DISTRICT BROCHURE OF MORADABAD DISTRICT, U.P.

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

By
R.C. Verma
Scientist 'B'

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MORADABAD DISTRICT AT A GLANCE

1.	**GENERAL INFORMATION**		
i.	Geographical Area (Sq. Km.)	:	3759.79
ii.	Administrative Divisions (as on 31.03.2007)	:	
	Number of Tehsil/Block		6/12
	Number of Panchayat/Villages		960/1794
iii.	Population (as on 2001 census)	:	3,81,098
iv.	Average Annual Rainfall (mm)	:	967
2.	**GEOMORPHOLOGY**		
	Major Physiographic Units	:	
	Major Drainages	:	Ramganga and its tributaries
3.	**LAND USE (Sq. Km.)**		
a)	Forest area	:	0.64
b)	Net area sown	:	3161.96
c)	Cultivable area	:	
4.	**MAJOR SOIL TYPES**	:	
5.	**AREA UNDER PRINCIPAL CROPS (as on 31.3.2007)**	:	Wheat – 193910 ha Rice – 132537 ha
6.	**IRRIGATION BY DIFFERENT SOURCES** (Areas and Number of Structures) (Km^2 / Nos)		
	Dugwells	:	
	Tubewells/Borewells	:	1260.62 by 105529 Nos
	Tanks/ponds	:	0.95 by 276 Nos
	Canals	:	160.88 by 511 Km length
	Other Sources	:	100.09 by 13357 Nos
	Net Irrigated Area	:	2685.72
	Gross Irrigated Area	:	4890.57
7.	**NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-3-2007)**		
	No. of Dugwells	:	4
	No. of Piezometers	:	3

8.	**PREDOMINANT GEOLOGICAL FORMATIONS**	:	
9.	**HYDROGEOLOGY**	:	
	Major water bearing formation	:	
	(Pre-monsoon Depth to water level during May'2007)	:	13.73 mbgl
	(Post-monsoon Depth to water level during Nov'2007)	:	11.78 mbgl
	Long term water level trend in 10 years (1997-2006) in m/yr (Based on CGWB data for 1998-2007)	:	Pre-monsoon : 0.068 Post-monsoon : 0.311
10.	**GROUND WATER EXPLORATION BY CGWB (As on 31-3-2007)**		
	No of wells drilled (EW, OW, PZ, SH, Total)	:	EW-6, PZ-4, SH-2
	Depth range (m)	:	225-430
	Discharge (litres per second)	:	
	Storativity (S)	:	1.93×10^{-5}
	Transmissivity (m^2/day)	:	5951
11.	**GROUND WATER QUALITY**		
	Presence of Chemical constituents more than permissible limit (e.g. EC, F, As, Fe)	:	Nil
	Type of water	:	Bicarbonate type
12.	**DYNAMIC GROUND WATER RESOURCES (2004)-in MCM**		
	Annual Replenishable Ground Water Resources	:	1155.34
	Net Annual Ground Water Draft	:	1092.54
	Projected Demand for Domestic and Industrial Uses upto 2025	:	-
	Stage of Ground Water Development	:	94.56%
13.	**AWARENESS AND TRAINING ACTIVITY**		
	Mass Awareness Programmes organized	:	Nil
	Date	:	-
	Place	:	-
	No. of participants	:	-
	Water Management Training Programmen 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)		Nil
15.	**GROUND WATER CONTROL AND REGULATION**	:	
	Number of OE Blocks	:	3 (1-Bahjoi, 2-Dingerpur, 3-Sambhal)
	No of Critical Blocks	:	Nil
	No of blocks notified	:	Nil
16.	**MAJOR GROUND WATER PROBLEMS AND ISSUES**	:	Declining trend on ground water regime due to over-exploitation.

Note : Latest available data may be incorporated.

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I. INTRODUCTION

Moradabad district forms a part of Gangetic alluvial plain and lies between $28^0$20' and $29^0$16' north latitudes and $78^0$24' and $79^0$0' east longitude covering an area of 3759.79 sq.km. It is bounded by Bijnor and Nainital district in east by Rampur district in south by Budaun district and in west by Jyotiba Phule Nagar district. The district is administratively divided into 6 tehsils and is further divided into 12 development blocks. Total population as per 2001 census is 38,1098. The density of population is 967 per sq. km.

The district Moradabad is drained by river Ramganga and its tributaries namely Dhela Nadi, Koshi Nadi, Gangan Nadi, Aril Nadi and Sot Nadi.

Irrigation in major part of the district is carried out by means of minor irrigation structures such as tubewells, cavity wells and surface irrigation system by canals. Canal irrigation practiced only in part of the blocks namely Thakurdwara, Bhagatpur, Dilari and Munda Pandey. Rest of the blocks are devoid of surface irrigation by canal. In the district only 260.97 Km^2 area i.e. 9.72% is irrigated by surface irrigation by means of canal & other sources and remaining 2685.72 Km^2 area i.e. 90.28% of the total irrigated area is irrigated by ground water.

The Central Ground Water Board has carried out 6 nos. of exploratory tubewell and two numbers slim hole to decipher subsurface aquifer geometry, to determine the aquifer parameters and quality of subsurface water. CGWB has constructed 4 nos. of piezometers to close monitor the depth to water level in data scare regions.

II. RAINFALL & CLIMATE

The average annual rainfall is 967.3 mm. The climate is sub-humid and it is characterised by hot summer, a bracing cold season and general dryness except in the south-west monsoon season. About 86% of rainfall takes place from June to September. During monsoon surplus water is available for deep percolation to ground water.

There is no meteorological observatory in the record of Bareilly, which may be taken as representative meteorological condition. May and early part of June form the hottest part of the year. In May, the mean daily maximum temperature is about 40^0C and mean daily minimum temperature about 25^0C and maximum temperature rises upto over 45^0C. With the advancement of the monsoon in June there is a appreciable drop in day temperature. January is generally the coldest month with mean daily maximum temperature at about 21^0C and the mean daily minimum is about 8^0C. The mean monthly maximum temperature is 29.4^0C and mean monthly minimum temperature is 12^0C.

The air is very humid during south-west monsoon season and the rest of the period the humidity is comparatively less. The mean monthly relative humidity is 69% and mean monthly evening relative humidity is 51%.

Winds are generally light with a little strengthening in the summer and monsoon seasons. The mean wind velocity is 5.1 K.m.p.h.

Potential evapotranspiration is 1402.8 mm.

III. GEOMORPHOLOGY & SOIL TYPES

Geomorphologically, the area of the district can be divided into two broad geological units namely

1. Younger Alluvium
2. Older Alluvium

YOUNGER ALLUVIUM:

The area occupied by younger alluvium can be delineated along Ramganga and Dhela rivers draining the district. The younger alluvium is confined dominantly within the flood plain of these rivers.

The flood plain can be further differentiated into two geomorphic units –

(i) Flood Plain, (ii) Older Flood Plain

(i) **Flood Plain:** The river channel and its adjacent areas forming terraces, which are subjected to periodic flooding consisting of sand, silt and silty sand with minor clays from the flood plain of river. This is a narrow zone along river channel and gets flooded regularly during rainy season.

(ii) **Older Flood Plain:** Older flood plain of river Ramganga can be delineated extending to few kilometers. Locally it is known as Khadar. The zone is characterised by presence of fluvial land from such as meander scars, cut off meanders forming water bodies and paleochannels. The sediments are fine grained sand and silt with thin clay horizons. The zone can be separated from older alluvium by presence of natural levee, sand dunes and abrupt change in slope.

OLDER ALLUVIUM:

It occupies the entire upland or interfluve area between the major drainage Ramganga and Kosi and Sot & Ramganga. The soils are silty, clayey and sandy in varying proportions. The older alluvium can be differentiated into following geomorphic units:

(i) Sandy Tract and

(ii) Central Upland Plain of Interfluve Area.

(i) **Sandy Tract:** These are occurring very close to old flood plain of Ramganga. This unit correspond to Bhur of physiographic unit. This unit is characterised by absence of drainage ways, indication of high permeability as coarse sand exists.

(ii) **Central Upland Plain or Interfluve Area:** The unit occupies the central part as well as eastern part of the district and is characterised by presence of well drainage ways namely Ganga & Sot. The soils are clayey through at place these are sandy. Back swamp deposits can also be seen in this zone.

4.0 GROUND WATER SCENARIO

4.1 HYDROGEOLOGY:

The district is underlain by alluvial sediments having thickness of around 1000m (ONCG) comprising clay, silt and various grades of sand. Limited drilling carried out for ground water exploration down to a depth of 450 mbgl reveals the presence of potential aquifers with a marked change in sedimentation below 390mbgl. The sediments down to 390 m can be boradly divided into two aquifer groups. The upper aquifer group down to 180 m being exploited extensively by state & private tubewells. The second potential aquifer group present below 180 m depth, still remains to be fully harnessed for optimum utilization. For proper management of ground water resources, it is recommended to tap this aquifer in future. Deep drilling below 400 m is the need of the area for proper understanding of deeper aquifers.

Central Ground Water Board, Northern Region under its exploratory drilling programme has drilled 9 numbers of boreholes at Azad Nagar (Moradabad block), Bahjoi (Bahjoi block), Bhataua (Sambhol block), Budh Nagar & Dilari (Dilari block) and Maseri Rasoolpur (Boria Khera block), Budh Nagar (Thakurdwara block) down to a depth varying 50.00 to 350.00 mbgl with an objective of mapping of sub-surface sediments and aquifer system. The location of well shown in Annexure-1.

The cumulative thickness of screened granular zones in these aquifer groups varies from 36 to 112 m. The average yield varies from 1445 to 5220 lpm for drawdown ranging from 1.85 m to 8.7 m. The specific capacity of tubewells varies from 222 to 1263 lit/min/m of drawdown.

Depth to water level in the area during premonsoon period vary from 2.57 to 14.54 mbgl and in postmonsoon period vary from 1.70 to 13.69 mbgl. The water level is comparatively shallower in the vicinity of canal and in the flood plain of river Ramganga and its tributaries. The water level occurs comparatively at deeper in the southern west blocks of river Ramganga fallen in tehsil Bilari, Sambhal and Moradabad. During 2006 the annual seasonal water level fluctuation varies 0.04 to 0.60 m. The study of water level trend for almost all hydrograph stations shows a continuous declining except hydrograph of Thakurdwara located in the canal

command area. Due to insufficient data available with CGWB, no trend has been determined, however based on GWD data from year 2002 to 2006 the trend of water level of premonsoon period is 05.63 m/year and in postmonsoon period is 0.049m/year.

4.2 GROUND WATER RESOURCES:

To facilitate the ground water development judiciously, the ground water resources have been worked out. The blockwise resources are as follows:

Table-1

DYNAMIC GROUND WATER RESOURCES OF MORADABAD DISTRICT, U.P.

(as on 31.03.2004)

Sl. No.	Assessment Blocks	Annual ground water recharge (in ham)	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.	Asmoli	8474.21	7626.79	7471.77	-121.71	97.97	Semi Critical
2.	Bahjoi	6814.81	6474.07	8356.18	-2191.59	129.07	Over Exploited
3.	Bania Khera	9293.66	8828.98	7792.06	748.32	88.26	Safe
4.	Bhagatpur Tanda	14773.72	14035.04	11064.82	2560.41	78.84	Safe
5.	Bilari	8776.46	7898.82	7061.61	575.66	89.40	Semi Critical
6.	Dilari	12927.45	11634.70	11599.31	-240.78	99.70	Semi Critical
7.	Dingarpur	9211.82	8751.23	9500.16	-1100.78	108.56	Over Exploited
8.	Moradabad	4646.20	4413.89	3567.86	713.89	80.83	Safe
9.	Munda Pandey	13067.26	11760.54	10523.72	982.70	89.48	Safe
10.	Pawansa	10415.55	9373.99	9333.86	-183.29	99.57	Semi Critical
11.	Sambhal	10371.21	9334.09	12603.82	-3736.54	135.03	Over Exploited
12.	Thakurdwara	16212.71	15402.07	10378.47	4639.22	67.38	Safe
	Total	**124985.07**	**115534.21**	**109253.63**	**2645.49**	**94.56**	

The annual utilisable ground water resource in the district for the year 2003-04 have been marked as 115534.21 ham of which 109253.63 ham is utilized during same year, thus leaving balance 2645.49 ham for future development. Since the net

availability for future irrigation development in blocks Asmoli, Bahjoi, Dilari, Dingarpur, Pawansa and Sambhal is in negative, no further additional ground water structure may be recommended for utilizing dynamic ground water resources. Five blocks namely Bania Khera, Bhagatpur Tanda, Moradabad, Munda Pandey and Thakurdwara fall in safe category where ground water development varies from 67.38% to 89.48%. A review of blockwise ground water resource potential data table-1 reveals that Bahjoi, Dingarpur and Sambhol blocks are fall in over exploited category of block where stage of ground water development is more than 100%.

In the northern part of the district in blocks Thakurdwara, Dilari, Bhagatpur Tanda, Munda Pandey and in parts of Moradabad district, the irrigation by surface water is being carried out in 26097 ham i.e. 9.72% of the total irrigation by means of 511 Km. length of canal and other soruces. In the canal command area depth to water level is shallow and occurs less than 7 mbgl.

4.3 GROUND WATER QUALITY:

Ground water in phreatic aquifers in general is colourless, odourless and slightly alkaline in nature. The specific electrical conductance of ground water in the phreatic zone ranges from 300-1080 micro siemens/cm at 25^0C. The conductance below 750 micro siemens/cm at 25^0C have been observed in 67% of the samples analysed.

It is observed that ground water is suitable for drinking and domestic purpose in respect to constituents except nitrate. Nitrate is found in excess 45 mg/l in about 33% of sampels analysed which is due to the use of fertilizers for agriculture and other untreated waste disposal. Phosphate is not found in ground water. The As (Arsenic) has been found ranging from nd to 70 micro gm/litre in Moradabad block (Ashiyana 70 microgram/litre).

4.4 STATUS OF GROUND WATER DEVELOPMENT (BLOCKWISE):

In Moradabad district, the salient features of ground water structure is as follows:

Table-2

SALIENT FEATURES OF GROUND WATER STRUCTURE

Sl. No.	Name of ground water structure	Depth range (mbgl)	Diameter (m)	Discharge range (lpm)	Type of pumps & water lift up devices	Use
1.	Dug well	7-28	0.90-2.50	-	Rope & bucket	Domestic but now not in use
2.	Private tubewell / borings	30-40	0.1-0.2	500-600	Electric / Diesel operated	Water supply for domestic & irrigation
3.	Public (state) tubewells	75-130	0.30-0.35	1445-5200	Electric operated	Water supply for domestic & irrigation

The blockwise source of irrigation and irrigated area by different sources are given in Table-3

Table-3

BLOCKWISE SOURCE OF IRRIGATION AND IRRIGATED AREA BY DIFFERENT SOURCES AS ON 31.3.08

Sl. No.	Name of block	Irrigated area by canals (surface irrigation)	Canal length (Km)	Irrigation by other sources surface (ham)	Nos. of pump set on ground	Irrigation by public / tubewell (ham)	No. of public / tubewell	Irrigation by private tubewell / boring (ham)	No. of private tubewell / boring
1.	Thakurdwara	5882	162	470	26	0	61	10333	8042
2.	Dilari	9380	119	625	27	0	17	8604	14215
3.	Asmoli	0	0	795	13	201	75	11215	4994
4.	Sambhal	0	0	620	31	302	112	17114	9196
5.	Pawansa	0	0	410	11	279	84	13192	10089
6.	Bhagatpur Tanda	0	107	715	6	8	23	8003	7116
7.	Moradabad	0	8	770	10	91	40	5201	4379
8.	Munda Pandey	28	28	695	22	35	35	12418	6944
9.	Dingarpur	0	0	1854	34	353	113	3700	9404
10.	Bania Khera	0	0	786	32	654	87	7258	9957
11.	Bilari	0	0	650	24	274	119	5534	9780
12.	Bahjoi	0	0	709	8	325	69	6703	6819
	Total Rural	**15290**	**424**	**9099**	**244**	**2522**	**835**	**10975**	**98935**
	Total Urban	**456**	**0**	**240**	**0**	**57**	**11**	**3211**	**0**
	Total District	**15746**	**424**	**9339**	**244**	**2579**	**846**	**14186**	**98935**

The long term data of National Hydrograph station of CGWB shows that except a few places, the entire district exhibit a declining trend of water level on an average 0.2848 m/year in last 20 years resulting in drying out the number of dugwells and also shallow ground water structures.

V. GROUND WATER MANAGEMENT STRATEGY

5.1 GROUND WATER DEVELOPMENT:

Keeping in view the availability of ground water resources and prevailing hydrogeological scenario, a blockwise future development plan for augmenting the irrigation water supply has been worked out Table-4 utilizing only 70% (6081.02ham) of ground water balance allocated for irrigation. It has been further proposed to exploit the 50% of this balance (i.e. 3040.51 ham) through private tubewells/borings of maximum 100 m depth and remaining through moderately deep state tubewells of 150-200 m depth. Thus by this way about 1695 private tubewells/borings and about 238 state tubewells may be constructed which will create additional irrigation potential for 11808.22 hact. in the district.

Table-4

BLOCKWISE PROPOSAL OF GROUND WATER DEVELOPMENT FOR IRRIGATION PURPOSE

Block	**Ground water availability** (ham)	**Ground water allocated for domestic / industrial use 15% of Col. 2** (ham)	**Ground water available for irrigation 85% of Col. 2** (ham)	**Ground water proposed to be utilized for supply of future irrigational development 70% of Col. 4** (ham)	**Proposed structures as per available potential**		**Feasible for deep tubewell tapping Aq Gr. II recommending drilling down to 350 m**	**Additional irr. Potential may be created through newly proposed T/w** (ham)
					Private tubewell/boring with pumpsets taking 50% of Col. 5 (Unit draft 1.8 ham) (ham)	***STW tapping Gr. I & part of II Gr. Only taking 50% of Col. 5 (Unit draft 12.8 ham) (ham)***		
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Thakurdwara	4639.22	695.88	3943.34	2762.44	767	108	Feasible	5524.88
Dilari	(-)240.78	Nil	-	-	-	-	Feasible	Nil
Asmoli	(-)121.71	-	-	-	-	-	Feasible	Nil
Sambhal	(-)3736.54	-	-	-	-	-	Feasible	Nil
Pawansa	(-)183.29	-	-	-	-	-	Feasible	Nil

Block	Ground water availability (ham)	Ground water allocated for domestic / industrial use 15% of Col. 2 (ham)	Ground water available for irrigation 85% of Col. 2 (ham)	Ground water proposed to be utilized for supply of future irrigational development 70% of Col. 4 (ham)	Proposed structures as per available potential		Feasible for deep tubewell tapping Aq Gr. II recommending drilling down to 350 m	Additional irr. Potential may be created through newly proposed T/w (ham)
					Private tubewell/boring with pumpsets taking 50% of Col. 5 (Unit draft 1.8 ham) (ham)	*STW tapping Gr. I & part of II Gr. Only taking 50% of Col. 5 (Unit draft 12.8 ham) (ham)*		
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Bhagatpur Tanda	2560.41	384.06	2176.35	1523.44	423	60	Feasible	3046.88
Moradabad	713.89	107.08	606.81	424.77	118	17	Feasible	849.54
Munda Pandey	982.70	117.40	865.30	605.70	168	24	Feasible	1211.40
Dingarpur	(-)1100.78	-	-	-	-	-	Feasible	Nil
Bania Khera	748.32	112.25	636.07	445.25	124	17	Feasible	490.50
Bilari	575.66	86.34	489.32	342.51	95	13	Feasible	685.02
Bahjoi	(-)2191.59	-	-	-	-	-	-	Nil
District Total	**10220.20**	**1503.01**	**8687.17**	**6081.02**	**1695**	**238**	**-**	**11808.22**

5.2 WATER CONSERVATION & ARTIFICIAL RECHARGE:

Effective and efficient water management options needs to incorporate both structural & non structural measures including water conservation, augmentation of this natural resource (especially ground water assets by artificial recharge techniques).

Depth to water levels are deep in parts of Moradabad and Dingarpur, Bilari, Bania Khera, Bahjoi, Pawansa, Sambhal and Asmoli blocks and show declining trend in ground water due to over exploitation. The surface water especially during monsoon can be then utilized for recharge to ground water in deeper depleting water level areas (Plate-VI). Suitable artificial recharge structures such as recharge shaft, recharge pit, abandoned handpumps/tubewells (as shown in Plate-VI). Rooftop rainwater harvesting structures (Moradabad district) in urban areas should be adopted.

VI. GROUND WATER RELATED ISSUES AND PROBLEMS

The major ground water related issue and problem is of deep ground water levels, declining water levels and in some parts of Moradabad town ground water

pollution by Manganese near Brassware Industries are reported (Ref. Ground Water Studies by Dr. D.S. Pandey, March 1993). There is no any water logged, drought affected or water scarcity areas reported from the district. No drilling problems or risk to natural disorder etc. are faced in any parts of the district.

VII. AWARENESS & TRAINING ACTIVITY

7.1 MASS AWARENESS PROGRAMME (MAP) & WATER MANAGEMENT TRAINING PROGRAMME (WMTP) BY CGWB:

No Mass Awareness Programme (MAP) and Water Management Training Programme (WMTP) were organised by Central Ground Water Board in any part of the district.

7.2 PARTICIPATION IN EXHIBITION, MELA, FAIR ETC.:

No exhibition, Mela, Fair etc. were organised on the district so far.

7.3 PRESENTATION & LECTURES DELIVERED IN PUBLIC FORUM / RADIO / TV / INSTITUTION OF REPUTE / GROSS ROOTS ASSOCIATION / NGO / ACADEMIC INSTITUTION ETC.:

No presentation & lectures delivered in public forum by CGWB in any part of the district. However a national publicity for mass awareness programme on conservation of water, artificial recharge practices to adopt in the area for augmenting ground water resources etc. are being carried out by the Ministry of Water Resources, Government of India. (By Doordarshan Programme).

VIII. AREA NOTIFIED BY CGWA/SGWA

In the district no any area or block yet has been notified by CGWA/SGWA.

IX. RECOMMENDATIONS

Based upon studies carried out in the district, it is observed that water level is declining very fast in south west of river Ramganga and strongly recommended that exploitation of ground water through tubewells in first aquifer group in the blocks Asmoli, Sambhol, Pawansa, Bahjoi, Bania Khera, Bilari, Dingarpur and parts of Moradabad and in north of Ramganga in block Dilari (Semi critical block) be stopped. Artificial recharge practice to shallow aquifers by various methods should be adopted to raise the water level. Since about 90% of ground water requirements are being catered by aquifer group-I, a declining trend in ground water levels has regionally been observed. To check this trend and minimize the stress on shallow aquifers, withdrawal of ground water through shallow tubewells, tapping aquifer group-I should be restricted and efforts should be made, as for as possible to exploit the ground water in future from deeper aquifer (Group-II) through heavy duty tubewells. Scientific approach should be made while executing the future ground water development plan and water management practices should be utilized and public be made aware about the decline of water level.

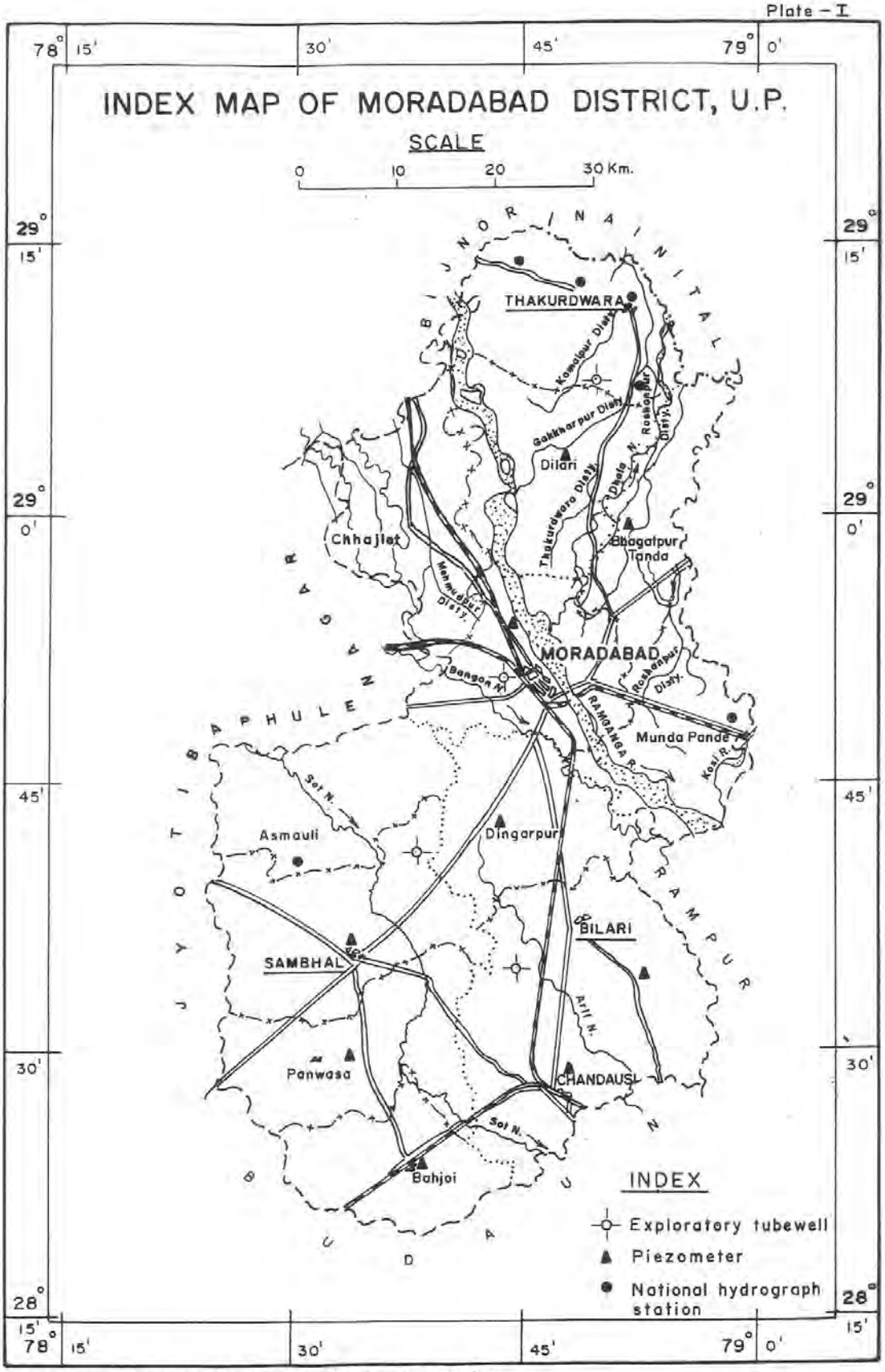
Annexure-I

STATUS OF GROUND WATER EXPLORATION IN MORADABAD DISTRICT AS ON 1.10.2006

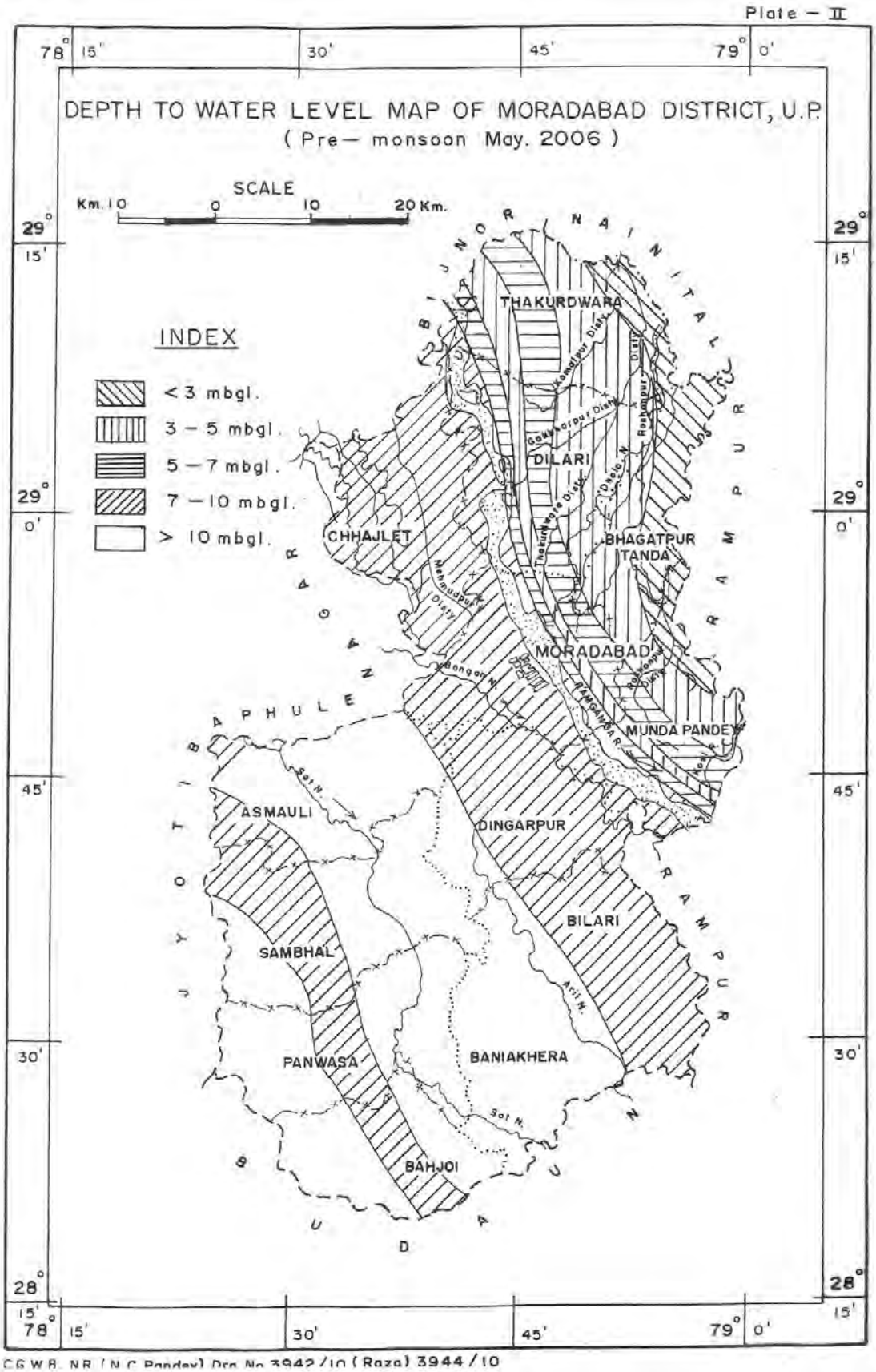
Sl. No.	Location/Latitude/Longitude/Toposheet	Type of Well	Drilled Depth/Bed rock (mbgl)	Zones Tapped (mbgl)	Water Level (mbgl)	Yield (lpm)	Draw down (m)	Transmissivity T (m^2/day)	Storativity S	Geology	Electrical Conductivity (micromhos/ cm at 25^0C)	Chloride (mg/l)	Remarks
1.	Azad Nagar	EW	-	-	-	-	-	-	-	Alluvium	-	-	Drilling under progress
2.	Bahjoi	SH	450.35 N.EN	33-41 49-53 65-95 106-119 136-144 153-163 185-193 203-230 255-267 291-299 303-313 356-374 386-393 411-431	-	-	-	-	-	Alluvium	-	-	Zones encountered
3.	Bataua	EW	452.48 N.EN	265-274 285-297 300-315	-	-	-	-	-	Alluvium	-	-	
4.	Budh Nagar $29^0$11’36” $78^0$50’12”	EW	450.00	110-122 148-157 175-184 214-226 253-259 295-307	-	-	-	-	-	Alluvium	-	-	

Sl. No.	Location/Latitude/Longitude/Toposheet	Type of Well	Drilled Depth/Bed rock (mbgl)	Zones Tapped (mbgl)	Water Level (mbgl)	Yield (lpm)	Draw down (m)	Transmissivity T (m^2/day)	Storativity S	Geology	Electrical Conductivity (micromhos/ cm at 25^0C)	Chloride (mg/l)	Remarks
				313-325 331-337 349-355 391-403 421-427									
5.	Delari Changeri $29^0$02’12” $78^0$45’18”	SH	450.00	165-185	-	-	-	-	-	Alluvium	553	25	Zone encountered
6.	Gajraula I $28^0$49’40” $78^0$15’20”	EW	254.73	160-172 188-200 206-218 227-233	5.74	-	-	-	-	Alluvium	-	-	Not tested
7.	Gajraula II $28^0$49’40” $78^0$15’20”	PZ	704.20	610-628 637-643	5.36	-	-	-	-	Alluvium	-	-	Not tested
8.	Mawesi Rasulpur $28^0$34’30” $78^0$45’45” 53L	EW	450.79	80-98 110-119 134-140 149-161 173-182 263-269 275-281 332-344	11.3	2480	3.72	5951	1.93×10E-5	Alluvium	-	-	
9.	M.D.A. Moradabad	EW	225.00	121-130 147-153 168-177 196-205 210-222	9.0	-	-	-	-	Alluvium	-	-	

Plate – I

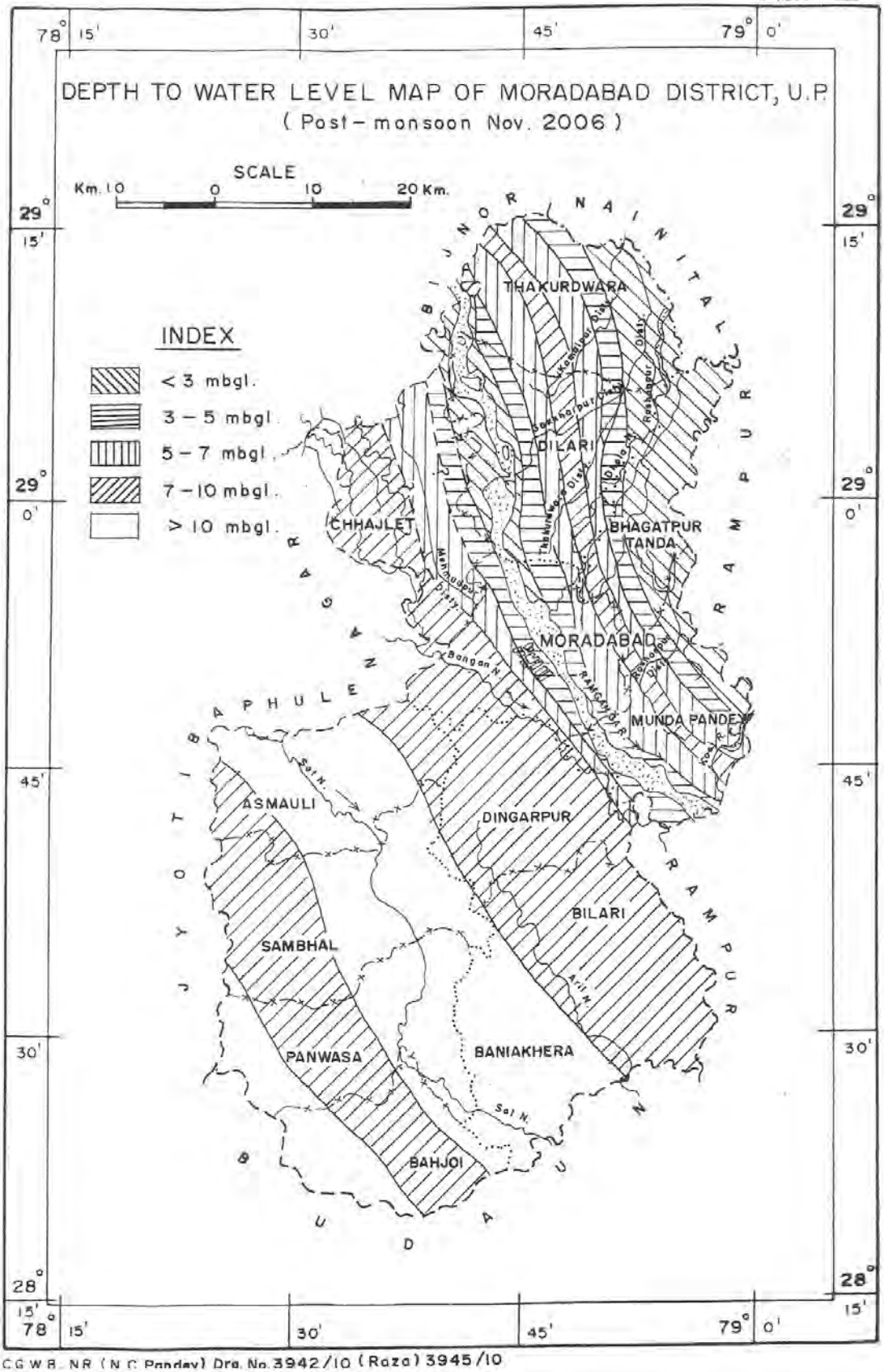


CGWB. NR (N.Chandra) Drg. No. 2520/08(Raza) 3943/10.



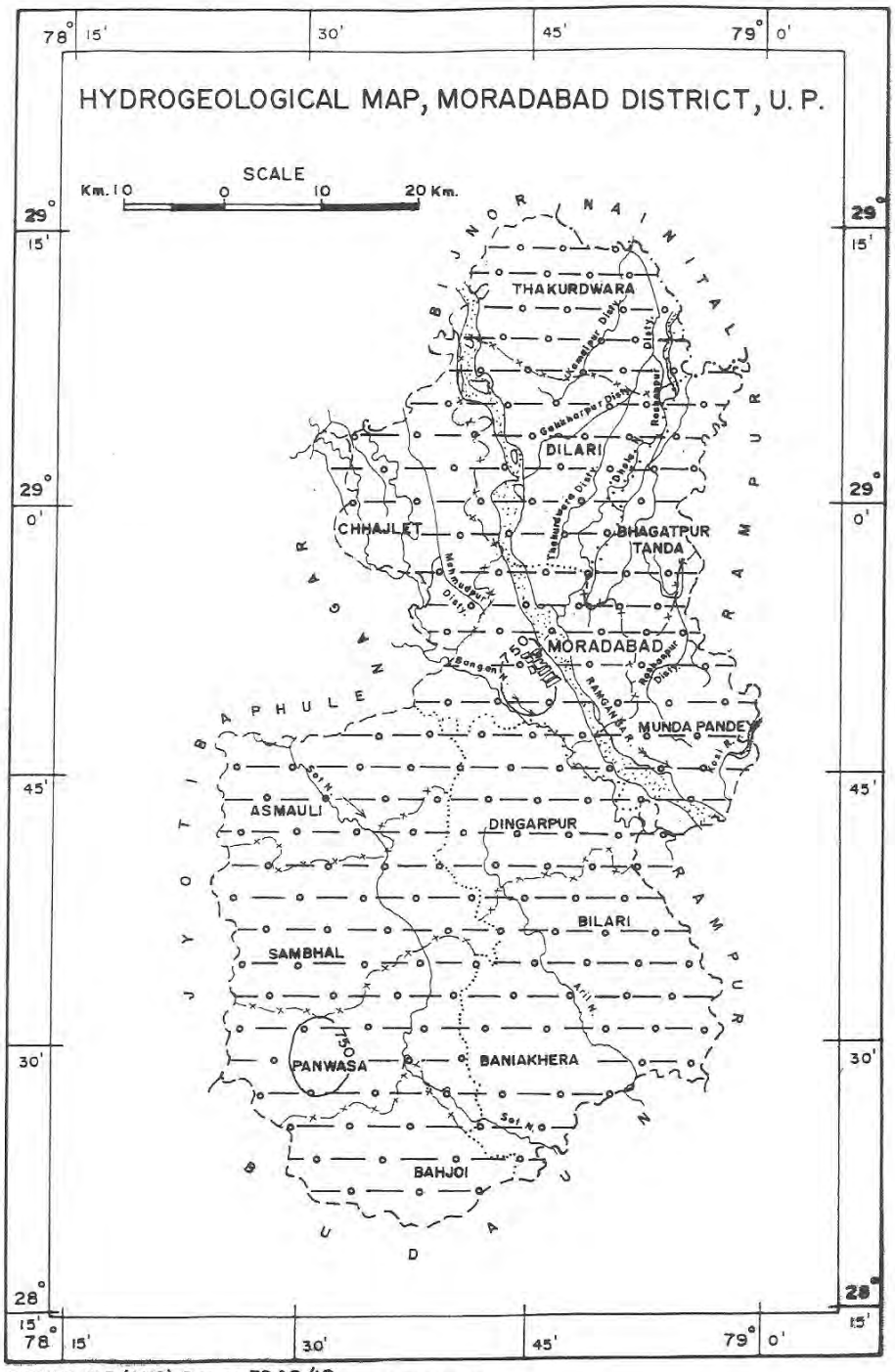
CGWB, NR (N.C. Pandey) Drg. No. 3942/10 (Raza) 3944/10

Plate – III



CGWB. NR (N C Pandey) Drg. No. 3942/10 (Raza) 3945/10

PLATE - IV

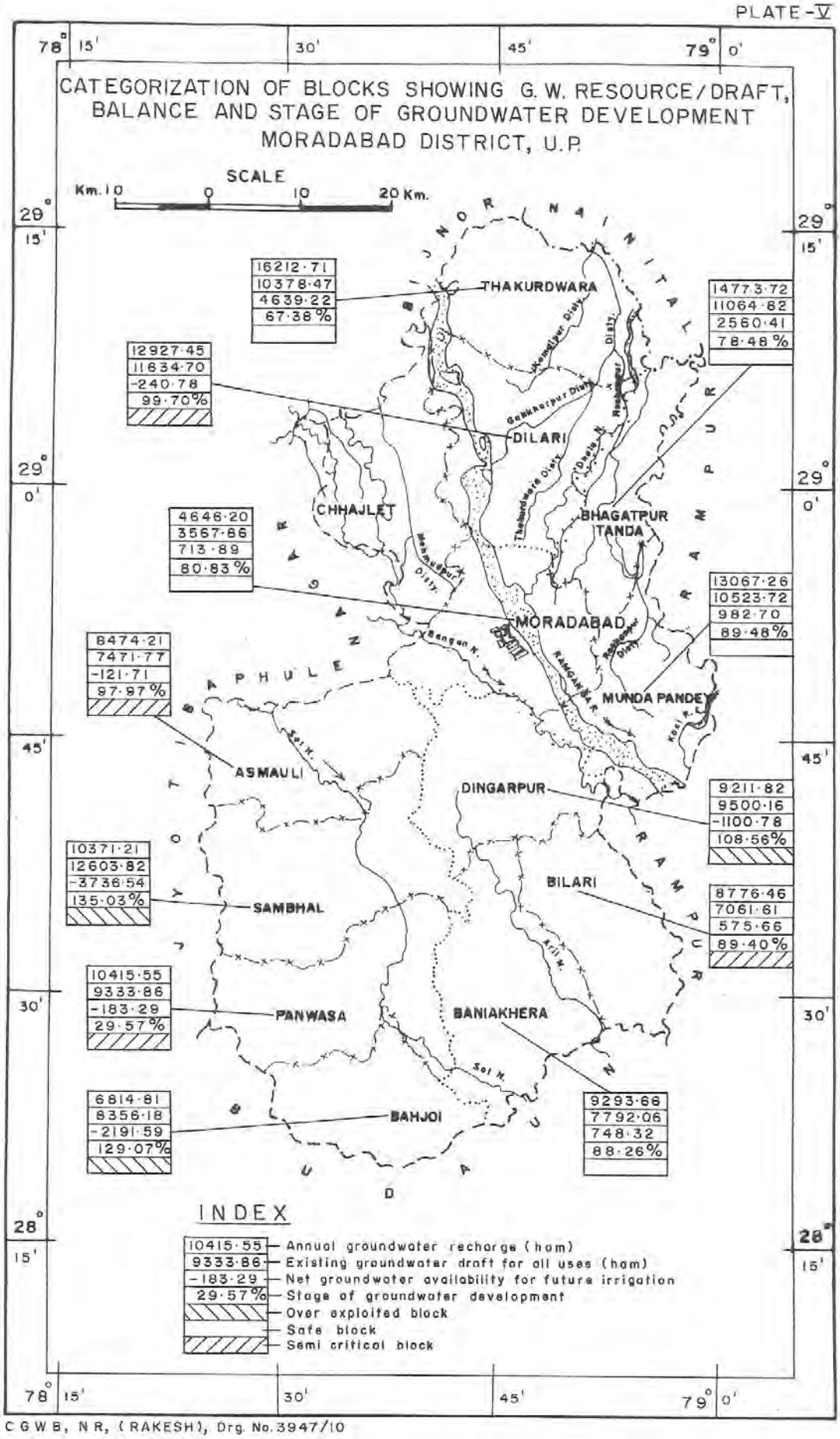


C.G.W.B., N.R.(AKS), Drg.no.3946/10.

LEGEND

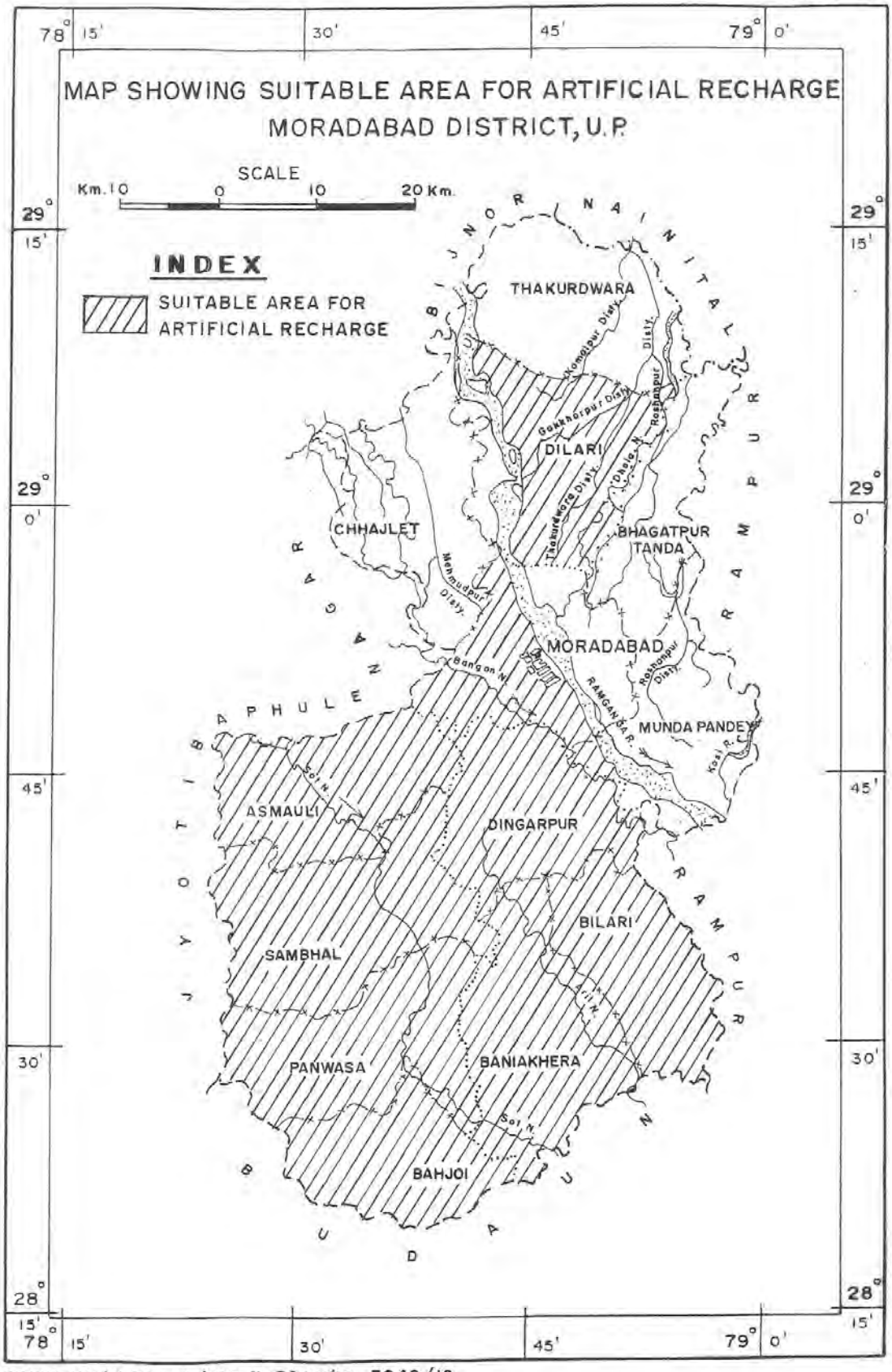
	WELLS FEASIBLE	RIGS SUITABLE	DEPTH OF WELL (M)	DISCHARGE (LPM)	SUITABLE ARTIFICIAL RECHARGE STRUCTURES
Soft Rock Aquifer	Dug Wells / Hand Pump	Manual / Hand boring set	20 – 40	50 - 100	Recharge Shaft, Recharge Pit, Abandoned Handpumps / Tubewells, Rooftop Rain Water Harvesting Structures in urban areas.
	Shallow Tube Well	Rotary Rigs (Direct / Reverse)	50 - 100	1000 - 2000	
	Deep Tube Well	Rotary (Direct)	100 – 400**	2000 – 3000	
Major river			Electrical Conductivity (Micromhos/cm at 25° C) 750		

PLATE - V



C G W B, N R, (RAKESH), Drg. No. 3947/10

PLATE-VI



CGWB, NR (N.C.Pandey) Drg. No. 3942/10, 3948/10