DISTRICT GROUND WATER INFORMATION BOOKLET

KHARGONE DISTRICT
MADHYA PRADESH

Ministry of Water Resources
Central Ground Water Board
North Central Region
Government of India

2013

KHARGONE DISTRICT PROFILE

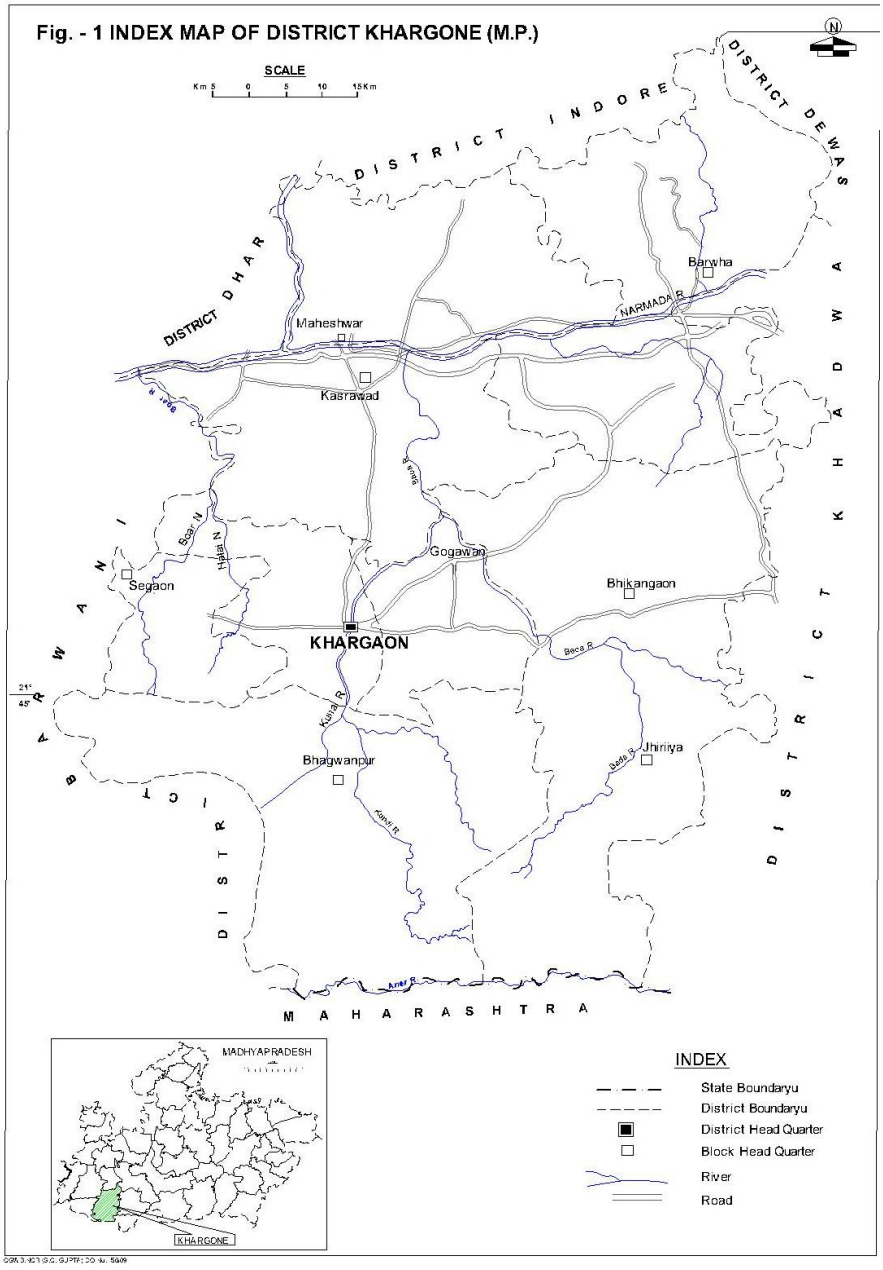
S. No.	Items	Statistic	
1	**General Information**		
	(i) Geological Area	803000 Ha	
	(ii) Administrative Division : (As on 2013)		
	Number of Blocks/ Name	09, Kasravad, Bhagwanpura, Segaon, Badwah, Bhilangaon, Jhirnaya, Maheswar, Khargone and Gogaon	
	Number of villages	1436	
	(iii) Population (2011)	1872413	
	(iv) Normal Rainfall (mm)	835	
2	**Geomorphology**		
	Major Physiographic Units :	Flood plain, alluvial plain Buried pediment, Pediment Basaltic upland, Denudation hills, Deccan plateau, structural hills lineaments, and valley hills lineaments and valley fills.	
	Major Drainages	Narmada, The Tapti	
3	**Land Use in Ha ('000)**		
	(a) Forest Area	1.685 Ha.	
	(b) Net area sown	405.67 Ha.	
	(c) Gross cropped area :	534.71 Ha	
4	**Major Soil Types**	Kali-I, Kali-II, Kali-III, Halki Khardri and Bardi	
5	**Principal Crops**	Jowar, Cotton, Groundnut, Wheat, Maize, Gram, Tuwar	
6	**Irrigation by Different Sources**	**Area Irrigated ('000 Ha)**	**Nos.**
	Dug wells	93.662	62611
	Tube well/Bore wells	30.926	8885
	Tanks/Ponds	24.396	144
	Canals	26.555	108
7	**Number of Ground Water Monitoring Wells of CGWB. (As on 31.3.2013)**		
		Alluvium, Deccan trap, Bagh beds , Vindhyan Sand stone and shale, Granite Gneisses and Bijawara	
8	**Predominant Geological Formations**	Alluvium, Deccan trap, (Weathered/fractured) and Bagh beds.	
	No. of Dug wells **No. of Peizometers**	20 07	
9	**Hydrogeology**		

	Major Water Bearing Formation.	Alluvium, Deccan trap, (Weathered/fractured) and Bagh beds.
	Depth to water level during 2012 Long Term water level trend in 10 years (2003-2012)	Pre-Monsoon: 4.20-12.70 mbgl Post-Monsoon**:** 1.90 – 11.70 mbgl Pre monsoon: Rise 0.01 – 26.02 cm/yr Fall 3.49 – 12.39 cm/yr Post monsoon: Rise 0.01 – 22.66 cm/yr Fall 37.22 cm/yr
10	**Ground Water Exploration by CGWB (As on 31.3.2013)**	
	No. of wells drilled EW	EW 15, OW 24, Pz 08
	Depth range (m)	66-232.0
	Discharge (lps)	0.1-13.0/ - / 0.14-6.31
	Transmissivity (m^2/day)	2-312
11	**Ground Water Quality**	
	Presence of chemical constituents	EC 260 – 4150 µmhos/cm NO_3 1.2 – 620 mg/l F 0.013 – 0.89 mg/l
12.	**Dynamic Ground Water Resources (2009)**	
	Net Ground Water Availability	77219 Ham
	Gross Ground Water Draft	55848 Ham
	Projected Demand for Domestic and Industrial uses upto 2035	4647 Ham
	Stage of Ground Water Development	72 %
13	**Efforts of artificial recharge and rain water harvesting**	
	Project completed by CGWB, Nos.	02
	Amount Spent	2 Lakhs
	Project under technical quidance of CGWB, NCR, Numbers	Nil
14	**Awareness and Training Activity**	
14	Mass Awareness Programme organized No. of Participant	1 at Bhikangaon 200
	Water Management Training Programme Number of Participants	1 at Zilla Panchayat, Khargone 75
	No of Semi Critical Blocks	Non Command area of three blocks (Barwaha, Khargone and Maheshwar).
15	Major ground water related problems & issues.	Depletion of Water levels

1.0 INTRODUCTION

1.0 General

Khargone district lies between north latitudes 22^0 47' and 22^0 35' and east longitudes 75^0 19 and 76^0 14 in parts of survey of India Toposheet No. 46N, 460, 55B and 55C and encompasses an area of 8030 sq. km. The district forms almost central section of Narmada valley which is bordered by Vindhyans scarpment in the north and Satpura hills ranges in the south.



The district is divided in to nine blocks namely Kasrawad, Bhagwanpura, Segoan, Badwah, Bhikagon, Jhiranya, Maheshwar and Khargone.

The main drainage in formed being Narmada river and various small nalas and rivelutes joins to Narmada. The Tapti driange system extends in a limited area along the southern boundary of the district.

CGWB has taken up ground water exploration programme in the years (1983-87) and drilled 15 exploratory wells, 24 observation wells and 8 piezometer in the district.

2.0 CLIMATE AND RAINFALL

The climate of Khargone district, M. P. Characterized by a hot summer and general dryness except during the south west monsoon season. The year may divided into four seasons. The cold season, December to February is followed by the hot season from March to about the middle of June. The period from the middle of June to September is the south west monsoon season. October and November form the post monsoon or transition period.

The normal annual rainfall of Khargone district is 835 mm. The maximum rainfall received during south west monsoon period i.e. June to September about 92.8% of the annual rainfall received during monsoon season. Only 7.2% of the annual rainfall takes place between October to May period. Thus surplus water for ground water recharge is available only during the south west monsoon period.

The normal maximum temperature received during the month of May is 41.8^0 C and minimum during the month of December 11.1^0. The normal annual means maximum and minimum temperature of Khargone district is 34^0 C & 19.6^0 C respectively.

During the south west monsoon season the relative humidity generally exceeds 85% (August month). In the rest of the year is drier. The driest part of the year is the summer season, when relative humidity's are less 34% April is the driest month of the year.

The wind velocity is higher during the pre-monsoon period as compared to post monsoon period. The maximum wind velocity 9.0 kh/hr. observed during the month of June and minimum 2.5 km/hr. during the month of December. The average normal annual wind velocity of Khargone district is 4.9 km./hr.

3.0 GEOMORPHOLOGY & SOIL TYPES

The district exhibits varied geomorphic units, the presence of fluvial units showing the occurrences of alluvium in the flood plains of all major stream and rivers, buried Pedi plains showing denudational hills as seen in the north western parts of the district.

Similarly structural hogbacks and Cuesta belonging to vindhyan meta sedimentary are restricted to northern boundary of the district. Basaltic uplands forming lower belt that extends from west to east in the southern parts of the district. This upland tract also forms major forests in the district.

Generally there are five types of soils namely Kali I, (0-1 mbgl) and Kali II (1-2 mbgl) (2-3 mbgl) Halkikhardri and Bardi. These soils are classified as medium black cotton soils containing 50% silt and clay to gather. Alluvial type of soils is found on both the sides of the river Narmada and is some patches along its tributaries.

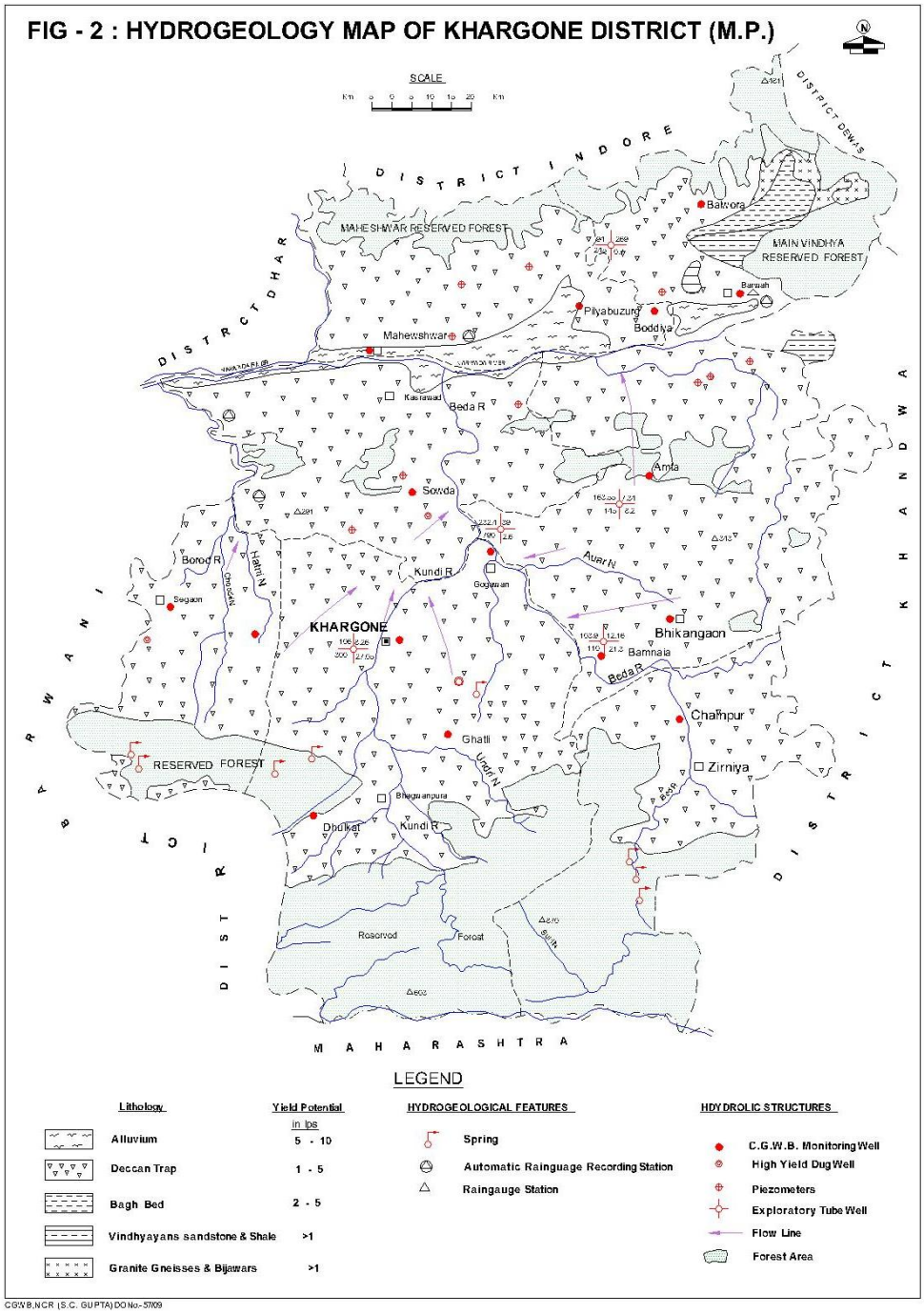
4.0 GROUND WATER SCENARIO

4.1 Hydrogeology

In the district Archaen granite and gneisses form pheratic aquifers where ever jointed or weathered. In general this aquifers has a poor potential. Bijawars and vindhyans in this district also have poor potential because of these massive and compactness occurrence of ground water rarely exceeds 12 mbgl. Bagh beds forms phereaticas well as confined condition at the contact with Deccan trap. They forms good potential aquifers system in phreatic as well as in confined condition.

The bore well drilled by CGWB, reveals that basaltic aquifers have depth range from 20.00 to 160.00 mbgl and yield potential 24 to 70 m^3/day, transmissivity ranges from 15 to 350 m^3/day. In Bagh beds potential zones formed at depth 52-54 mbgl & 67-86 mbgl yield potential is 180-245 lpm and aquifer properties. As transmissivity 108 m^3/day and storage coefficient is $1.99x10^{-3}$.

In Deccan trap deeper aquifers potential depends on ;intensity of fracture and its areal extent. They ranges from 5 lps to as high as 800 lpm the transmissivity characteristics of the confined aquifers ranges from 2 m^2/day to as high as 312 m^2/day.

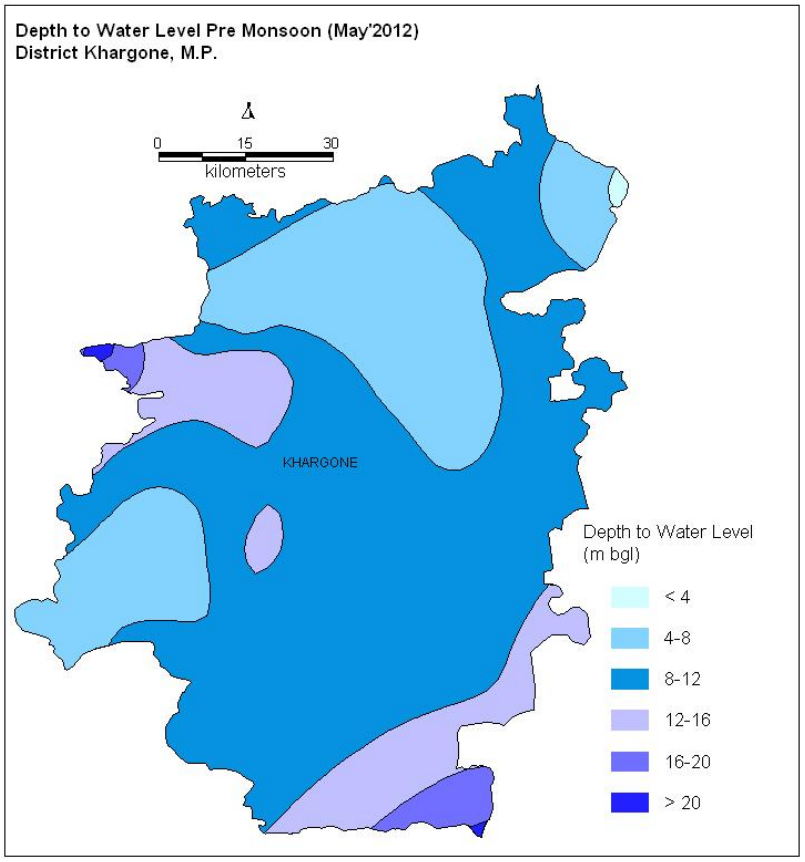


Depth to Water Level

Central Ground Water Board is carrying out water level monitoring since year 1972 in the district. Water levels of these monitoring wells are being monitored four times in a year during the month of January, May, August and November. To study ground water regime of the area pre monsoon and post monsoon depth to water level maps has been prepared. Water level is being monitoring from 20 dug wells and 7 piezometers in the district.

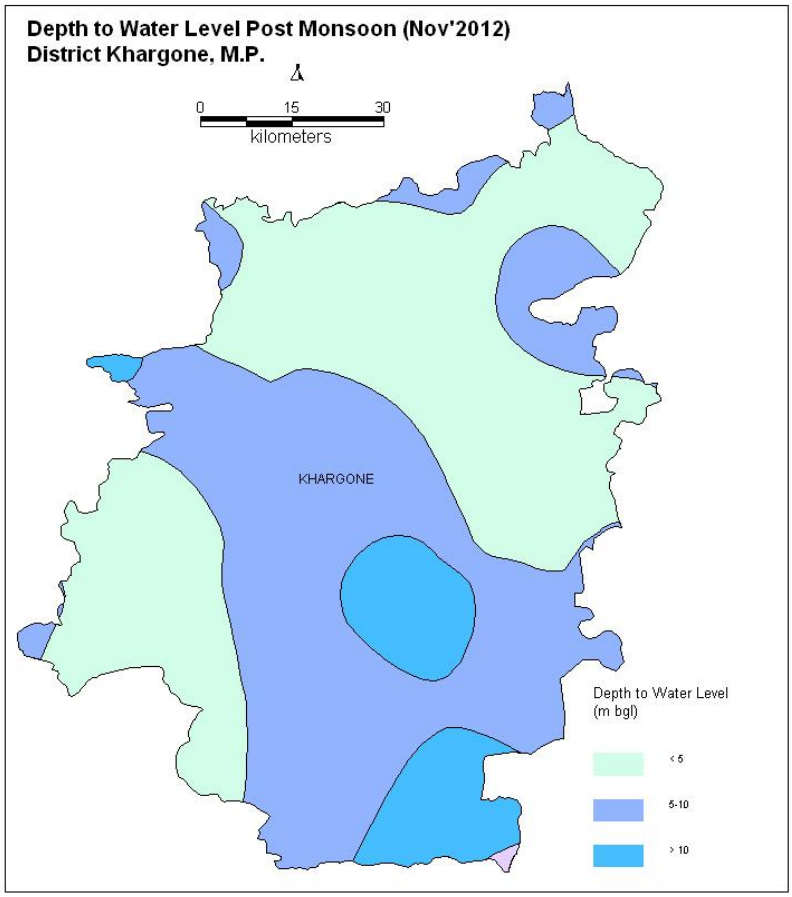
Pre- Monsoon (2012)

The water level ranges from 4.20 mbgl to 12.70 mbgl during pre-monsoon. In major part of the district depth to water level is in the range of 8 to 12 mbgl.



Post Monsoon (2012)

During post monsoon period water level ranges from 1.90 mbgl to 11.70 mbgl.In major part of the district, water level is between 5 to 10m.



Groundwater level trend (May2003 to May 2012)

Analyses of Groundwater level data of pre-monsoon period indicate that there is rise as well as decline in water level in the district. In general, rise in water level is in the range of 0.01 to 26.02 cm/year whereas decline is in the range of 3.49 to 12.39 cm/yr.

4.2 Aquifer Parameters

The yield of dug wells tapping vesicular basalts and massive trap range from 24 to 70 m^3/day. The specific capacity of wells various from 25 Lpm per meter of draw down in the massive trap to 285 lpm/m in the weathered vesicular basalts. The specific capacity of wells in alluvial aquifer varies from 320 lpm / m to 494 lpm/m of draw down. Depth of dug well varies from 6 to 20 mbgl. The yield of bore well varies from 1 lps to as high as 13 lps in basaltic aquifer and depth of well ranges from 40 to 160 mbgl. The productivity aquifer zones generally occur between 21 to 45 mbgl and deep seated fractured aquifer occurred in between 124 to 130 mbgl.

4.3 Ground Water Resources (2009)

Khargone district is underlain by mainly Basaltic lava flows of Deccan trap. Dynamic ground water resources of the district have been estimated for base year - 2008/09 on block-wise basis (Table 1). There are nine number of assessment units (block) in the district which fall under non-command (99 %) and command (1.%- Bhagwanpura, Kasrawad and Khargone) sub units. Bhagwanpura, Bhikhangaon and Jhirnia are categorized as safe. Khargone, Maheshwar and Barwha blocks of the district are categorized as semi critical. The highest stage of ground water development is computed as 90 % in Khargone. The net ground water availability in the district is 77,219 ham and ground water draft for all uses is 55,848 ham, making stage of ground water development 72% (76 % in 2003/04) as a whole for district. After making allocation for future domestic and industrial supply for next 25 years, balance available ground water for future irrigation would be 19,999 ham.

Table 1: Ground water availability and Stage of development

DYNAMIC GROUND WATER RESOURCES (As on March, 2009)										
S. No.	**Assessment Unit**	**Sub-unit Command/ Non-Command/**	**Net Annual Ground water Availability (ham)**	**Existing Gross Ground water Draft for Irrigation (ham)**	**Existing Gross Ground water Draft for Domestic & Industrial water Supply (ham)**	**Existing Gross Ground water Draft for All uses (ham)**	**Provision for domestic, and industrial requirement supply to next 25 year (2033) (ham)**	**Net Ground water Availability for future irrigation d development (ham)**	**Stage of Ground water Development (%)**	**Category**
		Command								
1	Barwaha	Non-Command	14586	11758	488	12246	488	2340	84	Semi Critical
		Block Total	**14586**	**11758**	**488**	**12246**	**488**	**2340**	84	Semi Critical
2	Bhagwanpura	Command	338	50	32	82	41	247	24	Safe
		Non-Command	3941	2002	397	2399	566	1373	61	Safe
		Block Total	**4279**	**2052**	**428**	**2481**	**607**	**1619**	**58**	Safe
3	Bhikangaon	Command								
		Non-Command	12431	8125	403	8528	635	3672	69	Safe
		Block Total	**12431**	**8125**	**403**	**8528**	**635**	**3672**	**69**	Safe
4	Gogawan	Command								
		Non-Command	5323	3652	120	3772	238	1433	71	Safe
		Block Total	**5323**	**3652**	**120**	**3772**	**238**	**1433**	**71**	Safe
5	Kasrawad	Command	348	23	36	59	68	256	17	Safe
		Non-Command	13617	7921	310	8230	431	5265	60	Safe
		Block Total	**13965**	**7944**	**346**	**8290**	**499**	**5522**	**59**	Safe
6	Khargone	Command	316	89	40	129	41	186	41	Safe
		Non-Command	6363	5506	346	5852	346	511	92	Semi Critical
		Block Total	**6680**	**5595**	**386**	**5981**	**387**	**698**	**90**	
7	Mahashwar	Command								
		Non-Command	9809	7099	520	7619	727	1983	78	Semi Critical
		Block Total	**9809**	**7099**	**520**	**7619**	**727**	**1983**	**78**	Semi Critical
8	Segaon	Command								
		Non-Command	3875	2637	180	2817	315	923	73	Safe
		Block Total	**3875**	**2637**	**180**	**2817**	**315**	**923**	**73**	Safe
9	Zirniya	Command								
		Non-Command	6271	3712	403	4115	750	1809	66	Safe
		Block Total	**6271**	**3712**	**403**	**4115**	**750**	**1809**	**66**	Safe
		District Total	**77219**	**52574**	**3274**	**55848**	**4647**	**19999**	**72**	

4.3 Ground Water Quality

Ground water quality in the district is accessed annually by CGWB on the basis of water samples collected from hydrograph stations in the district. Groundwater in the district is generally fresh to saline as electric conductivity values varies between 260 to

4150 µs/cm at 25° C. Fluoride in the district ranges from 0.01 to 0.89 mg/l and the nitrate concentration ranges from 1.2 to 620 mg/l.