

DISTRICT GROUND WATER INFORMATION BOOKLET



BHIND DISTRICT MADHYA PRADESH



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

BHIND DISTRICT PROFILE

S.No.	ITEMS	STATISTICS	
1.	General Information		
	i) Geographical area (In Sq. km)	4459	
	ii) Administrative Divisions		
	Number of Tehsil/Blocks	8/6	
	Number of Villages	949	
	iii) Population (Census 2011)	1,703,562	
	iv) Normal Rainfall (mm)	754.4	
2.	Geomorphology		
	i) Major Physiographic Units	1. Younger Alluvium plain 2. Older Alluvium plain 3. Ravines 4. Ridge Sedimentary	
	ii) Major Drainage	Lower Chambal Sub Basin of Yamuna Basin . Major Rivers Chambal, Kunwari, Vaisali, Sind & Pahuj	
3.	Land Use ('000Ha)		
	i) Forest area	8.9	
	ii) Net area sown	320.8	
	iii) Gross Cropped area	344.8	
4.	Major Soil Type	: Deep Alluvial Soils	
5.	Principal Crop	: Paddy, Mustard, Wheat	
6.	Irrigation by Different Sources		
		No. of Structures	Area ('000ha)
	Dugwells	9967	66.9
	Tube wells/Bore wells	781	18.1
	Tanks/Ponds	7	0.4
	Canals	3	18.2
	Other Sources	-	18.0
	Net Irrigated Area	-	105.1
Gross Irrigated Area	-	105.5	
7.	Number of Ground Water Monitoring Wells of CGWB(As on 31.3.2013)		
	No. of Dug Wells	17	
	No. of Piezometers	1	
8.	PREDOMINANT GEOLOGICAL FORMATIONS	Alluvium followed by Vindhyan & Gwalior series.	
9.	HYDROGEOLOGY	Alluvium, Weathered fractured & jointed Vindhyan sand stones & shale	
	Major Water Bearing Formation (Pre-monsoon) Depth to water level during 2012)	4.10 to 34.90 m b.g.l.	

	(Post-monsoon) Depth to water level during 2012)	2.40 to 34.90 m b.g.l.
	Long Term water level trend in 10 years (2003-2012) in cm/yr	11.17 to 76.13 (fall)
10.	Ground Water Exploration by CGWB (As on 31.3.2013)	
	No of wells drilled (EW,OW,PZ,SH, Total)	Ew-32, OW-50, Pz-1
	Depth Range (m)	18.2 – 188.7
	Discharge (litres per second)	11.80 – 57.20
	Storativity (S)	0.21*10 ⁻³ to 4.80* 10 ⁻³
	Transmissivity (m ² /day)	161 to 5406
11.	Ground Water Quality	
	Presence of Chemical constituents more than permissible limit (eg EC, F, As,Fe)	Electrical Conductivity ranges from 650 to 3800 micromhos/cm at 25 ⁰ c
	Type of Water	Nitrate -1.2 to 347 Flouride- 0.16 to 2.3
12	DYNAMIC GROUND WATER RESOURCES (2009) in MCM	
	Net Annual Ground Water Availability	578.81
	Net Annual Ground Water Draft	222.10
	Projected Demand for Domestic and Industrial Uses upto 2033	39.08
	Stage of Ground Water Development	38%
13	Efforts of Artificial Recharge & Rainwater Harvesting	
	Projects completed by CGWB (No. & Amount Spent)	Nil
	Projects under technical guidance of CGWB (Numbers)	Nil
14	Ground Water Control And Regulation	
	Number of OE Blocks Number of Semi Critical Blocks Number of Safe Blocks	All blocks are under safe category

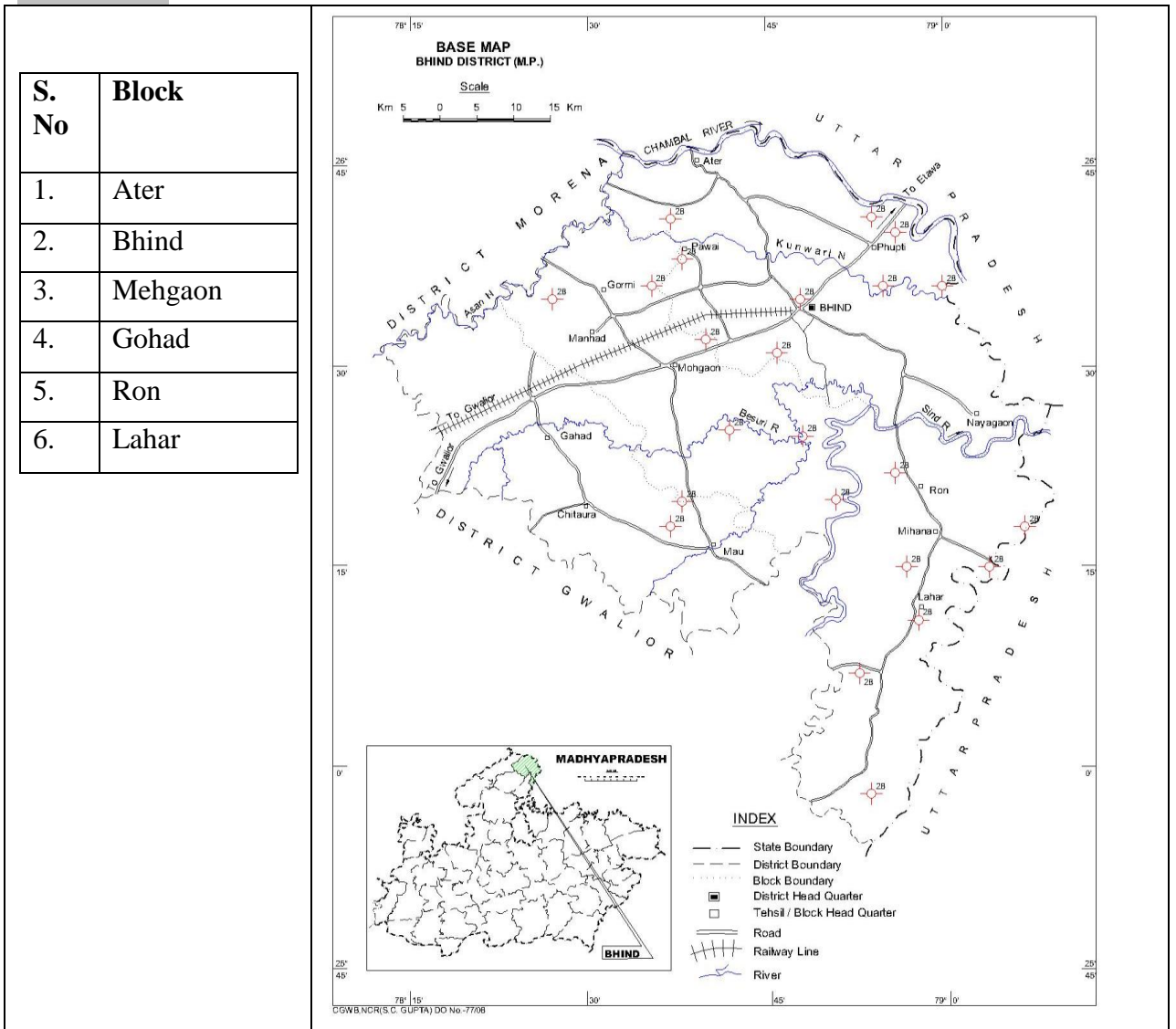
1.0 INTRODUCTION

1.1 Administrative Divisions

Bhind district is situated in the northern part of the Madhya Pradesh and covers an area of 4459 sq. km. It lies between N Latitude 25° 55' and 26° 45' and E longitude 78° 12' and 79° 05' and falling in Survey of India toposheet nos 54 J & N. It is bounded in the North and east by Uttar Pradesh, in the south by the Gwalior & Datia districts in the west by the district Datia .

Bhind district is divided into 8 tehsils and 6 blocks. It has 949 villages. total population of the district is 1,703,562 (As per census 2011). The administrative divisions (block) are given in Table No. 1

Table No. 1 Administrative Division



1.2 Basin & Sub basins

Chambal, Asad, Kunawari, Besali, Sindh & Pahuj rivers drain the area. Ravines & Gullies have developed along the course of all rivers particularly along the flood plains. A very fine network of gullies and forming dendritic drainage network characterizes these. The depth of dissection by gullies is more intense along the river Chambal as compared to others.

1.3 Hydrology & Irrigation

The entire Bhind district lies in lower Chambal basin. Major tributaries are Kunwari, Asad, Besali, Sindh & Pahuj rivers. The details of the catchment area of each rivers are given in table 2.

Table 2 Catchment Area of the Major Rivers

Sub Basin	Catchment area in the district (sq. Km.)	% of the Catchment area in the district	Length of river in the district (Km)
Direct Catchment of River Chambal	257.87	5.79	46.3
Asad & Kunwari	896.14	20.13	85.0
Besali	1729.28	38.84	57.0
Sindh	785.76	17.65	64.0
Pahuj	783.17	17.59	30.0
Total	4451.96	100.00	282.30

Surface Water availability

The water availability at 75% dependability of major rivers is given in table no 3

Table 3 Surface Water Availability of the major rivers

Sub Basin	Yield in MCM/Sq. Km	Total yield in MCM
Direct Catchment of River Chambal	01406	36.22
Asad & Kunwari	0.1406	126.00
Besali	0.1176	203.35
Sindh	0.1288	101.21
Pahuj	0.1288	100.87
Total		567.65

1.4 Previous work

Systematic Hydrogeological studies was carried out by CGWB under Annual Action Plan of 1971 – 72, 1984 – 85, 1985 – 86 & 1993 –94 After the systematic Hydrogeological surveys the ground Water management studies was carried out in the entire district under AAP 1991 - 92. The ground water exploration in the district was carried out under Annual Action Plan form 1985 to 1993. Total 32 Exploratory Wells, 50 Observation Wells and 1 Pz are constructed in the district.

2.0 CLIMATE & RAINFALL

The climate of Bhind district, characterised by a hot summer and general dryness except during the southwestern monsoon. A year may be divided into four seasons, cold season from December to February followed by the hot season from March to about middle of June. The period from Middle of June to September is the southwestern monsoon season. October & November forms the post monsoon or transition period. The nearest observatory is at Gwalior and all meteorological parameters except rainfall of this station are used for analysis. The normal rainfall of the district is 754.4 mm. District receives maximum rainfall during south west monsoon period i.e. June to September. About 91.9% of the annual rain fall predicates during the monsoon season.

During the southwest monsoon season the relative humidity generally exceeds 83% (August month). The driest period is summer season, when relative humidity is less than 26%. May is the driest month of the year.

Normal maximum temperature during the month of May is 42⁰C and minimum during January month is 7.1⁰C. Normal mean maximum & minimum temperature is 32.5⁰C & 21.8⁰C respectively.

Wind velocity is higher during the pre monsoon period as compared to the post monsoon period. The maximum wind velocity is 11.3 km/h during the month of June and minimum is 3.1 km/h during the month of November. Average normal annual wind velocity is 6.4 km/h.

3.0 GEOMORPHOLOGY & SOIL TYPES

3.1 Geomorphology

Physiographically, a large area of the district forms part of the vast older alluvial plains. Ravines along the river Chambal is special feature of the district. The area has very gentle slope towards northeast with highest elevation of 190 m above MSL in the southwestern part and the lowest elevation of 149 m above MSL in the northwestern part.

3.2 Soil

The soil in the district generally falls under the broad group of deep alluvial soils. Color of the soil varies from brown, yellowish brown to dark gray brown. Texture of soils varies from sandy loam (below 20% clay), loam (20 – 30% clay), clay loam (30 – 40% clay) & clay (more than 40% clay). Clay loam soil found in some parts of Gohad & Mehgaon blocks and sandy loam soil is usually found in other blocks.

4.0 GROUND WATER SCENARIO

4.1 Hydrogeology

Alluvium forms most prolific aquifer in the district. Vindhyan Sandstone & Shale and Quartzite of Gwalior Series is also encountered in the area. The hydrogeological map of the district is presented as figure 2. The hydrogeological properties of different formations are discussed hereunder:

4.1.1 Alluvium

The alluvial formation covers the major part of the district. Thickness varies from 70 to 250m and resting over the Vindhyan & Archaeans rocks. Alluvium consists of clay, sand & gravels. The thickness of the clay overburden generally decreases towards north. Thickness of sand and gravel aquifers vary from 3 to 17 m. The thickness of the overburden more than 60 m is occurring in south of Mehgaon.

Ground Water in this formation occurs under unconfined (up to a depth of 50 to 60 mbgl) and semi confined to confined conditions in the deeper aquifers i.e. below 60 m. The dug wells & shallow tube wells tap mainly kankary horizon. The deeper tube wells especially in the northern part tap sandy & gravelly aquifers underlying the clays.

1. Fine Sand: - In this aquifer yield is not more and encounter mostly in dug wells & shallow tube wells. The thickness of this is about 5 m and forms the upper most aquifer system in the district.
2. Medium Sand: - This aquifer system generally occurring under the thick clay beds therefore the ground water in this aquifer occurs under semi confined to confined conditions.
3. Coarse Sand: - This aquifer system is important as it has good porosity, permeability and yielding capacity. Ground water in this formation occurs under confined condition because it is generally occurs at the depth.

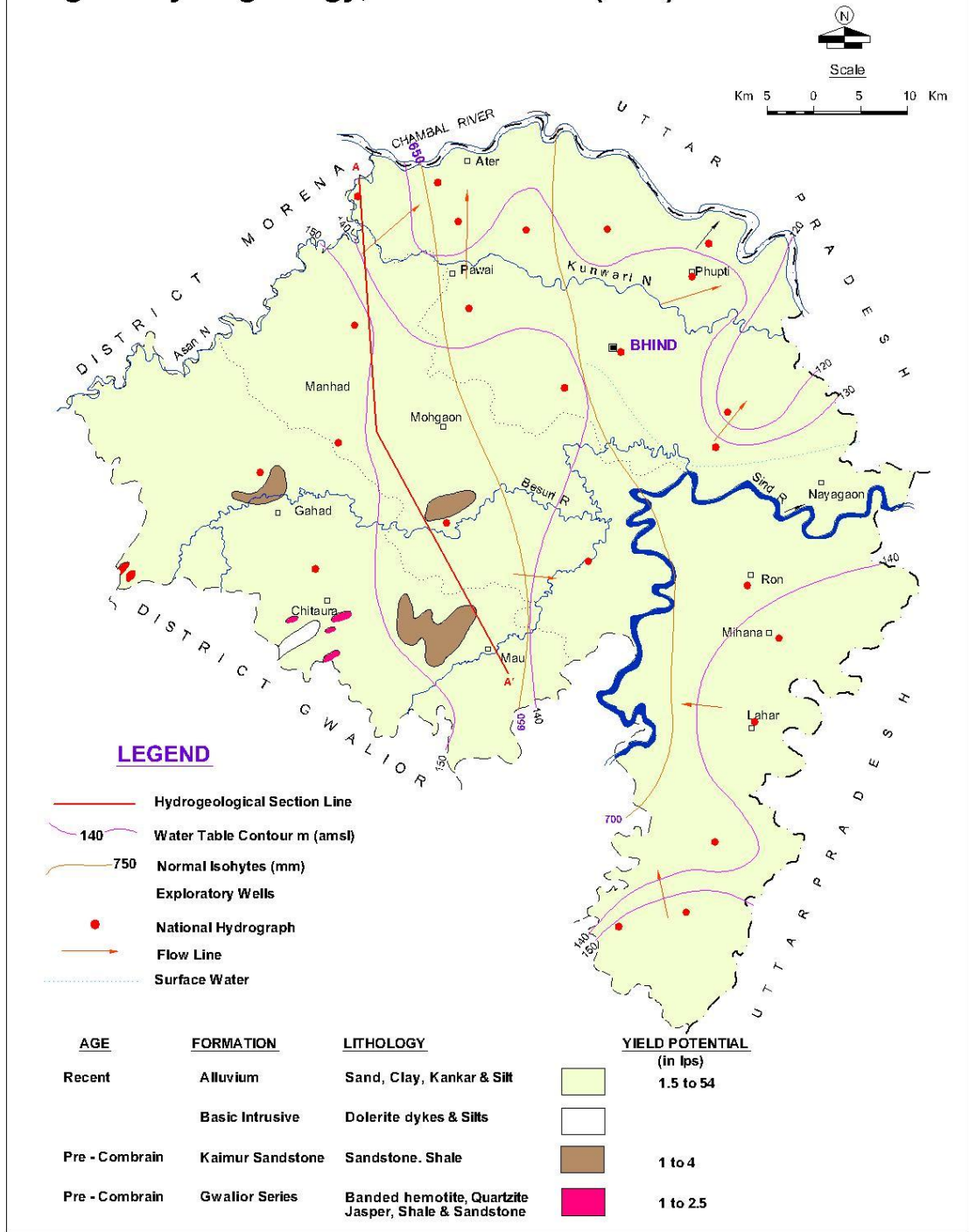
4.1.2 Vindhyan Formation

Some outcrops of this formation are exposed in the western parts of the district in Gohad tehsil. The sandstone & shales of the formation are encountered in the tube wells between 86 to 172 m b.g.l. (Source CGWB, Ground water Exploration). As these rocks are hard compact & devoid of weaker zones therefore the ground water occurrence is meager and ground water development in this formation is less.

4.1.3 Gwalior Series

Gwalior series is exposed in southwestern part of the district and consists of Banded Hematite Quartzite. Ground water occurs under semi confined to confined conditions and yield potential is less.

Fig. 2 : Hydrogeology, District Bhind (M.P.)



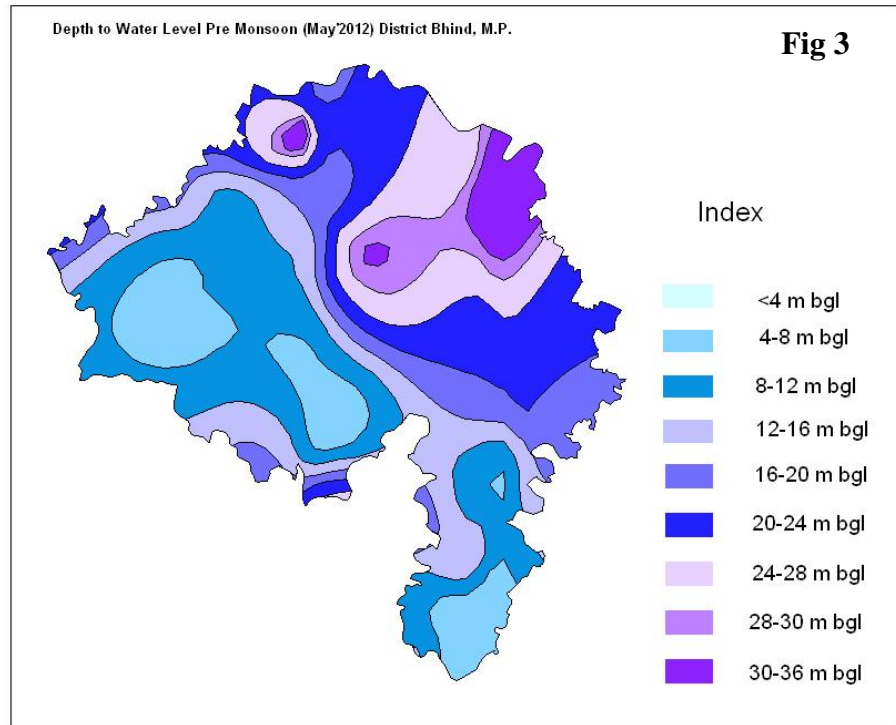
CGWB, NCR(S.C. GUPTA) DO No.-131/09

Depth to Water Level

To monitor the change in ground water levels in the district, Central ground Water board is Regularly monitoring 17 dug wells and one Pz four times in a year.

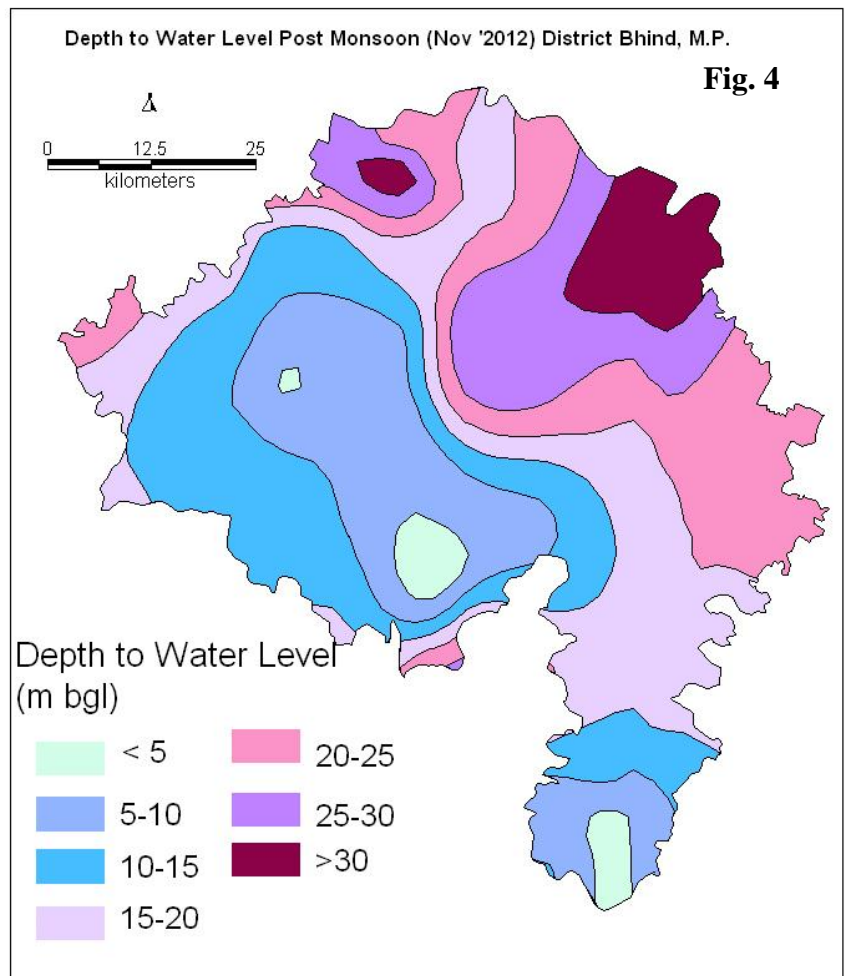
Pre Monsoon Depth to Water Levels (May 2012)

The depth to water levels (DTW) map is presented as figure 3. During the pre monsoon period DTW ranges 4.10 mbgl to 34.9 mbgl. However, in major part the DTW is less than 28 mbgl. Deeper water level of more than 30 mbgl is observed in small isolated patches in northern and northeastern part.



Post Monsoon Water Levels (Nov 2012)

The post monsoon depth to water levels map is presented as figure 4. The DTW ranges from 2.40 mbgl to 34.9 mbgl. However, in major part the DTW ranges from 5 to 30 mbgl. Deeper water level of more than 30 mbgl is observed in two isolated patches one each in northern and north eastern part.



Decadal Depth to water Level Trend (2003-2012)

During Premonsoon period an overall declining trend is observed. It ranges from 11.17 cm/year to 76.13 cm/year.

4.2 Ground Water Resources (2011)

Block wise Groundwater Resources has been calculated for the base year 2009 on the basis of GEC'97. Over all ground water development of the district is 38% and all the blocks of the district falls in safe category of ground water development. Net Ground water availability is 58781 ham, Gross Ground water draft for all uses is 22210 ham. The blockwise ground water resources of the district are presented in table 4.

Table 4. Block wise Ground Water Resources (2009)

S. No.	District/ 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 {(13/10)*100} (%)	Category
	Bhind									
	Ater	Command	1364	199	43	242	129	1036	18	Safe
		Non-Command	6261	2331	397	2728	548	3382	44	Safe
		Block Total	7624	2530	440	2971	676	4417	39	Safe
	Bhind	Command	3839	445	131	576	160	3235	15	Safe
		Non-Command	4826	1940	254	2194	325	2561	45	Safe
		Block Total	8665	2385	386	2770	485	5796	32	Safe
	Gohad	Command	6681	1109	211	1319	366	5206	20	Safe
		Non-Command	8033	4463	314	4778	550	3020	59	Safe
		Block Total	14715	5572	525	6097	916	8226	41	Safe
	Lahar	Command	3935	511	121	632	152	3273	16	Safe
		Non-Command	4586	2217	246	2463	308	2061	54	Safe
		Block Total	8522	2729	367	3095	459	5334	36	Safe
	Mehgaon	Command	4812	589	150	739	219	4004	15	Safe
		Non-Command	9233	3798	447	4245	654	4780	46	Safe
		Block Total	14045	4387	597	4984	873	8785	35	Safe
	Ron	Command	3838	1105	306	1411	377	2356	37	Safe
		Non-Command	1372	783	99	881	121	468	64	Safe
		Block Total	5210	1888	405	2293	498	2824	44	Safe
		District Total	58781	19490	2720	22210	3908	35383	38	Safe

4.3 Ground water quality

Ground Water quality in Bhind district is assessed by CGWB on the basis of water samples collected from nineteen numbers of hydrograph stations . The electric conductivity varies between 650 to 3800 micro mhos/cm. Nitrate in the ground water varies from 1.2 to 347 mg/l. Fluoride ranges from 0.16 mg/l to 2.3 mg/l