DISTRICT GROUND WATER BROCHURE
KANPUR DEHAT DISTRICT, U.P.
(AAP: 2012-13)

By
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Scientist 'C'

CONTENTS

PLATES:

APPENDIX:

KANPUR DEHAT DISTRICT AT GLANCE

1.	**GENERAL INFORMATION**		
	i. Geographical Area (Sq km.)	:	3021
	ii. Administrative Divisions	:	
	Number of Tehsil/Block		5/10
	Number of Panchayat/Villages		102/1032
	iii. Population (as on 2001 census)	:	15,63,336
	iv. Average Annual Rainfall (mm)	:	782.8
2.	**GEOMORPHOLOGY**		
	Major Physiographic Units	:	Older Alluvium plain, older flood plain & active flood plain
	Major Drainages	:	Yamuna, Pandu, Rind, Sengar
3.	**LAND USE (000 hactare)(2010-11)**		
	a) Forest area	:	5.79
	b) Net area sown	:	222
	c) Gross area sown	:	295
4.	**MAJOR SOIL TYPES**	:	Bhur, Matiyar, Domat
5.	**AREA UNDER PRINCIPAL CROPS (as on 2010-11)**	:	-
6.	**IRRIGATION BY DIFFERENT SOURCES** (Area in ha)		
	Tubewells/Borewells	:	22150 / 87739 ha
	Canals	:	62872 ha
	Other Sources	:	125 ha
	Net Irrigated Area	:	172886 ha
	Gross Irrigated Area		202000 ha
7.	**NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-3-2012)**		
	No. of Dugwells	:	6
	No. of Piezometers(GWD,U.P.)	:	3
8.	**PREDOMINANT GEOLOGICAL FORMATIONS**		
9.	**HYDROGEOLOGY**		
	Major water bearing formation	:	Sand, silt, gravel

	Pre-monsoon Depth to water level during 2012	:	3.64 – 16.70 mbgl
	Post-monsoon Depth to water level during 2012	:	1.30 – 15.47 mbgl
	Long term water level trend in 10 years (2003-2012) in cm/yr	:	Premonsoon Rise 00- 06 cm/yr Fall 1.8 – 71 cm/yr Postmonsoon Rise 0 – 04 cm/yr Fall 08 – 82 cm/yr
10.	**GROUND WATER EXPLORATION BY CGWB (As on 31-3-2012)**		
	No of wells drilled (EW, OW, PZ, SH, Total)	:	EW-6, OW-2
	Depth range (m)	:	163 – 378
	Discharge (litres per second)	:	4.17 – 52.9
	Storativity (S)	:	2.3×10^{-4} to 2.90×10^{-4}
	Transmissivity (m^2/day)	:	2266 to 3100 m^2/day
11.	**GROUND WATER QUALITY**		
	Presence of Chemical constituents more than permissible limit (e.g. EC, F, As, Fe)	:	As upto 42 ppb
	Type of water	:	Potable
12.	**DYNAMIC GROUND WATER RESOURCES (31.03.2009)-in MCM**		
	Annual Replenishable Ground Water Resources	:	809
	Net Annual Ground Water Draft	:	552
	Projected Demand for Domestic Industrial Uses upto 2029	:	46
	Stage of Ground Water Development	:	68.28%
13.	**AWARENESS AND TRAINING ACTIVITY**		
	Mass Awareness Programmes organized	:	Nil
	Date	:	
	Place	:	
	No. of participants	:	
	Water Management Training Programme organized	:	Nil
	Date		
	Place		
	No. of participants		
14.	**EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING** Projects completed by CGWB (No & Amount spent)	:	Nil
	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	:	Nil
	No of blocks notified	:	Nil
16.	**MAJOR GROUND WATER PROBLEMS AND ISSUES**	:	Water Logging

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1.0 INTRODUCTION

The Kanpur Dehat district occupies the central part of Uttar Pradesh on eastern bank of Yamuna river and encompasses a total geographical area of 3021 sq. km., lying between latitude $26^0$06'30" – $26^0$50'15" N and longitude $79^0$30'00" – $81^0$10'15" E. The river Yamuna forms the south-western boundary of the district while north-western side is bounded by Etawah and Kannauj district. The rest of its periphery is contiguous with the Kanpur Nagar district. The total population of the district as per 2001 census is 1563336 souls having 844331 male and 718997 female population. The district headquarter is at Mati (near Akbarpur) which is about 43 Km. from Kanpur city on Kanpur – Bhognipur – Agra highway (NH-2). The district is divided into five tehsils having ten blocks vis a vis Rasoolabad, Maitha, Akbarpur, Sarwarh Khera, Jinjhak, Derapur, Sandalpur, Rajpur, Malasa and Amrodha. The drainage system of the district is controlled by Ganga – Yamuna and tributaries like Pandu, Rind and Sengar. The land use pattern of the district in(2010-11) shows forest cover of 5797 hectare. The net sown area is 221999 hectare. The net irrigated area is 172886 hectare(78% of net sown area). The total length of canal in the district is 1087 Km. The area irrigated by canal is 62872 hectare (36.3%) whereas 109889 hectare (63.5%) is by ground water utilising state and private tubewell and borewells.

Several hydrogeological, pollution and environmental studies have been carried out in Kanpur district by geologist of G.S.I. and GWD with special attention to Kanpur Metropolis. The Central Ground Water Board under its ground water exploration programme carried out drilling in Kanpur Dehat. The study on hydrogeology and ground water potential of Kanpur Dehat was carried out during 2000-2001.

2.0 RAINFALL & CLIMATE

The average annual rainfall of the district is 782.8 mm the climate is sub-humid and it is characterised by a hot summer and general dryness except during the southwest monsoon. About 90% of rainfall takes place from June to September. During monsoon surplus water is available for percolation to ground water.

May is the hottest month of the year. The mean daily maximum temperature in May is 41.70^0C. The mean daily minimum temperature is 8.6 ^{0}C and maximum temperature varies upto 45^0C.

With the onset of the monsoon in third week of June the day temperature drops down appreciably. The January is the coldest month with mean daily maximum temperature 22.8^0C and mean daily minimum temperature at 8.6^0C. The mean monthly maximum temperature is 32.2^0C and mean monthly minimum temperature is 19.5^0C. During monsoon season, the relative humidity is high and in summer season, relative humidity is less. The mean monthly morning relative humidity is 69% and mean monthly evening relative humidity is 50%. The mean wind velocity is 9.6Km/hr. The potential evapotranspiration is 1660 mm.

3.0 GEOMORPHOLOGY & SOILS TYPES

The Kanpur Dehat district occupies a part of the Gaga-Yamuna doab in the Indo-Gangetic Plain. More than 90% of the district area exhibits more or less a flat topography with a gentle slope towards south-west. The elevation of the land surface varies from 117 m to 139 m.a.m.s.l. Geomorphologically, the area can be classified into three broad geomorphic units viz. Older Alluvial Plain, Older Flood Plain of rivers Yamuna, Sengar, Rind and Pandu and Active Flood Plain of these rivers (Plate-II).

(a) Older Alluvial Plain:

It is the oldest geomorphic unit which covers about 80% of the district area with many Paleo-channels, Tals, meander cutoff's and ox-bow lakes occur in this plain. Bad land and ravines are developed along the bank of Yamuna and Sengar rivers. The major parts of the area between Sengar and Pandu rivers are affected with salt encrustations.

(b) Older Flood Plain:

The Older Flood Plains of Yamuna, Sengar and Pandu rivers are limited to their higher zones and occur as narrow, curvilinear lenticular patches along course of these rivers. These are represented by either one or two terraces. The higher (T_2) being erosional and lower (T_1) depositional terrace which are characterised by fluvial landforms like abandoned channels and meanders cutoff's.

(c) Active Flood Plain:

It is restricted to the present day active channel regimes of Yamuna, Sengar and Rind rivers. The associated landform include point, channel and lateral bars.

Soils:

The major area (about 90%) falls under Yamuna sub basin is covered by older alluvial soils consisting broadly of 'Bhur' or sandy soil occupying high mounds, Matiyar or clay rich soil in depressions and 'Domat' or loam in the plains.

4.0 GROUND WATER SCENARIO

The unconsolidated alluvial sediments deposited over undulatory surface of the basement rock shows alternative beds of granular and clay horizons and the thickness of these sediments varies from 150 m (along Yamuna in south) to 565 m (along Pandu in north).

These granular zones form the multiple aquifer system and have been clubbed into four groups. The vertical and horizontal extents of different aquifer groups and cumulative thickness of granular zones in each group are as follows (Plate-IV).

Table-1

Aquifer Group	**Occurrences**		**Ariel Extent**	**Potential**	**Quality**
	Depth Range (mbgl)	*Cumulative (Thickness of granular zone) (m)*			
I Aquifer Group	GL-150	40-65	In entire district	Low to moderate	Good
II Aquifer Group	150-250	30-50	North & central part of district	Moderate	Poor (Saline)
III Aquifer Group	200-250	70-120	In entire district	High	Good potable
IV Aquifer Group	Below 250	30-70	Encountered in south-western parts only	Moderate	Poor (Saline)

The ground water occurs under unconfined condition in phreatic aquifer and in confined condition in deeper aquifer. In year 2012 depth to water level in pre monsoon period varied from 3.64 mbgl to 16.70 mbgl and during post monsoon from 1.30 mbgl to 15.42 mbgl. The fluctuation in ground water level varied from 0.20 to 2.34 m. The long term water level trends (2003-2012) shown a falling trend in maximum number of NHS wells.

The premonsoon water level trend for last 10 years (2003-2012) shows fall from 4 to 69 cm/year whereas rise is 8 cm/year. In pre-monsoon period decline in water levelo trend varies from 1.8 to 71 cm/year. In post-monsoon period long term level trend show a fall from 8 to 82 cm/year. All the hydrograph stations are showing decline in water level only one hydrograph station Kanjhari showing rising trend . The aquifer parameters of confined aquifer determined after conducting pumping test on tubewells, the specific capacity varies from 2.88 to 61.30 (lpm/m). The transmissivity varies from 884 - 6458 m^2/day and storativity varies between 2.03×10^{-4} - 8.6×10^{-4}.

4.2 GROUND WATER RESOURCES

The estimation of dynamic ground water resource is generally based on the component of annual ground water recharge through various sources and ground water draft through suitable ground water structures like dugwells, shallow / deep tubewells etc. The dynamic resource is annually replenishable by precipitation, irrigation return flow, canal and tank seepage etc. The total ground water recharge includes the annual replenishable ground water recharge and potential recharge in shallow water zones. The 85% of this resource can be utilized for irrigation purpose leaving 15% for future domestic and industrial uses.

The annual ground water recharge for the district (as on 31.03.2009) has been estimated as to **80952** ham. The net ground water availability of the district is 80951.80 ham. The gross ground water draft for all uses is 55274.91 ham. The net ground water availability for future irrigation development is 24598.16 ham. The stage of ground water development is 68.28 % . The Blockwise details are given in the Table-2.

The Rasoolabad block is showing maximum level of ground water development i.e. 85.42 % where as minimum ground water development is observed as 42.28 % in Rajpur block.

The main source of surface water in the area is Yamuna river and its tributaries i.e. Sengar and Rind rivers, Pandu river (a tributary of Ganga) network of lower Ganga canals (Plate-III). About 80% of the district area covering all the blocks come under Ganga Canal Command.

Table-2

DYNAMIC GROUND WATER RESOURCES OF UTTAR PRADESH AS ON 31.03.2009

Sl. No.	Assessment Units Blocks	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*
1.	Akbarpur	7455.26	5214.37	2111.28	69.14	Safe
2.	Akraudha	7971.51	4488.98	3351.83	56.31	Safe
3.	Derapur	6561.74	3056.83	3434.07	46.59	Safe
4.	Jhinjhak	7527.37	4833.05	2608.69	64.21	Safe
5.	Maitha	8657.92	6840.36	1700.88	79.01	Safe
6.	Malasa	7632.74	5186.32	2369.43	67.95	Safe
7.	Rajpur	6172.99	2610.05	3485.78	42.28	Safe
8.	Rasoolabad	14978.04	12794.65	1999.20	85.42	Safe
9.	Sandalpur	6339.24	3905.97	2369.85	61.62	Safe
10.	Sarwankhera	7655.00	6344.33	1167.16	82.88	Safe
	Total	**80951.80**	**55274.91**	**24598.16**	**68.28**	

4.3 GROUND WATER QUALITY:

The ground water in phreatic aquifer in general is colourless, odourless and slightly alkaline in nature. The specific electrical conductance of ground water in phreatic zone is in the range of 490-1730 μs/cm at 25^0C. At some places water samples analyzed have shown high Nitrate exceeding permissible limit (45 mg/l).. The higher value of Nitrate above permissible limit are observed at villages Sandalpur (974 mg/l), Bhitargaon (204 mg/l), Amraudha (563 mg/l). The value of Arsenic in phreatic aquifer varies from nil to 42ppb. The value of Arsenic beyond 10 ppb is reported at Akbarpur, Phukhrayan, Sachendi, Sikandra, Sakhjanwari, Raipur, Jinjhak, Mungispur, Gajner, Muhammadpur, Shajhanpur, Sheoli, Jaunra and Badhwara villages.

The Fluoride is within permissible limit ranging from 0.01 to 0.98 mg/l. The ground water is suitable for drinking domestic and agricultural purposes. The Phosphate is not found in the ground water.

The analytical results of water samples collected from deep aquifer shows that formation water of II^{nd} aquifer group is brackish to saline, alkaline in reaction, bicarbonate type, moderately to highly mineralised and hard. It is not fit for drinking as well as irrigation purposes.

In aquifer group III all constituents are generally within the desirable limits. The ground water is fit for all purposes.

The ground water in aquifer group IV is saline (E.C. 3887 μs/cm at 25^0C).

4.4 STATUS OF GROUND WATER DEVELOPMENT:

The present stage of ground water development in the district is 68 % leaving huge scope (of 24598 ham) for future development (Table-2). All the blocks are in safe category.

Based on the prevailing hydrogeological scenario as deciphered from studies, a blockwise future ground water development plan has been worked out and shown in Table-2 utilizing available ground water for future irrigation uses. It is expected to create an additional irrigation potential of 49496 ha. It is further proposed to exploit 40% of this balance through moderately deep tubewell (upto 200m depth), 30% through shallow tubewell (100 m depth) and remaining 30% through shallow borings

limited upto 60 m depth. At present area irrigated through ground water is 97011 hectare which is 60% of total irrigation (i.e. 164232 hectare).

5.0 GROUND WATER MANAGEMENT STRATEGY

5.1 GROUND WATER DEVELOPMENT:

At present 73.3% of total cultivated area gets assured irrigation through surface and ground water resources. (in 3:2 ratio) and about 59749 hectare cultivated area is still not covered under any irrigation facilities. The ground water resource estimation data (Table-2) shows the net ground water availability for future irrigation is 24598 ham. The proposed development plan after execution will create 49196 ha cultivated land thus covering 90 % cultivated area of the district under assured irrigation.

The efforts are to be made for its integrated development of surface water with ground water in canal command area. It is suggested that the conjunctive use of ground water with surface water should be promoted in these areas by exploiting the ground water through shallow borings. It helps in lowering the ground water level and ultimately checking the salt encrustations and formation of Reh.

The scientific approach, in sites selection and proper designing of wells would be useful to get optimum yield from tubewells. For avoiding the interference between two tubewells and their better performance the safe distance between the two structures should be maintained as given below:

a) Between two deep tubewells : 300 m

b) Between two shallow tubewells : 200 m

c) Between two shallow borings : 100 m

Depending upon the position of different aquifer groups, the recommended drilling depth of heavy-duty deep tubewells for different regions are as follows:

Pandu – Rind Tract : 400 mbgl

Rind – Sengar Tract : 300 mbgl

Sengar – Yamuna Tract : 200 mbgl

5.2 WATER CONSERVATION & ARTIFICIAL RECHARGE:

The district has not much scope for artificial recharge due to occurrence of shallow water conditions (less than 8 mbgl) in about 75% of the total district area during postmonsoon period. Secondly very steep water table conditions in remaining 25% of the area and occurrence of badland/ravines along Yamuna and Sengar river also do not favour artificial recharge. As per dynamic ground water resources of 31.03.2009 all blocks of the district are in safe category.

The water level trend for last 10 years (2003-2012) shows declining trend in pre and post monsoon period in Akbarpur, Pukhraya, Raipur, Sahjanpur, Muhammadpur villages. Water conservation through ponds and tanks are suitable in these areas.

6.0 GROUND WATER RELATED ISSUES AND PROBLEMS

6.1 WATER LOGGING:

Major parts of district lying between Pandu and Sengar rivers may be categorised as areas prone to water logging as ground water levels are within 2–5mbgl during postmonsoon period. Water logging in small localised patches along the main canal is also a common features. The main reason of water logging in this part of the area is the existence of dense network of canals and of surface water being the major source of water for irrigation, leading to under development of ground water.

6.2 SOIL ALKALINITY / SODACITY:

Alkaline / Sodic saline efflorescence is wide spread in north-western and south-eastern part of Kanpur Dehat district, mostly in the area lying between lower Ganga Canal (Etawah branch) and Pandu river. The development of saline efflorescence locally called 'Reh' is caused due to prolonged evapotranspiration process, involving upward irrigation of subsoil salts in areas with very shallow ground water and hard pan of Kankar or clay. Salt infestations adversely affect the productivity of soil and in acute cases it renders the land barren of 'Usar'.

6.3 BADLAND / RAVINES:

Badland represents dissected topography of upland caused by headward erosion and growth of rills and gullies. Causative factor of ravines are higher river ward slope, easily erodable lithology, lack of vegetation, forest cover and entrenchment of river base level. Ravines / badland are mostly developed along the bank of Yamuna and Sengar rivers and covers about 5% of district area. Ravines over 15 m deep have been observed along Yamuna river whereas ravines occurring along Sengar are comparatively shallower, having gully depth less than three meters. These are reclaimable at places through cropping but those crops which do not require much water need to be sown.

6.4 DEPLETION OF GROUND WATER LEVEL:

The long term water level data of hydrograph stations of CGWB and their trend analysis (1996-2007) show declining trend of water level in almost all the blocks except Rasoolabad, Maitha and parts of Sikandra blocks. The areas where water table is depleting more than 50 cm/year are Pukhraya, Mungrishpur, Raipur and Gajner.

6.5 GROUND WATER QUALITY PROBLEM (GEOGENIC):

In water samples analysed for phreatic aquifer (Ground Water Monitoring Stations) the concentration of fluoride is within permissible limit ranging from 0.01to0.81 mg/l. The value of Arsenic varies from nil to 42 ppb. At Kainijari, Jhinjak, Jaunra, Baghpu. Sikandra, Mungispur, Akbarpur, Shahjanpur, Gajner and Pukhraya the Arsenic concentration is between 10 to 42 ppb.

As per BIS norm Arsenic permissibility limit for drinking water, is 50 ppb, whereas as per WHO (UNICEF) norm it is 10 ppb.

6.6 RISK TO NATURAL DISASTER:

The annual floods are common in low lying Yamuna terrace. The flooding of lower terrace (T_1) and its cutoff parts is recurring phenomena while the upper terrace (T_2) faces only high level and less frequent floods. Floods area is also observed along broken ravine country along Sengar and Rind rivers by back flows, but is for short durations.

7.0 RECOMMENDATIONS

(1) The major parts of the area occupying northern part of the district have been identified as 'Area Prone to Water Logging'. It is suggested that in canal command area where water level rest within 5 mbgl, round the year, conjunctive use of ground water and surface water should be promoted by exploiting ground water through shallow boring. It will help in lowering the water levels and ultimately checking the salt infestation and formation of 'Reh'. Similarly in tail ends of canals interventions such as water conservation structures should be adopted.

(2) All the blocks except Rasoolabad, Maitha and parts of Sinkandra block exhibit-declining trend in ground water level (2003-2012). Although all blocks are in safe category as per dynamic resources of 31.03.2009, it requires proper monitoring in future.

(3) Efforts should be made to reclaim the shallow ravinous areas & barren land (resulted, due to saline efflorescence) for agriculture purposes.

(4) Special attention should be paid to the areas where high concentrations of Nitrate has been reported. An extensive micro level survey in the area is called for.

(5) To minimise the over stress on Aquifer I it is advisable to plan water supply by tubewells tapping deeper aquifers in future, for domestic, irrigation & industrial uses. Aquifer Group III has a great potential for future development.

(6) It is imperative to explore the scope for utilizing the poor quality formation water of 'Aquifer Group II' after proper blending with fresh water for irrigation and industrial uses. It may be helpful in flushing of aquifers of this particular group and ultimately improving its quality in due course of time.

Appendix-I

DETAILS OF EXPLORATORY TUBEWELL IN KANPUR DEHAT DISTRICT, U.P.

S. No.	Location /Coordinates /Topo sheet	Depth Drilled Constructed depth (m)	Granular zone encountered (mbgl)	Granular zones tapped (mbgl)	SWL (mbgl) Year	Discharge (lps) Drawdown (m)	Specific capacity (lps)	T (m^2/day)	S K (m/day)	Remarks
1.	Tishti $26^0$43'10" $79^0$55'00" 54N/14	539.48 378.00	1.55-14.05 271.21-292.06 295.06-439.81 529.16-535.48	296-318 334-345 352-372 Tap Aq.Gr. IV	8.21 1982	46.6 6.37	7.3	2266.00	Nd 42.75	Bed rock = 538.48 Granite
2.	Jajmuiya $26^0$32'41" $79^0$54'24" 54N/14	456.85 356.00	22.25-29.87 32.61-37.80 62.48-89.92 116.74-123.44 201.17-265.18 277.37-283.46 297.18-306.32 336.80-346.56 347.47-354.18	245-265 271-284 300-306 337-345 348-353 Tap Aq.Gr. III	9.57 1982	52.90 5.57	9.5	3100.53	2.96×10^{-4} 59.62	Bed rock = 455.85 Sandstone

S. No.	Location /Coordinates /Topo sheet	Depth Drilled Constructed depth (m)	Granular zone encountered (mbgl)	Granular zones tapped (mbgl)	SWL (mbgl) Year	Discharge (lps) Drawdown (m)	Specific capacity (lps)	T (m^2/day)	S K (m/day)	Remarks
3.	Ban $26^0$34'00" $79^0$39'00"	365.20 330.00	10.67-19.20 21.34-27.35 39.01-51.20 56.04-64.00 83.82-92.09 98.15-108.20 120.30-172-21 176.78-182.88 188.36-202.70 207.81-215.79 227.09-330.10 239.30-245.30 246.09-257.50 276.50-280.40 284.50-291.00 307.80-310.90 318.50-326.10 344.40-350.50	125-160 223-235 251-258 318-328 Taps Aq. Group I & II	12.74 1981	46.60 7.20	6.47	2996.00	2.03×10^{-4} 46.81	Bed rock = 363.99 Sandstone

S. No.	Location /Coordinates /Topo sheet	Depth Drilled Constructed depth (m)	Granular zone encountered (mbgl)	Granular zones tapped (mbgl)	SWL (mbgl) Year	Discharge (lps) Drawdown (m)	Specific capacity (lps)	T (m^2/day)	S K (m/day)	Remarks
4	Kurwa Khurd 54N/15	311.65 2.24	25-32 47-58 60-76 82-99 106-114 123-134 168-203 206-223 230-252 255-276 279-307	62-74 86-98 107-113 131-140 146-155 170-176 185-191 197-207 209-218 Taps Aq. Group I & III	3.10 2002	4.17 0.68	61.3	2997.00	-	Bed rock = 311.65 Granites
5	Mati $26^0$21'12" $79^0$58'48"	201.30 163.00	24-32 91-96 99-116 133-137 145-159	91-95 99-115 145-157 Taps Ag. Group I & III	11.14 2002	31.6 6.11	5.17	3041.00	-	Bed rock = NE
6.	Milan Park Pukhraya $26^0$13'24" $79^0$58'00"	206 152	17-23 43-80 92-96 97-101 104-109 112-118 122-135 136-144 146-152 153-163 165-181	70-78 97-101 104-108 113-117 123-131 136-144 Taps Ag. Group I & III	21.05	34.43 3.28	10.5	3024.00	-	As per electrical log water quality deteriorates below 181 m depth bgl

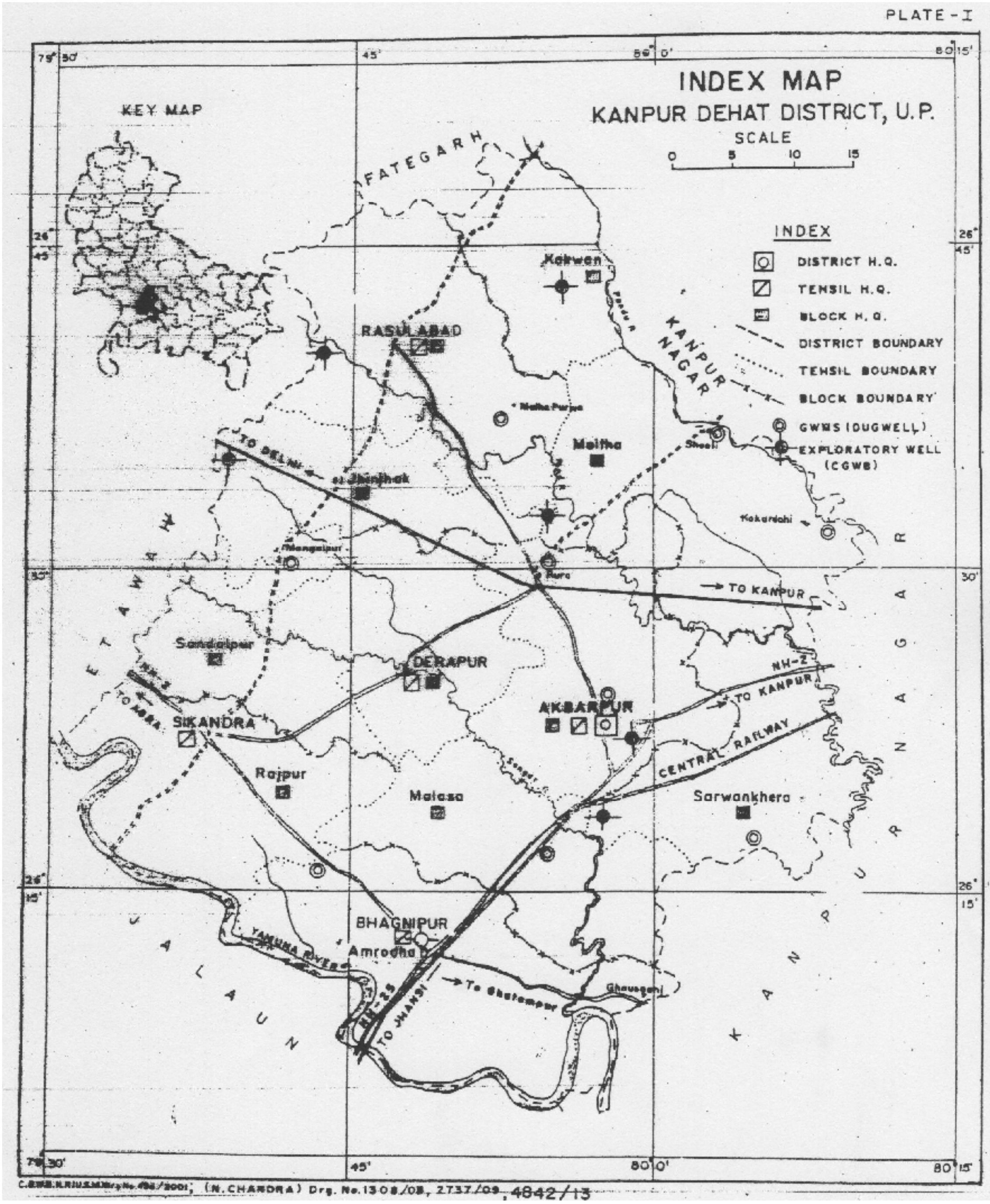
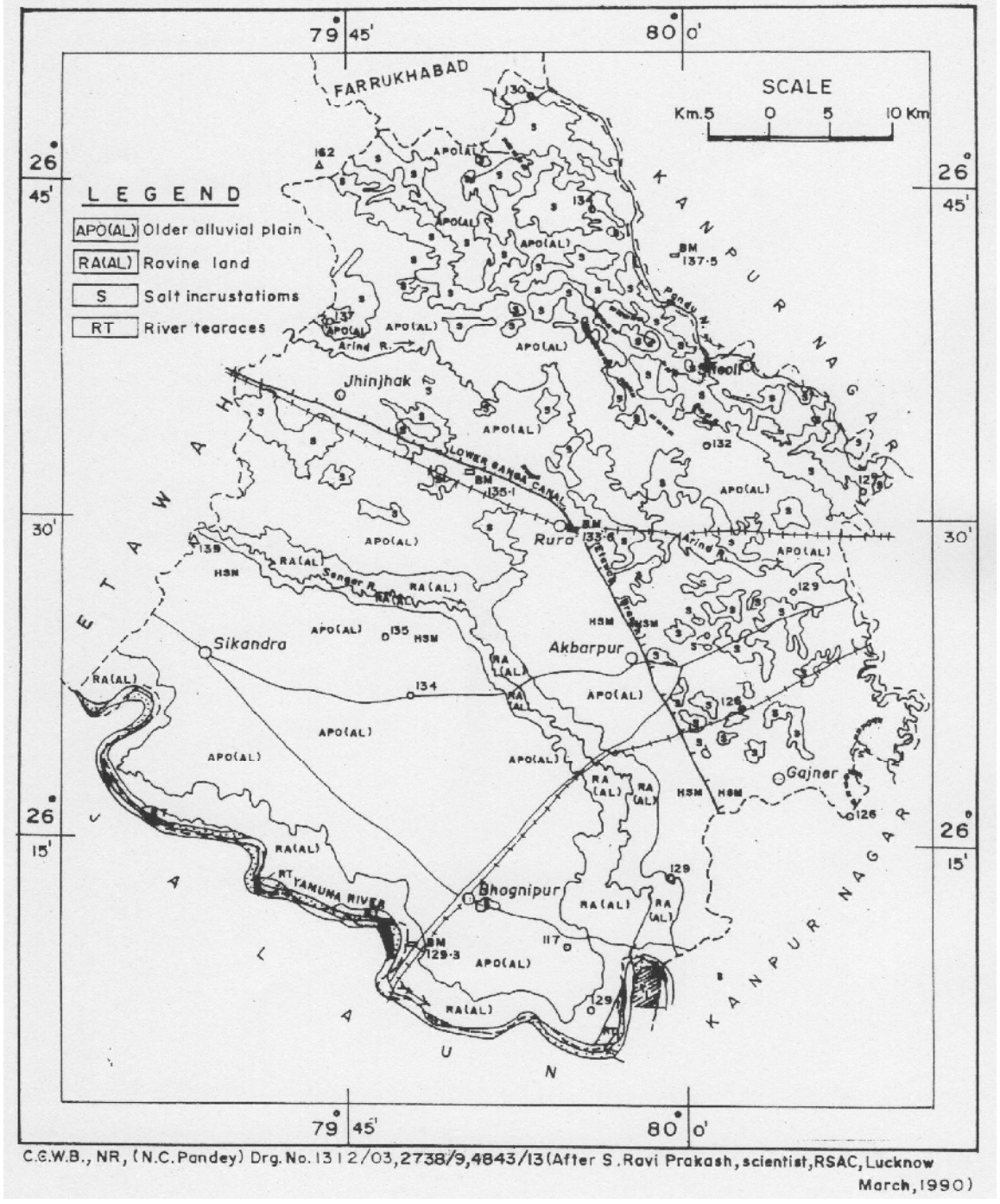


PLATE - I
INDEX MAP
KANPUR DEHAT DISTRICT, U.P.
SCALE
0 5 10 15
KEY MAP
INDEX
DISTRICT H.Q.
TEHSIL H.Q.
BLOCK H.Q.
DISTRICT BOUNDARY
TEHSIL BOUNDARY
BLOCK BOUNDARY
GWMS (DUGWELL)
EXPLORATORY WELL (CGWB)
FATEGARH
KANPUR NAGAR
ETAWAH
JALAUN
KANPUR NAGAR
Kalwan
RASULABAD
Maitha
Jhinjhak
TO DELHI
TO KANPUR
Sandalpur
DERAPUR
SIKANDRA
TO AGRA
NH-2
AKBARPUR
CENTRAL RAILWAY
Rajpur
Malasa
Sarwankhera
BHAGNIPUR
Amrodha
YAMUNA RIVER
TO JHANSI
NH-25
79° 30'
45'
80° 0'
80° 15'
26° 45'
30'
26° 15'
(N. CHANDRA) Drg. No. 1308/08, 2737/09, 4842/13

HYDROGEOMORPHOLOGICAL MAP OF KANPUR DEHAT DISTRICT, U.P.

(Based on interpretation of IRS – IA imagery with limited field checks) PLATE-II



C.G.W.B., NR, (N.C. Pandey) Drg. No. 1312/03, 2738/9, 4843/13 (After S. Ravi Prakash, scientist, RSAC, Lucknow March, 1990)

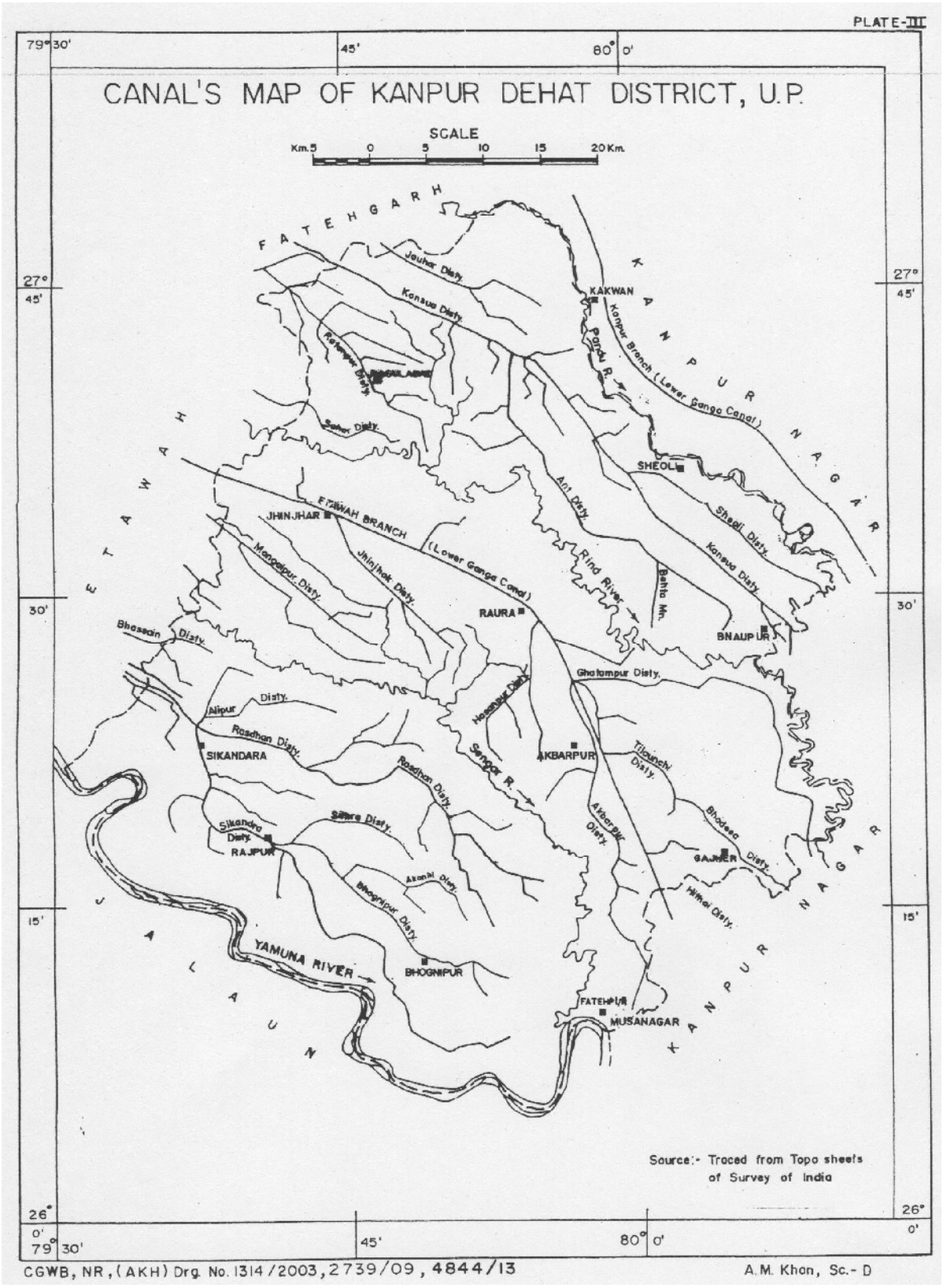


PLATE-III
CANAL'S MAP OF KANPUR DEHAT DISTRICT, U.P.
SCALE
Km. 5 0 5 10 15 20 Km.
79° 30'
45'
80° 0'
27° 45'
30'
15'
26° 0'
FATEHGARH
ETAWAH
JALAUN
KANPUR NAGAR
Jauhar Distty.
Konsua Distty.
Rahmpur Distty.
Saher Distty.
KAKWAN
Kanpur Branch (Lower Ganga Canal)
Pandu R.
SHEOLI
Sheoli Distty.
Konsua Distty.
Arsi Distty.
Rind River
Barha Nh.
BHAUPUR
Ghatampur Distty.
JHINJHAR
ETAWAH BRANCH (Lower Ganga Canal)
Mangalpur Distty.
Jhinjhak Distty.
RAURA
Bhasaain Distty.
Alipur Distty.
Rasdhan Distty.
SIKANDARA
Hasanpur Distty.
Sengar R.
AKBARPUR
Tilaunchi Distty.
Akbarpur Distty.
Bhadesa Distty.
GAJNER
Hirhai Distty.
Sikandra Distty.
RAJPUR
Saiara Distty.
Akauli Distty.
Bhognipur Distty.
YAMUNA RIVER
BHOGNIPUR
FATEHPUR
MUSANAGAR
Source:- Traced from Topo sheets of Survey of India
CGWB, NR, (AKH) Drg. No. 1314/2003, 2739/09, 4844/13
A.M. Khan, Sc.- D

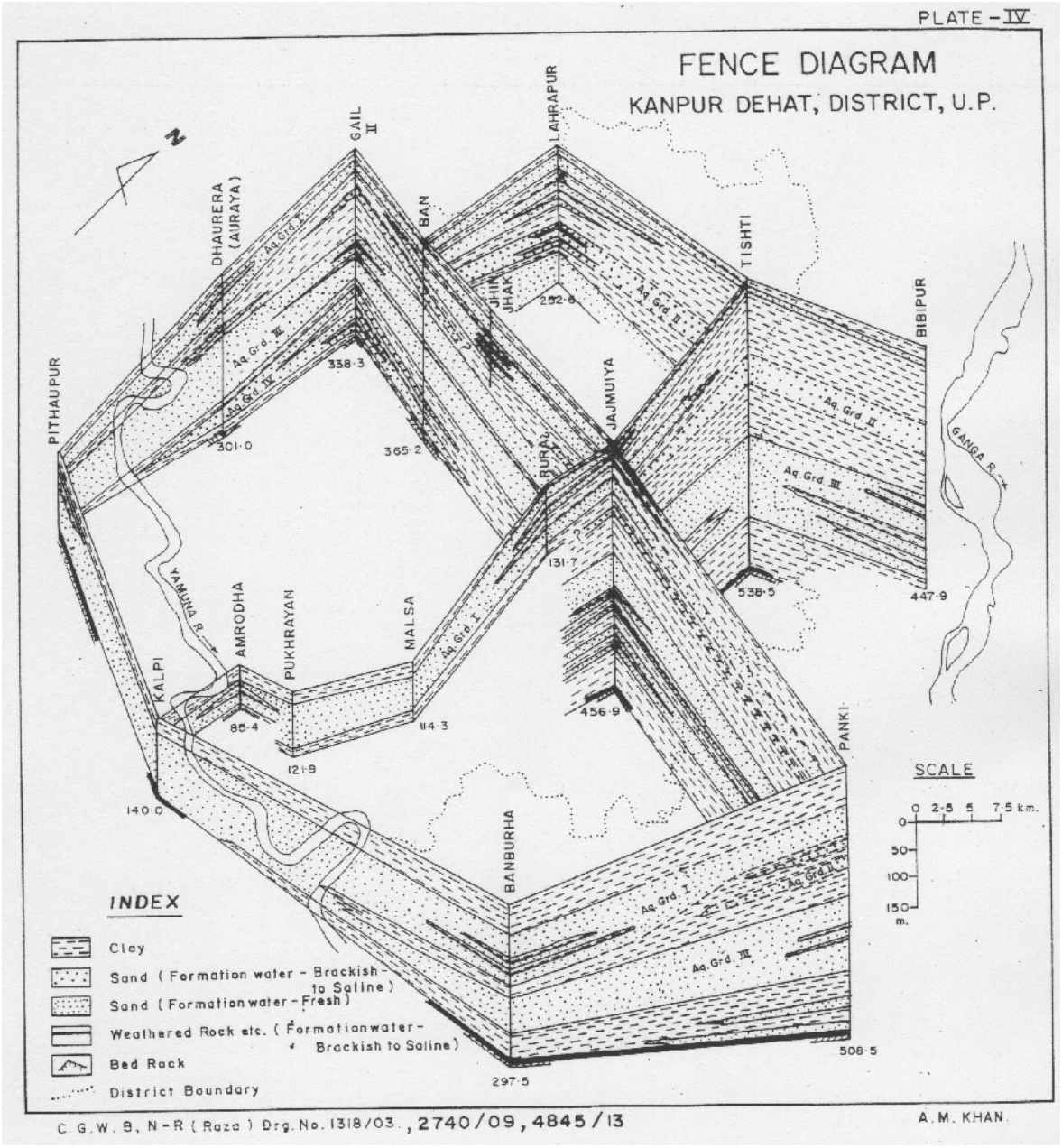


PLATE - IV
FENCE DIAGRAM
KANPUR DEHAT, DISTRICT, U.P.
N
GAIL II
LAHRAPUR
DHAURERA (AURAYA)
BAN
JHIK JHAK
TISHTI
BIBIPUR
PITHAUPUR
JAJMUIYA
PURAI
GANGA R.
YAMUNA R.
AMRODHA
PUKHRAYAN
MALSA
KALPI
PANKI
BANBURHA
Aq. Grd. I
Aq. Grd. II
Aq. Grd. III
Aq. Grd. IV
338·3
301·0
365·2
252·6
131·7
538·5
447·9
456·9
85·4
114·3
121·9
140·0
508·5
297·5
SCALE
0 2·5 5 7·5 km.
0
50
100
150 m.
INDEX
Clay
Sand (Formation water - Brackish to Saline)
Sand (Formation water - Fresh)
Weathered Rock etc. (Formation water - Brackish to Saline)
Bed Rock
District Boundary
C.G.W.B, N-R (Raza) Drg. No. 1318/03., 2740/09, 4845/13
A.M. KHAN.

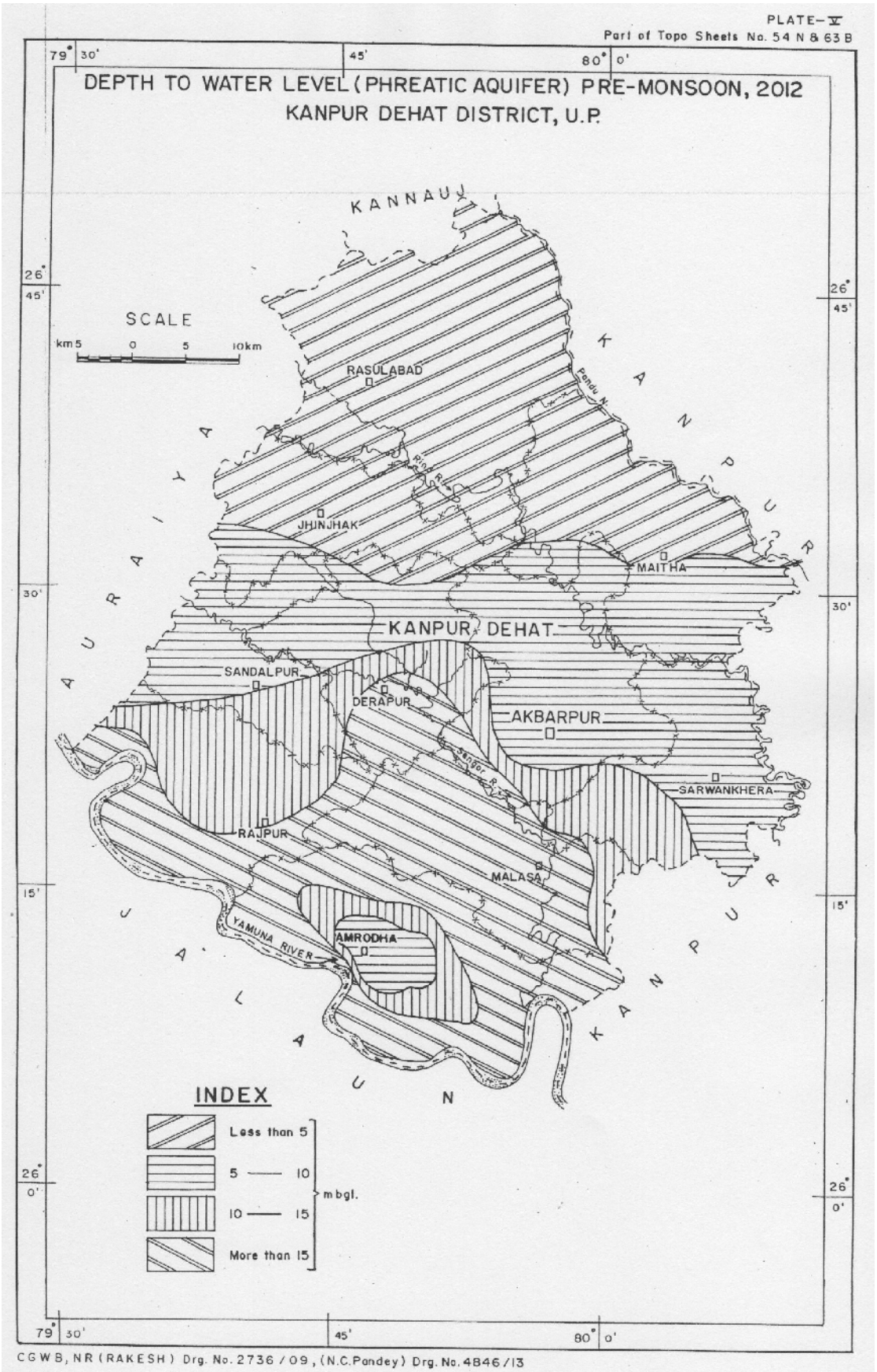
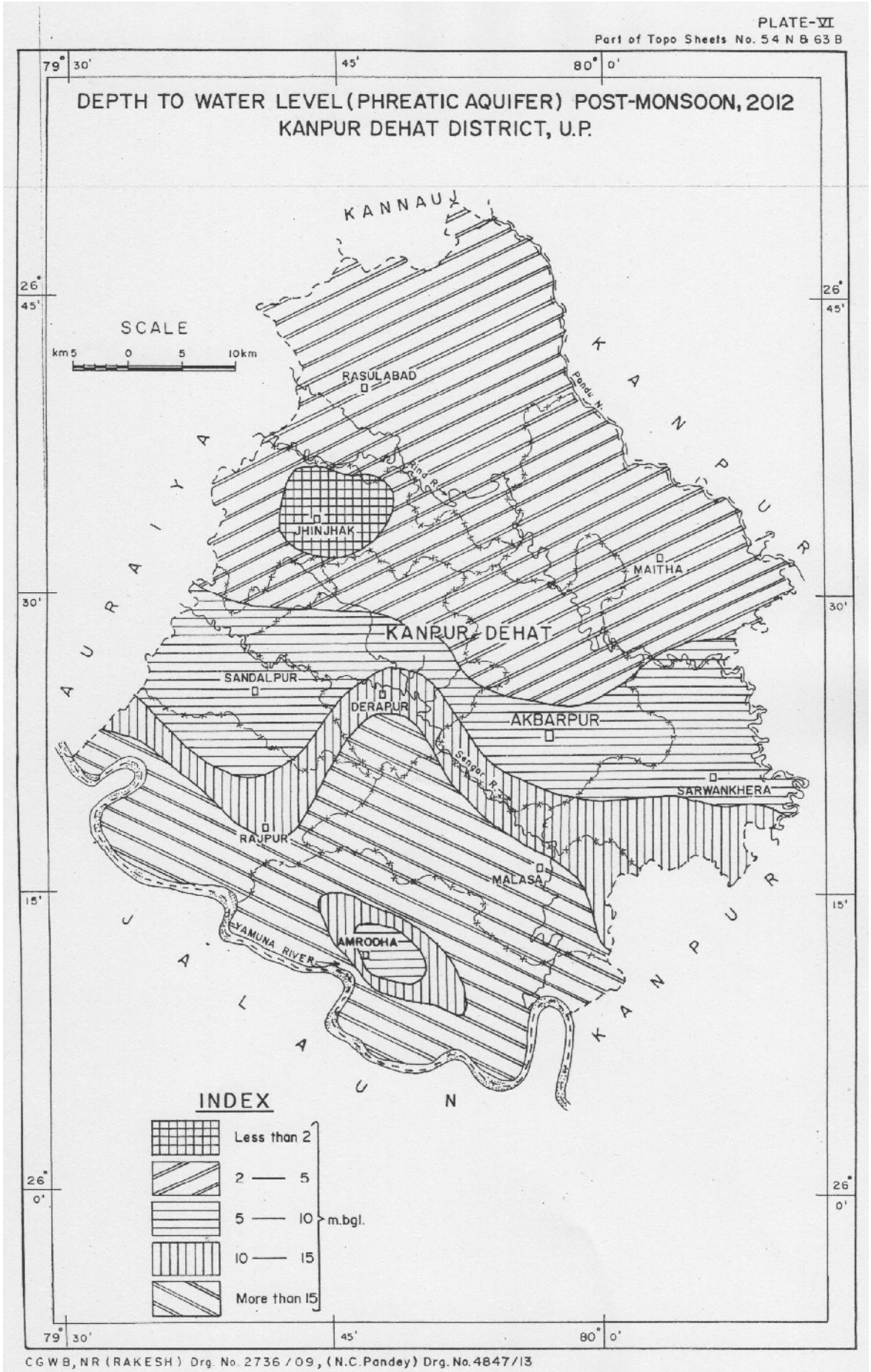


PLATE-V
Part of Topo Sheets No. 54 N & 63 B
DEPTH TO WATER LEVEL (PHREATIC AQUIFER) PRE-MONSOON, 2012
KANPUR DEHAT DISTRICT, U.P.
79° 30'
45'
80° 0'
26° 45'
30'
15'
26° 0'
KANNAUJ
SCALE
km 5 0 5 10km
RASULABAD
Pandu N.
Rind R.
JHINJHAK
MAITHA
KANPUR DEHAT
SANDALPUR
DERAPUR
AKBARPUR
Sengar R.
SARWANKHERA
RAJPUR
MALASA
YAMUNA RIVER
AMRODHA
AURAIYA
KANPUR
JALAUN
INDEX
Less than 5
5 — 10
10 — 15
More than 15
mbgl.
CGWB, NR (RAKESH) Drg. No. 2736/09, (N.C.Pandey) Drg. No. 4846/13

PLATE-VI

Part of Topo Sheets No. 54 N & 63 B

DEPTH TO WATER LEVEL (PHREATIC AQUIFER) POST-MONSOON, 2012
KANPUR DEHAT DISTRICT, U.P.



CGWB, NR (RAKESH) Drg. No. 2736/09, (N.C. Pandey) Drg. No. 4847/13

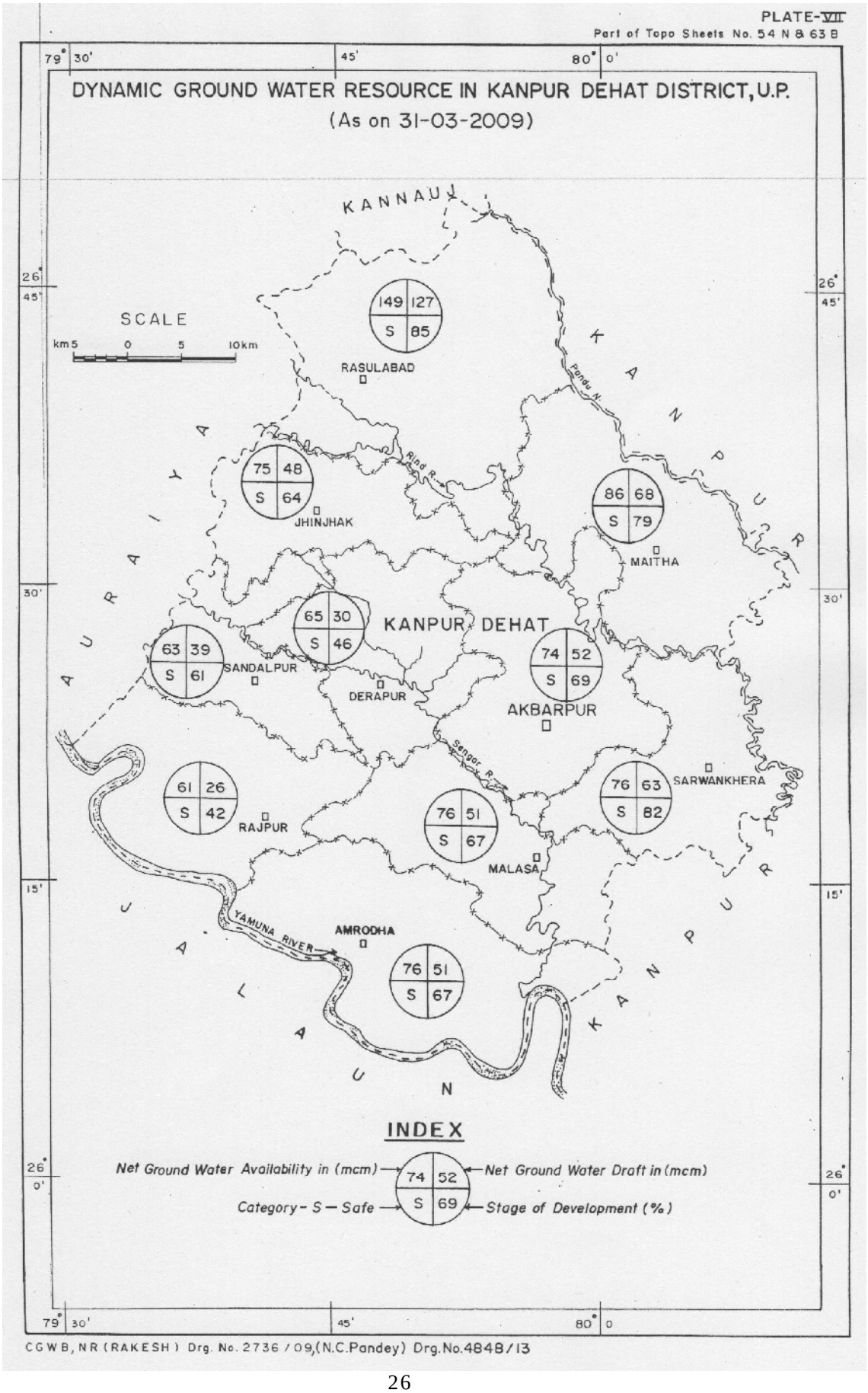
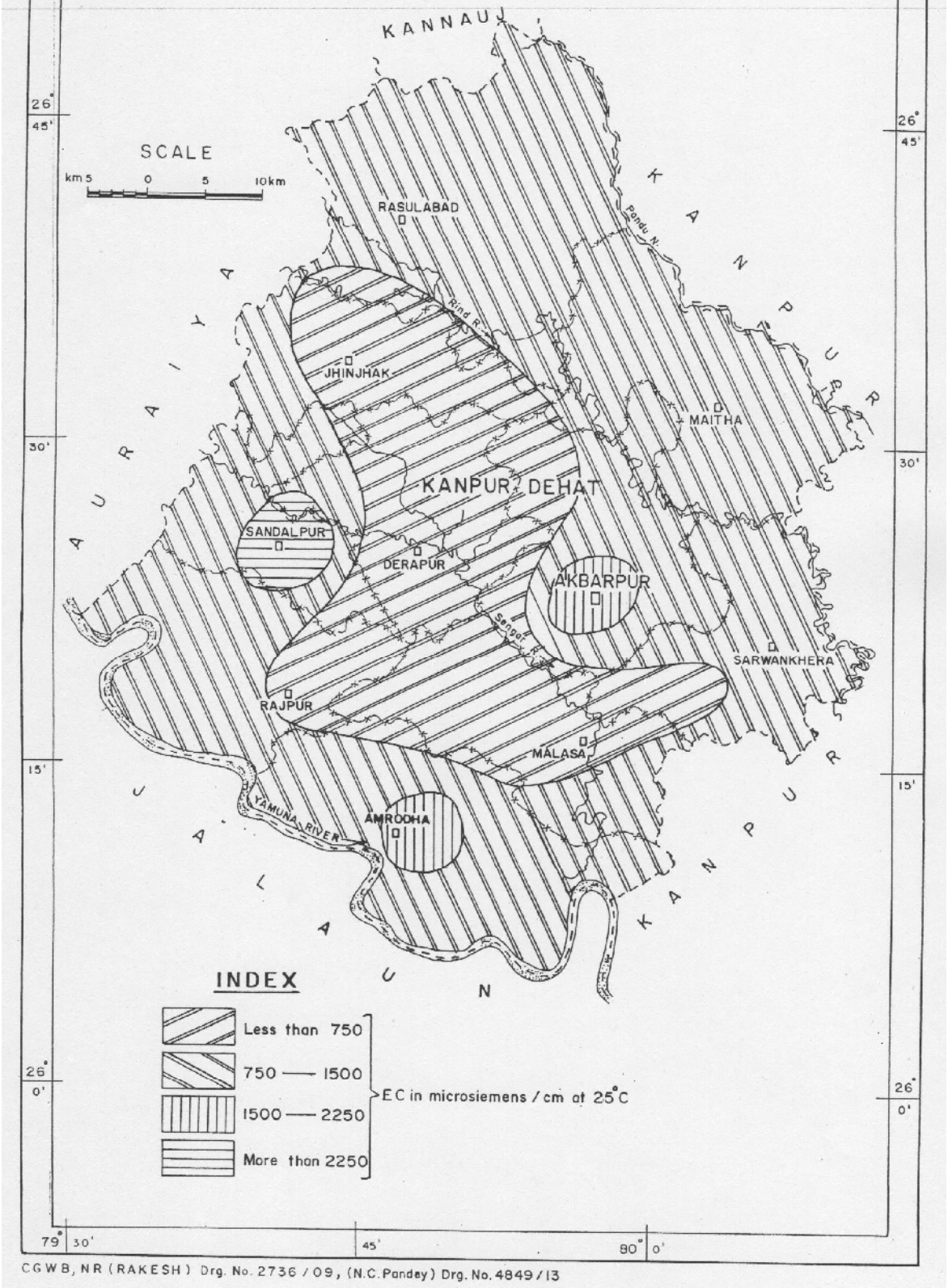


PLATE-VII
Part of Topo Sheets No. 54 N & 63 B
DYNAMIC GROUND WATER RESOURCE IN KANPUR DEHAT DISTRICT, U.P.
(As on 31-03-2009)
KANNAUJ
SCALE
km 5 0 5 10km
149 127
S 85
RASULABAD
75 48
S 64
JHINJHAK
86 68
S 79
MAITHA
65 30
S 46
KANPUR DEHAT
63 39
S 61
SANDALPUR
74 52
S 69
AKBARPUR
DERAPUR
61 26
S 42
RAJPUR
76 51
S 67
MALASA
76 63
S 82
SARWANKHERA
AMRODHA
76 51
S 67
YAMUNA RIVER
Rind R.
Pandu N.
Sengar R.
AURAIYA
KANPUR
JALAUN
INDEX
Net Ground Water Availability in (mcm)
74 52
S 69
Net Ground Water Draft in (mcm)
Category - S - Safe
Stage of Development (%)
79° 30'
45'
80° 0'
26° 45'
30'
15'
26° 0'
CGWB, NR (RAKESH) Drg. No. 2736 / 09, (N.C.Pandey) Drg.No.4848/13

PLATE-VIII

Part of Topo Sheets No. 54 N & 63 B

ISOCON (PHREATIC ZONE) MAP OF KANPUR DEHAT DISTRICT, U.P.
(May 2012)



CGWB, NR (RAKESH) Drg. No. 2736 / 09, (N.C. Pandey) Drg. No. 4849 / 13