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

(A.A.P.: 2012-2013)

By

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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 – $26^0$30' to $27^0$10' Longitudes – $82^0$45' to $83^0$15'
iii.	**Administrative Division**		
	a) Number of Tehsil	:	3
	b) Number of Block (1.Samariyawan, 2.Mehdawal, 3.Baghauli, 4.Khalilabad, 5.Nath Nagar, 6.Hainser Bazar, 7.Samtha, 8. Belhar Kala, 9. Pauoli)	:	9
	c) Number of Panchayat (Nyay)	:	85
	d) Number of Village	:	1576
iv.	Population (as on 2011 census)	:	17,14,300
	Density of population	:	1041 per sq.km.
iv.	Normal Annual Rainfall	:	1166 mm
2.	**GEOMORPHOLOGY**		
	Major Physiographic Units Younger Alluvial – Sand, Silt and Clay adjacent to flood plain of the rivers Older Alluvial – Plain are very similar to younger alluvial plains.	:	Younger alluvial plain Older alluvial plain
	Major Drainages	:	Ghaghara, Kuwana and Rapti rivers, Ami and Anui are the other rivers.
3.	**LAND USE (As per Statistic Book – 2011 - 2012)**		
a)	Forest area	:	4374 ha
b)	Net area sown	:	121297 ha
c)	Cultivable area	:	174810 ha
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 per Statistic Book-2011- 2012)**	:	Rabi:102119 ha, Kharif: 101678 ha, Jayad: 4196 ha

6.	**IRRIGATION BY DIFFERENT SOURCES (As per Statistic Book-2011- 2012)** (Areas / Number of Structures)		
	Dugwells	:	1487 ha/ 320
	Govt. Tubewells / Borewells	:	8210 ha, / 399
	Private Tubewells & Pumpsets	:	75439 ha/ 42824
	Other Sources	:	737 ha
	Canals	:	15637 ha/ 103 km.
	Net Irrigated Area	:	101510 ha
	Gross Irrigated Area	:	106536 ha
7.	**NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-3-2009)**		
	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 2012) 2.92 – 5.59
		:	(Postmonsoon 2012) 0.63– 2.27
	Long term of water level (2003 - 2012) in m/yr		Rise (Premonsoon) 0.1482 m/yr at Nathnagar Fall (Postmonsoon) 0.0234 m/yr in Khalilabad
10.	**GROUND WATER EXPLORATION BY CGWB (As on 31-3-2012)**	:	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 (2009)**		
	Annual Replenishable Ground Water Recharge	:	82090.14 ham
	Net Annual Ground Water Availability	:	73881.13 ham
	Existing Gross Ground Water Draft for All Uses	:	52068.90 ham
	Net Ground Water Availability for Future Irrigation Development	:	19521.72 ham
	Stage of Ground Water Development	:	70.48 %
	Category of Blocks	:	Safe
13.	**AWARENESS AND TRAINING ACTIVITY**	:	Nil
14.	**EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING**	:	Nil
15.	**GROUND WATER CONTROL AND REGULATION**	:	
	All blocks	:	Safe
16.	**MAJOR GROUND WATER PROBLEMS AND ISSUES**	:	(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 Ambedkarnagar district and on the west by Basti district. The river Ghaghara separated this district from Ambedkarnagar 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 5th September 1997.

1.1 Location & Extent:

The district has been divided into three (3) tehsils and seven (9) blocks. The district have an area of about 1646 sq.km. (As per Statistical Diary 2012) and lies between latitudes 26^{0}30' to 27^{0}10' north and longitudes 82^{0}45' to 83^{0}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 1714300 (As per census – 2011). The density is 1041 per Km^2 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 (cultivable area)	-	174810 ha
(ii)	Forest area	-	4374
(iii)	Net area sown	-	121297 ha
(iv)	Irrigation area (Net)	-	101510 ha

2.0 RAINFALL & CLIMATE

The average annual rainfall is 1166 mm. The climate in sub-humid and it resembles out to be eastern part of U.P. being moist and relaxing exception 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 41.5^0C and maximum temperature in the period may sometimes be as high as 47^0C. With the onset of the monsoon temperature begin to drop and night temperature continue to be high, January is the coldest month with temperature 9.7^0C. The mean monthly maximum temperature is 32.2^0C and mean monthly minimum temperature is 19.9^0C.

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 depression 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 sub-divided 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 399 state tube wells, 42824 private tubewell and pumpsets (Statistic Book-2012) 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 (2012):

Based on the water level data of National Hydrograph Station, pre-monsoon and post-monsoon 2012 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.

Table-1

DEPTH TO PRE & POST MONSOON WATER LEVEL

Sl. No.	Well Name	Premonsoon 2012 (mbgl)	Postmonsoon 2012 (mbgl)	Fluctuation (m)
1.	Dhanghata	4.99	2.09	2.90
2.	Khalilabad	5.59	2.25	3.34
3.	Maidawal	4.82	2.77	2.05
4.	Nathnagar	2.92	0.63	2.29
5.	Pipra first	4.1	1.03	3.07

Pre-monsoon (2012) range (mbgl) : 2.92 – 5.59

Post-monsoon (2012) range (mbgl) : 0.63 – 2.25

Seasonal Fluctuation range (m) : 2.05 – 3.34

Long Term Water Level Trend:

The trend of water level from year 2003 – 2012 (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		0.0243	10		0.0234	39	0.0316	
2.	Nathnagar	10	0.1482		10	0.0367		40	0.1274	
3.	Pipra first	8		0.1141	9	0.1689		29	0.3370	
4..	Dhanghata	10	0.0040		9	0.0594		39	0.1152	
5..	Maidawal	10	0.0399		10		0.0175	64	0.0740	

The water level rise ranges from 0.0316 m/year to 0.3370 m/year in whole of the district. The water level trend is indicative of poor ground water development in the district.

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

4.2 Ground Water Resources:

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

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

(As on 31.03.2009) **Table-3**

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.	Baghauli	9187.89	8269.10	5732.77	2285.00	69.33	Safe
2.	Hainsar Bazar	15645.71	14081.14	8584.85	5145.77	60.97	Safe
3.	Khalilabad	8598.92	7739.03	6127.36	1260.26	79.17	Safe
4.	Mehdawal	8226.01	7403.41	4705.60	2492.07	63.56	Safe
5.	Nath Nagar	8512.00	7660.80	5359.00	2026.15	69.95	Safe
6.	Poli	5880.85	5292.77	3477.63	1683.96	65.71	Safe
7.	Santha	10599.40	9539.46	7769.11	1552.93	81.44	Safe
8.	Semariyawa	8523.74	7671.37	6454.22	852.73	84.13	Safe
9.	Vehlar Kalan	6915.62	6224.06	3858.36	2222.86	61.99	Safe
	TOTAL	**82090.14**	**73881.13**	**52068.90**	**19521.72**	**70.48**	

Allocation for domestic & industrial requirement supply up to 2025: 5667.78 ham. The above ground water resource potential estimates (as on 31.3.2009) indicate that annual ground water recharge in the area is 82090.14 ham and the draft for all uses is 52068.90 (ham). Net ground water availability for future irrigation development is 19521.72 ham and stage of ground water development is 70.48 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-3).**

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 2012. Ground water in phreatic aquifer, in general is colourless & odourless. The specific conductance of ground water from shallow aquifer ranges from 396 to 683 micromhos/cm at 25^0C. The pH is 7.84-8.03 in the district. The HCO_3 (Bicarbonate) ranges from 195 - 390 mg/l. **(Table – 4)** 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 hand pumps are well within permissible limit.

Table – 4

GROUND WATR QUALITY OF SANT KABIR NAGAR DISTRICT

Sr.No.	Block	pH	EC in	HCO_3	Cl	F	NO_3	TH	Ca	Mg	Na	K
			in µ S/cm	in mg/l								
1.	Khalilabad	7.89	636	317	35	Nd	1.5	250	20	48	27	1.8
2.	Nath Nagar	8.03	547	262	64	0.46	nd	230	12	48	34	0.9
3.	Mehdawal	8.02	404	195	28	0.23	5.1	155	36	16	22	2.1
4.	Haisar Bazar	7.90	436	281	14	0.39	nd	175	16	32	28	2.7
5.	Bhagauli	8.10	488	293	21	Nd	nd	1956	24	32	28	3.8
6.	Semariyawa	8.00	642	390	21	0.56	nd	170	44	14	2881	3.9
7	Santha	7.84	683	329	50	0.61	nd	270	44	38	1528	2.0
8	Poli	7.98	396	232	14	nd	nd	175	32	23	15	3.4

4.4 Status of Ground Water Development:

Presently the ground water is being developed through 399 state tube wells, 75439 private tube well and pump sets and other source etc. The total ground water draft of the district is 52068.90 ham. Which is being used in present domestic, industrial and irrigation purposes against ground water availability of 73881.13 ham. Blockwise ground water abstraction structure is given in **Table – 5**

Table – 5

GROUND WATER ABSTRACTION STRUCTURE OF SANT KABIR NAGAR DISRTRICT

Sr.No.	Block	Govt. Tube well	Shallow Tube well	Medium Tube well	Deep Tube well	Pump Sets	Dug Wells
1.	Baghauli	58	5574	0	17	2	15
2.	Hainsar Bazar	49	4436	0	13	1	22
3.	Khalilabad	87	4894	1	16	2	113
4.	Mehdawal	53	4877	1	17	2	0
5.	Nath Nagar	33	4712	0	15	2	66
6.	Poli	14	3367	0	8	1	0
7.	Santha	12	4926	0	15	2	22
8.	Semariyawa	50	5576	0	17	2	17
9.	Vehlar Kalan	39	4314	0	13	1	0
	Total	**399**	**42676**	**2**	**131**	**15**	**320**

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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 **19521.72** (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 9 blocks of Sant Kabir Nagar district, the stage ground water development is **70.48** 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. 19521.72 ham for future exploitation. At present the level of development of Sant Kabir Nagar district is 70.48% in all blocks under 'Safe' category of development. Allocation for domestic and industrial requirement supply upto 2025 is 5667.78 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 52068.90 ham. The drinking water supply to sizeable proportion of the rural masses is dependent on India Mark II hand pumps. They are deprived of sustained supply of the basic requirement.

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

5.1 Water Conservation and Artificial Recharge:

The depth to water level in the Sant Kabir Nagar district, during premonsoon-2012 ranges from 2.92 to 5.59 mbgl and during postmonsoon-2012 ranges from 0.63 to 2.77 mbgl. Above water level data shows less than 7.00 mbgl in the district for pre and postmonsoon 2012. Artificial recharge can not be suggested in the district.The stage ground water development is 70.48% in the district under 'Safe' category.

The conservation of rain water and surface water in natural 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.

(3) The district appears to be prone to water logging.

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.

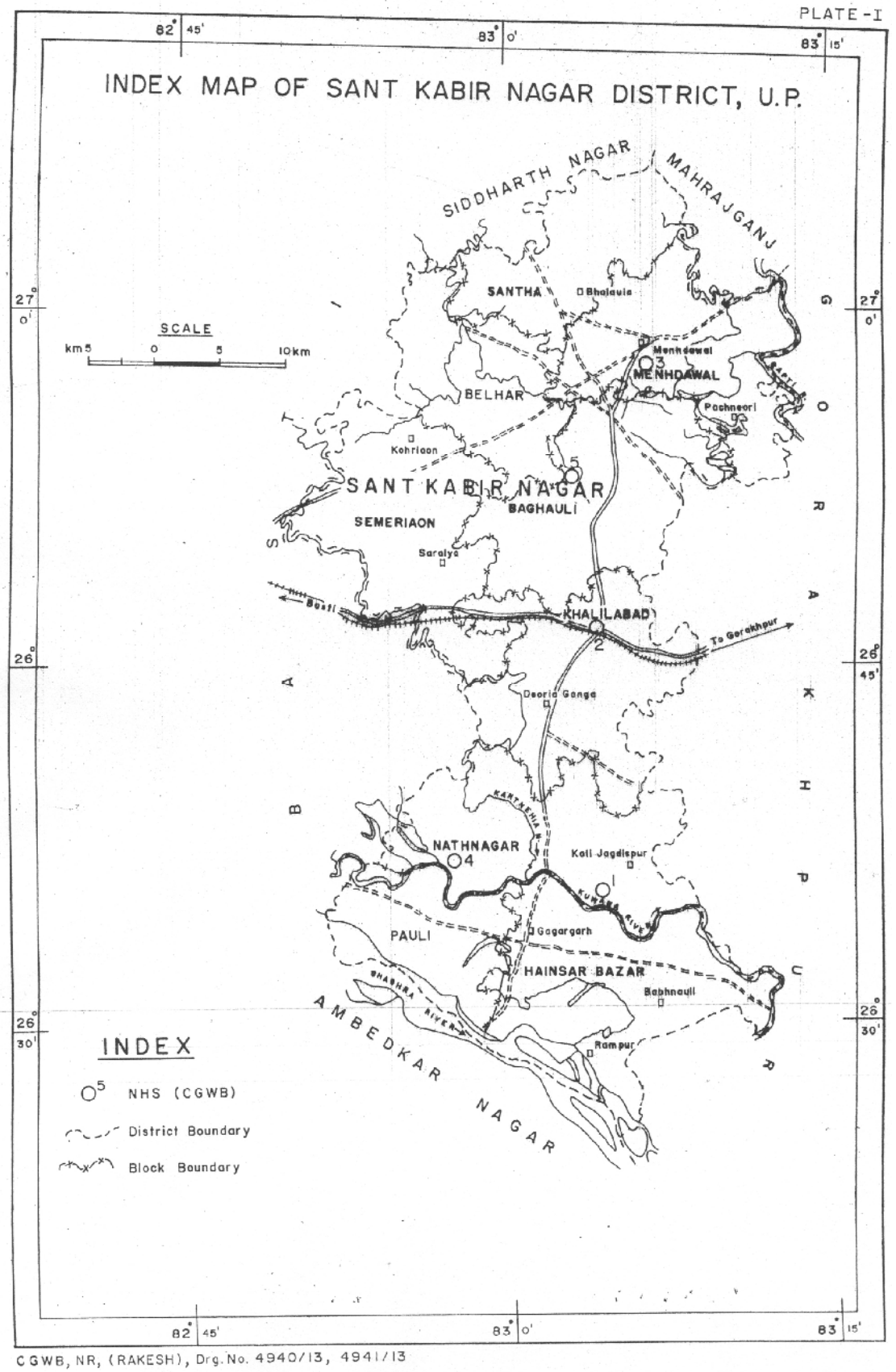
9.0 RECOMMENDATIONS

The following recommendations are suggested:

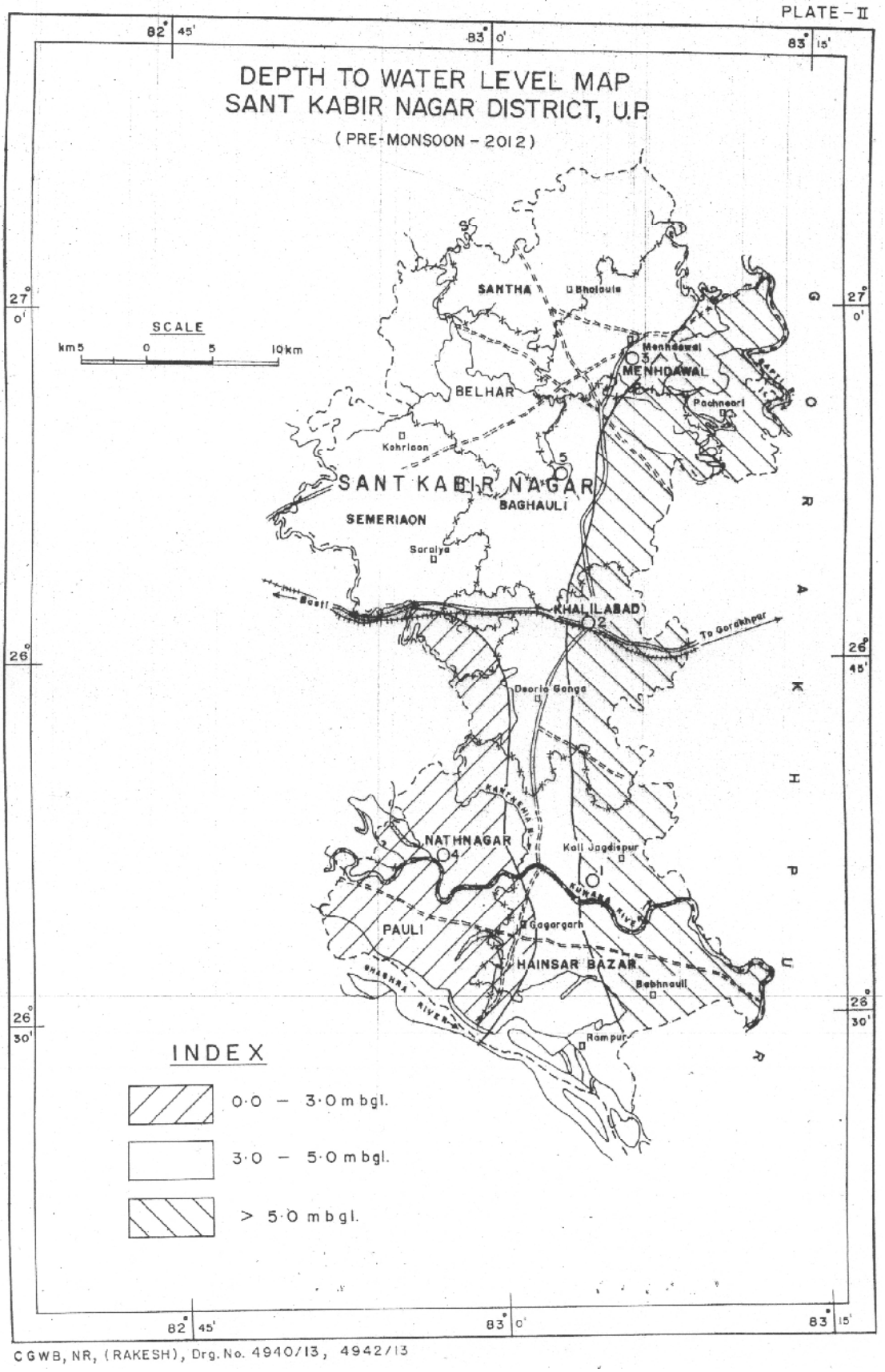
(1) Behaviour of deeper aquifer is not known as no exploratory tubewell has been constructed by CGWB in the Sant Kabir Nagar. It is suggested that exploratory tubewells may constructed by CGWB so that aquifer parameters and nature of deeper granular zones may be identified.

(2) It is suggested that the conservation of rainwater and surface water in these tanks, ponds and abandoned channels be encouraged to 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.



CGWB, NR, (RAKESH), Drg. No. 4940/13, 4941/13



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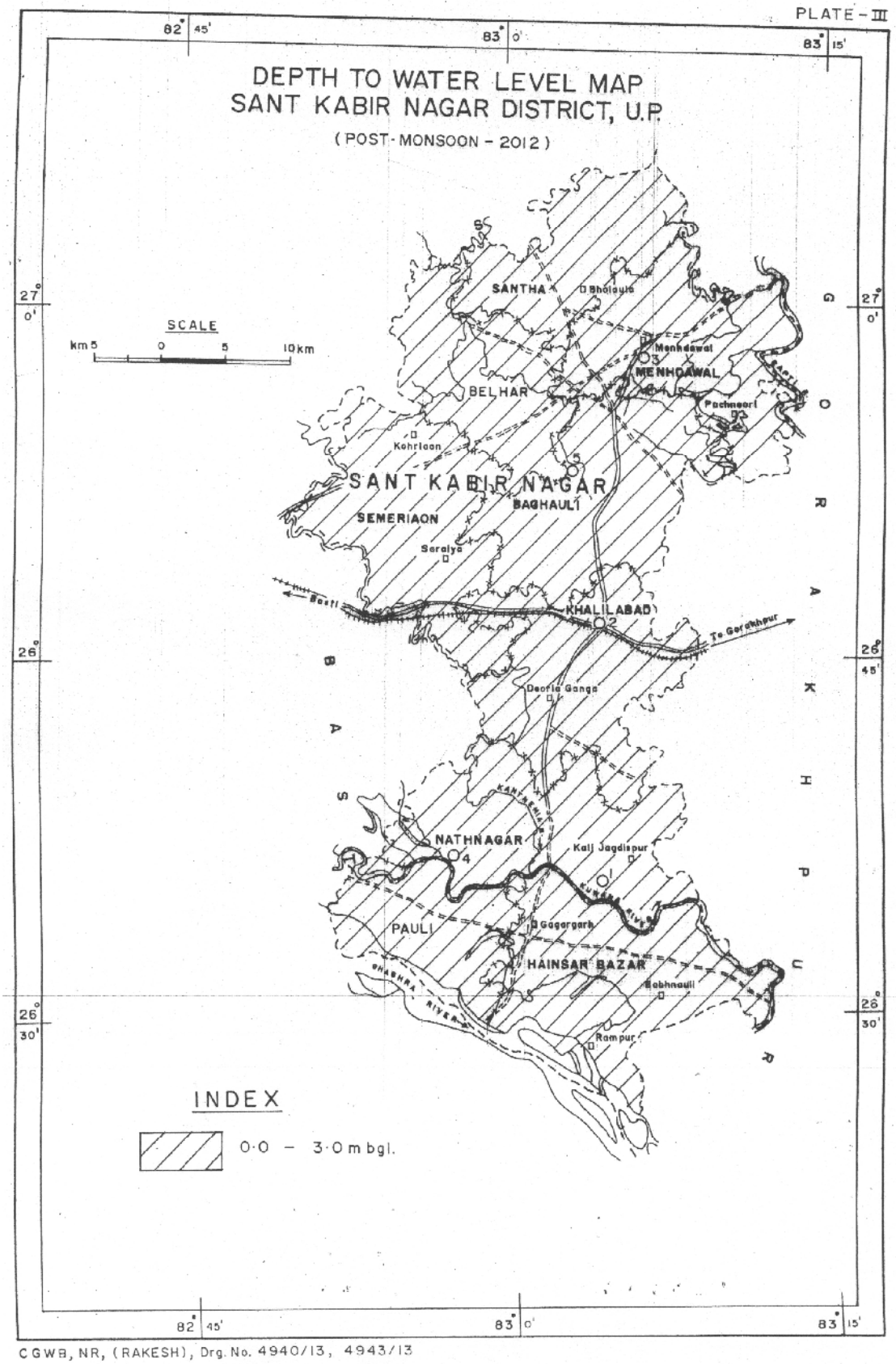

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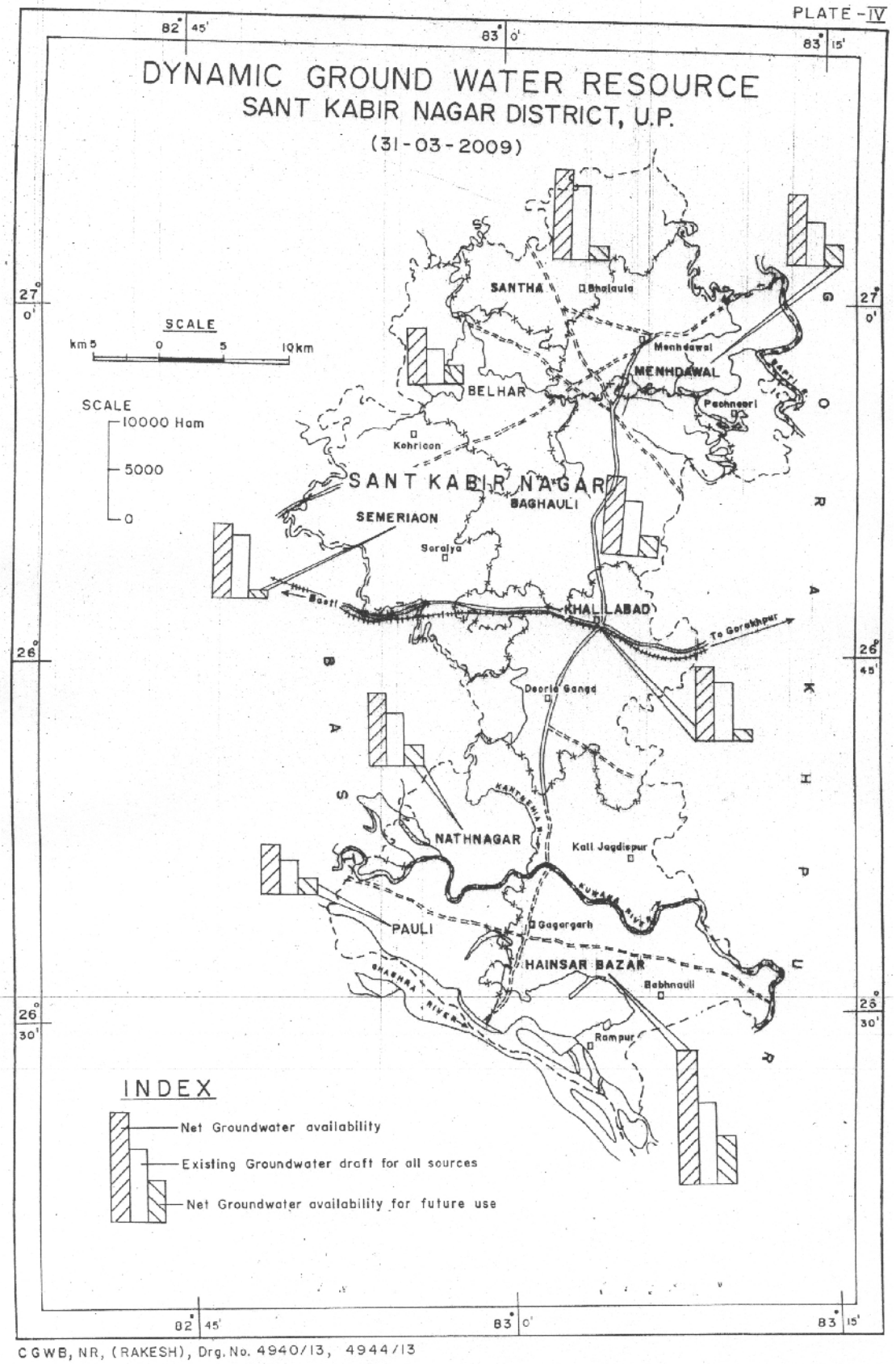

CGWB, NR, (RAKESH), Drg. No. 4940/13, 4944/13