



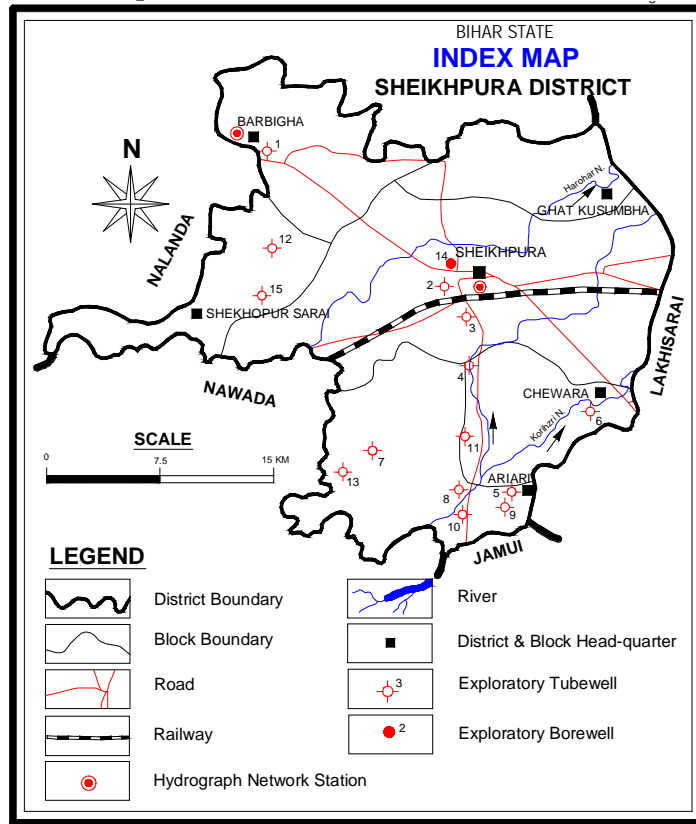
स्वच्छ सुरक्षित जल – सुन्दर खुशहाल कल

CONSERVE WATER - SAVE LIFE



Ground Water Information Booklet

Sheikhpura District, Bihar State



Central Ground Water Board
 Ministry of Water Resources
 (Govt. of India)
 Mid-Eastern Region
 PATNA

September, 2007

PREPARED BY	-	Mr. Mukesh Kumar Mandal, STA (HG)
UNDER SUPERVISION OF	-	Dr. K.K.Singh, Scientist'D'
CARTOGRAPHY BY	-	Mr. J.K. Tandon, Draughts man (Gr.- II)

SHEIKHPURA DISTRICT AT A GLANCE

Sl. No.	ITEMS	Statistics		
1.	GENERAL INFORMATION			
	i)	Geographical area (SqKm)	689	
	Administrative Division (As on 2001)			
	i)	Number of Tehsil/ Block	06	
	ii)	Number of Panchyat/Villages	54/1313	
	iii)	Population (As on 2001 Census)	525187	
	iv)	Average Annual Rainfall (mm)	1042	
2.	GEOMORPHOLOGY			
	Major physiographic unit :		Hill, Pediplain, Alluvial Plain	
	Major Drainages:		Harohar and Korihzri	
3.	LAND USE (SqKm)			
	a)	Forest area:	Nil	
	b)	Net area sown:	320.80	
	c)	Cultivable area:	487.13	
4.	MAJOR SOIL TYPE		Entsols & Inceptisols	
5.	AREA UNDER PRINCIPAL CROPS		Paddy, Wheat, Onion	
6.	IRRIGATION BY DIFFERENT SOURCES (Areas Sqkm and Number of Structures)		Area	No.
	Dugwell		-	-
	Tubewell/Borewell		223.56	-
	Tank/ponds		-	-
	Canals		-	-
	Other sources		3.97	-
	Net irrigated area		-	
	Gross irrigated area		227.53	
7.	NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-3-2007)			
	No of Dug wells		02	
	No of Piezometers		Nil	

8.	HYDROGEOLOGY	
	Major Water bearing formation	a) Unconsolidated Sediment of Alluvium Plain. b) Hard rock/fissured formation Quartzit.
	(Pre-monsoon Depth to water level during 2006) m bgl.	6-10
	(Post-monsoon Depth to water level during 2006) m bgl.	1-7
	Long term water level trend in 10 yrs (1997-2006) in m/yr	-
9.	GROUND WATER EXPLORATION BY CGWB (As on 31-07-2007)	
	No of wells drilled (EW, OW, PZ, SH, Total)	15, 08, Nil, Nil, 23
	Depth range (m)	50-200
	Storativity (S)	3×10^{-5} to 5×10^{-3}
	Transmissivity (m^2/day)	5.25 to 2250
10.	GROUND WATER QUALITY	
	Presence of Chemical constituents more than permissible limit (e.g EC, F, As, Fe)	Not reported
	Type of water	Potable
11.	DYNAMIC GROUND WATER RESOURCES(2004)- in mcm	
	Annual Replenishable Ground water Resources	16.297
	Net Annual Ground Water Draft	7.836
	Projected Demand for Domestic and industrial Uses up to 2025	1.642
	Stage of Ground Water Development	48.08%
12.	AWARENESS AND TRAINING ACTIVITY	
	Mass Awareness Programmes organized	Nil
	Date:	-
	Place:	-
	No of participant :	-
	Water Management Training Programmes organized	Nil
	Date	-
	Place	-
	No of participant	-
13.	EFFORT OF ARTIFICIAL RECHARGE & RAIN WATER HARVESTING	
	Project completed by CGWB(No & Amount spent)	Nil

	Project under technical guidance of CGWB (Numbers)	Nil
14.	GROUND WATER CONTROL AND REGULATION	
	Number of OE Blocks	Nil
	Number of Critical Blocks	Nil
	Number of Blocks notified	Nil
15	MAJOR GROUND WATER PROBLEMS AND ISSUES	Source finding in hard rock area

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Sheikhpura District, Bihar State

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1.0 Introduction

1.1 Administration

Sheikhpura district is located in the south of river Ganga with a geographical area is 689km². It lies between 24⁰58' and 25⁰16' North Latitude and 85⁰34' and 85⁰58' East Longitude, and falls in the Survey of India degree sheet number 72/ G. The district is bounded in the north and west by Nalanda district, in the east by Lakhisarai district and in the south by Nawada and Jamui districts. The district is having one subdivision and six developmental blocks (figure-1) for administrative and development point of view. There are 54 panchyat and 1313 villages in the district having a total population of 5.25 lakhs as per the census 2001 with a decadal growth (1991-2001) of 24.96%. The population density of the district is 762-person/sq km with a sex ratio of 920.

1.2 Basin/sub-basin, Drainage

Sheikhpura district forms a part of Phalgu-Kiul sub-basin of Ganga Basin. The district is having moderate to low drainage density with parallel to sub-parallel drainage pattern. The Harorar and Khorizri are the two main rivers flowing through the district in the NE direction to meet the river Ganga in Munger district.

1.3 Irrigation Practices

The economy of the district is agrarian in nature and the principal crops are wheat and paddy with 13703 ha under wheat crop. Other than this, onion, potato and green vegetable are grown on a large scale. As per the data of year 2004-

2005 (Govt. of Bihar) the gross irrigated area is about 227.53 ha. The cultivable area is 487.13 ha. The area of 223.56 ha is irrigated by tube wells and 3.97 ha by other sources. Conjunctive use of surface and ground water can bring the desired development in this water scarce district.

1.4 Studies/ activities carried out by CGWB

Central Ground Water Board has carried out hydrogeological surveys and ground water explorations in the district. So far, a total 23 wells have been drilled by CGWB, Out of these wells 15 are exploratory and 08 are observation wells. There are 22 tube wells in alluvial area and 01 bore wells in hard rock area. Regular monitoring of one hydrograph stations in the district is being done four times in a year since 1975 by CGWB. It has generated invaluable data on water level fluctuation and chemical quality of ground water. Ground water resources of the district have been estimated (GEC-1997, norm) in the year 2004, which highlighted the stage of ground water development as 48% on an average.

2.0 Rainfalls and Climate

The average annual rainfall of district is 1042 mm. About 80% of the rainfall is received during June to September by south-west monsoon. The climate of Sheikhpura district represents a transition between dry climates of the northern India and warm and humid of West Bengal. In the summer season temperature rises up to 42⁰C, while in winter season it drops to as low as 2⁰C.

3.0 Geomorphology and Soil types

3.1 Geomorphology

The major part of the district is occupied by alluvial plain except the hill near to the Sheikhpura town.

- a) Older Alluvial Plain forms a major part of the district and comprises sediments deposited by tributaries of Ganga river. Average height of this plain is 45 m amsl.
- b) Younger Alluvial Plain forms the northeastern parts of the district, mainly in Ghat Kusumbha block. The relief of this plain varies on an average from 40 to 55m above mean sea level.
- c) The rocky upland mainly occurs near Sheikhpura town where it constitutes landmasses of quartzite, trending in east west direction. It is surrounded on all sides by alluvial plains thus forming inselberg. The hill attains its maximum height of 220 m amsl near Sheikhpura town.

3.2 Soils

The Sheikhpura district consists mainly of Entisols and Inceptisols group of soils generated under different lithological and pedogenic conditions. Calcareous alluvial soil of Inceptisols group occurs on the northern part of district mainly around Ghat Kusumbha block. Younger alluvial soil of Entisols group occurs in a major part of the district. It is deficient in nitrogen, phosphoric acid and humus. Texturally these soils are sandy to loamy and the pH value is on the alkaline side.

4.0 Ground Water

4.1 Hydrogeology

Hydrogeologically, the district is divided into two parts (a) unconsolidated / porous formation (b) hard rock/ fissured formation (Figure 5).

(a) Porous formation: The Quaternary alluvium constitutes this hydrogeological unit. The alluvial tract spread over the major part of the district, with sediment thickness ranging from 20 to 190 m. The variation in thickness of the alluvium is due to uneven bed-rock topography. Alluvium comprises clay, silt and sand. There are 22 tube wells drilled by CGWB and maximum depth being 190m bgl at Barbigha village. Aquifers in this formation are in unconfined to semi-confined conditions and discharge varies from 25 to 65 lps.

(b) The hard rock / fissured formation: It comprises mainly quartzite. The secondary porosities developed by means of weathering and / or fracturing are the main repository of ground water. In general these rocks form poor aquifers. The exploratory drilling data of this area reveals three sets of fracture/ joints occurring at different depths up to 100m bgl. Identification of groundwater potential area has been done based on study of lineaments picked up from satellite imageries. The zones of lineaments are the potential areas for ground water exploration and recharge. Weathered residium, saprolite zone and fractures within 15-35m bgl depths constitute shallow aquifer in the hard rocks. There is one bore well drilled in hard rock area to a maximum depth of 104m bgl in Sheikhpura town. Ground water occurs under semi-confined condition in hard rock and normally discharge ranges from 1 to 10 lps with a drawdown of 12-18 m. Detailed exploratory data is given in Table1.

The pre-monsoon depth to ground water level of phreatic aquifer is ranging from 6 to 10m bgl, while the post-monsoon depth to ground water level is ranging from 1 to 7m bgl. Long-term water level data (1997-2006) indicates no significant decline in water level. Depth to water level for the pre-monsoon and post-monsoons period of the year 2006 are shown in figures 2 and 3 respectively.

4.2 Ground Water Resources

Annually replenishable dynamic ground water resource of the district has been estimated (GEC-1997, norm) as on 31st March 2004 for all the blocks. The net annual replenishable ground water resource of the district is 16297.46 ham.

The gross ground water draft for all uses is 7834.31 ham and allocation for domestic and industrial requirement up to year 2025 is 1642.57 ham. The present stage of ground water development of the district as on 31st March 2004 is 48.08 %. All the six blocks of the district fall under safe category (figure 4). At present maximum ground water development is in Barbigha block (64.38%), while minimum is in Ghat kusumba block (22.08%). Details of ground water resources of all blocks are shown in Table 2.

4.3 Chemical Quality of Ground Water

Chemical analysis of phreatic aquifer reveals that pH varies from 7.40 to 8.3, EC from 640 to 750 micro Seimens/cm, calcium from 40 to 58 ppm, magnesium from 25 to 55 ppm, sodium from 44 to 63 ppm, potassium from 1.2 to 3.5 ppm, bicarbonate from 280 to 375 ppm, sulphate from 10 to 231 ppm, chloride from 25 to 209 ppm, nitrate from 25 to 130 ppm and fluoride 0.5 to 0.88 ppm. EC contour is shown in Figure 5. The ground water is by and large suitable for drinking and irrigation purposes.

4.4 Status of Ground Water Development- Block wise

The occurrence and movement of ground water is governed by geology and geomorphology. An attempt has been made to summarize block wise information on suitable well type, depths, discharge and suitable drilling method (Table. 3).

5.0 Ground Water Management Strategy

5.1 Ground Water Development

The most suitable area for ground water development is alluvial plain in Barbigha, Ghat kusumba, Ariari blocks. Maximum thickness of alluvium is encountered in Barbigha village i.e. 190 m. Direct and reverse rotary drillings are suitable in unconsolidated formation. In hard rock areas ground water development can be done by drilling bore wells to a depth of 150 m. The sites of the wells should be scientifically selected after studying the geology and analyzing satellite imageries and sites pinpointed by geophysical techniques. In general depth of weathering ranges from 5 to 10m bgl in hard rock area. Detail information related to depth, discharge, drilling methods etc are given in Table 3.

5.2 Water Conservation and Artificial Recharge

The gross irrigated area of the district is about 47% of the total cultivable area i.e 487.13 sq km. Though there is an overall availability of ground water, the location of a prospective site is difficult in hard rock terrain. As such at some places shortage of water is observed. In these areas water conservation techniques could be used. The district receives average annual rainfall of 1042 mm, construction of water conservation structures will help arrest runoff, recharge the aquifer and retain the soil moisture. Contour bunding, check dam,

gully plug, and percolation tank are suitable structures in the hard rock areas, while recharge shaft and percolation tank are suitable structures in unconsolidated formation.

6.0 Ground Water Related Issue and Problems

A major part of the district is occupied by unconsolidated sediments. In some part of the district, discharge is comparatively less due to poor aquifer. Water scarcity is felt in non-monsoon lean period in hard rock area. In general, the chemical quality of ground water is potable and suitable for irrigation purposes.

7.0 Mass Awareness and Training Activity

7.1 Mass Awareness Programme

Mass Awareness Programme (MAP) and Training Activity have not been organized in this district so far and will be taken up in near future.

8.0 Area notified by Central Ground Water Board (CGWA)/ State Ground Water Authority (SGWA)

All blocks of Sheikhpura district are under safe category for ground water development point of view. No block has been notified by CGWA/SGWA.

9.0 Recommendation

1. The stage of ground water development is around 48% indicating that there is large scope for further ground water development however the artificial recharge including rainwater harvesting should be taken to augment the ground water reserve.
2. The district headquarter at Sheikhpura to be taken up under artificial recharge of ground water, keeping in view of rapid increase in ground water draft. The ground water draft in Sheikhpura urban area is to the tune of 7.30 lakhs lpd. Roof top rainwater harvesting to be taken up to recharge the aquifer in Sheikhpura urban area.
3. Area falling within 9-10 water level in post monsoon period around Sheikhpura town is found most suitable for artificial recharge.
4. Suitable structure for artificial recharge in the area under porous formation are recharge shaft and percolation tank.
5. Suitable structures for artificial recharge in hard rock areas are contour bunding, check dam, gully plug, and percolation tank.

Figure.-1

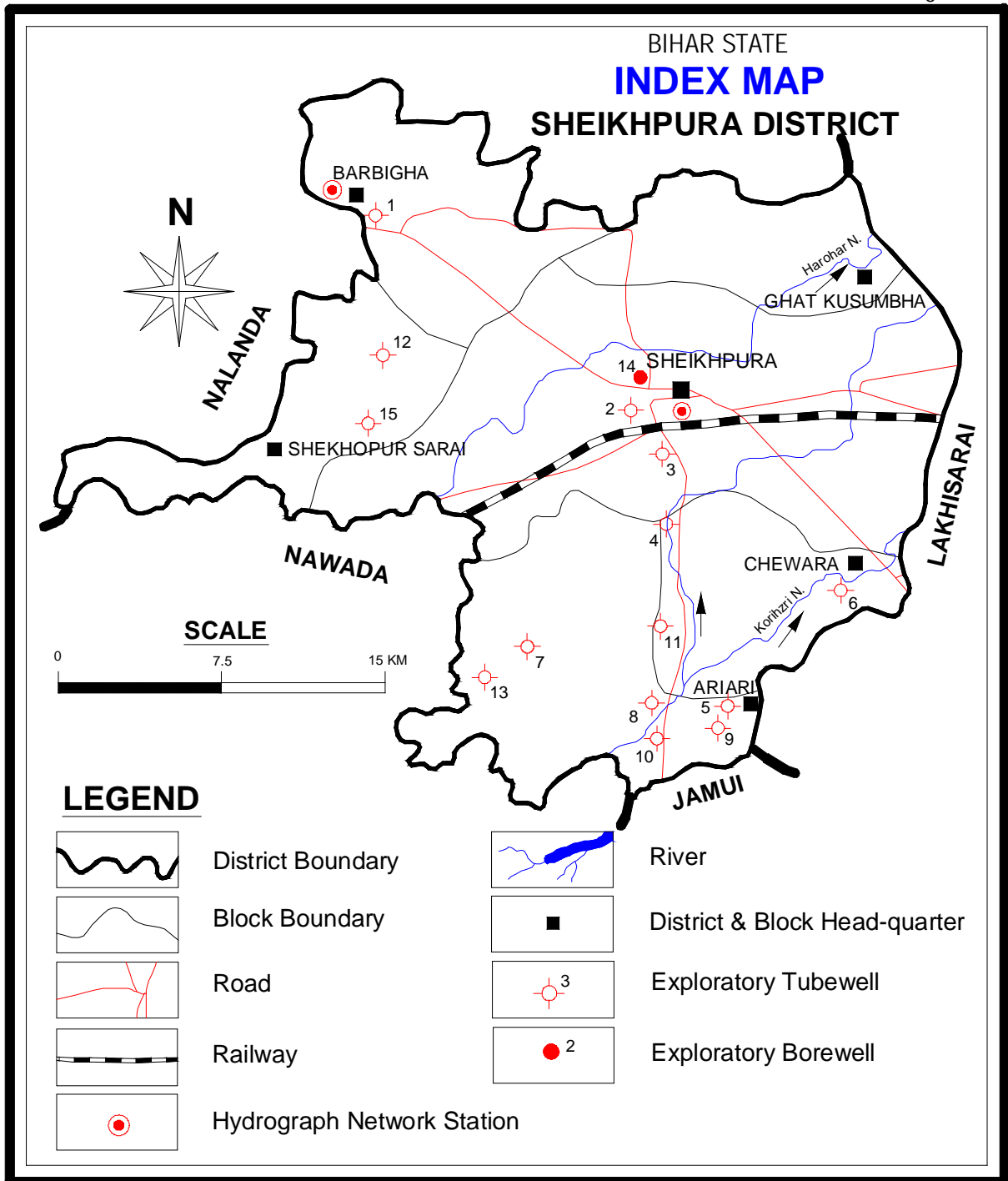


Figure: - 2

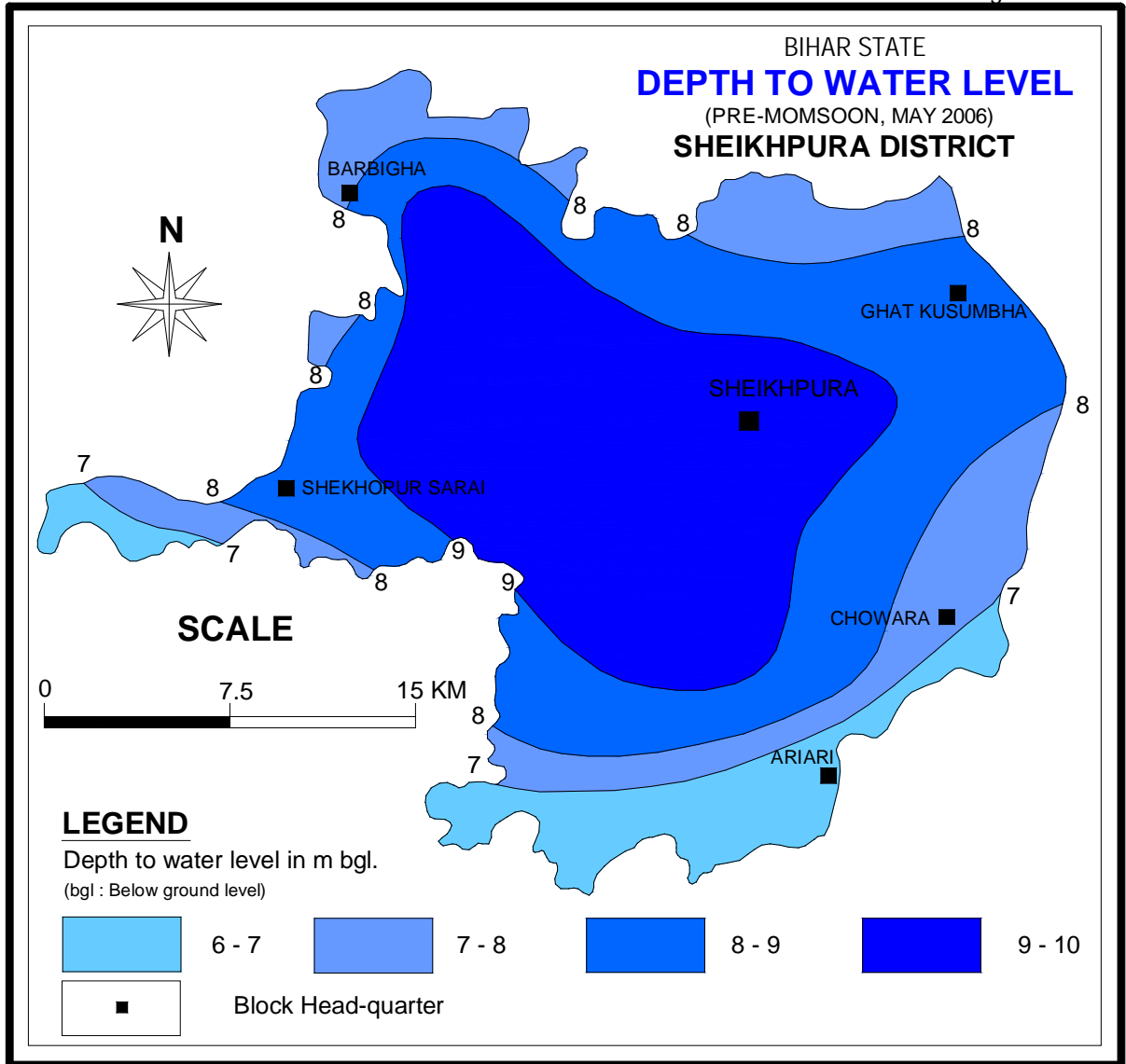


Figure - 3

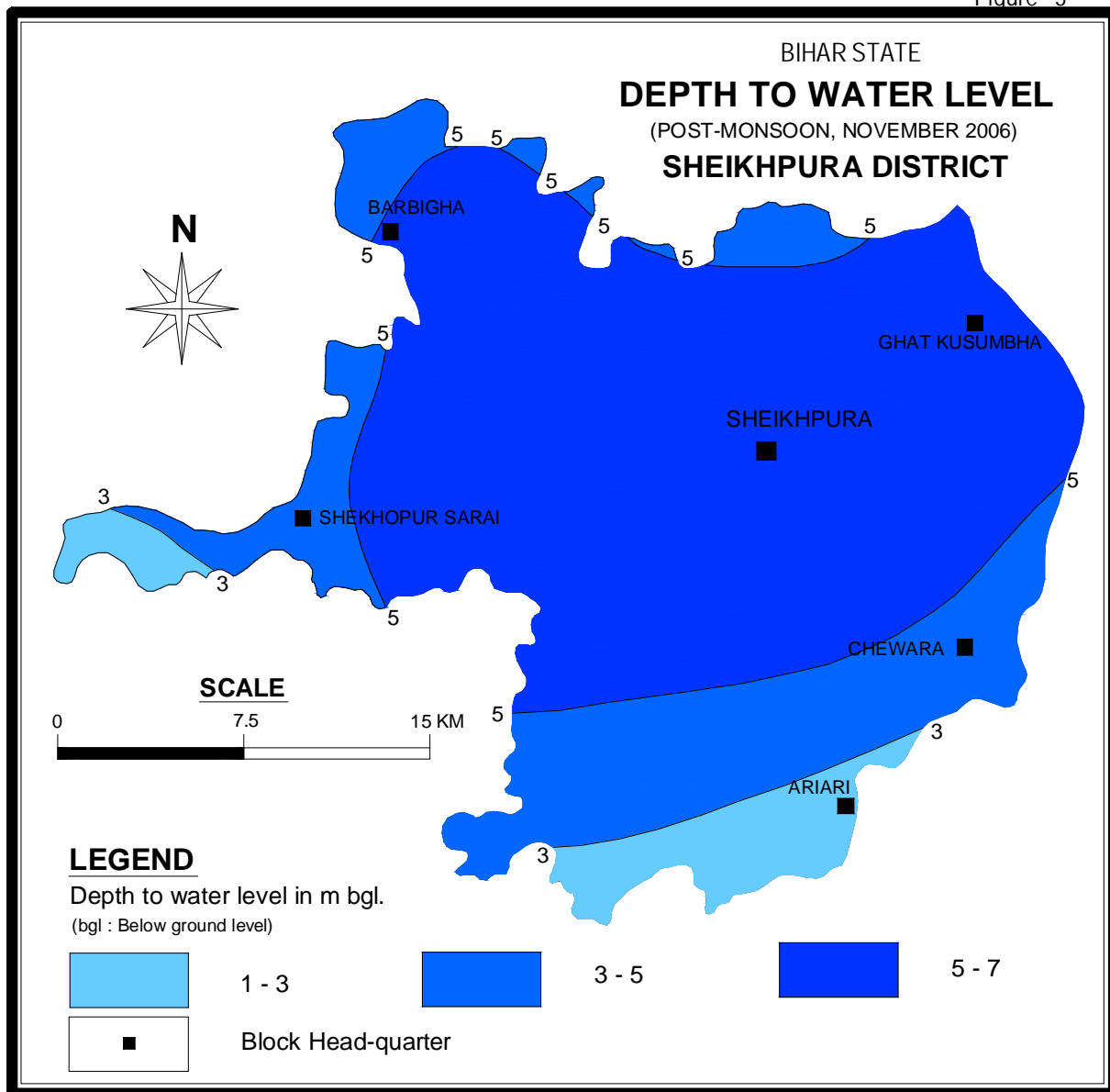


Figure.-4

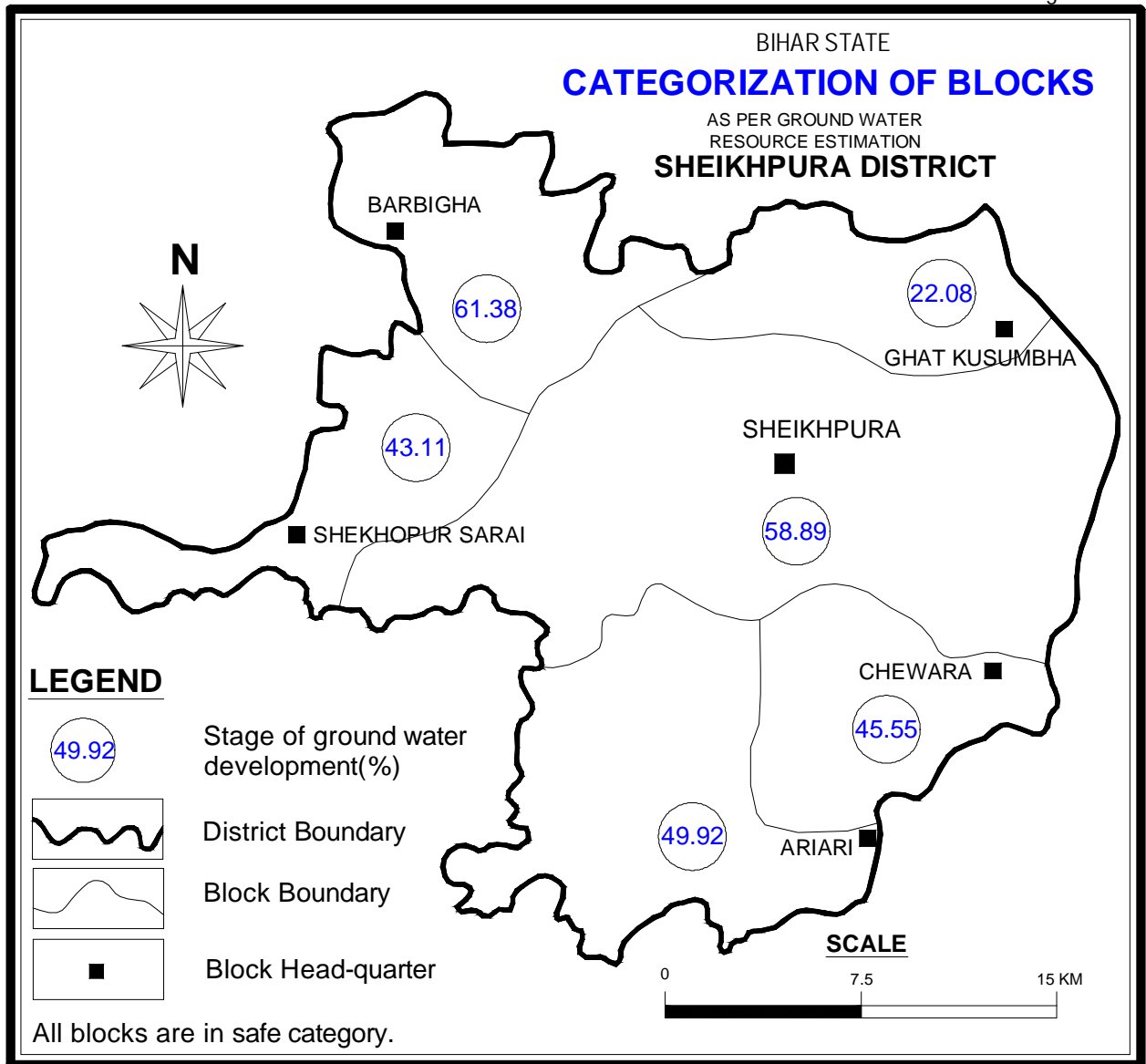


Figure - 5

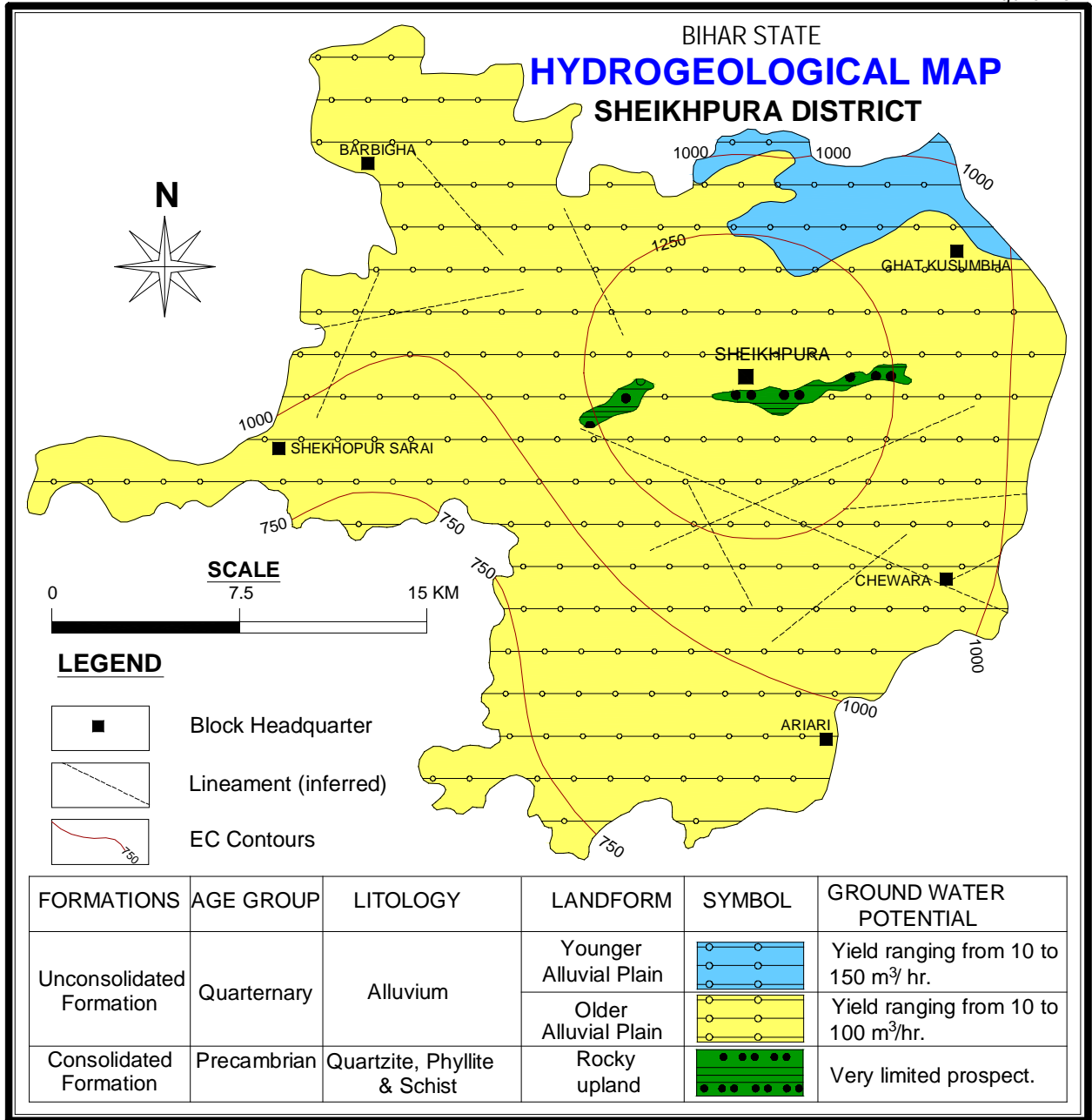


Figure-5

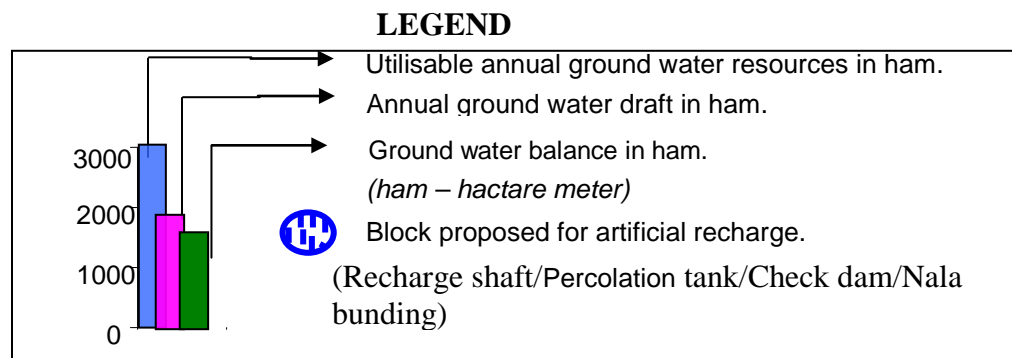
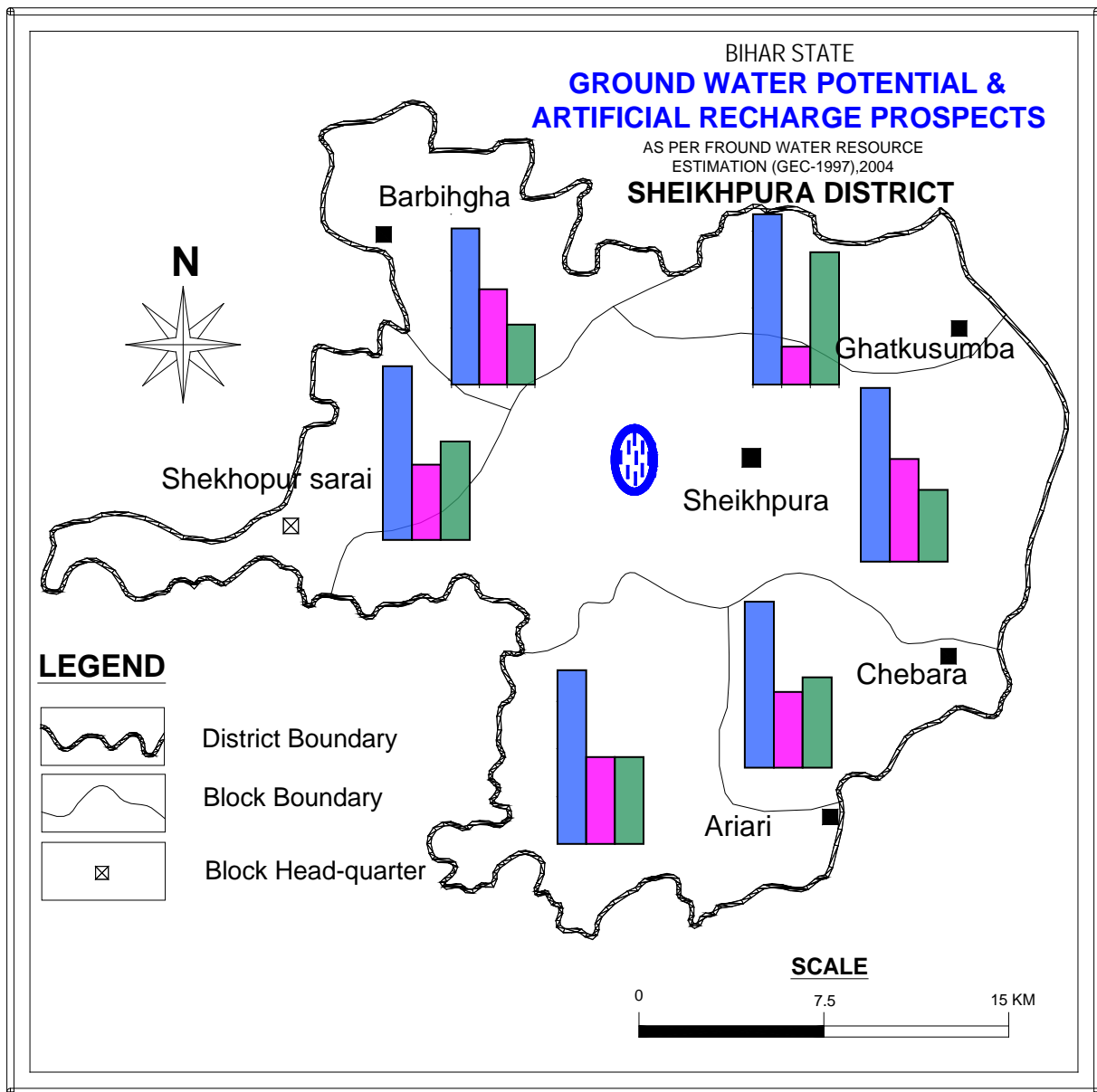


Table no. 1

DETAILS OF EXPLORATORY WELL (EW), SHEIKHPURA DISTRICT (BIHAR).

Exploratory Well No.	Location	Formation	Depth Drilled (m bgl).	Discharge (m ³ /hr.)	Transmissivity (m ² /day)	Storativity	Quality of water
1	2	3	4	6	7	8	9
1	BARBIGHA	Alluvium	200.00	247.32	2250.40	01.9X10 ⁻¹	POTABLE
2	SHEIKHPURA	Alluvium	107.30	208.00	648.00	5.37X10 ⁻⁴	POTABLE
3	NIMMIE	Alluvium	154.60	188.60	766.70	1.9X10 ⁻⁴	POTABLE
4	HUSSAINABAD	Alluvium	116.94	160.70	697.88	4.05 X10 ⁻⁴	POTABLE
5	ARIARI	Alluvium	75.00	22.00	-	-	POTABLE
6	CHEWARA	Alluvium	74.80	160.80	672.00	1.50 X10 ⁻⁴	POTABLE
7	KASAR	Alluvium	74.00	7.29	5.25	-	POTABLE
8	SOHDI	Alluvium	51.70	61.32	295.00	-	POTABLE
9	LOHAN	Alluvium	54.30	Abandoned	-	-	POTABLE
10	CHORARIARI	Alluvium	58.80	45.00	-	-	POTABLE
11	BEMAN	Alluvium	47.00	60.00	-	-	POTABLE
12	SAMAS	Alluvium	159.50	130.00	1100.00		POTABLE
13	SASBAHNA	Alluvium	75.00	105.00	-	-	POTABLE
14	SHEKHPURA	Quartzite	103.00	12.24	15.22	-	POTABLE
15	CHARUWANA	Alluvium	153.40	63.74	1334.00	-	POTABLE

Table no. 2**Stage of ground water development of the Sheikhpura district (Bihar state) as on 31st March 2004.**

(in hectare meter)

SL No	Assessment Unit/Block	Net Annual Ground water Availability	Gross Ground Water Draft for Irrigation	Gross Ground water Draft from Domestic and Industrial Water Supply	Gross Ground Water draft For all Uses (4+5)	Allocation for Domestic and Industrial Requirement for up to next 25 years	Net Ground Water Availability for future irrigation development (3-4-7)	Stage of Ground Water Development (6/3)*100 (%)	Categorization for future G.W Development
1	2	3	4	5	6	7	8	9	10
1	Ariari	3642.12	1680.06	138.08	1818.14	204.96	1757.10	49.92	Safe
2	Barbihga	2741.83	1358.47	324.35	1682.82	635.34	748.03	64.38	Safe
3	Chebara	2873.36	1212.20	96.56	1306.76	143.33	1517.84	45.55	Safe
4	Ghatkusumba	2218.19	432.67	57.18	489.85	84.88	1700.64	22.08	Safe
5	Sheikhpura	2901.53	1449.34	259.50	1708.84	437.14	1015.06	58.89	Safe
6	Shekhopursarai	1920.43	735.66	92.24	827.90	136.92	1047.85	43.11	Safe
	Total	16297.46	6868.40	967.91	7834.31	1642.57	7786.52	48.08	

Table no. 3

Block wise data on suitable well type, design and suitable pump of Sheikhpura district.

S.No	Block Name	Suitable Well type	Expected Discharge (LPM)	Recommended depth (m)	Diameter of well	Suitable Drilling method	Type of pump	Success rate
1.	Ariari	Tube well	100-500	100-150	4 inch	Rotary	Submersible	Moderate
2.	Barbihga	Tube well	500-1500	100-150	4-6 inch	Rotary	Submersible	Good
3.	Chewara	Tube well	500-1000	75-100	4 inch	Manual	Submersible	Good
4.	Ghatkusumba	Tube well	500-1000	100-150	4-6 inch	Rotary	Submersible	Good
5.	Sheikhpura	Tube well	100-500	50-100	4 inch	Rotary	Submersible	Moderate
		Bore well	100-150	50-100	4 inch	DTH	Submersible	Moderate
6.	Shekhopursarai	Tube well	100-200	20-30	4 inch	Rotary	Submersible	Good

*In all blocks shallow tube well up to depth of 60 m is feasible.