

# DISTRICT GROUND WATER BROCHURE OF SANT KABIR NAGAR, U.P.

(A.A.P.: 2008-2009)

By

**A.K. Pandey**

Scientist 'B'

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## SANT KABIR NAGAR DISTRICT AT GLANCE

### 1. GENERAL INFORMATION

District	:	Sant Kabir Nagar
i. Geographical Area (Sq. Km.)	:	1646
ii. Location	:	Latitudes – 26 <sup>0</sup> 30' to 27 <sup>0</sup> 10' Longitudes – 82 <sup>0</sup> 45' to 83 <sup>0</sup> 15'
iii. <b>Administrative Division</b>		
a) Number of Tehsil	:	3
b) Number of Block	:	7
(1.Samariyawan, 2.Mehdawal, 3.Baghauli, 4.Khalilabad, 5.Nath Nagar, 6.Hainser Bazar, 7.Samtha)		
c) Number of Panchayat (Nyay)	:	85
d) Number of Village	:	1576
iv. Population (as on 2001 census)	:	14,20,226
Density of population	:	863 per sq.km.
iv. Normal Annual Rainfall (mm)	:	1250.2

### 2. GEOMORPHOLOGY

Major Physiographic Units	:	Younger alluvial plain Older alluvial plain
Younger Alluvial – Sand, Silt and Clay adjacent to flood plain of the rivers		
Older Alluvial – Plain are very similar to younger alluvial plains.		
Major Drainages	:	Ghaghara, Kuwana and Rapti rivers, Ami and Anui are the other rivers.

### 3. LAND USE (As on Statistic Book – 2006) (ha.)

a) Forest area (ha)	:	4368
b) Net area sown (ha)	:	118458
c) Cultivable area (ha)	:	174914

### 4. MAJOR SOIL TYPES

: Alluvial soils – Older alluvial soil, Younger alluvial soil  
The older alluvial soil occupies high, younger soils are restricted to marginal tract.

### 5. AREA UNDER PRINCIPAL CROPS (As on : Rabi, Kharif, Jayad Statistic Book-2006)

- 6. IRRIGATION BY DIFFERENT SOURCES**  
(Areas and Number of Structures) (ha)
- Dugwells : -
- Govt. Tubewells / Borewells : Area 3028 ha, T/W No. 345
- Private Tubewells & Pumpsets : Area 82804 ha, Nos. 55422
- Other Sources : Area 12609 ha
- Canals : Area 2296 ha, length 72 km.
- Net Irrigated Area : 100737 ha
- Gross Irrigated Area : 101000 ha
- 7. NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-3-2007)**
- No. of Dugwells : 5
- No. of Piezometers : Nil
- 8. PREDOMINANT GEOLOGICAL FORMATIONS** : The district fall under Central Ganga Plain in the inter fluvial belt of Ghaghara and Rapti rivers. Geologically the area is comprised of older and younger alluvium of quaternary age.
- 9. HYDROGEOLOGY** : The two tiers aquifer system, CGWB has not carried out exploratory drilling in the distt.
- The water bearing formation : Sand, gravel, clay and kankar in different proportions.
- Depth to water level (NHS) in mbgl : (Premonsoon 2007) 3.58 – 6.61  
: (Postmonsoon 2007) 1.77– 4.57
- Long term of water level (1998-2007) in m/yr : Rise (Premonsoon) 0.0259 m/yr at Dhanghata  
Fall (Postmonsoon) 0.0231-0.1502 m/yr
- 10. GROUND WATER EXPLORATION BY CGWB (As on 31-3-2007)** : Not carried out exploratory drilling in the district.
- 11. PRESENCE OF CHEMICAL CONSTITUENTS LESS THAN PERMISSIBLE LIMIT (e.g. EC, F, As, Fe)** : Presence of chemical constituents less than permissible limit (EC, F, As, Fe)
- 12. DYNAMIC GROUND WATER RESOURCES (2004)-in MCM**
- Annual Replenishable Ground Water Recharge : 57065.99

	Net Annual Ground Water Availability	:	53888.70
	Existing Gross Ground Water Draft for All Uses	:	38349.28
	Net Ground Water Availability for Future Irrigation	:	13024.11
	Development		
	Stage of Ground Water Development	:	71.16%
	Category of Blocks	:	Safe
<b>13.</b>	<b>AWARENESS AND TRAINING ACTIVITY</b>	:	Nil
<b>14.</b>	<b>EFFORTS OF ARTIFICIAL RECHARGE &amp; RAINWATER HARVESTING</b>	:	Nil
<b>15.</b>	<b>GROUND WATER CONTROL AND REGULATION</b>	:	
	All blocks	:	Safe
<b>16.</b>	<b>MAJOR GROUND WATER PROBLEMS AND ISSUES</b>	:	(1) No exploratory tubewells in the district (2) Collection of aquifer parameters.

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## **1.0 INTRODUCTION**

Sant Kabir Nagar is one of the five districts in the state which is under the administrative control of newly created Basti division. It is bounded on the north by Siddharth Nagar district, on the east by Gorakhpur district, on the south by Faizabad district and on the west by Basti district. The river Ghaghara separated this district from Faizabad district on its southern boundary. Khalilabad town is the district headquarters. The district is named after Sant Kabir, the most renowned disciple of great Vaishnava reformer. The district of Sant Kabir Nagar has been carved out as a separate district vide state government notification no. 2649/15/97-309/97-Rev-5 dated 5<sup>th</sup> September 1997.

### **1.1 Location & Extent:**

The district has been divided into three (3) tehsils and seven (7) blocks. The district have an area of about 1646 sq.km. (As per Statistical Diary 2006) and lies between latitudes 26<sup>0</sup>30' to 27<sup>0</sup>10' north and longitudes 82<sup>0</sup>45' to 83<sup>0</sup>15' east in part of Survey of India Toposheet No. 63 I & J (Plate-1). There are 1576 villages on record. These villages are governed by 85 Nyaya Panchyats and 647 Gram Sabhas.

### **1.2 Population:**

The total population of the district is 1420226(As per census – 2001). The density is 863 per Km<sup>2</sup> in the district.

### **1.3 Drainage:**

The drainage system of district is mainly governed by the river Ghaghara, Kuwana and Rapti. Ami and Anui are the other rivers.

#### **1.4 Land Use, Agriculture and Irrigation Practices:**

The salient features of land use pattern, agriculture and irrigation practices in the district are given below:

(i)	Total land use (ha) (cultivable area)	-	174914
(ii)	Forest area (ha)	-	4368
(iii)	Net area sown (ha)	-	118458
(iv)	Irrigation area (Net) (ha)	-	100737

## **2.0 RAINFALL & CLIMATE**

The average annual rainfall is 1250.2 mm. The climate is sub-humid and it resembles that of the eastern part of U.P. being moist and relaxing except during the cold and summer seasons. About 90% of rainfall takes place from June to September. During monsoon surplus water is available for deep percolation to ground water.

There is a meteorological observatory station, the record of which may be taken as representative meteorological condition. May is the hottest month with the mean daily maximum temperature at 41.5<sup>0</sup>C and maximum temperature in the period may sometimes be as high as 47<sup>0</sup>C. With the onset of the monsoon temperature begins to drop and night temperature continues to be high, January is the coldest month with temperature 9.7<sup>0</sup>C. The mean monthly maximum temperature is 32.2<sup>0</sup>C and mean monthly minimum temperature is 19.9<sup>0</sup>C.

During the cold season and first half of the hot season the air is very dry. In the period of June to November the air is moist with relative humidity being about 75%. The mean monthly morning relative humidity is 66% and mean monthly evening relative humidity 50%.

## **3.0 GEOMORPHOLOGY & SOIL TYPES**

Geomorphologically the district may be divided into two major units, the younger alluvium and the older alluvium plains. The younger alluvial plain is a flat to

gently sloping, slightly undulated land surface produced by extensive deposition of unconsolidated sand, silt and clays adjacent to flood plain of the rivers. The older alluvial plains are very similar to younger alluvial plains, comprises the low valley of the Ghaghra in south, extending to its tributary Kuwana between Hainsar and Nathnagar blocks area and Rapti river North-East of district in Gorakhpur. The altitude of the Sant Kabir Nagar district area ranges between 73 to 97 mamsl.

The soils of the district are mainly transported i.e. alluvial soil, comprising sand, silt and clay in varying proportions. The alluvial soils of the district are subdivided into older alluvial soil and younger alluvial soil. The older alluvial soil occupies high land which the younger soils are restricted to marginal tract of the Ghaghra river.

## **4.0 GROUND WATER SCENARIO**

### **4.1 HYDROGEOLOGY:**

The Sant Kabir Nagar, being a part of Central Ganga Plain, lies between fluvial belt of river Ghaghra in the south and Rapti in the northeast. It comprises admixture of sand, gravel, clay and kankar in different proportions. It belongs to quaternary alluvium brought by southerly flowing rivers originating from Himalays. The actual thickness of sediments is not known as the deepest tubewell constructed by State Department is only down to depth of 100.0 mbgl (Approximately). CGWB has not carried out exploratory drilling in the Sant Kabir Nagar district. However, based on exploratory drilling down to 310 mbgl in the Sidharthnagar district, it may be inferred that two tier system exist in the area within the depth drilled.

Various state agencies has constructed 345 state tubewells, 55422 private tubewell and pumpsets (As on Statistic Book-2006) in the Sant Kabir Nagar district. The study of borehole data reveals that the existing granular zones comprised fine to medium grained sand with occasional occurrence of gravel.

### **Depth to Water Level (2007):**

Based on the water level data of National Hydrograph Station, pre-monsoon and post-monsoon 2007 depth to water level map have been prepared (Plate-2 and 3)

and data is given below (Table-1). The location of NHS wells is given in the Index Map Plate-1.

However in the southern part, the setting changes appreciably for thinning of discrete sand units or aquifer upto 150 m depth. The cumulative thickness of aquifer ranges from 6 to 26 m and the intervening clays dominate. Over all it can be inferred as multiple aquifer system.

Table-1

Sl. No.	Well Name	Premonsoon 2007 (mbgl)	Postmonsoon 2007 (mbgl)	Fluctuation (m)
1.	Dhanghata	4.57	2.72	1.85
2.	Khalilabad	4.85	2.08	2.77
3.	Maidawal	4.71	2.22	2.49
4.	Nathnagar	3.58	1.77	1.81
5.	Pipra first	6.61	4.57	2.04

Pre-monsoon (2007) range (mbgl) : 3.58 – 6.61

Post-monsoon (2007) range (mbgl) : 1.77 – 4.57

Seasonal Fluctuation range (m) : 1.81 – 2.77

#### Long Term Water Level Trend:

The trend of water level from year 1998-2007 (NHS) of Sant Kabir Nagar district is computed in Table-2

Table-2

#### WATER LEVEL TREND OF SANT KABIR NAGAR DISTRICT, U.P.

Sl. No.	Location	Premonsoon			Postmonsoon			Annual		
		Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)
1.	Khalilabad	10		0.1003	10		0.06476	38		0.1502
2.	Nathnagar	10		0.0262	10	0.0034		39	0.0009	
3.	Pipra first	8		0.1141	9		0.0184	31		0.0847
4.	Dudhara	3			2			9		
5.	Dhanghata	10	0.0259		10		0.0088	39		0.0231
6.	Lohraiyen	5			4			15		
7.	Maidawal	9		0.0539	10		0.0287	54	0.0603	

The water level rise ranges from 0.0009 (Nathnagar) to 0.0603 (Maidwal) annual m/year and fall ranges from 0.0088 (Dhanghata) to 0.0676 (Khalilabad) annual m/year.

Specific yield of unconfined aquifers and parameters of confined aquifers and not known.

#### 4.2 Ground Water Resources:

The blockwise recharge, draft and balance for future developments are given in Table-3.

Table-3

### DYNAMIC GROUND WATER RESOURCES OF SANT KABIR NAGAR DISTRICT, U.P.

(As on 31.03.2004)

Sl. No.	Assessment Units – Blocks	Annual Ground Water Recharge (in ham)	Net Annual Ground Water Availability (in ham)	Existing Gross Ground Water Draft for All Uses (in ham)	Net Ground Water Availability for Future Irrigation Development (in ham)	Stage of Ground Water Development (in %)	Category of Block
1	2	3	4	5	6	7	8
1.	Baghauri	8156.55	7748.72	5847.07	1383.68	75.46	Safe
2.	Hainsar Bazar	12418.88	11797.94	5161.95	6248.48	43.75	Safe
3.	Khalilabad	7050.76	6698.22	5510.05	826.65	82.26	Safe
4.	Mehdawal	6479.94	5831.95	4484.50	1125.50	76.90	Safe
5.	Nath Nagar	8353.85	7936.15	6310.80	1348.25	79.52	Safe
6.	Santha	7454.38	7081.66	5547.15	1271.51	78.33	Safe
7.	Semariyawa	7151.63	6794.05	5487.76	820.06	80.77	Safe
	<b>TOTAL</b>	<b>57065.99</b>	<b>53888.70</b>	<b>38349.28</b>	<b>13024.11</b>	<b>71.16</b>	

Allocation for domestic & industrial requirement supply upto next 25 years (year 2029) : 5882.49 ham.

The above ground water resource potential estimates (as on 31.3.2004) indicate that annual ground water recharge in the area is 57065.99 ham and the draft for all uses is 38349.28 (ham). Net ground water availability for future irrigation development is 13024.11 ham and stage of ground water development is 71.16 in the Sant Kabir Nagar district. On the stage of development and long term trends of the pre

and post monsoon water levels as per GEC norms 1997, the category of blocks are under safe category (Plate-4).

#### **4.3 Ground Water Quality:**

To study the chemical quality of ground water for domestic, industrial and irrigation purpose, the samples of NHS could be available for the year 2007. Ground water in phreatic aquifer, in general is colourless & odourless. The specific conductance of ground water from shallow aquifer ranges from 220 to 340 micromhos/cm at 25<sup>0</sup>C. The pH is 7.00-7.85 in the district. The HCO<sub>3</sub> (Bicarbonate) ranges from 122-207mg/l. It is observed that the ground water is suitable for drinking and domestic uses in respect to all constituents. In the district area all constituents in handpumps are well within permissible limit.

#### **4.4 Status of Ground Water Development:**

Presently the ground water is being developed through 345 state tubewells, 55422 private tubewell and pumpsets and other source etc. The total ground water draft of the district is 38349.28 ham. Which is being used in present domestic, industrial and irrigation purposes against ground water availability of 53888.70 ham. Blockwise ground water abstraction structure is given in Table-3.

Ground water development is basically a peoples programme undertaken /through individual and collective effects from finance obtained as loans from institutional sources or invested by the farmers from their own sources. Ground water development has several advantages over surface water development methods and has become a vital factor in promoting innovating agricultural practices through high yielding varieties of crops. Ground water is widely distributed and provides an assured and dependable source of irrigation input. Net water availability for future irrigation development is 13024.11 (ham).

The criteria of categorisation is given as below on the basis of development (GEC-1997)

- |    |            |   |                |
|----|------------|---|----------------|
| 1. | Upto 70%   | - | Safe           |
| 2. | Upto 90%   | - | Semi Critical  |
| 3. | Upto 100%  | - | Critical       |
| 4. | Above 100% | - | Over Exploited |

The 7 blocks of Sant Kabir Nagar district, the stage ground water development is 71.16% under safe category.

## **5.0 GROUND WATER MANAGEMENT STRATEGY**

Keeping above discussions in mind, a judicious management of ground water has to be implemented through the balance ground water available, i.e. 53888.70 ham for future exploitation. At present the level of development of Sant Kabir Nagar district is 71.16% in all blocks under 'Safe' category of development. Allocation for domestic and industrial requirement supply upto 25 years (year 2029) is 5882.49 ham. As such, state tubewell and private tubewells, including pumping sets on borings, may be constructed in the district through which area of irrigation potential will be created in the district.

Safe drinking water supply to the rural population is important in all the national planning processes. The existing gross ground water draft for all uses is 38349.28 ham. The drinking water supply a sizeable proportion of the rural masses is deprived of sustained supply of the basic requirement. The mounting population growth rate in every decade of census operation needs to be examined as this component occupies plan priority.

The first aquifer in the area in the state and private tubewells may be tapped for safe drinking water supply in rural area in blocks Hainsar Bazar, Mehidawal, Santha, Baghaulti, Nath Nagar. The stage of ground water development is more than 80% in Semariyawa and Khalilabad blocks.

### **5.1 Water Conservation and Artificial Recharge:**

The depth to water level in the Sant Kabir Nagar district, during premonsoon-2007 ranges from 3.58 to 6.61 mbgl and during postmonsoon-2007 ranges from 1.77 to 4.57 mbgl. Above water level data shows less than 7.00 mbgl in the district for pre and postmonsoon 2007. The stage ground water development is 71.16% in the district under 'Safe' category.

So, various schemes, as artificial recharge in the district in the area where water level is more than 10.00 may be launched. It is felt essential to conserve rain

water and surface water in already existing natural depressions in such area. Such area should be declared permanently for conservation, storage of rain water and surface water during floods by formulating suitable laws. The conservation of rain water and surface water in these tanks, ponds and abandoned channels will not only recharge the ground water, but will increase the irrigation potential to improve the socio-economic condition of the district.

## **6.0 GROUND WATER RELATED ISSUES AND PROBLEMS**

- (1) Behaviour of deeper aquifer & its characteristics are not known as no exploratory tubewell has been constructed by CGWB in the Sant Kabir Nagar district.
- (2) A good number of ground water monitoring stations is not available in the district for monitoring of water level and quality of ground water.

## **7.0 AWARENESS AND TRAINING ACTIVITY**

Nil.

## **8.0 AREAS NOTIFIED BY CGWA/SGWA**

None of the area has been notified in the district so far.

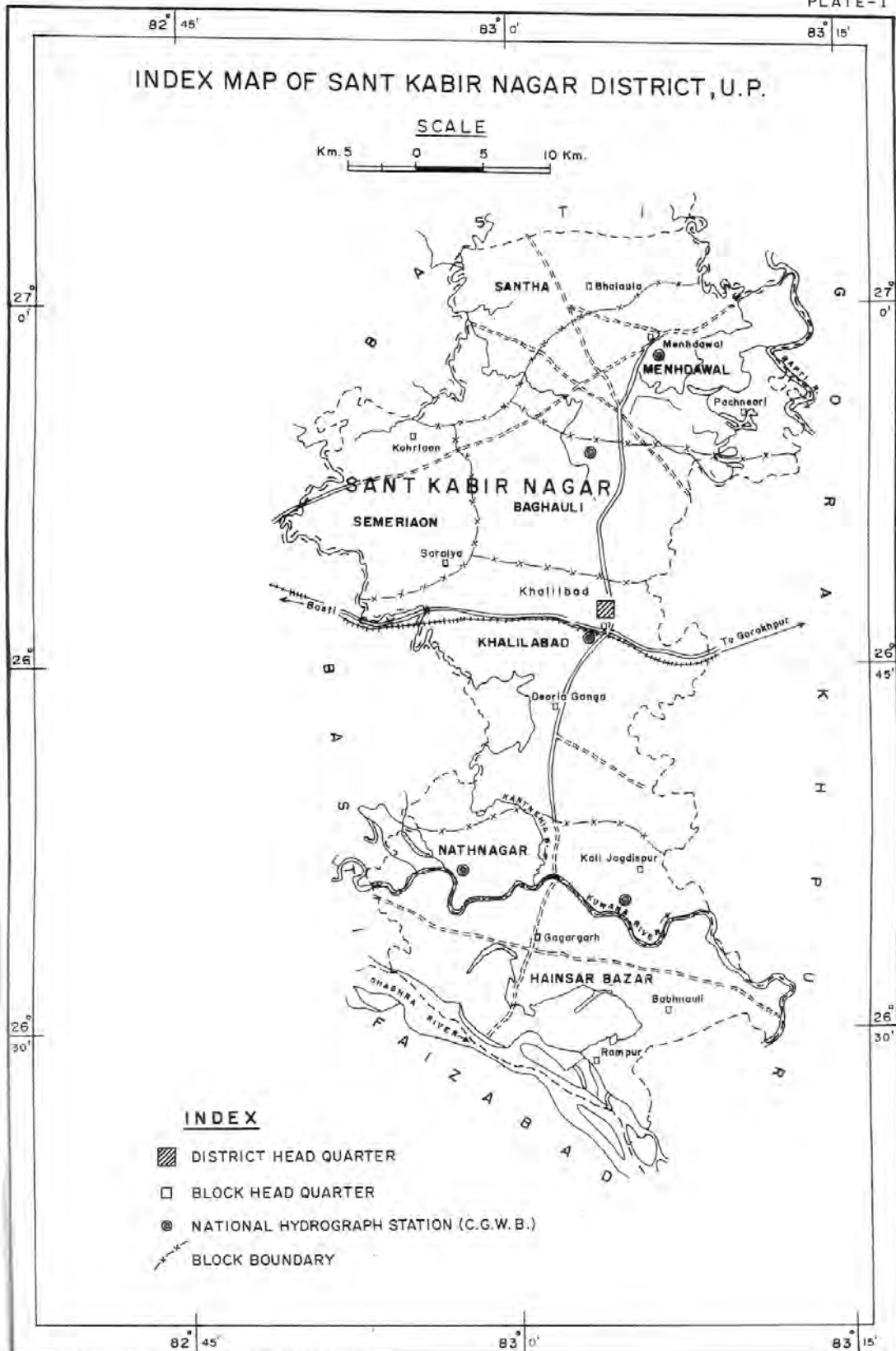
## **9.0 RECOMMENDATIONS**

The following recommendations are suggested:

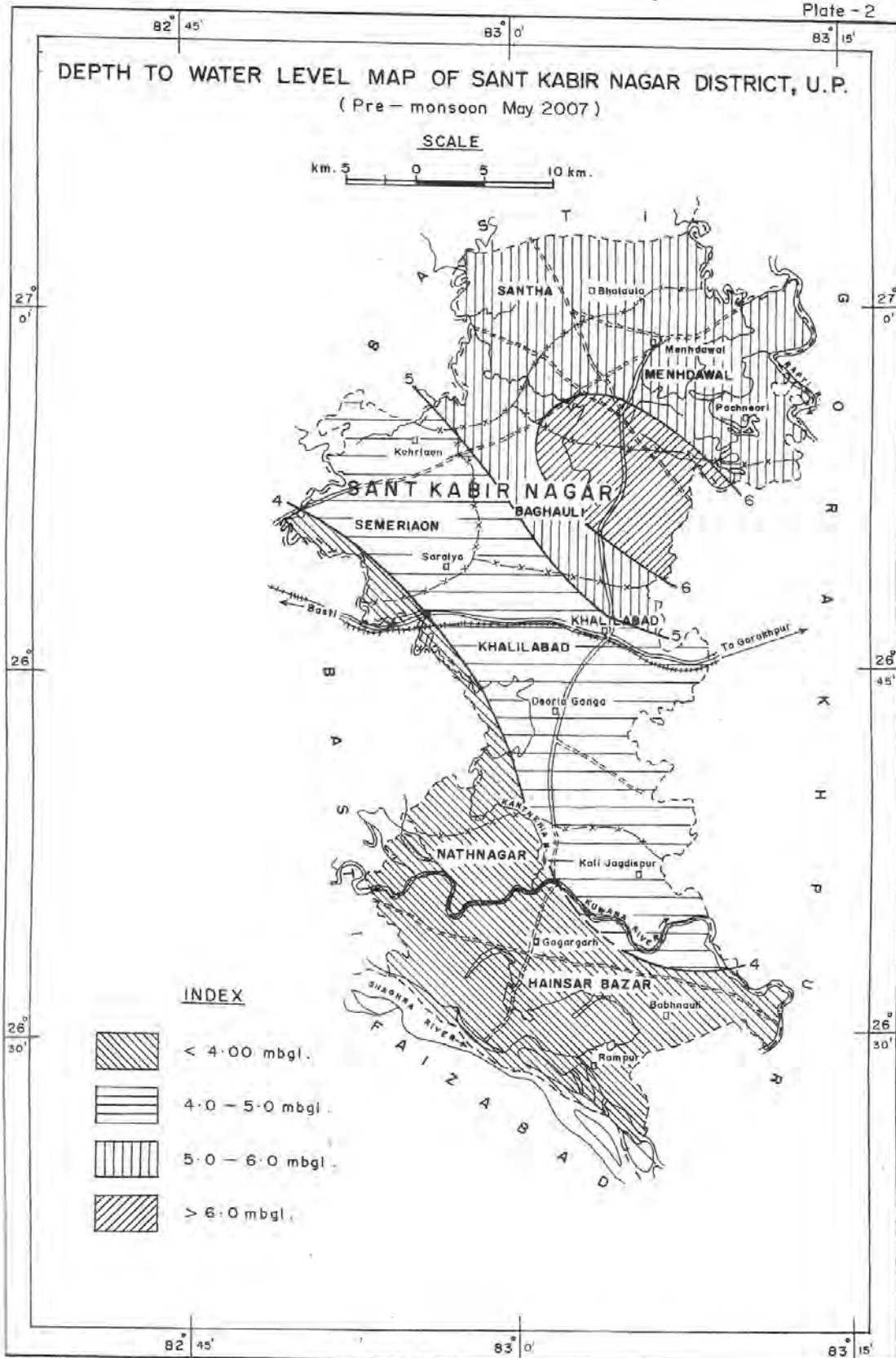
- (1) Behaviour of deeper aquifer is not known as no exploratory tubewell has been constructed by CGWB in the Sant Kabir Nagar. It is suggested that

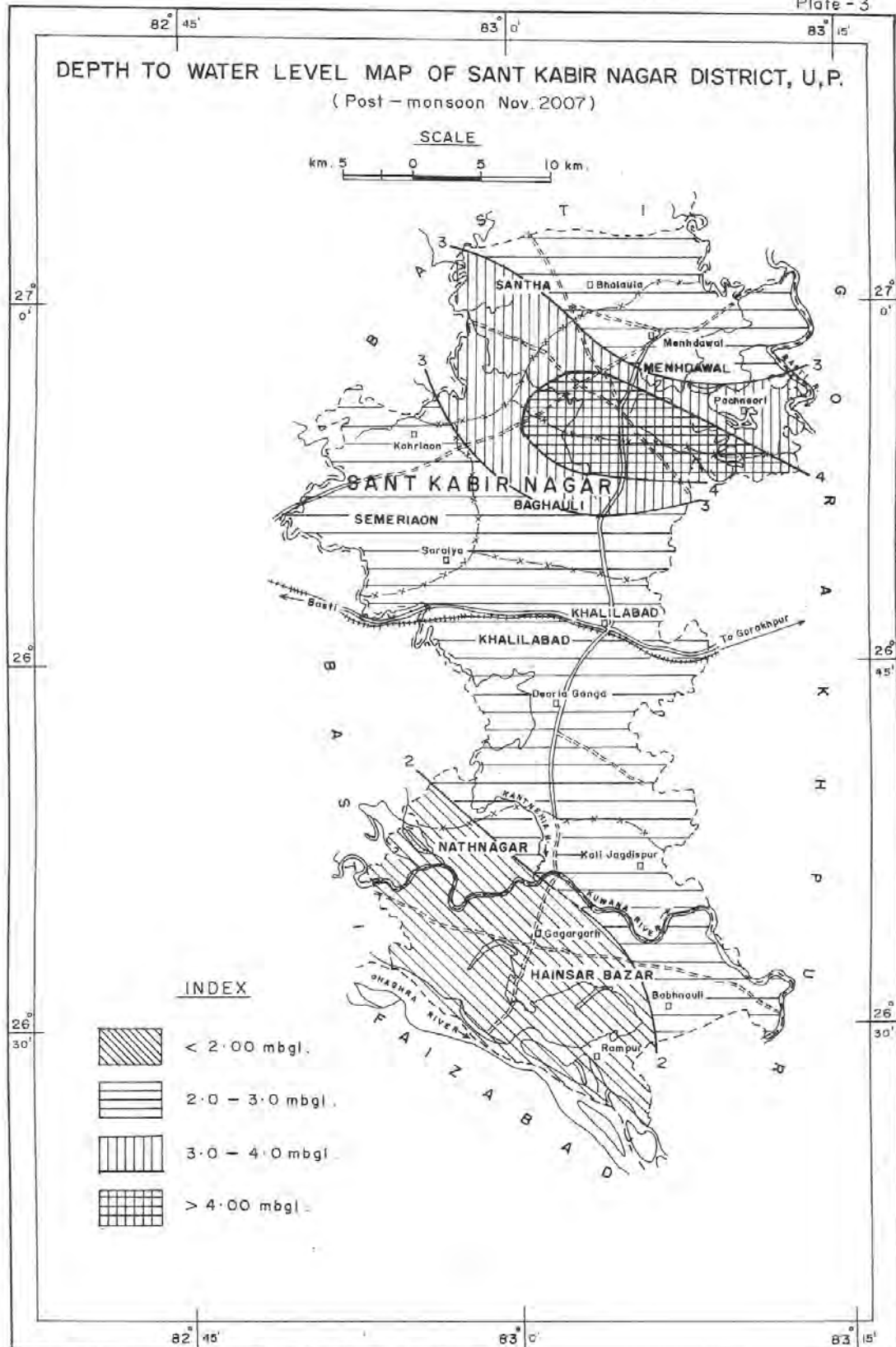
exploratory tubewells may constructed by CGWB so that aquifer parameters and nature of deeper granular zones may be identified.

- (2) It is suggested that the conservation of rainwater and surface water in these tanks, ponds and abandoned channels will increase the irrigation potential in the such area.
- (3) A good number of NHS should be increased in the area for regular monitoring of water levels and quality of ground water.



CGWB, NR, (RAKESH) Drg. No. 2339/06, (AKS), 2762/09.





## DYNAMIC GROUND WATER RESOURCES SANT KABIR NAGAR DISTRICT, U.P. (ON 31 3 2004)

