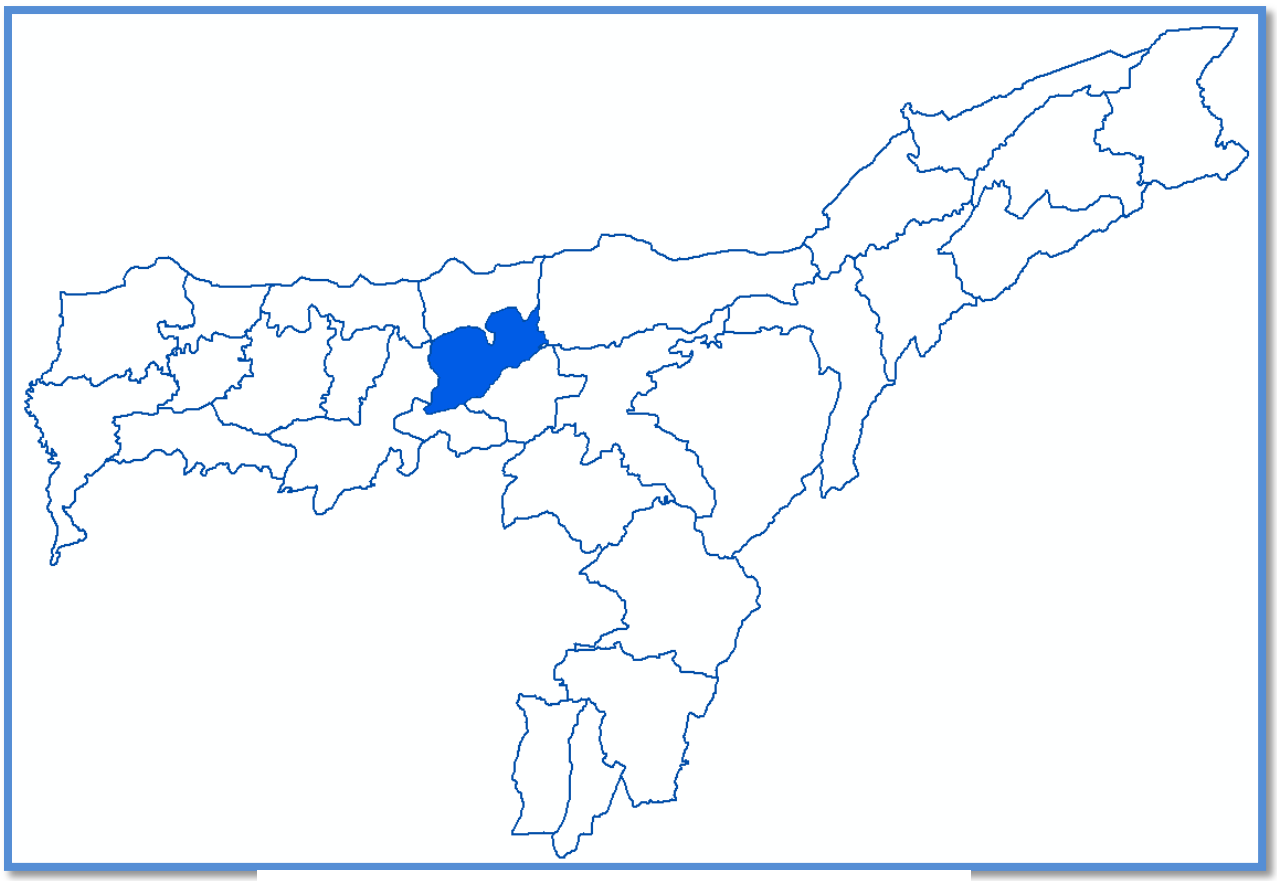
Technical Report Series: D

No:

Ground Water Information Booklet

Darrang District, Assam



Central Ground Water Board

North Eastern Region

Ministry of Water Resources

GROUND WATER INFORMATION BOOKLET
DARRANG DISTRICT, ASSAM

DISTRICT AT A GLANCE

Sl.No.	Items	Statistics
1.	**GENERAL INFORMATION**	
	i) Geographical Area (Sq.Km.)	1,630
	ii) Administrative Divisions	
	Number of Blocks	6
	Number of Villages	520
	iii) Population (as on 2001 Census)	7,64,300
	iv) Average Annual Rainfall (mm)	2,127
2.	**GEOMORPHOLOGY**	
	Major Physiographic Units	Alluvial plains
	Major Drainages	Brahmaputra, Dhansiri, Bega, Mangaldoi and Noa rivers
3.	**LAND USE (Sq.Km.)**	
	a) Forest Area	27.0
	b) Net area sown	1,140
	c) Cultivable area	950.0
4.	**MAJOR SOIL TYPES**	Younger and Older Alluvial Soils
5.	**AREA UNDER PRINCIPAL CROPS (as on 2007 in sq.km.)**	1,400
6.	**IRRIGATION BY DIFFERENT SOURCES**	
	a) Surface water (Sq.km.) i) Surface flow, Lift irrigation	30.0
	b) Ground water (sq.km.) i) Tube wells	5.0
7.	**NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (as on 31.03.2009)**	
	No. of Dug Wells	9
	No. of Piezometers	-
8.	**PREDOMINANT GEOLOGICAL FORMATIONS**	Alluvial sediments of Quaternary age
9	**HYDROGEOLOGY**	
	Major Water bearing Formation	Recent Alluvium
	(Pre-monsoon depth to water level during 2008	2.0 to 4.0 m bgl
	(Post -monsoon depth to water level during 2008)	1.0 to 2.0 m bgl
	Long term water level trend in 10 years	No significant change in water level

10	**GROUND WATER EXPLORATION BY CGWB (as on 31.03.2009)**	
	No. of wells drilled (EW,OW,PZ,SH,Total)	EW- 5, OW- 4, Total = 9 Nos.
	Depth of Range (m)	191 - 300
	Discharge (m^3/hr)	44 - 251
	Storativity (S)	$2.45 \times 10^{-5} - 2.8 \times 10^{-2}$
	Transmissivity (T) (m^2/day)	19,11,894
11	**GROUND WATER QUALITY**	
	Presence of Chemical constituents more than permissible limits (e.g. EC, F,As,Fe)	Sporadic occurrence of high concentration of Fe in few pockets in shallow and deeper aquifer
	Type of Water	Generally good for drinking & irrigation purposes
12	**DYNAMIC GROUND WATER RESOURCES (as on March 2009) in MCM**	
	Annual Replenishable Ground Water Resources	1754.32
	Net Annual Ground Water Draft	511.61
	Projected demand for domestic and industrial uses up to 2025	51.59
	Stage of Ground Water Development	31%
13	**AWARENESS AND TRAINING ACTIVITY**	
	Mass Awareness Programmes organised	One, 02.02.2005 at Mangaldoi
	Water Management Training Programmes organised	One, 03.02.2005 at Mangaldoi
14	**EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING**	
	Projects completed by CGWB (No. & amount spent)	Nil
	Project under technical guidance of CGWB (No.)	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**	Higher concentration of Fe is observed in few pockets in shallow and deeper aquifer of the district

GROUND WATER INFORMATION BOOKLET
DARRANG DISTRICT, ASSAM

1.0 INTRODUCTION

The present Darrang district of Assam was bifurcated into two districts namely Darrang and the other is newly created Udalguri district under B.T.C. area. It is located in the central part of state of Assam on north of the River Brahmaputra. The new Darrang district consists of 6 (six) blocks and 520 villages.

The district occupies part of the Brahmaputra basin and the mighty river Brahmaputra is flowing westerly direction through the southern boundary. The district is also drained by perennial rivers flowing from north to south.

The irrigation facilities mostly confined to a few lift and surface water schemes. However, farmers are utilising ground water from shallow tube wells for multiple crop harvesting. The district is famous for its vegetable productions and other Rabi crops.

The detailed hydrogeological survey aided by exploratory drilling has been carried out in the area. In addition, Central Ground Water Board is monitoring Ground Water Monitoring Stations. Ground water development potential of the district has been assessed for future planning and development. A number of investigations for the feasibility of tube well have been carried out for various user agencies and required supports have also been provided to State Government from time to time.

2.0 RAINFALL AND CLIMATE

The climate of the district is sun-tropical and humid. The winter season starts by November and continues till February. December/January is the coldest month and the temperature comes down to almost 15^0 C. The temperature starts rising from the month of February/March and July/August is the hottest month and it reaches up to about 40^0 C. The air is highly humid throughout the year and during rainy season ; the relative humidity is about 90 percent.

The area receives heavy rainfall every year and out of 1,951 mm of annual normal rainfall, 60 to 65% is received during June to September from south-west monsoon. The district also receives about 501 mm of rainfall during pre-monsoon period from March to May in the form of thunder showers and hail storms.

3.0 GEOMORPHOLOGY AND SOIL TYPE

Physiographically the entire district is an alluvial plain with flat topography and there is a very gentle slope towards Brahmaputra river, which makes the southern boundary of the district.

The district has soil cover of younger alluvium and older alluvium which have undergone diversified pedagogical changes. The soils are characterised by medium to high organic carbon, low to medium phosphate and potash contents.

The alluvial soils are light yellow to light grey in colour of recent age. The texture of the soil ranges from sandy loam to silty loam in nature. The soil is suitable for cultivation of rice crops.

4.0 GROUND WATER SCENARIO

4.1 Hydrogeology

Hydrogeologically, the entire area except a small pocket in the south western corner of the district is occupied by alluvial sediments of Quaternary age. Ground water occurs under unconfined condition in shallow aquifers and under semi-confined to confined condition in deeper aquifers. The aquifers are consisting of various grades of gravel, sand etc. It has a good yield prospect for both shallow and deep tube wells. The water level rests at shallow depth and in major parts of the district, it rests between 2 and 4 m bgl during pre-monsoon period. The post monsoon water level rests between 1 and 2 m bgl and in some places, it is above ground level. The long term water level trend shows no significant changes in water level in the last 10 years in the district.

The shallow tube wells tapping aquifers above 50 m bgl are capable of yielding 20 – 100 m^3/hr at drawdown of less than 3 m. Medium to heavy duty tube wells constructed down to 100 to 150 m bgl, tapping about 25 – 40 m granular zones are capable of yielding more than 100 m^3/hr. The summarised results of the exploratory drilling done by Central Ground Water Board in the district are given in Table – 1.

Table – 1 Summarised Hydrogeological data of Exploratory Wells in Darrang district, Assam drilled by C.G.W.B.

Year of constr-Uction	Location	Depth drilled (m)	Aquifer zones tapped (m)	Swl (m bgl)	Discha-rge m^3/hr DD (m)	Trans-missivity m^2/day	Hydra-ulic Conduc-tivity (m/d)	Specific capacity (lpm/m)	Stor-age Co-efficie nt (S)	Geology	Sub Basin Sub-sub basin
1	2	3	4	5	6	7	8	9	10	11	12
1981-82	Kharupetia EW $26^0$24'38" $92^0$06'35"	300.2 167	56-68, 83-91.76, 90-110.96, 115.45-128, 140-146.21, 158-164.26	7.64	90.24 5.63	11,894	204.43	267.14	-	Alluviu m sand (f to c) gravel, pebble gravel, pebble	Mora Dhansiri Mongaldoi
1981-82	Kuyapani EW $26^0$25'05" $91^0$58'29"	300.2 167	36.84 - 43, 46-52.17, 64-82.56, 93.86-101. 109.74-115, 122-130.96	1.10	251.74 3.724	7902.90	148.80	1126.66	-	-do-	-do-
1981-82	Kalaigaon EW+OW $26^0$25'05" $91^0$58'29"	300.2 167	38- 44, 55-60.9, 78.14 -84, 106.5-130, 139-145	0.98	188.04 5.23	3447.37	73.07	599.24	2.8 x 10^{-2}	-do-	-do-
1981-82	Orang EW+OW $26^0$42'05" $92^0$20'00"	276.42 148	45.95-70.73, 76.01-98.44, 99.47-108.97, 112.09-118.32, 138, 85-145	2.48	216.54 10.12	18.75	0.34	356.62	2.7 x 10^{-3}	-do-	-do-
2002-03	Mangaldoi EW $26^0$25'36" $92^0$02'00"	202 129	65-77, 83-86, 90-95, 104-110, 117-126	1.60	47.7 0.66	2891	82.60	1205.05	-	-do-	-do-

4.2 Ground Water Resources

The dynamic Ground Water Resources are estimated based on the methodology adopted as per GEC 97 following water level fluctuation and rainfall infiltration factors methods.

The annual dynamic ground water resources of the newly formed district are estimated to be 1754.32mcm (half of the old Darrang district), while the net annual ground water draft is511.61 mcm. The present stage of ground water development is about31 %. The district is under safe category and sufficient resources are still available for development.

4.3 Ground Water Quality

To study the quality of ground water, water samples collected from GWMS and exploratory wells constructed in the district were analysed in the Chemical Laboratory of C.G.W.B., NER, Guwahati. The interpretation of the results of the chemical analysis shows that ground water is fresh and suitable for both the domestic and irrigation purposes. Higher contents of iron more than permissible limit occurring sporadically require treatment before being used for drinking purpose.

4.4 Status of Ground Water Development

Ground water development is at low key at present and estimated to be 230 mcm against the vast annual resources of 575 mcm. After allocation for domestic and industrial purposes, the net annual dynamic resources for future irrigation in 2025 are estimated to be 300-350 mcm.

Ground water is mainly used for drinking and irrigation purposes and industrial use is considered to be negligible. Water supply schemes are executed by Assam Public Health Engineering Department through construction of ground water structures like dug well, hand pump and deep tube wells, etc. Ground water is used for irrigation purposes mainly through shallow tube wells implemented by Agriculture Department. The existing gross ground water draft for irrigation is 215 mcm.

5.0 GROUND WATER MANAGEMENT STRATEGY

Thick and extensive alluvial deposits forming rich aquifer system covering the almost entire district is very much suitable for ground water development through ground water abstraction structures like open wells, shallow and deep tube wells. For drinking and other purposes, individual households construct open wells and filter point wells which are feasible all over the district. Ring wells of 0.80 to 1.20 m diameter constructed at the depth of 5 to 10 n bgl are likely to hold sufficient quantities of water to meet the domestic requirement. Filter point wells constructed at the depth of about 15 to 20 m bgl fitted with galvanised iron/PVC pipes and filter are also suitable for extraction of ground water.

For agriculture purpose, shallow tube wells at the depth of about 30 to 40 m bgl may be constructed. A length of 9 to 12 m slotted pipe in the aquifer may be sufficient. A Centrifugal pump may be used to irrigate about 2 – 3 ha of land at an average annual draft of 0.03 mcm.

6.0 GROUND WATER RELATED ISSUES AND PROBLEMS

A part of the area of the district is devastated with floods every year during monsoon. Most of the area succumbs to water logging condition and utilisation of dynamic ground water resources is essential for lowering of water table which can be done by construction of shallow tube wells for agricultural purposes.

The sporadic occurrence of excess iron content is ground water requires suitable treatment before consumption.

7.0 AWARENESS AND TRAINING ACTIVITY

In a progressive society, it is natural that demands of water will be on the rise. The increasing population and urbanization affects these precious resources both in terms of quantity and quality. Therefore, proper understanding of the management, development and conservation of this precious resource is essential for the society. With this view, a Mass Awareness Programme and a Water Management Training Programme were organised at Mangaldoi town on 2nd February, 2005 and 3rd February, 2005 respectively.

8.0 RECOMMENDATION

Detailed hydrogeological surveys aided by exploratory drilling carried out by Central Ground Water Board, Guwahati have revealed the existence of rich aquifer system down to the depth of 300 m bgl. The area consists of unconsolidated alluvial formation of Quaternary age laid down by River Brahmaputra and its tributaries.

Considering the hydrogeological set up and availability of huge ground water resources and the present stage of ground water draft, it can be concluded that there is an ample scope for the development of ground water through construction of different ground water structures in a planned way.

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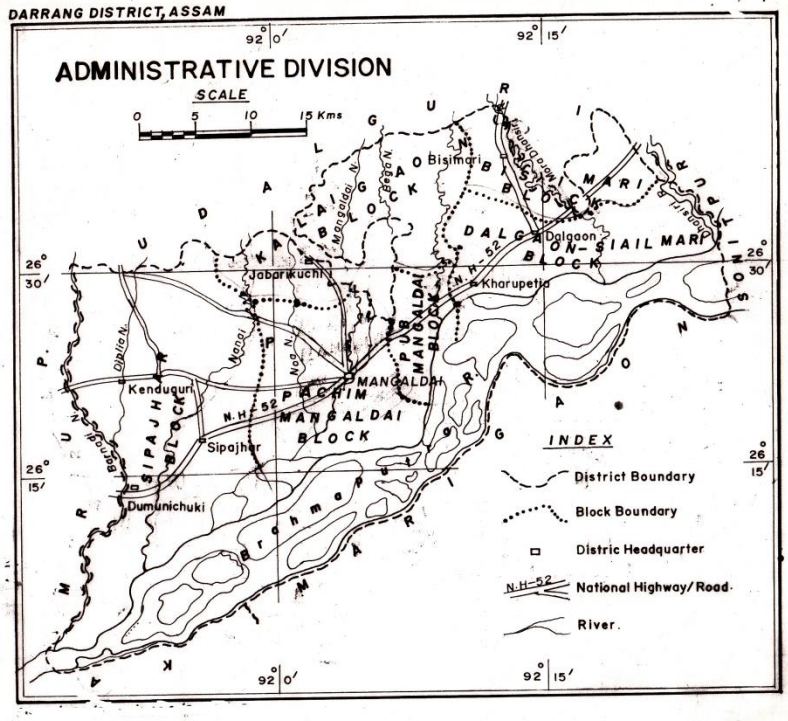
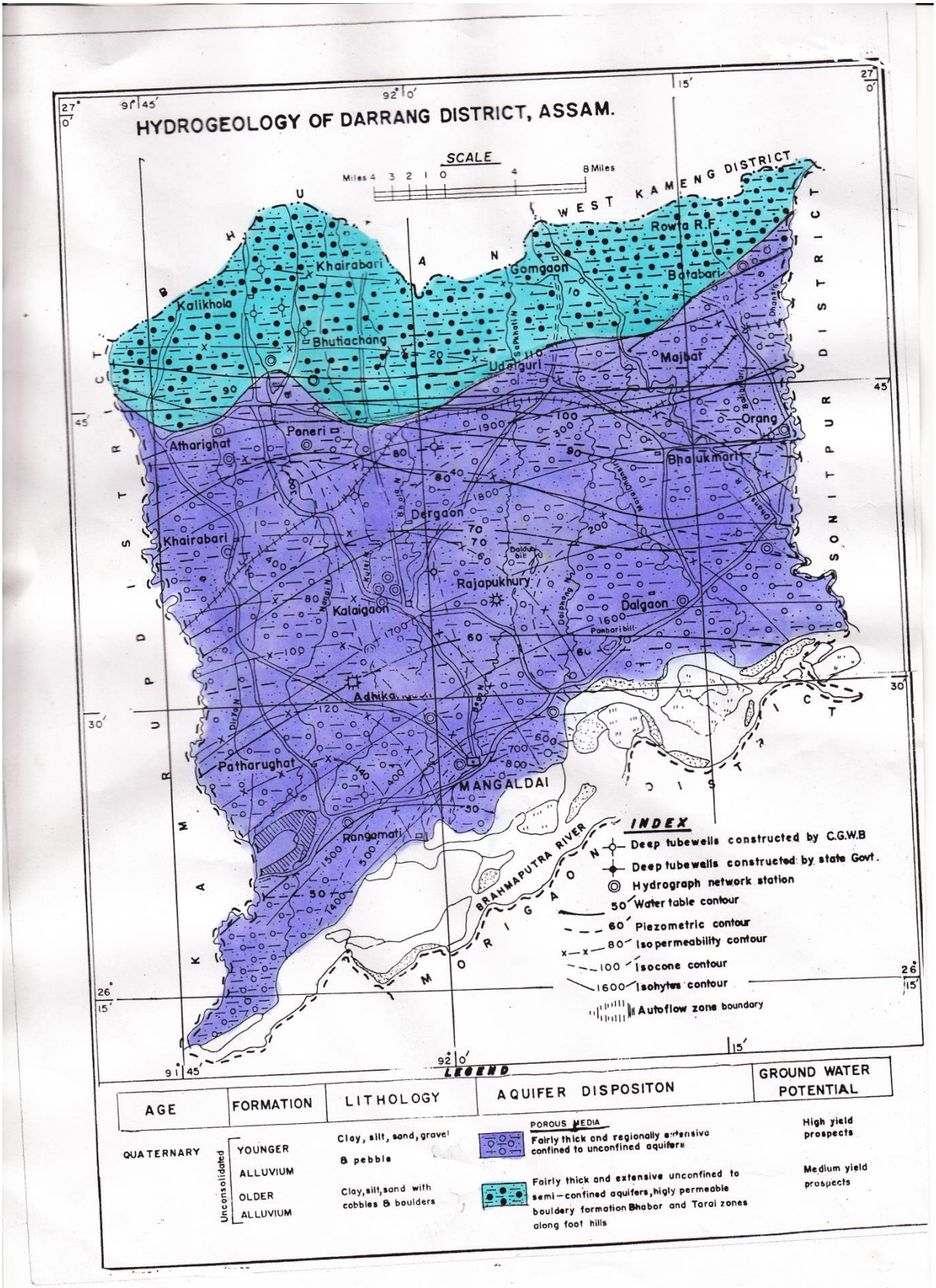
DARRANG DISTRICT, ASSAM




HYDROGEOLOGY OF DARRANG DISTRICT, ASSAM.
SCALE
Miles 4 3 2 1 0 4 8 Miles
BHUTAN
WEST KAMENG DISTRICT
SONITPUR DISTRICT
UPPER BRAHMAPUTRA VALLEY
BRAHMAPUTRA RIVER
Khairabari
Kalikhola
Bhutiachang
Gomgaon
Rowta R.F.
Batabari
Majbat
Udalguri
Orang
Bhaluknari
Paneri
Atharighat
Dergaon
Khairabari
Rajapukhury
Kalaigaon
Dalgaon
Adhikary
Patharughat
MANGALDAI
Rangamati
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Water table contour
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Isopermeability contour
Isocone contour
Isohytes contour
Autoflow zone boundary
LEGEND
AGE
FORMATION
LITHOLOGY
AQUIFER DISPOSITON
GROUND WATER POTENTIAL
QUATERNARY
Unconsolidated
YOUNGER ALLUVIUM
OLDER ALLUVIUM
Clay, silt, sand, gravel & pebble
Clay, silt, sand with cobbles & boulders
POROUS MEDIA
Fairly thick and regionally extensive confined to unconfined aquifers
Fairly thick and extensive unconfined to semi-confined aquifers, higly permeable bouldery formation Bhabor and Terai zones along foot hills
High yield prospects
Medium yield prospects