DISTRICT GROUND WATER INFORMATION BOOKLET

SIDHI DISTRICT

MADHYA PRADESH

Ministry of Water Resources
Central Ground Water Board
North Central Region

Government of India

2013

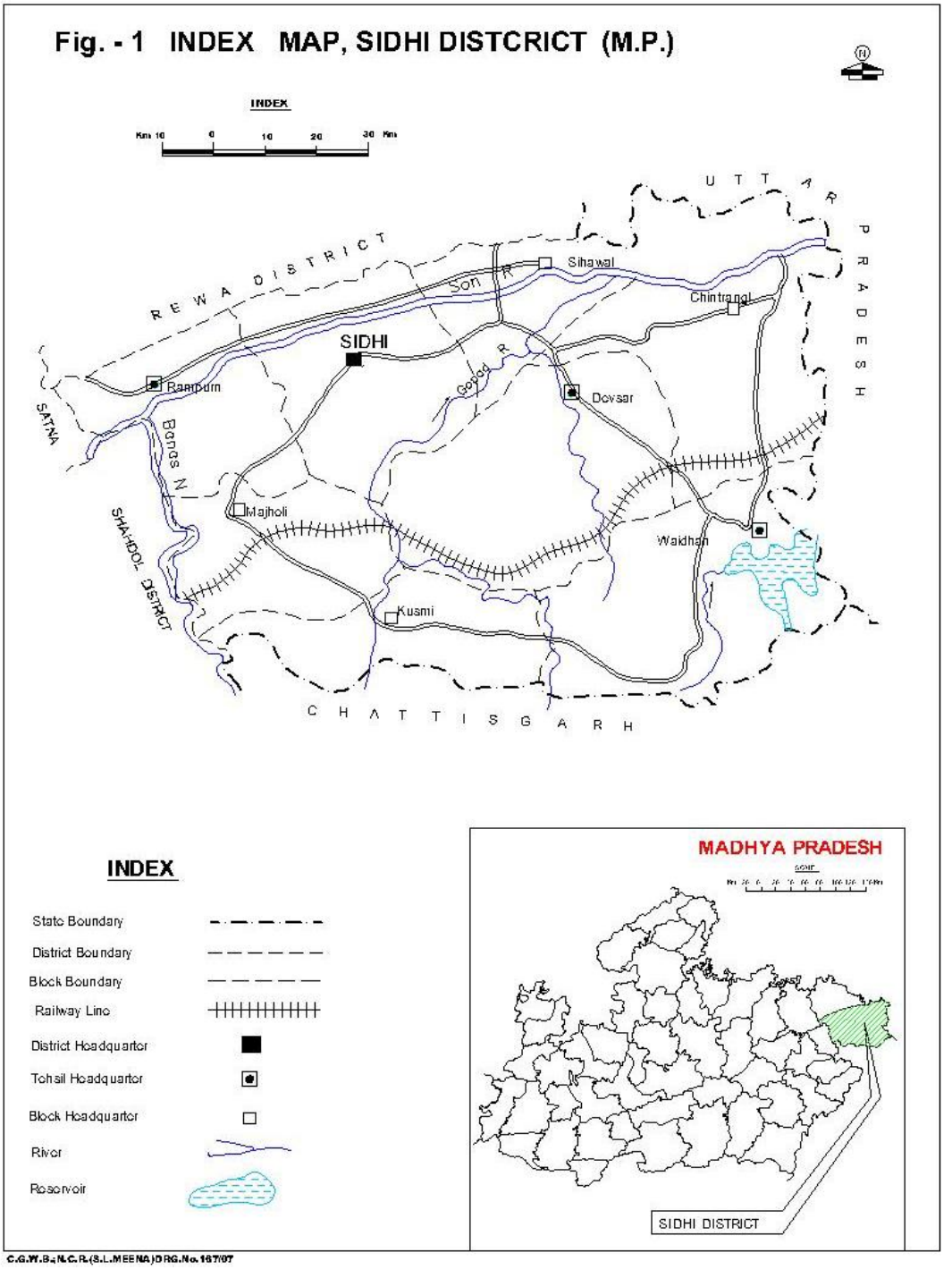
SIDHI DISTRICT AT A GLANCE

S.No.	Items	Statistics	
1	General Information		
	i) Geographical Area	485400 Ha	
	District Head Quarter	Sidhi	
	ii) Administrative Division Number of Tehsil/Block Number of Villages (2012) Population (As per census 2011) Normal Annual Rainfall (mm)	 5 Block 1882 1126515 1154.2	
2.	Geomorphology		
	1. Major Physiographic Units :	Kaimur Range Central Part hills Southern Part hills	
	2. Major Drainage :	Son River, Gopad River, Banas nadi, Rihand River	
3.	Land use		
	a) Forest Area	433533 ha	
	b) Net area sown	275391 ha	
	c) Cultivable area	3745 ha	
4.	Major Soil Types	Red soil, Alluvial & Latertic soil	
5.	Area Under Principal Crops	Paddy, Wheat, Gram, Pulses, maize	
6.	Irrigation By Different Sources		
	Structures	**Nos.**	**Area (ha)**
	Dug Wells	11541	26970
	Tube wells/Bore wells	11541	12095
	Tanks/Ponds	17	453
	Canals	160	12453
	Other sources	10516	63431
	Net irrigated Area	-	266976
	Gross Irrigated Area	-	6343
7.	Number of Ground Water Monitoring		
	Wells of CGWB Dug Wells	22	
	No. of Piezometers	5	

8.	Predominant Geological Formations	Granites, Gneisses, Sandstone, Alluvium
9.	Hydrogeology i) Major water bearing formation ii) Pre monsoon depth to water level during 2012 iii) Post monsoon depth to water level during 2012 iv) Long term water level trend in 10 years (2003-12)	 Gondwana, Vindhayan. 2.60-23.66 mbgl. 1.05-15.17 mbgl. 0.02-0.21 m/year falling
10.	Ground Water Exploration by CGWB	
11	Exploration well Depth	EW-17, OW-1, Pz-7 37 – 302 M bgl
12	Ground Water Quality	EC-110-865, Nitrate-.06-52, F-.03-1.5
13	Ground Water Resources (2009)	
	i) Net Annual Ground Water Availability	328.29 Mcm
	ii) Gross Ground Water Draft	128.89 Mcm
	Iii) Projected Demand for Domestic and Industrial uses upto 2033	33.81 Mcm
	iii) Stage of Ground Water Development	39%

1.0 INTRODUCTION :

The Sidhi District in located in the north eastern part of Madhya Pradesh State having a total geographical area of 10526 sq kms and extend by north latitude 23^0 45' and 24^0 45' and east longitudes 81^0 15' and 83^0 00' and lies in survey of India Toposheet Nos. 63H & I respectively.



The District is divided into 5 tehsils viz. Gopadbanas, Sihawal, Kusmi, Majholi, Singrauli, Rampur Naikin, Devsar, Chitrangi and Churhat and 8 community development blocks. vi Sidhi, Sihawal Kusmi, Majholi, Rampur, Naikin, Devsar, Chitrangi, Singrauli and Churhat for its administrative functioning and revenue collections. Besides Sidhi there are six other towns and 1882 village in the district. The administrative division of Sidhi is shown in Fig-1.

Drainage :

In the district four major river and numerous streams, nalas originating from central and southern high lands and discharging their water to either one of these four major river. In the district some river flowing from west to east in the northern part of the district, The Banas river flow from south of north in the western area. The Gopad river flows in the central part of the area from south to north and the Rihand river in the south eastern part of the district flowing from south west to north east district.

CGWB Activities :

Reappraisal Hydrogeological Surveys - 1994-94

Ground Water Exploration Programme is as follow -

	No. of well drilled		Year (AAP)
	12 EW	-	1990-91
		-	1993-94
	5 EW	-	1998- 99
	7 EW	-	2000-01
Total No.	24EW	-	

2.0 Climate and Rainfall

The climate of Sidhi district is Characterized by a hot summer and general dryness except during the south west monsoon season. The year may divided into four seasons. The cool 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 Sidhi district is 1132.7 mm. Sidhi district received maximum rainfall received during south west monsoon period i.e. June to September. About 89.7% of the annual rainfall received during monsoon season. Only 10.9% 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 42^0C and minimum during the month of Jannuary is 8.1^0C. The normal annual means maximum and minimum temperature of Sidhi district is 32.5^0C& 18.6^0C respectively.

During the south west monsoon season the relative humidity generally exceeds 85% (August month). In the rest of the year is direr. The driest part of the year is the summer season, when relative humidity's are less 35%. May 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 is 6.5 km/hr. observed during the month of June and minimum 1.6 km/hr. during the month of November. The average normal annual wind velocity of Sidhi district is 3.6 km/hr. Normal climatologically parameters of Sidhi District is given in attached Annexure.

Normal Climatological Parameters for Sidhi District

S.No.	Paramters	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1	Maximum Temp (^{0}C)	24.3	27.6	33.4	39.1	42.0	39.2	32.9	31.7	32.3	32.6	29.5	25.3	32.5
2	Maximum Temp (^{0}C)	8.1	10.8	15.5	21.5	25.8	27.5	25.1	24.6	23.8	19.4	13.0	8.3	18.6
3	Relative Hu idity (%)	76	68	51	38	35	58	83	85	82	73	69	74	66
4	Wind Velo. (Km./hr.)	2.1	2.7	3.3	4.5	.5.1	6.5	5.3	4.5	3.9	2.4	1.8	1.6	3.6
5	Rainfall (m.m.)	27.0	18.4	13.2	3.4	8.8	133.	338.2	325.2	211.8	33.4	12.1	7.7	1132.7

3.0 Geomorphology & Soil

The district as a whole constitute a hilly terrain with restricted plains along the course of rivers. The district can be divided into three physiographic division

(1) Kaimur, hilly range elevation rises upto 609 m amsl.
(2) The Cetral Part hilly ranges rises upto 548 m. amsl. and
(3) Southern hilly ranges varies between 365 and 488 m amsl.

In the district four main river flows along with several nallahs and rivilutes. The major rivers are the Son, Banas, Gopal and the Richand river as shown in fig. 1 along the drainage course they forms valley fill.

The soil types in the district are mainly alluvium red sandy, red & yellow loamy, sandy, laterite soil and loam soil.

The alluvial soil is mostly restricted along the banks of major rivers like son, Banas and Rihand whose thickness varies from few meters to 25 meters. The red sand soil mostly occurs in the sand stone areas, the lateritic soils is generally observed in the plateau areas.

4.0 Ground Water Scenario

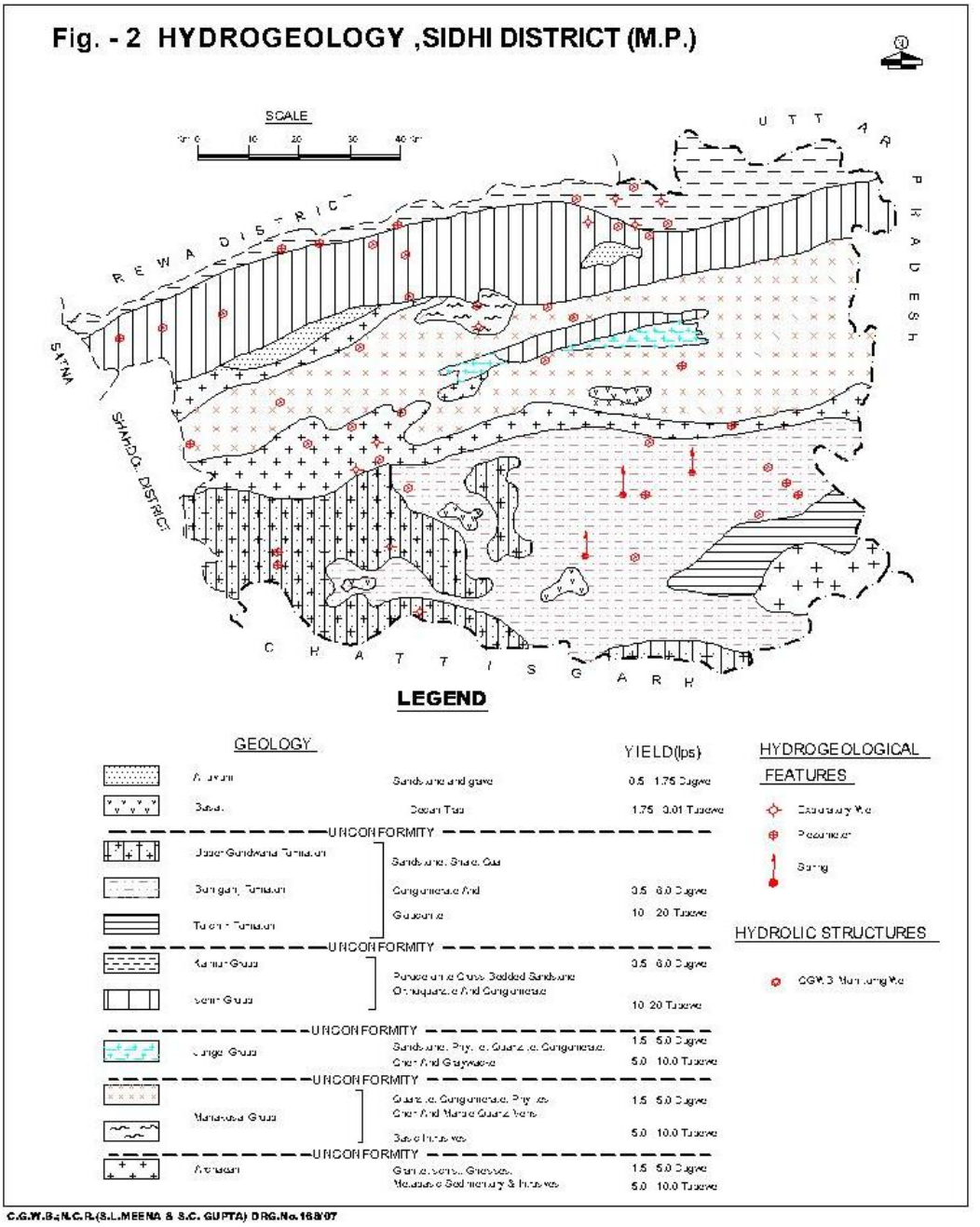
4.1 Hydrogeology :

Aquifer system and aquifer parameters

Archaeans :

This group is generally comprises of granite, gneisses, schist phyllites and quartzites, where ground water occurs under phreatic conditions.

The thickness of weather zones generally varies between 8.0 to 10 mbgl. with te depth of dug wells ranged between 3.0 to 18 mbgl. and depth to water ranging between 2.0 to 18 mbgl i.e. dry. The well discharge varies between 144 m^3/day to 432.5m^3/day during pre-monsoon.



Vindhyan

The limestone, sandstone and shales, covers large part in Son basin Sidhi district. The depth of dug wells ranges between 8.0-35 mbgl. with depth to water table varying between 6.0-31.0 mbgl. The seasonal fluctuation of water level varied between 1.0 to 9.0 mbgl.

Lower Gondwana :

Talchir and Barakar occurs in south central part of the district. The depth of dug wells ranges between 6 to 10 m and depth to water level varying between 3.0 to 6.0 mbgl. Talchir sandstone and shale's having yield from 288 to 520 m^3/day as Barkar sandstone are high yielding formation and yield range between 300 to 600 m^3/day. It is also observed that rate of recuperation in water level is high in the wells tapping Barkar sandstone, when compared to the Talchir formation.

Upper Gondwana :

The upper Gondwana formation mainly consists of sandstone and clay and appear as hilly terrain in the southern part of the district.

The depth of water level varies from 2 to 16 mbgl and the yield of wells varies from 100 to 144 m^3/day in summer season and fluctuation in water level shows awide from 1.30 to 9.70 m.

The upper Gondwana sandstone is gritty and with pebbles at places. The well yield varies from 200 to

500 m^3/day.

Alluvium :

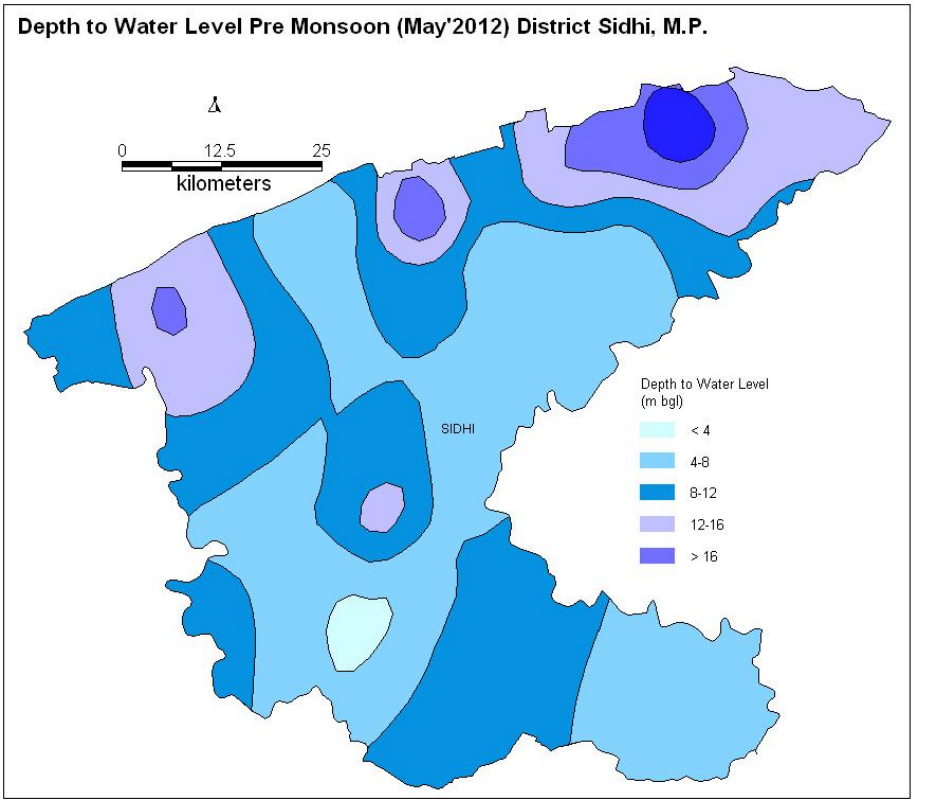
The alluvium cover of 2.0 to 30 m thickness occupy in the Son sub basin. The depth of the wells varied between 10.0 to 25.0 mbgl with depth to water level varying between 8.0 to 23.0 mbgl. the wells tapping alluvium yield are moderate to high in te range of 58 to 150 m^3/day.

Depth to Water Levels.

Ground water levels forms a very important parameter of the ground water system as these are its physical reflection. The ground water balance express itself is the change in the water levels, hence a continuous record is important and useful. CGWB, NCR, has 22 monitoring stations and 5 peizometers in Sidhi district. In general water level trend indicate the present stage of ground water development in the district and the intensity of surface irrigation in the command area is low.

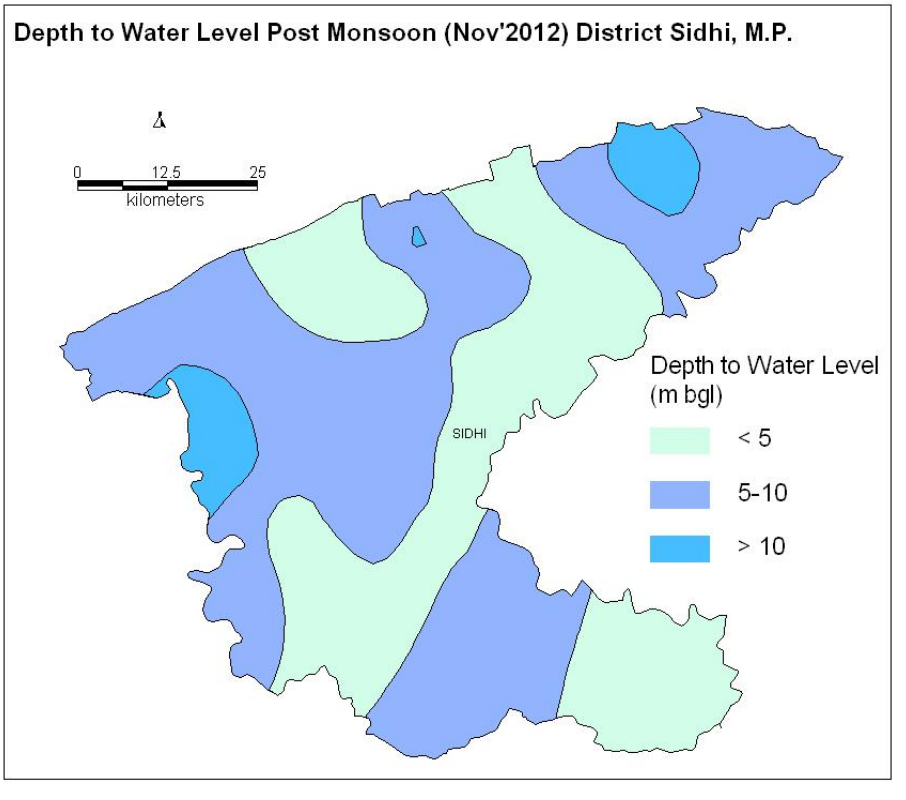
Pre-monsoon (2012)

During May 2012 the depth to water level (fig-3) in Sidhi district ranged between 2.60 & 23.66 mbgl. However in major part the depth to water level is between 4 and 12 mbgl.



Post-monsoon (2012).

In post monsoon period water level in the district varies from 1.05 to 15.17 mbgl. However in major part the depth to water level is less than 10 mbgl.



Water Level trend (May 2003 - 2012).

The water levels trend for the last 10 years indicates declining trend in the range of 0.02 to 0.21 m/yr

Aquifer Parameters :

The exploratory wells drilled in Gondwana sandstone vindhyan sandstone and limestone and alluvium area of the district. These exploratory wells were mostly drilled between 150m to 300 m bgl depth. Yield potential is good in Gondwana sandstone at one place free flowing well on site Haiki is also explored. In vindhyans due to its compaction nature wells drilled in this formation yield poor. transmissivity in Gondwana formation higher then vindhyans.

4.2 Ground Water Resources :

Sidhi district is underlain by Vindhyan limestone sandstone, Archaean granite Gondwana sandstone and Alluvium Dynamic ground water resources of the district have been estimated for base year -2008/09 on block-wise basis. Out of 4,85,400 ha of geographical area, 2,62,996 ha (54 %) is ground water recharge worthy area and 1,47,904 ha (30 %) is hilly area. There are five number of assessment units (block) in the district which fall under non-command (99 %) and command (1 % Sidhi) sub units. All blocks of the district are categorized. as safe. The highest stage of ground water development is computed as 66% in Sidhi block. The net ground water availability in the district 32,829 ham and ground water draft for all uses is 12,889 ham, making stage of ground water development 39 % (32 % 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 18,868ham.

Table : 1 - Ground Water Resources and Stage of Development

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
Kusmi	Command								
	Non-Command	12595	1472	162	1634	293	10830	13	Safe
	Block Total	**12595**	**1472**	**162**	**1634**	**293**	**10830**	**13**	Safe
Mahjholi	Command								
	Non-Command	5441	1501	339	1839	457	3483	34	Safe
	Block Total	**5441**	**1501**	**339**	**1839**	**457**	**3483**	**34**	Safe
Rampur Naikin	Command								
	Non-Command	5725	2972	694	3666	896	1858	64	Safe
	Block Total	**5725**	**2972**	**694**	**3666**	**896**	**1858**	64	Safe
Sidhi	Command	300	37	51	89	107	156	30	Safe
	Non-Command	**3846**	2191	483	2674	851	804	70	Safe
	Block Total	**4147**	**2228**	**534**	**2763**	**958**	**961**	**67**	Safe
Sihawal	Command								

	Non-Command	4921	2407	580	2987	778	1736	61	Safe
	Block Total	**4921**	**2407**	**580**	**2987**	**778**	**1736**	**61**	Safe
	District Total	**32829**	**10580**	**2310**	**12889**	**3381**	**18868**	**39**	

4.3 Ground Water Quality :

The quality of ground water is being monitored from National ground water stations for chemical analysis. EC values ranges from 110 to 865 micro mhos/ cm/ at 25^0C. All the ground water samples show the quality of water is in the permissible limits. Nitrate concentration ranges from 0.06 to 52 mg/lt. Fluoride ranges from 0.03 to 1.5 mg/lt.