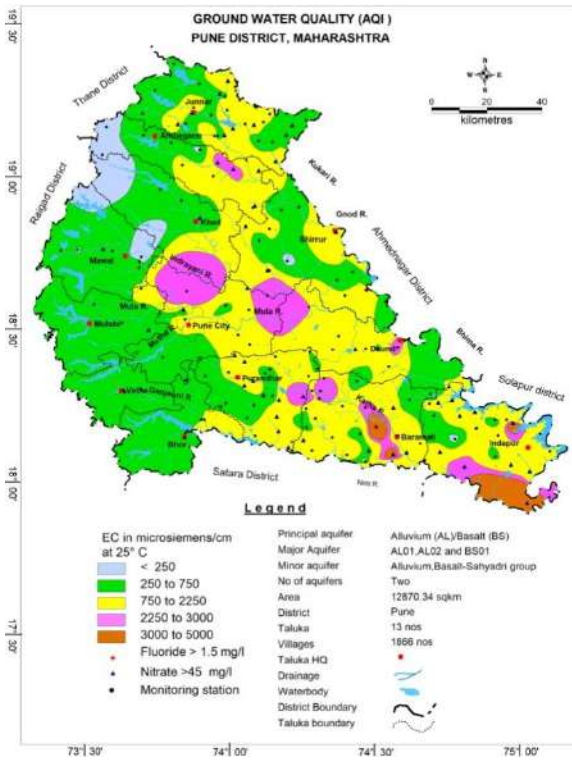


Fig. 4.1 (a): Ground water quality, Aquifer-I

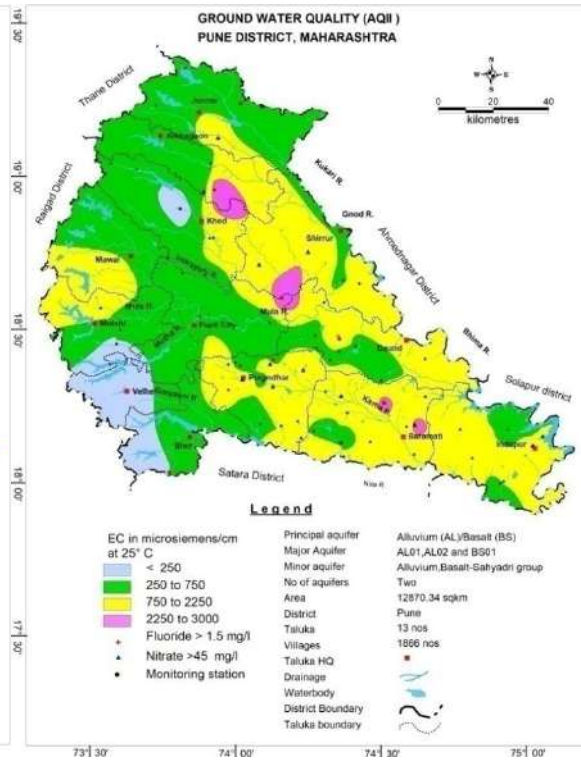


Fig. 4.1 (b): Ground water quality, Aquifer-II

4.4 Suitability of Ground Water For Drinking Purpose

In Aquifer-I, (shallow aquifer), only 2.6 % samples are having TDS concentration more than maximum permissible limit (MPL) of 2000 mg/l and 43 % of samples have TDS concentration above the Desirable limit (DL) but below the MPL. It is also seen that about 22 % samples have parameters like TH, Ca, Mg, Cl, SO₄ and NO₃ beyond the maximum permissible limit for drinking, indicating that the water is not suitable for drinking purpose. Samples from Shaha, Lumewadi, Varkute Bk and Ranmodwadi, Indapur taluka, Jawalarjun, Purandhar taluka and Nirvagaj, Baramati taluka have more than one parameter like TH, Ca, Mg, Cl, SO₄ and NO₃ beyond the maximum permissible limit for drinking, indicating water from such area is not fit for drinking purpose if directly consumed without treatment. Classification of ground water samples by Chemical constituents in Aquifer- I (shallow Aquifer) for drinking purpose is given in **Table 4.4**.

In Aquifer-II (Deeper aquifer), samples from Chandaydewadi, Sonwadi supe, Rui & Sherechiwadi, Baramati taluka, Ranjangaon, Shirur taluka, Rakh, Purandhar taluka and Nhavi Sanaas, Haveli taluka have more than one parameter like TH, Ca, Mg, Cl, SO₄ and NO₃ beyond the maximum permissible limit for drinking, indicating water from such area is not fit for drinking purpose if directly consumed without treatment. Classification of ground water samples by Chemical constituents in Aquifer- II (deeper Aquifer) for drinking purpose is given in **Table 4.5**.

Table 4.4: Classification of ground water samples by Chemical constituents in Aquifer-I (shallow Aquifer) for drinking purpose

Parameter	Drinking water Standards (IS-10500-2012)		Total no of ground water samples	Aquifer-I (Shallow aquifer)					
				Samples (<DL)		Samples (DL-MPL)		Samples (>MPL)	
	DL	MPL		No	%	No	%	No	%
pH	6.5-8.5	-	145	-	-	120	82.76	25	17.24
TDS	500	2000	116	63	54.31	50	43.1	3	2.59
TH	300	600	178	116	65.17	48	26.97	14	7.87
Ca (mg/L)	75	200	178	63	35.39	49	27.53	18	10.11
Mg (mg/L)	30	100	178	77	43.26	93	52.25	8	4.49

Parameter	Drinking water Standards (IS-10500-2012)		Total no of ground water samples	Aquifer-I (Shallow aquifer)					
				Samples (<DL)		Samples (DL-MPL)		Samples (>MPL)	
	DL	MPL		No	%	No	%	No	%
Cl (mg/L)	250	1000	178	152	85.39	24	13.48	2	1.12
SO ₄ (mg/L)	200	400	178	157	88.2	12	6.74	9	5.06
NO ₃ (mg/L)	45	No relax	178	162	91.01	-	-	16	8.99
Fe (mg/L)	0.3	1	178	155	87.08	18	10.11	5	2.81
F (mg/L)	1	1.5	178	163	91.57	14	7.87	1	0.56

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

Table 4.5: Classification of ground water samples by Chemical constituents in Aquifer-II Deeper Aquifer for drinking purpose

Parameter	Drinking water Standards (IS-10500-2012)		Total no of ground water samples	Aquifer-II (Deeper aquifer)					
				Samples (<DL)		Samples (DL-MPL)		Samples (>MPL)	
	DL	MPL		No	%	No	%	No	%
pH	6.5-8.5	-	102	-	-	92	90.2	10	9.8
TDS	500	2000	102	54	52.94	46	45.1	2	1.96
TH	300	600	102	68	66.67	24	23.53	10	9.8
Ca (mg/L)	75	200	102	72	70.59	25	24.51	5	4.9
Mg (mg/L)	30	100	102	60	58.82	37	36.27	5	4.9
Cl (mg/L)	250	1000	102	81	79.41	21	20.59	1	0.98
SO ₄ (mg/L)	200	400	102	89	87.25	9	8.82	4	3.92
NO ₃ (mg/L)	45	No relax	102	84	82.35	-	-	18	17.65
Fe (mg/L)	0.3	1	102	99	97.06	2	1.96	1	0.98
F (mg/L)	1	1.5	87	77	88.51	4	4.6	6	6.9

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

4.5 Suitability of Ground Water for Irrigation

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

4.5.1 Electrical Conductivity (EC)

The amount of dissolved ions in the water is best represented by the parameter electrical conductivity. The classification of water for irrigation based on the EC values is given in **Table 4.6** and discussed as follows: -

Low Salinity Water (EC: 100-250 $\mu\text{S}/\text{cm}$): 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 $\mu\text{S}/\text{cm}$): 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 $\mu\text{S}/\text{cm}$): 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 $\mu\text{S}/\text{cm}$): 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	8	4.49	4	3.92
2	Medium Salinity Water	250 to 750	74	41.57	38	37.25
3	High Salinity Water	750 to 2250	78	43.82	49	48.04
4	Very High Salinity Water	> 2250	18	10.11	11	10.78
Total			178		102	

In Aquifer-I (shallow) as well as Aquifer-II (deeper) aquifer, maximum numbers of samples fall under the category of medium to high salinity type of water. In general, Plants with moderate salt tolerance can be grown in most cases and special management for salinity control may be required and plants with good salt tolerance should be selected. In shallow aquifer around Khadki & Kalamb, Ambegaon taluka, Bhondvewadi, Jalgaon Supe, Nirvagaj, Medad & Morgaon, Baramati taluka, Rahu Sonwadi & Daund, Daund taluka, Pimparisandas & Bhosari, Haveli taluka, Giravi, Ranmodwadi, Varkute Bk & Lumewadi, Indapur taluka and Mawadi Kp & Jawalarjun, Purandhar taluka and deeper aquifer around Ranjangaon, Shirurtaluka, Ambegaon, Daund taluka, Rui, Chandaydewadi & Sonwadisupe, Baramati taluka, Nimgaon, Khed taluka and Nhavi Sanaas, Havelitaluka, wherever high salinity prevails (>2250 $\mu\text{S/cm}$), ground water can be used for irrigation for very high salt tolerant crops and with proper soil and crop management practices

4.5.2 Sodium Absorption Ratio (SAR)

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

It is observed that Sodium hazard is not present in ground water of the area in shallow as well as deeper aquifer, and as per SAR values, the water is suitable for irrigation. In shallow aquifer, out of 99.43 samples are having SAR less than 18 in 'Good' and 'Good to Permissible' category. While in deeper aquifer, 100% samples are having SAR value less than 10 in 'Good' category'. The classification of ground water samples based on SAR values for its suitability for irrigation purpose is shown in Table 4.7.

Table 4.7: Classification of Ground water for Irrigation based on SAR values

Characteristics	Quality Total No of GW samples	SAR value							
		< 10		10-18		18-26		> 26	
		Good		Good to Permissible		Doubtful		Bad (Unsuitable)	
		No. of Samples %	No. of Samples %	No. of Samples %	No. of Samples %	No. of Samples %	No. of Samples %		
Aquifer-I (Shallow Aquifer)	178	175	98.31	2	1.12	0	0.00	1	0.56
Aquifer-II (Deeper Aquifer)	102	102	100.00	0	0.00	0	0.00	0	0.00
Total	280	277	98.93	2	0.71	0	0.00	1	0.36

4.5.3 Residual Sodium Carbonate (RSC):

Residual Sodium Carbonate (RSC) is considered to be superior to SAR as a measure of sodicity particularly at low salinity levels. Calcium reacts with bi-carbonate and precipitate as CaCO_3 . Magnesium salt is more soluble and so there are fewer tendencies for it to precipitate. When

calcium and magnesium are lost from the water, the proportion of sodium is increased resulting in the increase in sodium hazard. This hazard is evaluated in terms of RSC. The classification of ground water samples based on RSC values for its suitability for irrigation purpose is shown in **Table 4.8**.

Table 4.8: Classification of Ground water for Irrigation based on RSC values.

Characteristics	Quality	RSC values (meq/L)					
		< 1.25		1.25-2.50		> 2.50	
		Good		Doubtful		Bad (Unsuitable)	
		Total No of GW samples	No. of Samples %	No. of Samples %	No. of Samples %	No. of Samples %	
Aquifer-I (Shallow Aquifer)	178	167	93.82	3	1.69	8	4.49
Aquifer-II (Deeper Aquifer)	102	90	88.24	8	7.84	4	3.92
Total	280	257	91.79	11	3.93	12	4.29

In Aquifer-I (Shallow Aquifer), it is observed that in general, the ground water of the area is suitable for irrigation as 93.82 % samples show RSC values less than 1.25 meq/l. Only 2.25% samples show RSC values more between 1.25 meq/l and 2.50 meq/l, at Rui, Indapur taluka, Daund, Daund taluka, Pimpalwandi, Junnar taluka and Kasurdi bk, Haveli taluka and 4.5% samples show RSC values more than 2.50 meq/l at Shirasgaon Kata, Shirur taluka, Ravangaon & Patas, Daund taluka Manchar, Ambegaon taluka Rui, Loni Deokar & Shetfal, Indapur taluka and Medad, Baramati taluka -ground water of the these areas is not suitable for irrigation.

Ground water of Aquifer-II (Deeper Aquifer) of the area, in general, is suitable for irrigation as 88.24 % samples show RSC values less than 1.25 meq/l. Only 2.25% samples show RSC values between 1.25 and 2.50 meq/l, at Dehane & Bhorgiri, Khed taluka, Khamunai & Wanewadi, Junnar taluka, Wadgaon Nimbalkar & Pandare, Baramati taluka and Vakil Basti, Indapur taluka and 4.5% samples show RSC values more than 2.50 meq/l at Sasvad, Purandhar taluka, Wadgaon Nimbalkar, Baramati taluka, Chikhali, Khed taluka and Koregaon Mul, Haveli taluka - ground water of the these areas is not suitable for irrigation.

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 Pune district based on GEC-97 methodology. Taluka wise ground water resources are given in table 8.1, and graphical representations of the resources on the map are shown in **Fig 5.1**.

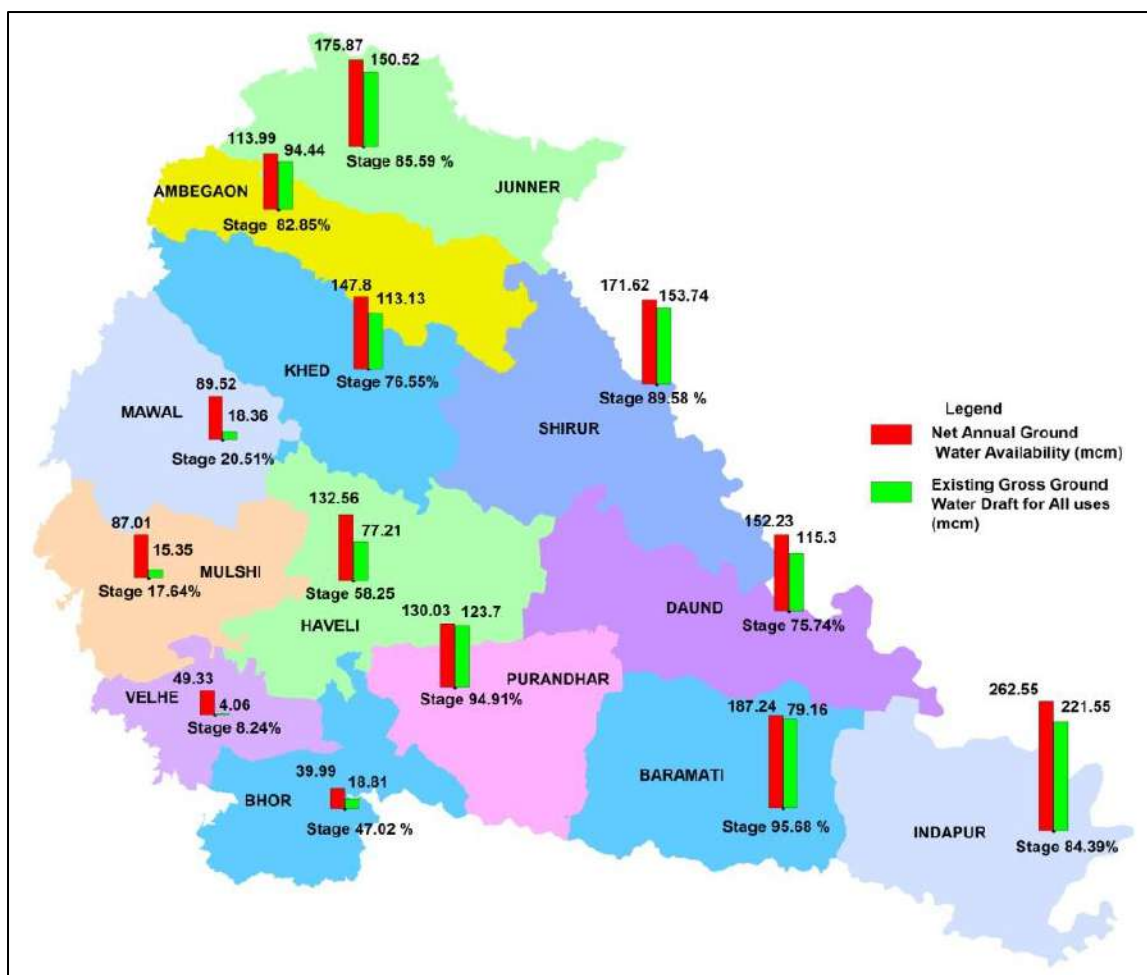


Fig 5.1: Taluka wise Ground Water Resources, 2013, Pune district

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

Administrative Unit	Command / Non-Command / Total	Net Annual Ground Water Availability	Existing Gross Ground Water Draft for irrigation	Existing Gross Ground Water Draft for domestic and industrial water supply	Existing Gross Ground Water Draft for All uses	Provision for domestic and industrial requirement supply to 2025	Net Ground Water Availability for future irrigation development	Stage of Ground Water Development %
Ambegaon	Command	3126.62	2926.46	144.30	3070.76			
Ambegaon	Non Command	8272.41	6070.89	302.53	6373.42			
Ambegaon	Total	11399.03	8997.35	446.82	9444.17	701.24	1904.22	82.85 / Safe
Baramati	Command	9516.01	9352.66	225.17	9577.83			
Baramati	Non Command	9208.90	8098.19	240.80	8338.99			
Baramati	Total	18724.91	17450.85	465.97	17916.82	780.16	1062.70	95.68 / Semi-Critical
Bhor	Command	408.94	12.30	24.32	36.61			
Bhor	Non Command	3590.90	1606.22	237.87	1844.09			
Bhor	Total	3999.84	1618.52	262.19	1880.70	520.43	1860.89	47.02 / Safe
Daund	Command	9463.84	6567.04	245.51	6812.55			

Administrative Unit	Command / Non-Command / Total	Net Annual Ground Water Availability	Existing Gross Ground Water Draft for irrigation	Existing Gross Ground Water Draft for domestic and industrial water supply	Existing Gross Ground Water Draft for All uses	Provision for domestic and industrial requirement supply to 2025	Net Ground Water Availability for future irrigation development	Stage of Ground Water Development %
Daund	Non Command	5759.30	4494.99	223.16	4718.15			
Daund	Total	15223.14	11062.02	468.68	11530.70	895.21	3261.98	75.74 /Safe
Haveli	Command	2705.11	1842.32	272.94	2115.26			
Haveli	Non Command	10551.33	4812.25	794.08	5606.32			
Haveli	Total	13256.44	6654.57	1067.02	7721.59	2146.82	4474.69	58.25 /Safe
Indapur	Command	21539.42	14692.44	1101.53	15793.97			
Indapur	Non Command	4715.88	6261.47	100.35	6361.82			
Indapur	Total	26255.29	20953.91	1201.88	22155.79	1879.84	5362.92	84.39 /Safe
Junnar	Command	5497.52	4570.65	150.02	4720.67			
Junnar	Non Command	12090.11	9934.15	398.13	10332.29			
Junnar	Total	17587.63	14504.80	548.16	15052.96	938.74	2402.36	85.59 /Safe
Khed	Command	2080.44	2007.14	236.50	2243.64			
Khed	Non Command	12699.17	8280.28	789.68	9069.96			
Khed	Total	14779.60	10287.42	1026.19	11313.61	1954.16	2964.95	76.55 /Safe
Maval	Command	495.35	86.06	28.37	114.43			
Maval	Non Command	8457.11	1365.92	356.03	1721.95			
Maval	Total	8952.47	1451.98	384.40	1836.38	767.45	6732.61	20.51 /Safe
Mulshi	Command	634.72	163.26	22.97	186.23			
Mulshi	Non Command	8067.09	644.76	703.91	1348.68			
Mulshi	Total	8701.82	808.02	726.88	1534.90	1453.76	6440.03	17.64 /Safe
Purandhar	Command	2261.83	1009.07	26.97	1036.04			
Purandhar	Non Command	10772.04	11027.11	307.06	11334.17			
Purandhar	Total	13033.87	12036.18	334.03	12370.21	579.21	992.23	94.91 /Semi-Critical
Shirur	Command	7819.84	6530.88	435.12	6965.99			
Shirur	Non Command	9342.15	7901.20	507.35	8408.55			
Shirur	Total	17161.99	14432.07	942.47	15374.54	1573.85	2378.42	89.58 /Safe
Velhe	Command	62.88	2.51	18.91	21.42			
Velhe	Non Command	4870.43	263.09	122.22	385.31			
Velhe	Total	4933.31	265.60	141.12	406.73	253.54	4395.51	8.24/Safe
Total (ham)		174009.35	120523.31	8015.80	128539.11	14444.40	44233.51	73.87 /Safe
Total (MCM)		1740.09	1205.23	80.16	1285.39	144.44	442.34	

Ground Water Resources estimation was carried out for 12480.06 sq. km. area (15642 sq. km. Geographical area –2884.73 sq. km. hilly area - 277.21 sq. km. area has poor ground water quality area), out of which 3378.17 sq. km. is under command and 9101.89 sq. km. is non-command. As per the estimation, the net annual ground water availability comes to be 1740.09 MCM. The gross draft for all uses is estimated at 1285.39 MCM with irrigation sector being the major consumer having a draft of 1205.23 MCM. After making provision for Domestic and Industrial Supply, projected for 2025, kept as 144.44 MCM, Ground Water Availability for future Irrigation is 442.34 MCM. Stage of ground water development varies from 47.02% (Bhor taluka) to 94.91 % (Purandhar taluka). The overall stage of ground water development for the district is 73.87%. Two Talukas namely Baramati and Purandhar are categorized as "Semi-Critical" where stage of ground water development is computed as 95.68% and 94.91 % respectively, while rest of the Talukas are categorized as "Safe".

5.2 Ground Water Resources – Aquifer-II

The ground water resources of Aquifer-II (Basalt) were also assessed to have the correct quantification of resources so that proper management strategy can be framed. The total resources of aquifer-II have been estimated as 259.64 MCM. Taluka wise summarized Ground Water Resources of Aquifer-II are given in **Table 5.2**.

Table 5.2: Taluka wise summarized Ground Water Resources of Aquifer-II (Deeper aquifer)

Taluka	Mean thickness (m)	Area (sqkm)	Piezometric head (m)	Sy	S	Resource above confining layer (MCM)	Resource in confining aquifer (MCM)	Total Resource (MCM)
AMBEGAON	2	325.4	35	0.005	0.00012	1.36668	3.254	4.62068
AMBEGAON	4.5	25.72	25	0.003	0.00036	0.22955	0.34722	0.57677
AMBEGAON	4.5	200.5	30	0.003	0.00026	1.54586	2.70675	4.25261
AMBEGAON	4.5	100.3	20	0.005	0.00012	0.24072	2.25675	2.49747
AMBEGAON	7.5	38.79	15	0.003	0.00016	0.09135	0.87278	0.96413
AMBEGAON	10.5	96.15	25	0.005	0.00016	0.37739	5.04788	5.42526
BARAMATI	0.75	88.8244	35	0.005	0.00012	0.37306	0.33309	0.70615
BARAMATI	0.75	9.25221	25	0.003	0.00036	0.08258	0.02082	0.10339
BARAMATI	0.75	20.8415	30	0.003	0.00026	0.16069	0.04689	0.20758
BARAMATI	2	771.953	20	0.005	0.00012	1.85269	7.71953	9.57222
BARAMATI	4.5	11.3855	15	0.003	0.00016	0.02681	0.1537	0.18052
BARAMATI	4.5	225.733	25	0.005	0.00016	0.886	5.07899	5.96499
BARAMATI	7.5	89.2504	35	0.005	0.00012	0.37485	3.34689	3.72174
BARAMATI	7.5	67.5332	25	0.003	0.00036	0.60273	1.5195	2.12223
BARAMATI	10.5	49.8139	30	0.003	0.00026	0.38407	1.56914	1.9532
BARAMATI	10.5	43.1501	20	0.005	0.00012	0.10356	2.26538	2.36894
BHOR	2	217.87	15	0.003	0.00016	0.51308	1.30722	1.8203
BHOR	4.5	19.8227	25	0.005	0.00016	0.0778	0.44601	0.52381
BHOR	4.5	102.548	35	0.005	0.00012	0.4307	2.30733	2.73803
DAUND	2	602.077	25	0.003	0.00036	5.37354	3.61246	8.986
DAUND	4.5	396.723	30	0.003	0.00026	3.05873	5.35576	8.41449
DAUND	4.5	211.722	20	0.005	0.00012	0.50813	4.76375	5.27188
DAUND	7.5	35.0147	15	0.003	0.00016	0.08246	0.78783	0.87029
DAUND	7.5	15.9861	25	0.005	0.00016	0.06275	0.59948	0.66222
DAUND	7.5	3.06496	35	0.005	0.00012	0.01287	0.11494	0.12781
HAVELI	4.5	58.1262	25	0.003	0.00036	0.51878	0.7847	1.30348
HAVELI	4.5	207.266	30	0.003	0.00026	1.59802	2.79809	4.39611
HAVELI	7.5	312.2093	20	0.005	0.00012	0.7493	11.7078	12.4572
HAVELI	7.5	60.4811	15	0.003	0.00016	0.14243	1.36082	1.50326
HAVELI	10.5	0.000127	25	0.005	0.00016	5E-07	6.7E-06	7.2E-06
VELHE	2	577.847	15	0.003	0.00016	1.36083	3.46708	4.82791
INDAPUR	2	540	30	0.005	0.00025	4.05	5.4	9.45

Taluka	Mean thickness (m)	Area (sqkm)	Piezometric head (m)	Sy	S	Resource above confining layer (MCM)	Resource in confining aquifer (MCM)	Total Resource (MCM)
INDAPUR	4.5	725.8	25	0.003	0.00016	2.84877	9.7983	12.6471
INDAPUR	7.5	202.1	25	0.003	0.00016	0.79324	4.54725	5.34049
JUNNER	2	373.6	30	0.005	0.00012	1.34496	3.736	5.08096
JUNNER	4.5	156.5	30	0.003	0.00026	1.20662	2.11275	3.31937
JUNNER	7.5	567.6	20	0.005	0.00012	1.36224	21.285	22.6472
KHED	2	528.577	30	0.005	0.00025	3.96433	5.28577	9.2501
KHED	4.5	137.224	25	0.003	0.00016	0.5386	1.85252	2.39113
KHED	4.5	303.312	25	0.003	0.00016	1.1905	4.09471	5.28521
KHED	7.5	20.3771	30	0.005	0.00012	0.07336	0.76414	0.8375
KHED	7.5	108.417	30	0.003	0.00026	0.8359	2.43938	3.27528
KHED	10.5	185.809	20	0.005	0.00012	0.44594	9.75497	10.2009
MAWAL	0.75	163.038	30	0.005	0.00025	1.22279	0.61139	1.83418
MAWAL	2	434.235	25	0.003	0.00016	1.70437	2.60541	4.30978
MAWAL	4.5	134.783	25	0.003	0.00016	0.52902	1.81957	2.34859
MAWAL	7.5	54.6315	30	0.005	0.00012	0.19667	2.04868	2.24535
MULSHI	0.75	54.341	30	0.003	0.00026	0.41897	0.12227	0.54124
MULSHI	2	277	20	0.005	0.00012	0.6648	2.77	3.4348
MULSHI	4.5	113.28	30	0.005	0.00025	0.8496	2.5488	3.3984
PUNE CITY	2	1011	25	0.003	0.00016	3.96818	6.066	10.0342
PURANDHAR	0.75	9.73975	25	0.003	0.00016	0.03823	0.02191	0.06014
PURANDHAR	0.75	198.319	30	0.005	0.00012	0.71395	0.7437	1.45764
PURANDHAR	2	632.139	30	0.003	0.00026	4.87379	3.79283	8.66663
PURANDHAR	4.5	126.117	20	0.005	0.00012	0.30268	2.83763	3.14031
PURANDHAR	4.5	9.34553	30	0.005	0.00025	0.07009	0.21027	0.28037
PURANDHAR	4.5	0.228842	25	0.003	0.00016	0.0009	0.00309	0.00399
SHIRUR	2	722.099	25	0.003	0.00016	2.83424	4.33259	7.16683
SHIRUR	4.5	297.75	30	0.005	0.00012	1.0719	6.69938	7.77128
SHIRUR	7.5	466.178	30	0.003	0.00026	3.59423	10.489	14.0832
						64.8969	194.746	259.643

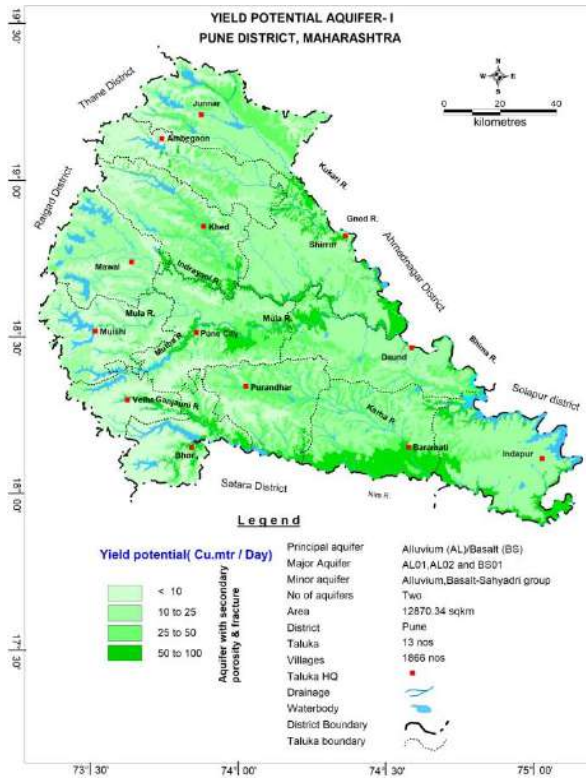
6.0 Ground Water Related Issues

6.1 Low Ground Water Potential

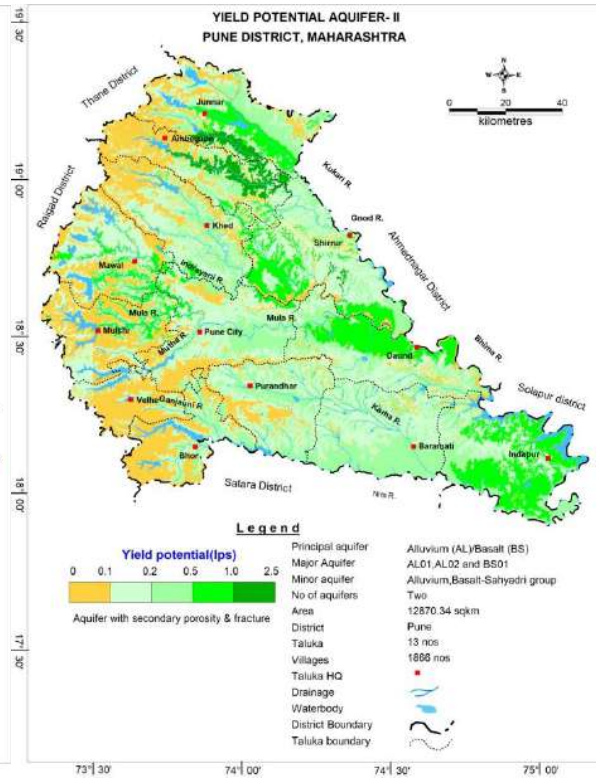
Aquifer – I : Low ground water potential areas have been identified in major part of Pune District, Yield is less than 25 m³/day, mostly due to limited depth of weathering and fractures in Aquifer-I (Basalt).

Aquifer – II: Limited aquifer potential of Aquifer-II (Basalt) is identified in major part of Pune District, especially in about 2388.5 sq km (about 71.27 % of Ambegaon, Indapur & Junnar taluka, having yield potential less than 1.0 lps.

Sustainability of both the aquifers is limited and the wells normally sustain pumping of 0.5 to 3 hours.

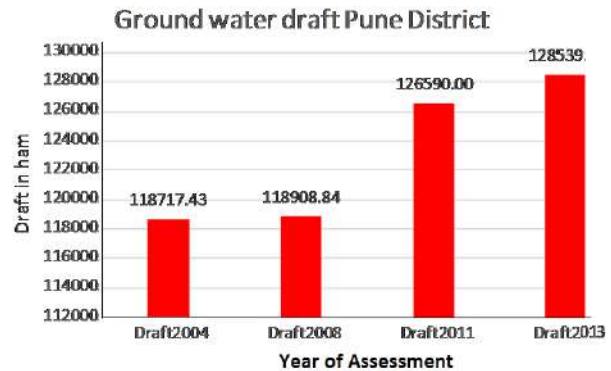
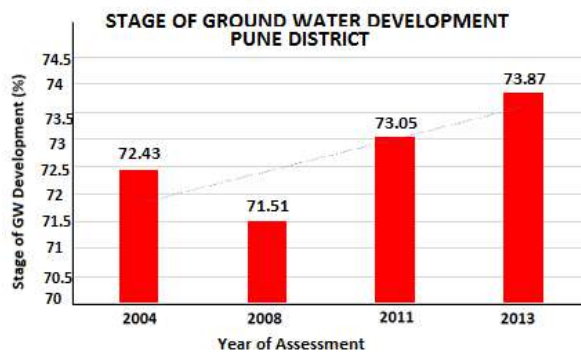


Aquifer -I yield potential



Aquifer -II yield potential

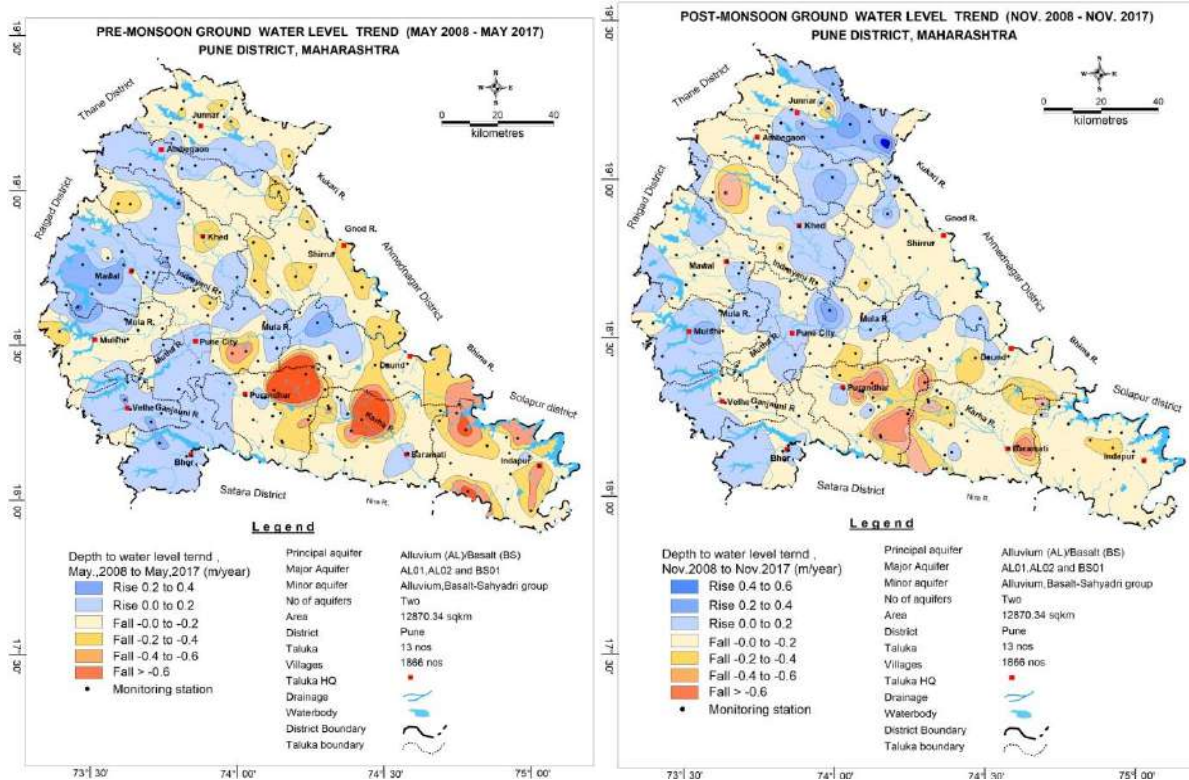
6.2 Exploitation of Ground Water - Continuous Increase in Draft and Increase in Stage of Ground Water Development



The stage of ground water development has increased over the period of time from 2004 to 2013 in all the talukas from 72.43 % to 73.87 % .The main reason for ground water overdraft is intensive irrigation for cash crop. Overall draft for these talukas has increased from 1187.17 MCM in 2004 to 1285.39 MCM in 2013

6.3 Declining Water Levels

Low rainfall, frequent drought and 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 3300 sq km, i.e., 21 % area covering part of Purandhar, Baramati, Indapur, Haveli and Daund talukas and isolated parts of Khed, Shirur, Junnar and Mulshi talukas. In post monsoon season, decline more than 0.20 m/year has been observed in 1395 sq km, i.e., 8.9 % area covering patches in part of Purandhar, Baramati and Khed talukas.



Premonsoon Fall @ >0.2m/year 3300 Sq km

Postmonsoon Fall @ >0.2m/year 1395 sq km

6.4 Low Rainfall (Rain Shadow area) and Droughts

Based on the decadal rainfall trend analysis from 2008 to 2017 it is observed that the all talukas of Pune district experience low and declining rainfall trend since from 2013 to 2016 (2017, however, recorded good rainfall), and drought area have been observed in eastern part of the district i.e., Daund, Indapur, Baramati, Purandhar, Shirur and Haveli. These talukas are also experiencing decling rainfall trend @ 0.74 mm/yr at Indapur, -1.29 mm/year at Ambegaon and @ -1.374 mm/yr at Junnar. Thus, indicating that these talukas are experiencing low and declining rainfall with frequent droughts.

6.5 Caving and loss of drilling formation:

Red boles, black boles, the intertrappean beds, have collapsible nature when they are saturated. The weathered/highly fractured saturated formation at the contact zones also collapse as a result of which drill rods assembly gets stuck up. This sometimes leads to loss of circulation of fluid there by compounding the problems further. The red bole is usually encountered at the depth of more than 170 m in this area with thickness ranging from 8 to 10 m. The water bearing zones encountered fills up the bore well and that infuses the bole beds in the succession resulting in the collapse of the bole beds. The casing or cement sealing of the red bole is not possible below 100 m bgl, as the present rig is equipped to lower casing down to 100 m bgl depth. Loss of air in jointed and fractured Basalt was observed during drilling. The problem can be solved by sealing the zones by lowering casing or by cement sealing. This process may often damage the potential aquifer zones if not carried out meticulously with proper equipment. This problem was noticed during drilling of exploratory well at CWPRS, Khadakwasla, Pune.

7.0 Management Plan

Taluka wise aquifer management plan have been prepared for Aquifer I (Weathered and jointed fractured Basalt) and Aquifer II (jointed and fractured basalt), with the objective of bringing the current stage of ground water development up to 70% by adopting supply side and demand interventions, for the five talukas (out of 14 talukas of Pune District), namely, Ambegaon, Indapur, Junnar, Baramati and Purandhar talukas, where aquifer mapping has been completed till 2017-18. The management plan has been proposed to manage the ground water resources and to arrest further decline in water levels. The management plan comprises two components namely supply-side management and demand side management. The supply side Management is proposed based on surplus surface water availability and the unsaturated thickness of aquifer whereas the demand side management is proposed by use of micro irrigation techniques. Change in cropping pattern towards less water-intensive irrigation crops (Demand side intervention) has not been proposed in the area cash crop cultivation drives the economy of the region.

7.1 Supply Side Management

The supply side management of ground water resources can be done through the artificial recharge of surplus runoff available within river sub basins and micro watersheds. Also, it is necessary to understand the unsaturated aquifer volume available for recharge. The unsaturated volume of aquifer was computed based on the area feasible for recharge, unsaturated depth below 5 mbgl and the specific yield of the aquifer. The **Table 7.1** gives the taluka wise volume available for the recharge.

Table 7.1: Area feasible and volume available for Artificial Recharge

Taluka	Geographical Area (sq. km.)	Area feasible for recharge (Sq km)	Unsaturated Volume (MCM)
Ambegaon	786.71	251.93	503.86
Indapur	1467.62	1144.09	2288.18
Junnar	1097.57	780.695	1561.39
Baramati	1383.63	559.67	1119.34
Purandhar	1082.46	249.935	499.87
Total	5817.99	2986.32	5972.64

The total unsaturated volume available for artificial recharge is 5972.64 MCM and it ranges from 499.87 MCM in Purandhar taluka to 2288.18 MCM in Indapur taluka. The available surplus runoff can be utilized for artificial recharge through construction of percolation tanks, Check dams and recharge shafts at suitable sites. The number of percolation tanks, and check dams are decided based on the number of suitable streams available in the district.

Thus, after taking into consideration all the factors, only 73.16 MCM of surplus water can be utilised for recharge, which is given in table 10.2. This surplus water can be utilized for constructing 692 check dams with estimated expenditure of Rs. 207.6 crores and 262 percolation tanks with estimated expenditure of Rs. 393 crores 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 54.87 MCM/year. Tentative locations of these structures are given in fig. 10.1 and details also given in **Annexure VII** (Percolation Tanks) and **Annexure VIII** (Check Dams).

Rainwater harvesting in urban areas can be adopted in 25% of the household with 50 Sq. m roof area. A total of 55 MCM potential can be generated by taking 80% runoff coefficient. The estimated cost for rainwater harvesting through rooftop is calculated as Rs. 134 crore. Hence, this technique is not economically viable and therefore it is not recommended.

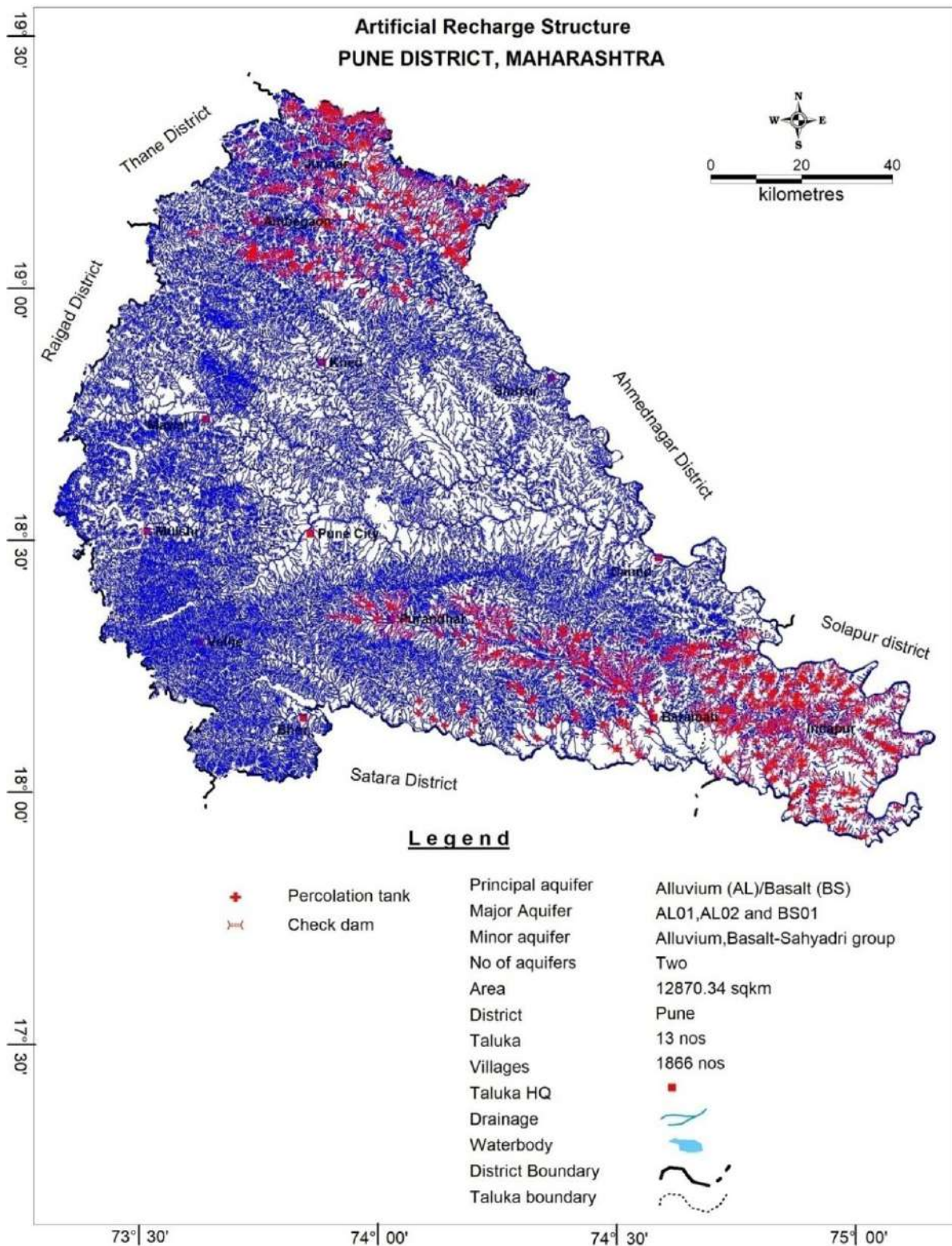


Fig 7.1: Proposed Artificial Recharge structures

Table 7.2: Proposed Recharge Structures

Taluka	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 recharged @ 75 % efficiency (MCM)
					PT	CD	PT	CD	
Ambegaon	786.71	251.93	503.86	6.17	22	59	3.3	1.3275	4.63
Indapur	1467.62	1144.09	2288.18	28.03	98	281	14.7	6.3225	21.0225
Junnar	1097.57	780.695	1561.39	19.13	67	191	10.05	4.2975	14.3475
Baramati	1383.63	559.67	1119.34	13.71	54	97	8.1	2.1825	10.2825
Purandhar	1082.46	249.935	499.87	6.12	21	64	3.15	1.44	4.59
Total	5817.99	2986.32	5972.6	73.16	262	692	39.30	15.57	54.87

7.2 Demand Side Management

A demand side intervention such as change in cropping pattern has not been proposed in the area cash crop cultivation drives the economy of the region. However, as discussed earlier, there is a scope for increasing areas under micro-irrigation techniques (**Table 7.3**) like drip irrigation (about 372.5 sq km area of sugarcane, of which 166 sq. km. is under groundwater irrigation and 17.71 sq. km. area of onion crop as also about 40% of Double crop area (65.0 Sq km) is proposed to be covered under Drip). Volume of Water expected to be saved is estimated as 94.62 MCM in sugarcane crop (Sugarcane Surface Flooding irrigation req- 2.45 m. Drip Req. - 1.88, WUE- 0.57 m) and 28.51 MCM in Onion crop (Onion requirement - 0.78 m, Drip - 0.52 m) with Estimated Expenditure of Rs. 246.1116 Crore and Rs. 46.1249 Crore respectively.

Table 7.3: Demand Side Management - -Area Proposed for Drip Irrigation

Taluka	Geographical Area (Sq km)	Sugarcane crop area sq km	Sugarcane crop area under ground water irrigation (100% ground water irrigated area proposed to be covered under Drip) (sq.km.)	Volume of Water expected to be saved (MCM). Surface Flooding req- 2.45 m. Drip Req. - 1.88, WUE- 0.57 m	Area proposed to be covered under Drip (sq.km.) Onion area	Volume of Water expected to be conserved (MCM). (Onion requirement - 0.78 m, Drip - 0.52 m)	Area proposed to be covered under Drip (sq.km.) double crop area	Volume of Water expected to be conserved (MCM). DC requirement - 0.90 m, Drip - 0.40 m,	Total water saved (MCM)
Ambegaon	786.71	44.04	20	11.4	2	0.52			11.92
Indapur	1467.62	89.34	40	22.8	5	1.3			24.10
Junnar	1097.57	78.17	30	17.1	2.71	0.7046			17.80
Baramati	1383.63	155.3	72	41.04		0			41.04
Purandhar	1082.46	5.62	4	2.28	8	2.08	65	26	30.36
Total	5817.99	372.47	166	94.62	17.71	4.6046	65	26	125.22

7.3 Expected Benefits

The impact of groundwater management plans on the groundwater system in the district after its implementation is evaluated and the outcome shows significant improvement in groundwater scenario in all talukas as given in the **Table 7.4**.

Table 7.4: Expected benefits after management options

Taluka	Water Recharged by Supply side intervention (MCM)	Water saving by demand side interventions (MCM)	Net Ground water availability (MCM)	Total ground water draft (MCM)	Ground water resources after supply side management(MCM)	Ground water Draft after demand side management (MCM)	Expected stage of Development (%)
Ambegaon	4.6275	11.92	113.99	94.44	118.62	82.52	69.57
Indapur	21.0225	24.1	262.55	221.55	283.57	197.45	69.63
Junnar	14.3475	17.8046	175.88	150.52	190.23	132.72	69.77
Baramati	10.2825	41.04	187.25	179.17	197.53	138.13	69.93
Purandhar	4.59	30.36	130.34	123.70	134.93	93.34	69.18
Total	54.87	125.2246	870.01	769.38	924.88	644.16	69.65

7.4 Development Plan:

The ground water development plan is recommended to bring the stage of development upto 70%. Balance ground water resources available for ground water development is 3.26 MCM after the stage of is bought up to 70% after implementing demand side management, which can bring additional 5.02 sq. km. area under assured ground water irrigation. The details of the development plan are given in **Table 7.5**.

Table 7.5: Development Plan proposed

Taluka	Ground water resources after supply side management (MCM)	Ground water Draft after demand side management (MCM)	Expected stage of Development %	Balance GWR available for GW Development after STAGE OF GWD is brought to 70% (MCM)	Proposed No. of DW @1.5 ham for 90% of GWR Available)	Proposed No. of BW @1.5 ham for 10% of GWR Available)	Additional Area (sq.km.) proposed to be brought under assured GW irrigation with av. CWR of 0.65 m after 70% stage of GWD is achieved (Sq.Km)
Ambegaon	118.62	82.52	69.57	0.51225	31	3	0.79
Indapur	283.57	197.45	69.63	1.05075	63	7	1.62
Junnar	190.23	132.72	69.77	0.44385	27	3	0.68
Baramati	197.53	138.13	69.93	0.14275	9	1	0.22
Purandhar	134.93	93.34	69.18	1.111	67	7	1.71
Total	924.88	644.16	69.65	3.2606	196	22	5.02

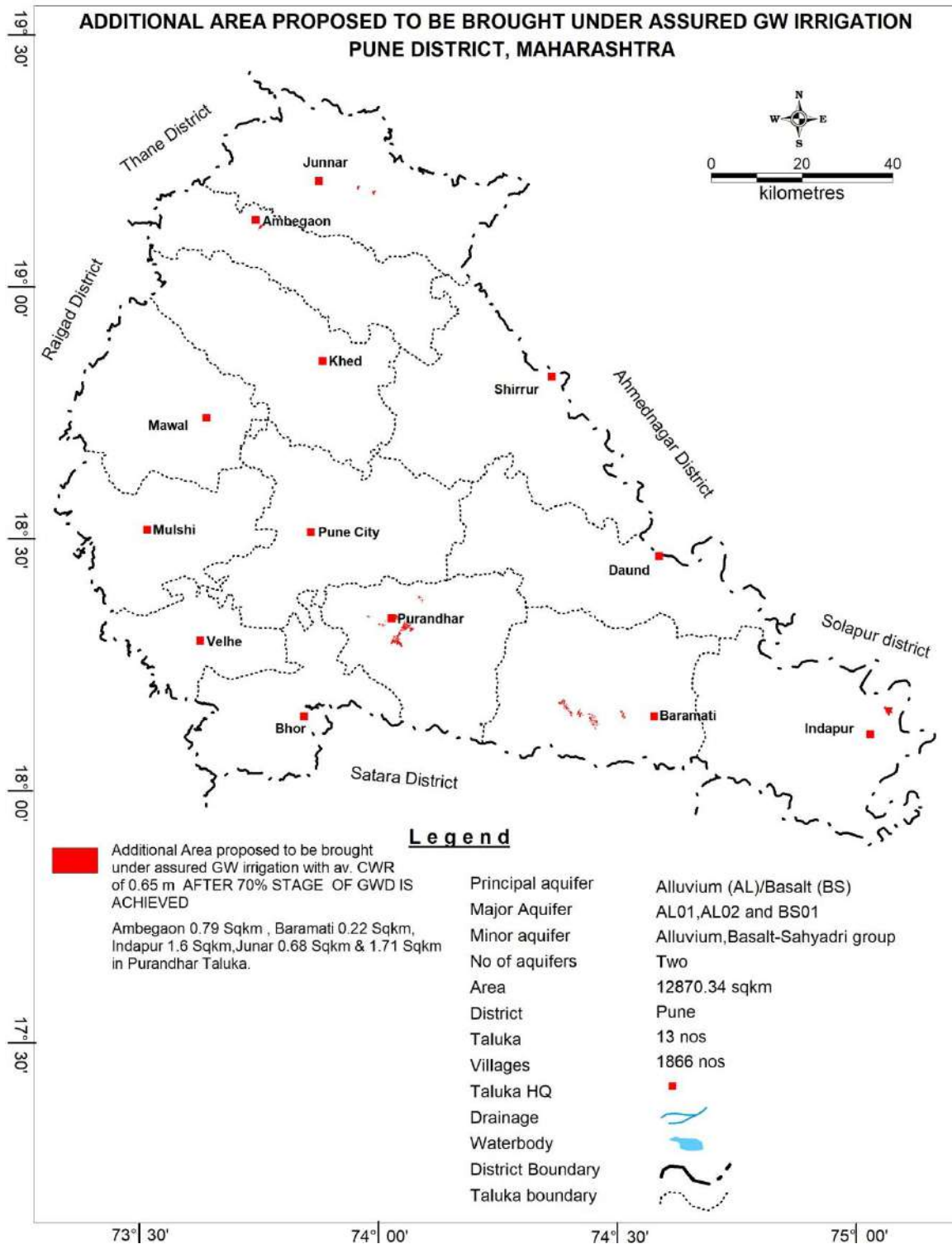


Fig 7.2: Additional area under Assured GW irrigation.

8.0 SUM UP

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

Pune is the second largest district of Maharashtra State in respect of area, with a geographical area of 15642 sq. km. The district forms part of Western Ghat and Deccan Plateau. Physiographically the district shows a hilly and undulating terrain, with altitude ranging between 100 and 500 m above MSL - Pune stands on the leeward side of the Western Ghats. The district comes under Krishna River Basin and is drained by River Bhima and its tributaries, namely Pushpavati, Krushnavati, Kukadi river, Meena, Ghod River, Bhama, Andhra, Indrayani river, Pavna River, Mula river, Mutha river, Ambi, Mose, Shivganga, Kanandi, Gunjavni, Welvandi river, Nira river, Karha river, and Velu. The average rainfall is about 1000 mm. The drought prone areas in the east receive rainfall of 500 to 600 mm. Talukas with the low rainfall intensity, the dry and semi-arid zone (rainfall < 500 mm, being a rain shadow region of the Sahyadrian mountainous zone) are Shirur, Daund, Indapur and Baramati.

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

For Aquifer-I (Deccan Trap- Weathered/Fractured Basalt), yield varies from 10 to 100 m³/day, the specific capacity of the wells ranges from 1.7 to 18.9 lpm/m of draw down, the permeability ranges from 12 to 65 m/day and the transmissivity ranges from 5.0 to 55 m²/day. The specific yield ranges from 0.019 to 0.028. The depth to water levels during premonsoon (May 2017) ranges between 0.9 (Jambhul, Mawal taluka) and 30.35 mbgl (Pargaon, Purandhar taluka) and during post-monsoon (Nov. 2017) ranges between ground level (Kondhawale, Tamhini Bk and Viseghar, Mulshi taluka, Vadgaon Mawal, Mawal taluka and Ambhu, Khed taluka) and 25.2 mbgl (Pargaon, Purandhar taluka). Deep water levels of the order of 20 m bgl are observed in patches in Haveli, Ambegaon, Junnar, Shirur, Indapur, Baramati and Purandhar talukas. The analysis of hydrographs show rising trends of water levels during the premonsoon and postmonsoon periods, inspite of the fact that Ambegaon, Indapur, Junnar, Baramati and Purandhar talukas of Pune district have stage of ground water development higher than 80%. This is partly due to 'above average' rainfall during 2017 and partly due to seepage from canals and percolation from rain water harvesting structures, that are increasingly becoming popular in the district. For Pune district, as per Ground Water Resource Estimation (2013), the net annual ground water availability is 1740.09 MCM. The gross draft for all uses is estimated at 1285.39 MCM with irrigation sector being the major consumer having a draft of 1205.23 MCM. The overall stage of ground water development for the district is 73.87%. Two Talukas namely Baramati and Purandhar are categorized as "Semi-Critical" where stage of ground water development is computed as 95.68% and 94.91 % respectively, while rest of the Talukas are categorized as "Safe".

In Deeper Aquifer-II (Jointed/Fractured Basalt), yield is low (less than 2.5 lps), the transmissivity varies from 18 to 89 m²/day. The storage coefficient varied between 0.00034 to 6.37 x10⁻⁴. The pre-monsoon depth to water levels during May 2017, range from 9.00 (Sherechiwadi, Wadgaon Nimbalkar, Baramati Taluka, CWPRS, Lohgaon, Haveli Taluka, and Lavale, Mulshi Taluka) to 70.00 mbgl (Ambhi Khurd, Pandhare, Baramati Taluka and Parainche, Purandhar Taluka) and post monsoon (Nov. 2017) depth to water levels range between 1.50 (Singapur, Purandhar taluka) and

45.00 mbgl (Ambhi Khurd, Pandhare, Baramati Taluka and Parainche, Purandhar Taluka).

In shallow aquifer, the quality of ground water is found suitable for drinking, domestic, and irrigation purposes. Around Khadki & Kalamb, Ambegaon taluka, Bhondvewadi, Jalgaon Supe, Nirvagaj, Medad & Morgaon, Baramati taluka, Rahu Sonwadi & Daund, Daund taluka, Pimparisandas & Bhosari, Haveli taluka, Giravi, Ranmodwadi, Varkute Bk & Lumewadi, Indapur taluka and Mawadi Kp & Jawalarjun, Purandhar taluka, very high salinity prevails ($EC > 2250 \mu S/cm$), ground water may be used for drinking only after suitable treatment and for irrigation, water can be used for very high salt tolerant crops and with proper soil and crop management practices. In shallow aquifer, high concentration of fluoride is found in Medad village, Baramati taluka (2.89 mg/l). RSC values more than 2.50 meq/l are found at Shirasgaon Kata, Shirur taluka, Ravangaon & Patas, Daund taluka Manchar, Ambegaon taluka Rui, Loni Deokar & Shetfal, Indapur taluka and Medad, Baramati taluka - ground water of the these areas is not suitable for irrigation.

In Deeper aquifer, the quality of ground water is found suitable for drinking, domestic, and irrigation purposes. Around Chandaydewadi, Sonwadisupe, Rui & Sherechiwadi, Baramati taluka, Ranjangaon, Shirur taluka, Rakh, Purandhar taluka and Nhavi Sanaas, Haveli taluka have more than one parameter like TH, Ca, Mg, Cl, SO_4 and NO_3 beyond the maximum permissible limit for drinking, indicating water from such area is not fit for drinking purpose if directly consumed without treatment. Fluoride concentration more than permissible limit is observed in ground water samples from deeper aquifer at Khamunai, Junnar taluka, Aпти, Bhor taluka, Nhavi Sanaas, Haveli taluka, Sonwadisupe, Baramati taluka and Waghapur, Purandhar taluka and ground water from deeper aquifer of the these areas may be used with caution for drinking water. Ground water of deeper aquifer of the area, in general, is suitable for irrigation. However, RSC values more than 2.50 meq/l at Sasvad, Purandhar taluka, Wadgaon Nimbalkar, Baramati taluka, Chikhali, Khed taluka and Koregaon Mul, Haveli taluka - ground water of the these areas is not suitable for irrigation.

Taluka wise aquifer management plan have been prepared for Aquifer I (Weathered and jointed fractured Basalt) and Aquifer II (jointed and fractured basalt), with the objective of bringing the current stage of ground water development up to 70% by adopting supply side and demand interventions, for the five talukas (out of 14 talukas of Pune District), namely, Ambegaon, Indapur, Junnar, Baramati and Purandhar talukas, where aquifer mapping has been completed till 2017-18. The management plan has been proposed to manage the ground water resources and to arrest further decline in water levels. The management plan comprises two components namely supply-side management and demand side management. The supply side Management is proposed based on surplus surface water availability and the unsaturated thickness of aquifer whereas the demand side management is proposed by use of micro irrigation techniques. Change in cropping pattern towards less water-intensive irrigation crops (Demand side intervention) has not been proposed in the area cash crop cultivation drives the economy of the region. The supply side interventions include utilizing 54.87 MCM (out of 73.162 MCM) of Surplus runoff water by a proposal to construct 262 Percolation Tanks with estimated expenditure of Rs. 393 crores and 692 Check Dams with estimated expenditure of Rs. 207.6 crores. This supply side intervention should lead to recharge (@ 75% efficiency) of about 54.87 MCM/year. The demand side interventions include proposal to bring 100 % ground water irrigated Sugarcane crop area (166 sq.km.) and Onion crop area (17.71 sq. km. area of onion crop as also about 40% of Double crop area (65.0 Sq km) is proposed to be covered under Drip) to be covered under Drip Irrigation. Volume of Water expected to be saved is estimated as 94.62 MCM in sugarcane crop (Sugarcane Surface Flooding irrigation req- 2.45 m. Drip Req. - 1.88, WUE- 0.57 m) and 28.51 MCM in Onion crop (Onion requirement - 0.78 m, Drip - 0.52 m) with Estimated Expenditure of Rs. 246.1116 Crore and Rs. 46.1249 Crore respectively.

Balance ground water resources available for ground water development is 3.26 MCM after the stage of is brought up to 70% after implementing demand side management, which can bring additional 5.02 sq. km. area under assured ground water irrigation.

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

PROPOSED MANAGEMENT PLAN

**Augmentation by AR -
40.0 MCM**



**Aquifer I Resources -
Dy- 552.42 MCM
In storage- 0.14**

**Aquifer II Resources -
73.756 MCM**

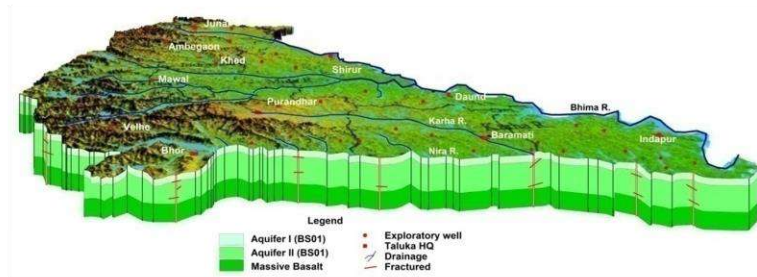
**GW scenario after implementing
Supply side interventions /Artificial Recharge
GWA 552.42 + 40.0 MCM by AR
= 592.42 MCM**

**Demand Side/ WUE Measures
GW saved by WUE measures: 54.59 MCM.
GW quantum required to bring stage of GWD
@70% :-51.82 mcm**

**Total Draft Will be 466.51 – 51.3 = 415.21 mcm
GWR available for Development after bringing
stage of GWD up to 70% = 2.77 mcm**

**GW quantum saved by
WUE - 54.59 MCM**

**Total Draft -
466.51 MCM**



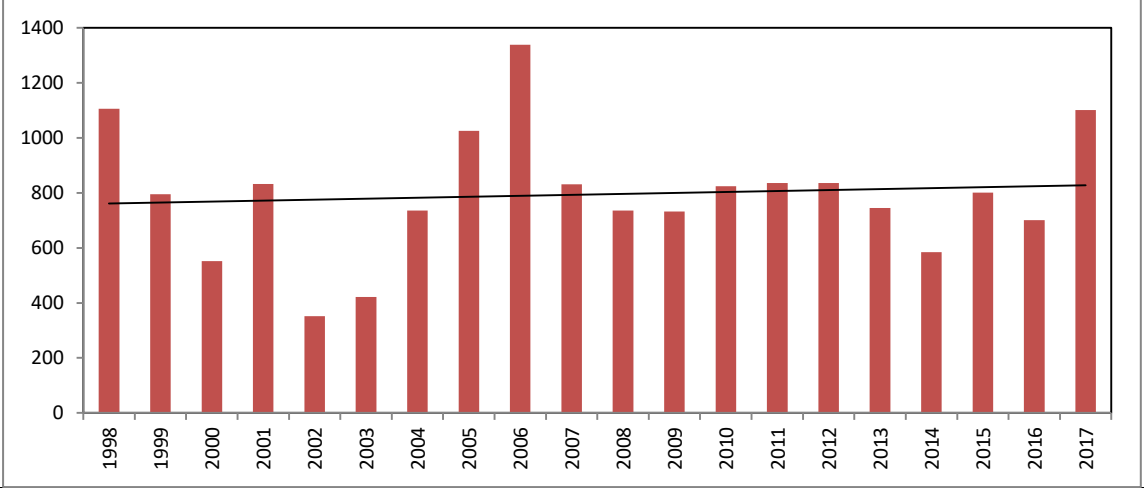
PROBABLE BENEFITS AFTER IMPLEMENTING AR & WUE MEASURES

- Bringing down to STAGE OF GW DEVELOPMENT to 70 % from Present stage of GW development of 82.85% , 84.39% & 85.59% of Ambegaon ,Indapur and Junnar respectively with enhance availability of GWR after supply side & Demand side intervention,
- Beside this, about 427 ha of additional Area can also be brought under assured GW irrigation from 2.77 MCM of Balance GWR available for GW Development after STAGE OF GWD is brought to 70% (safe category)

BLOCK WISE AQUIFER MAPS AND MANAGEMENT PLAN

- 1 AMBEGAON TALUKA**
- 2 BARAMATI TALUKA**
- 3 INDAPUR TALUKA**
- 4 JUNNAR TALUKA**
- 5 PURANDHAR TALUKA**

9.0 AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, AMBEGAON TALUKA, PUNE DISTRICT, MAHARASHTRA

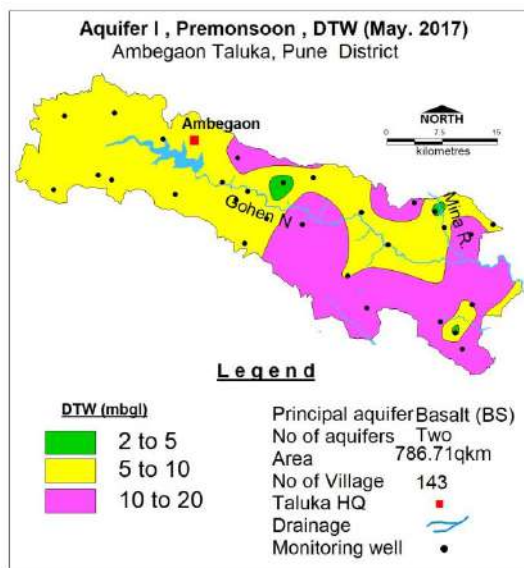
1. SALIENT FEATURE							
1.1 Introduction							
Taluka Name				Ambegaon			
Geographical Area (Sq. Km.)				997.18			
Hilly Area (Sq. Km)				210.47			
Mapable Area (Sq. Km.)				786.71			
Saline Area (Sq. Km.)				0			
Population (2011)				235972			
Climate				Tropical Monsoon			
1.2 Rainfall Analysis							
Normal Rainfall				794 mm			
Annual Rainfall (2017)				1100.2 mm			
Decadal Average Annual Rainfall (2008-17)				487.51 mm			
Long Term Rainfall Analysis (1998-2017)		Rising Trend 3.5 mm/year Probability of Normal/Excess Rainfall- 60% & 20%. Probability of Drought (Moderate/Severe)-: 15 % Moderate & 5 % Severe.					
Rainfall Trend Analysis (1998 to 2017) <i>EQUATION OF TREND LINE: $y = 3.498x + 757.2$</i>							
							
1.3. Geomorphology & Geology							
Geomorphic Unit		Plateau (Undissected to highly Dissected) with weathered thickness ranging from 0 to 5 m with escarpment slopes.					
Geology		Deccan Traps (Basalt) Age: Upper Cretaceous to Lower Eocene					
1.4. Hydrology & Drainage							
Drainage		Bhima-Ghod River System – Mina River, Gohen Nadi watershed, streams originating from hills in the north-west.					
Hydrology	Major Project	Medium Project	Minor Project	Percolation Tank	KT weir	Check Dam	Lift Irrigation
	1	0	1	1	49	5	1
1.5. Land Use, Agriculture, Irrigation & Cropping Pattern							
Geographical Area (Sq. Km.)				1042.75			
Forest Area (Sq. Km.)				243			
Cultivable Area (Sq. Km.)				779.04			

Net Sown Area (Sq. Km.).		632.18
Double Cropped Area (Sq. Km.)		146.86
Area under Irrigation (Sq. Km.)	Surface Water	61.75
	Ground Water	84.59
Principal Crops (Reference year 2011-12)	Crop Type	Area (Sq. Km.)
	Jowar (Kharip)	4.01
	Jowar (Rabbi)	249.01
	Bajra	150.77
	Wheat	44.6
	Rice	34.34
	Other Cereals	33.07
	Gram Harbhara	69.59
	Other Pulses	39.98
	Sugarcane	33.04
	Oil Seeds	91.17
	Citrous fruit	5.72
	Onion	31.78

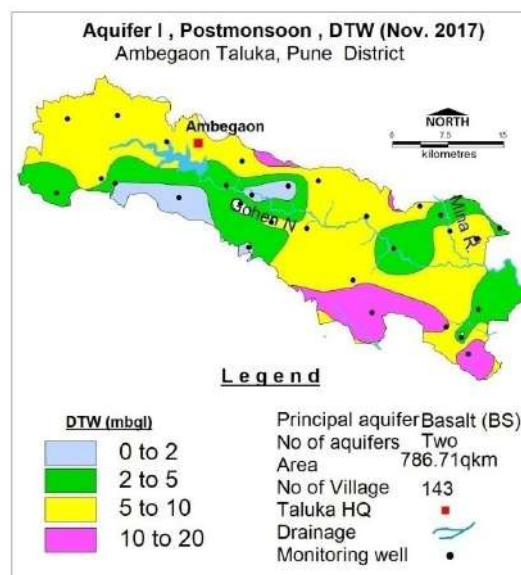
1.6. Water Level Behavior

1.6.1 Aquifer-I / Shallow/phreatic/unconfined Aquifer

Pre-Monsoon (May-2017) Water level ranging between 5 and 10 mbgl has been observed in major part of the taluka while water level in the range of 10 to 20 mbgl is observed in eastern and southern parts of the taluka.



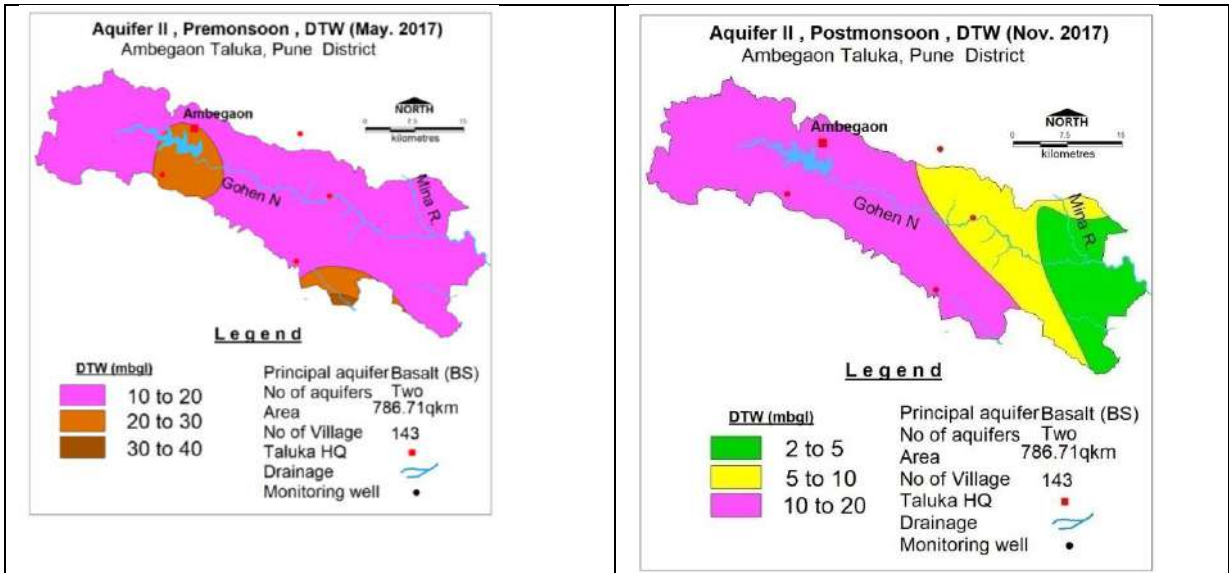
Post-Monsoon (November-2017) Water Level less than 10 mbgl has been observed in major part of the taluka; deeper water level in the range of 10 to 20 mbgl is observed in patches in the south-eastern part of the taluka, south of Baramati town.



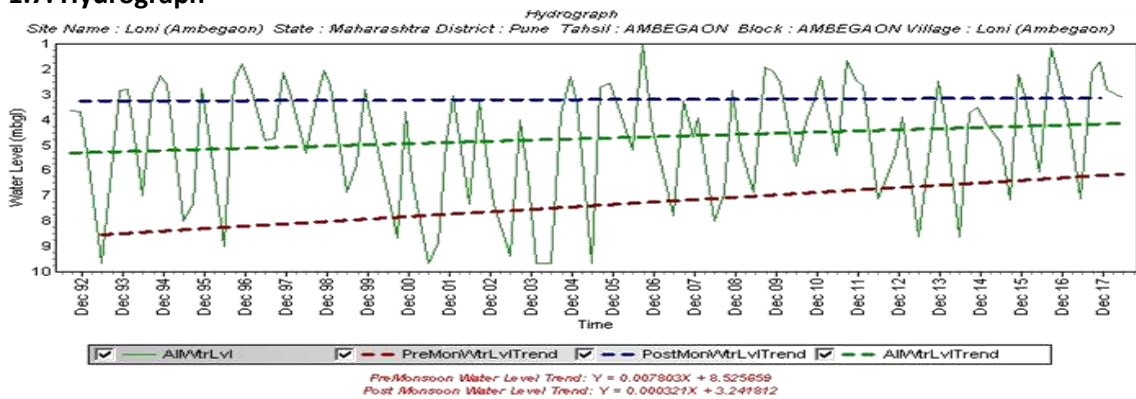
1.6.2 Aquifer-II / Deeper/Semi-confined to confined Aquifer

Pre-Monsoon Water Level (May 2017)
Water level < 20 mbgl is observed in major part of the taluka; water level between 20 to 30 mbgl is observed in a patch, south of Ambegaon and another patch around Shriramnagar and Pokhari.

Post-Monsoon Water Level (Nov. 2017) Water level <10 mbgl is observed in eastern half and 10 to 20 mbgl is observed in western part of the taluka.



1.7. Hydrograph



Hydrograph shows Pre-monsoon rising trend @ 0.0078m/year

Hydrograph shows Post-monsoon rising trend @ 0.003 m/year

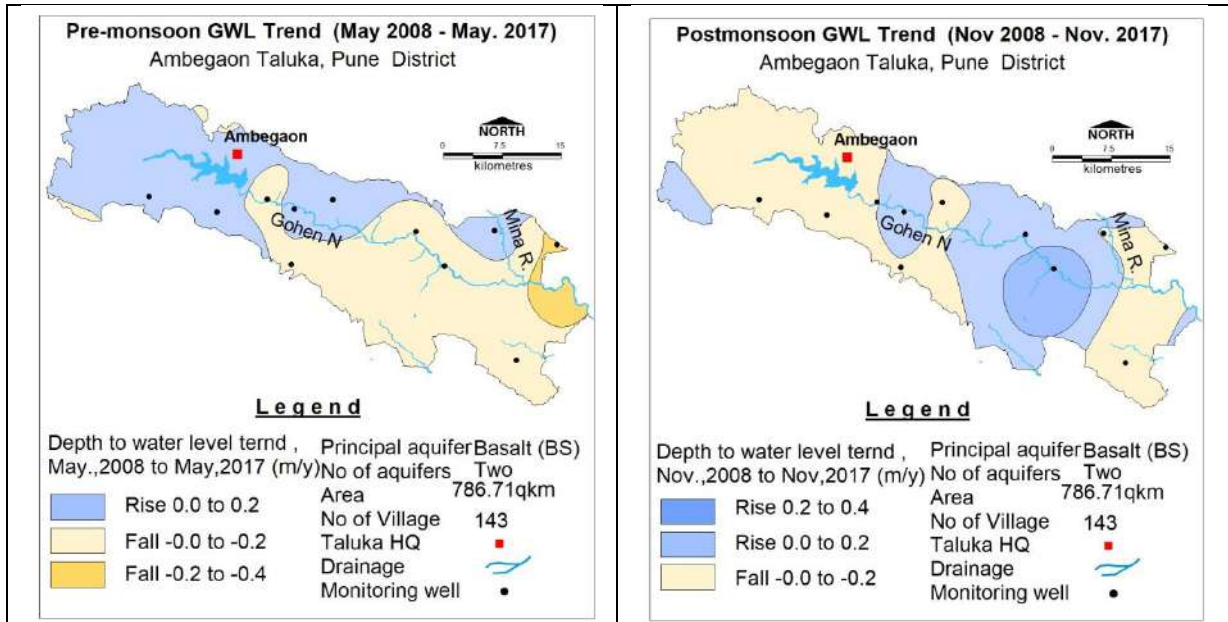
1.9. Water Level Trend (2008-2017)

Pre-Monsoon trend
Rising 0.0376 to 0.2546 m/year
Falling 0.0883 to 0.1555 m/year

Post-Monsoon trend
Rising 0.0039 to 0.1293 m/year
Falling 0.1017 to 0.3823 m/year

Premonsoon Water level Trend (2008-17)
Declining trend up to 0.2 m/year is observed in almost eastern half of the taluka. Rising water level trend has been observed in small part in northern and western parts of the taluka.

Postmonsoon Water level Trend (2008-17)
Declining trend up to 0.2 m/year is observed in almost entire taluka; significant decline in water level > 0.2 m/year has been observed in an isolated well at Khadki. Rising water level trend has been observed in central part and in isolated parts in western part of the taluka.



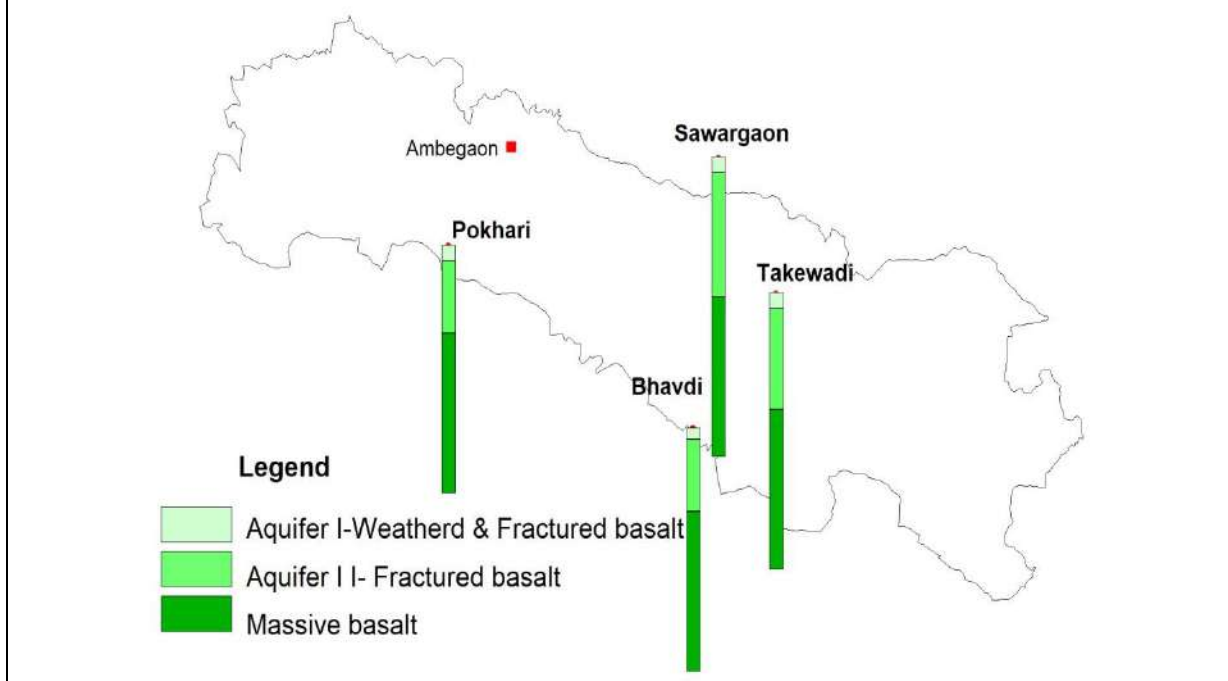
2. GROUND WATER ISSUES

Major Issues Identified are
 Over - Exploitation Limited Aquifer Potential, Water Scarcity - lean period

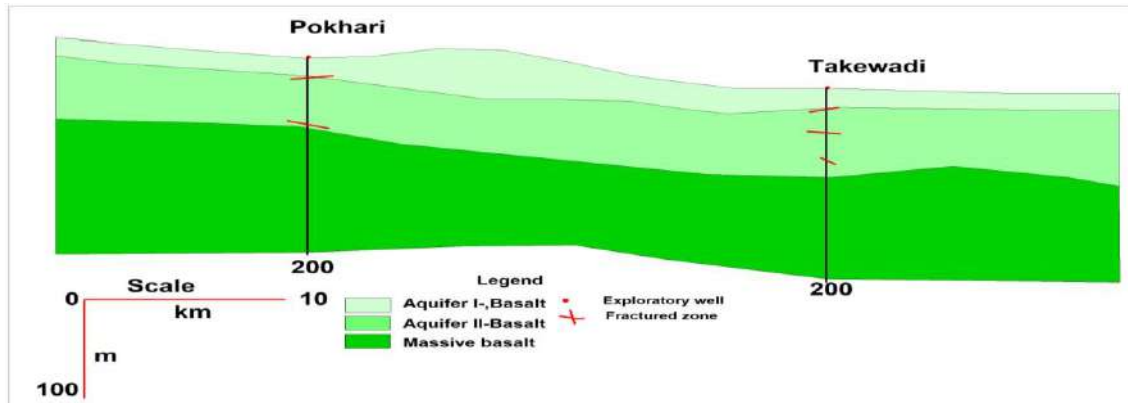
3. AQUIFER DISPOSITION

3.1. Number of Aquifers Aquifer-I / Shallow/phreatic/unconfined Aquifer – DT Basalt
 Aquifer-II / Deeper/Semi-confined /confined Aquifer – DT Basalt

3.2. Bar Diagram



3.3. Cross Sections

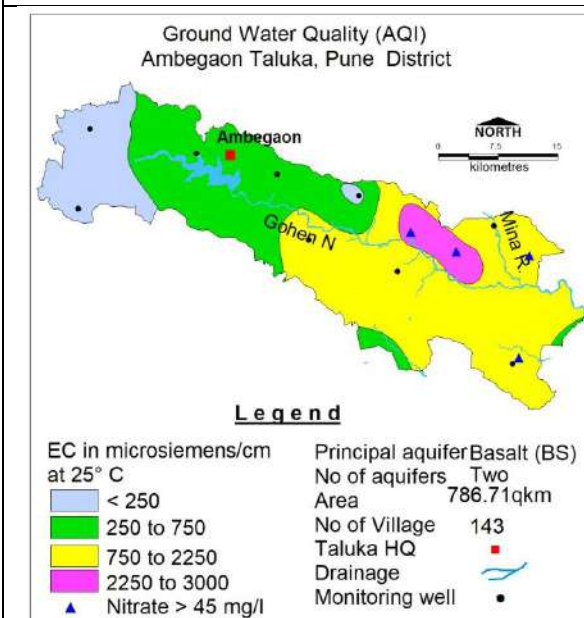


3.4. Aquifer Characteristics

Major Aquifers	Basalt (Deccan Traps)	
Type of Aquifer (Phreatic /Semiconfined/Confined)	Aquifer-I / Shallow/phreatic/unconfined	Aquifer-II / Deeper/Semi-confined to confined Aquifer
Depth of Occurrence (mbgl)	5-20	17-125
Granular/ Weathered / Fractured rocks (m)	3.7-10	1-3
Yield	10 - 100 m3/day	0.2-2.5 lps
Specific yield/ Storativity (S)	0.02	0.0003
Transmissivity (T)	T: 5-55 m ² /day	T: 25-200 m ² /day

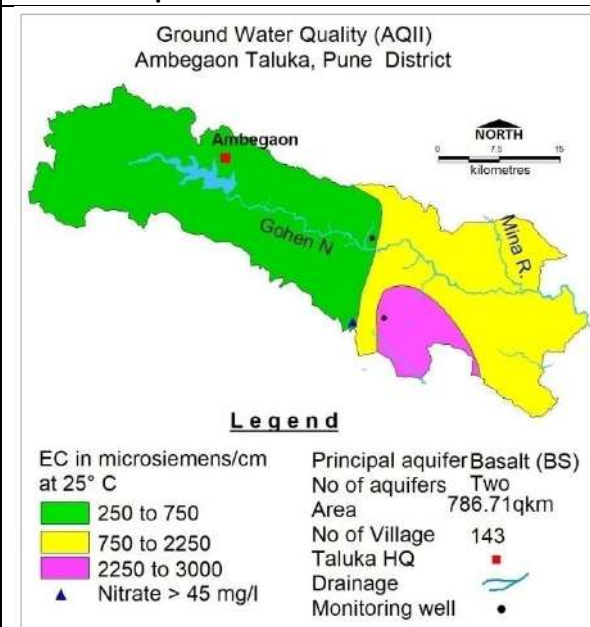
4. GROUND WATER QUALITY

4.1. Aquifer-I / Shallow/ phreatic/ unconfined



In general the water quality of shallow aquifer in Ambegaon taluka is potable and good for drinking, domestic, industrial as well as irrigation purposes. Nitrate more than 45 mg per litre was detected in water sample from Loni (Ambegaon), Pabal, Shingave, Kalamb and

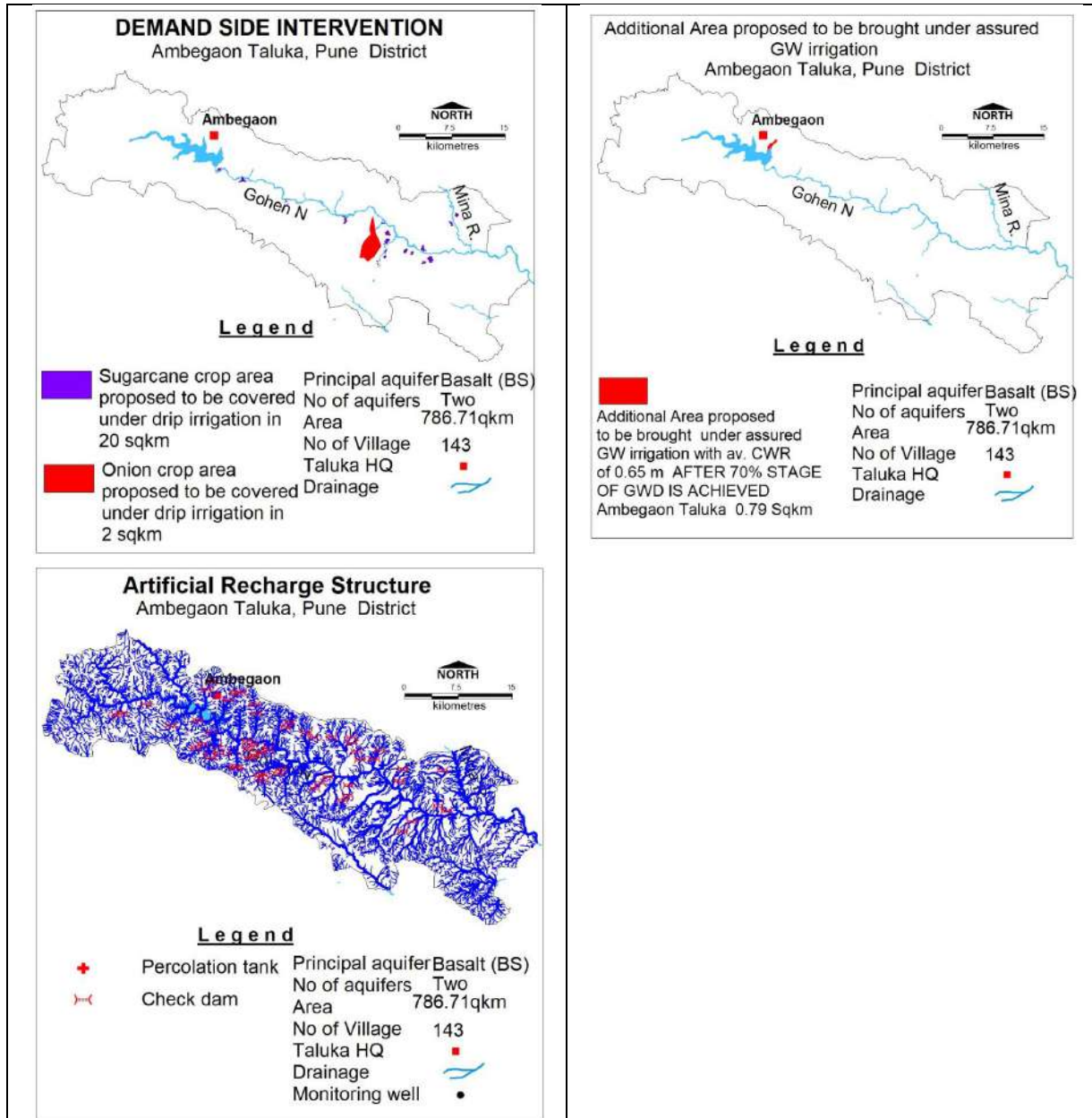
4.2. Aquifer-II / Deeper/ Semi-confined to confined Aquifer



In general the water quality of deep aquifer in Ambegaon taluka is potable and very good for drinking, domestic, industrial as well as irrigation purposes. Nitrate more than 45 mg per liter was detected in water sample from

Khadki. Fluoride more than 1 mg/l was found in Ranjani and Loni water samples. Around Khadki and Kalamb, very high salinity prevails (>2250 μ S/cm), which is not suitable for drinking, domestic, industrial as well as irrigation purposes. Ground water can be used for drinking only after treatment and for irrigation for very high salt tolerant crops and with proper soil and crop management practices.	Bhavdi EW.			
5. GROUND WATER RESOURCE				
Aquifer-I / Shallow/ phreatic/ unconfined (Basalt)				
Ground Water Recharge Worthy Area (Sq. Km.)	200.31			
Total Annual Ground Water Recharge (MCM)	13.06			
Natural Discharge (MCM)	187.25			
Net Annual Ground Water Availability (MCM)	174.51			
Existing Gross Ground Water Draft for irrigation (MCM)	4.66			
Existing Gross Ground Water Draft for domestic and industrial water supply (MCM)	179.17			
Existing Gross Ground Water Draft for All uses(MCM)	7.8			
Provision for domestic and industrial requirement supply to 2025(MCM)	10.63			
Net Ground Water Availability for future irrigation development(MCM)	95.68			
Stage of Ground Water Development (%)	200.31			
Category	Semi Critical			
Aquifer-II / Deeper/ Semi-confined to confined Aquifer (Basalt)				
Total Area (Sq. Km.)	Mean aquifer thickness (m)	Sy	Piezometric Head (m above confining layer)	Total Resource (MCM)
786.86	5.6	.003 to .005	20	18.34
6.0. GROUND WATER RESOURCE MANAGEMENT				
Available Resource (MCM)				114
Gross Annual Draft (MCM)				94.44
Stage of GW Development (%)				82.85
Annual Available Resource (MCM)				113.99
Gross Annual Draft (MCM)				94.44
Domestic Rquirement (MCM)				4.47
DEMAND (MCM)				
Agricultural demand -GW				89.97
Agricultural demand -SW				55.50
Domestic demand - GW				4.47
Domestic demand - SW				1.12
Total Demand(mcm)				151.06
SUPPLY (MCM)				
Agricultural Supply -GW				89.97
Agricultural Supply -SW				55.50
Domestic Supply - GW				4.47
Domestic Supply - SW				1.12
Total supply(mcm)				151.06
Interventions proposed to deal with overexploitation				
6.1 SUPPLY SIDE MANAGEMENT				
Rainwater Harvesting and Artificial Recharge				

Volume of unsaturated granular zone (MCM)		503.86
Recharge Potential (MCM)		10.08
Surface water requirement @ 75% efficiency (MCM)		13.41
Availability of Surplus surface runoff (MCM)	6.17	
Surplus runoff considered for planning (MCM) @ 100%	6.17	4.63
Proposed Structures	Percolation Tank (@ Rs.150 lakh, Av. Gross Capacity-100 TCM*2 fillings = 200 TCM)	Check Dam (@ Rs.30 lakh, Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM)
Number of Structures	22	59
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	3.30	1.33
Estimated Expenditure (Rs. in Cr.)	33.00	17.70
RTRWH - Urban Areas		
Households to be covered (25% with 50 m ² area)		12590
Total RWH potential (MCM)		0.36
Rainwater harvested / recharged @ 80% runoff co-efficient		0.28
Estimated Expenditure (Rs. in Cr.) @ Rs. 15000/- per HH		18.89
<i>RTRWH - Urban Areas Economically not viable & Not Recommended</i>		
Total volume of water expected to be recharged/conserved by AR		4.63
Stage of ground water development after supply side intervention		79.62
GAP TO BRING STAGE OF GWD UPTO 70%		11.41
6.2 DEMAND SIDE INTERVENTIONS		
Proposed Cropping Pattern change		None
Micro irrigation techniques		
Sugarcane crop area (33.04) ,about 20 sq km area is ground water irrigated ,100 % ground water irrigated (20 sqkm) proposed to be covered under Drip (sq.km.)		20
Volume of Water expected to be saved (MCM). Surface Flooding req- 2.45 m. Drip Req. - 1.88, WUE- 0.57 m		11.40
Estimated Expenditure (Rs. in Cr.) @ Rs. 25,000/- per acre		29.65
Area proposed to be covered (37.78sq.km.) 50% Onion area (about 4 sq km area is ground water irrigated) , proposed to be covered under Drip (sq.km.)		2
Volume of Water expected to be conserved (MCM). Onion requirement - 0.78 m, Drip - 0.52 m,		0.52
Estimated Expenditure (Rs. in Cr.)		1.2355
Alternate Sources		Nil
6.3 Expected Benefits		
Additional GW resources available after implementing above measures (MCM)		11.92
Volume of Water Required TO BRING STAGE OF GWD UPTO 70%		11.41
Balance GWR available for GW Development after STAGE OF GWD is brought to 70%		0.51
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 OR		0.79
Regulatory Measures	Regulation of wells below 60 m	



10.0 AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, BARAMATI TALUKA, PUNE DISTRICT, MAHARASHTRA

1. SALIENT FEATURE								
1.1 Introduction								
Taluka Name				Baramati				
Geographical Area (Sq. Km.)				1383.63				
Hilly Area (Sq. Km)				5.79				
Mapable Area (Sq. Km.)				1377.85				
Saline Area (Sq. Km.)				50.95				
Population (2011)				375185				
Climate				Tropical monsoon				
1.2 Rainfall Analysis								
Normal Rainfall				494.5 mm				
Annual Rainfall (2017)				583.2 mm				
Decadal Average Annual Rainfall (2008-17)				505.43 mm				
Long Term Rainfall Analysis (1998-2017)		Rising Trend 3.5 mm/year Probability of Normal/Excess Rainfall- 60% & 20%. Probability of Drought (Moderate/Severe)-: 15 % Moderate & 5 % Severe.						
Rainfall Trend Analysis (1901 to 2017)								
1.3. Geomorphology & Geology								
Geomorphic Unit		Plateau (Undissected to highly Dissected) with weathered thickness ranging from 0 to 5 m; valley fill deposits along streams.						
Geology		Deccan Traps (Basalt) - Age: Upper Cretaceous to Lower Eocene Alluvium – Age Quaternary						
1.4. Hydrology & Drainage								
Drainage		Karha-Nira River System –streams originating from hills in the west.						
Hydrology		Major Project	Medium Project	Minor Project	Percolation Tank	KT weir	Check Dam	Lift Irrigation
		0	0	8	1	86	13	0
1.5. Land Use, Agriculture, Irrigation & Cropping Pattern								
Geographical Area (Sq. Km.)				1383.63				
Forest Area (Sq. Km.)				49.29				
Cultivable Area (Sq. Km.)				1359.15				
Net Sown Area (Sq. Km.)				1041.06				
Double Cropped Area (Sq. Km.)				392.69				
Area under Irrigation		Surface Water		233.79				
		Ground Water		181.54				

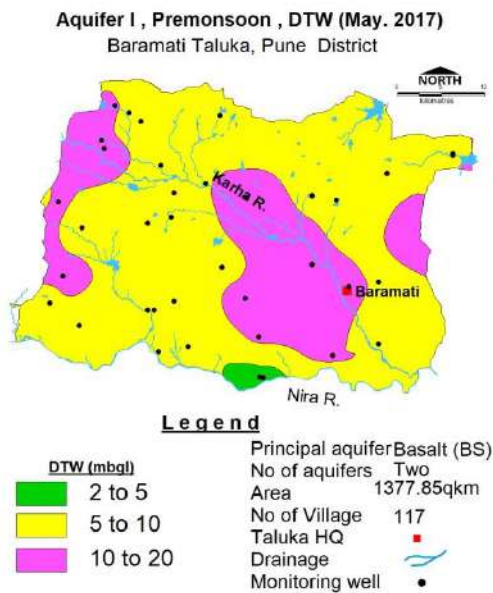
Principal Crops	Crop Type	Area (Sq. Km.)(Reference year 2011-12)
	Jawari	617.91
	Bajra	40.79
	Wheat	88.8
	Sugarcane	155.3
	Gram	77.91
	Groundnut	39.08
Horticultural Crops	Onion	35.08

1.6. Water Level Behavior

1.6.1 Aquifer- I /Shallow / Phreatic/Unconfined aquifer

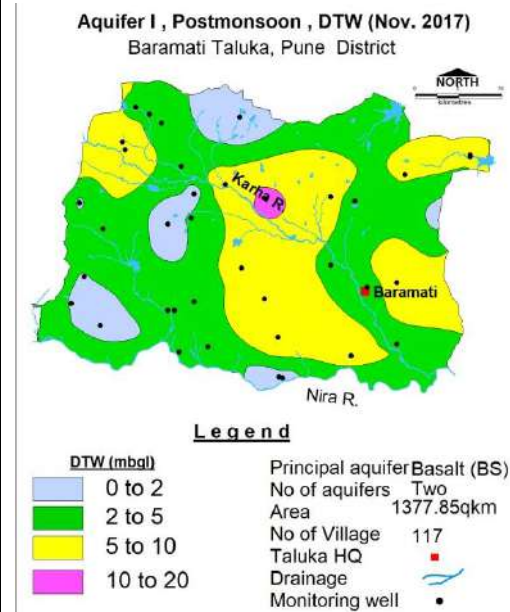
Pre-Monsoon Water Level (May 2017)

Water level ranging between 5 and 10 mbgl has been observed in major part of the taluka while water level in the range of 10 to 20 mbgl is observed in eastern, central (around Karha river, east of Baramati town) and western parts of the taluka.



Post-Monsoon Water Level (Nov. 2016)

Shallow Water Level less than 10 mbgl has been observed in almost entire taluka except a small patch in the central part, just north of Karha river.



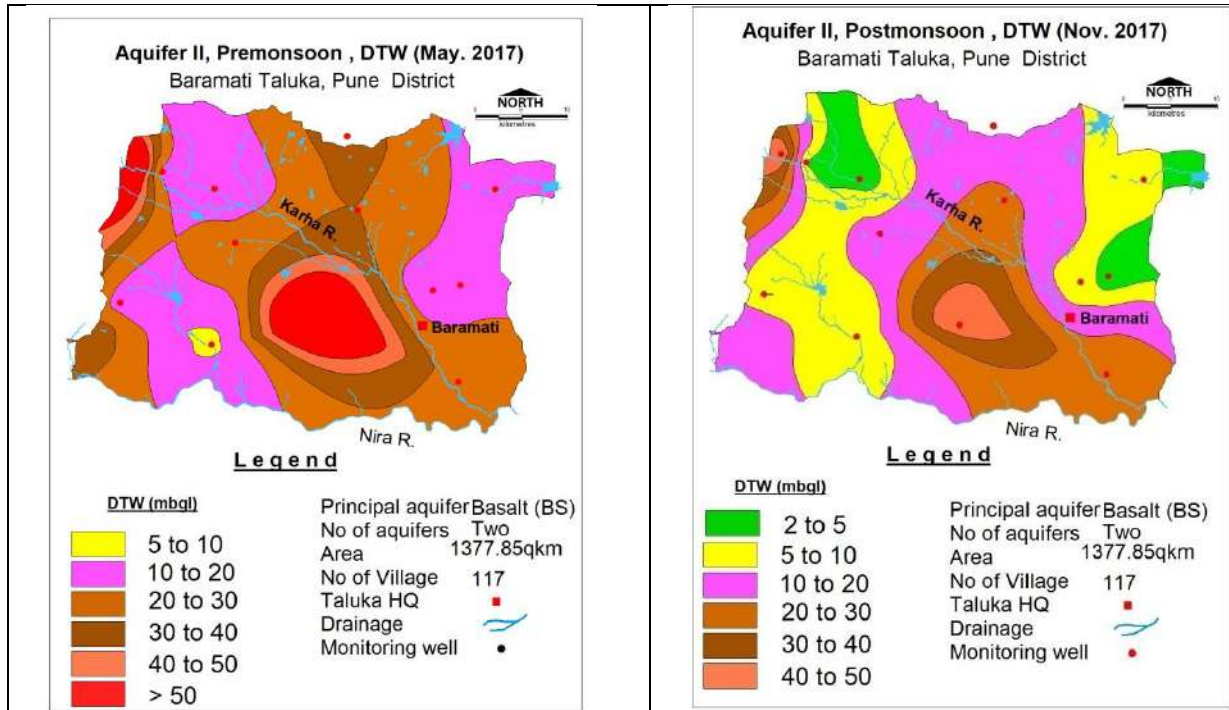
1.6.2 Aquifer- II/Deeper/Semi-Confined/Confined Aquifer-Water Level

Pre-Monsoon (May-2017)

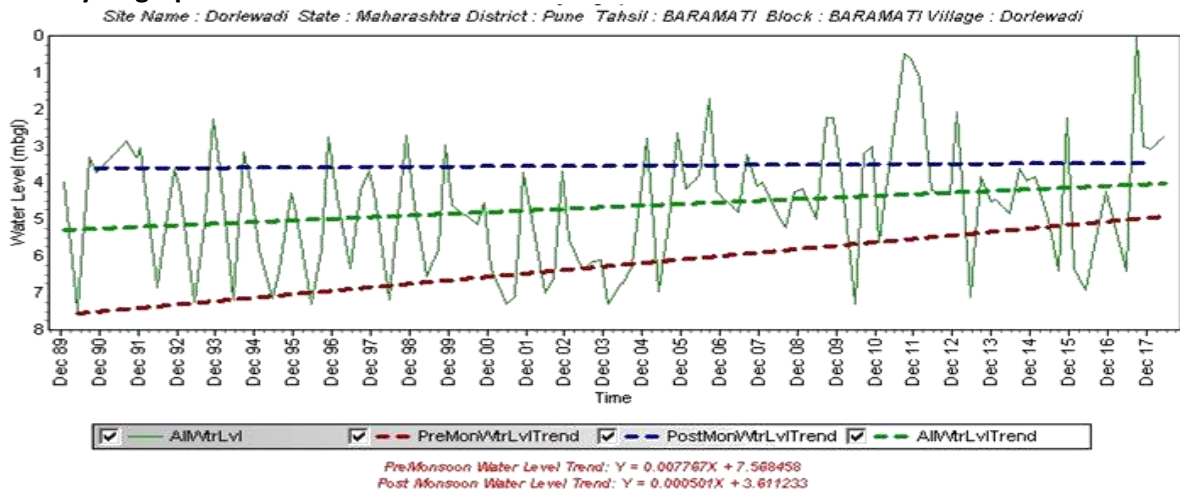
Water level < 20 mbgl is observed in north-western, south-western and north-eastern part of the taluka; water level between 20 to 40 mbgl is observed in major part of the taluka and deep waterlevel >50 mbgl is seen south of Karha river, west of Baramati town.

Post-Monsoon (November-2017)

Water level <10 mbgl is observed in north-western, south-western and north-eastern part of the taluka; water level between 10 to 30 mbgl is observed in major part of the taluka and deep waterlevel in the range of 40 to 50 mbgl is seen south of Karha river, west of Baramati town.



1.7. Hydrograph



Hydrograph shows Pre-monsoon rising trend @ 0.0077 m/year

Hydrograph shows Post-monsoon rising trend @ 0.0005 m/year

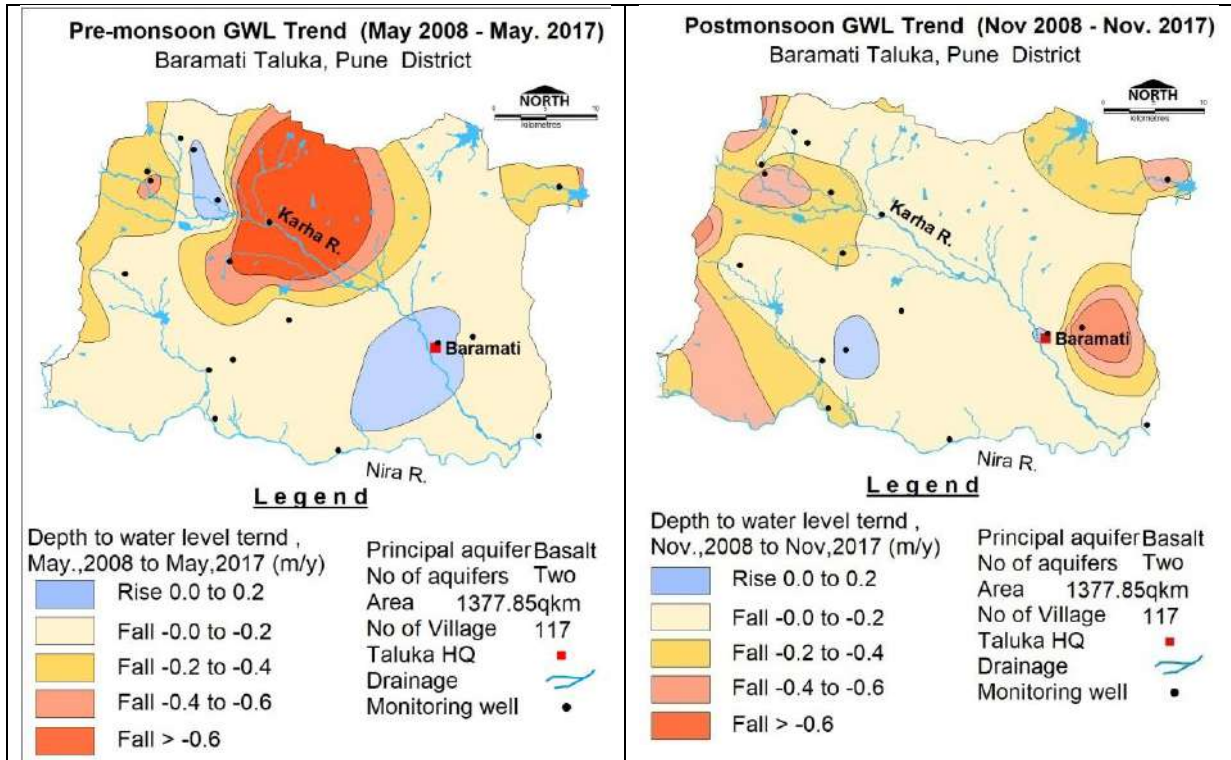
1.8. Water Level Trend (2008-2017)

Pre-Monsoon trend
Rising 0.0041 to 1.382 m/year
Falling 0.0116 to 0.1748 m/year

Post-Monsoon trend
Rising 0.0065 to 0.9327 m/year
Falling 0.0029 to 0.1410 m/year

Premonsoon Water level Trend (2007-16)
Declining trend up to 0.2 m/year is observed in almost eastern half of the taluka. Rising water level trend has been observed in small part in northern and western parts of the taluka.

Postmonsoon Water level Trend (2007-16)
Declining trend up to 0.2 m/year is observed in almost entire taluka; significant decline in water level > 0.2 m/year has been observed in an isolated well at Khadki. Rising water level trend has been observed in central part and in isolated parts in western part of the taluka.



2. GROUND WATER ISSUES

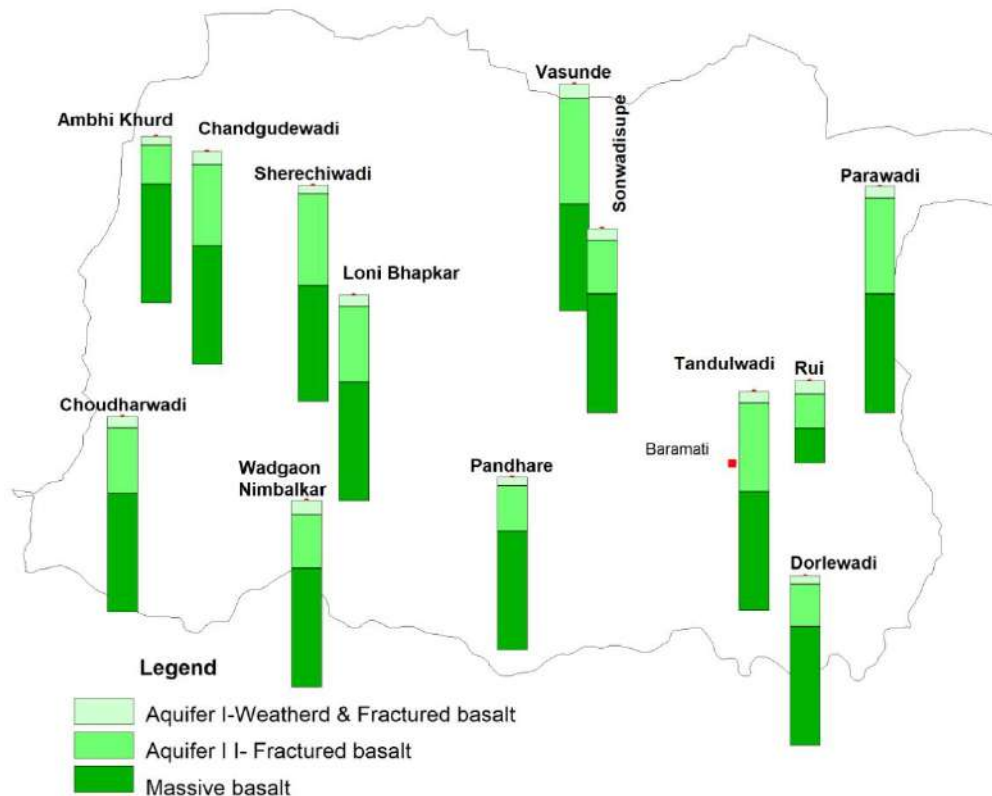
Major Issues Identified: Over – Exploitation, Limited Aquifer Potential, Water Scarcity - lean period

3. AQUIFER DISPOSITION

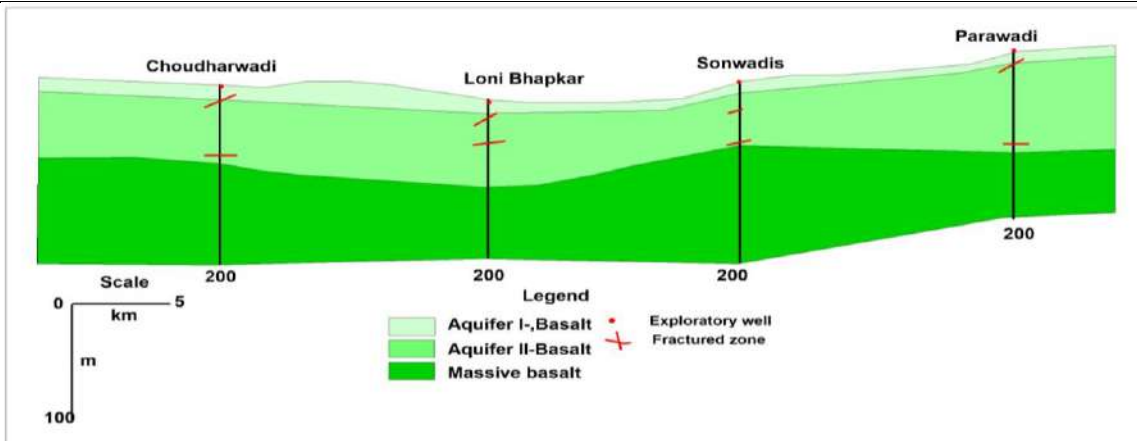
3.1. Number of Aquifers

Aquifer-I / Shallow/phreatic/unconfined Aquifer – DT Basalt
Aquifer-II / Deeper/Semi-confined /confined Aquifer – DT Basalt

3.2. Bar Diagram



3.3. Cross Sections

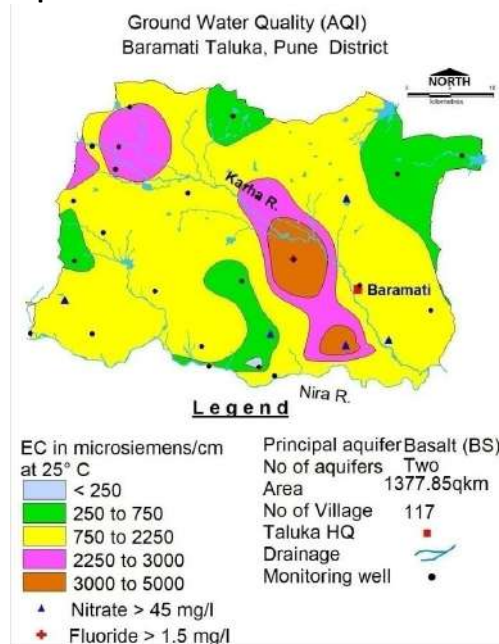


3.4. Aquifer Characteristics

Major Aquifers	Basalt (Deccan Traps)	
Type of Aquifer (Phreatic/Semiconfined/Confined)	Aquifer-I / Shallow / phreatic / unconfined Aquifer – DT Basalt	Aquifer-II / Deeper /Semi-confined / confined Aquifer – DT Basalt
Depth of Occurrence (mbgl)	8-22	15-175
Granular/ Weathered/ Fractured rocks Thickness (m)	5-12.8	0.5-12
Yield	10 - 100 m ³ /day	0-1 lps
Specific yield/ Storativity (S)	0.02	0.00054
Transmissivity (T)	T: 5-55 m ² /day	T: 20-200 m ² /day

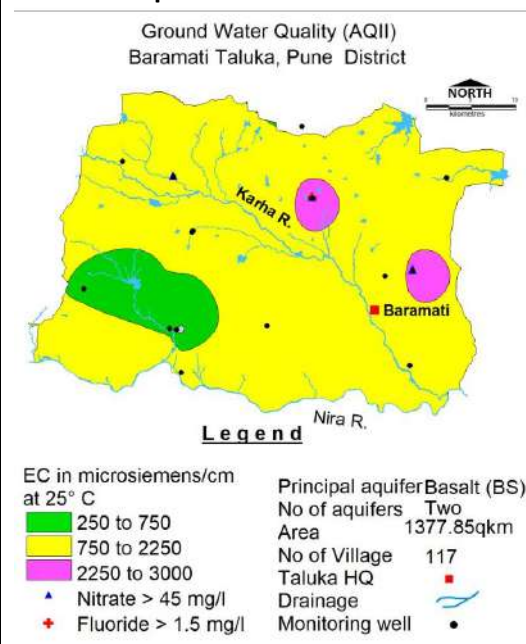
4. GROUND WATER QUALITY

4.1 Aquifer-I / Shallow / phreatic / unconfined Aquifer



In general the water quality of shallow aquifer in Baramati taluka is potable and good for drinking, domestic, industrial as well as irrigation

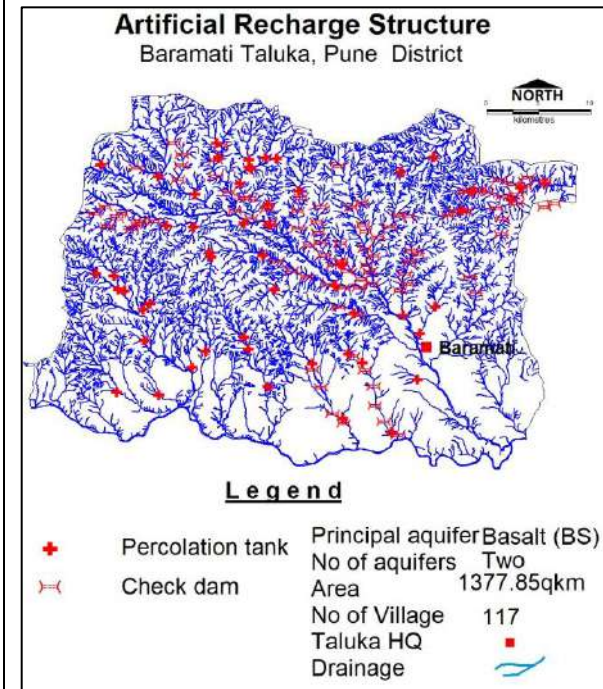
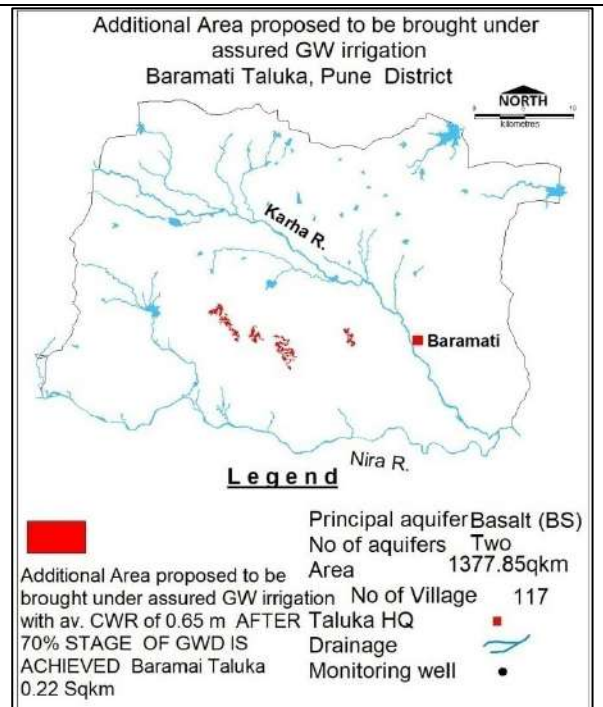
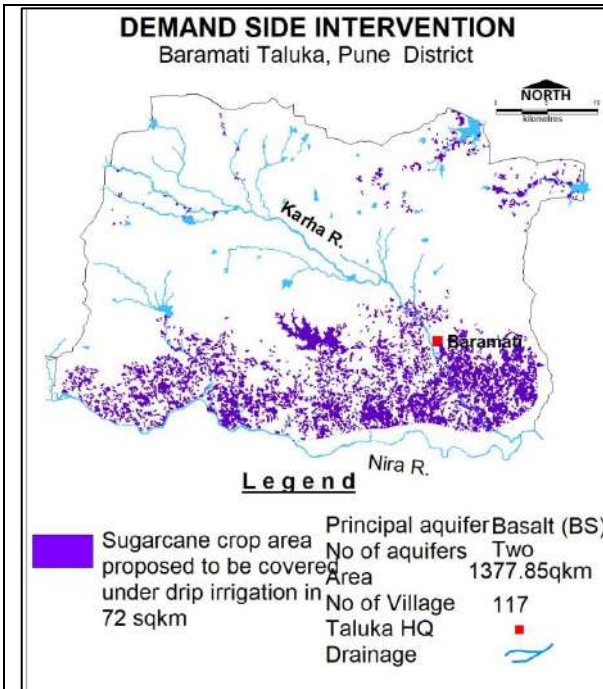
4.2 Aquifer-II / Deeper /Semi-confined / confined Aquifer



In general the water quality of deep aquifer in Baramati taluka is potable and very good for drinking, domestic, industrial as well as

<p>purposes, except around Karha river. Ground water around Nirvagaj is not fit for drinking purpose if directly consumed without treatment. Nitrate more than 45 mg per litre was detected in water sample from Gojubavi, Jogwadi and Nirvagaj. High concentration of fluoride is found in Medad village (2.89 mg/l). Around Bhondvewadi, Jalgaon Supe, Nirvagaj, Medad & Morgaon, very high salinity prevails (EC >2250 μS/cm), which is not suitable for drinking, domestic, industrial as well as irrigation purposes. Ground water can be used for drinking only after treatment and for irrigation for very high salt tolerant crops and with proper soil and crop management practices.</p>	<p>irrigation purposes. Ground water around Chandaydewadi, Sonwadisupe, Rui & Sherechiwadi is not fit for drinking purpose if directly consumed without treatment. Nitrate more than 45 mg per litre was detected in water sample from Sherechiwadi, Sonwadisupe and Rui. RSC values is more than 2.50 meq/l at Medad -ground water of this area is not suitable for irrigation.</p>			
5. GROUND WATER RESOURCE				
5.1 Aquifer-I / Shallow / phreatic / unconfined Aquifer				
Ground Water Recharge Worthy Area (Sq. Km.)	1377.85			
Total Annual Ground Water Recharge (MCM)	200.31			
Natural Discharge (MCM)	13.06			
Net Annual Ground Water Availability (MCM)	187.25			
Existing Gross Ground Water Draft for irrigation (MCM)	174.51			
Existing Gross Ground Water Draft for domestic and industrial water supply(MCM)	4.66			
Existing Gross Ground Water Draft for All uses(MCM)	179.17			
Provision for domestic and industrial requirement supply to 2025(MCM)	7.8			
Net Ground Water Availability for future irrigation development(MCM)	10.63			
Stage of Ground Water Development (%)	95.68			
Category	Semi Critical			
5.2 Aquifer-II / Deeper /Semi-confined / confined Aquifer				
Total Area (Sq. Km.)	Mean aquifer thickness (m)	Sy	Piezometric Head (m above confining layer)	Total Resource (MCM)
1377.74	5	0.003 to 0.005	25	26.9
6.0. GROUND WATER RESOURCE MANAGEMENT				
Available Resource (MCM)				187.25
Gross Annual Draft (MCM)				179.17
Stage of GW Development				95.68
Annual Available Resource (MCM)				187.25
Gross Annual Draft (MCM)				179.17
Domestic Requirement (MCM)				4.66
DEMAND (MCM)				
Agricultural demand -GW				174.51
Agricultural demand -SW				164.00
Domestic demand - GW				4.66
Domestic demand - SW				1.17
Total Demand(mcm)				344.34
SUPPLY (MCM)				
Agricultural Supply -GW				174.51
Agricultural Supply -SW				164.00
Domestic Supply - GW				4.66
Domestic Supply - SW				1.17

Total supply(mcm)		344.34
Interventions proposed to deal with overexploitation		
6.1 SUPPLY SIDE INTERVENTIONS		
Rainwater Harvesting and Artificial Recharge		
Volume of unsaturated granular zone (MCM)		1119.34
Recharge Potential (MCM)		22.39
Surface water requirement @ 75% efficiency (MCM)		29.78
Availability of Surplus surface runoff (MCM)		13.71
Surplus runoff considered for planning (MCM) @ 100%	13.71	10.28
Proposed Structures	Percolation Tank (@ Rs.150 lakh, Av. Gross Capacity-100 TCM*2 fillings = 200 TCM)	Check Dam (@ Rs.30 lakh, Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM)
Number of Structures	54	97
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	8.10	2.18
Estimated Expenditure (Rs. in Cr.)	81.00	29.10
RTRWH - Urban Areas		
Households to be covered (25% with 50 m ² area)		22700
Total RWH potential (MCM)		0.64
Rainwater harvested / recharged @ 80% runoff co-efficient		0.51
Estimated Expenditure (Rs. in Cr.) @ Rs. 15000/- per HH		34.05
<i>RTRWH in Urban Areas is economically not viable & Not Recommended</i>		
Total volume of water expected to be recharged/conserved by AR		10.28
Stage of ground water development after supply side intervention		90.70
GAP TO BRING STAGE OF GWD UPTO 70%		40.897
6.2 DEMAND SIDE INTERVENTIONS		
Proposed Cropping Pattern change		None
Micro irrigation techniques		
Sugarcane crop area (33.04) ,about 20 sq km area is ground water irrigated ,100 % ground water irrigated (20 sqkm) proposed to be covered under Drip (sq.km.)		72
Volume of Water expected to be saved (MCM). Surface Flooding req- 2.45 m. Drip Req. - 1.88, WUE- 0.57 m		41.04
Estimated Expenditure (Rs. in Cr.) @ Rs. 25,000/- per acre		106.7472
Alternate Sources		Nil
Additional GW resources available after implementing above measures (MCM)		41.04
Volume of Water Required TO BRING STAGE OF GWD UPTO 70%		40.90
Balance GWR available for GW Development after STAGE OF GWD is brought to 70%		0.14
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 OR		0.22
Regulatory Measures	Regulation of wells below 60 m	



11.0 AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, INDAPUR TALUKA, PUNE DISTRICT, MAHARASHTRA

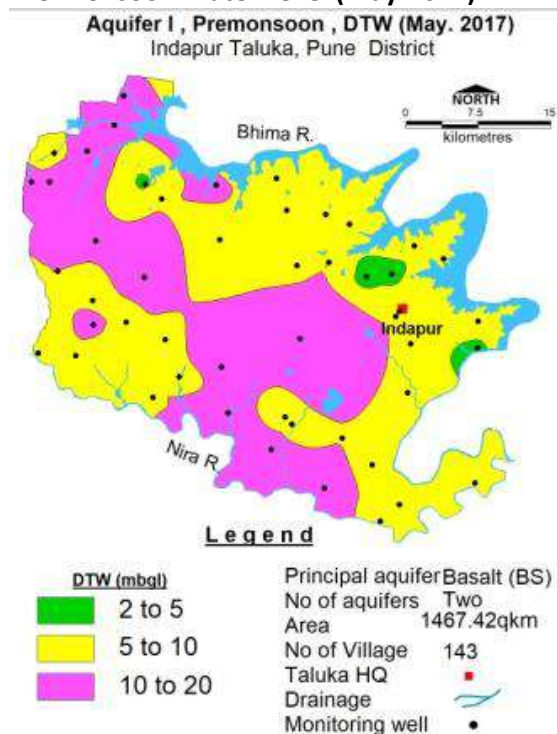
1. SALIENT FEATURE							
1.1 Introduction							
Taluka Name						Indapur	
Geographical Area (Sq. Km.)						1469.38	
Hilly Area (Sq. Km)						1.76	
Mapable Area (Sq. Km.)						1467.62	
Saline Area (Sq. Km.)						69.49	
Population (2011)						357668	
Climate						Tropical monsoon	
1.2 Rainfall Analysis							
Normal Rainfall						529.5 mm	
Annual Rainfall (2017)						605.2 mm	
Decadal Average Annual Rainfall (2008-17)						490.89 mm	
Long Term Rainfall Analysis (1998-2017)				Rising Trend 0.77 mm/year Probability of Normal/Excess Rainfall- 54% &21%. Probability of Drought-: 18 % Moderate &6 % Severe& 1% acute			
Rainfall Trend Analysis (1920 to 2017) EQUATION OF TREND LINE: $Y = 0.77 X + 494.1$							
1.3. Geomorphology & Geology							
Geomorphologic Unit				Plateau (Slightly dissected to highly Dissected) with weathered thickness ranging from 0 to 5 m.			
Geology				Deccan Traps (Basalt)Age: Upper Cretaceous to Lower Eocene Alluvium – Age Quaternary			
1.4. Hydrology & Drainage							
Drainage				Bhima & Nira Rivers– right bank Bhima and left bank Nira watersheds.			
Hydrology	Major Project	Medium Project	Minor Project	Percolation Tank	KT weir	Check Dam	Lift Irrigation
	0	1	15	1	17	1	0
1.5. Land Use, Agriculture, Irrigation & Cropping Pattern							
Geographical Area						1467.91 Sq. Km.	
Forest Area						78.64 Sq. Km.	
Cultivable Area						1129.7 Sq. Km.	

Net Sown Area		1015.43 Sq. Km.
Double Cropped Area		114.27 Sq. Km.
Area under Irrigation	Surface Water	227.72Sq. Km.
	Ground Water	264.69Sq. Km.
Principal Crops(<i>Reference year 2011-12</i>)	Crop Type	Area (Sq. Km.)
	Jowar (Kharip)	0.21
	Jowar (Rabbi)	643.04
	Bajra	24.1
	Wheat	65.4
	Rice	25.24
	Other Cereals	20.33
	GramHarbhara	25.74
	Other Pulses	37.52
	Sugarcane	89.35
	Oil Seeds	3.59
Horticultural Crops	Citreous fruit	12.77
	Onion	24.78

1.6. Water Level Behavior

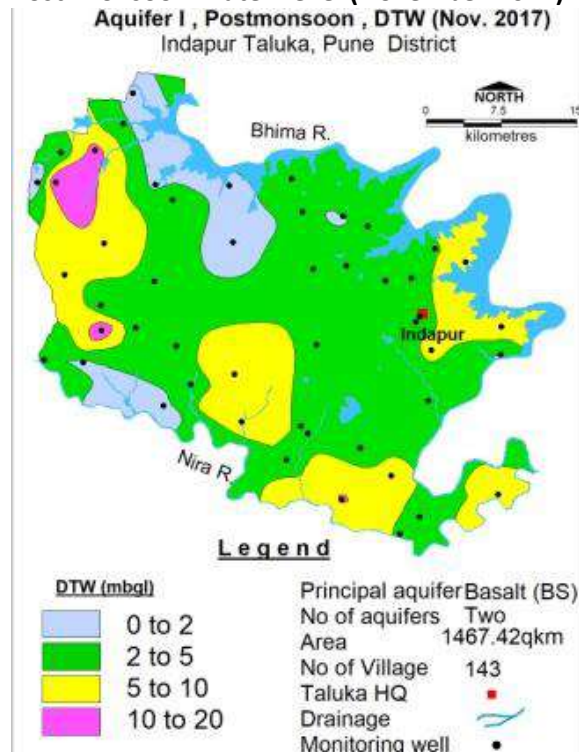
1.6.1 Aquifer- I /Shallow / Phreatic/Unconfined aquifer

Pre-Monsoon Water Level (May-2017)



Water level ranging between 5 and 20 mbgl has been observed in major part of the taluka. Only a small patch, north of Indapur has water levels less than 5 mbgl.

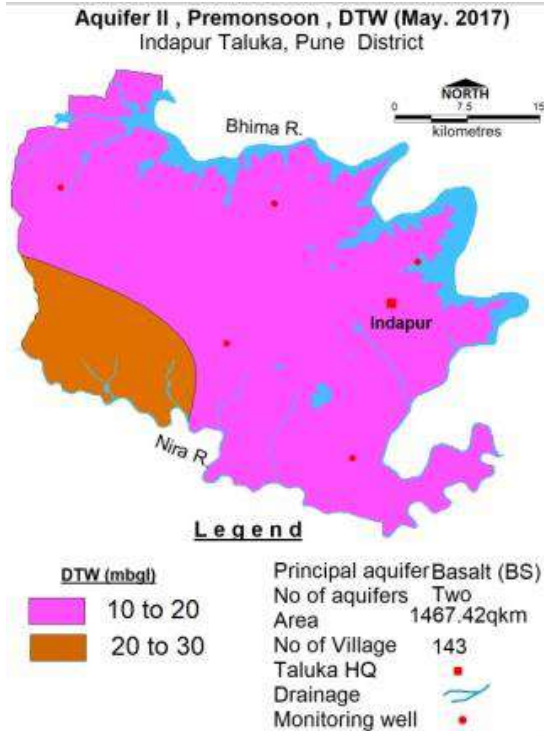
Post-Monsoon Water Level (November-2017)



Water level ranging between 2 and 5 mbgl has been observed in major part of the taluka. Water Level less than 2 mbgl has been observed in north-western and south-western parts of the taluka near Bhima and Nira rivers respectively. Water level in the range of 5 to 10 mbgl is observed in large patches while deeper water level more than 20 mbgl has been observed as small patches in the western part of the taluka.

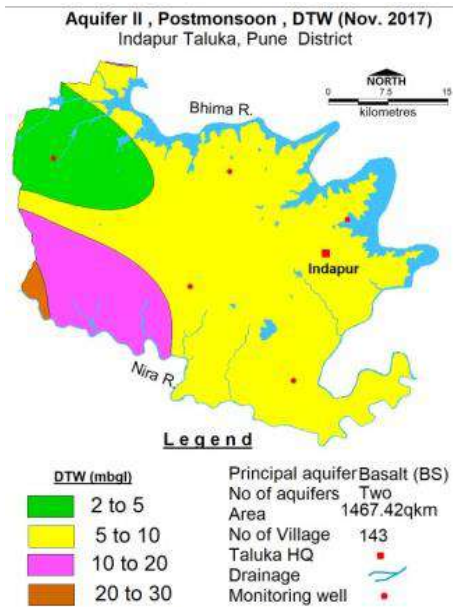
1.6.2 Aquifer- II/Deeper/Semi-Confined/Confined Aquifer-Water Level

Pre-Monsoon Water Level (May 2017)



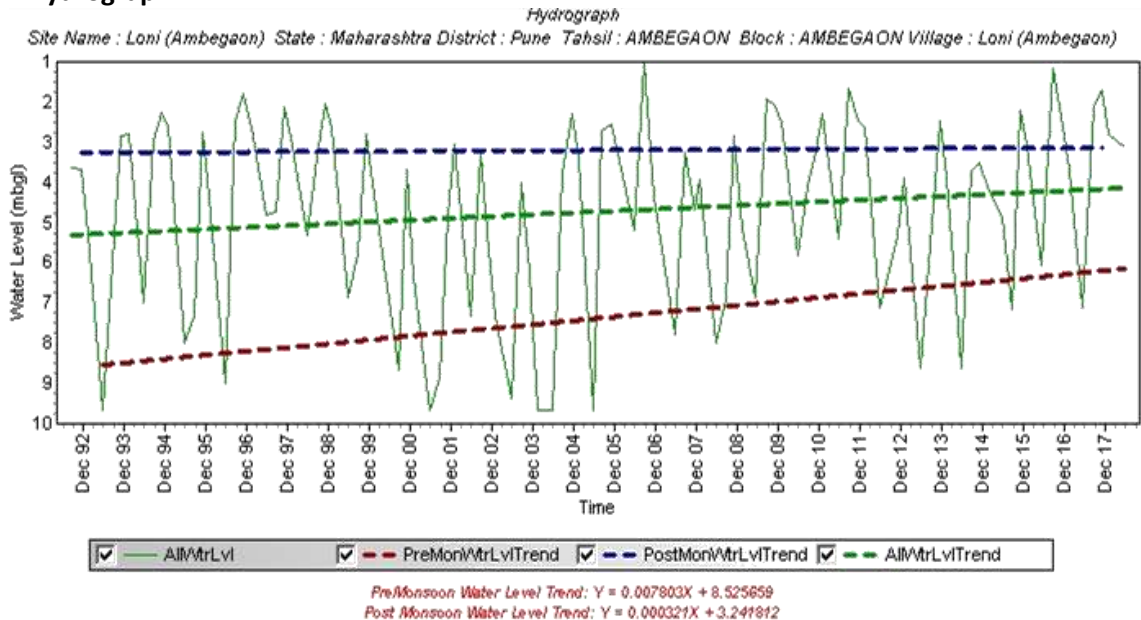
Water level between 10 and 20 mbgl is observed in major part of the taluka; water level between 20 to 30 mbgl is observed in south-western part of the taluka.

Post-Monsoon Water Level (Nov. 2017)



Water level <10 mbgl is observed in major part of the taluka; water level between 10 and 30 mbgl is observed in south-western part of the taluka.

1.7. Hydrograph

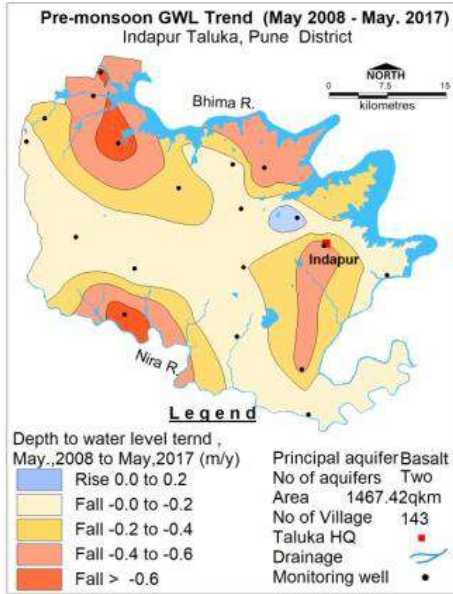


1.8. Water Level Trend (2008-2017)

Hydrograph shows Pre-monsoon rising trend @ 0.0078m/year	Hydrograph shows Post-monsoon rising trend @ 0.003 m/year
Pre-Monsoon trend Rising 0.0001to 0.650m/year Falling 0.1055 m/year (single well)	Post-Monsoon trend Rising 0.0063to 0.3171m/year Falling 0.0313m/year (single well)

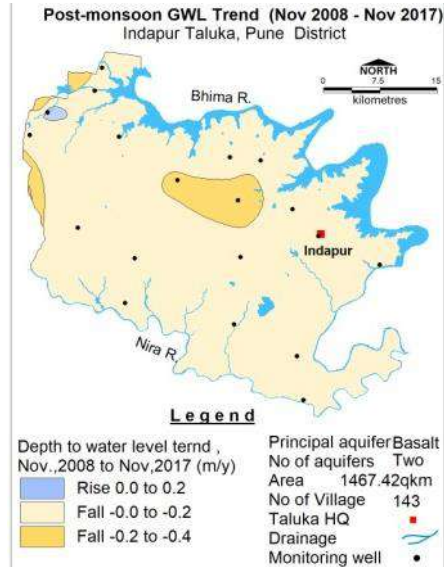
Premonsoon Water level Trend (2007-16)

Declining trend up to 0.2 m/year is observed in almost eastern half of the taluka. Rising water level trend has been observed in small part in northern and western parts of the taluka.



Postmonsoon Water level Trend (2007-16)

Declining trend up to 0.2 m/year is observed in almost entire taluka; significant decline in water level > 0.2 m/year has been observed in an isolated patch in the centre of the taluka.



2. GROUND WATER ISSUES

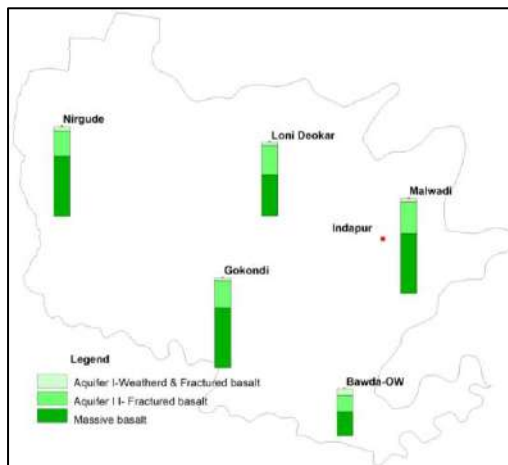
Major Issues Identified: Over – Exploitation, Limited Aquifer Potential, Water Scarcity - lean period

3. AQUIFER DISPOSITION

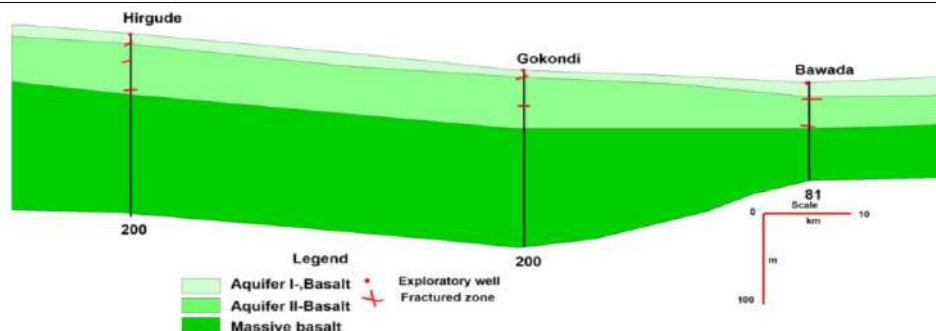
3.1. Number of Aquifers

Aquifer- I /Shallow / Phreatic/Unconfined aquifer- DT Basalt
Aquifer- II/Deeper/Semi-Confined/Confined Aquifer - DT Basalt

3.2. Bar Diagram



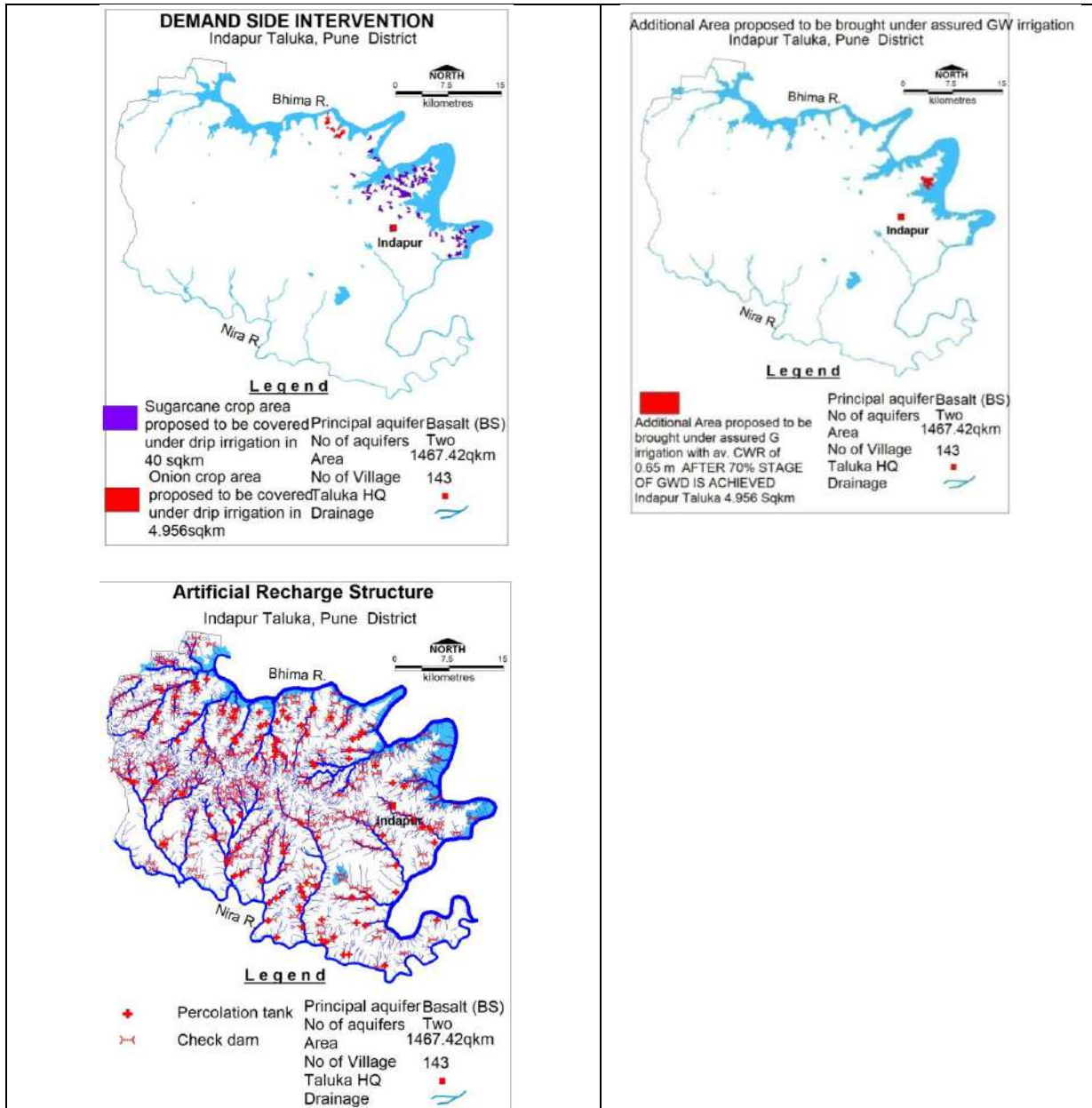
2.3. Cross Sections



3.4. Aquifer Characteristics		
Major Aquifers	Basalt (Deccan Traps)	
Type of Aquifer (Phreatic/Semiconfined/Confined)	Aquifer- I /Shallow / Phreatic/Unconfined aquifer- DT Basalt	Aquifer- II/Deeper/Semi- Confined/Confined Aquifer - DT Basalt
Depth of Occurrence (mbgl)	5-24	10-105
Granular/ Weathered/ Fractured rocks Thickness (m)	3-14	1-3
Yield	<10 - 100 m ³ /day	0-1.7 lps
Specific yield/ Storativity (S)	0.02	0.0003
Transmissivity (T)	T: 5-30 m ² /day	T:2 5-100 m ² /day
4. GROUND WATER QUALITY		
4.1 Phreatic Aquifer (Aquifer-I)	4.2 Semiconfined/Confined Aquifer (Aquifer II)	
<p style="font-size: small;">Ground Water Quality (AQI) Indapur Taluka, Pune District</p> <p style="font-size: x-small;">Legend EC in microsiemens/cm at 25° C ■ < 250 ■ 250 to 750 ■ 750 to 2250 ■ 2250 to 3000 ■ 3000 to 5000 ▲ Nitrate > 45 mg/l — Principal aquifer Basalt (BS) — No of aquifers Two — Area 1467.42qkm — No of Village 143 — Taluka HQ — Drainage — Monitoring well</p>	<p style="font-size: small;">Ground Water Quality (AQII) Indapur Taluka, Pune District</p> <p style="font-size: x-small;">Legend EC in microsiemens/cm at 25° C ■ 250 to 750 ■ 750 to 2250 — Principal aquifer Basalt (BS) — No of aquifers Two — Area 1467.42qkm — No of Village 143 — Taluka HQ — Drainage — Monitoring well</p>	
<p>In general the water quality of shallow aquifer in Indapur taluka is potable and good for drinking, domestic, industrial as well as irrigation purposes. Samples from Shaha, Lumewadi, Varkute Bk and Ranmodwadi is not fit for drinking purpose if directly consumed without treatment. Nitrate more than 45 mg per litre was detected in water sample from Kalewadi, PimpaleAwasari, Lumewadi, Pilewadi, Kardanwadi, Varkute Kh, RanmodwadiVarkute Bk and Bhadalwadi. Fluoride more than 1 mg/l was found in Rui and Shetfalwater samples. Around Giravi, Ranmodwadi, Varkute Bk & Lumewadi, very high salinity prevails (>2250 μS/cm), which is not suitable for drinking, domestic, industrial as well as irrigation purposes. Ground water can be used</p>	<p>In general the water quality of deep aquifer in Indapur taluka is potable and very good for drinking, domestic, industrial as well as irrigation purposes. Fluoride more than 1 mg/l was found in water sample of borewell at Reda village.</p>	

for drinking only after treatment and for irrigation for very high salt tolerant crops and with proper soil and crop management practices.				
5. GROUND WATER RESOURCE				
5.1. Aquifer-I/ Phreatic Aquifer (Basalt)				
Ground Water Recharge Worthy Area (Sq. Km.)				1467.62
Total Annual Ground Water Recharge (MCM)				276.37
Natural Discharge (MCM)				13.82
Net Annual Ground Water Availability (MCM)				262.55
Existing Gross Ground Water Draft for irrigation (MCM)				209.54
Existing Gross Ground Water Draft for domestic and industrial water supply(MCM)				12.02
Existing Gross Ground Water Draft for All uses(MCM)				221.56
Provision for domestic and industrial requirement supply to 2025(MCM)				18.8
Net Ground Water Availability for future irrigation development(MCM)				53.63
Stage of Ground Water Development (%)				84.39
Category				SAFE
5.2 Aquifer-II Semiconfined/Confined Aquifer (Basalt)				
Total Area (Sq. Km.)	Mean aquifer thickness (m)	Sy	Piezometric Head (m above confining layer)	Total Resource (MCM)
1467.9	5	0.003 to 0.005	25	27.44
6.0. GROUND WATER RESOURCE MANAGEMENT				
Available Resource (MCM)				262.55
Gross Annual Draft (MCM)				221.56
Stage of GW Development				84.39
Annual Available Resource (MCM)				262.55
Gross Annual Draft (MCM)				221.55
Domestic Rquirement (MCM)				12.01
DEMAND (MCM)				
Agricultural demand -GW				209.54
Agricultural demand -SW				168.50
Domestic demand - GW				12.01
Domestic demand - SW				3.00
Total Demand(mcm)				393.05
SUPPLY (MCM)				
Agricultural Supply -GW				209.54
Agricultural Supply -SW				168.50
Domestic Supply - GW				12.01
Domestic Supply - SW				3.00
Total supply(mcm)				393.05
Interventions proposed to deal with overexploitation				
6.1 SUPPLY SIDE INTERVENTIONS				
Rainwater Harvesting and Artificial Recharge				
Volume of unsaturated granular zone (MCM)				2288.18
Recharge Potential (MCM)				45.76
Surface water requirement @ 75% efficiency (MCM)				60.86
Availability of Surplus surface runoff (MCM)				28.03
Surplus runoff considered for planning (MCM) @ 100%		28.03	21.02	

Proposed Structures	Percolation Tank (@ Rs.150 lakh, Av. Gross Capacity-100 TCM*2 fillings = 200 TCM)	Check Dam (@ Rs.30 lakh, Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM)
Number of Structures	98	281
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	14.70	6.32
Estimated Expenditure (Rs. in Cr.)	147.00	84.30
RTRWH - Urban Areas		
Households to be covered (25% with 50 m ² area)		19900
Total RWH potential (MCM)		0.56
Rainwater harvested / recharged @ 80% runoff co-efficient		0.45
Estimated Expenditure (Rs. in Cr.) @ Rs. 15000/- per HH		29.85
<i>RTRWH in Urban Areas is economically not viable & Not Recommended</i>		
Total volume of water expected to be recharged/conserved by AR		21.02
Stage of ground water development after supply side intervention		78.13
GAP TO BRING STAGE OF GWD UPTO 70%		23.05
6.2 DEMAND SIDE INTERVENTIONS		
Proposed Cropping Pattern change		None
Micro irrigation techniques		
Sugarcane crop area (89.34), about 40 sq km area is ground water irrigated, 100% ground water irrigated (40 sq km) proposed to be covered under Drip (sq.km.)		40
Volume of Water expected to be saved (MCM). Surface Flooding req- 2.45 m. Drip Req. - 1.88, WUE- 0.57 m		22.80
Estimated Expenditure (Rs. in Cr.) @ Rs. 25,000/- per acre		59.30
Area proposed to be covered (24.78sq.km.) 20% Onion area		4.956
Volume of Water expected to be conserved (MCM). Onion requirement - 0.78 m, Drip - 0.52 m		1.28856
Estimated Expenditure (Rs. in Cr.)		3.061569
Alternate Sources		Nil
Additional GW resources available after implementing above measures (MCM)		24.09
Volume of Water Required TO BRING STAGE OF GWD UPTO 70%		23.05
Balance GWR available for GW Development after STAGE OF GWD is brought to 70%		1.04
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		1.60
Regulatory Measures	Regulation of wells below 60 m	



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

1.. SALIENT FEATURE							
1.1. Introduction							
Taluka Name				Junnar			
Geographical Area (Sq. Km.)				1404.46			
Hilly Area (Sq. Km)				306.88			
Mapable Area (Sq. Km.)				1097.57			
Saline Area (Sq. Km.)				0			
Population (2011)				373987			
Climate				Tropical Monsoon			
1.2 Rainfall Analysis							
Normal Rainfall				760.9 mm			
Annual Rainfall (2017)				1133.5 mm			
Decadal Average Annual Rainfall (2008-17)				887.49 mm			
Long Term Rainfall Analysis (1998-2017)				Rising Trend 1.55 mm/year Probability of Normal/Excess Rainfall- 62% &18%. Probability of Drought (Moderate/Severe)-: 17% Moderate &3% Severe.			
Rainfall Trend Analysis (1901 to 2017) EQUATION OF TREND LINE: Y= 1.53 X +681.8							
1.3. Geomorphology & Geology							
Geomorp hic Unit		Plateau (Undissected to highly Dissected) with weathered thickness ranging from 0 to 2 m with escarpment slope. Mesa, Butte					
Geology		Deccan Traps (Basalt) Age: Upper Cretaceous to Lower Eocene					
1.4. Hydrology & Drainage							
Drainage		Kukadi-Pushpavati River System – Meena River, streams originating from hills in the north-west.					
Hydrology		Major Project		Mediu m Project		Minor Project	
		4		2		2	
		Percolatio n Tank		KT weir		Check Dam	
		0		38		24	
		Lift Irrigation				1	
1.5. Land Use, Agriculture, Irrigation & Cropping Pattern							
Geographical Area				1042.75 Sq. Km.			
Forest Area				243 Sq. Km.			
Cultivable Area				779.04 Sq. Km.			
Net Sown Area				632.18 Sq. Km.			

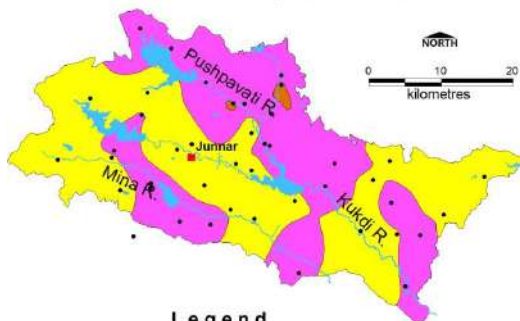
Double Cropped Area		146.86 Sq. Km.
Area under Irrigation	Surface Water	149.99Sq. Km.
	Ground Water	164.79Sq. Km.
Principal Crops (Reference year 2011-12)	Crop Type	Area(Sq. Km.)
	Jowar (Rabbi)	355.5
	Bajra	235.11
	Wheat	67.19
	Rice	60.42
	Other Cereals	29.01
	GramHarbhara	105.8
	Other Pulses	59378
	Sugarcane	78.17
	Oil Seeds	111.27
	Citreous fruit	15.7
Horticultural Crops	Onion	27.1
	Jowar (Rabbi)	355.5

1.6. Water Level Behaviour

1.6.1 Aquifer- I /Shallow / Phreatic/Unconfined aquifer

Pre-Monsoon Water Level (May-2017)

Aquifer I , Premonsoon , DTW (May. 2017)
Junnar Taluka, Pune District



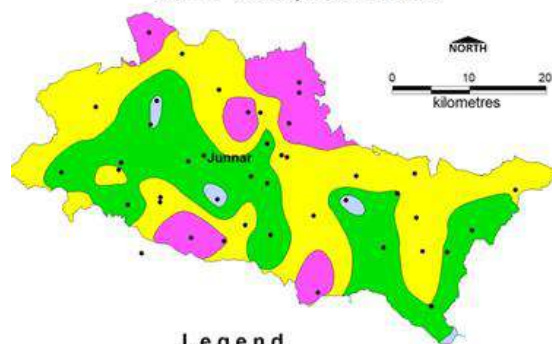
Legend

DTW (mbgl)	Principal aquifer Basalt (BS)
5 to 10	No of aquifers Two
10 to 20	Area 1097.52qkm
20 to 30	No of Village 183
	Taluka HQ
	Drainage
	Monitoring well

Water level ranging between 5 and 20 mbgl has been observed in major part of the taluka.

Post-Monsoon Water Level (November-2017)

Aquifer I , Postmonsoon , DTW (Nov. 2017)
Junnar Taluka, Pune District



Legend

DTW (mbgl)	Principal aquifer Basalt (BS)
0 to 2	No of aquifers Two
2 to 5	Area 1097.52qkm
5 to 10	No of Village 183
10 to 20	Taluka HQ
	Drainage
	Monitoring well

Water level ranging between 2 and 10 mbgl has been observed in major part of the taluka. Water Level less than 2 mbgl has been observed in isolated patches. Water level in the range of 10 to 20 mbgl is observed in patches in northern and southern parts of the taluka.

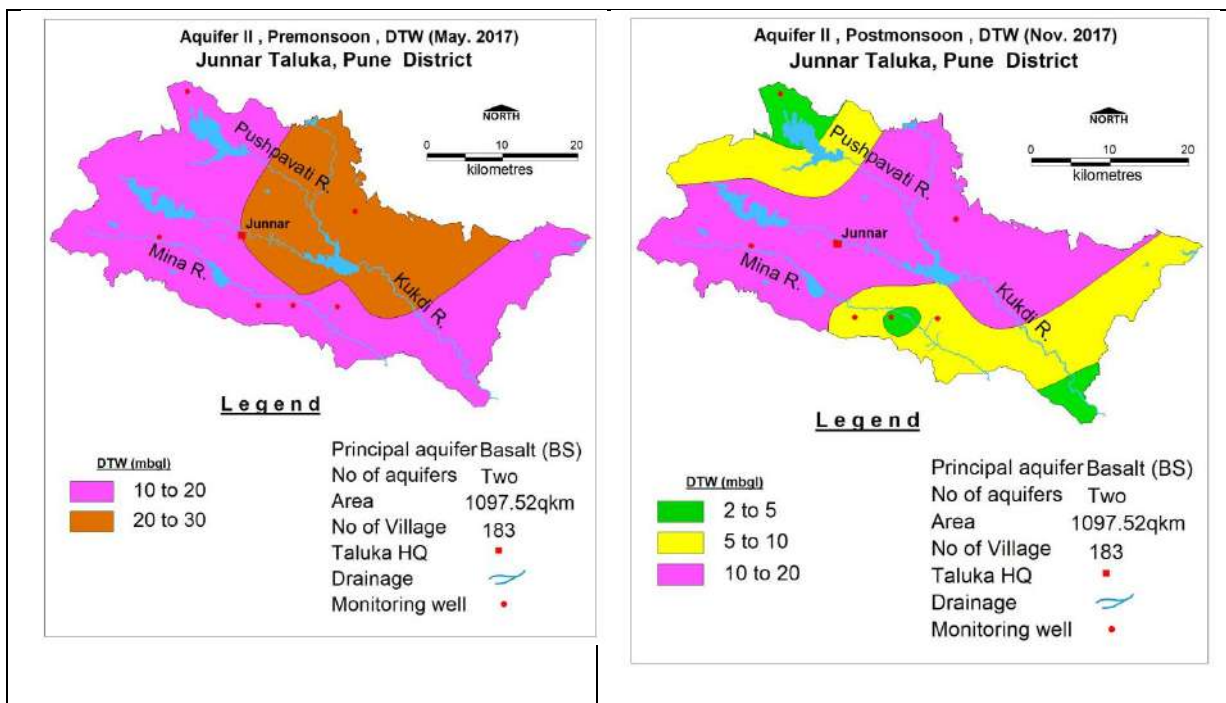
1.6.2 Aquifer- II/Deeper/Semi-Confined/Confined Aquifer-Water Level

Pre-Monsoon Water Level (May 2017)

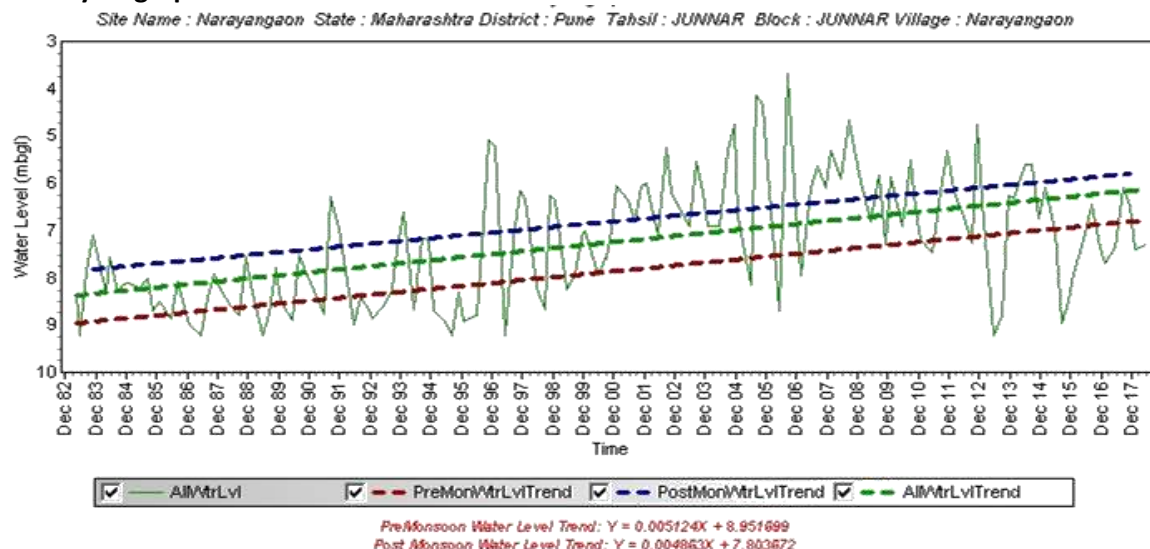
Water level between 10 to 20 mbgl is observed in major part of the taluka, except in central and north-central part, where water level between 20 to 30 mbgl is observed.

Post-Monsoon Water Level (Nov. 2017)

Water level between 10 to 20 mbgl is observed in major part of the taluka. Water level <10 mbgl is observed in south-eastern and north-western part of the taluka.

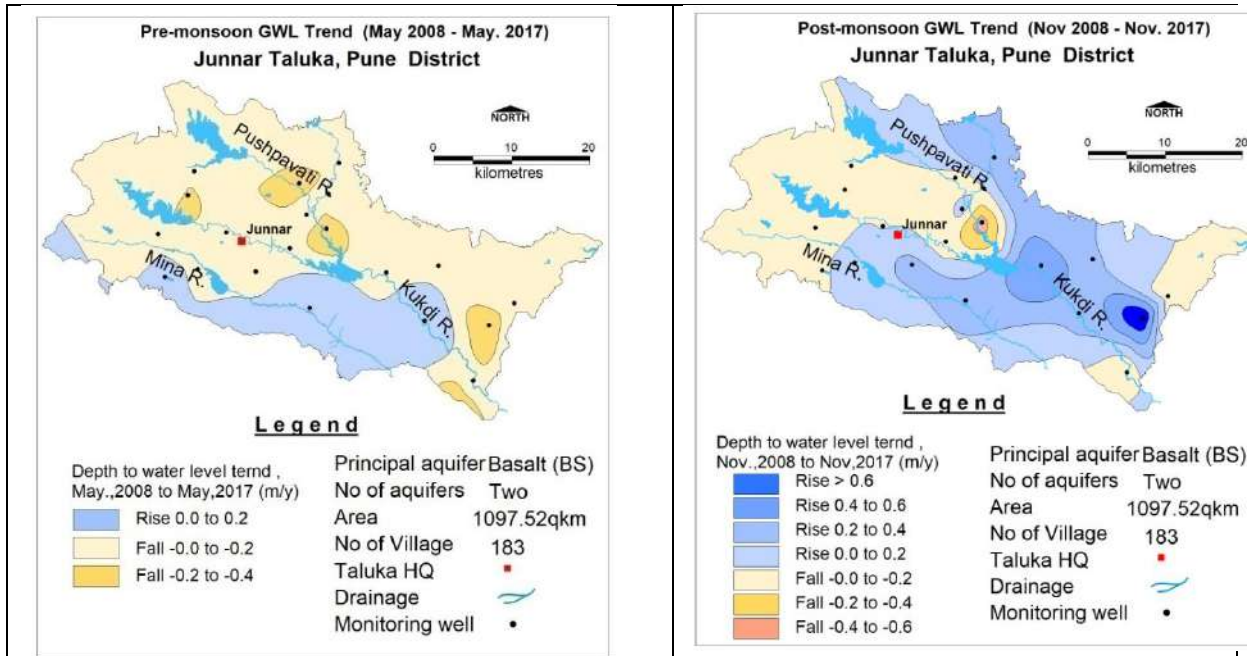


1.7. Hydrograph



1.8. Water Level Trend (2008-2017)

Hydrograph shows Pre-monsoon rising trend @ 0.0051m/year	Hydrograph shows Post-monsoon rising trend @ 0.0049 m/year
Pre-Monsoon trend Rising 0.0218 to 0.3272 m/year Falling 0.1314 to 0.1903 m/year	Post-Monsoon trend Rising 0.0012to 0.4449 m/year Falling 0.027 to 0.6992 m/year
Premonsoon Water level Trend (2007-16) Declining trend up to 0.2 m/year is observed in major part of the taluka. Rising water level trend up to 0.2 mhas been observed in south-central pars of the taluka between Karha and Nira rivers.	Postmonsoon Water level Trend (2007-16) Declining trend up to 0.2 m/year is observed in western part and, north-eastern and south-eastern corners taluka; Rising water level trend has been observed innorthern, southern, central and western part of the taluka.



2. GROUND WATER ISSUES

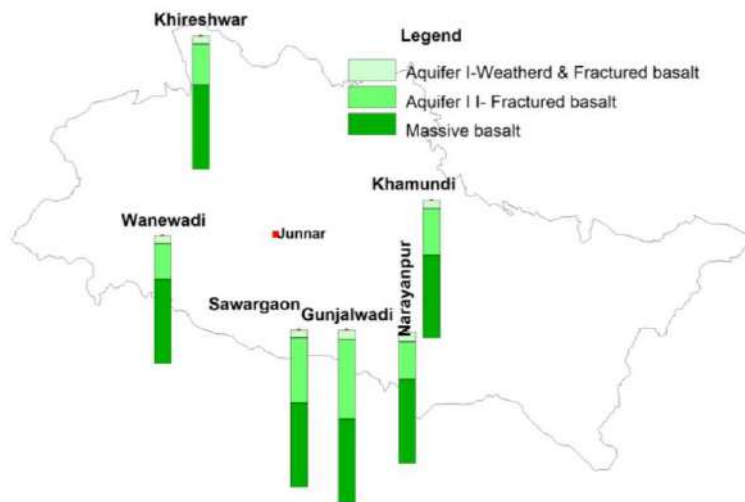
Major Issues Identified: Over – Exploitation, Limited Aquifer Potential, Water Scarcity - lean period

3. AQIFER DISPOSITION

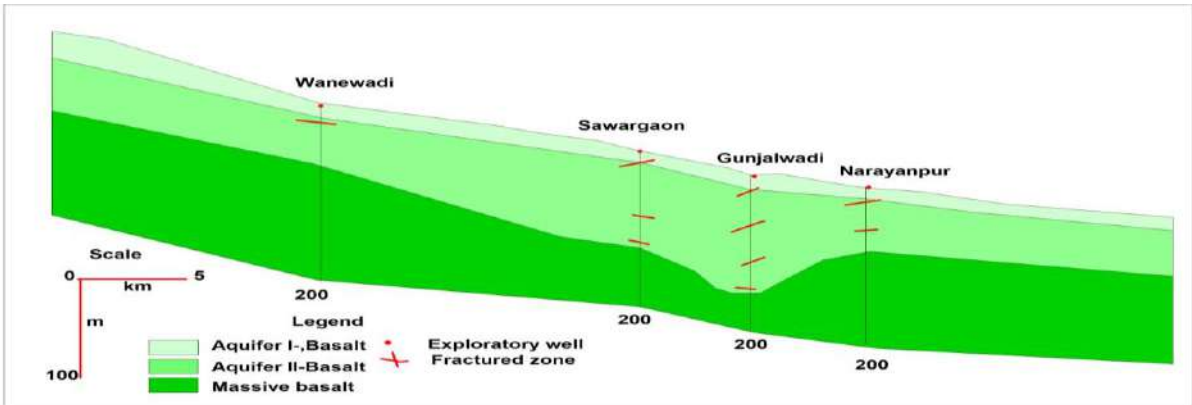
3.1. Number of Aquifers

Aquifer- I /Shallow / Phreatic/Unconfined aquifer- DT Basalt
 Aquifer- II/Deeper/Semi-Confined/Confined Aquifer - DT Basalt

3.2. Bar Diagram



3.3. Cross Sections

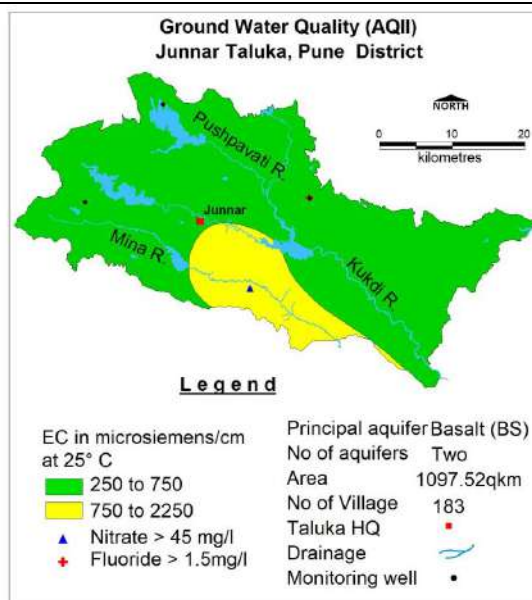
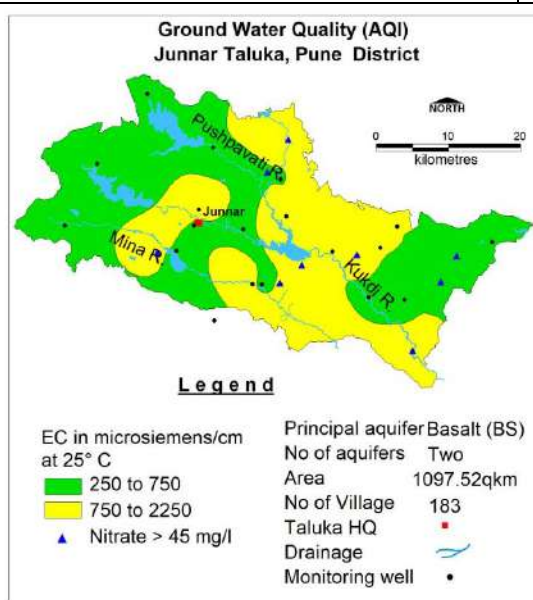


3.4. Aquifer Characteristics		
Major Aquifers	Basalt (Deccan Traps)	
Type of Aquifer (Phreatic/Semiconfined/Confined)	Aquifer- I /Shallow / Phreatic/Unconfined aquifer- DT Basalt	Aquifer- II/Deeper/Semi-Confined/Confined Aquifer - DT Basalt
Depth of Occurrence (mbgl)	5-29	20-189
Granular/ Weathered/ Fractured rocks Thickness (m)	3-22	1-12
Yield	<10 - 100 m ³ /day	0-2.5 lps
Specific yield/ Storativity (S)	0.02	0.003
Transmissivity (T)	T: 5-40 m ² /day	25-150 m ² /day

4. GROUND WATER QUALITY

Phreatic Aquifer (Aquifer-I)

Semiconfined/Confined Aquifer (Aquifer II)



In general the water quality of shallow aquifer in Junnar taluka is potable and good for drinking, domestic, industrial as well as irrigation purposes. Nitrate more than 45 mg per litre was detected in water sample from Yenere, Belhe, Otur, Paragon tarf, Narayangaon, Ambe Gavhan, Bhorwadi and Ale. Fluoride more than 1 mg/l was found in Ale and Bori bk water samples. Ground water around these villages can be used for drinking only after treatment.

In general the water quality of deep aquifer in Junnar taluka is potable and very good for drinking, domestic, industrial as well as irrigation purposes. Nitrate more than 45 mg per litre was detected in water sample from Gunjalwadi EW. Fluoride more than 1 mg/l was found in water sample of Khamunai EW. Ground water around these villages can be used for drinking only after treatment.

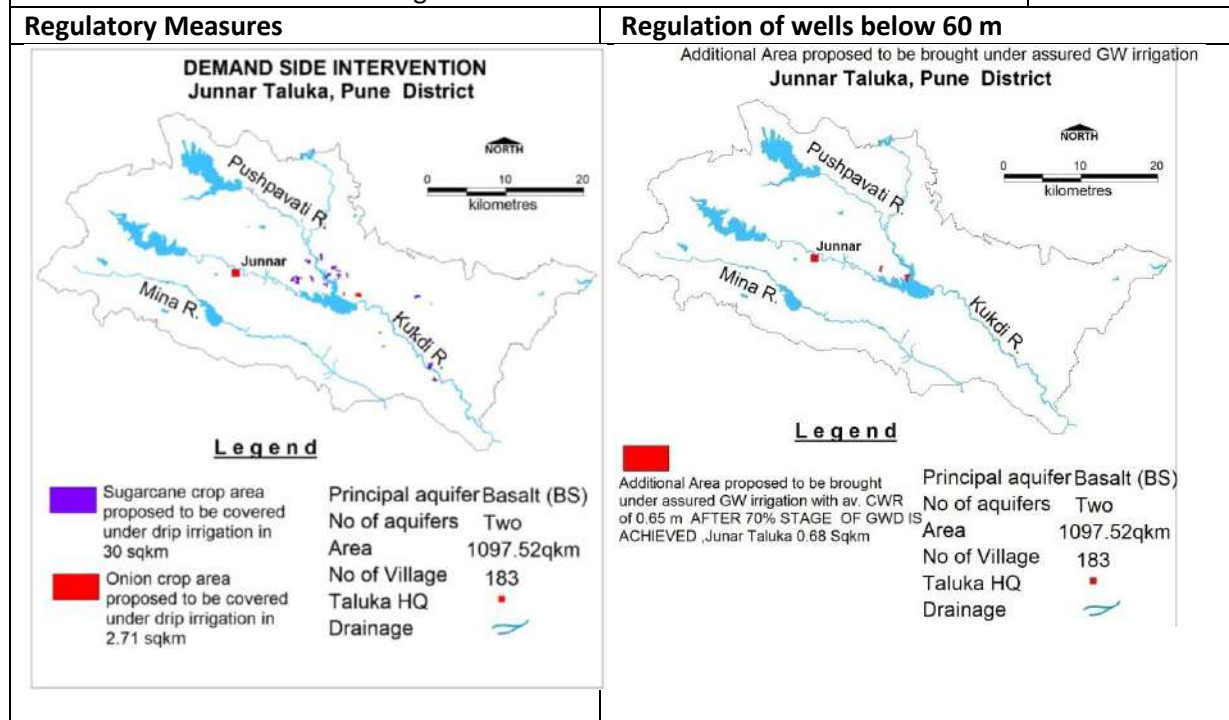
5. GROUND WATER RESOURCE

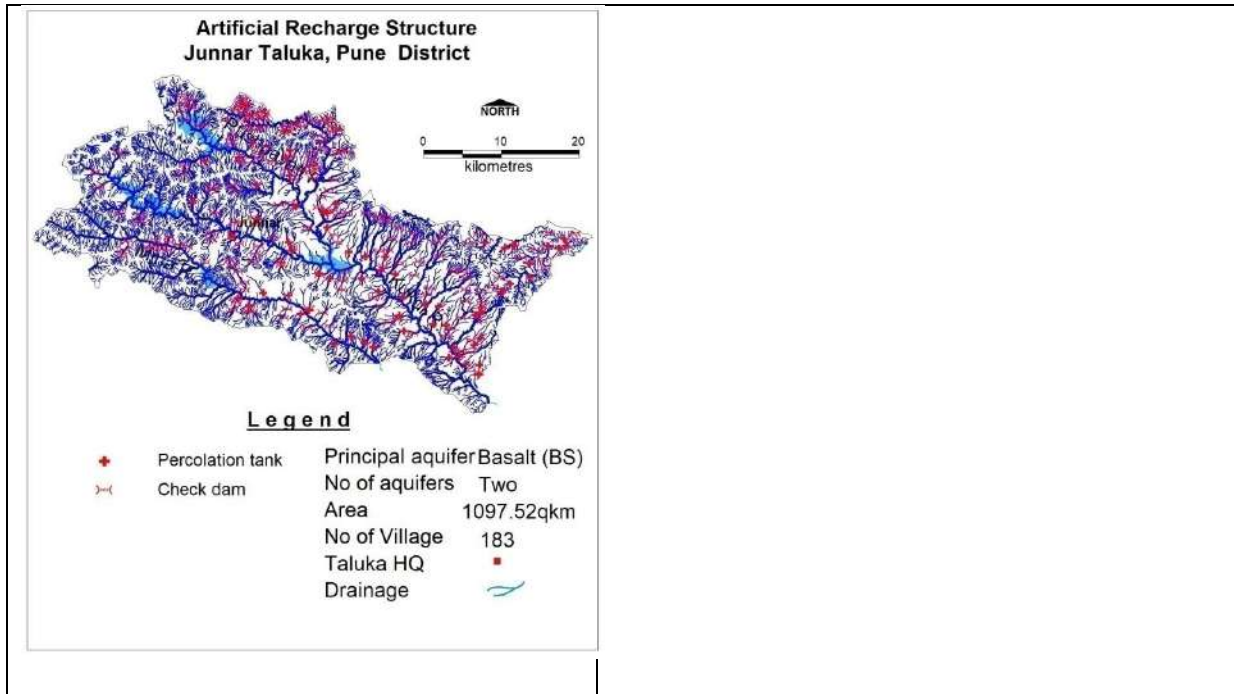
5.1. Aquifer- I /Shallow / Phreatic/Unconfined aquifer- DT Basalt

Ground Water Recharge Worthy Area (Sq. Km.)	1097.57
Total Annual Ground Water Recharge (MCM)	185.15
Natural Discharge (MCM)	9.27
Net Annual Ground Water Availability (MCM)	175.88
Existing Gross Ground Water Draft for irrigation (MCM)	145.05
Existing Gross Ground Water Draft for domestic and industrial water	5.48

supply(MCM)				
Existing Gross Ground Water Draft for All uses(MCM)		150.53		
Provision for domestic and industrial requirement supply to 2025(MCM)		9.39		
Net Ground Water Availability for future irrigation development(MCM)		24.02		
Stage of Ground Water Development (%)		85.59		
Category		SAFE		
5.2. Aquifer-II : Semiconfined/Confined Aquifer (Basalt)				
Total Area (Sq. Km.)	Mean aquifer thickness (m)	Sy	Piezometric Head (m above confining layer)	Total Resource (MCM)
1097.7	5	0.003 to 0.005	25	31.05
65.0. GROUND WATER RESOURCE ENHANCEMENT				
Available Resource (MCM)		175.88		
Gross Annual Draft (MCM)		150.53		
Stage of GW Development		85.59		
Annual Available Resource (MCM)		175.88		
Gross Annual Draft (MCM)		150.52		
Domestic Requirement (MCM)		5.48		
DEMAND (MCM)				
Agricultural demand -GW		145.04		
Agricultural demand -SW		110.26		
Domestic demand - GW		5.48		
Domestic demand - SW		1.37		
Total Demand(mcm)		262.15		
SUPPLY (MCM)				
Agricultural Supply -GW		145.04		
Agricultural Supply -SW		110.26		
Domestic Supply - GW		5.48		
Domestic Supply - SW		1.37		
Total supply(mcm)		262.15		
Interventions proposed to deal with overexploitation				
6.1 SUPPLY SIDE INTERVENTIONS				
Rainwater Harvesting and Artificial Recharge				
Volume of unsaturated granular zone (MCM)		1561.39		
Recharge Potential (MCM)		31.23		
Surface water requirement @ 75% efficiency (MCM)		41.54		
Availability of Surplus surface runoff (MCM)		19.13		
Surplus runoff considered for planning (MCM) @ 100%	19.13	14.35		
Proposed Structures	Percolation Tank (@ Rs.150 lakh, Av. Gross Capacity-100 TCM*2 fillings = 200 TCM)	Check Dam (@ Rs.30 lakh, Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM)		
Number of Structures	67	191		
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	10.05	4.30		
Estimated Expenditure (Rs. in Cr.)	100.50	57.30		
RTRWH - Urban Areas				

Households to be covered (25% with 50 m ² area)	21450
Total RWH potential (MCM)	0.61
Rainwater harvested / recharged @ 80% runoff co-efficient	0.48
Estimated Expenditure (Rs. in Cr.) @ Rs. 15000/- per HH	32.18
<i>RTRWH in Urban Areas is economically not viable & Not Recommended</i>	
Total volume of water expected to be recharged/conserved by AR	14.35
Stage of ground water development after supply side intervention	79.13
GAP TO BRING STAGE OF GWD UPTO 70%	17.36
6.2 DEMAND SIDE INTERVENTIONS	
Proposed Cropping Pattern change	None
Micro irrigation techniques	
Sugarcane crop area (78.17), about 30 sq km area is ground water irrigated, 100% ground water irrigated (30 sq km) proposed to be covered under Drip (sq.km.)	30
Volume of Water expected to be saved (MCM). Surface Flooding req- 2.45 m. Drip Req. - 1.88, WUE- 0.57 m	17.10
Estimated Expenditure (Rs. in Cr.) @ Rs. 25,000/- per acre	44.48
Area proposed to be covered (27.1sq.km.) 10%Onion area	2.71
Volume of Water expected to be conserved (MCM). Onion requirement - 0.78 m, Drip - 0.52 m,	0.7046
Estimated Expenditure (Rs. in Cr.)	1.674103
Alternate Sources	NIL
Additional GW resources available after implementing above measures (MCM)	17.80
Volume of Water Required TO BRING STAGE OF GWD UPTO 70%	17.36
Balance GWR available for GW Development after STAGE OF GWD is brought to 70%	0.44
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	0.68





13.0 AQUIFER MAPS AND GROUND WATER MANAGEMENT PLAN, PURANDHAR TALUKA, PUNE DISTRICT, MAHARASHTRA

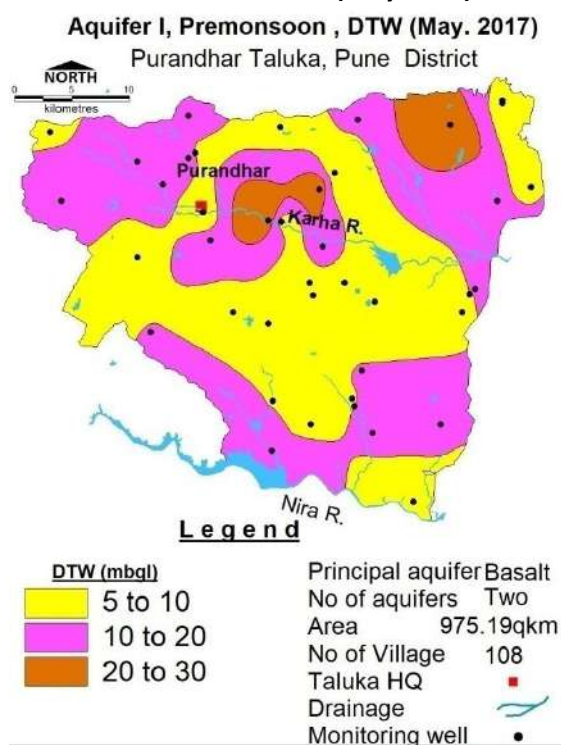
1. SALIENT FEATURE								
1.1 Introduction								
Taluka Name				Purandhar				
Geographical Area (Sq. Km.)				1082.46				
Hilly Area (Sq. Km)				107.27				
Mapable Area (Sq. Km.)				975.19				
Saline Area (Sq. Km.)				6.82				
Population (2011)				189323				
Climate				Tropical Monsoon				
1.2 Rainfall Analysis								
Normal Rainfall				581.2 mm				
Annual Rainfall (2017)				421 mm				
Decadal Average Annual Rainfall (2008-17)				490.89 mm				
Long Term Rainfall Analysis (1998-2017)		Rising Trend 0.685 mm/year Probability of Normal/Excess Rainfall- 56% & 21%. Probability of Drought (Moderate/Severe)-: 18% Moderate & 5 % Severe.						
Rainfall Trend Analysis (1901 to 2017) EQUATION OF TREND LINE: $Y = 0.685 X + 539.3$								
1.3. Geomorphology & Geology								
Geomorphic Unit		Plateau (Slightly dissected to highly Dissected) with weathered thickness ranging from 0 to 5 m; Mesa, Butte ,valley fill deposits along streams.						
Geology		Deccan Traps (Basalt) - Age: Upper Cretaceous to Lower Eocene Alluvium – Age Quaternary						
1.4. Hydrology & Drainage								
Drainage		Karha-Nira River System –streams originating from hills in the west.						
Hydrology		Major Project	Medium Project	Minor Project	Percolation Tank	KT weir	Check Dam	Lift Irrigation
		0	1	9	0	32	9	1
1.5. Land Use, Agriculture, Irrigation & Cropping Pattern								
Geographical Area				1082.46Sq. Km.				
Forest Area				22.21Sq. Km.				
Cultivable Area				891Sq. Km.				
Net Sown Area				857.65Sq. Km.				

Double Cropped Area		33.35Sq. Km.
Area under Irrigation	Surface Water	71.52 Sq. Km.
	Ground Water	58.83Sq. Km.
Principal Crops (Reference year 2011-12)	Crop Type	Area (Sq. Km.)
	Jawari	321.88
	Bajra	170.98
	Wheat	78.83
	Sugarcane	5.62
	Gram	8.31
	Groundnut	14.25
Horticultural Crops	Onion	20.23

1.6. Water Level Behaviour

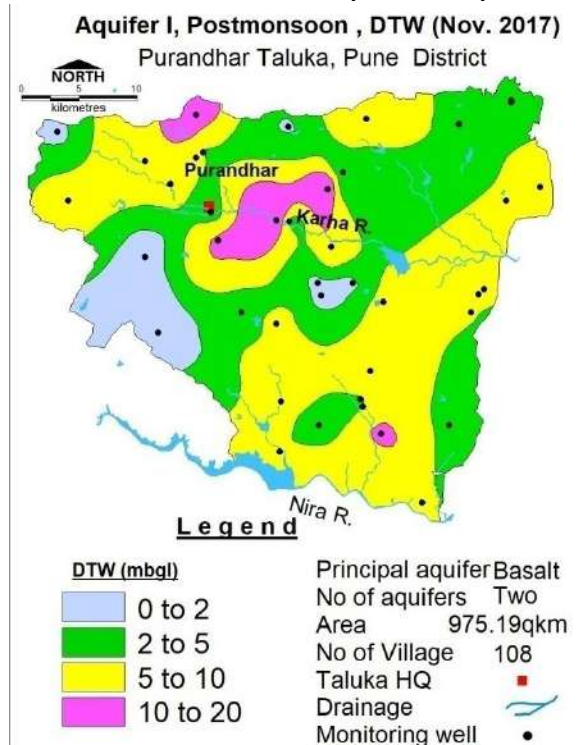
1.6.1 Aquifer- I /Shallow / Phreatic/Unconfined aquifer

Pre-Monsoon Water Level (May 2017)



Water level ranging between 5 and 10 mbgl has been observed in major part of the taluka while water level in the range of 10 to 20 mbgl is observed in eastern, central (around Karha river, east of Purandhar town) and western parts of the taluka.

Post-Monsoon Water Level (Nov. 2017)



Shallow Water Level less than 10 mbgl has been observed in almost entire taluka except a small patch in the central part, just north of Karha river.

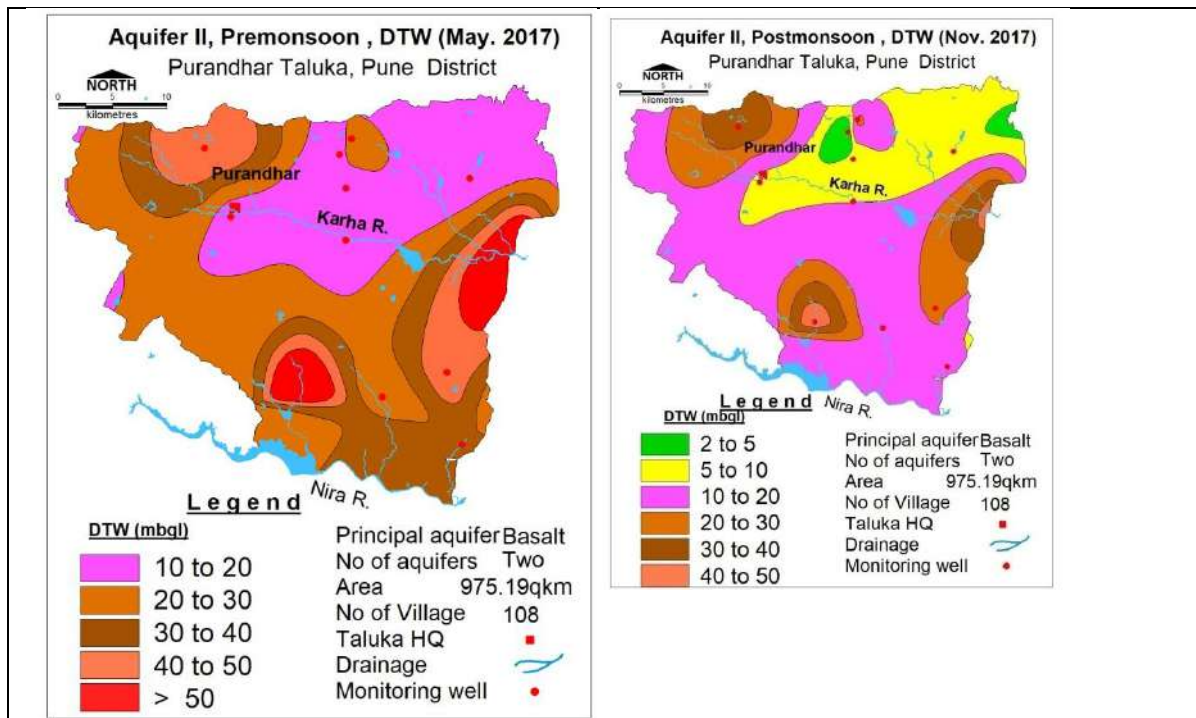
1.6.2 Aquifer- II/Deeper/Semi-Confined/Confined Aquifer-Water Level

Pre-Monsoon Water Level (May 2017)

Water level < 20 mbgl is observed in north-western, south-western and north-eastern part of the taluka; water level between 20 to 40 mbgl is observed in major part of the taluka and deep waterlevel >50 mbgl is seen south of Karha river, west of Purandhar town.

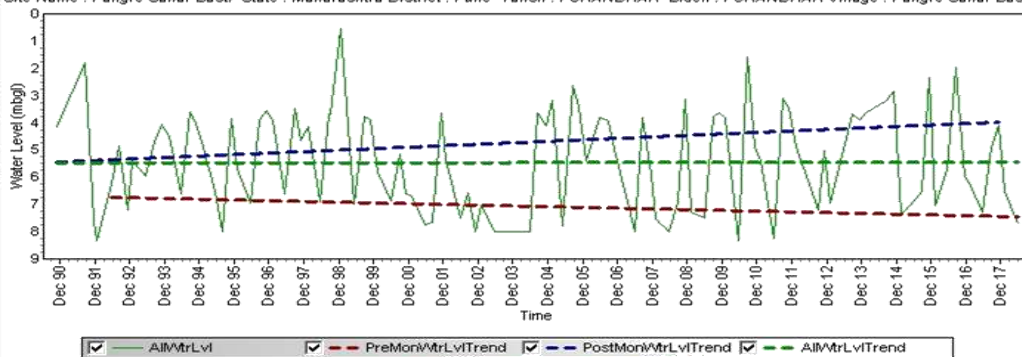
Post-Monsoon Water Level (Nov. 2017)

Water level <10 mbgl is observed in north-western, south-western and north-eastern part of the taluka; water level between 10 to 30 mbgl is observed in major part of the taluka and deep waterlevel in the range of 40 to 50 mbgl is seen south of Karha river, west of Purandhar town.



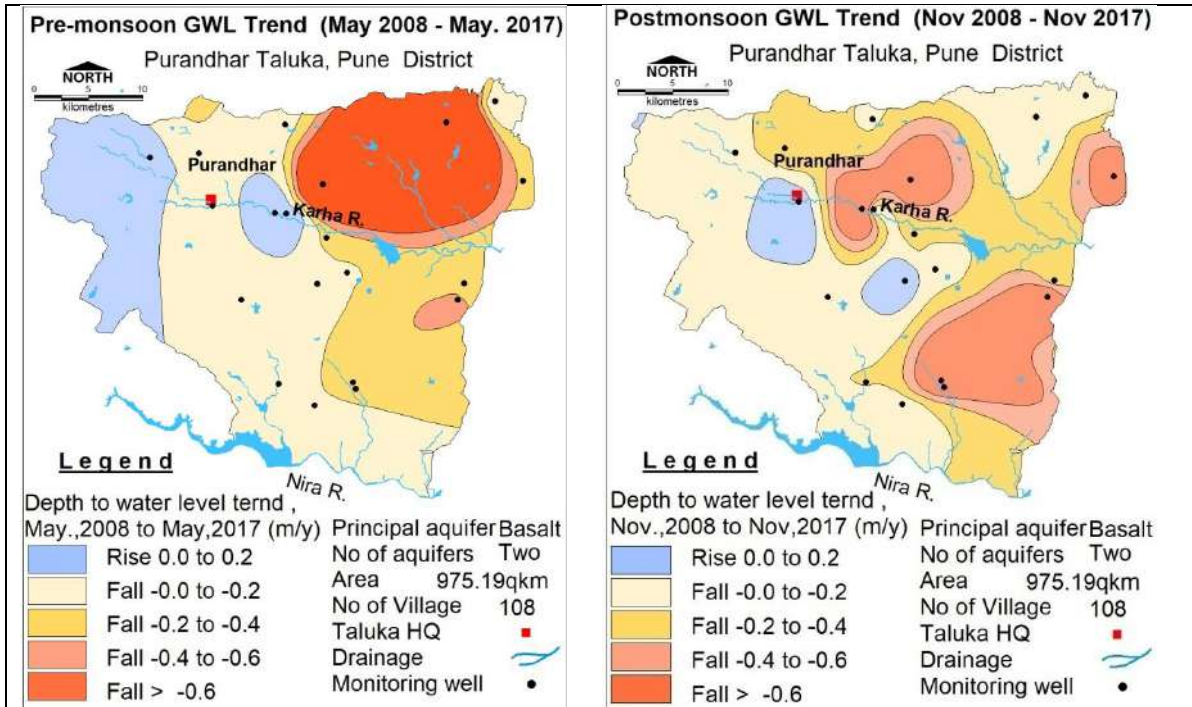
1.7. Hydrograph

Site Name : Pangre Sailar Basti State : Maharashtra District : Pune Tahsil : PURANDHAR Block : PURANDHAR Village : Pangre Sailar Basti



1.8. Water Level Trend (2008-2017)

Hydrograph shows Pre-monsoon falling trend @ 0.0021m/year	Hydrograph shows Post-monsoon rising trend @ 0.0044 m/year
Pre-Monsoon trend Rising 0.0346 to 2.077 m/year Falling 0.0756to 0.1639 m/year	Post-Monsoon trend Rising 0.0148 to 1.5885 m/year Falling 0.0900to 0.1082 m/year
Premonsoon Water level Trend (2008-17) Declining trend up to 0.2 m/year is observed in almost entire eastern half of the taluka with the north-eastern portion showing decline in water level > 0.6 m. Rising water level trend has been observed in western parts of the taluka.	Postmonsoon Water level Trend (2008-17) Declining trend up to 0.2 m/year is observed in almost entire taluka with patches showing showing decline in water level > 0.6 m. Rising water level trend has been observed in patches in central part of the taluka.



2. GROUND WATER ISSUES

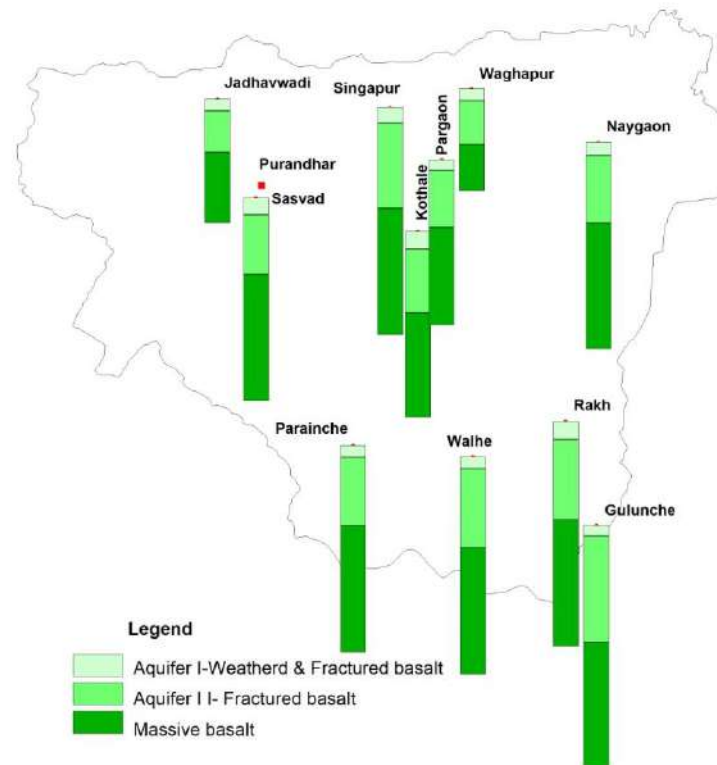
Major Issues Identified: Over – Exploitation, Limited Aquifer Potential, Water Scarcity - lean period

3. AQUIFER DISPOSITION

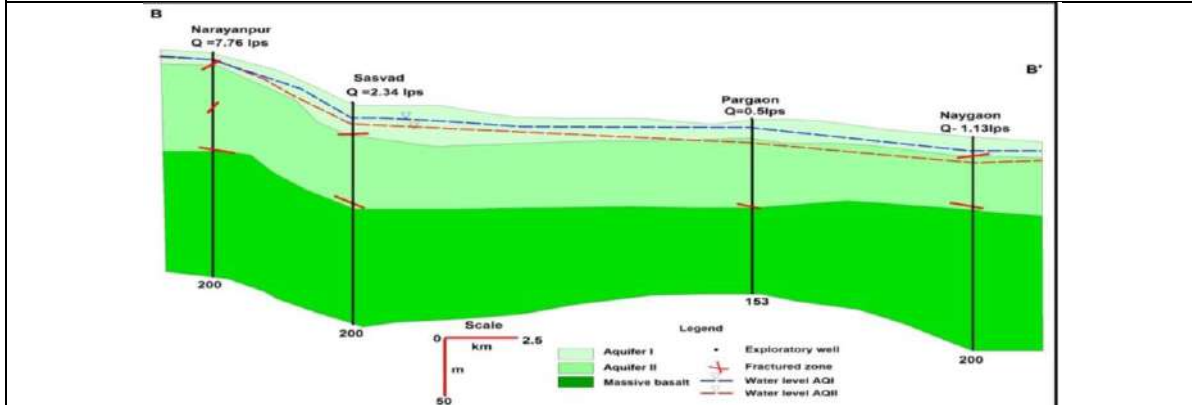
3.1. Number of Aquifers

Aquifer- I /Shallow / Phreatic/Unconfined aquifer- DT Basalt
Aquifer- II/Deeper/Semi-Confined/Confined Aquifer - DT Basalt

3.2. Bar Diagram



3.3. Cross Sections

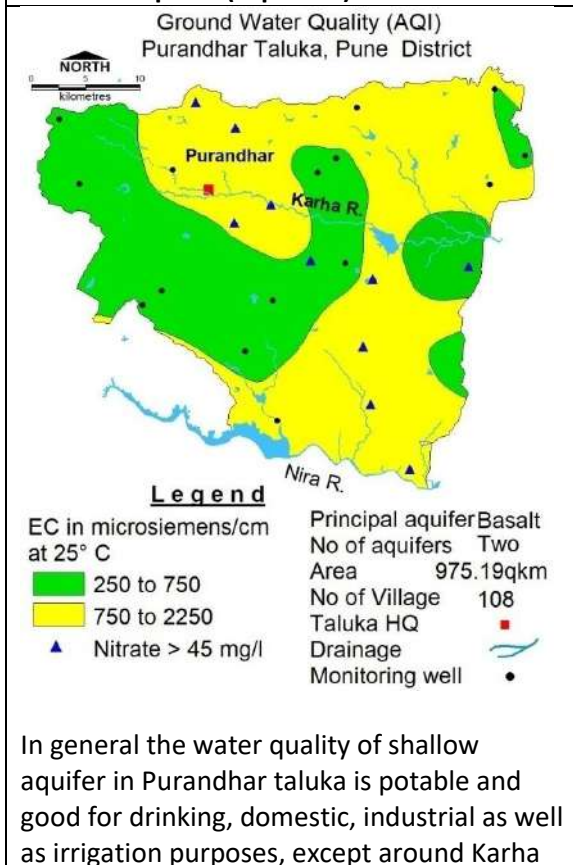


3.4. Aquifer Characteristics

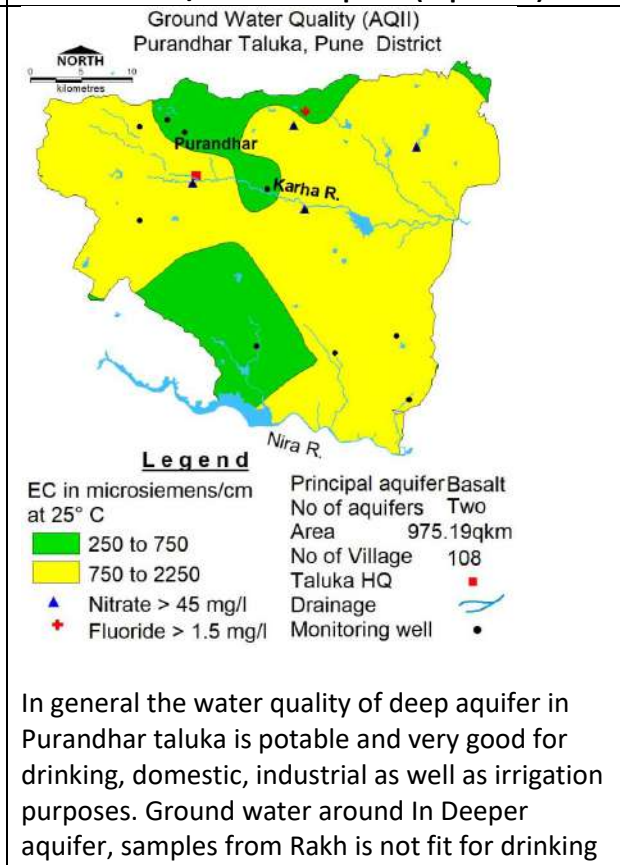
Major Aquifers	Basalt (Deccan Traps)	
Type of Aquifer (Phreatic/Semiconfined/Confined)	Aquifer- I /Shallow / Phreatic/Unconfined aquifer- DT Basalt	Aquifer- II/Deeper/Semi-Confined/Confined Aquifer - DT Basalt
Depth of Occurrence (mbgl)	5-16	27-168
Granular/ Weathered/ Fractured rocks Thickness (m)	3-12.8	0.5-4
Yield	<10 - 100 m ³ /day	0-1.7 lps
Specific yield/ Storativity (S)	0.02	0.00054
Transmissivity (T)	T: 5-20 m ² /day	T: 25-100 m ² /day

4. GROUND WATER QUALITY

Phreatic Aquifer (Aquifer-I)

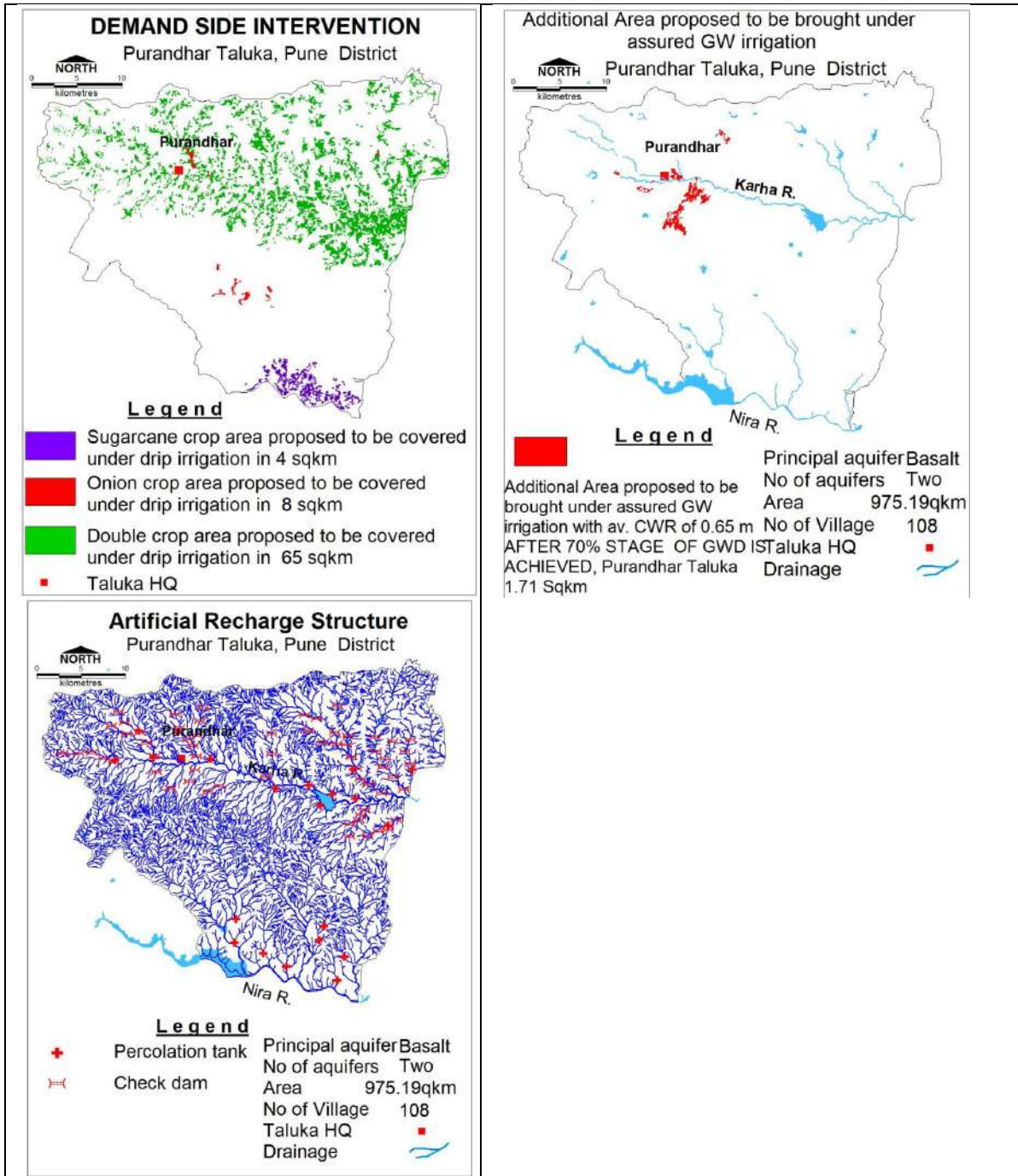


Semiconfined/Confined Aquifer (Aquifer II)



<p>river. Nitrate more than 45 mg per litre was detected in water sample from Daundaj, Pimpale, Khalad, Dive, Jawalarjun, Sakurde, Jejuri, Kamatwadi-Walha, Zendewadi, Pimpri (Kh) and Malvasti. Around Jawalarjun very high salinity prevails in ground water (EC >2250 μS/cm), which is not suitable for drinking, domestic, industrial as well as irrigation purposes. Ground water can be used for drinking only after treatment and for irrigation for very high salt tolerant crops and with proper soil and crop management practices.</p>	<p>purpose if directly consumed without treatment. Nitrate more than 45 mg per litre was detected in water sample from Saswad, Belsar, Singapur and Naygaon. Fluoride more than 1 mg/l was found in water sample of Waghapur EW. RSC values of ground water from confined aquifer is more than 2.50 meq/l at Saswad - ground water of these areas is not suitable for irrigation.</p>			
5. GROUND WATER RESOURCE & EXTRACTION				
5.1 Aquifer-I/ Phreatic Aquifer (Basalt)				
Ground Water Recharge Worthy Area (Sq. Km.)	975.19			
Total Annual Ground Water Recharge (MCM)	137.20			
Natural Discharge (MCM)	6.86			
Net Annual Ground Water Availability (MCM)	130.34			
Existing Gross Ground Water Draft for irrigation (MCM)	120.36			
Existing Gross Ground Water Draft for domestic and industrial water supply (MCM)	3.34			
Existing Gross Ground Water Draft for All uses (MCM)	123.7			
Provision for domestic and industrial requirement supply to 2025 (MCM)	5.79			
Net Ground Water Availability for future irrigation development (MCM)	9.92			
Stage of Ground Water Development (%)	94.91			
Category	Semi Critical			
5.2 Aquifer-II Semiconfined/Confined Aquifer (Basalt)				
Total Area (Sq. Km.)	Mean aquifer thickness (m)	Sy	Piezometric Head (m above confining layer)	Total Resource (MCM)
975.89	3	0.003 to 0.005	25	13.61
6.0. GROUND WATER RESOURCE MANAGEMENT				
Available Resource (MCM)				130.34
Gross Annual Draft (MCM)				123.7
Stage of GW Development				94.91
Annual Available Resource (MCM)				130.34
Gross Annual Draft (MCM)				123.70
Domestic Requirement (MCM)				3.34
DEMAND (MCM)				
Agricultural demand -GW				120.36
Agricultural demand -SW				44.00
Domestic demand - GW				3.34
Domestic demand - SW				0.84
Total Demand (mcm)				168.54
SUPPLY (MCM)				
Agricultural Supply -GW				120.36
Agricultural Supply -SW				44.00
Domestic Supply - GW				3.34
Domestic Supply - SW				0.84
Total supply (mcm)				168.54

Interventions proposed to deal with overexploitation		
6.1 SUPPLY SIDE INTERVENTIONS		
Rainwater Harvesting and Artificial Recharge		
Volume of unsaturated granular zone (MCM)		499.87
Recharge Potential (MCM)		10
Surface water requirement @ 75% efficiency (MCM)		13.3
Availability of Surplus surface runoff (MCM)		6.12
Surplus runoff considered for planning (MCM) @ 100%	6.12	4.59
Proposed Structures	Percolation Tank (@ Rs.150 lakh, Av. Gross Capacity-100 TCM*2 fillings = 200 TCM)	Check Dam (@ Rs.30 lakh, Av. Gross Capacity-10 TCM * 3 fillings = 30 TCM)
Number of Structures	21	64
Volume of Water expected to be conserved / recharged @ 75% efficiency (MCM)	3.15	1.44
Estimated Expenditure (Rs. in Cr.)	31.50	19.20
RTRWH - Urban Areas		
Households to be covered (25% with 50 m ² area)		12800
Total RWH potential (MCM)		0.33
Rainwater harvested / recharged @ 80% runoff co-efficient		0.26
Estimated Expenditure (Rs. in Cr.) @ Rs. 15000/- per HH		19.20
<i>RTRWH in Urban Areas is economically not viable & Not Recommended</i>		
Total volume of water expected to be recharged/conserved by AR		4.59
Stage of ground water development after supply side intervention		91.68
GAP TO BRING STAGE OF GWD UPTO 70%		29.249
6.2 DEMAND SIDE INTERVENTIONS		
Proposed Cropping Pattern change		None
Micro irrigation techniques		
Sugarcane crop area (5.62) ,about 4 sq km area is ground water irrigated, 100% ground water irrigated (4 sq km) proposed to be covered under Drip (sq.km.)		4
Volume of Water expected to be conserved (MCM). Sugarcane requirement - 2.45 m, Pomegranate with Drip - 0.7 m, WUE - 1.75 m		2.28
Estimated Expenditure		5.9304
Area proposed to be covered (191.7sq.km.) 50% DC area drip/sprinkler		65
Volume of Water expected to be conserved (MCM). DC requirement - 0.90 m, Drip - 0.40 m,		26
Estimated Expenditure		40.15375
Area proposed to be covered (35.5sq.km.) 50%Onion area		8
Volume of Water expected to be conserved (MCM). Onion requirement - 0.78 m, Drip - 0.52 m,		2.08
Estimated Expenditure		4.942
Alternate Sources		Nil
Additional GW resources available after implementing above measures (MCM)		30.36
Volume of Water Required TO BRING STAGE OF GWD UPTO 70%		29.25
Balance GWR available for GW Development after STAGE OF GWD is brought to 70%		1.11
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 OR		1.71
Regulatory Measures	Regulation of wells below 60 m	



Annexures

Annexure I: Salient Features of Ground Water Exploration

S No	Taluka	Village	Type of Well	Drilling depth	Casing	AQ Zones	Pre SWL	Post SWL	PYT Discharge	AQI	AQII	Massive	Thickness AQII
				(m)	(m)	(m.bgl)	(m.bgl)	(m ³ /hr)	(m.bgl)	(m)			
1	Akole	Khireswar	EW	200	2.5	16 -31 ,50 -55	12	2.25	-	20	98	200	2
2	Ambegaon	Bhavdi	EW	200	5.5	9 -15 ,27 -33	18	12.9	-	15	90	200	1
3	Ambegaon	Pokhari	EW	200	2.75		21	14.15	-	20	90	200	1
4	Ambegaon	Sriramnagar	EW	200	5.5	-18	21	17.2	1.14	17	84	200	3
5	Ambegaon	Takewadi	EW	200	5.58		14	8.37	-	20	125	200	1
6	Ambegaon	Shingave	EW	90			3.2			20	32	90	2
7	Ambegaon	Shingave	OW	62.6	11.5	25.00- 26.00, 30.00-32.50			7.76	20	32	63	2
8	Baramati	Ambhi Khurd	EW	200	5.5	-	70	45	Traces	15	65	200	0.5
9	Baramati	Chandgudewadi	EW	123.5	5.5	11.8, 12.3	17.8	4.43		15	120	123.5	6
10	Baramati	Chandgudewadi	OW	200	5.5	43	17.8	5		21	135	200	0.5
11	Baramati	Choudharwadi	EW	200	5.6	109	17.8	5	1.37	20	109	200	3
12	Baramati	Dorlewadi	EW	200	5.5	105	27	24.1	3	25	105	200	3
13	Baramati	Dorlewadi	OW	200	5.5	35	27	24.1	Traces	15	70	200	0.5
14	Baramati	Loni Bhapkar	EW	200	5.5	-	25.5	12	0.38	20	125	200	1
15	Baramati	Pandhare	EW	200	11.5	-	70	45	Traces	15	75	200	0.5
16	Baramati	Parawadi	EW	142	11.5	65.00, 77.00, 141.00	18	4.85	7.76	25	141	142	9
17	Baramati	Parawadi	OW	200	5.5	159	18	7.85	2.16	20	159	200	9
18	Baramati	Rui	EW	198.2	5.5	12 -18 ,49 -62 ,97 - 152 ,70 -76 ,167 - 174	11	4.87	8.24	25	174	198.2	12
19	Baramati	Rui	OW	58	3.7	15 -21 ,52 -58	12	2.19	4.76	21	58	58	12
20	Baramati	Sherechiwadi	EW	195.2	6	9.2 -15.3, 33.6 - 39.7, 112.9 -119, 91.6 -97.7, 128.2 - 143.4, 146.5 -152.6	13	3.5	4.76	15	152	195.2	12
21	Baramati	Sherechiwadi	OW	152.6	23.5	9.2 -15.3	9	4.38	0.6	15	152	152.6	12
22	Baramati	Sherechiwadi	OW	24.5	7.2	9.2 -18.3	9	4.2	3.4	15	152	24.5	12
23	Baramati	Sonwadisupe	EW	200	3		30	21	0.6	20	90	200	2
24	Baramati	Tandulwadi	EW	93	5.5	30 .00, 91.00	11	2.3	12.18	30	91	93	3
25	Baramati	Tandulwadi	OW	200	5.5	149	19	11.1	2.16	20	149	200	3
26	Baramati	Wadgaon Nimbalkar	EW	200	8.5	24	9	5.1	2.16	24	90	200	3
27	Bhor	Apti	EW	123	3	-18	19.34	8	-	18	90	123	1

S No	Taluka	Village	Type of Well	Drilling depth	Casing	AQ Zones	Pre SWL	Post SWL	PYT Discharge	AQI	AQII	Massive	Thickness AQII
				(m)	(m)	(m.bgl)	(m.bgl)	(m ³ /hr)	(m.bgl)	(m)			
28	Bhor	Apti	OW	200	5.5	-49	18.3	8	1.5	18	125	200	3
29	Bhor	Bhor	EW	200	3	-21	16	5.85	-	21	105	200	1
30	Bhor	Narsapur	EW	92.25	11.5	16 - ,54 -	16.6	16.6	8.25	16	85	92.25	3
31	Bhor	Narsapur	OW	190	11.5	-84	13.45	13.45	-	16	85	190	3
32	Bhor	Penjalwadi	EW	200	8	-27	17	11	0.62	27	125	200	2
33	Daund	Ambegaon	EW	195.3	-	12 - ,184.5 -	14	7.95	1.05	19	145	195.3	2
34	Daund	Boribel	EW	152.5	2.65	5 - ,24 -	12	3.28	9.84	24	125	152.5	4
35	Daund	Boribel	OW	103.8	2.8	5 - ,25 -	12	3.49	12.18	25	90	103.8	4
36	Daund	Khor	EW	146.7	49	110 - ,143 -	17	4.3	3.17	25	143	146.7	6
37	Daund	Khor	OW	150	-	35 - ,108 -	12	3.41	-	21	108	150	2
38	Daund	Vasunde	EW	-	-	-	32	19	-	21	125	145	1
39	Daund	Vasunde	EW	180	30	109 - ,178 -	32	19	9.84	25	178	180	6
40	Daund	Vasunde	OW	180	-	98 - ,178 -	32	19	-	25	178	180	2
41	Haveli	CWPRS	EW	200	5.5	11 - ,49.5 -	14	5.6	4.08	20	135	200	4
42	Haveli	CWPRS	OW	128	5.5	-47.5	12	4.5	-	20	90	128	2
43	Haveli	CWPRS-EW	EW	200	7.5	17-18,90-93	9	4	4.77	17	93	200	3
44	Haveli	CWPRS-OW	OW	172.4	23.5	20.30 -21.30,119.50 -120.00	9	4	2.16	20	120	172.4	5
45	Haveli	Dighi	EW	158.6	4.85	11 - ,27.5 -30.6 ,112 - ,63 - ,122	18	6.4	8.25	27	122	158.6	9
46	Haveli	Dighi	OW	42.7	4.85	16 - ,34 -	18	6.4	3.42	27	42	42.7	9
47	Haveli	Dighi	OW	200	4.4	-	18	6.4	-	27	122	200	9
48	Haveli	Khamgaon	EW	138.2	3	-	22.58	13	-	20	90	138.2	1
49	Haveli	Lohgaon	EW	197.3	4.5	09-Nov	9	2.54	1.5	15	110	197.3	3
50	Haveli	Manjari	EW	200	6.1	10 -12 ,49.5 -52	12	7.3	8.25	12	52	200	4
51	Haveli	Manjari	OW	32.5	6.1	-10	12	7.3	0.85	12	32	32.5	1
52	Haveli	Nhavi Sandas	EW	90.1	5.5	-87	21	10.22	8.25	10	87	90.1	6
53	Haveli	Nhavi Sandas	OW	28.6	5.6	12 - ,15.4 -	21	10.22	4.76	28	28	28.6	6
54	Haveli	Nhavi Sandas	OW	129.2	2.5	18.4 - ,22 - ,104 - ,38 -	21	10.22	12.88	18	104	129.2	6
55	Haveli	Ravet	EW	200	4.7	4 - ,175 -	10	3.2	-	25	175	200	2
56	Haveli	Shindawane	EW	200	5.5	-7	16	8.9	2.34	25	175	200	3
57	Haveli	Shindawane	OW	31.5	5.5	-8.5	16	8.9	0.62	31	31	31.5	3
58	Haveli	Vade	EW	200	4	8 - ,64 -	12	2	4.08	14	135	200	4
59	Haveli	Vade	OW	87	4	8 - ,64 -	12	1.92	-	14	64	87	1
60	Haveli	Wadgaon Shinde	EW	200	6.1	14.8 - ,158 -	18	9.9	1.35	15	158	200	3

S No	Taluka	Village	Type of Well	Drilling depth	Casing	AQ Zones	Pre SWL	Post SWL	PYT Discharge	AQI	AQII	Massive	Thickness AQII
				(m)	(m)	(m.bgl)	(m.bgl)	(m ³ /hr)	(m.bgl)		(m)		
61	Indapur	Bawda-EW	EW	200	17.5	24-26 53.00-54.00	15	6.31	9.84	24	54	200	3
62	Indapur	Bawda-OW	OW	81	17.5	24-26 53.00-54.01	13	4.66	0.78	24	54	81	3
63	Indapur	Gokondi	EW	200	6	-10	19	9	-	10	90	200	1
64	Indapur	Loni Deokar	EW	-	-		13	7	-	13	98	135	1
65	Indapur	Malwadi	EW	200	2	-5.4	19	6	0.56	12	105	200	2
66	Indapur	Nirgude	EW	200	2.6	-5	14	2.05	-	14	86	200	1
67	Indapur	Wadapuri	EW	200	17.5	84.00 - 87.00	96		<0.14	12	87	200	3
68	Indapur	Vakil Basti	EW	200	1.75	-24	17	10.48	-	24	115	200	1
69	Junnar	Gunjalwadi	EW	200	5.5	6 -10 ,22 -37 ,83 -92 ,49 -58 ,180 -189	21	3.9	4.8	21	189	200	9
70	Junnar	Gunjalwadi	OW	104.2	5.62	6 -9 ,24 -40 ,85 -95 ,70 -76	17	4.53	10.45	24	76	104.2	12
71	Junnar	Gunjalwadi	OW	43	5.62	9.5 -15.8 ,25 -37	21	4.01	3.42	25	37	43	4
72	Junnar	Khamundi	EW	194	3	46 -55 ,104 -110	27	17.9	-	20	110	194	4
73	Junnar	Sawargaon	EW	200	6		18	9.52	-	19	154	200	1
74	Junnar	Wanewadi	EW	200	3.5	33 -42 ,80 -83	19	14.4	-	20	83	200	1
75	Khed	Chikhali	EW	200	5.5	24 - ,39 -	18	11.6	1.5	24	139	200	3
76	Khed	Dehane	EW	200	5.6	21 -51 ,64 -70 ,109 -115 ,91 -100 ,161 -167	16	9.72	4.07	21	169	200	12
77	Khed	Dehane	OW	150	5.6	24 -27 ,39 -49 ,131 -137 ,57 -70	16	9.55	3.4	24	105	150	12
78	Khed	Kadus	EW	200	7		16	9	-	20	105	200	1
79	Khed	Kharpudi	EW	189.1	5.6	36 -39 ,100 -113	55	27	3.4	25	113	189.1	5
80	Khed	Kharpudi	OW	115.9	3		55	27	-	18	105	115.9	5
81	Khed	Yelwadi	EW	164.7	5.6	15 -24 ,67 -76	14	5	-	24	76	164.7	1
82	Mawal	Ahirwade	EW	180	5.6	-18	50	32	-	18	125	180	1
83	Mawal	Bhoyre	EW	180.5	5.6	21 - ,102 -	21	10.5	3	21	102	180.5	3
84	Mawal	Chankhed	EW	200	6	-14	20	14	-	14	125	200	1
85	Mawal	Vadgaon	EW	200	6	18 - ,103 -	12	4.3	0.85	18	103	200	1
86	Mulshi	Balewadi	EW	200	3	11.5 - ,45 -	20	8.48	0.62	15	145	200	2
87	Mulshi	Belawade	EW	200	5.5	6.5 -6.5 ,27.5 -27.5	17	8.9	0.62	27	127	200	3
88	Mulshi	Kolwan	EW	200	5.5	07-Aug	11	3.74	-	20	135	200	1
89	Mulshi	Lavale	EW	85	6.1	7 - ,12 - ,48 - ,34 -37 ,62 -64	12	3.76	30.68	15	64	85	3
90	Mulshi	Lavale	OW	200	18.5		12	3.76	-	20	120	200	3

S No	Taluka	Village	Type of Well	Drilling depth	Casing	AQ Zones	Pre SWL	Post SWL	PYT Discharge	AQI	AQII	Massive	Thickness AQII
				(m)	(m)	(m.bgl)	(m.bgl)	(m ³ /hr)	(m.bgl)	(m)			
91	Mulshi	Lavale	OW	75	5.7	35.5 -35.5	12	3.76	1.5	20	66	75	3
92	Mulshi	Lavale	OW	75	6	66 -66	12	3.76	1.14	20	66	75	3
93	Mulshi	Lavale	OW	75	5.5	27.5 - ,66 -	9	3.4	1.14	13	66	75	3
94	Mulshi	Manjari	OW	62	13.7	30 -31	12	7.3	-	12	62	62	1
95	Pune City	Katraj	EW	200	5.6	13 - ,34 -	11.4	6	1.5	13	134	200	3
96	Pune City	KVBEG Yerawada	EW	36.6	12.5	4 - ,9 -	17	10	2.85	12	36	36.6	3
97	Pune City	KVBEG Yerawada	OW	21	12	5 - ,7 -	17	10	2.85	12	21	21	3
98	Pune City	Pune	EW	201.3	5.1	4.5 - ,152 -	9	2.9	1.5	20	152	201.3	3
99	Pune City	Pune	OW	32.5	2.5	-18	10	3.2	-	18	104	32.5	1
100	Pune City	Yerawada	EW	200	11.5	9 - ,132 -	50	27	-	11	132	200	1
101	Purandhar	Gulunche	EW	200	5.5	84.60, 168.00	35	17	0.01	18	168	200	0.5
102	Purandhar	Jadhavwadi	EW	112	5.6	-65	50	35	-	20	65	112	1
103	Purandhar	Kothale	EW	165	6.5	28 - ,100 -	17	10	-	28	100	165	1
104	Purandhar	Narayanpur	EW	160	7.8	32	18	5.1	7.76	20	120	160	3
105	Purandhar	Narayanpur	OW	200	5.6	34.8	18	5.8	Traces	25	90	200	0.5
106	Purandhar	Naygaon	EW	200	2.5	42 -51 ,58 -64	12	4.5	1.13	20	90	200	4
107	Purandhar	Naygaon (Khorawade)	EW	200	5.5	9 - ,21 -	11.4	6	-	21	105	200	1
108	Purandhar	Pangare Sailer Vasti	EW	184.7	5.6	-23	22.2	16	0.62	23	135	184.7	1
109	Purandhar	Parainche	EW	200	5.6	41.00, 108.00	70	45	Traces	20	108	200	0.5
110	Purandhar	Pargaon	EW	153.2	5.6	18 - ,70 -	14	5.6	-	18	90	153.2	1
111	Purandhar	Rakh	EW	200	5.6	28.70, 127.00	45	21	0.78	28	127	200	2
112	Purandhar	Sasvad	EW	200	6.2	27 -37 ,61 -94	16	8	2.34	27	94	200	4
113	Purandhar	Singapur	EW	200	4.6		12	1.5	-	25	135	200	1
114	Purandhar	Waghapur	EW	73.2	5.5	35 - ,45 -	30	21	2.34	20	70	73.2	3
115	Purandhar	Walhe	EW	200	5.5	19	21	12.3	0.38	19	125	200	1
116	Shirur	Dingrajwadi	EW	75.8	5	7.8 - ,13.5 -	12	1.85	4.76	20	70	75.8	6
117	Shirur	Dingrajwadi	OW	200	4.5	7.8 - ,13.5 -	12	1.85	-	20	125	200	6
118	Shirur	Kavthe	EW	200	5.5		11	1.8	-	21	135	200	1
119	Shirur	Nirvi	EW	200	3	-108	60	35	-	20	108	200	2
120	Shirur	Pabal	EW	201.5	2.75		13	1.8	-	21	125	201.5	1
121	Shirur	Pimple Jagtap	EW	200	3.5	8 -18 ,46 -49 ,161 -168 ,146 -152	14	2.87	3.4	18	152	200	9
122	Shirur	Ranjangaon	EW	200	5.5	6.4 -13 ,79 -85 ,161 -171 ,143 -149	18	9	3.4	20	149	200	9
123	Shirur	Ranjangaon	OW	171.1	5.65	79 -85 ,161 -171	18	9	-	25	171	171.1	9
124	Velhe	Khanapur	EW	200	3	-30	22.58	13	1.14	30	135	200	3

S No	Taluka	Village	Type of Well	Drilling depth	Casing	AQ Zones	Pre SWL	Post SWL	PYT Discharge	AQI	AQII	Massive	Thickness AQII
				(m)	(m)	(m.bgl)	(m.bgl)		(m ³ /hr)	(m.bgl)			(m)
125	Velhe	Kikvi	EW	190	4.1	2.5 - ,26.5 - ,54 - ,42.7 -	30	14.2	6	26	125	190	6
126	Velhe	Kikvi	OW	63	3.5	6.8 - ,24.5 -	30	14.25	2.34	26	60	63	4
127	Velhe	Kikvi	OW	60	3.5	-41	30	14.2	3.42	20	41	60	3
128	Velhe	Kotawdi	EW	200	11.5	13 - ,95 -	36.5	16	0.85	13	95	200	2
129	Velhe	Kotawdi	OW	110.8	12.5	-83	36.5	16	1.5	13	83	110.8	2
130	Velhe	Winzer	OW	30	11.5	-8	50	35	-	13	30	30	1
131	Velhe	Winzer	EW	200	13	8.5 - ,84 -	50	35	0.62	13	84	200	2

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

SI No.	Taluka	Well Name	Well Depth (m)	Water Level			Premonsoon WL trend (m/year)		Postmonsoon WL trend (m/year)	
				May 2017 (mbgl)	Nov. 2017 (mbgl)	Fluctuation (m)	Rise	Fall	Rise	Fall
1	AMBEGAON	Bhagadi	10.25	6	4.00	2.00	0.2546		0.0585	
2	AMBEGAON	Dhakale	14.6	7	1.90	5.10	0.0376		0.0053	
3	AMBEGAON	Girawali	7.2	3.5	1.00	2.50		0.1218	0.0306	
4	AMBEGAON	Gohe Kh.	12.2	8	1.10	6.90		0.1555	0.1293	
5	AMBEGAON	Kalamb	12.4	9.1	7.55	1.55	0.0864			0.1017
6	AMBEGAON	Kanase	13	5.9	2.40	3.50	0.1539		0.0043	
7	AMBEGAON	Khadaki	13	7.7	2.00	5.70	0.1327			0.3823
8	AMBEGAON	Loni	10.25	3.4	1.20	2.20	0.0888		0.1551	
9	AMBEGAON	Pimpalgaon Tarf Ghoda	10	3	0.50	2.50		0.1382		0.1973
10	AMBEGAON	Ranjani	10.95	4.4	3.40	1.00		0.0883	0.0039	
11	AMBEGAON	Taleghar	9.45	7	2.00	5.00		0.1555	0.0433	
12	BARAMATI	Baburdi	10.8	8.2	3.8	4.40		0.1748	0.3646	
13	BARAMATI	Baramati Rural	11.6	11.6	3	8.60		0.0405		0.0029
14	BARAMATI	Chandgude Wadi	90	11.1	9.9	1.20	0.3389		0.1749	
15	BARAMATI	Chandgude Wadi	31.6	11.4	7	4.40	0.4372		0.5000	
16	BARAMATI	Dhakale	10	5.5	6.4	-0.90	0.0643		0.1614	
17	BARAMATI	Jalochi	30	9.3	7.4	1.90	0.0519		0.9327	
18	BARAMATI	Karhati	60	9.8	6.15	3.65	1.3828		0.1703	
19	BARAMATI	Korhale Kh	58	7.25	3.1	4.15	0.1482		0.2117	
20	BARAMATI	Korhale Kh	90	9.15	4.15	5.00	0.2158		0.3349	
21	BARAMATI	Kutwalwadi	92.1	5.15	4	1.15	0.0841		0.0065	
22	BARAMATI	Loni Bhapkar	95	5.6	2.2	3.40	0.5933		0.2067	
23	BARAMATI	Murti	16.3	6.7	5	1.70	0.1198		0.1200	
24	BARAMATI	Nimbodi	30	8.95	5.2	3.75	0.3544		0.4536	
25	BARAMATI	Sangavi	7.9	4.6	1.3	3.30	0.0041		0.1243	
26	BARAMATI	Supe	30	6.25	3.25	3.00		0.0116	0.1474	
27	BARAMATI	Vadgaon Nimbalkar	8.2	7	2.9	4.10	0.0218			0.1410
28	BARAMATI	Vadgaon Nimbalkar	68	6	5.1	0.90	0.0391		0.1400	
29	BHOR	Apati	5	2.4	0.80	1.60		0.0603	0.0016	
30	BHOR	Bholavade	4.9	3.4	2.00	1.40		0.0673	0.0153	
31	BHOR	Bhor	10.2	5.8	2.00	3.80		0.1142		0.1306
32	BHOR	Jayatpad	3.8	2.2	0.60	1.60		0.2109		0.0058
33	BHOR	Khulshi	5.7	4	0.40	3.60	0.0245			0.0263
34	BHOR	Nasrapur	8.45	5.6	1.50	4.10		0.1750	0.0158	
35	BHOR	Venavadi	7.4	1.5	1.00	0.50		0.1527	0.0026	
36	DAUND	Bhandgaon	9	7.2	2.55	4.65	0.2014		0.1031	
37	DAUND	Gar	8	7.5	1.10	6.40	0.1600			0.1419
38	DAUND	Girim	7.15	4	2.60	1.40	0.0155		0.0589	
39	DAUND	Kalewadi	13.95	8.3	2.00	6.30	0.2609		0.0787	
40	DAUND	Kedgaon	7.4	6.2	2.60	3.60	0.1632		0.0196	
41	DAUND	Kurkumbh	5.85	3.6	1.70	1.90	0.0381		0.0417	
42	DAUND	Pargaon	14.45	8.5	3.20	5.30		0.1377	0.0071	
43	DAUND	Patas	10.25	8.7	6.30	2.40	0.2300		0.2926	
44	DAUND	Patethan	14.3	8.9	5.50	3.40	0.0386		0.0100	
45	DAUND	Rahu	15.8	10.4	5.50	4.90		0.2877		0.0981
46	DAUND	Ravangaon	13.1	7.3	2.40	4.90	0.0641		0.1817	
47	DAUND	Sonawade	11.5	5.6	2.95	2.65	0.0427		0.0766	
48	HAVELI	Alandi	12.8	9.8	3.90	5.90	0.1270		0.2564	

SI No.	Taluka	Well Name	Well Depth (m)	Water Level			Premonsoon WL trend (m/year)		Postmonsoon WL trend (m/year)	
				May 2017 (mbgl)	Nov. 2017 (mbgl)	Fluctuation (m)	Rise	Fall	Rise	Fall
		Mhatobachi								
49	HAVELI	Arvi	14.6	10	1.00	9.00		0.1464	0.0036	
50	HAVELI	Bhosari	15.25	7.7	1.10	6.60	0.0823		0.0396	
51	HAVELI	Charholi Bk	10.1	6.2	1.50	4.70	0.4017		0.0561	
52	HAVELI	Dhanori	9.4	3.6	1.10	2.50	0.0125		0.0135	
53	HAVELI	Katraj	10.8	6.2	2.10	4.10		0.1359		0.1095
54	HAVELI	Koregaon Mul	10.65	6.5	1.55	4.95		0.1777		0.1856
55	HAVELI	Loni Kalbhor	16.55	10.1	4.30	5.80	0.4683		0.1973	
56	HAVELI	Loni-Kand	10.65	9.6	3.20	6.40		0.1918	0.0271	
57	HAVELI	Moshi	13.5	4.4	3.40	1.00	0.1036		0.0306	
58	HAVELI	Pimpri Sandas	9.1	6.65	3.50	3.15		0.1473	0.0309	
59	HAVELI	Sangarun	9.55	4.5	2.00	2.50	0.0791		0.0298	
60	HAVELI	Shiraswadi	9	9	2.30	6.70	0.0502		0.0378	
61	HAVELI	Sonapur	10.7	4.78	2.90	1.88	0.0127		0.0625	
62	HAVELI	Uruli Dewachi	11.1	9.7	5.50	4.20	0.0255		0.0633	
63	HAVELI	Uruli Kanchan	15.1	12.7	5.00	7.70		0.1958	0.0417	
64	HAVELI	Wadki	13.65	11.9	4.50	7.40	0.5000		0.0778	
65	HAVELI	Wagholi	13.55	6.8	1.30	5.50		0.1700		0.5195
66	INDAPUR	Anthurne	11.5	8	4.30	3.70	0.0482		0.0250	
67	INDAPUR	Bawada	11	8.4	6.00	2.40	0.4141		0.0222	
68	INDAPUR	Bhadalwadi	10.9	4.6	1.80	2.80	0.6455		0.0149	
69	INDAPUR	Bhigvan	12.1	11.6	1.60	10.00	0.6023		0.1847	
70	INDAPUR	Galand Wadi No.1	8.25	4	2.00	2.00		0.1055	0.0813	
71	INDAPUR	Hingangaon	4.6	3.6	1.95	1.65	0.1064		0.0324	
72	INDAPUR	Indapur	14	10	4.00	6.00	0.4695		0.1687	
73	INDAPUR	Kalamb	15.8	9.8	1.80	8.00	0.6505		0.0256	
74	INDAPUR	Kauthali	9.15	8.3	4.00	4.30	0.1236		0.3171	
75	INDAPUR	Kazad	10	7.3	2.30	5.00	0.0191		0.0063	
76	INDAPUR	Lamjewadi	12.6	12.5	1.10	11.40	0.1659		0.1331	
77	INDAPUR	Loni	8.85	6.2	2.30	3.90	0.0536		0.0590	
78	INDAPUR	Madanwadi	14.4	12.7	2.10	10.60	0.5509		0.1210	
79	INDAPUR	Nimgaon Ketki	18.3	17.8	4.60	13.20	0.1986		0.0996	
80	INDAPUR	Reda	8.9	7	4.70	2.30	0.0001		0.0905	
81	INDAPUR	Rui	7.5	7	1.30	5.70	0.2904		0.2168	
82	INDAPUR	Sarati	12.5	8	4.80	3.20	0.0055		0.1578	
83	INDAPUR	Shetphalgadhe	12	6	2.40	3.60	0.2733			0.0313
84	INDAPUR	Tawashi	11.4	5.4	2.20	3.20	0.0655		0.1067	
85	INDAPUR	Varkute Bk.	8.9	7.1	1.80	5.30	0.5532		0.1566	
86	JUNNAR	Ale	13.65	8.6	4.80	3.80	0.0647			0.2127
87	JUNNAR	Aptale	18	11	3.00	8.00	0.1391		0.0952	
88	JUNNAR	Belhe	16.3	14.2	4.70	9.50	0.3147			0.6992
89	JUNNAR	Bori Bk.	11	6.3	3.10	3.20		0.1903		0.2510
90	JUNNAR	Dholwad	20.9	18	8.00	10.00	0.3067		0.4449	
91	JUNNAR	Dingore	15	13.5	6.00	7.50	0.2942		0.0735	
92	JUNNAR	Gulanchwadi	13.5	8.6	3.00	5.60	0.0570		0.0368	
93	JUNNAR	Hadsar	10.4	10.1	1.99	8.11	0.3272		0.0088	
94	JUNNAR	Khanapur	14.8	7.2	1.50	5.70	0.0477			0.2362
95	JUNNAR	Mangrul	20.35	14	5.00	9.00	0.1584		0.1286	
96	JUNNAR	Narayangaon	7.45	5.8	2.60	3.20		0.1314		0.2673
97	JUNNAR	Netwad	9.5	5.7	3.40	2.30	0.0218			0.0277
98	JUNNAR	Otur	24.6	17.8	12.40	5.40	0.0354		0.0027	
99	JUNNAR	Padali	10.8	5.9	2.60	3.30	0.0076		0.0012	
100	JUNNAR	Pimpalwandi	14.45	14	1.20	12.80	0.0600			0.5710
101	JUNNAR	Rohkadi	24.4	21.6	17.40	4.20	0.1204			0.3553

SI No.	Taluka	Well Name	Well Depth (m)	Water Level			Premonsoon WL trend (m/year)		Postmonsoon WL trend (m/year)	
				May 2017 (mbgl)	Nov. 2017 (mbgl)	Fluctuation (m)	Rise	Fall	Rise	Fall
102	JUNNAR	Sitewadi	11	8	1.90	6.10	0.0013		0.0058	
103	JUNNAR	Tambe	9.6	7.5	2.56	4.94		0.1677	0.0121	
104	JUNNAR	Tejewadi	13.15	9.8	4.20	5.60	0.1257		0.0824	
105	JUNNAR	Yenere	12.2	8.6	3.80	4.80	0.0627			0.0550
106	KHED	Ambethan	9	7	0.65	6.35	0.0482		0.2259	
107	KHED	Ambhu	13.5	12.8	0.00	12.80	0.2032			0.0344
108	KHED	Bahul	9.85	3.5	1.05	2.45		0.1914		0.1332
109	KHED	Bhorgiri	5.8	5.4	0.20	5.20	0.0224			0.0201
110	KHED	Chakan	11.85	5.5	0.60	4.90	0.0900			0.0807
111	KHED	Chandus	11	5	1.20	3.80	0.0045			0.1327
112	KHED	Chas	16.75	14.85	11.40	3.45	0.1241		0.1026	
113	KHED	Ghotavadi	10.55	9.3	0.90	8.40	0.2655		0.6039	
114	KHED	Kadadhe	9.5	8.3	1.70	6.60		0.2609	0.0618	
115	KHED	Kadus	9.6	5.8	3.00	2.80	0.0409		0.0821	
116	KHED	Kuruli	10.3	6.6	2.00	4.60		0.2436	0.0696	
117	KHED	Pait	9.5	6.4	1.20	5.20		0.1595	0.1238	
118	KHED	Rajgurunagar (Khed)	11	8.15	1.00	7.15	0.2800			0.0873
119	KHED	Saburdi	6.5	4.5	1.30	3.20		0.1164	0.0498	
120	KHED	Solu	13.5	9	2.56	6.44	0.0167		0.0390	
121	KHED	Varude	8.7	8	2.20	5.80	0.1093		0.0301	
122	KHED	Virham	14.5	13.85	1.90	11.95	0.3559		0.1042	
123	KHED	Wasuli	7.1	4.4	1.40	3.00		0.2005	0.0362	
124	MAWAL	Bhoyare	9	7	0.70	6.30		0.1019		0.1106
125	MAWAL	Brahmanoli	8.4	1.3	1.90	-0.60		0.1787	0.0277	
126	MAWAL	Chandkhed	8.3	4.3	1.90	2.40		0.1069	0.0197	
127	MAWAL	Chikhalse	9.3	1.2	0.30	0.90		0.3648	0.0197	
128	MAWAL	Induri	10.4	1.3	1.50	-0.20		0.1889	0.0482	
129	MAWAL	Jambhul	6.4	0.9	1.40	-0.50		0.2583	0.0599	
130	MAWAL	Kadadhe	4.8	1.2	0.90	0.30		0.2366	0.0294	
131	MAWAL	Karla	9.6	3.6	1.00	2.60		0.2764	0.0264	
132	MAWAL	Malawali P.M.	7.7	2.7	1.00	1.70		0.1486	0.0024	
133	MAWAL	Nane	7.9	5	0.90	4.10	0.0366		0.0024	
134	MAWAL	Somatane	8	4.5	1.00	3.50	0.0111			0.1214
135	MAWAL	Takave Bk.	8	3.1	1.80	1.30		0.1685	0.0270	
136	MAWAL	Talegaon Dabhade ®	10.4	4	2.00	2.00		0.2074		0.1073
137	MAWAL	Thakursai	9.3	2	1.60	0.40		0.4200	0.0262	
138	MAWAL	Thoran	5.3	4.7	0.80	3.90		0.0139	0.0169	
139	MAWAL	Vadgaon Mawal	4.6	3.4	0.00	3.40	0.0194		0.0040	
140	MULSHI	Andgaon	7	3.5	0.50	3.00	0.3059		0.0535	
141	MULSHI	Bhugaon	10.25	8.8	1.00	7.80		0.0366	0.0211	
142	MULSHI	Ghotavade	5.8	5	0.50	4.50	0.0782			0.0818
143	MULSHI	Hinjavadi	10.5	9.1	1.30	7.80	0.1162			0.1248
144	MULSHI	Kemasewadi	9.55	2.6	1.00	1.60		0.1301	0.0127	
145	MULSHI	Kondhawale	6.8	5.6	0.00	5.60	0.0647			0.2388
146	MULSHI	Nere	13	8	1.00	7.00	0.1583		0.0056	
147	MULSHI	Paud	10.85	8.34	2.10	6.24	0.0634		0.1333	
148	MULSHI	Sus	8.2	5.6	0.50	5.10	0.0828			0.0765
149	MULSHI	Tamhini Bk.	5.9	5.2	0.00	5.20	0.0610			0.1700
150	MULSHI	Viseghar	7.25	6.5	0.00	6.50		0.1419		0.1219
151	PURANDHAR	Belsar	16.5	14.6	9.1	5.50	0.2273		0.2650	
152	PURANDHAR	Chambhali	50	11.5	9	2.50		0.0767	0.1156	
153	PURANDHAR	Dive	36.1	18	7.3	10.70	0.1848		0.3763	

SI No.	Taluka	Well Name	Well Depth (m)	Water Level			Premonsoon WL trend (m/year)		Postmonsoon WL trend (m/year)	
				May 2017 (mbgl)	Nov. 2017 (mbgl)	Fluctuation (m)	Rise	Fall	Rise	Fall
154	PURANDHAR	Gurholi	8.7	7.6	1.9	5.70	0.1168		0.1727	
155	PURANDHAR	Harni	7.05	6.4	2.1	4.30	0.0964		0.1014	
156	PURANDHAR	Jejuri	7	5.5	1.4	4.10	0.1918		0.1201	
157	PURANDHAR	Khalad	30	6	13.75	-7.75		0.1639	1.0146	
158	PURANDHAR	Khanvadi	9.15	4.7	3.6	1.10		0.1432	0.1291	
159	PURANDHAR	Malshiras	100	29.2	4	25.20	2.0776		0.0148	
160	PURANDHAR	Mawadikade Pathar	34	11.6	5.5	6.10	0.2023		0.3253	
161	PURANDHAR	Mawadikade Pathar	14.85	7.2	5.6	1.60	0.4457		0.9624	
162	PURANDHAR	Pargaon	97	26.8	6	20.80	1.2474		0.2270	
163	PURANDHAR	Pargaon	35	30.35	25.2	5.15	1.3196		1.5885	
164	PURANDHAR	Parinche	11.85	9.7	7.7	2.00	0.0346		0.2057	
165	PURANDHAR	Pingori	9.4	7.5	3.2	4.30	0.1363		0.0432	
166	PURANDHAR	Pondhe	90	4.9	3.5	1.40	0.0408		0.0500	
167	PURANDHAR	Rise	60	9.15	7.85	1.30	0.3838		0.7416	
168	PURANDHAR	Sakurde	10.7	6.9	1.4	5.50	0.0533			0.0900
169	PURANDHAR	Saswad Rural	30	5.1	3.5	1.60	0.1179			0.1082
170	PURANDHAR	Walhe	9	7.3	3	4.30		0.0756	0.4565	
171	PURANDHAR	Walhe	30	12.5	6.4	6.10	0.7504		1.2750	
172	SHIRUR	Andhalgaon	7.85	7.8	3.60	4.20	0.0299		0.0611	
173	SHIRUR	Chincholi	7.6	6	2.80	3.20	0.0574		0.1057	
174	SHIRUR	Dhamari	14.15	13.5	2.40	11.10	0.3602		0.0142	
175	SHIRUR	Fakate	8.5	4.5	2.20	2.30	0.0842		0.0088	
176	SHIRUR	Gunat	13	12.2	2.90	9.30	0.3739		0.1354	
177	SHIRUR	Jambut	13.2	10.8	1.10	9.70	0.0533			0.1224
178	SHIRUR	Kawathe	9.2	6.8	1.30	5.50	0.0855			0.2300
179	SHIRUR	Kendur	9	8.8	3.70	5.10	0.1139		0.1352	
180	SHIRUR	Kondhapuri	18.9	18.5	6.10	12.40	0.3107		0.1480	
181	SHIRUR	Malthan	11.3	11.3	2.60	8.70	0.0457		0.1771	
182	SHIRUR	Mandavgan Farata	15.6	13.2	1.30	11.90	0.3409			0.1091
183	SHIRUR	Mhase Bk.	8.9	6.2	1.20	5.00	0.0667		0.0105	
184	SHIRUR	Nhavara	12.25	12.2	4.10	8.10	0.0101		0.0545	
185	SHIRUR	Nimgaon Dude	12.1	10.7	2.50	8.20	0.3146		0.0984	
186	SHIRUR	Pabal	13.7	12.1	1.90	10.20	0.2563		0.0321	
187	SHIRUR	Pimpale Jagtap	6.55	5.2	2.40	2.80	0.2642		0.0726	
188	SHIRUR	Pimparkhed	15.45	14.5	2.50	12.00	0.3595		0.0208	
189	SHIRUR	Ranjangaon Ganpati	12.2	10.55	3.10	7.45	0.2049		0.0221	
190	SHIRUR	Sanaswadi	13	7.3	6.10	1.20	0.2518		0.2402	
191	SHIRUR	Saradwadi	6.3	6.2	3.10	3.10	0.1921		0.0601	
192	SHIRUR	Shikrapur	10.65	9.75	3.70	6.05	0.0827		0.1482	
193	SHIRUR	Shirasgaon Kata	6.7	6	2.00	4.00	0.0615		0.0457	
194	SHIRUR	Shirur	13.5	12.8	4.40	8.40	0.3539		0.0737	
195	SHIRUR	Tandali	16.45	15.5	6.50	9.00	0.3041		0.1709	
196	SHIRUR	Vadner Kh.	8.3	6.7	1.70	5.00	0.1667		0.0491	
197	VELHE	Gunjavane	14.15	9	1.56	7.44		0.2303	0.0110	
198	VELHE	Margasani	10	8.6	0.70	7.90		0.1056	0.0120	
199	VELHE	Osade	5.8	2.3	0.80	1.50	0.0309		0.0288	
200	VELHE	Panshet	4	2.1	0.60	1.50		0.1114	0.0160	
201	VELHE	Velhe Bk.	6.1	2.1	0.10	2.00		0.1595	0.0088	
202	VELHE	Vihir	5.1	3.2	1.90	1.30		0.2131	0.0219	

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

S No	Agency	Taluka	Village	Toposheet Quadrant	Topographical Setting	Diameter (m)	Depth mbgl	Lining (m)	Elevation (m. amsl)	Use	Aquifer	Pre-monsoon DTW (mbgl)	Post-monsoon DTW (mbgl)	Fluctuation (m)	EC (µS/cm)	Temp. (°C)
1	CGWB	INDAPUR	Awasari	47N4-3A	Plain	6	10	—	498.6	irrigation	W. Basalt, Fr. Basalt	9.4	3.3	6.1	912	27.5
2	CGWB	INDAPUR	Bhodani	47K13-1C	Plain	10x10	18	2	503	irrigation	W. Basalt, Fr. Basalt	9.9	3.1	6.8	572	27.6
3	CGWB	INDAPUR	Bijwadi	47J16-2C	Plain, undulating	9.2x12.3	11	2	511.7	irrigation	Fr. Basalt	10	4.3	5.7	1316	30.6
4	CGWB	INDAPUR	Bori	47J16-2A	Plain	8	18	3	567.4	Drinking, irrigation	W. Basalt, Fr. Basalt	15	3.6	11.4	173	29.1
5	CGWB	INDAPUR	Gal& Wadi No.1	47N4-2A	Plain, undulating	3.5	8	3.7	531.4	Domestic, drinking	W. Basalt, Fr. Basalt	3.7	3	0.7	2475	27.5
6	CGWB	INDAPUR	Gal& Wadi No.2	47N4-3A	Plain, undulating	8.5	13	6.8	525.9	Domestic	W. Basalt, Fr. Basalt	8.8	5.3	3.5	464	26.9
7	CGWB	INDAPUR	Giravi	47O1-1B	Plain	9	10	2.5	487.7	irrigation	W. Basalt, Fr. Basalt	9	5.32	3.68	1048	27.6
8	CGWB	INDAPUR	Got&i	47J16-3B	Plain	9	30	2	534.7	irrigation	Fr. Basalt	15	6.9	8.1	535	27.6
9	CGWB	INDAPUR	Indapur Rural	47N4-2A	Plain	6	10	—	522.4	irrigation	Fr. Basalt	9.3	4.8	4.5	938	29.3
10	CGWB	INDAPUR	Jankshan (nv)	47J16-2A	Plain	6	10	—	541.1	irrigation	W. Basalt, Fr. Basalt	5.1	3.8	1.3	1490	27.3
11	CGWB	INDAPUR	Kalewadi	47J16-1B	Plain, undulating	10	14	1	503	Domestic, drinking	Vesicular & W. Basalt, Fr. Basalt	10.9	1.2	9.7	1388	32.1
12	CGWB	INDAPUR	Kardanwadi	47J12-2C	Plain	9	14.5	1.8	529.4	irrigation	Fr. Basalt	14	13	1	1343	29.4
13	CGWB	INDAPUR	Kazad	47J12-1C	Plain	6	12	3	568.3	irrigation	Vesicular Basalt, W. Basalt	11	9.3	1.7	1773	29.8
14	CGWB	INDAPUR	Lumewadi	47O1-1A	Plain, undulating	10.5	9.5	3	496	irrigation	W. Basalt, Fr. Basalt	8.6	4.1	4.5	1804	27.8
15	CGWB	INDAPUR	Nimbodi	47J12-2C	Plain	3.2	11	7	550.2	Rope & bucket	W. Basalt, Fr. Basalt	10	7.53	2.47	686	29.6
16	CGWB	INDAPUR	Nirgude	47J12-1C	Plain, undulating	10	15.8	1	556.5	irrigation	W. Basalt, Fr. Basalt	14.9	13.2	1.7	478	29.2
17	CGWB	INDAPUR	Nirnimgaon	47K13-1C	Plain	6	15	—	497.4	irrigation	W. Basalt, Fr. Basalt	13	10.1	2.9	1664	31.2

S No	Agency	Taluka	Village	Toposheet Quadrant	Topographical Setting	Diameter (m)	Depth mbgl	Lining (m)	Elevation (m. amsl)	Use	Aquifer	Pre-monsoon DTW (mbgl)	Post-monsoon DTW (mbgl)	Fluctuation (m)	EC ($\mu\text{S/cm}$)	Temp. ($^{\circ}\text{C}$)
18	CGWB	INDAPUR	Nirwangi	47J16-3B	Plain	8.5	27	2.6	497.9	irrigation	W. Basalt, Fr. Basalt	15	9.7	5.3	4707	28.2
19	CGWB	INDAPUR	Palasdeo	47J16-1B	plain	7.3	10.5	4.3	506.6	irrigation	W. Basalt, Fr. Basalt	5.2	4.1	1.1	1966	30
20	CGWB	INDAPUR	Pilewadi	47J16-1A	Plain, undulating	6	11	1	556.8	irrigation	Vesicular Basalt, W. Basalt	9.8	3.25	6.55	1345	28.4
21	CGWB	INDAPUR	Pimpale	47J11-3C	Plain, undulating	10.5	15	3	522.4	Domestic, drinking	Fr. Basalt	15	10.5	4.5	1495	32.4
22	CGWB	INDAPUR	Ranmodwadi	47J16-3A	Plain, undulating	4.4	7	1.7	508.3	Domestic	Fr. Basalt	5.5	3.9	1.6	2789	28.5
23	CGWB	INDAPUR	Reda	47J16-3B	Plain	8.5	10	2	512.2	irrigation	Fr. Basalt	6	4.8	1.2	3248	28.6
24	CGWB	INDAPUR	Redani	47K13-1B	Plain, undulating	7.8	15	4	496.4	Domestic	Fr. Basalt	14	3.6	10.4	2265	27.5
25	CGWB	INDAPUR	Shaha	47N4-2B	Plain	6	10	2	514.2	irrigation	Fr. Basalt	9.9	7.53	2.37	1276	30.3
26	CGWB	INDAPUR	Shirsadi	47N4-1A	Plain	13.2	13	2	521.2	irrigation	W. Basalt, Fr. Basalt	6.9	4.65	2.25	1054	24.5
27	CGWB	INDAPUR	Sugaon	47N4-2A	Plain	3	10.5	-	504.1	Drinking, irrigation	W. Basalt, Fr. Basalt	10	8.65	1.35	655	29.5
28	CGWB	INDAPUR	Udhat	47J12-3C	Plain	8	10.5	3.2	523.6	irrigation	W. Basalt, Fr. Basalt	5.7	1.8	3.9	3025	29.5
29	CGWB	INDAPUR	Varkute Bk.	47J16-1C	Plain	8.5	9	5	514.6	Domestic	W. Basalt, Fr. Basalt	6.5	3.65	2.85	3671	31
30	CGWB	AMBEGAON	Ahupe	47E12-2A	Hilly	14	8.5	4	996.7	Drinking - Washing		8.3	7.85	0.45	180	28
31	CGWB	AMBEGAON	Dimbhe Kh.	47E12-2B	Hilly	5	8	2	1004.1	Irrigation		8	6.3	1.7	180	30
32	CGWB	AMBEGAON	Gangapur Kh.	47E16-2A	Hilly	4	12	4	726.3	Irrigation		11	8.53	2.47	560	30
33	CGWB	AMBEGAON	Ghodegaon	47E16-3B	Undulating	4	10	6	677.4	Drinking - Washing		6.1	5.32	0.78	810	31
34	CGWB	AMBEGAON	Kadewadi	47E16-2B	Undulating	8	10	4	699.5	Irrigation		9	6.55	2.45	186	29
35	CGWB	AMBEGAON	Nagapur	47I4-3A	plines	3.5	12	5	616.2	Irrigation		8	5.98	2.02	1520	30
36	CGWB	AMBEGAON	Narodi	47E16-3B	Undulating				658.4			15	5.2	9.8		
37	CGWB	AMBEGAON	Nigdale (Mhatarbawadi)	47E12-3A	Hilly	5.5	9.5	2.5	949.7	Drinking - Washing		9	3.62	5.38	135	29
38	CGWB	AMBEGAON	Pahaddara	47J1-1B	Hilly	6.5	11	4	684.4	Irrigation		10	4.5	5.5	690	29

S No	Agency	Taluka	Village	Toposheet Quadrant	Topographical Setting	Diameter (m)	Depth mbgl	Lining (m)	Elevation (m. amsl)	Use	Aquifer	Pre-monsoon DTW (mbgl)	Post-monsoon DTW (mbgl)	Fluctuation (m)	EC (µS/cm)	Temp. (°C)
39	CGWB	AMBEGAON	Panchale Kh. (Panchale Bk)	47E12-2C	Hilly	4.5	9	3	702.9	Drinking - Washing		9	7.85	1.15	280	29
40	CGWB	AMBEGAON	Pargaon Tarf Khed	47F13-1C	Undulating	5*9	21	7	768.7	Drinking - Washing		20	15	5	560	29
41	CGWB	AMBEGAON	Pimpalgaon Tarf Ghoda	47E16-3A	Hilly	3.4	10	4	704.4	Drinking - Washing		6	5.6	0.4	510	30
42	CGWB	AMBEGAON	Shingave	47I4-3B	Undulating	4	22	2.5	630.7	Irrigation		19	10.23	8.77	1310	29
43	CGWB	AMBEGAON	Shirdade Wadi	47J1-2A	Undulating	6	11.5	1	697.8	Drinking - Washing		11	10.2	0.8	380	29
44	CGWB	AMBEGAON	Tambdemala	47F13-1C	Undulating	5.8	11	2	689.2	Irrigation		9.9	9.6	0.3	1020	29
45	CGWB	AMBEGAON	Thor&ale	47I4-3A	plains	3.5	13	4.5	651.2	Irrigation		13	6.2	6.8	1200	30
46	CGWB	AMBEGAON	Tirpad	47E12-2B	Hilly	8	8.9	4.5	1078.9	Drinking - Washing		8.5	8.1	0.4	180	28
47	CGWB	AMBEGAON	Vadgaon Pir	47J1-2B	Undulating	6.2	16	9	668.2	Drinking - Washing		15	13.2	1.8	480	30
48	CGWB	JUNNAR	Aldare	47E16-1B	plains	4.5	12	4	685.7	Drinking - Washing		9	4.1	4.9	810	30
49	CGWB	JUNNAR	Ambe Gavhan	47E15-3C	Hilly	7.5	19	13	685.9	Drinking - Washing		18	13.2	4.8	1550	31
50	CGWB	JUNNAR	Bhorwadi	47I4-2A	plains	3.5	10	4	655.2	Drinking - Washing		9	8.6	0.4	790	30
51	CGWB	JUNNAR	Chincholi	47E16-2B	Hilly	6	21	2	733.1	Irrigation		19	18.7	0.3	510	31
52	CGWB	JUNNAR	Devale	47E11-3C	Hilly	4	8	5	720.4	Drinking - Washing		7	5.9	1.1	310	31
53	CGWB	JUNNAR	Dingore	47E15-3C	Undulating	5.5	26	9	663.9	Irrigation		21	19.8	1.2	1320	30
54	CGWB	JUNNAR	Hivare Kh	47E16-1C	plains	7	24	2.5	642.9	Irrigation		16	7.1	8.9	720	31
55	CGWB	JUNNAR	Ingaloon	47E12-1C	Hilly	6	10		809.5	Drinking - Washing		9.1	4.1	5	350	31
56	CGWB	JUNNAR	Khireswar	47E15-2A	plains	8	18	3.4	687.9	Irrigation		16	12.65	3.35	340	30
57	CGWB	JUNNAR	Kolwadi	47E15-3B	Undulating	5	12	4	667.9	Irrigation		11	6.9	4.1	510	31
58	CGWB	JUNNAR	Manjarwadi	47I4-3A	plains	3	21	8	653.9	Irrigation		17	12.65	4.35	1480	30
59	CGWB	JUNNAR	Ozar	47E16-1C	plains	7	9.5	2	648.5	Irrigation		6.1	3.8	2.3	920	31
60	CGWB	JUNNAR	Pargaon Tarf Ale	47I4-3B	plains	6	14	4	609.2	Irrigation		6.9	4.9	2	910	31

S No	Agency	Taluka	Village	Toposheet Quadrant	Topographical Setting	Diameter (m)	Depth mbgl	Lining (m)	Elevation (m. amsl)	Use	Aquifer	Pre-monsoon DTW (mbgl)	Post-monsoon DTW (mbgl)	Fluctuation (m)	EC (μ S/cm)	Temp. ($^{\circ}$ C)
61	CGWB	JUNNAR	Pemdara	4718-1A	Undulating	3.2	8	3	774.6	Drinking - Washing		6.1	5.1	1	590	31
62	CGWB	JUNNAR	Pimpri Pendhar	4714-1A	plains	4	18	4	674	Irrigation		15	8.4	6.6	740	30
63	CGWB	JUNNAR	Rajuri	4714-2B	plains	4	12	4	665.2	Irrigation		12	9.1	2.9	710	29
64	CGWB	JUNNAR	Ralegan	47E16-1A	Hilly	6	10	8	756.7	Irrigation		9	6.3	2.7	360	31
65	CGWB	JUNNAR	Sanganore	47E15-2B	Undulating	6.5	12	4	689.9	Irrigation		11	6.3	4.7	240	29
66	CGWB	JUNNAR	Santwadi	4714-1B	Undulating	3.45	10	5	715.5	Irrigation		9	8.8	0.2	670	29
67	CGWB	JUNNAR	Sawargaon	47E16-2B	Undulating	5	16	5.5	695.5	Irrigation		15	10.3	4.7	1310	30
68	CGWB	JUNNAR	Sawargaon	47E16-2C	plains	5	14	6	682.3	Irrigation		8.9	6.52	2.38	1230	31
69	CGWB	JUNNAR	Tambewadi	4714-2B	Undulating	5.5	9.8	4	635.2	Irrigation		9.8	9.3	0.5	540	29
70	CGWB	JUNNAR	Yenere	47E16-1A	Hilly	6	18	12	733.3	Irrigation		16	8.9	7.1	1080	31
71	CGWB	Baramati	Bajrangwadi	47J8		10.5	10.2	2.5 m (rings)	544	Drinking Water supply		7.55	3.42	4.13	1958	28.8
72	CGWB	Baramati	Bhondvewadi	47J7		5.5	14.6	4 m (rings)	628	Irrigation		11.78	2.27	9.51	2315	29.5
73	CGWB	Baramati	Chaudhar Wadi	47J8		7	15	5 m	554	Irrigation		12.45	1.95	10.5	749	29.2
74	CGWB	Baramati	Dhumalwadi						539			10.4	8.33	2.07		
75	CGWB	Baramati	Dorlewadi						527			5	4.26	0.74		
76	CGWB	Baramati	Gojubavi	47J12		5.2	9	3.5 m	576	Irrigation		7.9	3.05	4.85	1232	30.5
77	CGWB	Baramati	Jalgaon Supe	47J8		8	13	4.5 m (rings)	576	Irrigation		12.2	10.7	1.5	1751	30.3
78	CGWB	Baramati	Jogwadi	47J8		4.6	11	7 m	641	Drinking water supply		11	1.81	9.19	935	28.6
79	CGWB	Baramati	Kamatwadi-Walha						632			12	10.6	1.4		
80	CGWB	Baramati	Karanje						566			6.1	1.92	4.18		
81	CGWB	Baramati	Karanjepul	47J8		10.5	10	2.5 m	559	Drinking water supply		5.55	0.7	4.85	940	28.8
82	CGWB	Baramati	Kololi	47J7		4.5	7.5	5.5 m	626	Drinking water supply		5.6	0.53	5.07	534	30.1

S No	Agency	Taluka	Village	Toposheet Quadrant	Topo graphical Setting	Diameter (m)	Depth mbgl	Lining (m)	Elevation (m. amsl)	Use	Aquifer	Pre- monsoon DTW (mbgl)	Post- monsoon DTW (mbgl)	Fluctuation (m)	EC (μ S/cm)	Temp. ($^{\circ}$ C)
83	CGWB	Baramati	Loni Bhapkar	47J8		4.2	7	4.5 m	598	Domestic, not drinking		6.15	1.1	5.05	1706	30.2
84	CGWB	Baramati	Loni Bhapkar	47J8		7.2	8.9	4.5 m	595	Irrigation		9.7	1.16	8.54		
85	CGWB	Baramati	Medad	47J12		5	13	3 m	554	Irrigation		11.6	4.65	6.95	4368	26.8
86	CGWB	Baramati	Nimbodi	47J11		3.8	8.6	3.5 m (rings)	539	Drinking water supply		9.9	6.84	3.06	280	30.7
87	CGWB	Baramati	Nirvagaj	47J12		10.5	16.25	3 m (rings)	527	Irrigation		11.15	6.5	4.65	3571	28.3
88	CGWB	Baramati	Parwadi	47J11		10.5	7	4 m (rings)	537	Irrigation		6.7	5.2	1.5	462	33.1
89	CGWB	Baramati	Sangavi	47J8		3	4.45	to bottom	528	Domestic		3.11	1.7	1.41	146	30
90	CGWB	Baramati	Sonkaswadi	47J8		10.5	12	7.5 m	551	Drinking water supply		11	9.2	1.8	675	27.4
91	CGWB	Baramati	Undavri Kade Pathar						580			8.77	6.75	2.02		
92	CGWB	Baramati	Vadgaon Nimbalkar	47J8		10.5	11	3.6 m	552	Drinking water supply		7.65	3.4	4.25	1024	26.3
93	CGWB	Purandhar	Ambale	47J3		6.8 m X 5 m	13	5 m	728	Not in use		11.15	9.5	1.65	1981	29
94	CGWB	Purandhar	Askarwadi	47F15		7.2	15.6	3 m	927	Irrigation		9.3	1.6	7.7	580	27.8
95	CGWB	Purandhar	Bhosalewadi	47J3		6.8	11	5 m	705	Drinking water supply		5.65	2.22	3.43	863	30.4
96	CGWB	Purandhar	Daundaj	47J4		7	14.5	11 m	656	Drinking water supply		10.1	6.6	3.5	1069	29.2
97	CGWB	Purandhar	Dive	47J3		6.75	13.5	9.25 m	800	Domestic, not drinking		8.83	4.9	3.93	1317	28.6
98	CGWB	Purandhar	Hivare	47F15		8.5	16.8	7.7 m	799	Drinking		13.85	7.05	6.8	1069	26.9

S No	Agency	Taluka	Village	Toposheet Quadrant	Topo graphical Setting	Diameter (m)	Depth mbgl	Lining (m)	Elevation (m. amsl)	Use	Aquifer	Pre- monsoon DTW (mbgl)	Post- monsoon DTW (mbgl)	Fluctuation (m)	EC (μ S/cm)	Temp. ($^{\circ}$ C)
								& 10.5 m (rings)		water supply						
99	CGWB	Purandhar	Jawalarjun	47J7		3.5	11	5.3 m	643	Irrigation		8.6	7.9	0.7	6459	27.9
100	CGWB	Purandhar	Jejuri						722			6.9	5.8	1.1		
101	CGWB	Purandhar	Kaldari	47F15		8	12	5 m (rings)	795	Drinking water supply		10.1	1.22	8.88	355	30.2
102	CGWB	Purandhar	Narayanpur						885			8.7	1	7.7		
103	CGWB	Purandhar	Pangre Sailer Basti						739			6.9	6	0.9		
104	CGWB	Purandhar	Pimpale	47J3		7.5	14	4 m	789	Irrigation & domestic		12.6	10.65	1.95	844	32
105	CGWB	Purandhar	Pimpri (Kh) Malvasti						561			5.7	5.35	0.35		
106	CGWB	Purandhar	Pondhe	47J7		7.5	4.1	3.5 m	720	Irrigation & domestic		7.2	1.72	5.48	931	29.9
107	CGWB	Purandhar	Rajuri	47J7		6	12	7 m	682	Irrigation		10.75	5.28	5.47	1206	29.9
108	CGWB	Purandhar	Sakurde						764			6.3	1.75	4.55		
109	CGWB	Purandhar	Thapewadi	47F15		7	18	10 m (rings)	883	Irrigation		13.15	6.85	6.3	433	25.9
110	CGWB	Purandhar	Veer	47J4		6.75	20	11 m	594	Drinking water supply		15.1	5.99	9.11	1035	32
111	CGWB	Purandhar	Zendewadi						836			15	12	3		
112	CGWB	Purandhar	Gulunche	47J4					585.4			13	4	9		
113	GSDA	AMBEGAON	Bhagadi				10.25		629			6	4	2		
114	GSDA	AMBEGAON	Dhakale				14.6		876.2			7	1.9	5.1		
115	GSDA	AMBEGAON	Girawali				7.2		683.8			3.5	1	2.5		
116	GSDA	AMBEGAON	Gohe Kh.				12.2		728.1			8	1.1	6.9		
117	GSDA	AMBEGAON	Kalamb				12.4		627.7			9.1	7.55	1.55		
118	GSDA	AMBEGAON	Kanase				13		664.3			5.9	2.4	3.5		

S No	Agency	Taluka	Village	Toposheet Quadrant	Topographical Setting	Diameter (m)	Depth mbgl	Lining (m)	Elevation (m. amsl)	Use	Aquifer	Pre-monsoon DTW (mbgl)	Post-monsoon DTW (mbgl)	Fluctuation (m)	EC (µS/cm)	Temp. (°C)
119	GSDA	AMBEGAON	Khadaki				13		616.9			7.7	2	5.7		
120	GSDA	AMBEGAON	Loni				10.25		665.7			3.4	1.2	2.2		
121	GSDA	AMBEGAON	Pimpalgaon Tarf Ghoda				10		664.3			9	1	8		
122	GSDA	AMBEGAON	Ranjani				10.95		626.7			4.4	3.4	1		
123	GSDA	AMBEGAON	Taleghar				9.45		1032.8			7	2	5		
124	GSDA	BHOR	Apati				5		782.1			4.3	0.8	3.5		
125	GSDA	BHOR	Bholavade				4.9		606.8			3.4	2	1.4		
126	GSDA	BHOR	Bhor				10.2		626.8			5.8	2	3.8		
127	GSDA	BHOR	Jayatpad				3.8		667			2.2	0.6	1.6		
128	GSDA	BHOR	Khulshi				5.7		685.9			4	1.4	2.6		
129	GSDA	BHOR	Nasrapur				8.45		654.8			5.6	1.5	4.1		
130	GSDA	BHOR	Venavadi				7.4		624.9			7	1	6		
131	GSDA	DAUND	Bh&gaon				9		575.5			7.2	2.55	4.65		
132	GSDA	DAUND	Gar				8		559.1			7.5	1.1	6.4		
133	GSDA	DAUND	Girim				7.15		600.8			4	2.6	1.4		
134	GSDA	DAUND	Kalewadi				13.95		513.9			8.3	2	6.3		
135	GSDA	DAUND	Kedgaon				7.4		582.3			6.2	2.6	3.6		
136	GSDA	DAUND	Kurkumbh				5.85		610.5			3.6	1.7	1.9		
137	GSDA	DAUND	Pargaon				14.45		549.8			8.5	3.2	5.3		
138	GSDA	DAUND	Patas				10.25		549.8			8.7	6.3	2.4		
139	GSDA	DAUND	Patethan				14.3		545.4			8.9	5.5	3.4		
140	GSDA	DAUND	Rahu				15.8		524.3			10.4	5.5	4.9		
141	GSDA	DAUND	Ravangaon				13.1		604.9			7.3	2.4	4.9		
142	GSDA	DAUND	Sonawade				11.5		524			5.6	2.95	2.65		
143	GSDA	HAVELI	Al&i Mhatobachi				12.8		608			9.8	3.9	5.9		
144	GSDA	HAVELI	Arvi				14.6		946.7			10	1	9		
145	GSDA	HAVELI	Bhosari				15.25		592.3			7.7	1.1	6.6		
146	GSDA	HAVELI	Charholi Bk				10.1		578.3			6.2	1.5	4.7		
147	GSDA	HAVELI	Dhanori				9.4		588			3.6	1.1	2.5		
148	GSDA	HAVELI	Katraj				10.8		669.6			6.2	2.1	4.1		
149	GSDA	HAVELI	Koregaon Mul				10.65		528.3			6.5	1.55	4.95		
150	GSDA	HAVELI	Loni Kalbhor				16.55		545.3			10.1	4.3	5.8		

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151	GSDA	HAVELI	Loni-K&				10.65		571.6			9.6	3.2	6.4		
152	GSDA	HAVELI	Moshi				13.5		574.7			4.4	3.4	1		
153	GSDA	HAVELI	Pimpri S&as				9.1		546.2			6.65	3.5	3.15		
154	GSDA	HAVELI	Sangarun				9.55		619			4.5	2	2.5		
155	GSDA	HAVELI	Shiraswadi				9		562.6			9	2.3	6.7		
156	GSDA	HAVELI	Sonapur				10.7		595.2			4.78	2.9	1.88		
157	GSDA	HAVELI	Uruli Dewachi				11.1		647.7			9.7	5.5	4.2		
158	GSDA	HAVELI	Uruli Kanchan				15.1		552.7			12.7	5	7.7		
159	GSDA	HAVELI	Wadki				13.65		565			11.9	4.5	7.4		
160	GSDA	HAVELI	Wagholi				13.55		578.4			6.8	1.3	5.5		
161	GSDA	INDAPUR	Anthurne				11.5		524			8	4.3	3.7		
162	GSDA	INDAPUR	Bawada				11		481.4			8.4	6	2.4		
163	GSDA	INDAPUR	Bhadalwadi				10.9		514.9			4.6	1.8	2.8		
164	GSDA	INDAPUR	Bhigvan				12.1		503.4			11.6	1.6	10		
165	GSDA	INDAPUR	Gal& Wadi No.1				8.25		518.3			4	2	2		
166	GSDA	INDAPUR	Hingangaon				4.6		473			3.6	1.95	1.65		
167	GSDA	INDAPUR	Indapur				14		513.5			10	4	6		
168	GSDA	INDAPUR	Kalamb				15.8		513.1			9.8	1.8	8		
169	GSDA	INDAPUR	Kauthali				9.15		528.6			8.3	4	4.3		
170	GSDA	INDAPUR	Kazad				10		543.3			7.3	2.3	5		
171	GSDA	INDAPUR	Lamjewadi				12.6		593			12.5	1.1	11.4		
172	GSDA	INDAPUR	Loni				8.85		529.7			6.2	2.3	3.9		
173	GSDA	INDAPUR	Madanwadi				14.4		500.3			12.7	2.1	10.6		
174	GSDA	INDAPUR	Nimgaon Ketki				18.3		536.8			17.8	4.6	13.2		
175	GSDA	INDAPUR	Reda				8.9		503.7			7	4.7	2.3		
176	GSDA	INDAPUR	Rui				7.5		529.3			7	1.3	5.7		
177	GSDA	INDAPUR	Sarati				12.5		482.3			8	4.8	3.2		
178	GSDA	INDAPUR	Shetphalgadhe				12		543.7			6	2.4	3.6		
179	GSDA	INDAPUR	Tawashi				11.4		513.6			5.4	2.2	3.2		
180	GSDA	INDAPUR	Varkute Bk.				8.9		532			7.1	1.8	5.3		
181	GSDA	JUNNAR	Ale				13.65		673.1			8.6	4.8	3.8		
182	GSDA	JUNNAR	Aptale				18		810.2			11	3	8		
183	GSDA	JUNNAR	Belhe				16.3		656			14.2	4.7	9.5		

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184	GSDA	JUNNAR	Bori Bk.				11		618.1			6.3	3.1	3.2		
185	GSDA	JUNNAR	Dholwad				20.9		649.9			18	8	10		
186	GSDA	JUNNAR	Dingore				15		669.1			13.5	6	7.5		
187	GSDA	JUNNAR	Gulanchwadi				13.5		723.8			8.6	3	5.6		
188	GSDA	JUNNAR	Hadsar				10.4		763.6			10.1	1.99	8.11		
189	GSDA	JUNNAR	Khanapur				14.8		706			7.2	1.5	5.7		
190	GSDA	JUNNAR	Mangrul				20.35		608.6			14	5	9		
191	GSDA	JUNNAR	Narayangaon				7.45		668.2			5.8	2.6	3.2		
192	GSDA	JUNNAR	Netwad				9.5		664.7			5.7	3.4	2.3		
193	GSDA	JUNNAR	Otur				24.6		672.8			17.8	12.4	5.4		
194	GSDA	JUNNAR	Padali				10.8		682.3			5.9	2.6	3.3		
195	GSDA	JUNNAR	Pimpalw&i				14.45		634.7			14	1.2	12.8		
196	GSDA	JUNNAR	Rohkadi				24.4		693.2			21.6	17.4	4.2		
197	GSDA	JUNNAR	Sitewadi				11		697			8	1.9	6.1		
198	GSDA	JUNNAR	Tambe				9.6		788.6			7.5	2.56	4.94		
199	GSDA	JUNNAR	Tejewadi				13.15		658.6			9.8	4.2	5.6		
200	GSDA	JUNNAR	Yenere				12.2		732.5			8.6	3.8	4.8		
201	GSDA	KHED	Ambethan				9		658.4			7	0.65	6.35		
202	GSDA	KHED	Ambhu				13.5		789.5			12.8	3.8	9		
203	GSDA	KHED	Bahul				9.85		563.2			3.5	1.05	2.45		
204	GSDA	KHED	Bhorgiri				5.8		667.4			5.4	1	4.4		
205	GSDA	KHED	Chakan				11.85		621.2			5.5	0.6	4.9		
206	GSDA	KHED	Ch&us				11		645.2			5	1.2	3.8		
207	GSDA	KHED	Chas				16.75		624			14.85	11.4	3.45		
208	GSDA	KHED	Ghotavadi				10.55		809.7			9.3	0.9	8.4		
209	GSDA	KHED	Kadadhe				9.5		632.9			8.3	1.7	6.6		
210	GSDA	KHED	Kadus				9.6		645.2			5.8	3	2.8		
211	GSDA	KHED	Kuruli				10.3		606			6.6	2	4.6		
212	GSDA	KHED	Pait				9.5		707.2			6.4	1.2	5.2		
213	GSDA	KHED	Rajgurunagar (Khed)				11		586.2			8.15	1	7.15		
214	GSDA	KHED	Saburdi				6.5		673.1			4.5	1.3	3.2		
215	GSDA	KHED	Solu				13.5		569.3			9	2.56	6.44		
216	GSDA	KHED	Varude				8.7		689.8			8	2.2	5.8		

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217	GSDA	KHED	Virham				14.5		709			13.85	1.9	11.95		
218	GSDA	KHED	Wasuli				7.1		662.7			4.4	1.4	3		
219	GSDA	MAWAL	Bhoyare				9		670.9			7	0.7	6.3		
220	GSDA	MAWAL	Brahmanoli				8.4		589.7			7	1.9	5.1		
221	GSDA	MAWAL	Ch&khed				8.3		601.4			4.3	1.9	2.4		
222	GSDA	MAWAL	Chikhalse				9.3		692.4			9	1.3	7.7		
223	GSDA	MAWAL	Induri				10.4		598.2			9	1.5	7.5		
224	GSDA	MAWAL	Jambhul				6.4		622.6			6	1.4	4.6		
225	GSDA	MAWAL	Kadadhe				4.8		589.7			4	0.9	3.1		
226	GSDA	MAWAL	Karla				9.6		624.1			3.6	1	2.6		
227	GSDA	MAWAL	Malawali P.M.				7.7		604.6			6.5	1	5.5		
228	GSDA	MAWAL	Nane				7.9		610.7			5	0.9	4.1		
229	GSDA	MAWAL	Somatane				8		600.6			4.5	1	3.5		
230	GSDA	MAWAL	Takave Bk.				8		665			7.5	1.8	5.7		
231	GSDA	MAWAL	Talegaon Dabhade				10.4		603.2			4	2	2		
232	GSDA	MAWAL	Thakursai				9.3		678.9			7	1.6	5.4		
233	GSDA	MAWAL	Thoran				5.3		974.9			4.7	0.8	3.9		
234	GSDA	MAWAL	Vadgaon Mawal				4.6		616			3.4	0.6	2.8		
235	GSDA	MULSHI	&gaon				7		648.8			3.5	1.09	2.41		
236	GSDA	MULSHI	Bhugaon				10.25		657.4			8.8	1	7.8		
237	GSDA	MULSHI	Ghotavade				5.8		570.3			5	1	4		
238	GSDA	MULSHI	Hinjavadi				10.5		573			9.1	1.3	7.8		
239	GSDA	MULSHI	Kemasewadi				9.55		688.3			8	1	7		
240	GSDA	MULSHI	Kondhawale				6.8		569			5.6	1.2	4.4		
241	GSDA	MULSHI	Nere				13		615.1			8	1	7		
242	GSDA	MULSHI	Paud				10.85		610.2			8.34	2.1	6.24		
243	GSDA	MULSHI	Sus				8.2		599.3			5.6	1.8	3.8		
244	GSDA	MULSHI	Tamhini Bk.				5.9		658.6			5.2	1	4.2		
245	GSDA	MULSHI	Viseghar				7.25		802.4			6.5	1.23	5.27		
246	GSDA	SHIRUR	&halgaon				7.85		536.8			7.8	3.6	4.2		
247	GSDA	SHIRUR	Chincholi				7.6		645.9			6	2.8	3.2		
248	GSDA	SHIRUR	Dhamari				14.15		642.4			13.5	2.4	11.1		

S No	Agency	Taluka	Village	Toposheet Quadrant	Topographical Setting	Diameter (m)	Depth mbgl	Lining (m)	Elevation (m. amsl)	Use	Aquifer	Pre-monsoon DTW (mbgl)	Post-monsoon DTW (mbgl)	Fluctuation (m)	EC (µS/cm)	Temp. (°C)
249	GSDA	SHIRUR	Fakate				8.5		597.7			4.5	2.2	2.3		
250	GSDA	SHIRUR	Gunat				13		576.4			12.2	2.9	9.3		
251	GSDA	SHIRUR	Jambut				13.2		600.3			10.8	1.1	9.7		
252	GSDA	SHIRUR	Kawathe				9.2		606.6			6.8	1.3	5.5		
253	GSDA	SHIRUR	Kendur				9		631			8.8	3.7	5.1		
254	GSDA	SHIRUR	Kondhapuri				18.9		594.4			18.5	6.1	12.4		
255	GSDA	SHIRUR	Malthan				11.3		594			11.3	2.6	8.7		
256	GSDA	SHIRUR	M&avgan Farata				15.6		516			13.2	1.3	11.9		
257	GSDA	SHIRUR	Mhase Bk.				8.9		564.7			6.2	1.2	5		
258	GSDA	SHIRUR	Nhavara				12.25		573.3			12.2	4.1	8.1		
259	GSDA	SHIRUR	Nimgaon Dude				12.1		582			10.7	2.5	8.2		
260	GSDA	SHIRUR	Pabal				13.7		672.7			12.1	1.9	10.2		
261	GSDA	SHIRUR	Pimpale Jagtap				6.55		589.1			5.2	2.4	2.8		
262	GSDA	SHIRUR	Pimparkhed				15.45		603.8			14.5	2.5	12		
263	GSDA	SHIRUR	Ranjangaon Ganpati				12.2		629.4			10.55	3.1	7.45		
264	GSDA	SHIRUR	Sanaswadi				13		573.7			7.3	6.1	1.2		
265	GSDA	SHIRUR	Saradwadi				6.3		588.7			6.2	3.1	3.1		
266	GSDA	SHIRUR	Shikrapur				10.65		579			9.75	3.7	6.05		
267	GSDA	SHIRUR	Shirasgaon Kata				6.7		544.6			6	2	4		
268	GSDA	SHIRUR	Shirur				13.5		553.4			12.8	4.4	8.4		
269	GSDA	SHIRUR	T&ali				16.45		519.9			15.5	6.5	9		
270	GSDA	SHIRUR	Vadner Kh.				8.3		596			6.7	1.7	5		
271	GSDA	VELHE	Gunjavane				14.15		720.9			9	1.56	7.44		
272	GSDA	VELHE	Margasani				10		674.1			8.6	0.7	7.9		
273	GSDA	VELHE	Osade				5.8		638.1			5	0.8	4.2		
274	GSDA	VELHE	Panshet				4		592.8			2.1	0.6	1.5		
275	GSDA	VELHE	Velhe Bk.				6.1		717.5			6	0.9	5.1		
276	GSDA	VELHE	Vihir				5.1		756.2			5	1.9	3.1		
277	GSDA	Baramati	Baburdi				10.8		606.8			8.2	3.8	4.4		
278	GSDA	Baramati	Baramati Rural				11.6		554.1			11.6	3	8.6		
279	GSDA	Baramati	Ch&gude Wadi				90		630.4			11.1	9.9	1.2		

S No	Agency	Taluka	Village	Toposheet Quadrant	Topographical Setting	Diameter (m)	Depth mbgl	Lining (m)	Elevation (m. amsl)	Use	Aquifer	Pre-monsoon DTW (mbgl)	Post-monsoon DTW (mbgl)	Fluctuation (m)	EC (µS/cm)	Temp. (°C)
280	GSDA	Baramati	Ch&gude Wadi				31.6		627.6			11.4	7	4.4		
281	GSDA	Baramati	Dhakale				10		583			9	6.4	2.6		
282	GSDA	Baramati	Jalochi				30		550.6			9.3	7.4	1.9		
283	GSDA	Baramati	Karhati				60		589.8			9.8	6.15	3.65		
284	GSDA	Baramati	Korhale Kh				58		538.9			7.25	3.1	4.15		
285	GSDA	Baramati	Korhale Kh				90		538.9			9.15	4.15	5		
286	GSDA	Baramati	Kutwalwadi				92.1		634.4			5.15	4	1.15		
287	GSDA	Baramati	Loni Bhapkar				95		599.4			5.6	2.2	3.4		
288	GSDA	Baramati	Murti				16.3		604.2			6.7	5	1.7		
289	GSDA	Baramati	Nimbodi				30		521.2			8.95	5.2	3.75		
290	GSDA	Baramati	Sangavi				7.9		528.6			4.6	1.3	3.3		
291	GSDA	Baramati	Supe				30		630			6.25	3.25	3		
292	GSDA	Baramati	Vadgaon Nimbalkar				8.2		560.6			7	2.9	4.1		
293	GSDA	Baramati	Vadgaon Nimbalkar				68		550.5			6	5.1	0.9		
294	GSDA	Purandhar	Belsar				16.5		709			14.6	9.1	5.5		
295	GSDA	Purandhar	Chambhali				50		829			11.5	9	2.5		
296	GSDA	Purandhar	Dive				36.1		797			18	7.3	10.7		
297	GSDA	Purandhar	Gurholi				8.7		798.4			7.6	1.9	5.7		
298	GSDA	Purandhar	Harni				7.05		605.7			6.4	2.1	4.3		
299	GSDA	Purandhar	Jejuri				7		733.4			5.5	1.4	4.1		
300	GSDA	Purandhar	Khalad				30		726.1			25	13.75	11.25		
301	GSDA	Purandhar	Khanvadi				9.15		724.8			4.7	3.6	1.1		
302	GSDA	Purandhar	Malshiras				100		716.7			29.2	4	25.2		
303	GSDA	Purandhar	Mawadikade Pathar				34		649.8			11.6	5.5	6.1		
304	GSDA	Purandhar	Mawadikade Pathar				14.85		659			7.2	5.6	1.6		
305	GSDA	Purandhar	Pargaon				97		734.8			26.8	6	20.8		
306	GSDA	Purandhar	Pargaon				35		734.8			30.35	25.2	5.15		
307	GSDA	Purandhar	Parinche				11.85		639.2			9.7	7.7	2		
308	GSDA	Purandhar	Pingori				9.4		743.6			7.5	3.2	4.3		
309	GSDA	Purandhar	Pondhe				90		720.5			4.9	3.5	1.4		

S No	Agency	Taluka	Village	Toposheet Quadrant	Topo graphical Setting	Diameter (m)	Depth mbgl	Lining (m)	Elevation (m. amsl)	Use	Aquifer	Pre- monsoon DTW (mbgl)	Post- monsoon DTW (mbgl)	Fluctuation (m)	EC (μ S/cm)	Temp. ($^{\circ}$ C)
310	GSDA	Purandhar	Rise				60		668.6			9.15	7.85	1.3		
311	GSDA	Purandhar	Sakurde				10.7		771.2			6.9	1.4	5.5		
312	GSDA	Purandhar	Saswad Rural				30		767.1			5.1	3.5	1.6		
313	GSDA	Purandhar	Walhe				9		630.8			7.3	3	4.3		
314	GSDA	Purandhar	Walhe				30		627.5			12.5	6.4	6.1		

Annexure IV: Details of micro-level wells, Pune district

Sl. No	Village	Tehsil	Long_deci	Lat_deci	Elevation (amsl)	Geology	Well. Depth (mbgl)	D.T.W. (Mbgl)	EC (µs/cm)	Thickness weathered portion (m)	Thickness of fracture zone (m)	Annual pumping hours.	HP of Pump	Rate of discharge (m ³ /hr)	Khari draft (m ³)	Rabi Draft (m ³)	Summer Draft (m ³)	Annual Draft m ³ /year
1	Ambi Kh	BARAMATI	74.30915	18.32336667	645	DT Basalt	12.7	8.5	832	6	3	625	3	9	3375	2250	0	5625
2	Bhondvewadi	BARAMATI	74.34056667	18.32098333	633	DT Basalt	13	12.5		3	4	890	3	10.8	972	8640	0	9612
3	Dandwadi	BARAMATI	74.43413333	18.32551667	634	DT Basalt	11.8	11.6	1266	1.5	2	555	5	14.4	5400	2592	0	7992
4	Dandwadi	BARAMATI	74.47853333	18.1038	543	DT Basalt	13.3	7	1473	2	4	715	3	10.8	432	6480	810	7722
5	Deulgaon Rasal	BARAMATI	74.46558333	18.30456667	619	DT Basalt	11.2	11	697	7	3	900	5	16.2	2916	11664	0	14580
6	Dorlewadi	BARAMATI	74.60758333	18.09523333	528	DT Basalt	7	5.8		4	0	850	3	9	360	6480	810	7650
7	Gojubavi	BARAMATI	74.57106667	18.23151667	577	DT Basalt	8.6	8	1703	5	1	560	3	9	1800	3240	0	5040
8	Jalgaon KP	BARAMATI	74.47658333	18.21868333	567	DT Basalt	12.5	10.9	8929	6	0	205	3	7.2	1152	324	0	1476
9	Jalochi	BARAMATI	74.5969	18.1631		DT Basalt	9	6.8		7	0	6172	3	10.8	1728	64929.6	0	66657.6
10	Jogwadi	BARAMATI	74.2621	18.2545		DT Basalt	18	16		18	0	225	5	12.6	1134	1701	0	2835
11	Karanjepul	BARAMATI	74.28716667	18.11805	555	DT Basalt	10	4.7	803	10		1760	5	14.4	0	13824	11520	25344
12	Karkhel	BARAMATI	74.49846667	18.29046667	595	DT Basalt	7.3	7	697	3	0	420	3	9	2160	1620	0	3780
13	Katewadi (Kanheri)	BARAMATI	74.65543333	18.13346667	540	DT Basalt	6	4.4		6		915	5	19.8	891	14256	2970	18117
14	Katphal	BARAMATI	74.61025	18.23536667	586	DT Basalt	9.3	7.8	1200	2	2	960	3	9	2160	6480	0	8640
15	Kharade Wadi	BARAMATI	74.51598333	18.31116667	607	DT Basalt	8	4.3	1012	4	1	330	3	9	810	2160	0	2970
16	Kololi	BARAMATI	74.44513333	18.30401667	634	DT Basalt	6.5	5.4	625	3.5	0	1020	5	16.2	7776	8748	0	16524
17	Loni Bhapkar	BARAMATI	74.3704	18.2269		DT Basalt	15	14		6		350	5	16.2	3240	2430	0	5670
18	Malegaon Bk	BARAMATI	74.50116667	18.10301667	541	DT Basalt	8.9	dry		3.6	2.2	840	3	18	0	8640	6480	15120
19	Medad	BARAMATI	74.53906667	18.17553333	554	DT Basalt	13	11.2	4368	3	3	420	5	18	1080	2880	3600	7560
20	Mekhali	BARAMATI	74.60235	18.094	527	DT Basalt	7	4.4	2365	6	1	1470	5	9	3600	7200	2430	13230
21	Modhave (Umbarwada / Murti)	BARAMATI	74.26993333	18.18786667	605	DT Basalt	10	7.2	1461	7	2	350	5	23.4	3510	4680	0	8190
22	Nimbut	BARAMATI	74.2405	18.11066667	551	DT Basalt	8	6.4	1412	8	0	920	3	10.8	1296	6480	2160	9936
23	Nirvagaj	BARAMATI	74.55206667	18.07296667	516	Alluvium	6	0.5	5556			1840	3	12.6	3024	10080	10080	23184
24	Pardhare	BARAMATI	74.4785	18.13821667	549	DT Basalt	10.5	6.2	887	7	1.5	1200	3	10.8	1728	8640	2592	12960
25	Parwadi	BARAMATI	74.63275	18.29396667	557	DT Basalt	9	4.5	1251	6	1	1040	3	12.6	3402	9072	630	13104

Sl. No	Village	Tehsil	Long_deci	Lat_deci	Elevation (amsl)	Geology	Well. Depth (mbgl)	D.T.W. (Mbgl)	EC (µs/cm)	Thickness weathered portion (m)	Thickness of fracture zone (m)	Annual pumping hours.	HP of Pump	Rate of discharge (m ³ /hr)	Khari draft (m ³)	Rabi Draft (m ³)	Summer Draft (m ³)	Annual Draft m ³ /year
26	Pimpali	BARAMATI	74.62373333	18.13061667	541	DT Basalt	16	2.5	861	6		100	17	64.8	0	38880	51840	6480
27	Sangvi	BARAMATI	74.46703333	18.06745	540	DT Basalt	6.1	5.9	2228	5	0	170	3	9	180	1080	270	1530
28	Shirsuphal	BARAMATI	74.58528333	18.30931667	570	DT Basalt	9	6.8	704	8	0	540	3	7.2	1728	2160	0	3888
29	Vadgaon Nimbalkar	BARAMATI	74.3672	18.12825	552	DT Basalt	15	3.6	1191	4	6	1616	5	16.2	4147	15552	6480	26179.2
30	Vadhane	BARAMATI	74.3518	18.35455	655	DT Basalt	13.5	dry		2	4	550	3	9	2250	2700	0	4950
31	Zaragadwadi	BARAMATI	74.61698333	18.09751667	533	DT Basalt	17	14.8		6	1.5	475	5	14.4	648	5760	432	6840
32	Bopgaon	PURANDHAR	73.9533	18.40166667	862	DT Basalt	12.8	11.8	677	3	3	320	3	12.6	2520	1512	0	4032
33	Devadi	PURANDHAR	73.93683333	18.28131667	725	DT Basalt	15	14.6	863	6	5	560	7.5	36	7200	12960	0	20160
34	Dhalewadi	PURANDHAR	74.15928333	18.30223333	689	DT Basalt	10			6	1	248	5	12.6	1613	1512	0	3124.8
35	Dive	PURANDHAR	74.0228	18.40198333	820	DT Basalt	17	16.7	950	6	2	810	3	12.6	1134	9072	0	10206
36	Garade	PURANDHAR	73.92423333	18.36595	885	DT Basalt	15.8	15.7	390	5	2	232	5	14.4	1037	2304	0	3340.8
37	Gulunche	PURANDHAR	74.22563333	18.14086667	567	DT Basalt	11	9.1	1.24	4	1	360	3	9	540	2700	0	3240
38	Karnalwadi	PURANDHAR	74.16666667	18.16353333	600	DT Basalt	23	15.1	1428	8	2	600	5	18	7200	3600	0	10800
39	Khanvadi	PURANDHAR	74.10485	18.3288	721	DT Basalt	18	17.5	1177	3	2	100	3	9	90	810	0	900
40	Kodit Bk.	PURANDHAR	73.97443333	18.34298333	803	DT Basalt	12.5	11	684	11	1	490	5	12.6	504	5670	0	6174
41	Kumbharvalan	PURANDHAR	74.06603333	18.376	769	DT Basalt	14	5.9	900	7	1	500	5	12.6	252	6048	0	6300
42	Malshiras	PURANDHAR	74.23066667	18.40983333	720	DT Basalt	8	4	1067	2	2.5	700	3	12.6	2520	6300	0	8820
43	Mandaki	PURANDHAR	74.12888333	18.1447	577	DT Basalt	10	3.9	920	5	2	1296	5	25.2	2419	20160	10080	32659.2
44	Mandhar	PURANDHAR	74.02433333	18.20033333	692	DT Basalt	10.5	8.5	472	6	2	400	3	12.6	504	4536	0	5040
45	Nawalewadi	PURANDHAR	74.08265	18.17895	627	DT Basalt	15.5	5.2	1081	3	3	165	5	21.6	972	2592	0	3564
46	Nazare Supe	PURANDHAR	74.20508333	18.30441667	663	DT Basalt	6	5.5		5.5	0.5	207	3	9	1215	540	108	1863
47	Pandeshwar	PURANDHAR	74.26298333	18.32325	648	DT Basalt	9	3.8	1855	1	1	628	5	16.2	2074	8100	0	10173.6
48	Pangare	PURANDHAR	74.06523333	18.2707	739	DT Basalt	9	8.5	803	4	3	400	3	12.6	504	4536	0	5040
49	Parinche	PURANDHAR	74.08385	18.21223333	657	DT Basalt	11.5	7.9	620	8	2	100	3	7.2	115.2	1080	1440	720
50	Pimpale	PURANDHAR	74.03673333	18.31225	791	DT Basalt	13	11.5		3	2.5	150	3	7.2	216	864	0	1080
51	Pimpri Kh.	PURANDHAR	74.203	18.11443333	586	DT Basalt	8.5	4.5	1491	3	0	325	3	10.8	1350	2160	0	3510
52	Pimpri	PURANDHAR	74.21768333	18.32766667	662	DT Basalt	16	15.5		5	1	120	0.5	0.9	27	54	27	108

Sl. No	Village	Tehsil	Long_deci	Lat_deci	Elevation (amsl)	Geology	Well. Depth (mbgl)	D.T.W. (Mbgl)	EC (µs/cm)	Thickness weathered portion (m)	Thickness of fracture zone (m)	Annual pumping hours.	HP of Pump	Rate of discharge (m ³ /hr)	Khari draft (m ³)	Rabi Draft (m ³)	Summer Draft (m ³)	Annual Draft m ³ /year
53	Pingori	PURANDHAR	74.12401667	18.22155	680	DT Basalt	11	9.1	726	6	0	770	7.5	18	2160	10800	900	13860
54	Pisurti	PURANDHAR	74.16121667	18.13633333	571	DT Basalt	10.5	8.5	3530	5	0	380	5	14.4	4608	864	0	5472
55	Pondhe	PURANDHAR	74.27116667	18.41055	718	DT Basalt	5	3.6	750	3	2	360	3.5	18	720	2880	2880	6480
56	Rakh	PURANDHAR	74.23653333	18.19335	612	DT Basalt	15.9	14.5	520	8.8	2	140	5	14.4	576	1440	0	2016
57	Rise	PURANDHAR	74.29385	18.3555	665	DT Basalt	18	14.6	1057	5	5	65	6.5	27	1080	675	0	1755
58	Somurdi	PURANDHAR	73.93978333	18.3185	878	DT Basalt	5.5	4.4	620	1.5	1.3	110	5	21.6	1080	1296	0	2376
59	Tekavadi	PURANDHAR	74.20298333	18.42033333	729	DT Basalt	10	dry		3	0.5	325	3	12.6	0	4095	0	4095
60	Udachiwadi	PURANDHAR	74.0505	18.37001667	779	DT Basalt	20	8.7	804	16	0	640	3	9	360	5400	0	5760
61	Veer	PURANDHAR	74.10526667	18.15466667	593	DT Basalt	16	4.6	766	4	3	890	5	23.4	1170	14040	5616	20826
62	Wagdarwadi	PURANDHAR	74.1978	18.21146667	652	DT Basalt	20	Dry		10	2	0	3	0	0	0	0	0

S. No.	Agency	Taluka	Location	pH	EC	Hardness	TDS	Na	K	Ca	Mg	CO ₃	HCO ₃	Cl	NO ₃	SO ₄	F	Fe	SAR	RSC
					μS/cm	----- mg/l -----														
170	GSDA	Shirur	Nimgaon Dude	11.1	516	124	330	52.0	13.6	16	20.4	34.2	2.9	114	0.4	30	0.9	0.2	2.03	-1.31
171	GSDA	Shirur	Pimple Jagtap	8.1	598	192	383	54.0	1	32	27.2	2.8	237.1	60	3.9	26	1.2	0.3	1.69	0.11
172	GSDA	Shirur	Shikrapur	8.5	670	224	429	51.0	2.8	32	35.0	3.9	131.9	120	7.7	17	0.7	0.2	1.48	-2.22
173	GSDA	Shirur	Shikrapur	8.5	670	224	429	51.0	2.8	32	35.0	3.9	131.9	120	7.7	17	0.7	0.2	1.48	-2.22
174	GSDA	Shirur	Shirasgaon Kata	9.2	1166	256	746	88.0	0.6	12.8	54.4	18.0	451.4	86	18	44	1.5	0.1	2.39	2.82
175	GSDA	Shirur	Tandali	9.2	282	120	180	17.0	1.1	8	24.3	13.9	93.3	28	3.5	12	0.7	0.1	0.67	-0.43
176	NHS2016	Velhe	Kolawade		346	155	185	14.1	0.41	34.068	17.0	0.0	103.7	35.45	58	7	0.36	0.0	0.49	-1.42
177	NHS2016	Velhe	Wehle		268	110	142	17.9	2.89	36.072	4.9	0.0	109.8	35.45	21	7	0.36	0.0	0.74	-0.41
178	GSDA	Welha	Welha Bk	8.5	342	288	219	15.0	1	64	31.1	6.7	225.1	70	1	9	0.5	0.6	0.38	-1.88

S. No.	Agency	Taluka	Location	Type	pH	EC	Hardness	TDS	Na	K	Ca	Mg	CO ₃	HCO ₃	Cl	NO ₃	SO ₄	F	Fe	SAR	RSC
						μS/cm															
102	GSDA	Shirur	Nhavra	Borewell	9.2	578	148	370	54.0	5.1	17.6	25.3	25.3	169.9	88	6.4	35	0.9	0.2	1.93	0.64
103	GSDA	Shirur	Shirur	Borewell	7.9	388	180	248	19.0	0.7	43.2	17.5	1.2	158.8	72	3.2	16	0.5	0.1	0.62	-0.98

Annexure VII: Location of proposed Percolation tanks in Pune district

S.No	Village	Taluka	Structure	X	Y
1	Gohe Bk.	AMBEGAON	Percolation Tank	73.7335	19.0623
2	Gohe Bk.	AMBEGAON	Percolation Tank	73.7399	19.0695
3	Gohe Bk.	AMBEGAON	Percolation Tank	73.7419	19.0762
4	Dimbhe Kh.	AMBEGAON	Percolation Tank	73.7383	19.0821
5	Supedhar	AMBEGAON	Percolation Tank	73.7668	19.0635
6	Pimpalgaon Tarf Ghoda	AMBEGAON	Percolation Tank	73.8211	19.0656
7	Pimpalgaon Tarf Ghoda	AMBEGAON	Percolation Tank	73.8121	19.0709
8	Ghodegaon	AMBEGAON	Percolation Tank	73.8209	19.0458
9	Ghodegaon	AMBEGAON	Percolation Tank	73.8254	19.0464
10	Dhondmal Shindewadi	AMBEGAON	Percolation Tank	73.848	19.035
11	Dhondmal Shindewadi	AMBEGAON	Percolation Tank	73.8555	19.0422
12	Dhondmal Shindewadi	AMBEGAON	Percolation Tank	73.8595	19.0437
13	Chinchodi	AMBEGAON	Percolation Tank	73.898	19.02
14	Vadgaon Kashimbeg	AMBEGAON	Percolation Tank	73.9229	19.0269
15	Eklahare	AMBEGAON	Percolation Tank	73.9592	19.0238
16	Pimpalgaon Tarf Mahalunge	AMBEGAON	Percolation Tank	73.9698	18.9908
17	Chincholi	AMBEGAON	Percolation Tank	73.8767	19.0534
18	Kalamb	AMBEGAON	Percolation Tank	73.963	19.0447
19	Bharadi	AMBEGAON	Percolation Tank	74.0361	19.0003
20	Nagapur	AMBEGAON	Percolation Tank	74.0646	19.0098
21	Nirgoodsar	AMBEGAON	Percolation Tank	74.0553	18.9783
22	Kathapur Bk.	AMBEGAON	Percolation Tank	74.1111	18.9718
23	Ambi Kh	BARAMATI	Percolation Tank	74.2818	18.3055
24	Anjangaon	BARAMATI	Percolation Tank	74.4944	18.2008
25	Anjangaon	BARAMATI	Percolation Tank	74.5009	18.2194
26	Baburdi	BARAMATI	Percolation Tank	74.3672	18.2801
27	BARAMATI	BARAMATI	Percolation Tank	74.5712	18.1598
28	Chopadaj	BARAMATI	Percolation Tank	74.3214	18.1533
29	Deulgaon Rasal	BARAMATI	Percolation Tank	74.4618	18.2833
30	Dhakale	BARAMATI	Percolation Tank	74.4158	18.1464
31	Dhakale	BARAMATI	Percolation Tank	74.4118	18.1566
32	Gadikhelwadi (nv)	BARAMATI	Percolation Tank	74.61	18.2663
33	Gadikhelwadi (nv)	BARAMATI	Percolation Tank	74.5539	18.2996
34	Gadikhelwadi (nv)	BARAMATI	Percolation Tank	74.5839	18.3126
35	Gunwadi	BARAMATI	Percolation Tank	74.5691	18.12
36	Hol	BARAMATI	Percolation Tank	74.3346	18.1063
37	Jalgaon Kade Pathar	BARAMATI	Percolation Tank	74.4287	18.2273
38	Jalgaon Kade Pathar	BARAMATI	Percolation Tank	74.4392	18.1977
39	Jalgaon Supe	BARAMATI	Percolation Tank	74.4351	18.2533
40	Kalkhairewadi	BARAMATI	Percolation Tank	74.3868	18.3244
41	Karanjepul	BARAMATI	Percolation Tank	74.2958	18.1089
42	Karhati	BARAMATI	Percolation Tank	74.4116	18.255
43	Karhati	BARAMATI	Percolation Tank	74.4333	18.2709
44	Karhati	BARAMATI	Percolation Tank	74.408	18.2892
45	Khandaj	BARAMATI	Percolation Tank	74.5461	18.0741
46	Kololi	BARAMATI	Percolation Tank	74.4312	18.312
47	Kololi	BARAMATI	Percolation Tank	74.4413	18.3107
48	Kololi	BARAMATI	Percolation Tank	74.4184	18.3023
49	Korhale Bk	BARAMATI	Percolation Tank	74.377	18.1444
50	Loni Bhapkar	BARAMATI	Percolation Tank	74.3656	18.252
51	Loni Bhapkar	BARAMATI	Percolation Tank	74.3818	18.226
52	Loni Bhapkar	BARAMATI	Percolation Tank	74.3801	18.2293
53	Malegaon Bk	BARAMATI	Percolation Tank	74.5192	18.1343
54	Malegaon Kh.	BARAMATI	Percolation Tank	74.5068	18.1421
55	Medad	BARAMATI	Percolation Tank	74.5114	18.177
56	Moralwadi	BARAMATI	Percolation Tank	74.3032	18.1967
57	Murti	BARAMATI	Percolation Tank	74.2973	18.1977
58	Murti	BARAMATI	Percolation Tank	74.2934	18.2097

S.No	Village	Taluka	Structure	X	Y
59	Murti	BARAMATI	Percolation Tank	74.2771	18.2117
60	Naroli	BARAMATI	Percolation Tank	74.4162	18.3039
61	Naroli	BARAMATI	Percolation Tank	74.4163	18.3101
62	Nimbodi	BARAMATI	Percolation Tank	74.685	18.2896
63	Palshiwadi	BARAMATI	Percolation Tank	74.3201	18.1804
64	Palshiwadi	BARAMATI	Percolation Tank	74.3263	18.1859
65	Pandare	BARAMATI	Percolation Tank	74.4736	18.1337
66	Pandare	BARAMATI	Percolation Tank	74.4334	18.1138
67	Pansarewadi	BARAMATI	Percolation Tank	74.3883	18.3125
68	Parwadi	BARAMATI	Percolation Tank	74.6544	18.2754
69	Parwadi	BARAMATI	Percolation Tank	74.663	18.2859
70	Parwadi	BARAMATI	Percolation Tank	74.6185	18.2823
71	Shirawali	BARAMATI	Percolation Tank	74.5014	18.0861
72	Supe	BARAMATI	Percolation Tank	74.3337	18.2954
73	Tandulwadi	BARAMATI	Percolation Tank	74.5559	18.1755
74	Tandulwadi	BARAMATI	Percolation Tank	74.5852	18.183
75	Tardoli	BARAMATI	Percolation Tank	74.3413	18.2531
76	Vadgaon Nimbalkar	BARAMATI	Percolation Tank	74.3646	18.1307
77	Nimsakhar	INDAPUR	Percolation Tank	74.8227	18.024
78	Anthurne	INDAPUR	Percolation Tank	74.7958	18.0725
79	Nimsakhar	INDAPUR	Percolation Tank	74.8143	18.0431
80	Nirwangi	INDAPUR	Percolation Tank	74.8576	18.0179
81	Nimbodi	INDAPUR	Percolation Tank	74.6867	18.1428
82	Kazad	INDAPUR	Percolation Tank	74.7204	18.1417
83	Nirwangi	INDAPUR	Percolation Tank	74.8689	17.9909
84	Khorochi	INDAPUR	Percolation Tank	74.8669	17.9687
85	Khorochi	INDAPUR	Percolation Tank	74.8781	17.9481
86	Redani	INDAPUR	Percolation Tank	74.9114	17.9611
87	Pithewadi	INDAPUR	Percolation Tank	74.9419	17.9413
88	Pithewadi	INDAPUR	Percolation Tank	74.9371	17.9451
89	Bawada	INDAPUR	Percolation Tank	74.9768	17.9977
90	Vakilwasti	INDAPUR	Percolation Tank	74.9965	17.9977
91	Bhandgaon	INDAPUR	Percolation Tank	75.0342	18.0042
92	Awasari	INDAPUR	Percolation Tank	75.0342	18.037
93	Varkute Kh.	INDAPUR	Percolation Tank	74.9315	18.0718
94	Narutwadi	INDAPUR	Percolation Tank	75.0077	18.1614
95	Varkute Bk.	INDAPUR	Percolation Tank	74.9732	18.1805
96	Thoratwadi	INDAPUR	Percolation Tank	74.8496	18.1698
97	Bandgarwadi (nv)	INDAPUR	Percolation Tank	74.7713	18.2648
98	Kumbhargaon	INDAPUR	Percolation Tank	74.7866	18.2687
99	Nirgude	INDAPUR	Percolation Tank	74.7192	18.2194
100	Kalas	INDAPUR	Percolation Tank	74.7798	18.1931
101	Palasdeo	INDAPUR	Percolation Tank	74.8865	18.2297
102	Bhawadi	INDAPUR	Percolation Tank	74.9251	18.2305
103	Varkute Bk.	INDAPUR	Percolation Tank	74.9664	18.2133
104	Kalthan No.1	INDAPUR	Percolation Tank	74.9853	18.1969
105	Kauthali	INDAPUR	Percolation Tank	74.9279	18.1614
106	Balpudi	INDAPUR	Percolation Tank	74.9247	18.1653
107	Kacharewadi	INDAPUR	Percolation Tank	74.9102	18.0897
108	INDAPUR	INDAPUR	Percolation Tank	75.0451	18.1355
109	Nirwangi	INDAPUR	Percolation Tank	74.8773	17.997
110	Nirwangi	INDAPUR	Percolation Tank	74.8853	18.0031
111	Reda	INDAPUR	Percolation Tank	74.917	18.0157
112	Bawada	INDAPUR	Percolation Tank	74.9829	17.9661
113	Bawada	INDAPUR	Percolation Tank	74.9945	17.9626
114	Tannu	INDAPUR	Percolation Tank	75.0876	17.9695
115	Sarati	INDAPUR	Percolation Tank	75.0198	17.913
116	Kacharewadi	INDAPUR	Percolation Tank	74.9728	17.9268
117	Pithewadi	INDAPUR	Percolation Tank	74.9532	17.9485

S.No	Village	Taluka	Structure	X	Y
118	Redani	INDAPUR	Percolation Tank	74.9082	17.9859
119	Redani	INDAPUR	Percolation Tank	74.9142	17.9977
120	Reda	INDAPUR	Percolation Tank	74.911	18.0046
121	Reda	INDAPUR	Percolation Tank	74.909	18.0107
122	Nimsakhar	INDAPUR	Percolation Tank	74.8315	18.026
123	Nirgude	INDAPUR	Percolation Tank	74.7228	18.2274
124	Poundhawadi	INDAPUR	Percolation Tank	74.7459	18.2472
125	Bhadalwadi	INDAPUR	Percolation Tank	74.7709	18.2259
126	Akole	INDAPUR	Percolation Tank	74.7553	18.2072
127	Akole	INDAPUR	Percolation Tank	74.7621	18.2146
128	Akole	INDAPUR	Percolation Tank	74.7487	18.1919
129	Dalaj No.2	INDAPUR	Percolation Tank	74.8231	18.2287
130	Dalaj No.2	INDAPUR	Percolation Tank	74.8079	18.2297
131	Kalas	INDAPUR	Percolation Tank	74.8305	18.1998
132	Gosaviwadi	INDAPUR	Percolation Tank	74.8239	18.1908
133	Kalas	INDAPUR	Percolation Tank	74.8227	18.1948
134	Bhawadi	INDAPUR	Percolation Tank	74.9269	18.2335
135	Varkute Bk.	INDAPUR	Percolation Tank	74.9489	18.2213
136	Loni	INDAPUR	Percolation Tank	74.9176	18.2003
137	Loni	INDAPUR	Percolation Tank	74.9102	18.2114
138	Malewadi	INDAPUR	Percolation Tank	74.8928	18.2202
139	Palasdeo	INDAPUR	Percolation Tank	74.8787	18.216
140	Kalewadi	INDAPUR	Percolation Tank	74.8649	18.2139
141	Kalewadi	INDAPUR	Percolation Tank	74.857	18.2104
142	Nhavi	INDAPUR	Percolation Tank	74.8755	18.1723
143	Nhavi	INDAPUR	Percolation Tank	74.8767	18.1792
144	Nhavi	INDAPUR	Percolation Tank	74.8755	18.1876
145	Nhavi	INDAPUR	Percolation Tank	74.8781	18.1939
146	Maradwadi	INDAPUR	Percolation Tank	74.8574	18.1965
147	Dalaj No.2	INDAPUR	Percolation Tank	74.8211	18.2209
148	Kalashi	INDAPUR	Percolation Tank	74.9899	18.2034
149	Kalthan No.1	INDAPUR	Percolation Tank	74.978	18.1946
150	Gagargaon	INDAPUR	Percolation Tank	74.9726	18.1702
151	INDAPUR	INDAPUR	Percolation Tank	75.0304	18.1397
152	Bandgarwadi (nv)	INDAPUR	Percolation Tank	74.7736	18.2575
153	Pimpale	INDAPUR	Percolation Tank	74.7282	18.2549
154	Kazad	INDAPUR	Percolation Tank	74.7142	18.1428
155	Bori	INDAPUR	Percolation Tank	74.7551	18.1248
156	Anthurne	INDAPUR	Percolation Tank	74.7912	18.0997
157	Shelgaon	INDAPUR	Percolation Tank	74.8205	18.0913
158	Shelgaon	INDAPUR	Percolation Tank	74.8305	18.1004
159	Sirsatwadi	INDAPUR	Percolation Tank	74.8273	18.0593
160	Paritwadi	INDAPUR	Percolation Tank	74.7306	18.0635
161	Nimbodi	INDAPUR	Percolation Tank	74.6921	18.1409
162	Nirnimgaon	INDAPUR	Percolation Tank	74.9654	17.9262
163	Reda	INDAPUR	Percolation Tank	74.9293	18.0112
164	Redani	INDAPUR	Percolation Tank	74.9084	17.9815
165	Lakhewadi	INDAPUR	Percolation Tank	74.9373	17.97
166	Babhulgaon	INDAPUR	Percolation Tank	75.0846	18.0657
167	Hingangaon	INDAPUR	Percolation Tank	75.0794	18.0825
168	INDAPUR	INDAPUR	Percolation Tank	75.0168	18.0745
169	Gotandi	INDAPUR	Percolation Tank	74.8875	18.0524
170	Gotandi	INDAPUR	Percolation Tank	74.8867	18.0615
171	Kalewadi	INDAPUR	Percolation Tank	74.8558	18.2278
172	Nhavi	INDAPUR	Percolation Tank	74.8879	18.1729
173	INDAPUR	INDAPUR	Percolation Tank	75.069	18.0852
174	INDAPUR	INDAPUR	Percolation Tank	75.0569	18.094
175	Watkhole	JUNNER	Percolation Tank	73.8432	19.2941
176	Kolwadi	JUNNER	Percolation Tank	73.8846	19.2978

S.No	Village	Taluka	Structure	X	Y
177	Netwad	JUNNER	Percolation Tank	73.9547	19.241
178	Ozar	JUNNER	Percolation Tank	73.9499	19.1906
179	Khamgaon	JUNNER	Percolation Tank	73.8288	19.2475
180	Udapur	JUNNER	Percolation Tank	73.9471	19.2774
181	Vadgaon Sahani	JUNNER	Percolation Tank	73.9146	19.1414
182	Dhalewadi Tarf Haveli	JUNNER	Percolation Tank	73.9367	19.177
183	Arvi	JUNNER	Percolation Tank	73.9459	19.1383
184	Nimdari	JUNNER	Percolation Tank	73.8838	19.1357
185	Sawargaon	JUNNER	Percolation Tank	73.897	19.127
186	Tejewadi	JUNNER	Percolation Tank	73.9459	19.2001
187	Pimpalgaon Joga	JUNNER	Percolation Tank	73.9018	19.3145
188	Pimpalgaon Joga	JUNNER	Percolation Tank	73.9427	19.2971
189	Alu	JUNNER	Percolation Tank	73.9479	19.3062
190	Ballalwadi	JUNNER	Percolation Tank	73.9066	19.2664
191	Kumshet	JUNNER	Percolation Tank	73.9078	19.2266
192	Nagadpadi	JUNNER	Percolation Tank	74.0558	19.1429
193	Shiroli T Ale	JUNNER	Percolation Tank	74.0867	19.0974
194	Bori Bk.	JUNNER	Percolation Tank	74.0859	19.1361
195	Bori Kh.	JUNNER	Percolation Tank	74.0815	19.1156
196	Khodad	JUNNER	Percolation Tank	74.0494	19.0792
197	Khodad	JUNNER	Percolation Tank	74.0382	19.0842
198	Khodad	JUNNER	Percolation Tank	74.0221	19.0914
199	Narayangaon	JUNNER	Percolation Tank	73.9708	19.1213
200	Warulwadi	JUNNER	Percolation Tank	73.9604	19.1171
201	Hivare Tarf Narayangaon	JUNNER	Percolation Tank	74.0017	19.083
202	Umbraj	JUNNER	Percolation Tank	74.0193	19.1891
203	Otur	JUNNER	Percolation Tank	73.9928	19.2338
204	Pimpalwandi	JUNNER	Percolation Tank	74.0763	19.1637
205	Pimpalwandi	JUNNER	Percolation Tank	74.0402	19.1838
206	Otur	JUNNER	Percolation Tank	73.9872	19.2361
207	Pimpalwandi	JUNNER	Percolation Tank	74.059	19.1671
208	Pimpalwandi	JUNNER	Percolation Tank	74.0642	19.183
209	Yedgaon	JUNNER	Percolation Tank	73.9832	19.1641
210	Kandali	JUNNER	Percolation Tank	74.035	19.1584
211	Yedgaon	JUNNER	Percolation Tank	73.9965	19.1584
212	Dholwad	JUNNER	Percolation Tank	73.9932	19.2171
213	Dumbarwadi	JUNNER	Percolation Tank	74.0037	19.2444
214	Mangrul	JUNNER	Percolation Tank	74.1625	19.0591
215	Mangrul	JUNNER	Percolation Tank	74.1547	19.068
216	Mangrul	JUNNER	Percolation Tank	74.1783	19.0474
217	Sakori T Belhe	JUNNER	Percolation Tank	74.1729	19.0813
218	Belhe	JUNNER	Percolation Tank	74.1745	19.1158
219	Sakori T Belhe	JUNNER	Percolation Tank	74.1479	19.0781
220	Belhe	JUNNER	Percolation Tank	74.1799	19.1186
221	Ranmalawadi	JUNNER	Percolation Tank	74.1803	19.0896
222	Mangrul	JUNNER	Percolation Tank	74.1795	19.0582
223	Jadhav Wadi	JUNNER	Percolation Tank	74.1224	19.105
224	Pargaon Tarf Ale	JUNNER	Percolation Tank	74.1416	19.0667
225	Kombadwadi	JUNNER	Percolation Tank	74.1384	19.1039
226	Shindewadi	JUNNER	Percolation Tank	74.2203	19.1971
227	Bangarwadi	JUNNER	Percolation Tank	74.182	19.1247
228	Gulanchwadi	JUNNER	Percolation Tank	74.2056	19.1421
229	Gulanchwadi	JUNNER	Percolation Tank	74.2076	19.1423
230	Gulanchwadi	JUNNER	Percolation Tank	74.2164	19.1522
231	Rajuri	JUNNER	Percolation Tank	74.1292	19.1258
232	Rajuri	JUNNER	Percolation Tank	74.1128	19.1281
233	Ane	JUNNER	Percolation Tank	74.2411	19.1758
234	Nalawane	JUNNER	Percolation Tank	74.2102	19.1933
235	Shindewadi	JUNNER	Percolation Tank	74.2768	19.1933

S.No	Village	Taluka	Structure	X	Y
236	Shindewadi	JUNNER	Percolation Tank	74.2856	19.1963
237	Shindewadi	JUNNER	Percolation Tank	74.2832	19.2039
238	Shindewadi	JUNNER	Percolation Tank	74.2211	19.1955
239	Ane	JUNNER	Percolation Tank	74.2407	19.1592
240	Nalawane	JUNNER	Percolation Tank	74.1866	19.1993
241	Shindewadi	JUNNER	Percolation Tank	74.2628	19.1959
242	Ambodi	PURANDHAR	Percolation Tank	74.0597	18.342
243	Chambali	PURANDHAR	Percolation Tank	73.9831	18.3707
244	Dhalewadi	PURANDHAR	Percolation Tank	74.1771	18.2951
245	Garade	PURANDHAR	Percolation Tank	73.9574	18.3407
246	Gulunche	PURANDHAR	Percolation Tank	74.2026	18.1412
247	Jadhavwadi (n.v.)	PURANDHAR	Percolation Tank	74.0249	18.3691
248	Jawalarjun	PURANDHAR	Percolation Tank	74.2495	18.2745
249	Kodit Bk.	PURANDHAR	Percolation Tank	73.9988	18.3433
250	Kothale	PURANDHAR	Percolation Tank	74.1651	18.3153
251	Mahur	PURANDHAR	Percolation Tank	74.0868	18.1793
252	Mandaki	PURANDHAR	Percolation Tank	74.1409	18.1314
253	Nazarekade Pathar	PURANDHAR	Percolation Tank	74.2146	18.3019
254	Nilanj	PURANDHAR	Percolation Tank	74.1292	18.312
255	Pandeshwar	PURANDHAR	Percolation Tank	74.2753	18.3313
256	Pimpri Kh.	PURANDHAR	Percolation Tank	74.1951	18.1174
257	Pimpri	PURANDHAR	Percolation Tank	74.212	18.3316
258	Ranamala (n.v.)	PURANDHAR	Percolation Tank	74.1902	18.3062
259	Samagirwasti (n.v.)	PURANDHAR	Percolation Tank	74.1162	18.1447
260	Veer	PURANDHAR	Percolation Tank	74.0852	18.1555
261	Walhe	PURANDHAR	Percolation Tank	74.1758	18.1584
262	Walhe	PURANDHAR	Percolation Tank	74.1811	18.1721

Annexure VIII: Location of proposed check dam in Pune district

S.No.	Village	Taluka	Structure	X	Y
1	Pimpalgaon Tarf Ghoda	AMBEGAON	Checkdam	73.7873	19.0539
2	Pimpalgaon Tarf Ghoda	AMBEGAON	Checkdam	73.7935	19.0575
3	Pimpalgaon Tarf Ghoda	AMBEGAON	Checkdam	73.8021	19.0605
4	Pimpalgaon Tarf Ghoda	AMBEGAON	Checkdam	73.8114	19.0639
5	Pimpalgaon Tarf Ghoda	AMBEGAON	Checkdam	73.812	19.0692
6	Ghodegaon	AMBEGAON	Checkdam	73.8051	19.0251
7	Ghodegaon	AMBEGAON	Checkdam	73.8047	19.0338
8	Sal	AMBEGAON	Checkdam	73.7995	19.0302
9	Ghodegaon	AMBEGAON	Checkdam	73.8238	19.0336
10	Ghodegaon	AMBEGAON	Checkdam	73.8276	19.0398
11	Pinglewadi Landewadi	AMBEGAON	Checkdam	73.8735	19.0148
12	Chinchodi	AMBEGAON	Checkdam	73.8805	19.0226
13	Narodi	AMBEGAON	Checkdam	73.8898	19.0307
14	Shewalwadi Varchilandewad	AMBEGAON	Checkdam	73.91	19.0006
15	Vadgaon Kashimbeg	AMBEGAON	Checkdam	73.9172	19.007
16	Vadgaon Kashimbeg	AMBEGAON	Checkdam	73.9178	19.0196
17	Phaladewadi Ugalewadi	AMBEGAON	Checkdam	73.7654	19.0615
18	Gohe Kh.	AMBEGAON	Checkdam	73.7352	19.0542
19	Gohe Kh.	AMBEGAON	Checkdam	73.7346	19.0605
20	Gohe Kh.	AMBEGAON	Checkdam	73.7159	19.0666
21	Mapoli	AMBEGAON	Checkdam	73.7362	19.085
22	Koltavade	AMBEGAON	Checkdam	73.7185	19.1003
23	Shinoli	AMBEGAON	Checkdam	73.7841	19.0749
24	Shinoli	AMBEGAON	Checkdam	73.7847	19.0652
25	Shinoli	AMBEGAON	Checkdam	73.7899	19.0706
26	Phaladewadi Ugalewadi	AMBEGAON	Checkdam	73.7705	19.0417
27	Phaladewadi Ugalewadi	AMBEGAON	Checkdam	73.7666	19.0425
28	Gohe Bk.	AMBEGAON	Checkdam	73.7474	19.0603
29	Gohe Bk.	AMBEGAON	Checkdam	73.7436	19.0685
30	Mapoli	AMBEGAON	Checkdam	73.7241	19.0717
31	Gavdewadi	AMBEGAON	Checkdam	73.9892	18.9619
32	Vachalmala	AMBEGAON	Checkdam	74.0017	18.9741
33	Kalamb	AMBEGAON	Checkdam	73.9519	19.0522
34	Kalamb	AMBEGAON	Checkdam	73.9588	19.0635
35	Mahalunge Padawal	AMBEGAON	Checkdam	73.9219	19.0719
36	Mahalunge Padawal	AMBEGAON	Checkdam	73.9215	19.0795
37	Thakarwadi	AMBEGAON	Checkdam	73.895	19.0798
38	Malawadi	AMBEGAON	Checkdam	73.8621	19.0855
39	Amondi	AMBEGAON	Checkdam	73.8348	19.092
40	Amondi	AMBEGAON	Checkdam	73.8396	19.098
41	Gangapur Kh.	AMBEGAON	Checkdam	73.7967	19.109
42	Gangapur Kh.	AMBEGAON	Checkdam	73.7935	19.1212
43	Borghar	AMBEGAON	Checkdam	73.7289	19.139
44	Borghar	AMBEGAON	Checkdam	73.7358	19.1481
45	Pokhari	AMBEGAON	Checkdam	73.6828	19.0942
46	Magholi	AMBEGAON	Checkdam	73.6511	19.1208
47	Savarli	AMBEGAON	Checkdam	73.619	19.1102
48	Rajpur	AMBEGAON	Checkdam	73.6114	19.1071
49	Malawadi	AMBEGAON	Checkdam	73.8705	19.0791
50	Mahalunge Padawal	AMBEGAON	Checkdam	73.9331	19.0518
51	Mahalunge Padawal	AMBEGAON	Checkdam	73.9283	19.0616
52	Chandoli Bk.	AMBEGAON	Checkdam	73.9848	19.0252
53	Chandoli Bk.	AMBEGAON	Checkdam	73.9896	19.04
54	Jawale	AMBEGAON	Checkdam	74.0466	18.9873
55	Bharadi	AMBEGAON	Checkdam	74.0366	18.9942
56	Ranjani	AMBEGAON	Checkdam	74.0418	19.0385
57	Phulvade	AMBEGAON	Checkdam	73.759	19.1268
58	Phulvade	AMBEGAON	Checkdam	73.7682	19.1356

S.No.	Village	Taluka	Structure	X	Y
59	Phulvade	AMBEGAON	Checkdam	73.7747	19.1352
60	Ambi Bk	BARAMATI	Checkdam	74.2758	18.2636
61	Anjangaon	BARAMATI	Checkdam	74.5047	18.2142
62	Anjangaon	BARAMATI	Checkdam	74.5001	18.2227
63	Anjangaon	BARAMATI	Checkdam	74.4926	18.2188
64	Anjangaon	BARAMATI	Checkdam	74.4842	18.2276
65	Anjangaon	BARAMATI	Checkdam	74.4806	18.2387
66	Anjangaon	BARAMATI	Checkdam	74.5013	18.1995
67	Anjangaon	BARAMATI	Checkdam	74.4876	18.2021
68	Anjangaon	BARAMATI	Checkdam	74.4683	18.2089
69	Barhanpur	BARAMATI	Checkdam	74.5278	18.2031
70	Barhanpur	BARAMATI	Checkdam	74.5256	18.2132
71	Barhanpur	BARAMATI	Checkdam	74.5226	18.2188
72	Barhanpur	BARAMATI	Checkdam	74.5181	18.2067
73	Barhanpur	BARAMATI	Checkdam	74.5156	18.1995
74	Chandgude Wadi	BARAMATI	Checkdam	74.3138	18.3027
75	Deulgaon Rasal	BARAMATI	Checkdam	74.4603	18.2657
76	Deulgaon Rasal	BARAMATI	Checkdam	74.4633	18.2768
77	Gadikhelwadi (nv)	BARAMATI	Checkdam	74.6128	18.2655
78	Gadikhelwadi (nv)	BARAMATI	Checkdam	74.6164	18.2831
79	Gadikhelwadi (nv)	BARAMATI	Checkdam	74.5963	18.2621
80	Gadikhelwadi (nv)	BARAMATI	Checkdam	74.6032	18.2653
81	Gadikhelwadi (nv)	BARAMATI	Checkdam	74.6117	18.2821
82	Gojubavi	BARAMATI	Checkdam	74.5634	18.2318
83	Gojubavi	BARAMATI	Checkdam	74.5693	18.2286
84	Gojubavi	BARAMATI	Checkdam	74.5618	18.2214
85	Jainakwadi	BARAMATI	Checkdam	74.6451	18.2459
86	Jalgaon Kade Pathar	BARAMATI	Checkdam	74.455	18.2145
87	Jalgaon Kade Pathar	BARAMATI	Checkdam	74.4413	18.2216
88	Jalgaon Supe	BARAMATI	Checkdam	74.4708	18.2361
89	Jalgaon Supe	BARAMATI	Checkdam	74.4603	18.2504
90	Jalgaon Supe	BARAMATI	Checkdam	74.4354	18.2559
91	Jaradwadi	BARAMATI	Checkdam	74.5197	18.254
92	Karhati	BARAMATI	Checkdam	74.418	18.2595
93	Karhati	BARAMATI	Checkdam	74.4105	18.2768
94	Karhati	BARAMATI	Checkdam	74.4173	18.2771
95	Karhati	BARAMATI	Checkdam	74.4325	18.2673
96	Karhati	BARAMATI	Checkdam	74.4028	18.266
97	Karhati	BARAMATI	Checkdam	74.3976	18.2816
98	Khandaj	BARAMATI	Checkdam	74.5301	18.0976
99	Khandaj	BARAMATI	Checkdam	74.5383	18.0836
100	Kharade Wadi	BARAMATI	Checkdam	74.497	18.3046
101	Malegaon Bk	BARAMATI	Checkdam	74.521	18.1283
102	Malegaon Kh.	BARAMATI	Checkdam	74.5102	18.14
103	Medad	BARAMATI	Checkdam	74.515	18.1756
104	Morgaon	BARAMATI	Checkdam	74.3143	18.2542
105	Morgaon	BARAMATI	Checkdam	74.317	18.2574
106	Morgaon	BARAMATI	Checkdam	74.2958	18.259
107	Morgaon	BARAMATI	Checkdam	74.3006	18.2633
108	Morgaon	BARAMATI	Checkdam	74.2854	18.269
109	Morgaon	BARAMATI	Checkdam	74.2875	18.2524
110	Morgaon	BARAMATI	Checkdam	74.3094	18.2498
111	Nepat Valan	BARAMATI	Checkdam	74.4974	18.1822
112	Nimbodi	BARAMATI	Checkdam	74.6849	18.2919
113	Nirvagaj	BARAMATI	Checkdam	74.551	18.0719
114	Pandare	BARAMATI	Checkdam	74.474	18.1286
115	Pansarewadi	BARAMATI	Checkdam	74.3858	18.2956
116	Pansarewadi	BARAMATI	Checkdam	74.3858	18.3093
117	Pansarewadi	BARAMATI	Checkdam	74.3907	18.3224

S.No.	Village	Taluka	Structure	X	Y
118	Parwadi	BARAMATI	Checkdam	74.6402	18.2681
119	Parwadi	BARAMATI	Checkdam	74.6464	18.2782
120	Parwadi	BARAMATI	Checkdam	74.6598	18.2795
121	Parwadi	BARAMATI	Checkdam	74.6669	18.2873
122	Parwadi	BARAMATI	Checkdam	74.6558	18.289
123	Parwadi	BARAMATI	Checkdam	74.6428	18.2922
124	Parwadi	BARAMATI	Checkdam	74.6467	18.2593
125	Parwadi	BARAMATI	Checkdam	74.6692	18.2945
126	Parwadi	BARAMATI	Checkdam	74.6591	18.2723
127	Parwadi	BARAMATI	Checkdam	74.6324	18.2815
128	Parwadi	BARAMATI	Checkdam	74.6262	18.2847
129	Pawnewadi	BARAMATI	Checkdam	74.5292	18.1143
130	Rui	BARAMATI	Checkdam	74.6216	18.1955
131	Rui	BARAMATI	Checkdam	74.6216	18.1955
132	Sawantwadi	BARAMATI	Checkdam	74.5575	18.2113
133	Shirawali	BARAMATI	Checkdam	74.5018	18.082
134	Shirawali	BARAMATI	Checkdam	74.4917	18.0901
135	Sonvadisupe	BARAMATI	Checkdam	74.4988	18.2374
136	Sonvadisupe	BARAMATI	Checkdam	74.4789	18.2471
137	Sonvadisupe	BARAMATI	Checkdam	74.4773	18.2563
138	Sonvadisupe	BARAMATI	Checkdam	74.4812	18.269
139	Supre	BARAMATI	Checkdam	74.3516	18.293
140	Supre	BARAMATI	Checkdam	74.3545	18.3054
141	Supre	BARAMATI	Checkdam	74.3552	18.3146
142	Supre	BARAMATI	Checkdam	74.348	18.3243
143	Tandulwadi	BARAMATI	Checkdam	74.553	18.1969
144	Tandulwadi	BARAMATI	Checkdam	74.5598	18.2025
145	Tardoli	BARAMATI	Checkdam	74.3297	18.2569
146	Undavadi Kade Pathar	BARAMATI	Checkdam	74.5288	18.2266
147	Undavadi Kade Pathar	BARAMATI	Checkdam	74.5327	18.2429
148	Undavadi Kade Pathar	BARAMATI	Checkdam	74.5432	18.252
149	Undavadi Kade Pathar	BARAMATI	Checkdam	74.5513	18.2621
150	Undavadi Kade Pathar	BARAMATI	Checkdam	74.5213	18.2334
151	Undavadi Kade Pathar	BARAMATI	Checkdam	74.5217	18.2481
152	Undavadi Kade Pathar	BARAMATI	Checkdam	74.5606	18.2612
153	Undavadisupe	BARAMATI	Checkdam	74.5093	18.2687
154	Undavadisupe	BARAMATI	Checkdam	74.5181	18.2726
155	Vanjarwadi	BARAMATI	Checkdam	74.6164	18.2084
156	Yelewasti	BARAMATI	Checkdam	74.4812	18.1133
157	Lakadi	INDAPUR	Checkdam	74.6839	18.1747
158	Lakadi	INDAPUR	Checkdam	74.6863	18.1648
159	Nimbodi	INDAPUR	Checkdam	74.6839	18.1549
160	Nimbodi	INDAPUR	Checkdam	74.6899	18.1568
161	Nimbodi	INDAPUR	Checkdam	74.6819	18.1446
162	Nimbodi	INDAPUR	Checkdam	74.6743	18.1499
163	Nimbodi	INDAPUR	Checkdam	74.6667	18.1568
164	Lakadi	INDAPUR	Checkdam	74.6646	18.1682
165	Shindewadi	INDAPUR	Checkdam	74.7124	18.1629
166	Kazad	INDAPUR	Checkdam	74.7176	18.1644
167	Kazad	INDAPUR	Checkdam	74.7232	18.1564
168	Kazad	INDAPUR	Checkdam	74.7324	18.1576
169	Kazad	INDAPUR	Checkdam	74.7312	18.1667
170	Kazad	INDAPUR	Checkdam	74.7296	18.1724
171	Kazad	INDAPUR	Checkdam	74.7396	18.1564
172	Kazad	INDAPUR	Checkdam	74.7388	18.1621
173	Kazad	INDAPUR	Checkdam	74.7396	18.1499
174	Kazad	INDAPUR	Checkdam	74.7236	18.1389
175	Kazad	INDAPUR	Checkdam	74.72	18.1343
176	Sansar	INDAPUR	Checkdam	74.7152	18.1286

S.No.	Village	Taluka	Structure	X	Y
177	Sansar	INDAPUR	Checkdam	74.7096	18.1187
178	Bori	INDAPUR	Checkdam	74.73	18.1194
179	Bori	INDAPUR	Checkdam	74.73	18.1137
180	Bori	INDAPUR	Checkdam	74.7425	18.1232
181	Bori	INDAPUR	Checkdam	74.7453	18.1301
182	Bori	INDAPUR	Checkdam	74.7557	18.1282
183	Bori	INDAPUR	Checkdam	74.7597	18.1335
184	Bori	INDAPUR	Checkdam	74.7605	18.1423
185	Birgundwadi	INDAPUR	Checkdam	74.7725	18.1442
186	Birgundwadi	INDAPUR	Checkdam	74.7713	18.1522
187	Kalas	INDAPUR	Checkdam	74.781	18.1392
188	Shelgaon	INDAPUR	Checkdam	74.8066	18.1114
189	Shelgaon	INDAPUR	Checkdam	74.8042	18.1198
190	Anthurne	INDAPUR	Checkdam	74.8002	18.1274
191	Kalas	INDAPUR	Checkdam	74.801	18.1335
192	Shelgaon	INDAPUR	Checkdam	74.8279	18.1152
193	Shelgaon	INDAPUR	Checkdam	74.8183	18.1206
194	Shelgaon	INDAPUR	Checkdam	74.8167	18.1267
195	Shelgaon	INDAPUR	Checkdam	74.8167	18.1347
196	Shelgaon	INDAPUR	Checkdam	74.8311	18.124
197	Shelgaon	INDAPUR	Checkdam	74.8303	18.1293
198	Shelgaon	INDAPUR	Checkdam	74.8263	18.1373
199	Shelgaon	INDAPUR	Checkdam	74.8255	18.1427
200	Shelgaon	INDAPUR	Checkdam	74.8487	18.1358
201	Shelgaon	INDAPUR	Checkdam	74.8423	18.1396
202	Shelgaon	INDAPUR	Checkdam	74.8415	18.1476
203	Shelgaon	INDAPUR	Checkdam	74.8552	18.1343
204	Shelgaon	INDAPUR	Checkdam	74.8584	18.1392
205	Shelgaon	INDAPUR	Checkdam	74.8564	18.1202
206	Shelgaon	INDAPUR	Checkdam	74.8624	18.1259
207	Hangarwadi	INDAPUR	Checkdam	74.8664	18.0943
208	Hangarwadi	INDAPUR	Checkdam	74.8616	18.0897
209	Shelgaon	INDAPUR	Checkdam	74.8503	18.0843
210	Hangarwadi	INDAPUR	Checkdam	74.8451	18.0782
211	Kadbanwadi	INDAPUR	Checkdam	74.8395	18.071
212	Sirsatwadi	INDAPUR	Checkdam	74.8295	18.0637
213	Sirsatwadi	INDAPUR	Checkdam	74.8219	18.0542
214	Sirsatwadi	INDAPUR	Checkdam	74.815	18.0474
215	Nimsakhar	INDAPUR	Checkdam	74.815	18.0397
216	Sirsatwadi	INDAPUR	Checkdam	74.8263	18.0485
217	Gotandi	INDAPUR	Checkdam	74.8427	18.0493
218	Nimsakhar	INDAPUR	Checkdam	74.8359	18.0298
219	Gotandi	INDAPUR	Checkdam	74.8632	18.042
220	Gotandi	INDAPUR	Checkdam	74.8652	18.0489
221	Gotandi	INDAPUR	Checkdam	74.8664	18.0557
222	Gotandi	INDAPUR	Checkdam	74.8676	18.0657
223	Gotandi	INDAPUR	Checkdam	74.87	18.0721
224	Gotandi	INDAPUR	Checkdam	74.8748	18.0794
225	Jankshan	INDAPUR	Checkdam	74.7637	18.0981
226	Jankshan	INDAPUR	Checkdam	74.7697	18.1061
227	Nimbodi	INDAPUR	Checkdam	74.6931	18.1412
228	Kurawali	INDAPUR	Checkdam	74.7168	18.0329
229	Jamb	INDAPUR	Checkdam	74.7124	18.0405
230	Anthurne	INDAPUR	Checkdam	74.7926	18.074
231	Lasurne	INDAPUR	Checkdam	74.7585	18.076
232	Paritwadi	INDAPUR	Checkdam	74.7288	18.0603
233	Paritwadi	INDAPUR	Checkdam	74.7304	18.0664
234	Paritwadi	INDAPUR	Checkdam	74.7364	18.071
235	KALAMB	INDAPUR	Checkdam	74.7645	18.0493

S.No.	Village	Taluka	Structure	X	Y
236	KALAMB	INDAPUR	Checkdam	74.7681	18.0321
237	KALAMB	INDAPUR	Checkdam	74.7765	18.0237
238	Thoratwadi	INDAPUR	Checkdam	74.7697	18.0638
239	Anthurne	INDAPUR	Checkdam	74.8054	18.068
240	Anthurne	INDAPUR	Checkdam	74.8062	18.0767
241	Kalas	INDAPUR	Checkdam	74.8066	18.1594
242	Kalas	INDAPUR	Checkdam	74.801	18.1671
243	Kalas	INDAPUR	Checkdam	74.7974	18.1716
244	Kalas	INDAPUR	Checkdam	74.7922	18.1816
245	Kalas	INDAPUR	Checkdam	74.789	18.1652
246	Kalas	INDAPUR	Checkdam	74.7878	18.1739
247	Kalas	INDAPUR	Checkdam	74.7802	18.1762
248	Kalas	INDAPUR	Checkdam	74.7749	18.1838
249	Kalas	INDAPUR	Checkdam	74.7769	18.1915
250	Gosaviwadi	INDAPUR	Checkdam	74.8167	18.1796
251	Gosaviwadi	INDAPUR	Checkdam	74.8167	18.1739
252	Gosaviwadi	INDAPUR	Checkdam	74.8235	18.1751
253	Rui	INDAPUR	Checkdam	74.8367	18.1766
254	Rui	INDAPUR	Checkdam	74.8419	18.1808
255	Rui	INDAPUR	Checkdam	74.8487	18.188
256	Maradwadi	INDAPUR	Checkdam	74.8552	18.1945
257	Nhavi	INDAPUR	Checkdam	74.9041	18.1762
258	Loni	INDAPUR	Checkdam	74.9065	18.1915
259	Loni	INDAPUR	Checkdam	74.9129	18.2002
260	Loni	INDAPUR	Checkdam	74.9161	18.2067
261	Loni	INDAPUR	Checkdam	74.9161	18.2121
262	Malewadi	INDAPUR	Checkdam	74.9225	18.2235
263	Lamjewadi	INDAPUR	Checkdam	74.665	18.2376
264	Shetphalgadhe	INDAPUR	Checkdam	74.6679	18.2437
265	Shetphalgadhe	INDAPUR	Checkdam	74.6767	18.2498
266	Shetphalgadhe	INDAPUR	Checkdam	74.6843	18.2688
267	Shetphalgadhe	INDAPUR	Checkdam	74.6927	18.2719
268	Nirgude	INDAPUR	Checkdam	74.6819	18.2239
269	Nirgude	INDAPUR	Checkdam	74.6871	18.2292
270	Nirgude	INDAPUR	Checkdam	74.6983	18.2323
271	Nirgude	INDAPUR	Checkdam	74.708	18.2365
272	Nirgude	INDAPUR	Checkdam	74.7152	18.2403
273	Pimpale	INDAPUR	Checkdam	74.7228	18.2563
274	Pimpale	INDAPUR	Checkdam	74.7236	18.2601
275	Pimpale	INDAPUR	Checkdam	74.7396	18.2601
276	Madanwadi	INDAPUR	Checkdam	74.7509	18.2616
277	Madanwadi	INDAPUR	Checkdam	74.7585	18.2776
278	Madanwadi	INDAPUR	Checkdam	74.7437	18.2886
279	Madanwadi	INDAPUR	Checkdam	74.736	18.2921
280	Madanwadi	INDAPUR	Checkdam	74.7268	18.2894
281	Madanwadi	INDAPUR	Checkdam	74.7252	18.2951
282	BHIGWAN	INDAPUR	Checkdam	74.7669	18.3027
283	BHIGWAN	INDAPUR	Checkdam	74.7709	18.3123
284	BHIGWAN	INDAPUR	Checkdam	74.7725	18.3203
285	BHIGWAN	INDAPUR	Checkdam	74.7633	18.3104
286	Dikasal	INDAPUR	Checkdam	74.7922	18.3119
287	Bandgarwadi (nv)	INDAPUR	Checkdam	74.7709	18.254
288	Bandgarwadi (nv)	INDAPUR	Checkdam	74.7709	18.2624
289	Bhadalwadi	INDAPUR	Checkdam	74.7689	18.2262
290	Poundhawadi	INDAPUR	Checkdam	74.7449	18.2288
291	Poundhawadi	INDAPUR	Checkdam	74.7449	18.2365
292	Poundhawadi	INDAPUR	Checkdam	74.7449	18.2456
293	Poundhawadi	INDAPUR	Checkdam	74.7477	18.2544
294	Nirgude	INDAPUR	Checkdam	74.7228	18.2144

S.No.	Village	Taluka	Structure	X	Y
295	Nirgude	INDAPUR	Checkdam	74.7031	18.1976
296	Nirgude	INDAPUR	Checkdam	74.6995	18.2029
297	Mhasobachiwadi	INDAPUR	Checkdam	74.6955	18.1972
298	Mhasobachiwadi	INDAPUR	Checkdam	74.6931	18.2052
299	Vaysewadi	INDAPUR	Checkdam	74.7316	18.1904
300	Kalas	INDAPUR	Checkdam	74.807	18.2003
301	Kalas	INDAPUR	Checkdam	74.8138	18.2052
302	Dalaj No.2	INDAPUR	Checkdam	74.8195	18.2163
303	Dalaj No.2	INDAPUR	Checkdam	74.8207	18.2235
304	Dalaj No.2	INDAPUR	Checkdam	74.8247	18.2323
305	Dalaj No.2	INDAPUR	Checkdam	74.805	18.2254
306	Dalaj No.2	INDAPUR	Checkdam	74.8074	18.2368
307	Palasdeo	INDAPUR	Checkdam	74.8888	18.2235
308	Palasdeo	INDAPUR	Checkdam	74.886	18.2372
309	Palasdeo	INDAPUR	Checkdam	74.8904	18.2464
310	Palasdeo	INDAPUR	Checkdam	74.9029	18.2475
311	Palasdeo	INDAPUR	Checkdam	74.9025	18.2399
312	Varkute Bk.	INDAPUR	Checkdam	74.947	18.2174
313	Bhawadi	INDAPUR	Checkdam	74.9506	18.2277
314	Bhawadi	INDAPUR	Checkdam	74.955	18.2391
315	Chandgaon	INDAPUR	Checkdam	74.9542	18.2509
316	Varkute Bk.	INDAPUR	Checkdam	74.9598	18.2083
317	Varkute Bk.	INDAPUR	Checkdam	74.9699	18.2182
318	Agoti No.2	INDAPUR	Checkdam	74.9707	18.2239
319	Agoti No.1	INDAPUR	Checkdam	74.9711	18.2338
320	Kalthan No.1	INDAPUR	Checkdam	74.9915	18.2007
321	Kalashi	INDAPUR	Checkdam	75.0023	18.2113
322	Varkute Bk.	INDAPUR	Checkdam	74.9679	18.1812
323	Kalthan No.2	INDAPUR	Checkdam	74.9811	18.1812
324	Kalthan No.2	INDAPUR	Checkdam	74.9955	18.1801
325	Shirsadi	INDAPUR	Checkdam	75.0252	18.1748
326	Shirsadi	INDAPUR	Checkdam	75.0425	18.1869
327	Shirsadi	INDAPUR	Checkdam	75.0505	18.1839
328	Padasthal	INDAPUR	Checkdam	75.0725	18.1999
329	Ajoti	INDAPUR	Checkdam	75.0846	18.166
330	Ajoti	INDAPUR	Checkdam	75.0874	18.1709
331	Malwadi	INDAPUR	Checkdam	75.0461	18.1382
332	Malwadi	INDAPUR	Checkdam	75.0553	18.1424
333	Malwadi	INDAPUR	Checkdam	75.0605	18.1473
334	INDAPUR	INDAPUR	Checkdam	75.0621	18.1329
335	Sugaon	INDAPUR	Checkdam	75.0689	18.1382
336	Vangali	INDAPUR	Checkdam	74.9915	18.1534
337	Vangali	INDAPUR	Checkdam	74.9911	18.1629
338	Thoratwadi	INDAPUR	Checkdam	74.8632	18.1523
339	Thoratwadi	INDAPUR	Checkdam	74.8644	18.1603
340	Thoratwadi	INDAPUR	Checkdam	74.8636	18.169
341	Rui	INDAPUR	Checkdam	74.86	18.177
342	Gokhali	INDAPUR	Checkdam	74.9723	18.097
343	Tarangwadi	INDAPUR	Checkdam	74.9807	18.0959
344	Indapur Rural	INDAPUR	Checkdam	74.9915	18.0913
345	Tarangwadi	INDAPUR	Checkdam	75.0011	18.0822
346	Indapur Rural	INDAPUR	Checkdam	75.0072	18.0868
347	INDAPUR	INDAPUR	Checkdam	75.0272	18.1081
348	INDAPUR	INDAPUR	Checkdam	75.04	18.1016
349	INDAPUR	INDAPUR	Checkdam	75.0533	18.0993
350	INDAPUR	INDAPUR	Checkdam	75.0633	18.0944
351	INDAPUR	INDAPUR	Checkdam	75.0725	18.0868
352	Hingangaon	INDAPUR	Checkdam	75.0834	18.0784
353	INDAPUR	INDAPUR	Checkdam	75.0673	18.0826

S.No.	Village	Taluka	Structure	X	Y
354	Shaha	INDAPUR	Checkdam	75.0846	18.1119
355	Shaha	INDAPUR	Checkdam	75.0866	18.1214
356	Taratgaon	INDAPUR	Checkdam	75.1138	18.0776
357	Kandalgaon	INDAPUR	Checkdam	75.1347	18.0963
358	Kandalgaon	INDAPUR	Checkdam	75.1142	18.1111
359	Vadapuri	INDAPUR	Checkdam	74.9943	18.0605
360	Zagadewadi	INDAPUR	Checkdam	74.9839	18.0662
361	Vadapuri	INDAPUR	Checkdam	75.0092	18.0582
362	Awasari	INDAPUR	Checkdam	75.0272	18.0372
363	Surwad	INDAPUR	Checkdam	75.0007	18.0003
364	Surwad	INDAPUR	Checkdam	74.9919	18.0045
365	Shetphal Haveli	INDAPUR	Checkdam	74.9787	18.0102
366	Bhodani	INDAPUR	Checkdam	74.9679	17.9957
367	Bawada	INDAPUR	Checkdam	74.9843	17.9957
368	Bawada	INDAPUR	Checkdam	74.9999	17.9835
369	Reda	INDAPUR	Checkdam	74.9277	18.0129
370	Kati	INDAPUR	Checkdam	74.9249	18.0228
371	Kati	INDAPUR	Checkdam	74.9185	18.0361
372	Pitkeshwar	INDAPUR	Checkdam	74.8856	18.0319
373	Pitkeshwar	INDAPUR	Checkdam	74.8937	18.038
374	Gotandi	INDAPUR	Checkdam	74.8888	18.0548
375	Gotandi	INDAPUR	Checkdam	74.8876	18.065
376	Gotandi	INDAPUR	Checkdam	74.8872	18.0727
377	Kacharewadi	INDAPUR	Checkdam	74.9021	18.0936
378	Kacharewadi	INDAPUR	Checkdam	74.8892	18.0993
379	Vyahali	INDAPUR	Checkdam	74.8824	18.1096
380	Vyahali	INDAPUR	Checkdam	74.8824	18.1195
381	Vyahali	INDAPUR	Checkdam	74.88	18.1279
382	Nimgaon Ketki	INDAPUR	Checkdam	74.9229	18.0868
383	Nimgaon Ketki	INDAPUR	Checkdam	74.9205	18.0913
384	Nimgaon Ketki	INDAPUR	Checkdam	74.9209	18.1039
385	Pondkulwadi	INDAPUR	Checkdam	74.9554	18.126
386	INDAPUR	INDAPUR	Checkdam	74.963	18.1249
387	INDAPUR	INDAPUR	Checkdam	74.9911	18.1028
388	Karewadi	INDAPUR	Checkdam	74.931	18.1325
389	Pondkulwadi	INDAPUR	Checkdam	74.9414	18.1393
390	Kauthali	INDAPUR	Checkdam	74.9181	18.1401
391	Kauthali	INDAPUR	Checkdam	74.9117	18.1409
392	Kauthali	INDAPUR	Checkdam	74.9133	18.1489
393	Nhavi	INDAPUR	Checkdam	74.8904	18.1542
394	Nhavi	INDAPUR	Checkdam	74.8904	18.1652
395	Nhavi	INDAPUR	Checkdam	74.882	18.1759
396	Nhavi	INDAPUR	Checkdam	74.8776	18.182
397	Nhavi	INDAPUR	Checkdam	74.8804	18.1911
398	Narutwadi	INDAPUR	Checkdam	75.0092	18.1511
399	Kalthan No.2	INDAPUR	Checkdam	75.0068	18.166
400	Kalthan No.2	INDAPUR	Checkdam	75.0096	18.1736
401	Bedshinge	INDAPUR	Checkdam	75.0344	18.0517
402	INDAPUR	INDAPUR	Checkdam	75.026	18.067
403	Surwad	INDAPUR	Checkdam	74.9963	18.0083
404	Bhodani	INDAPUR	Checkdam	74.9598	17.9984
405	Pithewadi	INDAPUR	Checkdam	74.9478	17.9442
406	Chakati	INDAPUR	Checkdam	74.9366	17.9533
407	Chakati	INDAPUR	Checkdam	74.9342	17.9632
408	Redani	INDAPUR	Checkdam	74.9013	17.9739
409	Khorochi	INDAPUR	Checkdam	74.8724	17.9701
410	Bawada	INDAPUR	Checkdam	75.0088	17.9472
411	Bawada	INDAPUR	Checkdam	75.0152	17.9556
412	Sarati	INDAPUR	Checkdam	75.0104	17.9114

S.No.	Village	Taluka	Structure	X	Y
413	Gondi	INDAPUR	Checkdam	75.0449	17.9282
414	Giravi	INDAPUR	Checkdam	75.0826	17.9449
415	Shetphal Haveli	INDAPUR	Checkdam	74.9646	18.0197
416	Shetphal Haveli	INDAPUR	Checkdam	74.9614	18.0258
417	Varkute Kh.	INDAPUR	Checkdam	74.9414	18.0608
418	Bhat Nimgaon	INDAPUR	Checkdam	75.0713	18.0395
419	INDAPUR	INDAPUR	Checkdam	75.0232	18.115
420	Vangali	INDAPUR	Checkdam	74.9871	18.1447
421	Nimgaon Ketki	INDAPUR	Checkdam	74.9298	18.0795
422	Nimgaon Ketki	INDAPUR	Checkdam	74.9398	18.0883
423	Nimgaon Ketki	INDAPUR	Checkdam	74.9458	18.097
424	Gokhali	INDAPUR	Checkdam	74.9614	18.1035
425	Tarangwadi	INDAPUR	Checkdam	74.9598	18.0948
426	Gokhali	INDAPUR	Checkdam	74.9831	18.1012
427	INDAPUR	INDAPUR	Checkdam	74.9811	18.1325
428	INDAPUR	INDAPUR	Checkdam	74.9731	18.1386
429	Balpudi	INDAPUR	Checkdam	74.9362	18.1691
430	Balpudi	INDAPUR	Checkdam	74.937	18.1794
431	Varkute Bk.	INDAPUR	Checkdam	74.949	18.1977
432	Nhavi	INDAPUR	Checkdam	74.9021	18.1626
433	Takali	INDAPUR	Checkdam	75.0878	18.1885
434	Takali	INDAPUR	Checkdam	75.0994	18.1866
435	Hingangaon	INDAPUR	Checkdam	75.089	18.0837
436	Hingangaon	INDAPUR	Checkdam	75.091	18.0898
437	Babhulgaon	INDAPUR	Checkdam	75.0685	18.0513
438	Sitewadi	JUNNER	Checkdam	73.818	19.2893
439	Sitewadi	JUNNER	Checkdam	73.814	19.2794
440	Devale	JUNNER	Checkdam	73.737	19.303
441	Ghatghar	JUNNER	Checkdam	73.7089	19.281
442	Phagul Gavhan	JUNNER	Checkdam	73.7141	19.2643
443	Nirgude	JUNNER	Checkdam	73.8216	19.195
444	Wanewadi	JUNNER	Checkdam	73.7839	19.2022
445	Mankeshwar	JUNNER	Checkdam	73.763	19.2241
446	Mankeshwar	JUNNER	Checkdam	73.7642	19.2309
447	Chawad	JUNNER	Checkdam	73.7402	19.2332
448	Khangaon	JUNNER	Checkdam	73.7987	19.2003
449	Khangaon	JUNNER	Checkdam	73.7995	19.2056
450	Nirgude	JUNNER	Checkdam	73.812	19.1972
451	Ghangaldare	JUNNER	Checkdam	73.7414	19.1848
452	Ghangaldare	JUNNER	Checkdam	73.745	19.1912
453	Sonawale	JUNNER	Checkdam	73.7486	19.2018
454	Ralegan	JUNNER	Checkdam	73.7727	19.1946
455	Ralegan	JUNNER	Checkdam	73.7799	19.1935
456	Botarde	JUNNER	Checkdam	73.7891	19.1938
457	Botarde	JUNNER	Checkdam	73.7971	19.1908
458	Muthalne	JUNNER	Checkdam	73.9429	19.3308
459	Mandave	JUNNER	Checkdam	73.9122	19.3513
460	Mandave	JUNNER	Checkdam	73.915	19.3456
461	Mandave	JUNNER	Checkdam	73.9166	19.3501
462	Mandave	JUNNER	Checkdam	73.9124	19.3427
463	Mandave	JUNNER	Checkdam	73.9134	19.3319
464	Muthalne	JUNNER	Checkdam	73.9409	19.3268
465	Muthalne	JUNNER	Checkdam	73.9439	19.328
466	Muthalne	JUNNER	Checkdam	73.9439	19.3354
467	Muthalne	JUNNER	Checkdam	73.9533	19.3365
468	Kolhewadi	JUNNER	Checkdam	73.8272	19.356
469	Kolhewadi	JUNNER	Checkdam	73.8232	19.3578
470	Kolhewadi	JUNNER	Checkdam	73.8232	19.3639
471	Khireswar	JUNNER	Checkdam	73.8144	19.3692

S.No.	Village	Taluka	Structure	X	Y
472	Khireswar	JUNNER	Checkdam	73.8124	19.359
473	Khireswar	JUNNER	Checkdam	73.8144	19.351
474	Khubi	JUNNER	Checkdam	73.8196	19.3412
475	Madh	JUNNER	Checkdam	73.8372	19.3347
476	Madh	JUNNER	Checkdam	73.8432	19.3363
477	Kopare	JUNNER	Checkdam	73.8892	19.3494
478	Jambhulshi	JUNNER	Checkdam	73.8916	19.3543
479	Jambhulshi	JUNNER	Checkdam	73.894	19.3577
480	Jambhulshi	JUNNER	Checkdam	73.8918	19.3605
481	Kopare	JUNNER	Checkdam	73.89	19.363
482	Kopare	JUNNER	Checkdam	73.8886	19.3653
483	Kopare	JUNNER	Checkdam	73.8856	19.3573
484	Kopare	JUNNER	Checkdam	73.8795	19.353
485	Kopare	JUNNER	Checkdam	73.8683	19.342
486	Jambhulshi	JUNNER	Checkdam	73.8966	19.3425
487	Jambhulshi	JUNNER	Checkdam	73.9004	19.348
488	Jambhulshi	JUNNER	Checkdam	73.8968	19.3465
489	Mandave	JUNNER	Checkdam	73.8936	19.3355
490	Mandave	JUNNER	Checkdam	73.9014	19.3308
491	Mandave	JUNNER	Checkdam	73.9056	19.3312
492	Amrapur	JUNNER	Checkdam	73.885	19.1987
493	Kumshet	JUNNER	Checkdam	73.9054	19.2207
494	Shiroli Kh	JUNNER	Checkdam	73.9267	19.2056
495	Pangari Tarf Otur	JUNNER	Checkdam	73.9339	19.2434
496	Alme	JUNNER	Checkdam	73.8813	19.2597
497	Alme	JUNNER	Checkdam	73.8761	19.2658
498	Golegaon	JUNNER	Checkdam	73.8862	19.2237
499	Aldare	JUNNER	Checkdam	73.8785	19.2241
500	Pimpalgaon Siddhanath	JUNNER	Checkdam	73.8565	19.2336
501	Godre	JUNNER	Checkdam	73.8513	19.2605
502	Godre	JUNNER	Checkdam	73.8545	19.2643
503	Kusur	JUNNER	Checkdam	73.8432	19.1768
504	Somatwadi	JUNNER	Checkdam	73.8513	19.2029
505	Somatwadi	JUNNER	Checkdam	73.8509	19.2101
506	Kumshet	JUNNER	Checkdam	73.901	19.2287
507	Dhamankhel	JUNNER	Checkdam	73.8729	19.1791
508	Agar	JUNNER	Checkdam	73.9014	19.1794
509	Agar	JUNNER	Checkdam	73.9046	19.187
510	Agar	JUNNER	Checkdam	73.909	19.1957
511	Kolwadi	JUNNER	Checkdam	73.887	19.2938
512	Pimpalgaon Joga	JUNNER	Checkdam	73.8769	19.3238
513	Pimpalgaon Joga	JUNNER	Checkdam	73.8769	19.3116
514	Pimpalgaon Joga	JUNNER	Checkdam	73.8741	19.3162
515	Pimpalgaon Joga	JUNNER	Checkdam	73.9082	19.2972
516	Pimpalgaon Joga	JUNNER	Checkdam	73.9098	19.3033
517	Pimpalgaon Joga	JUNNER	Checkdam	73.917	19.3109
518	Kolwadi	JUNNER	Checkdam	73.897	19.2916
519	Pimpalgaon Joga	JUNNER	Checkdam	73.9251	19.2931
520	Nimgaon Tarf Mahalunge	JUNNER	Checkdam	73.8914	19.145
521	Gunjalwadi	JUNNER	Checkdam	73.9391	19.1127
522	Dhalewadi Tarf Haveli	JUNNER	Checkdam	73.9363	19.1737
523	Gunjalwadi	JUNNER	Checkdam	73.9439	19.1234
524	Sawargaon	JUNNER	Checkdam	73.9018	19.1196
525	Sawargaon	JUNNER	Checkdam	73.897	19.1203
526	Nimdari	JUNNER	Checkdam	73.8773	19.1218
527	Nimdari	JUNNER	Checkdam	73.8805	19.1298
528	Nimgaon Tarf Mahalunge	JUNNER	Checkdam	73.8914	19.1537
529	Khanapur	JUNNER	Checkdam	73.8834	19.1658
530	Dhamankhel	JUNNER	Checkdam	73.8749	19.1738

S.No.	Village	Taluka	Structure	X	Y
531	Ambe Gavhan	JUNNER	Checkdam	74.0049	19.3024
532	Ambe Gavhan	JUNNER	Checkdam	73.988	19.3079
533	Otur	JUNNER	Checkdam	73.98	19.2841
534	Otur	JUNNER	Checkdam	73.9768	19.2888
535	Ambe Gavhan	JUNNER	Checkdam	73.9744	19.3036
536	Ahinavewadi	JUNNER	Checkdam	73.973	19.2962
537	Otur	JUNNER	Checkdam	73.9714	19.288
538	Otur	JUNNER	Checkdam	73.972	19.2812
539	Otur	JUNNER	Checkdam	73.9746	19.2738
540	Ambe Gavhan	JUNNER	Checkdam	74.0089	19.3058
541	Ambe Gavhan	JUNNER	Checkdam	74.0169	19.3056
542	Otur	JUNNER	Checkdam	74.0017	19.2721
543	Udapur	JUNNER	Checkdam	73.9523	19.2726
544	Otur	JUNNER	Checkdam	73.9612	19.2828
545	Udapur	JUNNER	Checkdam	73.9411	19.2851
546	Alu	JUNNER	Checkdam	73.9475	19.2999
547	Umbraj	JUNNER	Checkdam	74.0005	19.2093
548	Umbraj	JUNNER	Checkdam	74.0053	19.2006
549	Narayangaon	JUNNER	Checkdam	73.9708	19.1237
550	Yedgaon	JUNNER	Checkdam	73.9832	19.1616
551	Hivare Tarf Narayangaon	JUNNER	Checkdam	73.9957	19.1029
552	Narayangaon	JUNNER	Checkdam	73.9876	19.1188
553	Hivare Kh	JUNNER	Checkdam	73.9684	19.2177
554	Ozar	JUNNER	Checkdam	73.9507	19.1938
555	Warulwadi	JUNNER	Checkdam	73.968	19.1014
556	Bhorwadi	JUNNER	Checkdam	74.0097	19.1453
557	Yedgaon	JUNNER	Checkdam	74.0113	19.156
558	Yedgaon	JUNNER	Checkdam	74.0133	19.1658
559	Ambe Gavhan	JUNNER	Checkdam	74.0025	19.3316
560	Muthalne	JUNNER	Checkdam	73.9606	19.3333
561	Chilhewadi	JUNNER	Checkdam	73.9594	19.3395
562	Chilhewadi	JUNNER	Checkdam	73.9672	19.3448
563	Chilhewadi	JUNNER	Checkdam	73.9774	19.3391
564	Ambe Gavhan	JUNNER	Checkdam	73.989	19.3388
565	Ambe Gavhan	JUNNER	Checkdam	73.9912	19.3425
566	Ambe Gavhan	JUNNER	Checkdam	73.9977	19.3433
567	Ambe Gavhan	JUNNER	Checkdam	73.9985	19.3346
568	Ambe Gavhan	JUNNER	Checkdam	73.9997	19.3274
569	Ambe Gavhan	JUNNER	Checkdam	74.0059	19.3293
570	Ambe Gavhan	JUNNER	Checkdam	73.9818	19.3238
571	Ambe Gavhan	JUNNER	Checkdam	73.987	19.3161
572	Netwad	JUNNER	Checkdam	73.9475	19.245
573	Otur	JUNNER	Checkdam	73.982	19.2404
574	Otur	JUNNER	Checkdam	73.9852	19.2517
575	Otur	JUNNER	Checkdam	73.9945	19.26
576	Dumbarwadi	JUNNER	Checkdam	74.0001	19.2369
577	Dumbarwadi	JUNNER	Checkdam	74.0053	19.2313
578	Khamundi	JUNNER	Checkdam	74.0177	19.2339
579	Khamundi	JUNNER	Checkdam	74.0402	19.2336
580	Pimpri Pendhar	JUNNER	Checkdam	74.0646	19.2241
581	Pimpri Pendhar	JUNNER	Checkdam	74.0646	19.2298
582	Pimpri Pendhar	JUNNER	Checkdam	74.055	19.2294
583	Pimpalwandi	JUNNER	Checkdam	74.0807	19.1753
584	Pimpalwandi	JUNNER	Checkdam	74.0566	19.1904
585	Nagadpadi	JUNNER	Checkdam	74.049	19.1351
586	Pimpalwandi	JUNNER	Checkdam	74.0614	19.1726
587	Pimpalwandi	JUNNER	Checkdam	74.0678	19.1912
588	Pimpalwandi	JUNNER	Checkdam	74.0723	19.2033
589	Pimpri Pendhar	JUNNER	Checkdam	74.0811	19.2162

S.No.	Village	Taluka	Structure	X	Y
590	Bori Kh.	JUNNER	Checkdam	74.0687	19.1074
591	Bori Kh.	JUNNER	Checkdam	74.0787	19.1112
592	Vadgaon Kandali	JUNNER	Checkdam	74.0586	19.126
593	Wadgaon Anand	JUNNER	Checkdam	74.0999	19.2101
594	Santwadi	JUNNER	Checkdam	74.1264	19.1999
595	Santwadi	JUNNER	Checkdam	74.1336	19.2067
596	Rajuri	JUNNER	Checkdam	74.1641	19.1586
597	Unchkhadakwadi	JUNNER	Checkdam	74.1473	19.1662
598	Unchkhadakwadi	JUNNER	Checkdam	74.1577	19.1662
599	Kolwadi	JUNNER	Checkdam	74.1292	19.1843
600	Unchkhadakwadi	JUNNER	Checkdam	74.1657	19.1984
601	Nalawane	JUNNER	Checkdam	74.1777	19.2097
602	Belhe	JUNNER	Checkdam	74.1609	19.1317
603	Rajuri	JUNNER	Checkdam	74.1621	19.1457
604	Wadgaon Anand	JUNNER	Checkdam	74.0967	19.1999
605	Ale	JUNNER	Checkdam	74.106	19.1783
606	Ale	JUNNER	Checkdam	74.0991	19.1616
607	Rajuri	JUNNER	Checkdam	74.1152	19.1393
608	Rajuri	JUNNER	Checkdam	74.1188	19.1472
609	Shiroli T Ale	JUNNER	Checkdam	74.0971	19.0949
610	Sakori T Belhe	JUNNER	Checkdam	74.1557	19.0738
611	Belhe	JUNNER	Checkdam	74.1685	19.0867
612	Mangrul	JUNNER	Checkdam	74.1673	19.0731
613	Mangrul	JUNNER	Checkdam	74.1781	19.0496
614	Sakori T Belhe	JUNNER	Checkdam	74.1372	19.0915
615	Sakori T Belhe	JUNNER	Checkdam	74.1441	19.1006
616	Yadavwadi	JUNNER	Checkdam	74.1561	19.1127
617	Ane	JUNNER	Checkdam	74.2307	19.1821
618	Belhe	JUNNER	Checkdam	74.1826	19.109
619	Bangarwadi	JUNNER	Checkdam	74.1958	19.1488
620	Bangarwadi	JUNNER	Checkdam	74.2022	19.159
621	Bangarwadi	JUNNER	Checkdam	74.1814	19.1298
622	Bangarwadi	JUNNER	Checkdam	74.1814	19.1419
623	Ane	JUNNER	Checkdam	74.2475	19.1919
624	Pemdara	JUNNER	Checkdam	74.2596	19.1707
625	Pemdara	JUNNER	Checkdam	74.2568	19.1798
626	Shindewadi	JUNNER	Checkdam	74.2648	19.2105
627	Shindewadi	JUNNER	Checkdam	74.3001	19.2022
628	Shindewadi	JUNNER	Checkdam	74.2961	19.2101
629	Ambale	PURANDHAR	Checkdam	74.1731	18.383
630	Bhivadi	PURANDHAR	Checkdam	74.0169	18.3122
631	Bopgaon	PURANDHAR	Checkdam	73.9693	18.368
632	Bopgaon	PURANDHAR	Checkdam	73.9533	18.3761
633	Bopgaon	PURANDHAR	Checkdam	73.9611	18.3898
634	Bopgaon	PURANDHAR	Checkdam	73.9611	18.3898
635	Bopgaon	PURANDHAR	Checkdam	73.9673	18.379
636	Chambali	PURANDHAR	Checkdam	73.9908	18.3585
637	Chambali	PURANDHAR	Checkdam	73.9843	18.3689
638	Dive	PURANDHAR	Checkdam	74.0446	18.366
639	Dive	PURANDHAR	Checkdam	74.0482	18.381
640	Dive	PURANDHAR	Checkdam	74.0518	18.3944
641	Garade	PURANDHAR	Checkdam	73.9455	18.3428
642	Garade	PURANDHAR	Checkdam	73.9327	18.3487
643	Garade	PURANDHAR	Checkdam	73.9562	18.3396
644	Jadhavwadi (n.v.)	PURANDHAR	Checkdam	74.0214	18.3875
645	Jadhavwadi (n.v.)	PURANDHAR	Checkdam	74.026	18.3738
646	Jawalarjun	PURANDHAR	Checkdam	74.2582	18.2802
647	Khanvadi	PURANDHAR	Checkdam	74.1183	18.3243
648	Khanvadi	PURANDHAR	Checkdam	74.1183	18.3243

S.No.	Village	Taluka	Structure	X	Y
649	Kodit Bk.	PURANDHAR	Checkdam	73.9996	18.3455
650	Kodit Bk.	PURANDHAR	Checkdam	74.0015	18.3288
651	Kolvihire	PURANDHAR	Checkdam	74.208	18.2636
652	Kolvihire	PURANDHAR	Checkdam	74.2278	18.2633
653	Mawadi Supe	PURANDHAR	Checkdam	74.2047	18.3565
654	Mawadi Supe	PURANDHAR	Checkdam	74.2102	18.3438
655	Mawadikade Pathar	PURANDHAR	Checkdam	74.2386	18.2688
656	Mawadikade Pathar	PURANDHAR	Checkdam	74.2494	18.2701
657	Naygaon	PURANDHAR	Checkdam	74.2464	18.3428
658	Naygaon	PURANDHAR	Checkdam	74.2543	18.3601
659	Naygaon	PURANDHAR	Checkdam	74.237	18.3497
660	Naygaon	PURANDHAR	Checkdam	74.2357	18.3644
661	Nazare Supe	PURANDHAR	Checkdam	74.2246	18.2907
662	Nazare Supe	PURANDHAR	Checkdam	74.2197	18.2855
663	Nazare Supe	PURANDHAR	Checkdam	74.2181	18.2796
664	Nazare Supe	PURANDHAR	Checkdam	74.2083	18.2757
665	Pandeshwar	PURANDHAR	Checkdam	74.2663	18.3112
666	Pandeshwar	PURANDHAR	Checkdam	74.2543	18.3239
667	Pandeshwar	PURANDHAR	Checkdam	74.2438	18.3337
668	Pandeshwar	PURANDHAR	Checkdam	74.2422	18.307
669	Pargaon	PURANDHAR	Checkdam	74.1245	18.3471
670	Pargaon	PURANDHAR	Checkdam	74.1248	18.3673
671	Pimpale	PURANDHAR	Checkdam	74.0563	18.3086
672	Pimpale	PURANDHAR	Checkdam	74.0687	18.3148
673	Pimpri	PURANDHAR	Checkdam	74.2278	18.3161
674	Pimpri	PURANDHAR	Checkdam	74.2197	18.322
675	Pimpri	PURANDHAR	Checkdam	74.2155	18.3324
676	Pisarve	PURANDHAR	Checkdam	74.2067	18.3657
677	Pisarve	PURANDHAR	Checkdam	74.1949	18.3575
678	Pisarve	PURANDHAR	Checkdam	74.1917	18.3689
679	Pisarve	PURANDHAR	Checkdam	74.1799	18.3595
680	Rajewadi	PURANDHAR	Checkdam	74.1603	18.3869
681	Rajewadi	PURANDHAR	Checkdam	74.1639	18.3712
682	Rajuri	PURANDHAR	Checkdam	74.267	18.3497
683	Rajuri	PURANDHAR	Checkdam	74.2728	18.3373
684	Rajuri	PURANDHAR	Checkdam	74.2735	18.3614
685	SASVAD	PURANDHAR	Checkdam	74.0426	18.3311
686	Saswad Rural	PURANDHAR	Checkdam	74.0351	18.3621
687	Saswad Rural	PURANDHAR	Checkdam	74.0443	18.3448
688	Saswad Rural	PURANDHAR	Checkdam	74.0407	18.3559
689	Supe Kh.	PURANDHAR	Checkdam	74.0364	18.3194
690	Tekavadi	PURANDHAR	Checkdam	74.1952	18.3963
691	Thapewadi	PURANDHAR	Checkdam	73.9181	18.3477
692	Thapewadi	PURANDHAR	Checkdam	73.9014	18.3474

