

GROUND WATER BROCHURE OF LALITPUR DISTRICT, U.P.

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

By

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DISTRICT AT GLANCE

1. GENERAL INFORMATION

i. Geographical Area (Sq. Km.)	: 5039
ii. Administrative Divisions (as on 31.3.2008)	:
Number of Tehsil / Blocks	3/6
Number of Panchayat / Villages	338
iii. Population (as on 2001 census)	: 977734
iv. Average Annual Rainfall (mm)	: 1044.30

2. GEOMORPHOLOGY

Major Physiographic Units	: Northern Bundelkhand Gneisses, Schists & Granite Southern Vindhyan sandstone & shale
Major Drainages	: Betwa, Dhasan Sajnam & Shahzad

3. LAND USE (Sq. Km.)

a) Forest area	: 761.60
b) Net area sown	: 2678.63
c) Cultivable area	: 3279.66

4. MAJOR SOIL TYPES : Red soil, Black soil & Alluvial soil

5. AREA UNDER PRINCIPAL CROPS (as on 2005-06) : 362209 ha.

6. IRRIGATION BY DIFFERENT SOURCES

(Areas and Number of Structures)

Dugwells	: 77943 / 25838
Tubewells / Borewells	: 29036 / 2115
Canals	: 82083 / 649 Km.
Other Sources	: 8524 / 94 ha.
Net Irrigated Area	: 240778 ha.
Gross Irrigated Area	: 242399 ha.

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

No. of Dugwells	: 10
No. of Piezometers	: Nil

8. PREDOMINANT GEOLOGICAL FORMATIONS

9. HYDROGEOLOGY

Major water bearing formation	:	Fractured and weathered granite
(Pre-monsoon Depth to water level during 2008)	:	3.59 – 10.58 mbgl
(Post-monsoon Depth to water level during 2008)	:	1.87 – 5.59 mbgl
Long term water level trend in 10 years (1997-2008) in m/yr	:	Rise 0.0499 to 0.1524 m/yr Fall 0.0169 to 0.4659 m/yr

10. GROUND WATER EXPLORATION BY CGWB

(As on 31-3-2007)

No of wells drilled (EW, OW, PZ, SH, Total)	:	EW – 63, OW – Nil
Depth range (m)	:	20.30 – 178.30
Discharge (litres per minute)	:	08 – 630
Storativity (S)	:	-
Transmissivity (m ² /day)	:	-

11. GROUND WATER QUALITY

Presence of Chemical Constituents more than Permissible Limit (e.g. EC, F, As, Fe)	:	Nil
Type of water	:	

12. DYNAMIC GROUND WATER RESOURCES

(2004)-in MCM

Annual Replenishable Ground Water Resources	:	67813.67 ham
Gross Annual Ground Water Draft	:	32195.90 ham
Projected Demand for Domestic Industrial Uses upto 2029	:	
Stage of Ground Water Development	:	51.70%

13. AWARENESS AND TRAINING ACTIVITY

Mass Awareness Programmes organized	:	Nil
Date	:	
Place	:	
No. of participants	:	
Water Management Training Programme organized	:	1
Date	:	31.01.2006
Place	:	Lalitpur D.M. Auditorium
No. of participants	:	200

- 14. EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING** : Nil
- Projects completed by CGWB (No & Amount spent)
- Projects under technical guidance of CGWB (Numbers)
- 15. GROUND WATER CONTROL AND REGULATION** : -
- Number of OE Blocks : Nil
- No of Critical Blocks : Nil
- No of Semi-Critical Blocks : 2 (Bar & Talbehat)
- 16. MAJOR GROUND WATER PROBLEMS AND ISSUES** : Water scarcity and drought prone areas.

Note: Latest available data may be incorporated.

GROUND WATER BROCHURE OF LALITPUR DISTRICT, U.P.

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1.0 INTRODUCTION

Lalitpur district, is the southern most part of Uttar Pradesh, lies between 24⁰10' to 25⁰14' north latitude and 78⁰10' to 79⁰00' east longitude. Total geographical area of the district is 5039 sq.km. District headquarter is at Lalitpur and there are three number of tehsils namely Talbehat, Lalitpur and Mahrani. Further there are six number of blocks Bar, Talbehat, Jakhaura, Birdha-Mahraoni. Further there are six number of blocks Bar, Talbehat, Jakhaura, Birdha, Mahraoni and Mandawara. As per 2001 census district has population of 977734 out of which 519413 are males and 458321 females. Rural population is 835790 and urban population is 141944. Scheduled caste & Scheduled tribe population is 243790.

2.0 RAINFALL & CLIMATE

The average annual rainfall is 1044.3 mm. The climate is sub humid and it is characterised by a hot dry summer and a cold winter, About 91% of rainfall takes place from June to September. During monsoon surplus water is available for deep percolation to ground water.

3.0 GEOMORPHOLOGY & SOIL

3.1 GEOMORPHOLOGY:

Lalitpur district mostly occupies a part of the Bundelkhand massives in the north & the southern periphery of the district is traversed by the Vindhyan ranges.

The rolling lands of the Bundelkhand massives have an average altitude of 350 m & slope northwards with gradient of 1.5 m/Km.

3.2 SOIL:

In Lalitpur district mainly three types of soil are found on the basis of colour and topography. The red soil formed by the weathering of granite and gneisses. In the basis of texture red soil divided into two sub-group the Raker soils & the Parwa soils. The IInd soil group is black soil or black colour soil is formed partly in situ and partly transported. The parent material is limestone and granite. On the basis of texture it is further divided into two sub groups, a Black kabar and the Mar soil. The IIIrd type of soil is alluvial soil group found along the rivers as valley fills and comprises coarse sand of quartz & feldspars.

4.0 GROUND WATER SCENARIO

4.1 HYDROGEOLOGY:

The geological formation of Lalitpur may be grouped into three types:

(a) Crystalline rocks – mainly granite, gneisses, schists, quartz reefs, mafic rocks, its occupies about 80% of the district where as 18% is occupied by (b) Sedimentary rocks viz. mainly sandstone, shales and carbonate rocks. The remaining 2% area is occupied by the (c) unconsolidated alluvial valley fills formations.

In the crystalline rocks the occurrence of ground water largely depends on the topographical situations, intensity of weathering and the movement of ground water depends on the interconnection of fracture zones etc. The topographically elevated areas like inselberg, buttes, kopjes etc. form poor sites of ground water occurrence while the pediments and low lying areas (pediplain) are promising areas of ground occurrence. The ground water occurs in these crystalline rocks either in the sub-aerial weathered mantle or along the joints, fractures and other weak plains under the water table conditions.

In southern peripheral part of the district sedimentary rocks are exposed comprising mainly of sandstone and shale. Ground water in the sandstone shale

sequence occurs mainly in the fine interstices of the weathered zones and along the joint planes, bedding planes in the unaltered rocks. In the carbonate rocks the ground water occurs either in the weathered mantle or along the cavities and cavernous formed as a result of carstification. The availability of ground water depends upon the number of such cavities and other saturated weak planes in these rocks.

In Lalitpur district Central Ground Water Board constructed 15 exploratory wells at depth range 15.71 to 33.90 mbgl. with a discharge of 26 to 408 lpm. CGWB also constructed 8 exploratory wells during 2001-02 under AECF. The discharge varies from negligible to 500 litre per minutes.

Depth to Water Level:

As per depth to water level data collected from 14 ground water monitoring stations for the year 2007, premonsoon water level varies from 0.77 (Talbehat) to 11.85 mbgl (Madawara). In postmonsoon period depth to water level varies from 0.70 to 10.38 mbgl. Water level fluctuation varies from 0.07 m (Talbehat) to 2.60 m (Lalitpur). Shallow water level is observed in canal commands and the deeper water level noticed at southeastern part of the district mainly in Madawara block.

The shallow water level (0.00 – 3.00 mbgl) are occurring in the form of small pockets along the surface water bodies in Talbehat areas.

Long Term Water Level Trend:

The long term water level trend for ten years (1997-2006) of 14 ground water monitoring wells have shown that only three stations are showing rising trend and remaining 11 are showing declining trend. The wells, Amjhaza Ghati, Bansi and Jakhlaun showing rising trend from 0.0499 to 0.1524 m/year. The falling trend of eleven well varies from 0.0169 m/year (Lalitpur) to 0.4659 m/year (Madaura).

4.2 GROUND WATER RESOURCES:

As per report on dynamic ground water resources of Uttar Pradesh as on 31.03.2004. Annual ground water recharge of the district is 67813.67 ham. The net annual ground water availability is 62274.29 ham. The existing gross ground water draft for all uses is 32195.90 ham. The net ground water availability for future irrigation development is 28824.87 ham. The stage of ground water development is

51.70%. As per the estimates worked out 4 blocks are in safe category and the remaining 2 blocks Bar & Talbehat falls under semi-critical category.

4.3 GROUND WATER QUALITY IN LALITPUR DISTRICT:

Ground water in shallow aquifers is colourless and odourless. The specific electrical conductance ranges from 570-960 $\mu\text{s}/\text{cm}$ at 25⁰C. Fluoride and Nitrate are within permissible limit and ranges from 0.33-0.98 mg/l and 1.9-36.0 mg/l. Phosphate is not found in ground water of the area. It is observed that the ground water is suitable for drinking and domestic uses.

The 'As' content has been found within permitted limit of BIS (10 ppb).

Iron has been reported as 1.914 mg/l at Jhakura & 1.252 mg/l at Mahroni and other trace elements are within limit of permissibility of BIS.

4.4 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	25838	5.50-25.00	50-200
2.	State Tubewell	1	-	400
3.	Rahat	3593	10-25	100-200

The shallow dugwells are found in canal command area and the deeper ones are located along the Betwa river. The well generally meet out the domestic and irrigation requirements. There are 1065 diesel pumpsets used in dugwells for irrigation. Maximum number of diesel pumpsets are in Mahrauni block i.e. 192 and minimum are in Madawara block i.e. 156. In Lalitpur district only three electric pump are found, one each in Jakhaura, Talbehat and Birdha block. Only one state government deep tubewell existing in Mahrauni block. About 2/3rd area is irrigated by ground water and 1/3rd by surface water (canal). Maximum area irrigated through canal is in Mahrauni block (22004 ha) and minimum in Madawara block i.e. 6344 ha.

In all 63 numbers of tubewells have been constructed by CGWB in the district so far. Maximum number of handpumps are in Birdha block i.e. 146 and minimum

number of handpumps in Maharauni block i.e. 97. Depth of these handpumps varies from 32 to 87 mbgl and discharge varies from 8 to 40 lpm.

5.0 GROUND WATER MANAGEMENT STRATEGY

5.1 GROUND WATER DEVELOPMENT:

The maximum stage of ground water development is in Bar block (82.28%) and minimum stage of ground water development is in Birdha block (31.38%). The southern part of the area have good scope for further ground water development through tubewells. The tubewell may be constructed between 100 and 150 mbgl after carrying out hydrogeological studies. The weathered portion may be cased by 9" pipe and further drilling should be carried out in hard rock by using different size of button bits in telescopic manner (8½", 6½" & 6" dia) that will be uncased naked hole.

5.2 WATER CONSERVATION STRUCTURE & ARTIFICIAL RECHARGE:

In Lalitpur district, number of tanks, ponds and reservoirs had been constructed taking advantage of the typical physiography and drainage by constructing dams across the major and minor streams, with an objective to store water for irrigational and domestic purposes. Some famous and important reservoirs are Matatila dam, Rajgarh dam, Shahzad dam and Sajnam dam. Most of these reservoirs suffers from seepage losses due to the fractured nature of Bundelkhand granite and gneisses over these have been constructed.

Hence water conservation and artificial recharge scheme may be taken up in the district by way of constructing check dams, nala bounding, subsurface dyke and percolation tanks etc. to check the declining water level trend through ground water recharge and water conservation.

6.0 GROUND WATER RELATED ISSUES & PROBLEMS

6.1 DRILLING PROBLEMS:

First problem is that in highly fractured granite there are instances of borehole collapsing due to fractured granites. In these boreholes casing is not possible. The

second problem is that due to higher discharge and back pressure DTH drilling could not be possible to continue down to required depths. The district has different lithological units. Hence the combination rigs (Rotary cum DTH) are suitable for constructing successful deep tubewells.

6.2 RISK TO NATURAL DISASTER:

As we know that the district Lalitpur lies in the belt of drought prone regions of Uttar Pradesh. The life of the habitants become miserable when the water supply sources like dugwells, ponds & tanks etc. get dry due to failure of monsoon.

7.0 AWARENESS & TRAINING ACTIVITY

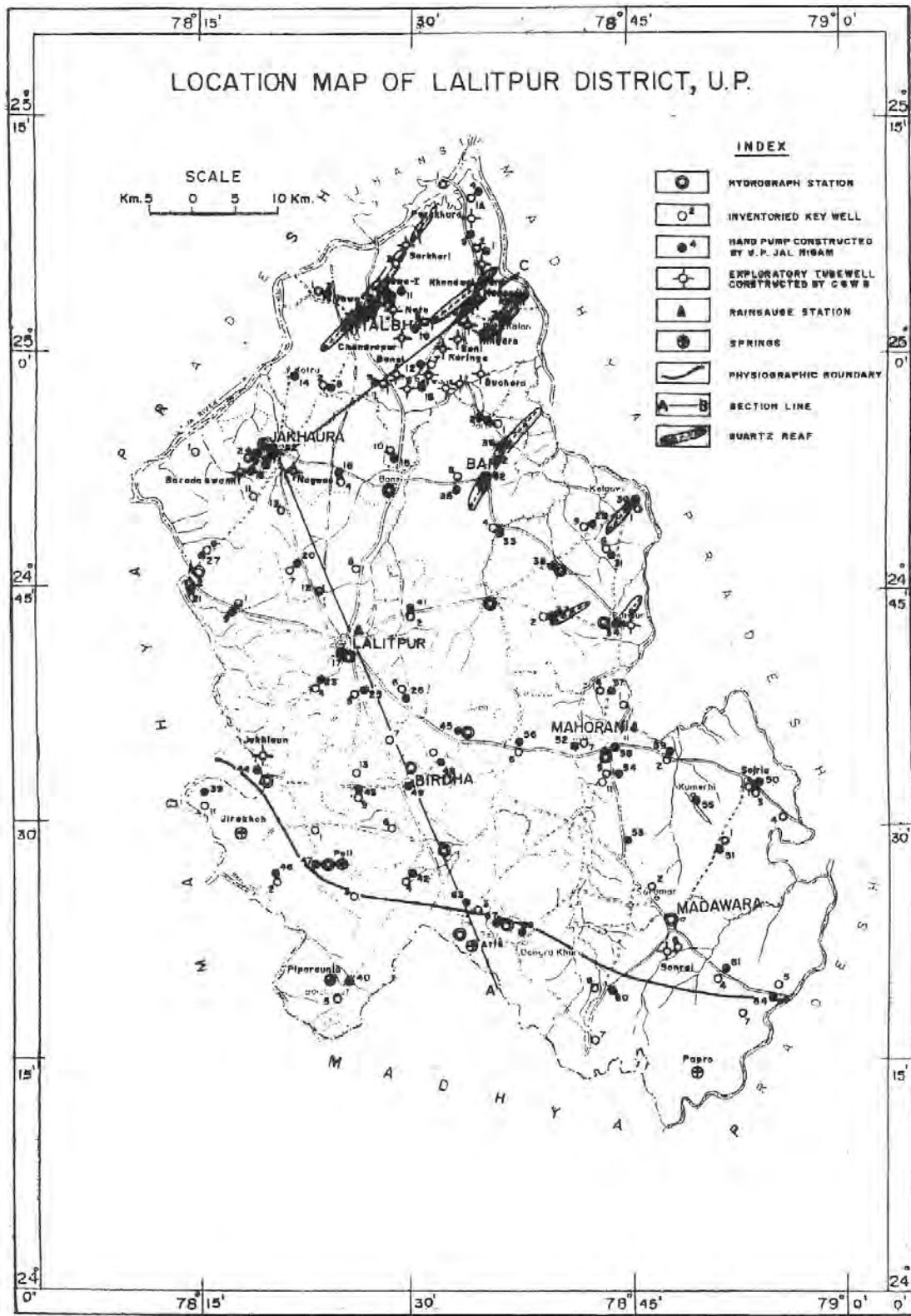
WATER MANAGEMENT TRAINING PROGRAMME:

The ground water management training programme was organised by CGWB, in Lalitpur district on 31.01.2006 at District Magistrate Auditorium, Lalitpur. The chief guest was C.D.O. Lalitpur. The theme of training was awareness about the ground water problems of the hard rock areas and its solution by way of "Artificial Recharge and Conservation of Water". The training was well attended by about 200 persons, involved officials, Gram Pradhan, Gram Sewak, active persons, teachers & students. In this training lectures were delivered by the scientist of CGWB, NR, Lucknow on various techniques of artificial recharge and various methods of water conservation

8.0 RECOMMENDATIONS

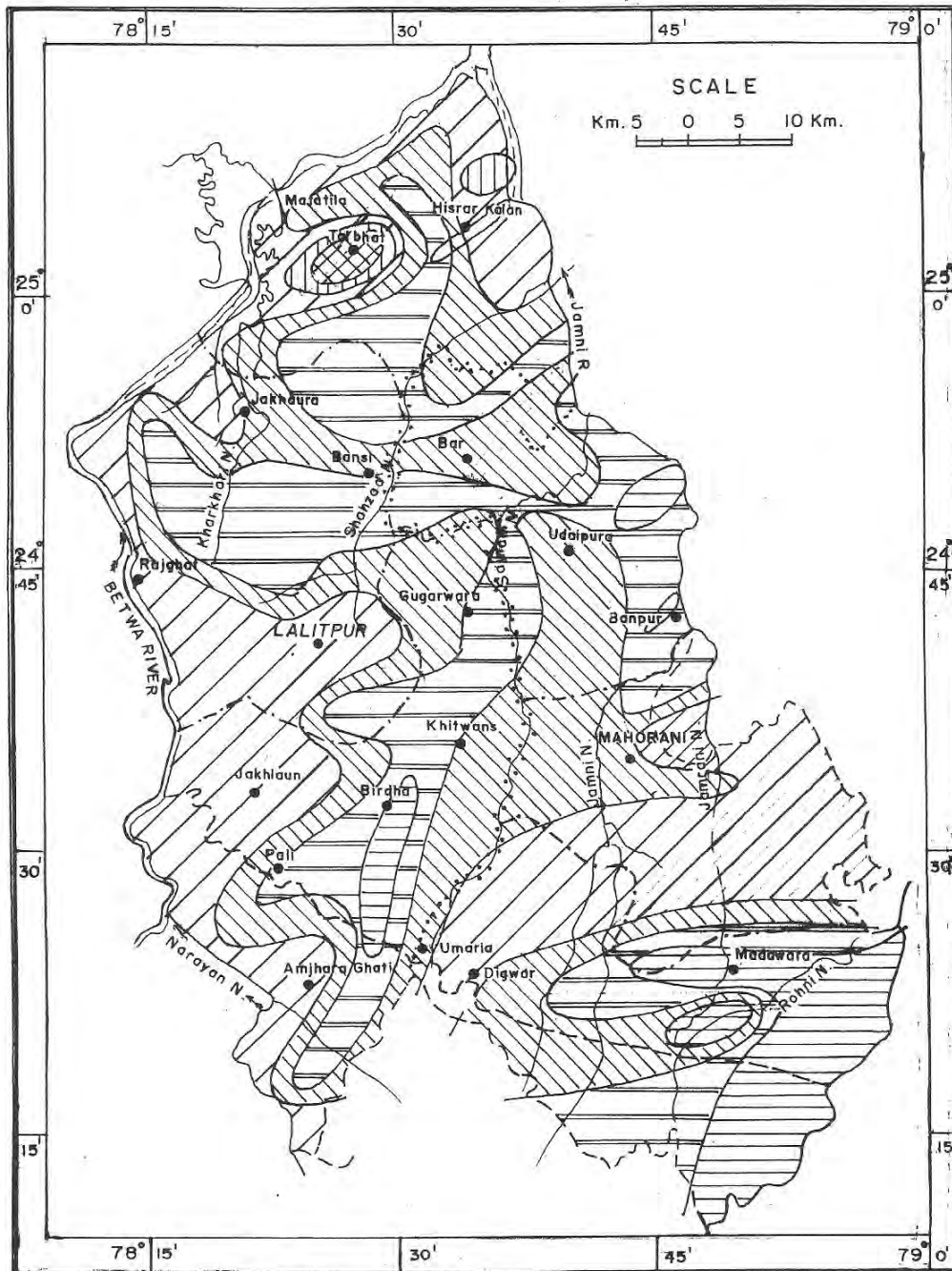
- (i) Construction of large dia wells with infiltration galleries across the strike.
- (ii) Construction of shallow to moderate deep tubewell with the help of imageries and hydrogeological / Geophysical investigations.
- (iii) Construction of sub-surface dams in selected areas to arrest the discharge into major & minor rivers.

- (iv) Construction of small tanks, bandhs, check dams and reservoirs at suitable sites particularly in the run-off area with the aim to check the surface water, run-off store water and to reduce the soil erosion.
- (v) Proper utilisation of natural barrier e.g. quartz reefs, hillocks etc. for the development of surface water reservoirs.
- (vi) Promotion of surface water irrigation system e.g. canals network and conjunctive use of surface water and ground water resources for agricultural purposes.
- (vii) Desiltation of existing reservoirs and lakes at proper time. The reservoir siltation problem needs immediate attention.
- (viii) Afforestation Programmes should be promoted in the area to reduce surface run-off and ultimately enhance ground water recharge.
- (ix) Promotion of modern techniques of drip irrigation and sprinkler irrigation system for cash / high input crops in the undulating agriculturable areas with the basic aim of judicious scientific utilisation of irrigation water.



CGWB, NR, Drg. NO. 2817/10







DEPTH TO WATER LEVEL MAP, LALITPUR DISTRICT, U.P.
(PRE - MONSOON - 2006)



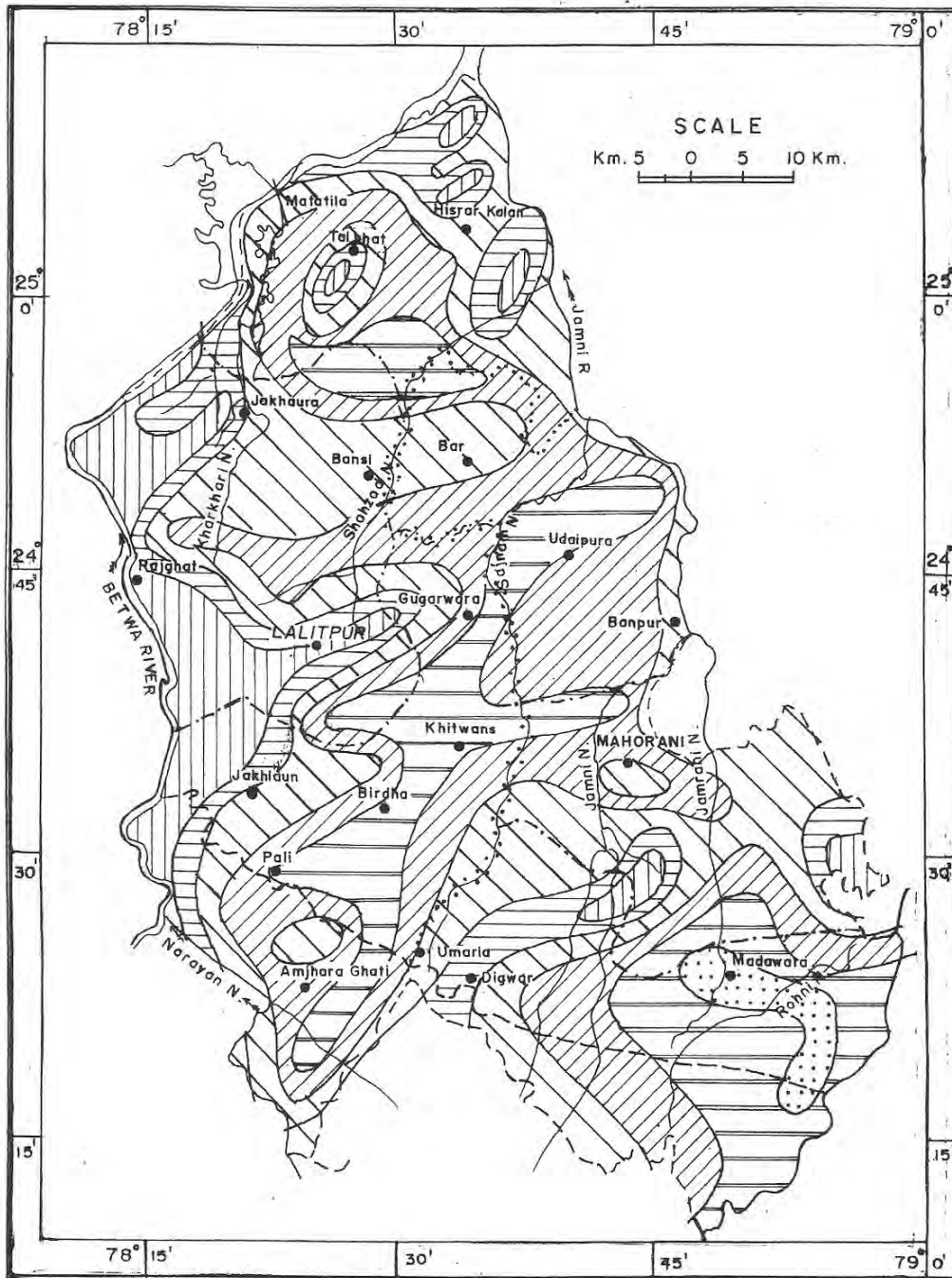
CGWB, NR (N. Chandra) Drg. No. 2818 / 10

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Range of Depth to water level (m. bgl)

	0 — 2
	2 — 3
	3 — 5
	5 — 7
	7 — 10
	> 10

DEPTH TO WATER LEVEL MAP, LALITPUR DISTRICT, U.P.
(POST-MONSOON-2006)



CGWB, NR (S.M. Raza) Drg. No. 2819 / 10

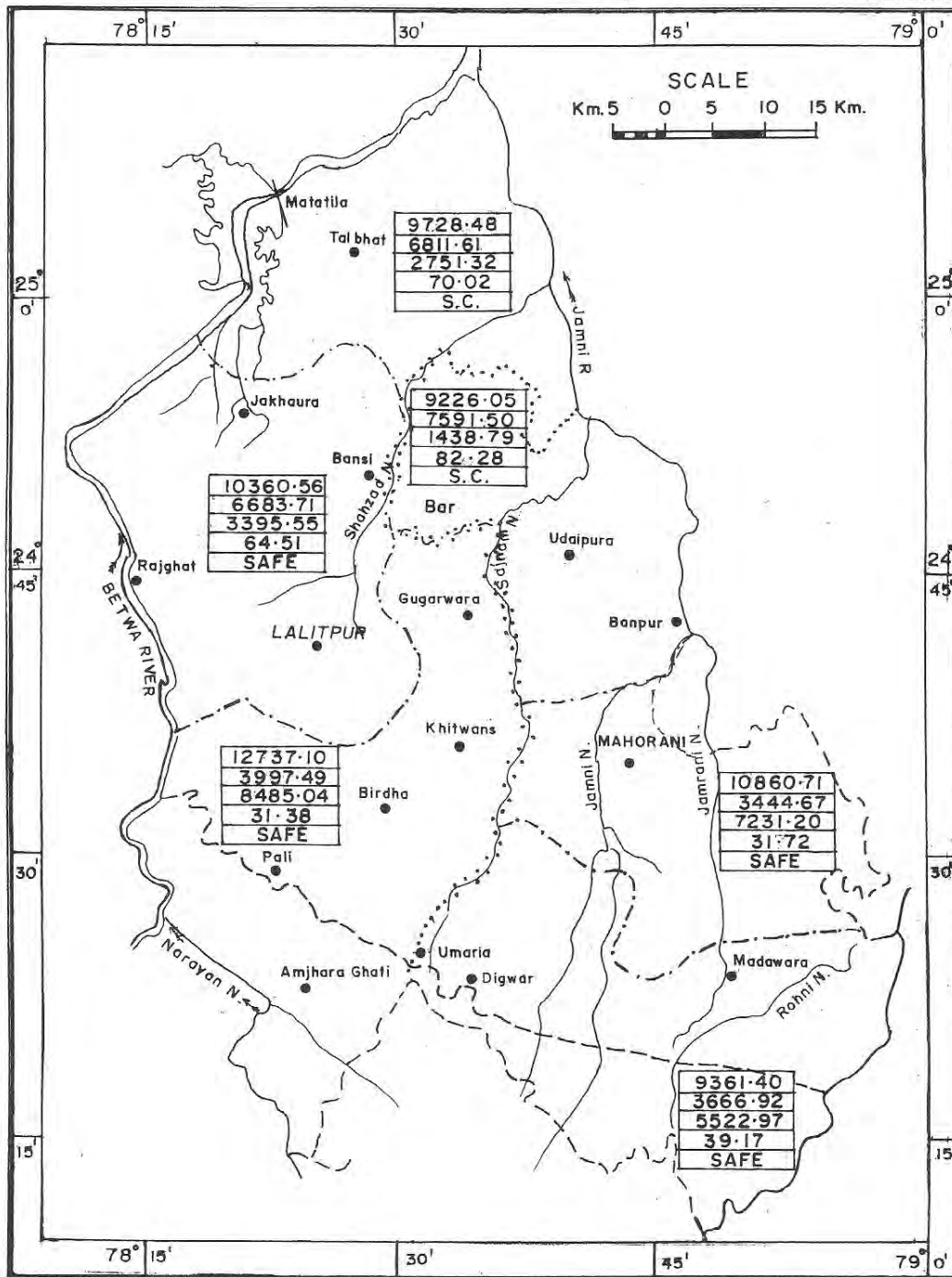
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Range of Depth to water level (m. bgl)

	0 — 2
	2 — 3
	3 — 5
	5 — 7
	7 — 10
	> 10

MAP SHOWING CATEGORIZATION OF BLOCKS
LALITPUR DISTRICT, U.P.
(Show G.W. resources/draft etc.)

PLATE-IV



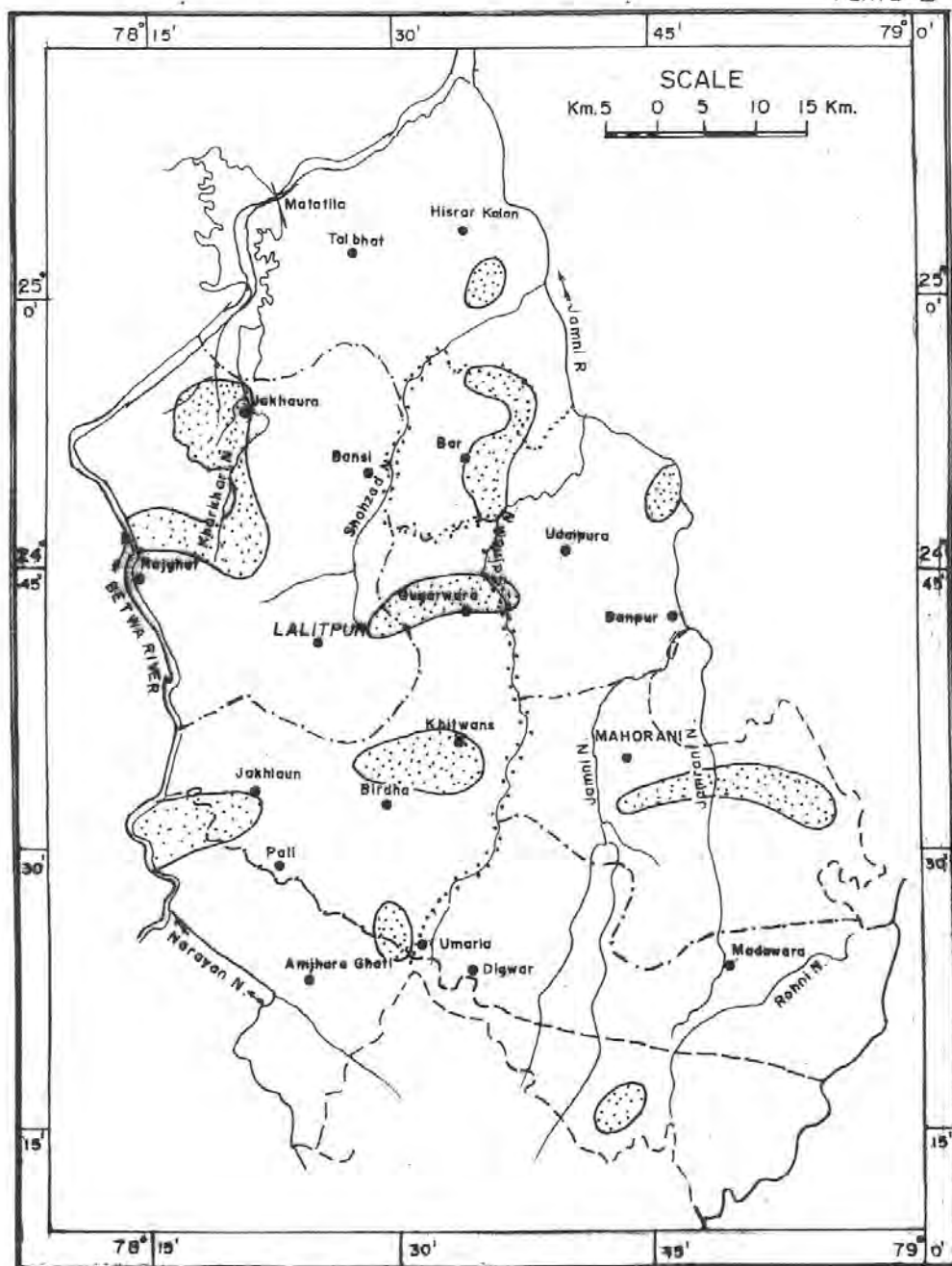
C.G.W.B., NR, (N.C.Pandey) Drg.No.2820/10

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12737.10	Net Annual Ground Water Availability in ham.
3997.49	Existing Gross Ground Water draft for all use in ham.
8485.04	Net G.W. Availability for future irrigation development in
31.38	Stage of G.W. development in% (ham.)
SAFE	Category of Block
S.C.	Semi Critical

ISO-CONDUCTIVITY MAP OF LALITPUR DISTRICT, U.P.

PLATE - V



C.G.W.B., NR, (N.C. Pandey), Drg. No. 2821/10

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E.C. range in microsiemens/Cm at 25° C

