DISTRICT GROUND WATER INFORMATION BOOKLET

SATNA DISTRICT
MADHYA PRADESH

Ministry of Water Resources
Central Ground Water Board
North Central Region
Government of India
2013

SATNA DISTRICT AT A GLANCE

S. No	ITEMS	STATISTICS
1.	**GENERAL INFORMATION**	
	i) Geographical area	7,502 sq. Km
	ii) Administrative Divisions (As on 31.03.2006) Number of Tahsil Number of Blocks Number of Gram Panchayats Number of Villages	 10 8 703 1999
	iii) Population (As on 2011 Census)	2,228,619
	iv) Average Annual Rainfall	1092.1 mm
2.	**GEOMORPHOLOGY**	
	Major Physiographic units	1 The Central Plateau 2 The South-western plateau 3 Kaimur range 4 The Northern Range 5 The Son Valley area, 6 The Yamuna Valley
	Major Drainages	1. Tons river 2. Son river 3. Baisuni river
3.	**LAND USE**	Sq. Km
	a) Forest area	2036.59
	b) Net area sown	3413
	c) cultivable area	3413

4.	**MAJOR SOIL TYPES**	Red and yellow soil and alluvial soils	
5	**PRINCIPAL CROPS (Year-2006)**	Paddy, Soya bean, Jowar, wheat and Gram	
6.	**IRRIGATION BY DIFFERENT SOURCES**	**Number of Structures**	**Area irrigated** (Sq. Km)
	Dug wells	16166	362.21
	Tube wells/ Bore wells	15162	594.24
	Tanks/ ponds	97	25.96
	Canals	59	71.48
	Others sources	-	09.51
	Net irrigated area Gross Irrigated Area	- -	1262.06 1251.85
7.	**NUMBER OF GROUND WATER MONITORING WELLS OF CGWB** (As on 31- 3- 2013) No of Dug Wells No of Piezometer	34 9	
8.	**PREDOMINANT GEOLOGICAL FORMATIONS**	Vindhyans limestone, shale ,sandstone and alluvium	
9.	**HYDROGEOLOGY**		

	➢ Major water bearing formation ➢ Pre- monsoon depth to water level range during 2012 ➢ Post- monsoon depth to water level range during 2012 ➢ Long term water level trend range in 10 yrs (2003- 2012) in m/yr	Limestone, shale, sandstone and alluvium Min 3.50 m Max 30.40 m Min 0.97 m Max 16.90 m 0.1 -0.32 m /year
10.	**GROUND WATER EXPLORATION BY CGWB** (As on 31- 03- 2013)	
	No of wells drilled (EW, OW, PZ, Total)	Exploratory Wells - 37 Observation Well – 8 Piezometer - 13
	Depth range (m)	50.10 - 215.30 m
	Discharge (liters per second)	1.20 –14.66 lps
	Storativity (S) range	1.20×10^{-4} to 2.6×10^{-2} (m^2/ day)
	Transmissivity range	2.56 to 746.00 (m^3/ day)
11.	**GROUND WATER QUALITY**	
	Presence of Chemical constituent more than permissible limit	1. Nitrate more than 45 mg/liter is recorded at Kirpalpur, Rampur, Kotar, Amarpatan and Amdara. 2. Sulphate more than 200 mg/liter is recorded at Maihar, Chhijwar, Unchehara, Jura, Satna, Chorhata etc. EC: 298-3140

		NO^3 : 2-175 mg/litre F: 0.13-1.23 mg/litre
	Type of water for irrigation purpose	C_1-S_1 , C_2-S_2 and C_3-S_1
12.	**DYNAMIC GROUND WATER RESOURCES** (2009)	MCM
	Net Ground Water Resources available	529.5
	Gross Annual Ground Water Draft	394.53
	Projected Demand for Domestic and industrial Uses for next 25 years	57.23
	Stage of Ground water Development	75%
13.	**EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING**	Recommended construction of artificial recharge structures
14.	**GROUND WATER CONTROL AND REGULATION**	-
	Number of OE Blocks Number of Critical Blocks Number of Semi Critical Number of Notified Blocks	**1-Rampur Baghelan** 2- Amarpatan and Sohawal 2- Maihar and Nagod **Nil**
15.	**MAJOR GROUND WATER PROBLEMS**	Decline of ground water levels
16	**Awareness and Training Activity** **Date:** **Place:**	 19.02.2003-20.02.2013 Satna
17	**Projects completed by CGWB**	NIL
	Projects under technical guidance of CGWB	NIL
18	**Major Groundwater Problems and Issues**	Depletion of water levels are reported' Rampur Baghelan Block is falling under Semi-Critical category.

1.0 NTRODUCTION

Satna district is one of representative district of Vindhya region of Madhya Pradesh. It takes its name from the head quarter's town, Satna. In turn the town derives its name from the Satna river, which flows through the vicinity and joins the tons river. The district is culturally and agriculturally rich. Satna district is famous for pilgrim stations namely Sharda Temple (at Maihar), Chitrakoot and Ramvan. Agriculture forms the major source of the income in the district. The district is also having industrial and mining importance. There are three major Cement Plants located at Satna, at Mankahri (in Rampur-baghelan Block) and at SarlaNagar (nearMaihar town). District is also big producer of Lime Stone mineral.

Satna district located in northern part of Madhya Pradesh having geographical area of 7,424 Sq km. It is bounded by the district of Chitrakoot (U.P.) in the north , by Katni and Umariya districts in south and Panna and Rewa districts form the western and eastern boundaries of the Satna district. The district lies between north latitudes 23º05' and 25º12' and eastern longitudes 80º21' and 81º23'. It falls in parts of Survey of India Toposheets No 63 C/ 12, &16, 63 D/ 5,6,7,8,9.10,11,12, 13, and 63D/14, &15 (full), 16 (part) and also in parts of 63H/ 1,2,3,7 & 8. It extends for about 132 Km from north to south and 102 Km from east to west. The district is well connected by roads with the state capital Bhopal and the adjacent district headquarters. Kanyakumari-Varanasi National Highway No.7 passes through southern part of the district.Katni-Allahabad broad gauge line of West-Central passes through the central part of the district.

Administrative Details

The satna district is part of Rewa Commissionery. The district has been divided into 10 Tehsils and 8 Blocks (Fig-1). There are 1816 villages and 11 towns in the district. Total population of the district is 18,70,104 (Census 2001). Details administrative divisions of the district are given in Table-1.

Table-1: Administrative Divisions of Satna District , Madhya Pradesh

Tehsil	Block	Area in Sq Km	No of Villages	No Gram Panchayats
10	**8 Nos**	**7502**	**1999**	**703**

Drainage

Satna district is falling under the Ganga basin area. The Yamuna, the Tons and the Son are Sub-basins of the Ganga basin, which are draining the area. Excepting small southern part, the district is mainly drained by river Tons and its tributaries. Tons is perennial river, which flows in north and north-east direction. Its main tributaries are westerly flowing Seranji Nala, nort-easterly flowing Lilji Nala, Barua Nala and Beehar Nadi, northerly flowing Magardaha Nala, and easterly flowing Satna, Simrawal and Asrawal rivers. The" Paisuni or Mandakni" sacred river, which is tributary of the river Yamuna drains northern part of the district (Chitrakoot area). Southeast part of the district is drained by Son river and its tributaries. ENE-WSW trending Kaimur hill range is acting main water divide of the area, which separates Tons Sub-basin from the Son Sub-basin.

Irrigation

Irrigation facilities in Satna district is not well developed. Only 37 % of net sown area is irrigated and rest of the area is rain-fed. Canal irrigation is negligible and only7148 hectare area is irrigated through this source which is 5.63 % of total irrigation of the district. Ground water is main source of irrigation in the district. Out of total 126206 hectares irrigated area of the district, 95,645 hectares area is irrigated from ground water sources, which is about 75.5 % of total irrigation in the district. There were 15,162 tube wells and 16,166 dug wells in the district during year 2006 for irrigation. During last decade (Year 1997 to 2006) manifold growth in tube wells is recorded in the district, from 7143 number, during the year 1997 to 15162 number in year 2006.

CGWB Activities

Reappraisal Surveys of the district was carried out by Shri S.S.P. Mishra, then Scientist-B, Shri G.Bhaskara Rao, then Scientist-B and Shri A. Shrinivas, Assistant Hydrogeologist during the year 1993-94. Reappraisal Surveys of the district is again carried out during year 2007-08 by Shri M.L.Parmar, scientist-B and Shri A.K. Jain, Scientist-B. CGWB had taken up exploratory drilling programme in the district during year 2004-07 and total 22 exploratory wells were drilled in the district at various locations. Under Hydrology Project, CGWB had drilled 8 shallow and 4 deep Piezometers for monitoring of water levels and water quality in the district.

2.0 RAINFALL AND CLIMATE

The climate of Satna district is characterized by a hot summer with general dryness, except during the south-west monsoon season. The year may be divided into four seasons. The cold season from December to February is followed by the hot season from March to about 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 Satna district is 1092.1 mm. The district receives maximum rainfall during south-west monsoon period (i.e. June to September) and about 87.7% of annual rainfall is received during this period. Only 12.3% of the annual rainfall takes place between periods October to May. Rainfall forms the sole source of natural recharge to ground water regime and the rain water is available for recharge to ground water is mainly during south-west monsoon period only. The maximum normal annual rainfall received in the district is 1106.5 mm at Satna and minimum is 1056.1 mm recorded at Maihar. The normal maximum temperature observed during the month of May is 41.9º C and minimum during the month of January is 8.7ºC. The normal annual mean maximum and minimum temperature of Satna district are 32.2ºC and 19ºC respectively.

During the south-west monsoon season the relative humidity generally exceeds 86% (August month). The rest of year is drier .The driest part of the year is the summer season, when relative humidity is less than 29%. 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 9.2 km/ hr observed during the month of June and minimum 2.8km/ hr during the month of November. The average normal annual wind velocity of Satna district is 5.4 km/hr. Normal climatological parameters of Satna district is given below in Table-2.

Table-2 : Normal Climatological Parameters of Satna District

S. N.	Climatic Parameter	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Annual
1	Maximum Temp (ºC)	24.2	27.4	33.3	38.8	41.9	39.2	32.2	30.8	31.6	32.0	29.2	25.4	32.2
2	Minimum Temp (ºC)	8.7	11.3	16.4	22.3	26.7	27.9	25.1	24.5	23.8	19.6	13.1	9.0	19.0
3	Relative Humidity (%)	69	60	44	31	29	54	83	86	81	69	61	68	61
4	Rainfall (mm)	3.6	4.3	5.3	6.0	7.3	9.2	7.6	6.6	5.5	3.4	2.8	2.4	5.4
5	Wind Speed (km/ hr)	30.8	15.3	12.7	5.4	7.9	119.0	338.6	330.9	181.9	40.1	14.9	9.0	1106.5

3.0 GEOMORPHOLOGY AND SOIL TYPES

3.1 Geomorphology

Almost entire Satna district lies on the Vindhyan plateau, which extends from the Kaimur hill range in the south to the edge of the Ganga valley in the north. It is traversed by three prominent hill ranges from south-south west to north-north east and is occupied by a higher plateau in the south-western part of the district known as " Parasmania Pahar" which is part of Bhander series. Maximum elevation of the district is 704 m above mean sea level, which is recorded near "Papra Reserve Forest" on Kaimur hill range on southern part of the district. The southern and northern fringes of the district lie low in the respective valleys of the Son and the Yamuna rivers. Geomorphologically the district can be broadly divided into five following topographic divisions

1. The Central Plateau
2. The South-western plateau and Kaimur range
3. The Northern Range
4. The Son Valley area, and
5. The Yamuna Valley

The central plateau occupy major part of the district area, centrally located between the Kaimur range in south and Pana range in the north.The central plateau is studded by small isolated hillocks namely, Kaitha hill (601.7m), Rampur (573m) and Bida (627.6m). The Kaimur hill range is passing through southern part of the district from Maihar and Amarpatan Tehsils in ENE-WSW direction forming water divide between Tons and Son Sub-basins. The northern range which is also called as "Panna range" is low range with broken ridges extends through the northern part of the district, extending from south-west to north-east direction .The Paisuni and Banganga streams rises from northern face of Panna rane. The highest peak of Panna hill range is Digri (484m). The son valley area is occurring as narrow strip, located south of Kaimur range. The Yamuna valley area is located on northern fringe of the district , below the Vindhyan plateau. It is part of the Ganga alluvial plain and characterized by the level plain with alluvial soil. Paisuni and Baghain rivers drain this area.

3.2 Soils

The soils are depending upon lithology of the area. Excepting small northen and southern part, Satna district is mainly underlain by sedimentary rocks of Vindhyan super group. In plateau area of the district which is occupied by shales with quartzites, Lime stones, conglomerates and sand stones is covered by "Red and Yellow Soils" and taxonomically it is designated as "Haplustults". Upland area of the district representing hill ranges is occupied by "Skeletal or Gravelly soils" and it is classified as "Lithic Entisols" from soil taxonomy point of view. Northern part of the area which is extension of Gangatic Plains is covered by "Alluvial Soil" and soil type is "Ustochrepts". Southern part of the district in son valley area is underlain by "Alluvial soils" which is thin and gravelly fertile soil.

4.0GROUND WATER SCENARIO

4.1 Hydrogeology

The main source of ground water recharge in the Satna district is rainfall. In Satna district various geological formations ranging in age from Archaeans to Recent are occurring in different part of area, making geological set up complex. However Vindhyans are main rock units of the area, covering more than 95 % of geographical area of the district. Among Vindhyan rocks both Lower and Upper Vindhyans are representing the area, but Lower Vindhyans are mostly occuping in southern part of the area in Son Sub-basin. Occurrence and movement of ground water in hard rocks is essentially by development and nature of secondary joints and fractures while solution cavities in limestones also play an important role. Ground water in general occurs under unconfined to semi-confined conditions. The occurrence and movement of ground water in different lithological units is briefly described in the following paragraphs:

Granite and Gneisses

Exposures of granite and granitic-gneisses is restricted only in northern fringe of Satna district forming hilly and forested area. Small patch of granite is also reported in south-eastern corner of the district in Son valley area, presently falling under submergence of Bansagar Reservoir.CGWB is not having any observation wells in granite terrain area. Ground water in granites occurs under phreatic conditions in weathered, fractured and jointed horizons.

Khenjua, Porcellanite and Basal Stage formations
(Semri-series, Lower- Vindhyans)

Lower Vindhyan rocks comprising basal conglomerate, Kajrahat limestone, Porcellanites, Glauconite beds, Fawn Limestone and Olive shales are occurring in southern part of the district. Small out crops of sandstone of Porcellanite Stage is also reported near Village Bansakar in north-west corner of the district in Baghain water shed, overlying granites. GSI has also reported narrow bands of Kajrahat Lime stone near Chitrakoot and Gupa-Godawari areas in northern part of the district, overlying Granites. Khenjua Hill comprising of Glauconite beds, fawn limestone and olive shales are forming

Ridge in southern part of the district almost parallel to Son river. Porcellanite and Basal stage formations of Son river valley are mostly submerged in Bansagar Reservoir area.

Rohtas Lime stone and Shales (Semri-series, Lower Vindhyan)

Rohtas limestone is light to dark grey in colour, fine grained and compact with shaly and sandy inter beds. These are thinly laminated, but massive form is also reported from some areas. Ground water generally occurs under unconfined conditions at shallow depths. Physiographic locations and degree of Karstification (Development of solution channels / Cavities) is important factor, which decides yield of ground water structure at specific location. Massive limestone does not have porosity / permeability. CGWB exploratory wells drilled at Ajwain, Rivara and Ramnagar gone dry due to massive nature of Rohtas limestone. Exploratory wells drilled at Bhadanpur and Mirgauti had yieled fairly good yield recorded as 1020 and 880 LPM respectively. Depth to water levels recorded in CGWB Ground Water Monitoring Well vary from 10 to 14.86 m, b.g.l. Depth of open Wells ranges from 10m to 20m, b.g.l. in this formation.

Kaimur and Rewa Series formations (Upper Vindhyans)

Kaimur and Rewa Series formations of Upper Vindhyan is together forming hilly and forested area, consisting of two limbs of synclinal basin. Main rock units are hard and compact siliceous (Quartzitic) sandstone and shales. Northern limb is quite broad while southern limb is rather narrow, representing " Kaimur Hill Range". In Kaimur hill range excepting establishment of Maihar Cement Plant entire area is barren. Ground water generally occurs in jointed, fractured and weathered horizons. Weathering of shales occurring in between sand stones has created valley like structures in northern limb area of Kaimur and Rewa series formations. Inhabitation is mostly confined in valley areas of northern limb where some ground water is available for domestic and agriculture needs. Otherwise this is scarcity area from the ground water availability point of view. Pre-monsoon depth to water level in Majhgawan and Nakaila Ground Water Monitoring Wells of CGWB was recorded 8.11 and 8.41 m, b.g.l. respectively during the year-2006. Yield Potential of these formations is less than 3 Liters / second.

Ganurgarh Shale (Bhander-Series, Upper Vindhyan)

Although shales are normally poorly permeable, but Ganurgarh shale due to its soft nature as compared to other compact it has undergone deep weathering (6-8m).Resultant weathering mantle supports development of dug wells for limited ground water exploitation. The presence of several joints and fissures has facilitated deeper percolation of ground water. Occurrences of solution cavities have been developed along the contact of Gypsum and Lime Stone. At deeper level gypsum bands are found in Ganurgarh shale. During excavation of " Bakiya Barrage Reservoir" lot of gypsum was reported in between Ganurgarh shale beds. Gypsum content is supporting development of artesian conditions in it, but quality of ground water is reported to be unsuitable, having excessive sulphate content. Ganurgarh shale is forming two limbs of syncline structure in the district Width of northern limb is wide, whereas southern limb is narrow and pinches south-westwards. Part of Ganurgarh Shale horizon is covered with alluvium received from Kaimur / Rewa Sand stone and deposited over this shale making good phreatic aquifer specially in southern limb area where its surface exposures are not seen due to overlain alluvial cover and providing good yield to dug wells located along foot hills of

Kaimur hill range from Amdara, Ghunwara, Delha, Madai, Kharamseda, Tala to Mukundpur. Yield potential of Ganurgarh shale is less than 4 Liters / second, but exploratory well drilled at village Jura has yielded 14 Liters / second discharge during pumping test for 24.00m draw down', tapping Ganurgarh shale aquifer at depth having sulphate content 700 mg/ litre making water unsuitable for human consumption.

Bhander Lime Stone

This unit is hard and compact but jointed and fractured. Along the joints and planes of stratification "Grikes" and "Solution Cavities" get developed through the process of dissolution of country rock by circulating ground water. Often cavities are filled with yellow coloured plastic clay known as "Terra-Rosa". Cavernous Lime stone hold good quantity of ground water, but quality may be slightly hard. General Yield Potential of Bhander (Nagod) Lime stone is 3 to 12 Liters/ second. Exploratory wells drilled at Kirpalpur (Satna-Anicut), Maihar-Stadium and Jhinna-Nala tapping Lime Stone aquifers has given good yields.

Sirbu Shale

Sirbu shale is younger unit of Upper Vindhyan having very thick horizon along Syncline axis. In low-lying topographic areas and in the weathered mantle occurrence of ground water is in limited quantity yet enough to sustain dug wells for domestic / drinking purposes. The brownish red variety is more productive than the grayish shales. Due to its impervious nature lot of small ponds are constructed in Sirbu shales which holds water even during summer season in Maihar and Amarpatan Blocks. These ponds are also used for production of water- Nuts in abundance. General yield potential of Sirbu shale is 1 to 3 Liters / second.

Upper Bhander Sand Stone

Upper Bhander sand stone is youngest unit of Vindhyan System hard and compact in nature and it forms hilly track in western part of the district. "Parasmaniya Plateau" of Unchehara Block is almost fully occupied by rocks of this group. Flagstone is also farming part of it at several places and flagstones mines are operative in the area. Normally ground water occurs under Phreatic conditions in shallow weathered and jointed rocks. Presence of joints and fractures provide secondary porosity so much so the feasibility for limited occurrences of ground water and its development through Dug wells / Dug-cum Bore well are reported to exists.

Laterite and Alluvium

Laterite is occurring as capping over hillocks on Kaimur / Rewa sand stone which is not important from ground water occurrence point of view. Alluvial unit comprising fine to medium sand with admixture of silty clay and gravel offers considerable primary porosity. Though its area is limited in the district but alluvium of recent age is an important aquifer of the area being developed through open wells and shallow tube wells in the area. Main occurrence is in northern part of the area between Baboopur and Chitakoot with variable thickness and approximate average thickness is less than 30 m. Alluvial Ravines are reported to be developing in the Chitrakoot area due to head wards erosion. Two strips of alluvium is also occurring in the district, at foothills of both limbs

of Rewa sand stones. Northern alluvial strip is passing through Singhpur, Jhali, Kothi and Birsinghpur. Southern alluvial strip is starting from Amdara to Ghunwara, Madai, Katha, Tala and Mukundpur occurring at northern face of Kaimur hill range.Both strips of alluvium are forming highly fertile land providing ground water for agriculture growth of the area through Dug Wells and shallow Tube Wells.

Aquifer Parameters

CGWB has drilled 32 exploratory wells in Satna district under ground water Exploration Programme and 8 observation wells. There are 13 piezometres constructed in the district to monitor the ground water regime.

Water Levels

The Central Ground Water Board has been carrying out water level monitoring of Ground Water Monitoring Wells Water levels of these monitoring stations are being monitored four times in a year, Viz- during the month of January, May, August and November. Presently there are 42 Ground Water Monitoring Wells, 34 dug wells and 9 piezometres, in the district. A Hydrogeological Map (Fig. 2) of Satna district has been prepared on the basis of data available with CGWB. To study ground water regime of the area, water level data of CGWB Ground Water Monitoring Wells have been used and following maps have been prepared.

(a) Pre-Monsoon Depth to water Level (May-2012)

In general depth to water level in the area ranges between 3.50 to 30.40 m below ground level. It is observed that the major part of the district was covered by the water levels varying between 4 to 12m bgl during the period

(b) Post-Monsoon Depth to Water Level (November 2012)

In general post monsoon depth to water level in the district ranges between 0.97 mbgl to 16.90 m, below ground level. It is observed that the major part of the district was covered by the water levels varying between 3 to 10 m bgl during the period

Long-term water level trend in last 10 years (Year 2003 to 2012)

The declining trend has been observed in the district ranging from 0.1 to 0.32 m/ year.

4.2 Ground Water Resources

Satna district is underlain by Vindhyan Shale, Limestone and Sandstone and Alluvium. Dynamic ground water resources of the district have been estimated for base year -2008/09 on block-wise basis. Out of 7,52,034 ha of geographical area, 6,72,106 ha (89 %) is ground water recharge worthy area and 79,928 ha (11%) hilly area. There are nine number of assessment units (block) in the district which fall under non-command . Maihar, and Nagod,, blocks of the district are categorized as semi critical (safe in 2003/04) Amarpatn and Sohawl blocks as critical (safe in 2003/04) Rampur Baghelan (critical in 2004) as over exploited and rest as safe. The highest stage of ground water development is computed as 102 % in Rampur Baghelan. The net ground water availability in the district is 52,950 ham and ground water draft for all uses is 39,453 ham, making stage of ground water development 75 % (69 % 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 12707ham.

Table-5 : Block wise Ground Water Resources Estimation Data of Satna District, Madhya Pradesh

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 (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} (%)
37	**Satna**								
	Amarpatan	Command							
		Non-Command	5850	5258	502	5761	502	89	98
		Block Total	**5850**	**5258**	**502**	**5761**	**503**	**88**	**98**
	Maihar	Command							
		Non-Command	6676	4388	863	5251	1026	1262	79
		Block Total	**6676**	4388	**863**	**5251**	**1026**	**1262**	**79**
	Majhgawan	Command							
		Non-Command	12174	4004	583	4586	695	7475	38
		Block Total	**12174**	**4004**	**583**	**4586**	834	**7336**	**38**
	Nagod	Command							
		Non-Command	8627	6878	525	7403	676	1073	86
		Block Total	**8627**	**6878**	**525**	**7403**	**676**	**1073**	**86**
	Ramnagar	Command							
		Non-Command	3490	1507	333	1840	387	1596	53
		Block Total	**3490**	**1507**	**333**	**1840**	**387**	**1596**	**53**
	Rampur Baghalan	Command							
		Non-Command	5276	4680	690	5370	690	-94	102
		Block Total	**5276**	**4680**	**690**	**5370**	**691**	**-95**	**102**
	Sohawal	Command							
		Non-Command	6920	5609	1012	6621	1012	**299**	96
		Block Total	**6920**	**5609**	**1012**	**6621**	**1012**	**299**	96
	Unchehra	Command							
		Non-Command	3937	2196	425	2621	594	1148	67
		Block Total	**3937**	**2196**	**425**	**2621**	**594**	**1148**	**67**
		District Total	**52950**	**34520**	**4933**	**39453**	**5723**	**12707**	**75**

4.3 Ground Water quality of Satna district

Quality of ground water is fresh to saline with EC ranging from 298 to 3140 mmhos/cm at 25° C, nitrate from 2 to 175 mg/l and fluoride from 0.13 to 1.23 mg/l.