

# DISTRICT GROUND WATER INFORMATION BOOKLET



## SHIVPURI DISTRICT MADHYA PRADESH



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

**SHIVPURI DISTRICT PROFILE**

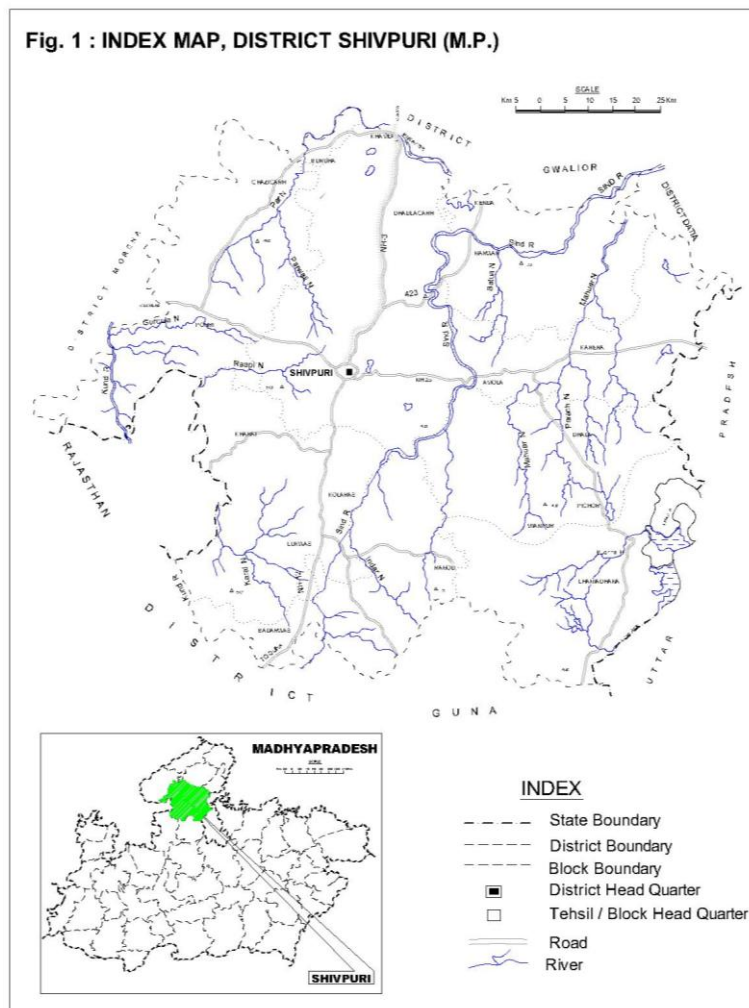
S.No.	Items	Statistics	
<b>1.</b>	<b>General Information</b>		
	i) Geographical area (sq. km)	10278	
	ii) Administrative Divisions (As on 2013)		
	Number of Tehsil/Blocks	7 / 8	
	Number of Panchayats/Villages	587/1326	
iii) Population (Census 2011)	1726050		
iv) Normal Annual Rainfall (mm)	816.3		
<b>2.</b>	<b>Geomorphology</b>		
	i) Major Physiographic Units	1. Denudational Hills 2. Pediment (Granite) 3. Deccan Pleatu 4. Alluvial Plains	
	ii) Major Drainage	Sind - Parwati sub-basin Sind - Kuno sub-basin Sind - Betwa sub-basin Sind - Mahur sub-basin	
<b>3.</b>	<b>Land Use (Sq.Km)</b>		
	i) Forest area:	178.61	
	ii) Net area sown:	3990.89	
	iii) Cultivable area:	4642.15	
<b>4.</b>	<b>Major Soil Types</b>		
		Black cotton soil, Sandy loam, Clayey loam,, Murram	
<b>5.</b>	<b>Principal Crops</b>		
		Wheat, Rice, Groundnut, Gram, Jawar etc	
<b>6.</b>	<b>Irrigation By Different Sources</b>		
		<b>No. of Structures</b>	<b>Area (Sq.km)</b>
	Dugwells	60465	661.98
	Tube wells/Bore wells	8961	465.98
	Tanks/Ponds	117	37.02
	Canals	50	245.95
	Other Sources	-	186.70
	Net Irrigated Area	-	1616.2
	Gross Irrigated Area)	-	1656.2
<b>7.</b>	<b>Number of Ground Water Monitoring Wells of CGWB(As on 31.3.2013)</b>		
	No. of Dug Wells	<b>32</b>	
	No. of Piezometers	<b>07</b>	
<b>8</b>	<b>Predominant Geological Formations</b>		
		Bundelkhand Granite,	

		Vindhayan, Deccan Trap.
<b>9</b>	<b>Hydrogeology</b>	
	Major Water Bearing Formation	Weathered/Fractured Granite, Vindhyan & Deccan Trap
	(Pre-monsoon) Depth to water level during 2012	5.00 – 18.92 mbgl
	(Post-monsoon) Depth to water level during 2012	3.83 – 16.29 mbgl
	Long Term water level trend in 10 years (2002-2012) in m/yr	+ 0.13m to + 0.17m (Pre) - 0.08m to - 0.84m(Pre) +0.02m to +0.04 (post) - 0.10m to - 1.32m(post)
<b>10.</b>	<b>Ground Water Exploration by CGWB (As on 31.3.2013)</b>	
	No of wells drilled (EW,OW,PZ,SH, Total)	45,10,7, Nil= 62
	Depth Range (m)	25m – 203.90m
	Discharge (litres per second)	0.15 – 22lps
<b>11.</b>	<b>Ground Water Quality</b>	
	Presence of Chemical constituents more than permissible limit (eg EC, F, As,Fe)	EC: 129-3182 mmhos/cm at 25° C Nitrate: 16-485 mg/l Fluoride: 0.04-1.13 mg/l
<b>12</b>	<b>Dynamic Ground Water Resources (2009)</b>	
	Net Ground Water Availability Gross Annual Ground Water Draft Projected Demand for Domestic and Industrial Uses upto 2035 Stage of Ground Water Development	<b>70699ham</b> <b>48441 ham</b> <b>4398 ham</b> 69%
<b>13</b>	<b>Efforts of Artificial Recharge &amp; Rainwater Harvesting</b>	
	Projects completed by CGWB (No. & Amount Spent)	Nil
	Projects under technical guidance of CGWB (Numbers)	Nil
<b>14</b>	<b>Ground Water Control and Regulation</b>	
	Number of OE Blocks	Nil
	Number of Critical Blocks	Nil
	Number of Notified Blocks	Nil

## 1.0 INTRODUCTION

Shivpuri district is situated in the northern part of the Madhya Pradesh and covers an area of about 10278 sq. km. It lies between N Latitude 26° 05' and 24° 40' and E longitude 77° 01' and 78° 29' and falling in Survey of India toposheet nos 54H, K & L. It is bounded in the North by district Gwalior, in the south by the district Guna, in the east by the district Datia and in the west by the Rajasthan state.

Shivpuri district is divided into 7 tehsils and 8 blocks. It has 1326 villages. total population of the district is 1726050 (census 2011).



**Table: Block area & Number of villages**

S. No	Block	Area in sq. km	No of villages
1.	Shivpuri	1956	190
2.	Kolaras	1152	778
3.	Badarwas	1216	145
4.	Karera	1014	134
5.	Narwar	984	147
6.	Pichor	1091	125
7.	Khanniyadhana	1292	173
8.	Pohari	1573	234
<b>Total</b>		<b>10278</b>	<b>1326</b>

## 1.2 Basin & Sub basins

Betwa & Sind Rivers flowing northerly forms the major drainage in the eastern and central parts and river Kuno is another major river in the western parts. The district falls in the Yamuna basin. The district can be divided into four sub basins.

### **Sub – Parwati Sub basin**

The Sind – Parwati sub basin of the Chambal River is in Yamuna basin. River Parwati flows west to east and forms the northern boundary of the district. This sub basin attains maximum height of 499.2 m above MSL at village Piparsuma and minimum 415.38 m above MSL. The general topography is hilly and sloping toward North & West.

### **Sind – Kuno Sub Basin**

The River Kuno flows from south to north forms western boundary of the district. The general slope is south – east to north – west i.e. towards Sind River. Sub basin attains maximum height of 575 m above MSL at village Bhaopur and minimum of 342 m above MSL at the confluence of river Kuno and Sind.

### **Sind – Betwa Sub Basin**

River Betwa flows from SW to NE and forms eastern boundary of the district. The general slope is towards NE. The maximum height in the sub basin is 417 m above MSL in Loharchha reserve forest and minimum is 313 m above MSL near village Bharot.

### **Sind – Mahur Sub Basin**

The River Mahur crosses the hilly area at an elevation of 296.91 m above MSL after flowing from south to north in Pichor block enters into Karera block at village Bardi. The general slope of the sub basin is towards North.

### **CGWB Activities**

Systematic Hydrogeological studies was carried out by CGWB under Annual Action Plan 1990-90. After the systematic Hydrogeological surveys the ground Water management studies was carried out in the entire district under AAP 1998 99 & 1999 2000. The ground water exploration in the district was carried out under the AAP 1999 –2000, 2000-01 & 2001-02.

## **2.0 GEOMORPHOLOGY & SOIL TYPES**

### **2.1 Geomorphology**

Physiographically, the district is an upland region over the Bundelkhand plains, with escarp in the east, characterized by rugged up landing topography with north south trending parallel ridges and intervening valleys. The eastern part is a pediplain over the granite. The maximum elevation is 522 m above MSL and minimum elevation is 266 m above MSL. In Shivpuri district, landforms are mainly Denudation hills of Vindhyan sediments and pediments of granites are predominant. Apart from these geomorphic units features like alluvial plain. Valley fills, intermundane valley and Deccan trap plateau arte also seen.

### **2.2 Soil**

The district is generally covered with sandy clay soil derived from the weathering of Bundelkhand granites and the Vindhyan formations. The southern part of the district is covered by the black cotton soils derived by the weathering of the Deccan trap formation. Depth of the soil varies from paper-thin to 15m. The color of the sandy soil is light yellow to yellowish brown. The central and southern parts of the

district are covered by lateritic soil of dark brown to yellowish brown in color. Alluvium is found all along the major and minor rivers, it consists of gravel, silt, sand and pebbles.

### **3.0 GROUND WATER SCENARIO**

#### **3.1 Hydrogeology**

District is characterized by variety of geological formations representing vast period of geological time.

##### **Alluvium -**

Ground water occurs in the granular zones of sands and gravels. The extent and thickness of this formation is limited. The maximum thickness of the alluvium is 15m therefore large diameter dug wells can be constructed. Yield of this formation ranges from 5 to 10 lps and ground water occurs under water table condition.

##### **Laterite -**

Laterites are semi-consolidated rock and consist of cavities. Thickness of this rock ranges from 3 to 75 m. The porosity and permeability are sufficient to act as good aquifer when it is occurring in low-lying areas. The yield of the dug wells constructed in this formation ranges from 2 to 4 lps.

##### **Deccan Trap -**

Water bearing capacities in Deccan trap formation differ from flow to flow. Phreatic aquifer occurs in weathered, jointed and fractured basalts. In the areas where weathered basaltic layer is extensive, a continuous aquifer can be traced to some distance, however due to low permeability of the weathered basalt the aquifer sustain limited ground water withdrawal. The groundwater at deeper levels occurs under semi confined to confined conditions in vesicular, jointed & fractured basalts. Yield of the wells in this formation varies from 1 to 5 lps. Unit draft of the wells varies from 0.0027 to 0.036 mcm/year.

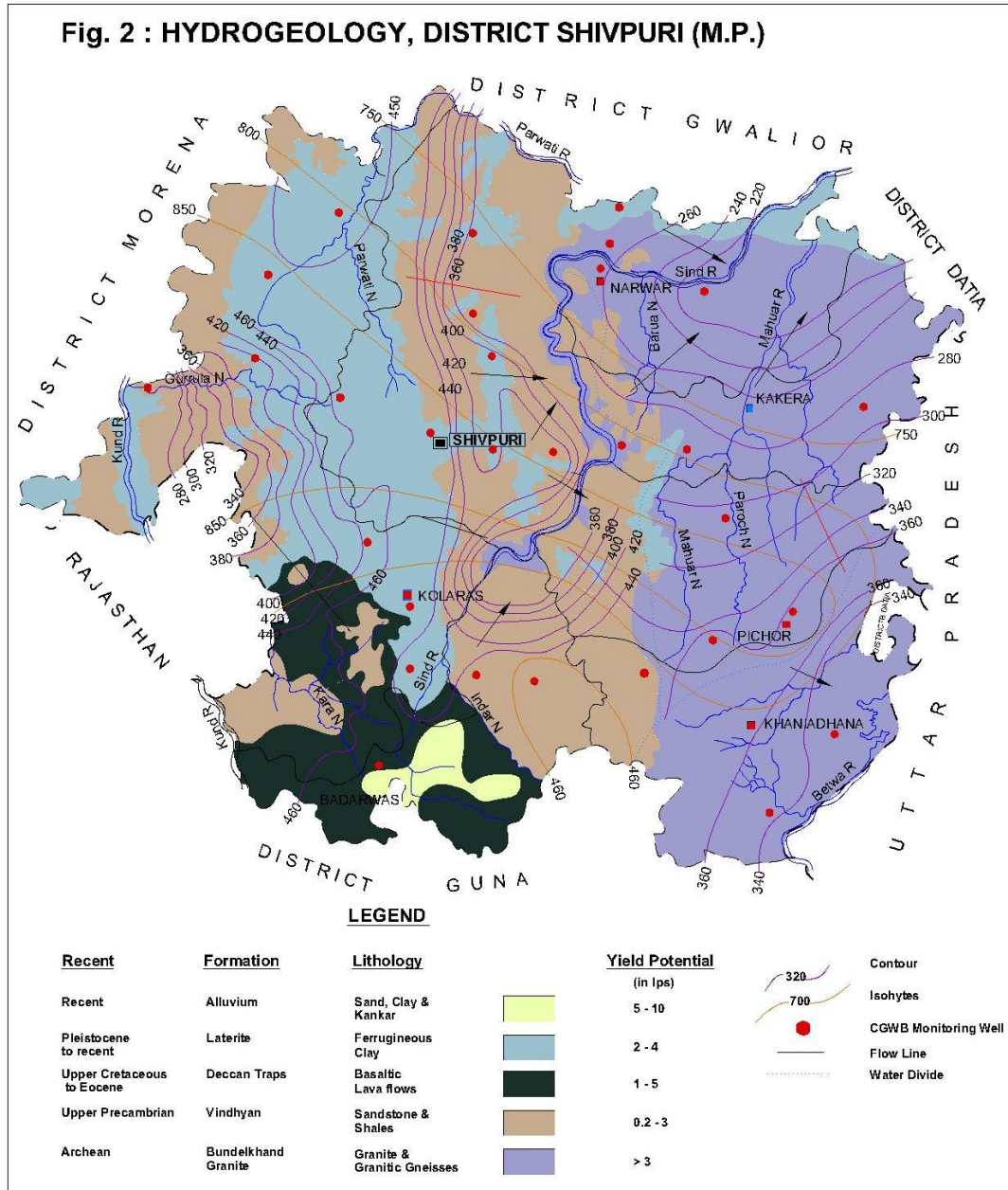
Under the Ground water Exploration Programme CGWB has constructed the exploratory wells & observation wells of 25.50 to 148.60 m deep. The depth to water levels in these wells varies from 6.00 to 29.60 m bgl and discharge of the wells ranges from negligible to 1.8 lps with a draw down maximum upto 48.00m.

##### **Vindhyan Sandstone and Shale -**

Sandstone of the Vindhyan formation is compact and having poor permeability, Joints and fractures in the sand stone controls the occurrence and movement of the ground water. Soil and weathered mantle developed in the Vindhyan formation is generally thin and as result ground water occurs at shallow depth under unconfined condition in jointed, fractured & weathered rocks. Yield of the wells ranges from 1 to 2 lps. Unit draft of the wells ranges from 0.001 to 0.026 mcm/year.

Under the Ground water Exploration Programme CGWB has constructed the exploratory wells & observation wells of 50.35 to 203.4 m deep. The depth to water levels in these wells varies from 4.38 to 29.60 m bgl and discharge of the wells ranges from 0.18 to 14.50 lps with a draw down ranges from 14.00 to 60.00 m.

**Fig. 2 : HYDROGEOLOGY, DISTRICT SHIVPURI (M.P.)**



**Bundelkhand Granit: -**

Granites are most extensive rock formation in the Karera & Narwar blocks. Ground Water occurs in the weathered part and vertical and horizontal joints. The yield of the wells is restricted to the weathered mantle and ranges from less than one to 3 lps. Unit draft of the wells in the formation varies from 0.00075 to 0.0051 mcm/year.

Under the Ground water Exploration programme CGWB has constructed the exploratory wells & observation wells of 135 to 203 m deep. The depth to water levels in these wells varies from 2.65 to 12.98 m bgl and discharge of the wells ranges from 0.2 to 5.4 lps with a draw down ranges from 36 to 65 m.

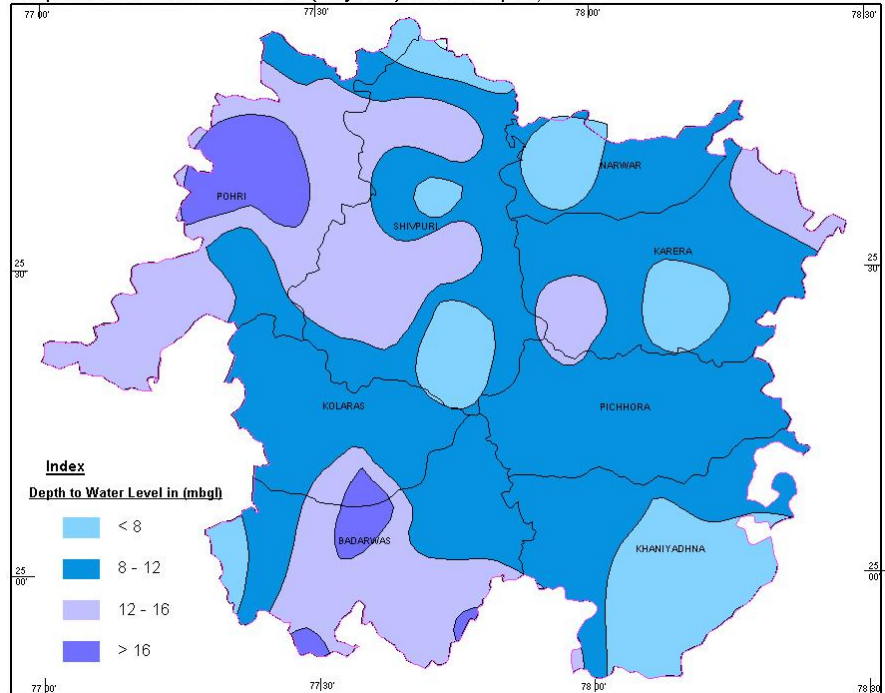
## Depth to Water Level

To monitor the change in ground water levels in the district, Central ground Water board is regularly monitoring 32 dug wells & 7 piezometers four times in a year.

### Pre Monsoon, 2012

The depth to water levels during the pre-monsoon period varies from 5.00 to 18.92m.bgl. In major part of the area, water level is in the range of 8 to 120 m.bgl.

Depth to Water Level -Pre Monsoon ( May 2012) District Shivpuri , M.P.



### Post Monsoon, 2012

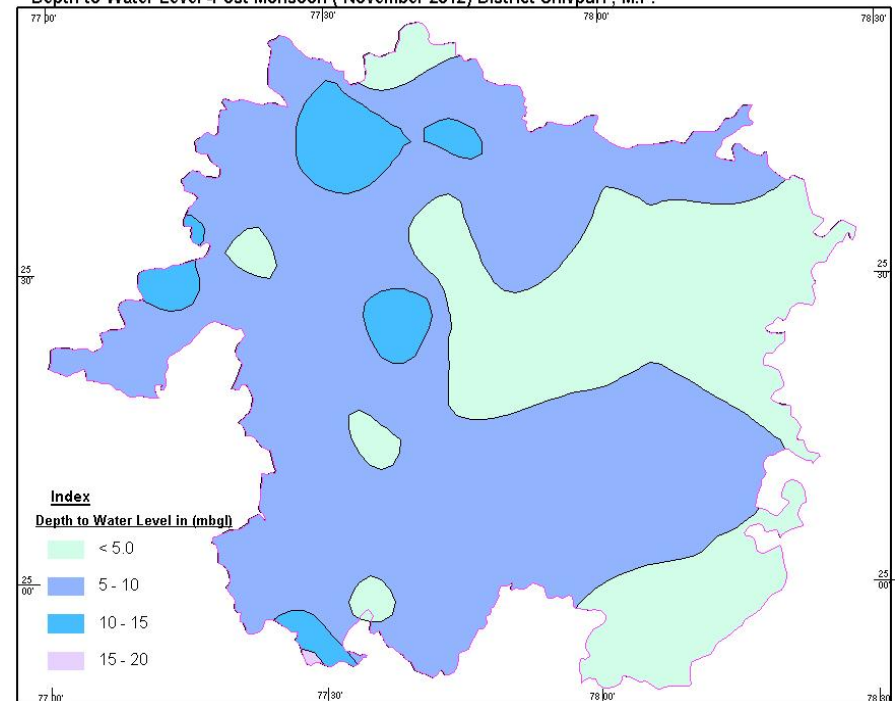
The depth to water levels during the post monsoon period varies from 3.83 to 16.29m.bgl. In major part of the district, water level varies from 5 to 10m.bgl.

### 4.3.3 Groundwater level trend (May 2003 to May 2012)

Analyses of Groundwater level data of pre-monsoon period indicate that there is rising trend in

the range of 0.13 to 0.17m/yr and declining trend in the range of 0.08 to 0.88 m/yr.

Depth to Water Level -Post Monsoon ( November 2012) District Shivpuri , M.P.



## 4.2 Ground Water Resources

Shivpuri district is underlain by Budelkhand granite; Basaltic lava flows of Deccan trap Vindhyan Sandstone and Alluvium. Dynamic ground water resources of the district have been estimated for base year -2008/09 on block-wise basis. Out of 1,02,7800 ha of geographical area, 9,77,049 ha (95 %) is ground water recharge worthy area and 50751 ha (5 %) is hilly area. There are eighth number of assessment



units (block) in the district which fall under non-command (94 %) and command (13.%) sub units. Badarwas, Karera, Khaniyadhana,, Narwar and Pichor blocks of the district are categorized. as semi critical (safe in 2003/04,) and rest under safe.

**Table: Groundwater availability & stage of development (2009)**

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 (11+12) (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
Badarwas	Command	329	80	6	85	11	239	26	Safe
	Non-Command	9629	7075	362	7436	362	2192	77	Semi-critical
	Block Total	<b>9958</b>	<b>7154</b>	<b>367</b>	<b>7521</b>	<b>372</b>	<b>2431</b>	<b>76</b>	
Karera	Command	906	386	59	445	111	188	49	Safe
	Non-Command	5602	4255	409	4664	409	1291	83	Semi-critical
	Block Total	<b>6508</b>	<b>4641</b>	<b>468</b>	<b>5109</b>	<b>520</b>	<b>1347</b>	<b>79</b>	
Khaniyadhana	Command	1333	445	46	491	80	808	37	Safe
	Non-Command	7169	5679	413	6092	413	1077	85	Semi-critical
	Block Total	<b>8497</b>	<b>6124</b>	<b>459</b>	<b>6583</b>	<b>493</b>	<b>1879</b>	<b>77</b>	
Kolaras	Command								
	Non-Command	9668	6153	328	6481	487	3027	67	Safe
	Block Total	<b>9668</b>	<b>6153</b>	<b>328</b>	<b>6481</b>	<b>487</b>	<b>3027</b>	<b>67</b>	<b>Safe</b>
Narwar	Command	1165	321	46	367	79	765	32	Safe
	Non-Command	6845	4974	441	5414	709	1163	79	Semi-critical
	Block Total	<b>8010</b>	<b>5295</b>	<b>487</b>	<b>5782</b>	<b>788</b>	<b>1928</b>	<b>72</b>	
Pichor	Command	1494	493	10	502	80	922	34	Safe
	Non-Command	6124	4561	326	4888	456	1107	80	Semi-critical
	Block Total	<b>7618</b>	<b>5054</b>	<b>336</b>	<b>5390</b>	<b>536</b>	<b>2028</b>	<b>71</b>	
Pohri	Command	211	28	7	35	12	171	17	Safe
	Non-Command	10980	4893	439	5332	627	5460	49	Safe
	Block Total	<b>11192</b>	<b>4921</b>	<b>445</b>	<b>5367</b>	<b>639</b>	<b>5631</b>	<b>48</b>	
Shivpuri	Command	358	60	7	66	11	287	19	Safe
	Non-Command	8891	5806	335	6141	551	2534	69	Safe
	Block Total	<b>9249</b>	<b>5866</b>	<b>342</b>	<b>6207</b>	<b>563</b>	<b>2821</b>	<b>67</b>	
	<b>District Total</b>	<b>70699</b>	<b>45208</b>	<b>3233</b>	<b>48441</b>	<b>4398</b>	<b>21093</b>	<b>69</b>	

The highest stage of ground water development is computed as 78 % in Khaniyadhana block. The net ground water availability in the district 70,699 ham and ground water draft for all uses is 48,441 ham, making stage of ground water development 69 % (68 % 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 21,093ham.

### 4.3 Ground water quality -

In general, ground water is suitable for domestic and irrigation purposes in the entire district except a few villages located in the south of the Sind River in Narwar & Karera blocks are having high fluoride content in dug well and tube wells. Due to the high content of the fluoride ground water in these villages are not suitable for the drinking purpose.