GROUND WATER BROCHURE OF HAMIRPUR DISTRICT, U.P.

(A.A.P.:2012-13)

By

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DISTRICT AT GLANCE

GENERAL INFORMATION

1.	**LOCATION**	:	Lat:$25^0$27'00" to $25^0$57'00" Long: $79^0$11'00" to $80^0$19'00"
2.	**GEOGRAPHICAL AREA (Sq. Km.)**	:	4139.09
3.	**ADMINISTRATIVE DIVISIONS (as on 31.03.2012)**		
	Number of Tehsil	:	3
	Number of Blocks	:	7
	Number of Nyaya Panchayat	:	59
	Number of Villages	:	627
4.	**POPULATION**		
	Male	:	993792
	Female	:	536703
5.	**CLIMATE**		
	a) Normal Rainfall (mm)	:	864
	b) Mean Maximum Temperature	:	47^0C
	c) Mean Minimum Temperature	:	2.6^0C
6.	**LAND USE (Ham)**		
	Total Area	:	390865
	Forest Area	:	24473
	Barren Land	:	4391
	Present Fallow Land	:	22437
	Pasture	:	460
	Garden	:	764
	Net Cultivate Area	:	292912
	Net Irrigated Area	:	116307
	Gross Irrigated Area	:	117368
7.	**IRRIGATION BY DIFFERENT SOURCE (HAM)**		
	Net Irrigated Area	:	116307
	By Canal	:	20904
	Tubewell Public	:	16548
	Tubewell Private	:	51603
	Pond	:	3872
	Wells	:	22525
	Other	:	855

8.	**GROUND WATER STRUCTURE**		
	Canal length in Km.	:	832
	Government tubewells in number	:	624
	Private tubewells pump set in number	:	16683
9.	**NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (AS ON 2012**	:	17
	Number of Piezometer	:	Nil
10.	**PREDOMINANT GEOLOGICAL FORMATION**	:	Quaternary Alluvium, Recent to sub recent, Precambrian, Bundelkhand Massif.
11.	**HYDROGEOLOGY AND AQUIFER GROUP**	:	The Granitic base has got very uneven configuration. The fresh rock generally occur below the surface clay and weathered material whose thickness is variable. The maximum thick 120.00 mts observed in Sulempur block and north of Betwa river is over 150.00 mts.
		:	Aquifer system prevails I tier – Ground water level to phreatic II tier – 150 m to 200 mts at base.
	Premonsoon depth to water level during May' 2012	:	4.08 to 29.32 mbgl
	Postmonsoon depth to water level during Nov.' 2012	:	2.22 to 28.82 mbgl
12.	**GROUND WATER EXPLORATION BY CGWB AS ON 2012**		
	Number of well drilled (EW, PZ, SH, Total)	:	EW 16
	Depth range (mts.)	:	74.74 to 200 mts.
	Discharge (liter per minute)	:	104 to 2994 lpm
	Storativity (S)	:	2.14×10^{3} to 7.90×10^{8}
	Transmissivity (m^2/day)	:	542 to 1744
13.	**GROUND WATER QUALITY**		
	Presence of chemical content more than permissible limit (eg EC, F, NO_3, As, Fe)	:	Nil

14. DYNAMIC GROUND WATER RESOURCES 2009 IN HAM

Annual replenish able ground water resources	:	49001.60
Gross Annual ground water Draft	:	20612:16
Projected demand for domestic Industrial Uses up to 2033	:	4995.13
Stage of ground water development	:	46.61%

15. AWARENESS AND TRAINING ACTIVITY

Mass Awareness Programs Organized		
Date	:	Nil
Place	:	
Number of Participant	:	
	:	

16. Effort of Artificial Recharge

Rain Water Harvesting		
Project complete CGWB (Number of amount spend)	:	NA
Project under technical guidance of CGWB	:	Nil

17. GROUND WATER CONTROL AND REGULATION :

Number of OE Blocks	:	Nil
No of Critical Blocks	:	Nil
No of blocks notified	:	Nil

18. MAJOR GROUND WATER PROBLEMS AND ISSUES : Broadly Natural and Geo-environmental problem occurs Natural Hazard like flood & Drought, soil alkalinity is wide spread in Moudaha Block.

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1.0 INTRODUCTION

The Hamirpur district is located in southern part of the state and is part of Bundelkhand plateau. It lies between the latitude $25^0$27'00" and $25^0$57'00" N and longitude $79^0$11'00" to $80^0$19'00" E. The district falls in survey of India toposheet no 54/0 and 63/0. The geographical area of district is 4139.09 sq.Km. Hamirpur having 3 (three) no of Tehsil and 8 (eight) no of block. As per 2011 census the district has population 993792 of which 536703 males and 457089 females Scheduled Cast population is 224478 and scheduled tribe population is 170.

Geographically the area comprises Bundelkhand granite gneiss complex and Recent alluvium. The thickness of alluvium varies from 120 to 150 mts. The master slope of district is due northeast. The district could be broadly divided into two physiographic regions.

(a) The southern part of district between latitude $25^0$30'00" and $25^0$42'00" of is mainly plain area with average elevation of 250 mamsl. The region is under lain by then alluvial cover.

(b) The northern part of district that is north latitude $25^0$42'00" N this part of district represent flat topography. The average elevation of the region 120m. above mean sea level.

The district chiefly constitute drainage basic of river Betwa and Ken which are two important right bank tributaries of river Yamuna, River Dharsan also drain major western part of district.

Agriculture is the main source of economy of district, both surface and ground water are used for irrigation the net irrigated area is 116307 Ha and gross irrigated area is 117368 Ha. Length of canal 832Km. and the no of Govt. tubewell is 624.

The district was covered under hydrogeology and ground water potential study by D.L. Shah in 1962–63, 1963–64 subsequently the district was surveyed in 1971–72.

2.0 RAINFALL & CLIMATE

The average annual rain fall 864mm. The climate is typical subtropical, characterized by prolonged summer, mild winter and moderately heavy rain fall during monsoon season. About 90% of which received from south west monsoon. May is hottest month with temperature. 47^0C January is usually coldest month with the temperature 2.6^0C.

The relative humidity is highest south west monsoon ranging between 70% to 80% with lowest around 40% during peak summer month of April & May.

3.0 GEOMORPHOLOGY & SOIL

3.1 GEOMORPHOLOGY:

The district is characterized by mainly three unit (1) Recent alluvium plain (ii) Bundelkhand gneiss and (iii) flood plains.

Recent Alluvial Plain :

The area occupied by the recent alluvium can be delineated all along Betwa and Ken river. These recent alluvium are semi confined.

Bundelkhand Granite Gneiss:

The isolated hillocks and interrupt to Topography of the regions.

3.2 SOIL:

The district comes under the Doab region of ken and Betwa covered by the recent alluvium, The development of soil in the district can be ascribe to different erosion and depositional agencies. Different morphological unit have different type of soil, the soil ranges from pure to stiff clay and including all combination of the two extreme litho units. The pure sand is called Bhur and Clay is called Matiar.

3.3 GEOLOGICAL SETUP:

The district, part of Bundelkhand plateau region is underlain by granites and basic intrusive. The Quaternary alluvial material overlies the granite. The thickness of alluvial varies from few meter to 150.00 mts in the district. The general geological sequence of the formation present in the district is as under.

Age	Formation	Lithology
Quaternary Recent to sub Recent	Alluvium	Sand, Silt, Clay
----------Unconformity----------		
Precambrian		Bundelkhand Massif

4.0 GROUND WATER SCENARIO

4.1 HYDROGEOLOGY:

Table-1

WATER LEVEL FLUCTUATION (PRE & POST - MONSOON)

FOR THE YEAR 2012

District Hamirpur				
Sl. No.	**Well Name**	**Pre-Monsoon (mbgl)**	**Post- Monsoon (mbgl)**	**Fluctuation (m)**
1.	Bewar	13.99	11.76	2.23
2.	Dhagwan	-	2.62	-
3.	Jalalpur	29.32	28.82	0.50
4.	Kapsa	4.12	2.22	1.90
5.	Khanna	4.77	3.97	0.80
6.	Kharela	4.08	-	-
7.	Kunetha	9.15	9.13	0.02
8.	Kurara	10.15	7.90	2.25
9.	Lalpura	15.22	10.47	4.75
10.	Maudaha	12.30	11.35	0.95
11.	Rath	5.52	2.85	2.67
12.	Terha	17.50	-	-

A perusal of table and depth to water level contour map for the period may 2012, reveals that water level varies from 4.08 mbgl as seen at Kharela to 29.32 mbgl in Jalalpur. Almost all the places of the district show DWL between 4.12 to 17.50 mbgl. A perusal of table and depth to water level contour map for the period November 2012 reveals water level has become shallower and varies from 2.22 at Kapsa (Maudaha block) to 28.82 mbgl in the Jalalpur 90% of the area lies in 5 to 10 mbgl water level.

SEASONAL FLUCTUATION:

Water table fluctuates in response to recharge to the aquifer and with drawl from the aquifer. The quantum of fluctuation is direct function of the above. Recharge take place mainly during rainy season. The minimum depth to water level in area is expected sometime at the close of monsoon or in the middle of monsoon period depending upon the intensity and duration of rainfall as well as soil characteristics and maximum depth to water level is expected to the rain fall.

ANNUAL SEASONAL FLUCTUATION OF WATER LEVEL:

Annual seasoned fluctuation of water level has been determined from the pre monsoon (May, 2012) and post monsoon (Nov., 2012) water level data of ground water monitoring wells the fluctuation varies from min 0.02 mbgl at Kunehta – and max 4.75 at Lalpura.

LONGTERM TREND OF WATER LEVEL:

Table-2 shows the long term trend of water level of Ground Water Monitoring Well for the ten year period 2003 to 2012.

Table–2

TREND OF WATER LEVEL - ALL
From Year 2003 to Year 2012

Sl. No.	Location	Pre Monsoon			Post Monsoon			Annual		
		Date Points	*Rise (m/year)*	*Fall (m/year)*	*Date Points*	*Rise (m/year)*	*Fall (m/year)*	*Date Points*	*Rise (m/year)*	*Fall (m/year)*
1.	Rath	10		0.3906	9		0.3600	38		0.1251
2.	Muskara	8		0.4880	4			25		0.6335
3.	Chhani Buzurg 1	3			4			16		
4.	Gohand	8		0.5795	5			26		0.6424
5.	Chandaul	3			2			12		
6.	Rihunta	7		0.3524	4			23		
7.	Jalalpur	9		1.1213	6		3.5200	28		2.2731
8.	Dhagwan	6		2.8851	6	0.5349		25	0.1747	
9.	Bewar	10		0.6606	8		0.5893	37		0.6213
10.	Lalpur	10		0.6224	9		0.4600	49		0.4678
11.	Kurara	10		0.1881	8		0.3643	33		0.1841
12.	Hamirpur	1			0			1		
13.	Kuchecha	4			2			16		
14.	Maudaha	8		0.7542	9		0.9399	35		0.7091
15.	Kharela	6	0.1631		4			24	0.1175	
16.	Khanna	9	0.0499		8	0.1547		36	0.1259	

Sl. No.	Location	Pre Monsoon			Post Monsoon			Annual		
		Date Points	*Rise (m/year)*	*Fall (m/year)*	*Date Points*	*Rise (m/year)*	*Fall (m/year)*	*Date Points*	*Rise (m/year)*	*Fall (m/year)*
17.	Kapsa	10	0.9230		9		0.1269	38	0.3075	
18.	Inghota	7		1.2971	6		2.0567	28		1.0808
19.	Kunetha	10	0.1266		6	0.1187		33	0.1190	
20.	Terha	7		0.4773	4			27		0.4218
21.	Pachkura	4			4			20		

LONG TERM WATER LEVEL TREND

Pre monsoon trend of water level:

A perusal of the table shows that there is falling trend at 12 places and rising trend at four places the range minimum decline 19 cm/year at Kurela and maximum decline 2.88 mts at Dhagwan almost 66% of well are showing decline in the rang 18cm to 2.88 mts. However 33% of well showing the rising of water level the minimum and maximum rise 0.04to 0.92 mts at Khanna and Kapsa area.

Post Monsoon Trend of Water Level:

A perusal of the table shows that at 8 places show the falling trend at the rate of 013 mts minimum and 3.50 mts maximum at Jalalpur area. The range of decline 0.13cm/year at Kapsa and 3.52 mts/year at Jalalpur area. However increasing trend showing at 0.11mts year at Kunehta and 0.53 mts/ year as Dhagwan area of district.

4.2 DYNAMIC GROUND WATER RESOURCES (As on 31.03.2009):

The net annual ground water availability in the District ranges from 5459.48 Ham to 8616.21 Ham, minimum being in Kurara block and maximum being at Maudaha Block. Gross ground water draft ranges from 2144.01 Ham at Muskura block and maximum in Moudaha block. Net ground water availability for future irrigation development & minimum is 2115.35 Ham at Sumerpur block and maximum 5680.70 ham in Muskara Block. Stage of ground water development in the District is minimum (28.50%) in Muskara block and maximum (57.38%) in Sumerpur block. Stage of ground water development of the district as whole is 46.61% of all the blocks of district are safe.

Table-3

GROUND WATER RESOURCES OF HAMIRPUR DISTRICT UTTAR PRADESH AS ON 31.3.2009

SI. No.	Assessment Units - Blocks/ District	Command/ Non Command/ Total	Net Annual Ground Water Availability	Existing Gross Ground Water Draft for Irrigation	Existing Gross Ground Water Draft for Domestic & Industria1 Water Supply	Existing Gross Ground Water Draft for AH uses (11+12)	Provision for Domestic and Industrial Requirement Supply for 2025	Net Ground Water Availability for future Irrigation Development (10-11-14)	Stage of Ground Water Development (13/10)* 100 (%)
1	*2*	*3*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
	DISTRICT - HAMIRPUR								
1-	GOHAND	Command	-	-	-	-	-	-	-
		Non - Command	-	-	-	-	-	-	-
		Total	6416.91	3119.65	228.06	3347.71	511.94	2785.32	52.17
2-	KURARA	Command	-	-	-	-	-	-	-
		Non - Command	-	-	-	-	-	-	-
		Total	5459.48	2158.85	243.31	2402.16	546.16	2754.47	44.00
3-	MAUDAHA	Command	-	-	-	-	-	-	-
		Non - Command	-	-	-	-	-	-	-
		Total	8616.21	4168.80	551.15	4719.95	237.20	3210.21	54.78
4-	MUSKARA	Command	-	-	-	-	-	-	-
		Non - Command	-	-	-	-	-	-	-

SI. No.	Assessment Units - Blocks/ District	Command/ Non Command/ Total	Net Annual Ground Water Availability	Existing Gross Ground Water Draft for Irrigation	Existing Gross Ground Water Draft for Domestic & Industria1 Water Supply	Existing Gross Ground Water Draft for AH uses (11+12)	Provision for Domestic and Industrial Requirement Supply for 2025	Net Ground Water Availability for future Irrigation Development (10-11-14)	Stage of Ground Water Development (13/10)* 100 (%)
1	*2*	*3*	*10*	*11*	*12*	*13*	*14*	*15*	*16*
		Total	8361.96	2144.01	239.34	2383.35	537.25	5680.70	28.50
5-	RATH	Command	-	-	-	-	-	-	-
		Non - Command	-	-	-	-	-	-	-
		Total	8081.96	3399.40	192.22	3591.62	431.49	4251.07	44.44
6-	SAREELA	Command	-	-	-	-	-	-	-
		Non - Command	-	-	-	-	-	-	-
		Total	5491.86	2400.80	220.38	2621.18	494.69	2596.37	47.73
7-	SUMERPUR	Command	-	-	-	-	-	-	-
		Non - Command	-	-	-	-	-	-	-
		Total	6573.20	3220.65	551.15	3771.80	1237.20	2115.35	57.38
	TOTAL		**49001.60**	**20612.16**	**2225.61**	**22837.77**	**4995.93**	**23393.51**	**46.61**

Sl. No.	Assessment Units – Blocks	Stage of Ground Water Development (%)	Pre-Monsoon		Post- Monsoon		Category (Safe / Semi Critical / Critical Over Exploited)
			Water levels trend	*Is there a significant decline (Yes/No)*	*Water levels trend*	*Is there a significant decline (Yes/No)*	
	District Hamirpur						
1	Gohand	52.17	7.59	No	18.35	No	Safe
2	Kurara	44.00	13.56	No	16.54	No	Safe
3	Maudaha	54.78	11.34	No	19.56	No	Safe
4	Muskara	28.50	6.14	No	18.72	No	Safe
5	Rath	44.44	10.62	No	15.44	No	Safe
6	Sareela	47.73	13.04	No	1.94	No	Safe
7	Sumerpur	57.38	8.62	No	10.34	No	Safe

4.3 GROUND WATER QUALITY:

Ground water in shallow aquifer, in general is colour less and slightly alkaline in nature, the specific conductance range from 550 to 1400 in □s/cm at 250C. It is observed that ground water is suitable for drinking and domestic uses in respect of all parameter.

4.4 STAGE OF GROUND WATER DEVELOPMENT:

Development of ground water in district is mainly through dug well, Handpumps – India Mark – II and tubewells the gross ground water draft far irrigation in the district on 31.03.2009, 20612.16 ham where as the ground water draft for the domestic and industrial was 2225.61 ham. Hence the existing gross ground water draft for all uses in district 022837.77 ham, Net ground water availability for future and irrigation development in the district 23393.51 Ham. A quantum of 23393.51 ham has been allocated for domestic and industrial requirement for next 25 year. Net available ground water availability in the district 49001.60 ham. The stage of ground water development of district 46.61% all the block of the district are safe.

Water Supply Based on Ground Water Sources:

U.P. Jal Nigam is the govt. agency responsible for providing drinking water supplies to the urban and rural population in the district. The water requirements of

the habitants are met with through surface water sources, through various mini water supply schemes or integrated water supply scheme utilizing the available ground water recourses. There are many shallow and deep tube wells through which water is supplied through pipe lines/taps in the urban areas of district. In the rural areas are the districts there are 627 No. of villages in which water is supplied by Tap/Hand pumps India Mark – II benefitting 819984 no of population.

5.0 GROUND WATER MANAGEMENT STRATEGY

5.1 Ground Water Development:

In the four block of district mainly Kurana, Muskara. Rath and Sareela the Level of development is <50%. In these blocks there is scope of ground water development with proper management and control.

In the area of low ground water development the well suitable for extraction of ground water suitability of rigs depth ranges and discharge in the district can be summarized as follows:

Sl. No.	Well Feasible	Rig Suitable	Depth of Wells (m)	Discharge (lpm)
1	Dug well/ Hand Pump	Manual/ Hand Boring set	20-60	50-150
2.	Shallow Tube well	Rotary Rigs Direct Rotary	50-150	0-1500
3.	Deep Tube Well	Combination Rig	150-300	500-2500

5.2 Water Conservation Artificial Recharge:

In the area where the post monsoon depth to water level is more than 8 mbgl and rate of decline during post monsoon 72cm/year there is immediate need to adopt techniques of water conservation and Artificial Recharge.

In such urban area roof top rain water harvesting should be made mandatory for government building, schools etc. Recharge Pit/Shafts/Trenches of suitable design are ideal scheme for rain water harvesting in such area. Central Ground Water Board provides free technical guidance for implementation of roof top rain water harvesting schemes. In rural area check dam, gully plug should be constructed as per local

hydrogeological condition to recharge the area. Revival, Renovation and Restoration of ponds should be encouraged to arrest the decline of water level.

6.0 GROUND WATER RELATED ISSUES AND PROBLEMS

The trend analysis of ground water level data indicate, fall of both pre and post – monsoon period in the major part of district. This will impact in.

1. Further decline of ground water level.
2. Drying up of dug wells/ shallow wells.

Increased expenditure and power consumption for withdrawing water from progressively deeper depth.

7.0 AWARENESS & TRAINING ACTIVITY

Central Ground Water Board has not conducted any Mass Awareness Programme and Water Management Training programme in the district.

8.0 AREAS NOTIFIED BY CENTRAL GROUND WATER AUTHORITY

Central Ground Water Authority has not notified any area/block in the district.

9.0 RECOMMENDATIONS

1. Artificial recharges technique should be adopted in the district due to occurrence of deep water condition to minimize the decline of water level. In urban area, roof top rain water harvesting, with structures such as Recharge pits/shafts/trenches of suitable design, should be made mandatory for all government buildings, schools etc. having large roof top area.

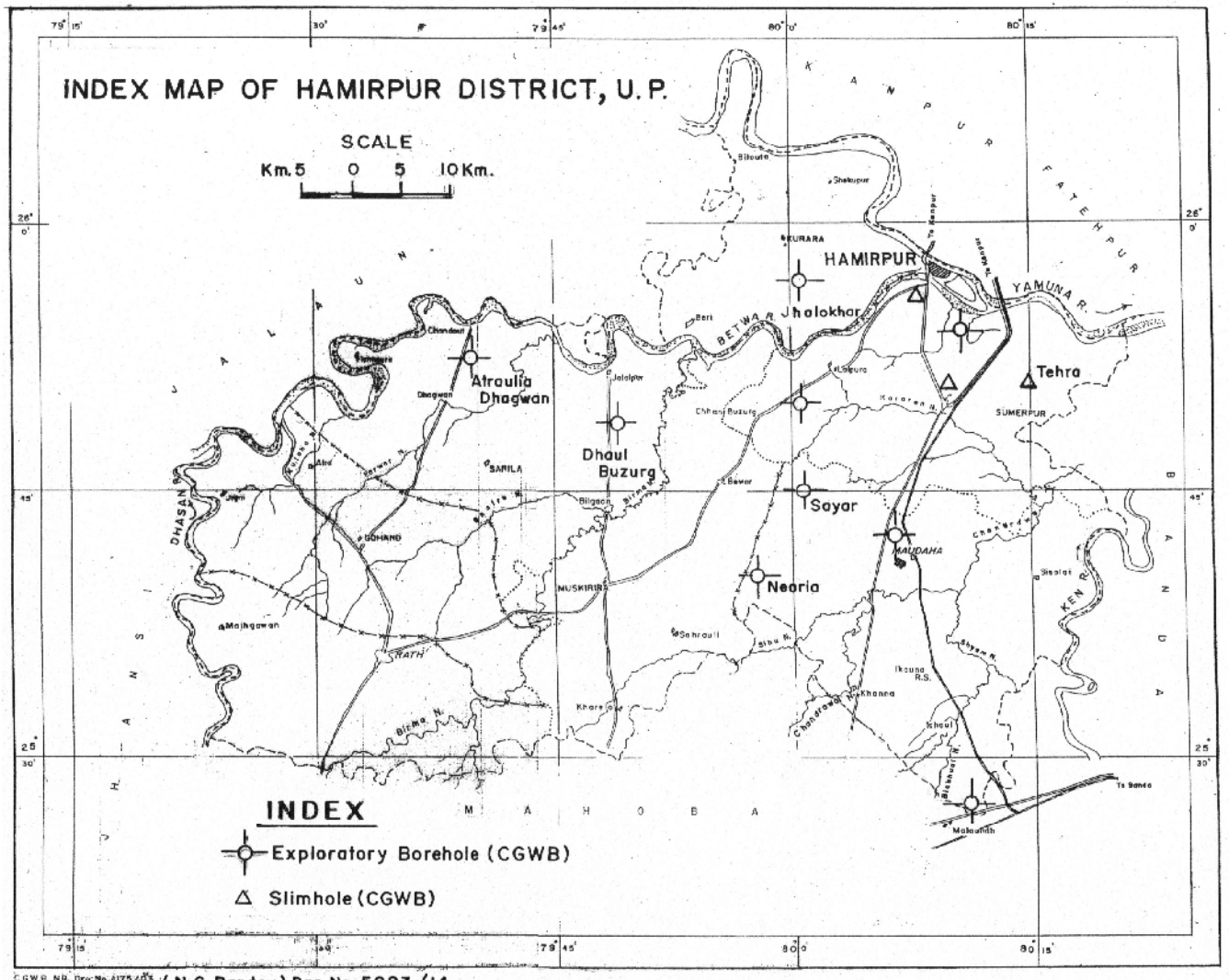
2. All the blocks are exhibiting declining trends in their ground water level hence proper vigilance and regular monitoring of water levels at close intervals through suitably located structure is essential.
3. To minimize the overstress on Aquifer Group–I, it is advisable to plan heavy duty water supply tube well for future all uses by exploiting the Ground water from the deeper aquifer.

REFERENCE

1. Statistical Data available in the web site : www.upgov.nic.in

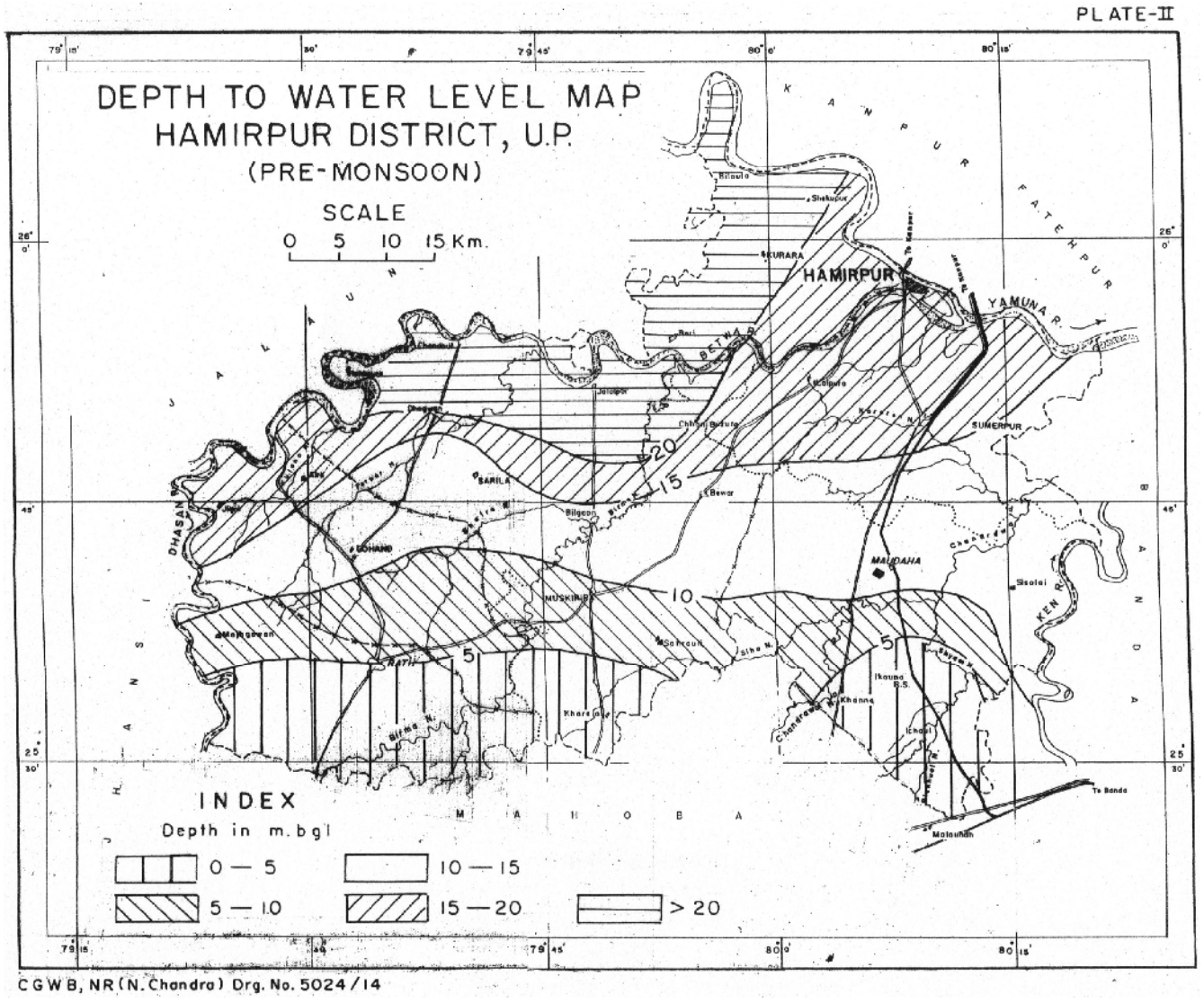
2. Saidul Haq 2000-01 : Report on Ground water management studies of Hamirpur District, U.P.

PLATE-I



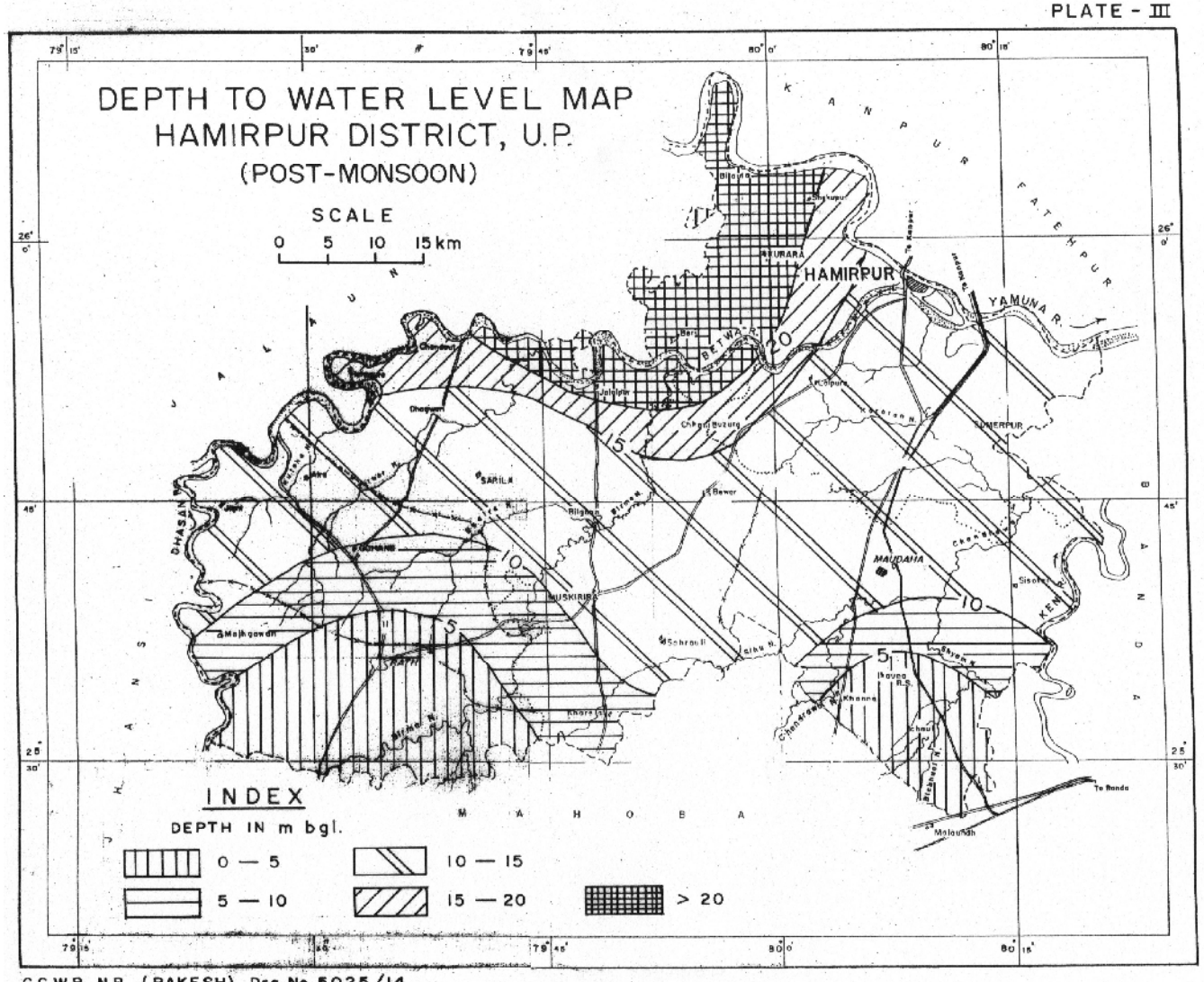
CGWB, NR, Drg. No. 4175/03, (N.C.Pandey) Drg. No. 5023/14

PLATE-II



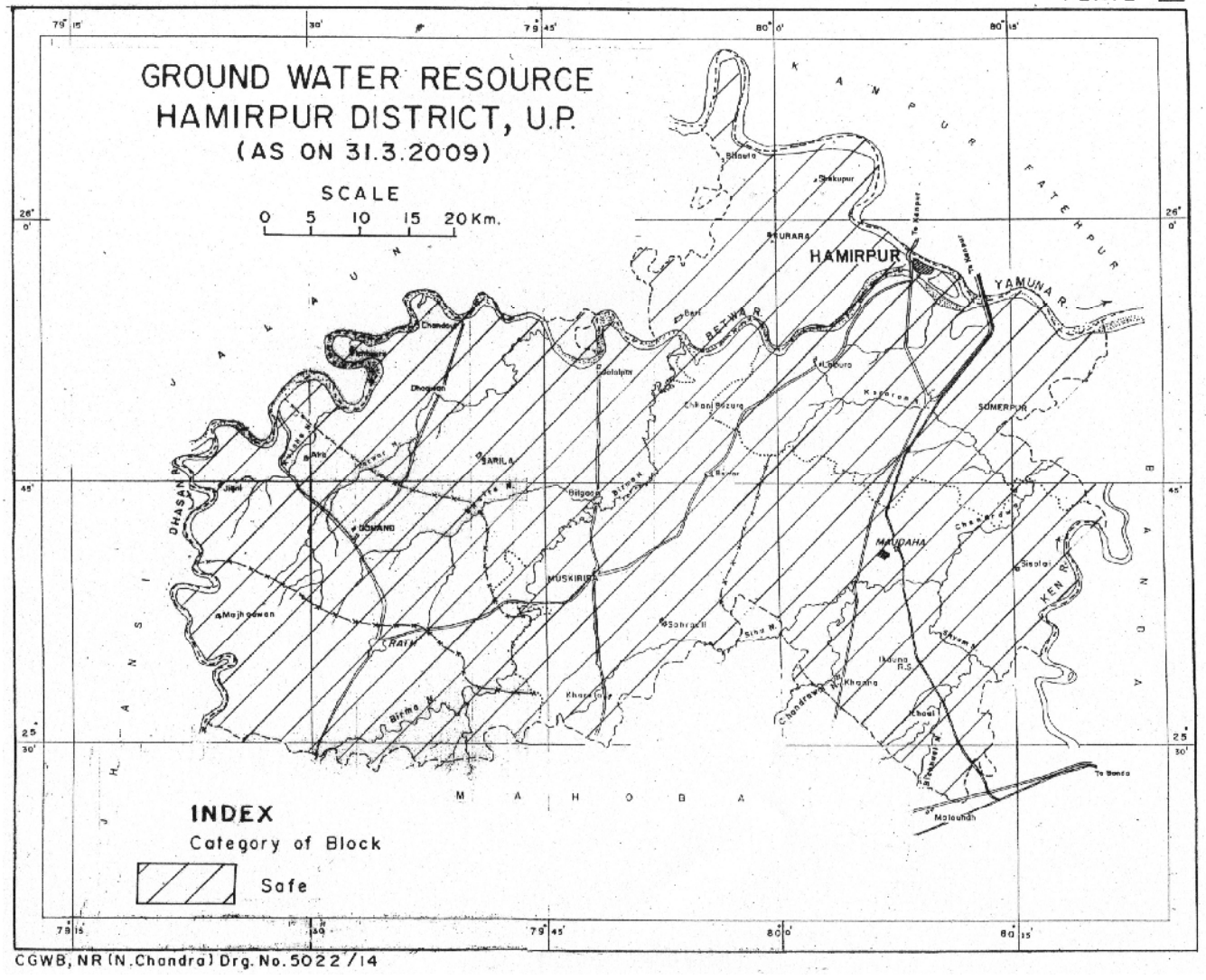
CGWB, NR (N. Chandra) Drg. No. 5024/14

PLATE - III



CGWB, NR, (RAKESH), Drg. No. 5025/14

PLATE - IV



CGWB, NR (N.Chandra) Drg. No. 5022 / 14