GROUNDWATER BROUCHER OF MIRZAPUR DISTRICT, U.P.

(A.A.P:2012-13)

By

Dr.H.K.Pandey, Scientist C

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PLATE:

MIRZAPUR DISTRICT AT A GLANCE

GENERAL INFORMATION

District	: Mirzapur
Geographical Area (Sq Km)	: 4522
Sub Division	
a) Number of Tehsil	:04
b) Number of Block	:12

CLIMATOLOGICAL DATA

Normal Rainfall (mm)	: 997.40
Mean Maximum temperature	44.0^{C}
Mean Minimum temperature	5.20^{C}
Average R. Humidity	56%
No of Rainy Days	58
Wind Speed Maximum	4.5Km/hr

LNAD USE (Ha)

Total area	: 361595
Total Forest area	: 569
Barren Land	: 7661
Present Fallow Land	: 55023
Pasture	: 682
Garden	: 15900

IRRIGATION

Net Cultivated Area	: 313865
Net Irrigated Area	:112477
By Canal	: 67434
Groundwater	:39250
Others	: 238

HYDRAULIC STRUCTUES

Dugwells	: 4867
Shallow tubewells	: 2488
Deep Tubewells	: 434
Exploratory Tubewells of CGWB	: 14

GROUNWATER RESOURCE POTENTIAL
(as on 31.03.09)

Net Groundwater Availability	: 101946
Gross Groundwater Draft	: 23184.88
Balance Groundwater Available (Ham)	: 78761.12
Stage of Groundwater Development	:
No of Critical Blocks	: None
No of Semi critical Blocks	: 02

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1.0 INTRODUCTION

Mirzapur district covers an area of 4522 sq.km and one of the Southern most district of U.P and is characterized by Hard rocks particularly Vindhyan sediments alluvial formations consisting of Marginal alluvium and Quaternary alluvium. The district is administratively divided in 04 tehsils namely Chunar, Marihan, Lalganj & Mirzapur Sadar and are further divided into 12 development blocks.

2.0 PHYSIOGRAPHY

The district is characterized with hard rock as well as alluvial formations and table land topographic features. Hard rock area comprising Marihan, Rajgarh and Halia blocks reflects the uneven plains and dotted with hillocks. Geomorphologically, the district can be divided into two distinct units; 1. Residual hills / Table lands and 2. Marginal Alluvial Plain. River Ganga is flowing from Hargarh to Narayanpur from west to east but changes its course near Chunar due to Chunar Fort. The drainage density is higher in hilly area and lower in marginal alluvial and alluvial area. Dendritic drainage pattern is common and trellis drainage pattern is observed in hard rock area. River Belan also flows in the district particularly in Halia block. The elevation of the area varies from 100-300mamsl. The general slope of the tract is from North to South. The topography is influenced or modifiedby the existing rivers and streams.

3.0 GEOLOGY

Geologically the district is characterized by Vindhyan system and it is overlain by Quaternary alluvium. The geological succession is given below:

Table-I

STRATIGRAPHIC SEQUENCE IN MIRZAPUR DISTRICT, U.P.

Period	Groups & Formation	Lithology
Recent	Quaternary Alluvium	Clay, Sand and Kankar
---------- Unconformity ----------"---------- --------		
Cambrian	Upper Vindhyan	Dhandhaurl quartzite scrap sandstone
	Lower Vindhyan	Bijaygarh shale, quartzite, sandstone, Susnai conglomerate and lower quartzite

3.1 Sub-Surface Geology:

Subsurface geology of the district has been inferred on the basis of 96 borehole data. Thickness of quaternary alluvium increases from south to north. It ranges from 35 m to 75 m. Depth of basement increases from west to east (106.0 to 159.0 m). The upper horizons of alluvium consist of sticky clay, kankar having a thickness 40 m to 50 m. It is evident from lithological section that water bearing sandstone and quartzite by confining beds are confined.

4.0 HYDROMETROLOGY

The average annual rainfall is 1085.00 mm. Climate is sub humid and is characterized by hot summer and pleasant monsoon and cold season. About 90% of rainfall takes place

from June to September. During monsoon surplus water flows into rivers and streams un-arrested due to hilly topographic features in Northern part of the district.

In February there is increase in temperature, May is the hottest month with the mean daily maximum temperature is 40.5°C and mean daily minimum temperature is 9.0°C. The Average temperature ranges from 14.15 to 39.80 C. The average temperature from March to June do not fluctuate much.

The average relative humidity is 85%. The average monthly relative humidity of the district is 41 %. Winds are generally high with some increase in force during summer and southwest monsoon season. The mean wind velocity is 2 knots and potential evapo-transpisration rate is 1456.7 mm.

5.0 HYDROGEOLOGY

Hydrogeological Set-up:

Exploratory drilling data of CGWB and state tubewell department show that there are fractures which create secondary porosity in hard rock area and porous formation in alluvial formations. The depth of these fractures differ from place to place. The ground water condition in the area are greatly influenced by the occurrence of two distinct litho-units.

a) Unconsolidated sediments in the northern part (Marginal Alluvium)

b) Hard Rock Formation: Comprising Upper Vindhyan sandstone and shale in the southern part.

5.1 Ground Water Condition:

Ground water is mainly controlled by drainage, topography and lithological behavior, it occurs under phreatic condition at shallow depths and fractures & granular zones under at deeper depths. Depth to water in pre-monsoon ranges between 5.00 to 45.00 mbgl. Postmonsoon water level varies between 3.10 to 15.50 mbgl. Water level fluctuation is minimum (2.1) in Chhanbey and maximum (5.61m) Rajgarh block. After the study of long term water level trend, it is inferred that a;; the well show the decline trend during pre-monsoon period. The average magnitude of falling trend over last 05 years is 50-65 em/year. The yield of the wells vary from 30 to 700 lpm ill hard rock and 600 to 2700 1 pm in alluvial

region. The shallow fractures and phreatic ground water has poor sustainability.

5.2 Ground Water Resources:

To facilitate the ground water development the ground water resources of the district have been worked out and are as follows. (Table-II):

Table-II

BLOCK WISE GROUND WATER RESOURCES OF MIRZAPUR DISTRICT , *U.P.* (as on 01-04-2009)

Sl. No.	Assessment unit (Blocks)	Ground water availability (Ham)	Ground water draft (Ham)	Level of development (%)	Category as on 31.03.09	Balance ground water (Ham)
1	Chhanbey	2913.97	2235.92	76.73	Semi-Critical	255.55
2	Halia	5208.39	2423.84	46.54	Safe	1930.45
3	Jamalpur	5640.63	3160.47	56.03	Safe	1994.15
4	Kon	2579.52	2371.12	91.92	Semi critical	0.00
5	Lalganj	5806.14	7202.51	58.18	Safe	2377.89
6	Majhaw	3928.05	3830.21	97.51	Critical	0.00
7	Marihan	2997.22	1360.34	45.39	Safe	1047.17
8	City	5301.40	3740.60	70.56	Semi-Critical	1009.93
9	Narainpur	6819.72	3107.26	45.56	Safe	3243.84
10	Pahari	6722.44	2079.13	30.93	Safe	4309.71
11	Rajgarh	4917.00	2107.56	42.86	Safe	2781.00
12	Sikhar	3967.24	3656.15	92.16	Critical	220.37
Total		58198.14	34262.81	58.87		19170.05

6.0 GROUND WATER QUALITY

6.1 Quality of Shallow Ground Water:

The chemical analysis of shallow ground water consists of pH, E.C., Na, K, Ca, Mg, HCO_3, CL, SO4, NO_3, F and TH as $CaCO_3$. The result reflects that the ground water is safe and potable except at few pockets in Marihan block where some have high iron content.

6.2 Quality of Deeper Aquifers:

Data of water samples collected from deeper aquifers reveals that the water is safe and potable from deeper fractures/aquifers and better than shallow aquifer.

7.0 GROUND WATER PROBLEMS ENCOUNTERED

After study, it is inferred that the following groundwater problems have been encountered in the district.

7.1 Water Table Depleted Area:

. In Mirzapur district, there is scarcity of ground water during summer season. In Rajgarh, Halia, Marihan and Lalganj blocks there is decline in water level over the years (2005-2010). Even the area which were experiencing water logging during year 2001 are showing water level depletion since 2007. It is well known fact that being rocky and hilly area, the ground water level has declined significantly over the years except canal command area due to canal seepage. Long term water level trend reveals that it is declining in entire district. The average decline in water level is 0.25 m to 0.75 m/year.

7.2 Artificial Recharge Area.

From the analysis of long term data of water level and rainfall of the district, it is inferred that water conservation and Artificial Recharge structures are needed. The check dams and bundhi have been constructed in very large number apart from water conservation ponds/tanks in the district. There is need of percolation tanks and bori- dams at suitable

locations in parts of Rajgarh, Marihan, Pahari, Lalganj and Halia blocks.

8.0 CONCLUSIONS

Mirzapur district covers an area of 4552 Sq. km. and falls in the Vindhyan Supergroup rocks. The district is characterized with hillocks, plateau and plains made by alluvium. Rainfall run-off is quite high in the hilly part of the district. River Ganga and Belan are main drainage apart from smaller streams in the district. The data of Exploratory drilling conducted by CGWB in the district reveals that ground water occurs in porous as well as fractures and weathered zones. Yield of well varies from 30 to 3100 lpm with 30m drawdown in the District. Depth to water level in pre-monsoon ranges between 5.00 to 45.00 mbgl. Post-monsoon water level varies between 3.30 to 16.75 mbgl. Water level data of all NHS falling in the district were analyzed from 2001 to 2011 which clearly show that the long term fluctuation ranges between 0.79 to 4.00 m corroborating insignificant base flow of ground water in the area. Long term water level trend has shown the decline in ground water level in entire district. The chemical analysis of ground water samples of the district show that the water quality is fresh and potable except few villages in Marihan block where high iron content in ground water has been observed.

9.0 RECOMMENDATIONS

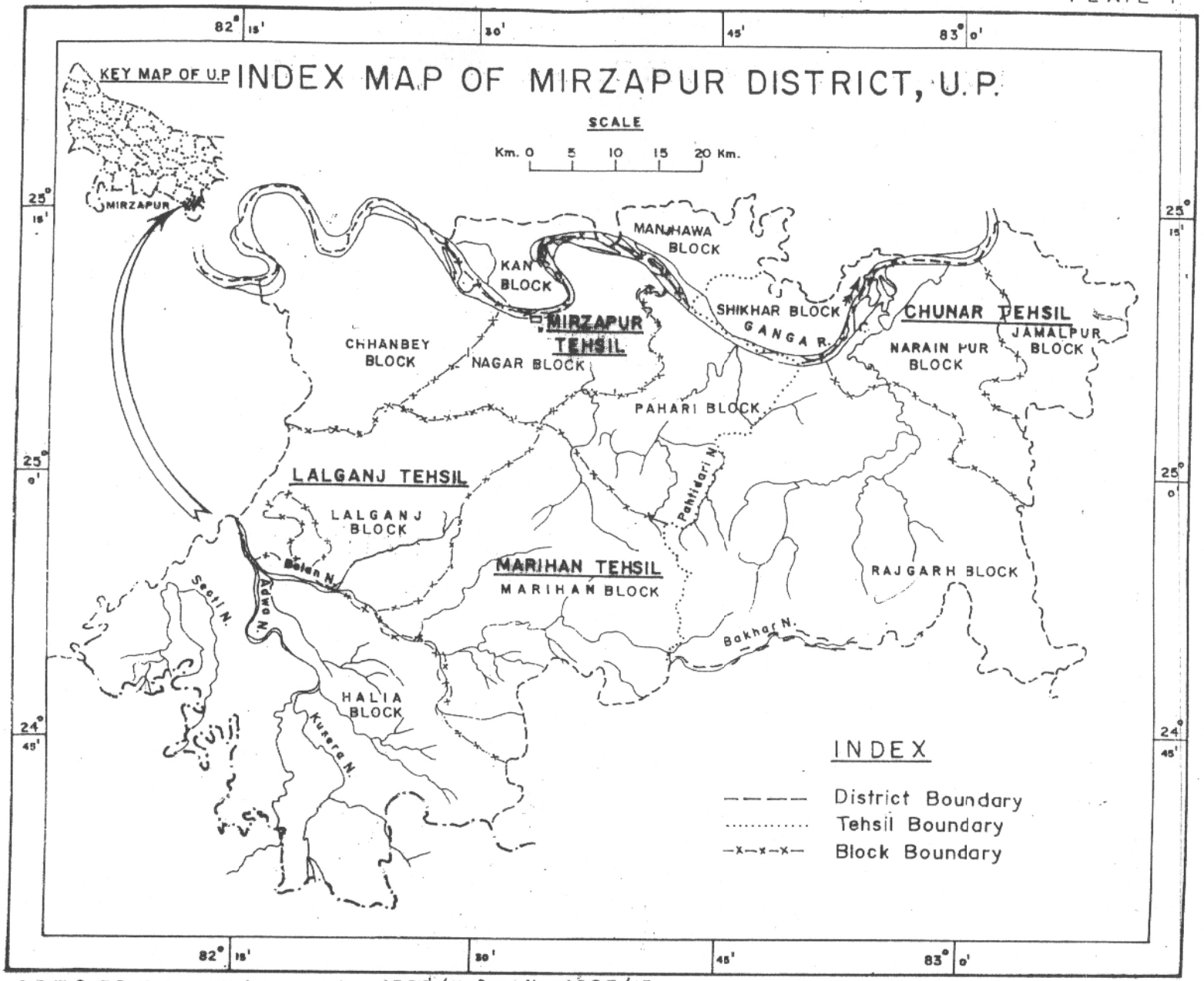
i) Delineation of buried and paleo-channels for potable ground water may be searched out.

ii) To counter the declining water level trend in the district the artificial recharge practices and water-shed management (from hill to valley approach) should be adopted at large scale.

iii) There is urgent need of Quality assessment of shallow and deeper groundwater and its relationship with the litho logical behavior.

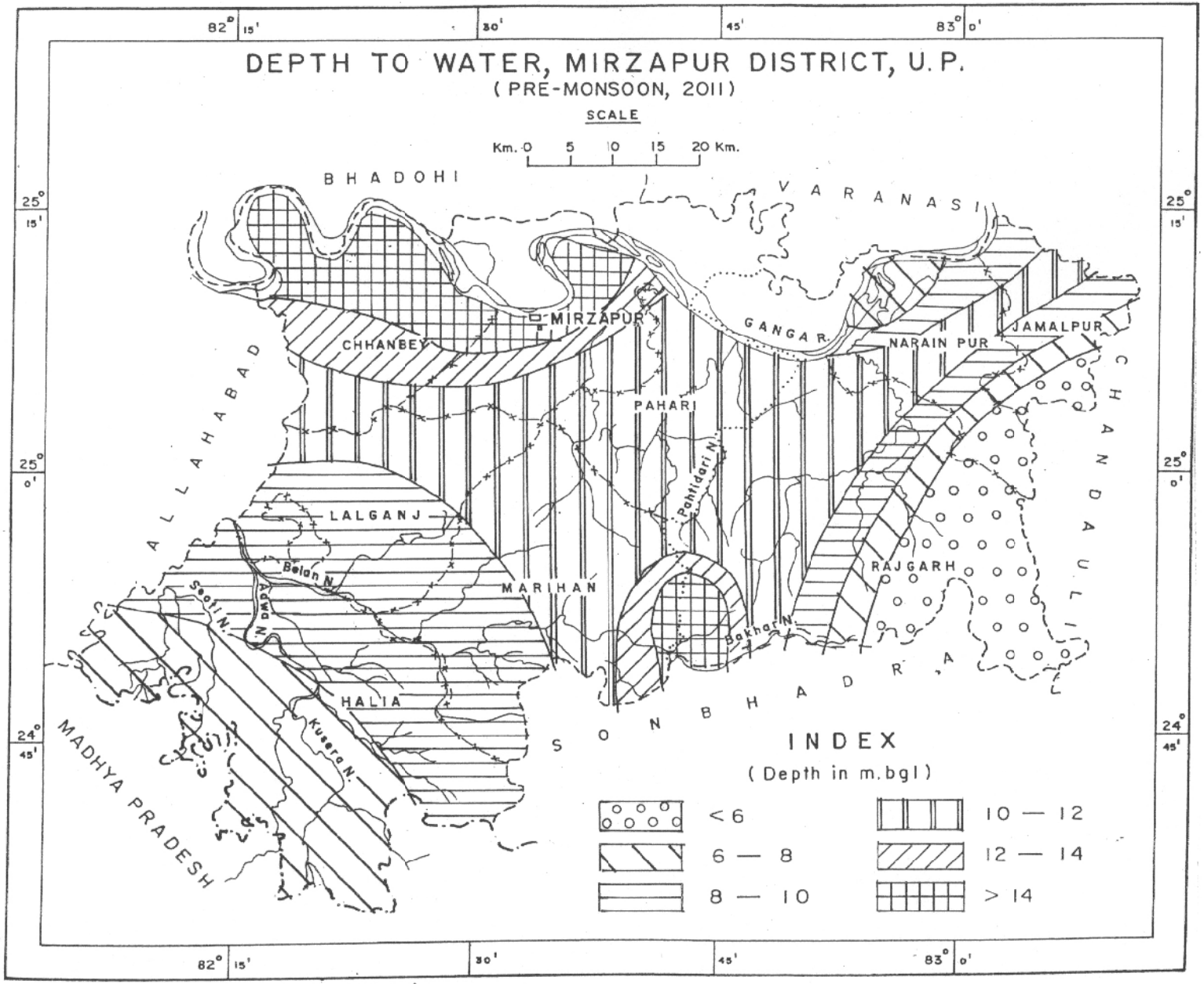
v) Exploration of potential sites for ground water withdrawl should be carried out through the help of Remote Sensing, Study of Satellite Imageries and Resistivity surveys.

PLATE-I



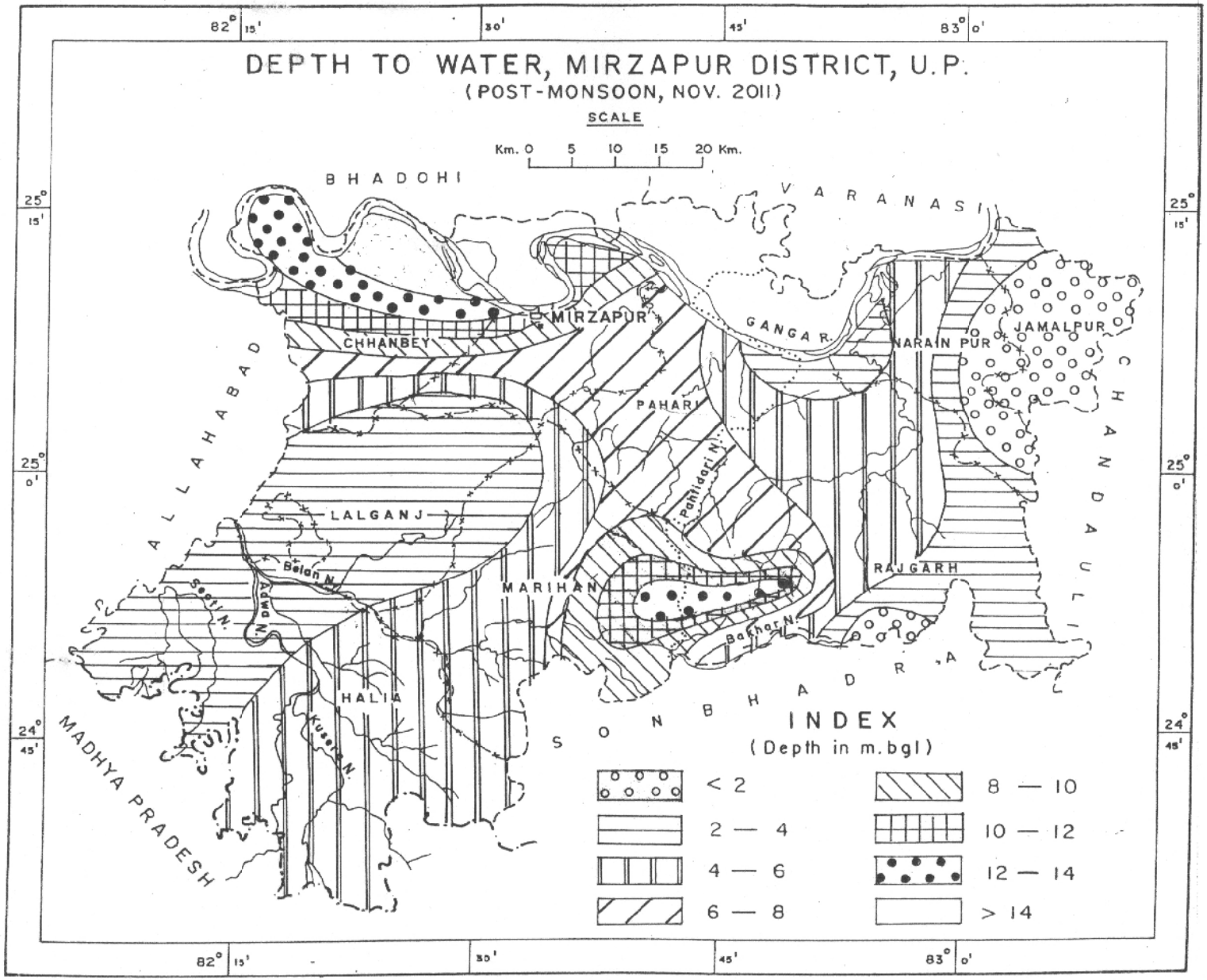
C. G. W. B., N.R., Drg. no. 7583/96. & 1942/05, 4388/II, Drg. No. 4827/13

PLATE-II



CGWB, NR (N. Chandra) Drg. No. 4828/13

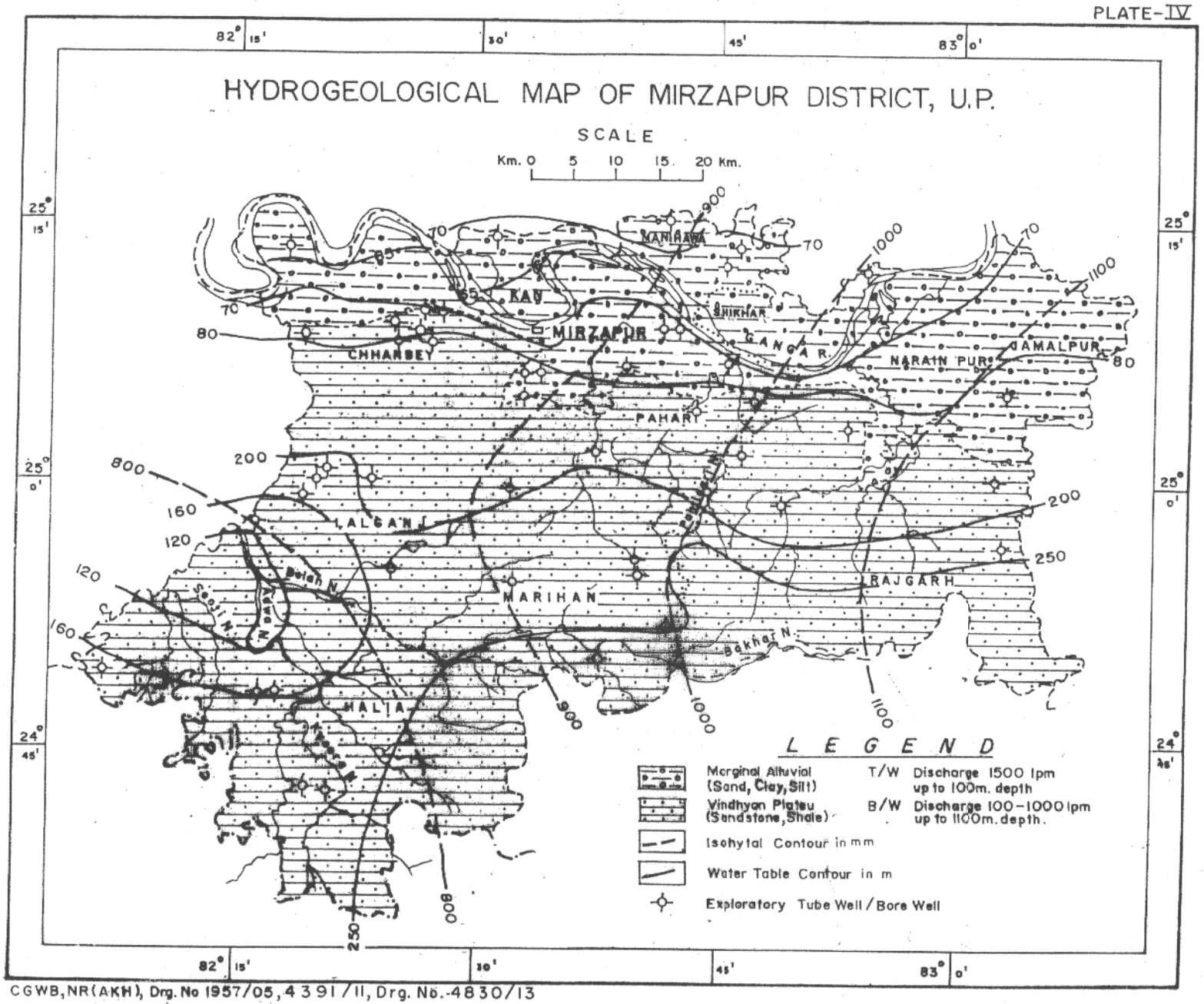
PLATE-III



C. G. W. B., N.R., Drg. no. 7583/96. (N. Chandra) Drg. No. 4829/13

PLATE-IV

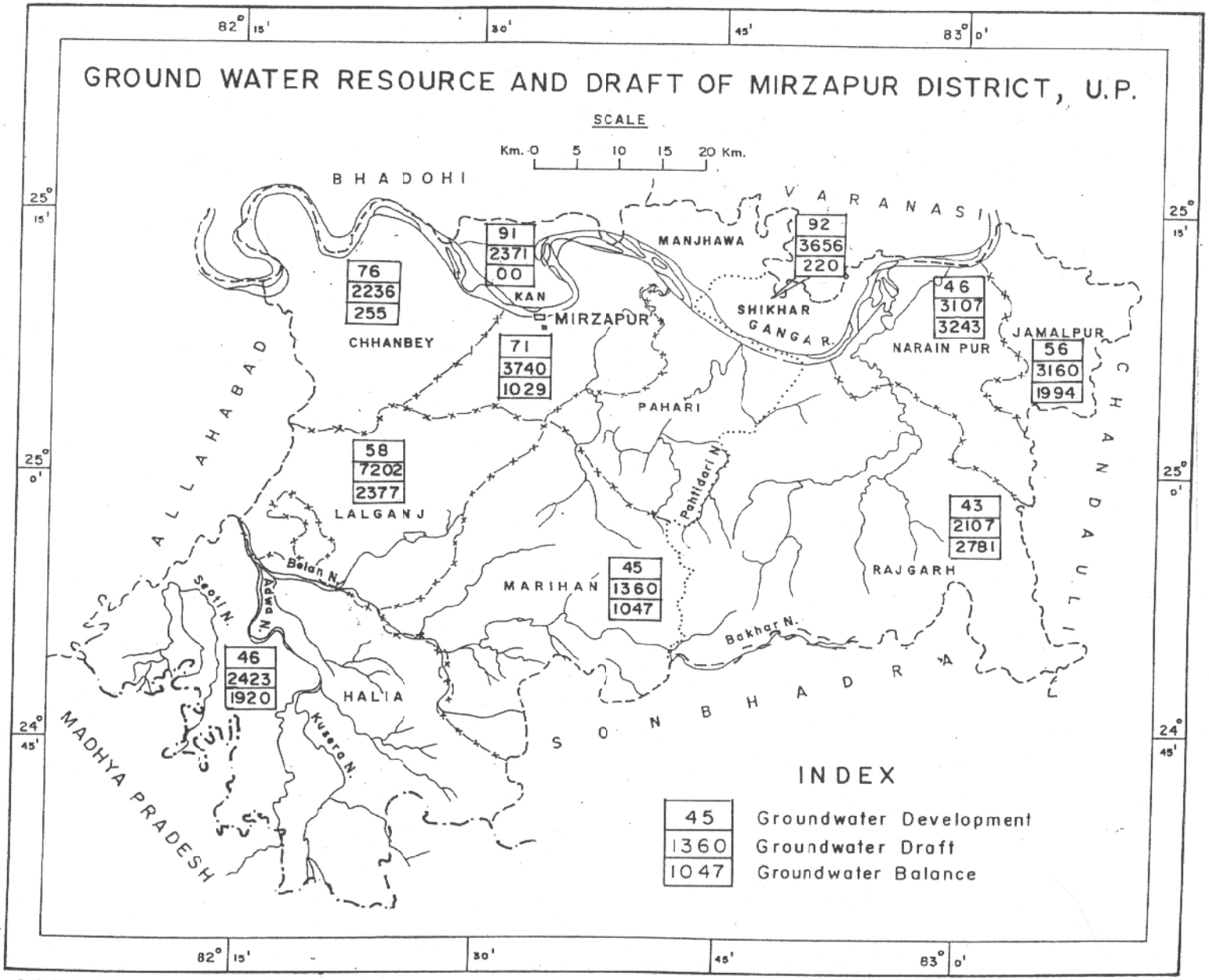
HYDROGEOLOGICAL MAP OF MIRZAPUR DISTRICT, U.P.



CGWB, NR(AKH), Drg. No 1957/05, 4391/11, Drg. No.-4830/13

PLATE - V

GROUND WATER RESOURCE AND DRAFT OF MIRZAPUR DISTRICT, U.P.



C. G. W. B., N.R., Drg. no. 7583/96. (N. Chandra) Drg. No. 4831/13