

GROUND WATER SCENARIO OF LAKHIMPUR KHERI DISTRICT, U.P.

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

By

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DISTRICT AT GLANCE

1. GENERAL INFORMATION

i. Geographical Area (Sq. Km.)	:	7680.00
ii. Administrative Divisions (as on 31.3.2005)		
Number of Blocks	:	6/15
Number of Panchayat Villages	:	1829
iii. Population (as on 2001 census)	:	32,07,234
iv. Average Annual Rainfall (mm)	:	1093.50 mm

2. GEOMORPHOLOGY

Major Physiographic Units	:	Older & Younger Alluvium
Major Drainages	:	Gomati & Ghaghra

3. LAND USE (Sq. Km.)

a) Forest area (Sq. Km.)	:	2321.54
b) Net area sown (Sq. Km.)	:	4863.82
c) Cultivable area (Sq. Km.)	:	4863.82

4. MAJOR SOIL TYPES

: Sandy Loam

5. AREA UNDER PRINCIPAL CROPS (as on 2004-05)

: 6984.20

6. IRRIGATION BY DIFFERENT SOURCES

(Areas and Number of Structures) (Sq.Km.)

Dugwells	:	168
Tubewells / Borewells	:	713 state tubewells & 108430 Private tubewells
Canals	:	641 Km.
Net Irrigated Area	:	1558.57
Gross Irrigated Area	:	1671.00

7. NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-3-2007)

No. of Dugwells	:	14
No. of Piezometers	:	Nil

8. PREDOMINANT GEOLOGICAL FORMATIONS

: Quaternary Alluvium

9. HYDROGEOLOGY

	Major water bearing formation	:	Sand, Silt and Gravels
	Pre-monsoon Depth to water level during 2012 (mbgl)	:	2.95 to 9.66
	Post-monsoon Depth to water level during 2012 (mbgl)	:	1.48 to 7.26
	Long term water level trend in 10 years (2003-2012) in m/yr	:	Rise 0.0018 - 0.2629 Fall 0.0017 - 0.2054
10.	GROUND WATER EXPLORATION BY CGWB (As on 31-3-2007)		
	No of wells drilled (EW, OW, PZ, SH, Total)	:	EW-11, OW-13 PZ-2
	Depth range (m)	:	38 to 450 mbgl (Seda – Meda flowing well encountered)
	Discharge (litres per second)	:	5 – 58
	Storativity (S)	:	2.05×10^{-3}
	Transmissivity (m^2/day)	:	3030 m^2/day
11.	GROUND WATER QUALITY		
	Presence of chemical constituents more than permissible limit (e.g. EC, F, As, Fe)	:	All constituents are within permissible limit except Arsenic
12.	DYNAMIC GROUND WATER RESOURCES (2009)-in MCM		
	Annual Replenishable Ground Water Resources	:	260691.03
	Gross Annual Ground Water Draft	:	8086.23
	Projected Demand for Domestic / Industrial uses upto 2025	:	14513.57
	Stage of Ground Water Development	:	61.89
13.	AWARENESS AND TRAINING ACTIVITY	:	Nil
	Mass Awareness Programmes organized		
	Date		
	Place		
	No. of participants		
	Water Management Training Programme organized	:	Nil
	Date		
	Place		
	No. of participants		

14.	EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING	:	Nil
	Projects completed by CGWB (No & Amount spent)	:	Nil
	Projects under technical guidance of CGWB (Numbers)	:	Nil
15.	GROUND WATER CONTROL AND REGULATION	:	
	Number of OE Blocks	:	Nil
	No of Critical Blocks	:	Nil
	No of blocks notified	:	Nil
16.	MAJOR GROUND WATER PROBLEMS AND ISSUES	:	Decline trend in block aquifer
17.	NUMBER OF INDUSTRIES	:	155 registered small scale 3140 minor industries

GROUND WATER SCENARIO OF LAKHIMPUR KHERI DISTRICT, U.P.

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

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I. INTRODUCTION

Lakhimpur Kheri is the northern most district of the Lucknow division and is situated in the sub-Himalayan belt bordering to Nepal. It is bounded on the east by the Ghaghra river which separates it from Bahraich district on the south by Sitapur district and for a short distance by Hardoi district. The western boundry matches with Sahjahanpur and Pilibhit districts and on the north is the kingdom of Nepal.

This district has been divided into 6 number of tehsils namely Nighasan, Gola Gokarnnath, Mohammedi, Lakhimpur, Dhaurahara and Behjam and 15 number of blocks.

The main river which control the whole drainage system of the district are Gomati and Ghaghra. All the rivers in the area are generally flowing from NW to SE direction.

II. CLIMATE & RAINFALL

The normal rainfall is 1093.5 mm, of which 86% rainfall is received during monsoon period and 14% during non-monsoon period.

The hottest month with maximum temperature upto 32.3⁰C in May and the coldest month with temperature 15.6⁰C is January. The humidity is lowest in April 39.5% where as it increases to about 82.5% in August. The mean monthly wind speed is generally high from March to September reaching maximum 5.2 Km/hr in May and in December being around 1.4 Km/hr. The annual potential evapotranspiration is 1369.1 mm. The highest P.E.T. occurs during May and lowest in December.

III. GEOMORPHOLOGY & SOIL TYPES

Geomorphologically the area of Lakhimpur district is a vast alluvial plain traversed by numerous streams flowing in a south-easterly direction. The surface of the land is interrupted by low river beds and the high banks which flank the streams on either side. The main river frequently change their course leaving behind old channels in which water accumulates to form lakes and swamps. The master slope of the country is towards south-east.

Loam or Dumat soil occupies the level upland where as clay or matiyar are found in the depressions. The tarai tract, in the northern part of the district, has soils varying from clayey loam to loam and just below often gravels are encountered.

IV. GROUND WATER SCENARIO

The district is occupied by the Ganga alluvium of the quaternary age, which consist of mainly fine to coarse sand, gravel, silt, clay and kankars. The granular zone consisting of different grades of sand and gravel form the multi-aquifer system in the area. Shallower aquifers are generally of un-confined nature where as the deeper aquifers are of semi-confined to confined nature. The clay beds are generally acting as the confining layers.

The Transmissivity (T) of deeper aquifer system is 3030 m²/day and the storage of co-efficient (S) is 2.05×10^{-3} . The yield of shallow tubewells tapping shallow aquifer zones varies from 2700 to 3300 lpm at economical drawdown.

Depth to Water Level:

In general, the depth to water level in the entire district varies from 2.95 to 9.66 mbgl, during premonsoon season and 1.48 to 7.26 mbgl during postmonsoon season. In the interfluvial tract of Sharda and Ghaghra rivers, the depth to water level generally ranges between 3 and 5 mbgl during premonsoon and in postmonsoon it ranges between 2 and 3 mbgl.

Long Term Water Level Trend:

The long term water level trend for 10 years (2003-2012) of 15 hydrograph stations have shown that only 9 wells have rising trend. These wells are Mailani, Chandan Chowki,,Asogpur, Dudhawa,Gularia, Behjam,Gomati river bank, Chapartala. It varies from 0.0018 to 0.2659 m/year. Remaining wells show annual falling trend varies from 0.0017 to 0.2054 m/year.

Ground Water Resources:

As per report on dynamic ground water resources of Uttar Pradesh as on 31-03-2009, annual ground water availability of the district is 260691.03 ham. The gross ground water draft for all uses is 8086.23ham. The stage of ground water development is 61.89%. As per the estimates worked out all blocks are in safe category.

Ground Water Quality:

Ground water of the district in phreatic aquifers, in general is colourless, odourless and slightly alkaline in nature. The specific electrical conductance of ground water in phreatic zone was in the range of 430 – 950 $\mu\text{s}/\text{cm}$ at 25⁰C. It is observed that 20% of the samples analysed have high Nitrate, which is most likely due to the use of fertilizers for agriculture and other improper waste disposal. Fluoride is found within the permissible limit and ranges from 0.13 to 0.41 mg/l. Phosphate is nil in ground water of the area.

The Arsenic content has been found ranging from nd to 138 ppb (village Popper Purwa in Ramia Bihar block) with most affected blocks are Nighasan, Palia which are in the doab of Ghaghra – Sharda rivers.

Iron has been found 1.863 mg/l of Dhaurahara and often trace elements are within limits of BIS.

Status of Ground Water Development:

In all blocks of the district ground water development takes place through dugwells, borewells and state tubewells. The relevant details are given below:

Sl. No.	Type of Structure	Number	Depth Range (mbgl)	Yield (lpm)
1.	Dugwells	168	4.50 – 10.90	-
2.	State Tubewells	713	100.0 – 150.0	200 – 500
3.	Borewells	108430	15.0 – 35.0	150 - 250

The area irrigated by canal is 641 Km. Drinking water tubewells have been constructed by Central Ground Water Board under exploration programme in town area and villages. Depth of drinking water tubewell varies from 227 to 331 mbgl. The yield of the tubewells varies from 250 to 3480 lpm. One flowing well have been observed at Seda – Meda. Total drilling depth of this tubewell was 450 mbgl.

V. GROUND WATER MANAGEMENT STRATEGY

5.1 Ground Water Development:

The stage of ground water development in the district is 61.89%. The maximum stage of ground water development is in Ramaiya Behr block that is 88.13%. minimum ground water development have been observed at Gola block that is 77.66%. All 15 blocks of this district are in safe category and have good scope for further ground water development.

It is advisable to plan heavy duty tubewells, in future, for domestic, irrigation and industrial uses. By exploiting these aquifers in order to reduce the overstress on shallow aquifers occurring down to depth of 150 mbgl. Depending upon the position of aquifer, the recommended drilling depth of heavy duty deep tubewells for different regions are given below:

- (i) Trans Sharda Tract : 450 mbgl
- (ii) Extreme North Tract : 500 mbgl.
along Mohan river (to know the depth of autoflow condition of aquifer by way of constructing exploratory tubewells)

5.2 Water Conservation Structure and Artificial Recharge:

In the blocks where the ground water development is nearly 80% viz. Behjam, Dhaurahara and Gola, the exploitation of ground water should be minimized and practice of the conjunctive use of ground water and surface water should be adopted. To conserve the ground water resources, drip sprinkler irrigation and change in cropping pattern will be useful beside the artificial recharge of ground water reservoirs.

VI. GROUND WATER RELATED ISSUE AND PROBLEMS

6.1 Risk to Natural Disaster:

The district lies in the belt of Arsenic affected area. The Arsenic concentration is >10 ppb have been recorded in blocks Palia, Nighasan, Ramia Bihar, Dhaurahara and Issanagar of district Lakhimpur. Further deep ground water exploration is completed. Following tube wells have been constructed and handed over to U.P. Jal Nigam for drinking water supply to the affected area-. The tube wells are:

1. Palia
2. Nighasan
3. Ramia Bihar
4. Dahruhra
5. Issanagar (Plate 07)

VII. MASS AWARENESS PROGRAMME

Recent by one programme will be conducted by CGWB in March 2009.

INDEX MAP OF LAKHIMPUR-KHERI DISTRICT, U.P.

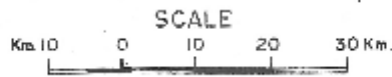
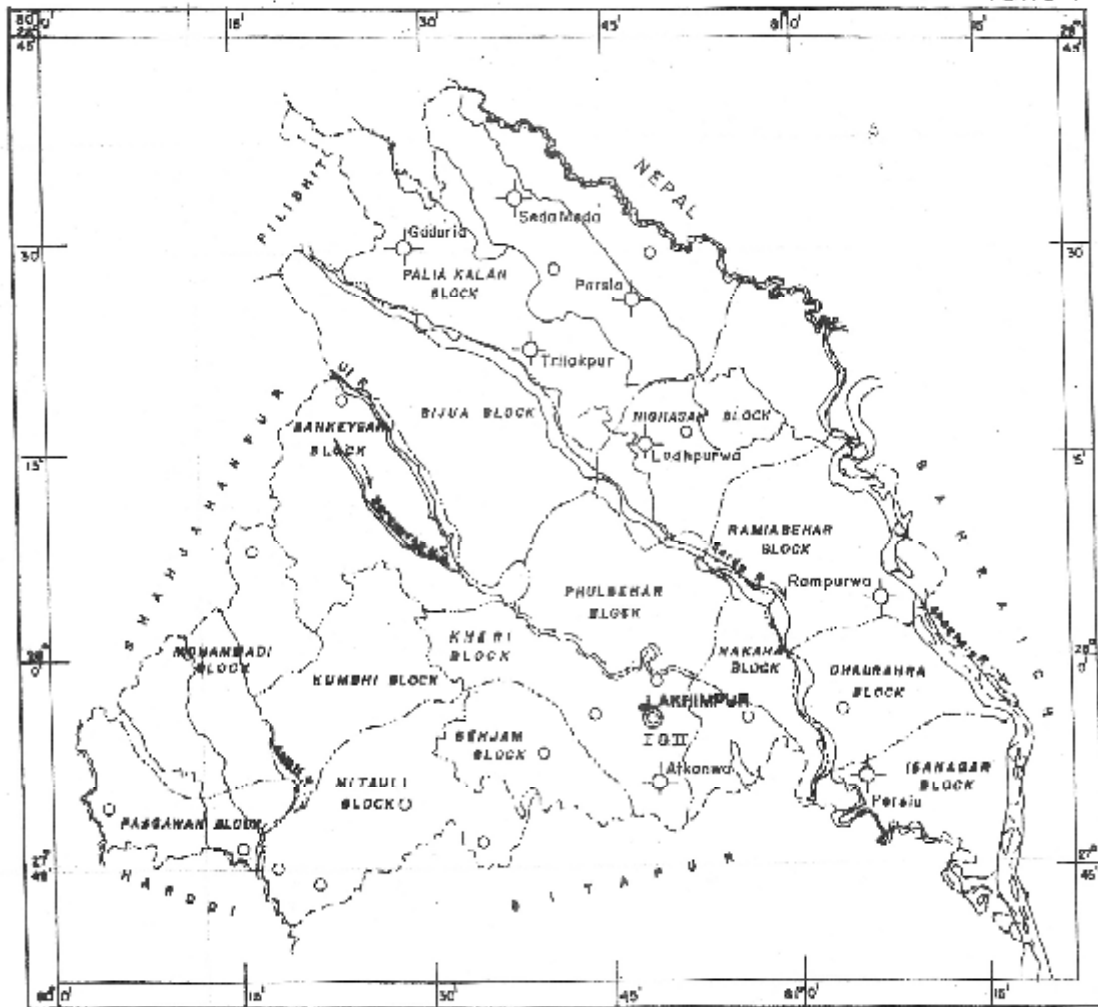


PLATE-I



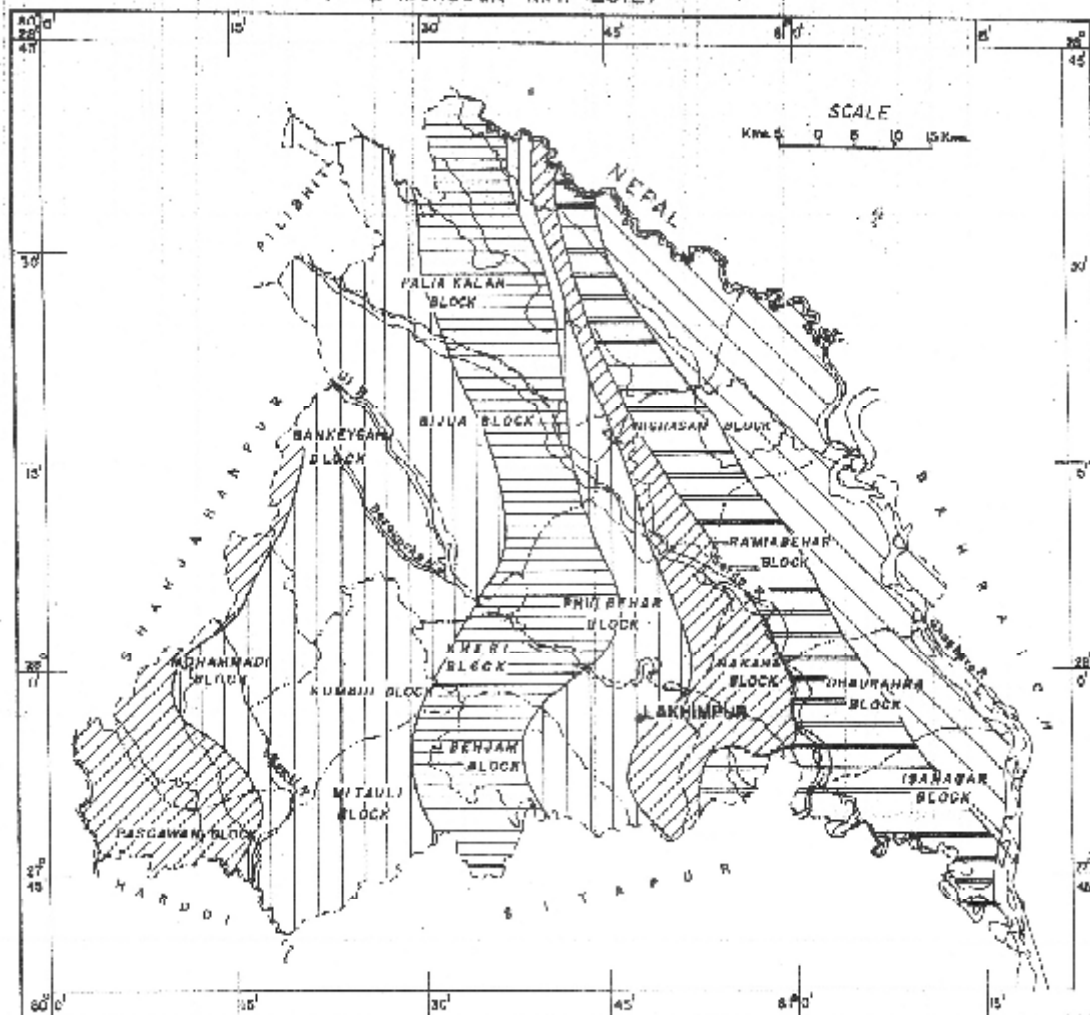
C.G.W.B., NR, (N.C. Pandey) Drg. No 4062 / 10, 4749 / 13

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- ⊙ Exploratory Tubewell
- Piezometer
- National Hydrograph Station

DEPTH TO WATER LEVEL MAP LAKHIMPUR-KHERI DISTRICT, U.P.
(PRE-MONSOON - MAY 2012)

PLATE-2



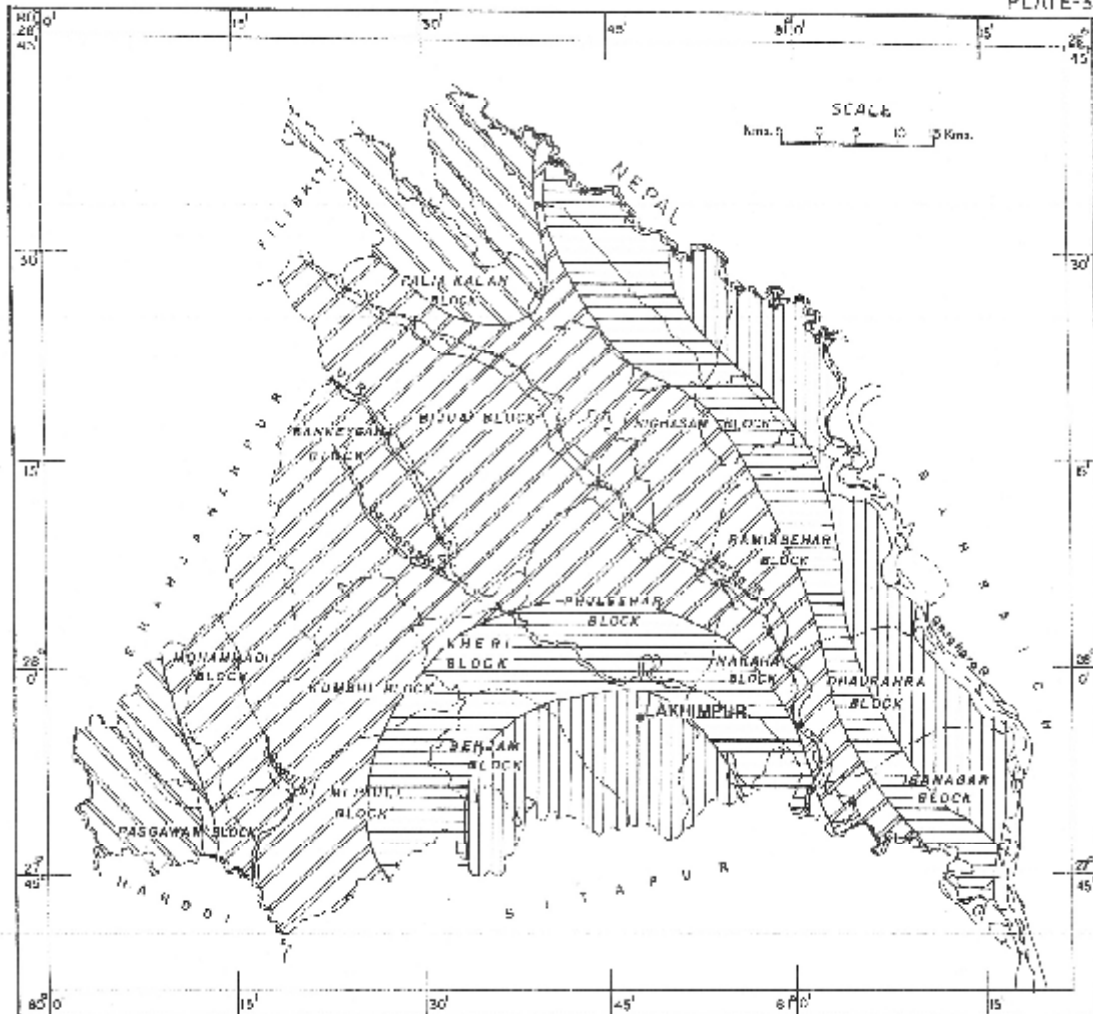
CGWB, N.R. (A.R), D.O. NO.4711/91, (CHAKESH), 4/5/2/13

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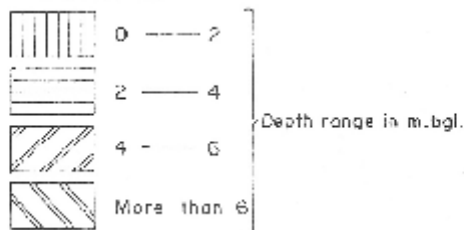
DEPTH TO WATER LEVEL MAP
 LAKHIMPUR-KHERI DISTRICT, U.P.
 (Post Monsoon Nov. 2012)

PLATE-5



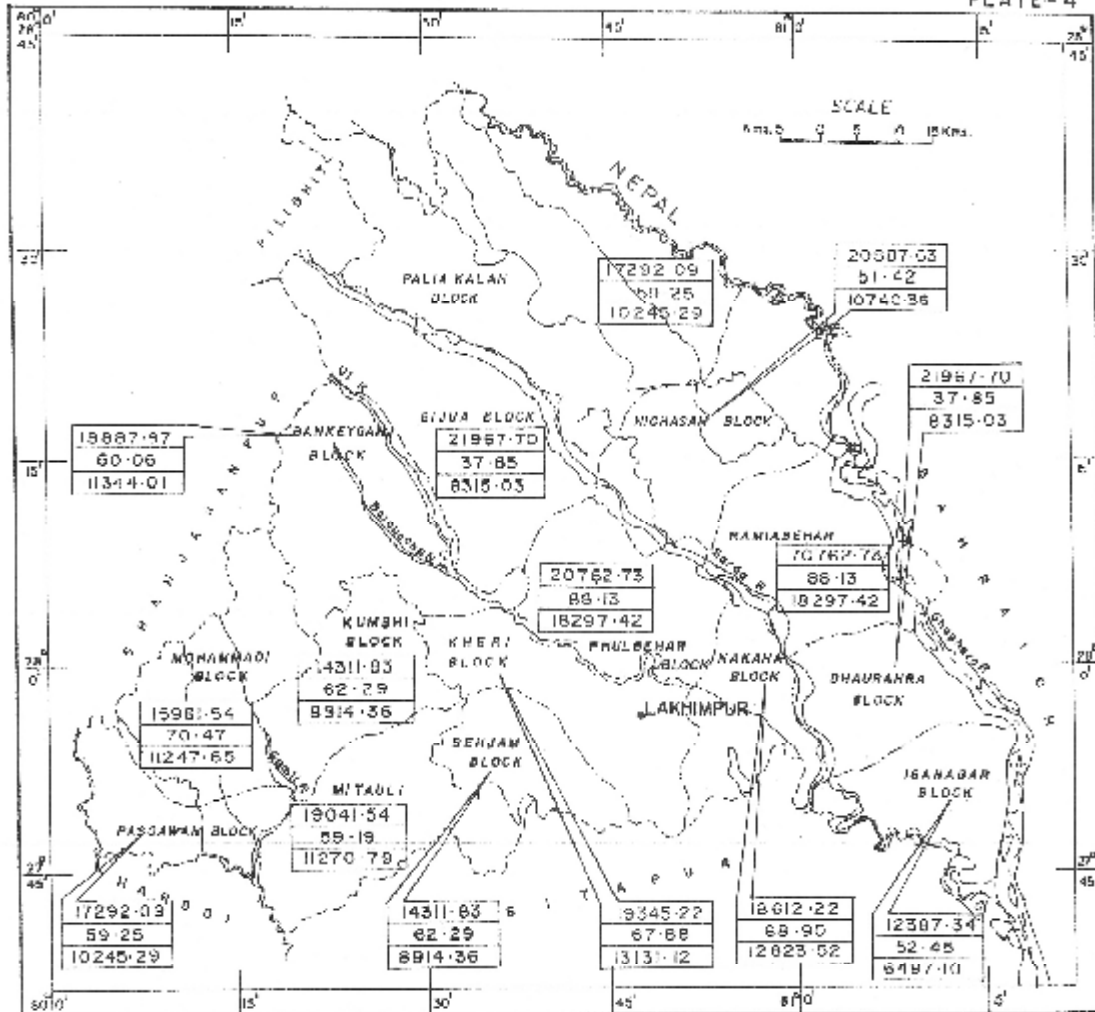
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DYNAMIC GROUNDWATER RESOURCES MAP LAKHIMPUR-KHERI DISTRICT, U.P.

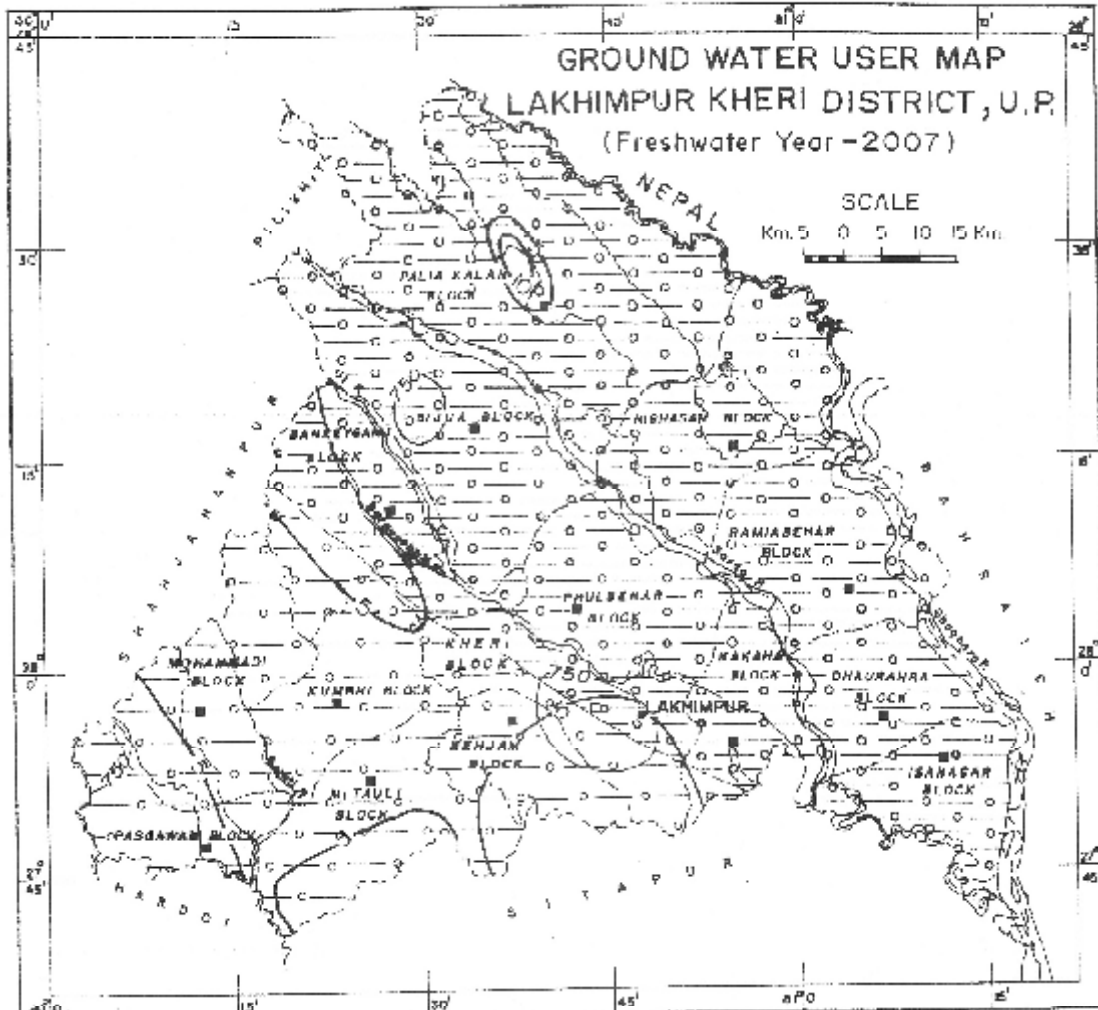
PLATE-4



GIS/II, NR, 14 R, D.O. NO. 1711/91, (H.C.Pandey) Drg. No. 4748/13

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19345.22	Net groundwater availability (ham)
67.88	Stage of groundwater development in %
13131.12	Groundwater draft (ham)



CGWB, NR, (N.C.Pundey) Drg. No. 4066/10, 4750/13

LEGEND

	WELLS FEASIBILITY	RIGS SUITABLE	DEPTH OF WELLS (M)	DISCHARGE (LPM)	SUITABLE ARTIFICIAL RECHARGE STRUCTURES*
Soil Rock Aquifer	Dug Wells / Hand Pump	Manual / Hand boring set	10 - 30	50 - 100	Recharge Shaft, Recharge Pit, Abandoned Handpumps / Tubewells, Rooftop Rain Water Harvesting Structures in urban areas.
	Shallow Tube Well	Rotary Rigs (Direct / Reverse)	50 - 100	1000 - 2000	
	Deep Tube Well	Rotary (Direct)	100 - 300**	>3000	
Soft Rock Aquifer	Dug Wells / Hand Pump	Manual / Hand boring set	10 - 30	50 - 100	Recharge Shaft, Recharge Pit, Abandoned Handpumps / Tubewells, Rooftop Rain Water Harvesting Structures in urban areas.
	Shallow Tube Well	Rotary Rigs (Direct / Reverse)	50 - 100	1000 - 2000	
	Deep Tube Well	Rotary (Direct)	100 - 300**	2000 - 3000	
Depth to Water level in m (Pre-monsoon decade: mean, 1993-2002)			Electrical Conductivity (Micromhos/cm at 25° C)		
Major river			750		
International Boundary			Block Headquarter		
District Boundary			Block Boundary		

* Applicable in arid/semi arid areas where depth to water level is > 8 m.
 ** L. (meters) upto depth explored i.e. deeper prospects yet to be found

ARSENIC AFFECTED AREA LAKHIMPUR-KHERI DISTRICT, U.P.

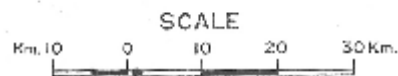
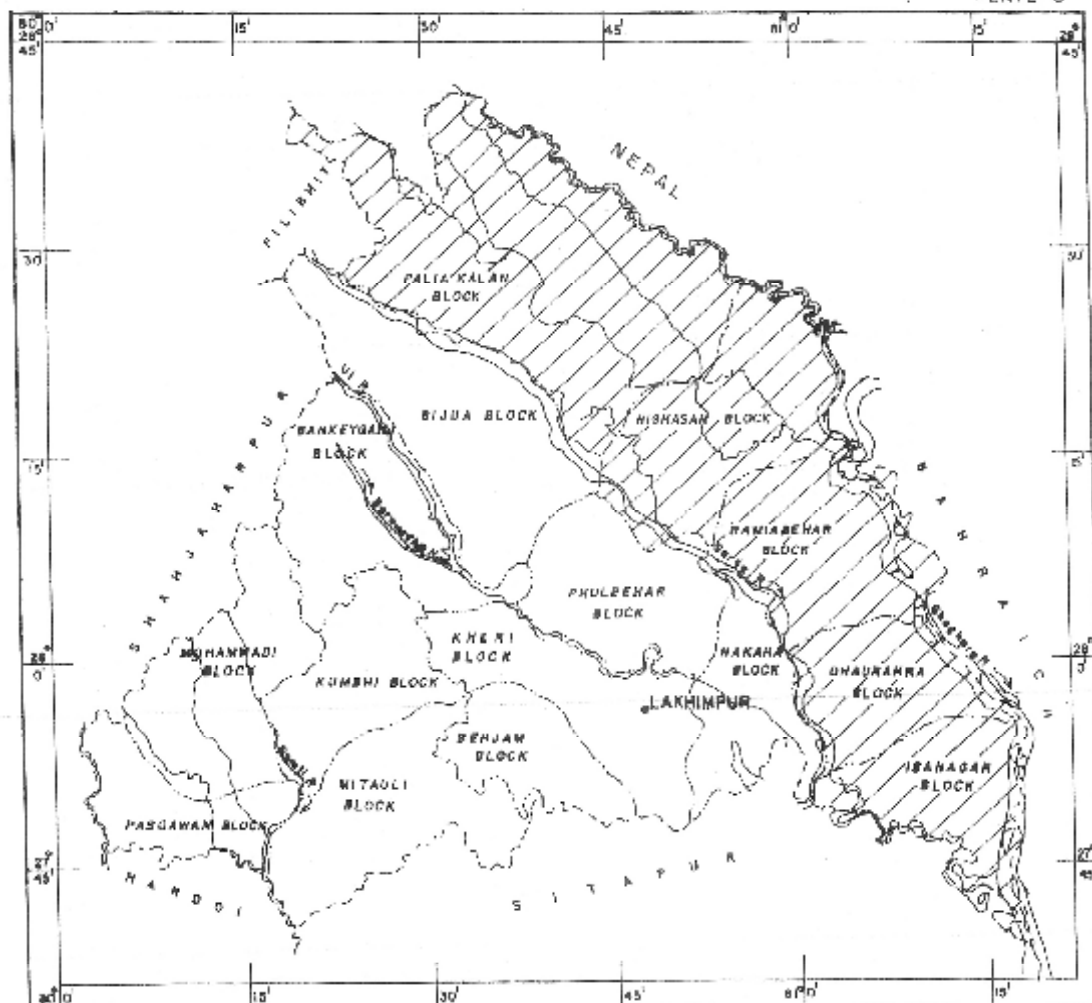



PLATE-6



C.G.W.B., NR, (N.C. Pondey) Drg. No. 4067/10, 4751/13

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 Arsenic Affected Block

EXPLORATION IN ARSENIC AFFECTED AREA LAKHIMPUR-KHERI DISTRICT, U.P.

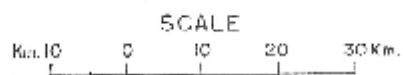
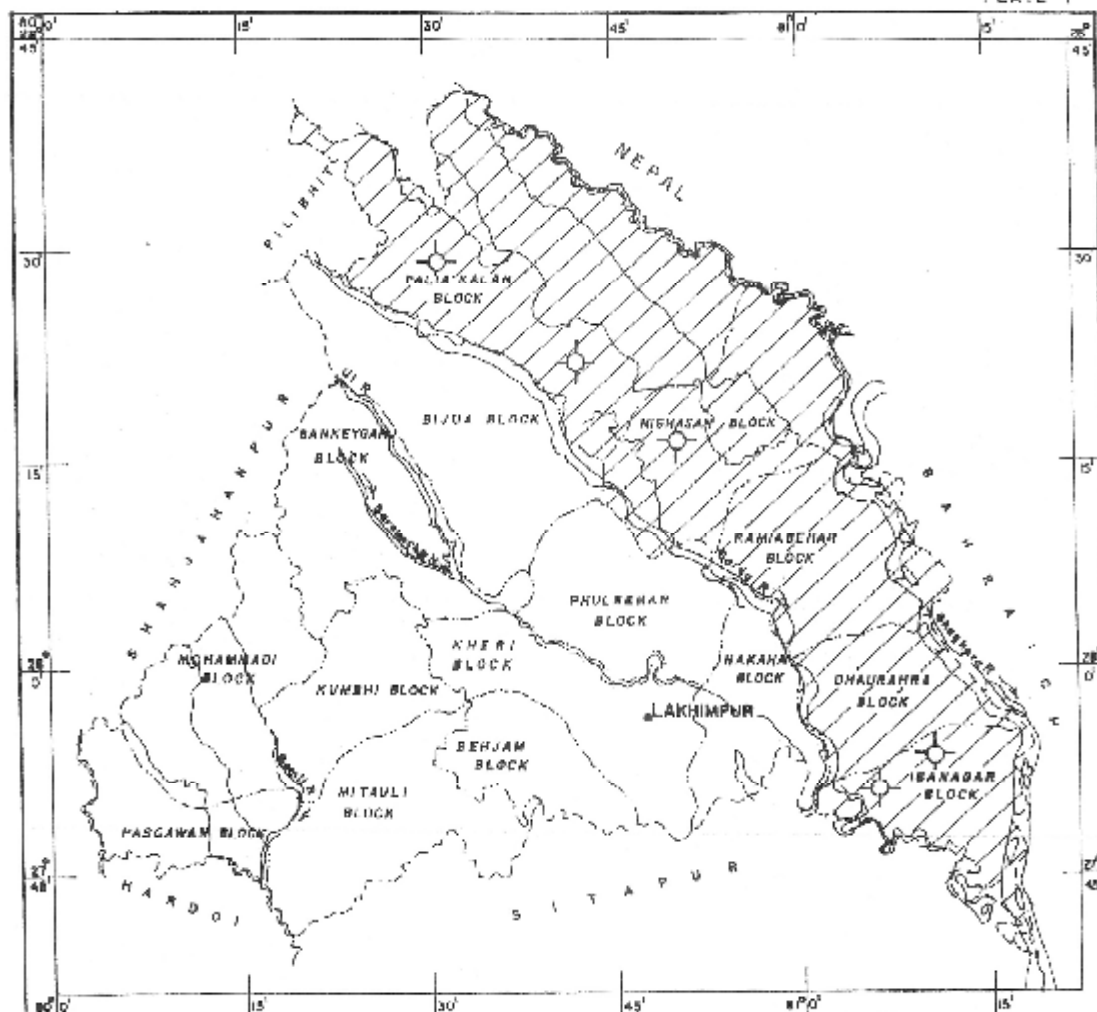


PLATE 7



C.G.W.B., NR, (N.C. Pandey) Drg. No. 4067/10, 4754/13

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- Arsenic Affected Block
- Exploratory Tubewell (CGWB) for Arsenic Studies