

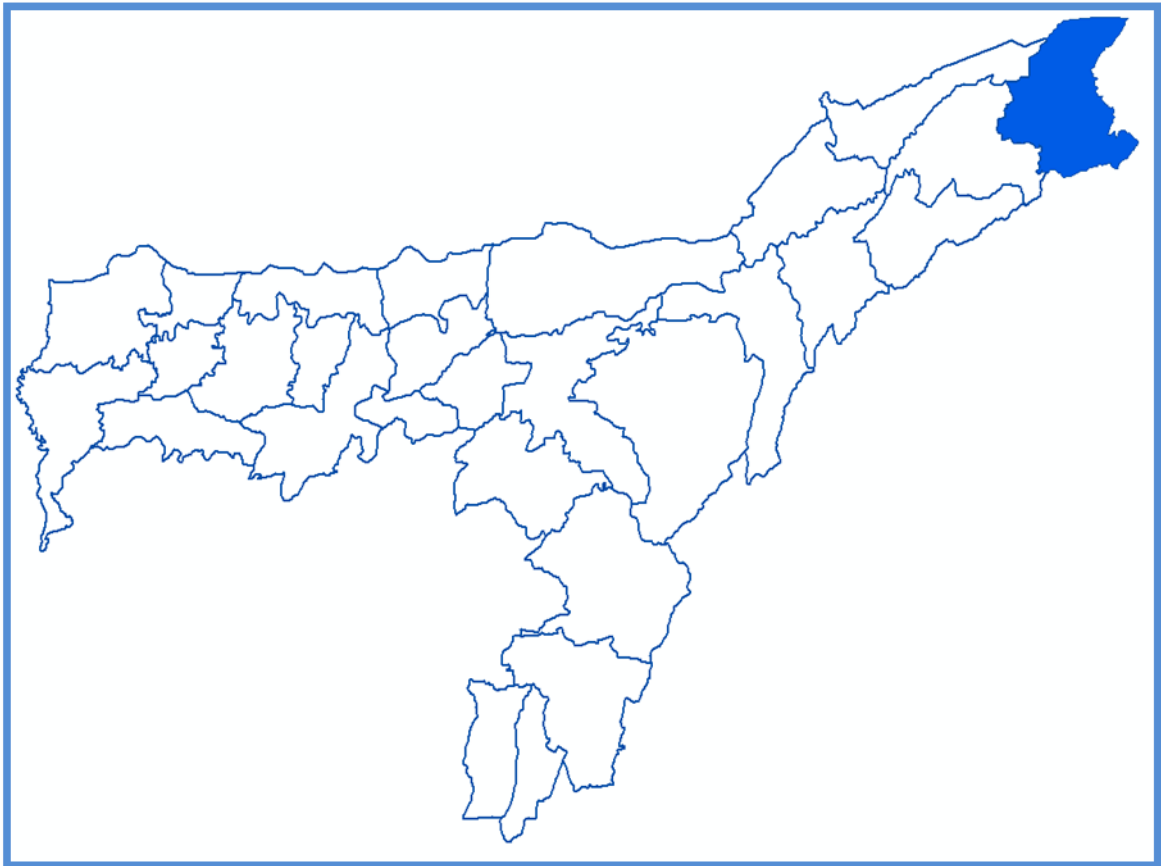
Technical Report Series: D

No:



# Ground Water Information Booklet

## Tinsukia District, Assam



**Central Ground Water Board**

**North Eastern Region**

**Ministry of Water Resources**

**GROUND WATER INFORMATION BOOKLET  
TINSUKIA DISTRICT, ASSAM**

**AT A GLANCE**

Sl.No.	Items	Statistics
<b>1.</b>	<b>GENERAL INFORMATION</b>	
	i) Geographical Divisions (Sq.Km.)	3,790
	ii) Administrative Divisions	
	Number of Block	7
	Number of Villages/Panchayats	1161/88
	iii) Population (as on 2009 Census)	1316948
	iv) Average Annual Rainfall (mm)	2,323
<b>2.</b>	<b>GEOMORPHOLOGY</b>	
	Major Physiographic Units	Younger and Older Alluvial Plain, Denudational hills
	Major Drainages	Brahmaputra, Burhi-Dihing, Dibru River
<b>3.</b>	<b>LAND USE (Sq.Km.)</b>	
	a) Forest Area	1,345.52
	b) Net area sown	999.45
	c) Cultivable area	1,452.33
<b>4.</b>	<b>MAJOR SOIL TYPES</b>	Newer and Older Alluvial Soil
<b>5.</b>	<b>AREA UNDER PRINCIPAL CROPS(as on 2011) (in Sq.Km.)</b>	306.95
<b>6.</b>	<b>IRRIGATED BY DIFFERENT SOURCES (in ha) (Areas and Numbers of Structures) March 2011</b>	
	Dug Wells	-
	Tube Wells/Bore Wells	1,118/27
	Tanks/Ponds	-
	Canals	-
	Other Sources Surface flow, lift	209
	Net Irrigated Area	-
	Gross Irrigated area	1,327
<b>7.</b>	<b>NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (as on 31.03.2013)</b>	
	No. of Dug Wells	17
	No. of Piezometers	-
<b>8.</b>	<b>PREDOMINANT GEOLOGICAL FORMATIONS</b>	Alluvial Plain, Tertiary Formation

<b>9</b>	<b>HYDROGEOLOGY</b>	
	Major Water bearing Formation	Alluvium
	(Pre-monsoon depth to water level during 2011)	2 - 4 m
	(Post -monsoon depth to water level during 2011)	2 – 3 m
	Long term water level trend in 10 years (2001-2011) in m/yr.	No significant rise/fall
<b>10</b>	<b>GROUND WATER EXPLORATION BY CGWB (as on 31.03.2013)</b>	
	No. of wells drilled (EW,OW,PZ,SH,Total)	EW-5, OW-1, Pz- Nil = 06 Nos.
	Depth of Range (m)	112 – 248
	Discharge (litres per second)	46 – 152
	Storativity (S)	$72 \times 10^{-4} - 91.5 \times 10^{-4}$
	Transmissivity ( $m^2/day$ )	760 – 19,582
<b>11</b>	<b>GROUND WATER QUALITY</b>	
	Presence of Chemical constituents more than permissible limit (e.g. EC, F,As,Fe)	Fe.
	Type of Water	Fresh
<b>12</b>	<b>DYNAMIC GROUND WATER RESOURCES (as on 2009) in MCM</b>	
	Annual Replenishable Ground Water Resources	1590.36
	Net Annual Ground Water Draft	166.97
	Projected demand for domestic and industrial uses up to 2025	42.57
	Stage of Ground Water Development	12%
<b>13</b>	<b>AWARENESS AND TRAINING ACTIVITY</b>	
	Mass Awareness Programmes organised	Nil
	Date	
	Place	
	No. of Participants	
	Water Management Training Programmes organised	Nil
	Date	
	Place	
	No. of Participants	
<b>14</b>	<b>EFFORTS OF ARTIFICIAL RECHARGE &amp; RAINWATER HARVESTING</b>	
	Projects completed by CGWB (No. & amount spent)	Nil
	Project under technical guidance of CGWB(No.)	Nil
<b>15</b>	<b>GROUND WATER CONTROL AND REGULATION</b>	
	Number of OE Blocks	Nil
	No. of Critical Blocks	Nil
	No. of Blocks notified	Nil
<b>16</b>	<b>MAJOR GROUND WATER PROBLEMS AND ISSUES</b>	Higher concentration of Iron in some localities

## **GROUND WATER INFORMATION BOOKLET TINSUKIA DISTRICT, ASSAM**

### **1.0 INTRODUCTION**

Tinsukia district of Assam is located in the easternmost part of the State lies between 27°14'03" and 27°48'05" North Latitudes and 95°13'30" and 96°00'00" East Longitudes. It covers an area of 3,790 sq. Km of Brahmaputra Basin. For administrative convenience, the district has been divided into 3 sub-divisions, 7 blocks and 88 Gram Panchayats.

The district is drained by mighty River Brahmaputra flowing NE-SW direction and its tributaries Dibru and Burhi-Dihing flowing from Naga-Patkai hill range in the south. All the rivers are ephemeral in nature and carry huge quantities of water and sediment during rainy season and cause submergence of low lying areas.

The irrigation facilities have been mostly confined to a few river lift and flow schemes. However, farmers accustomed with single rainfed paddy crop have now slowly switched over to multiple cropping practices by utilising ground water from shallow tube wells.

The detailed hydrogeological surveys aided by exploratory drilling have been carried out in the district by Central Ground Water Board. In addition, C.G.W.B. is monitoring Ground Water Monitoring Stations and ground water has been assessed for future planning and development. A number of investigations for the feasibility of construction of tube well have been carried out for various agencies and also providing required assistance to State Government as and when required.

## **2.0 RAINFALL AND CLIMATE**

The area experiences sub-tropical humid climate where winter temperature goes up to 37° C. Humidity is also more than 90 percent during rainy season.

The area is endowed with high rainfall during all the months in a year. The South West monsoon sets in the month of June and lasts up to September. Out of 2323 mm normal annual rainfall, about 65 percent rain is received from monsoon.

## **3.0 GEOMORPHOLOGY AND SOIL TYPE**

Physiographically the area is characterised by Brahmaputra plains and hills in the southern part, with gentle slope towards north-west. The distinguishable geomorphic units are as follows :

- (a) Flood plain
- (b) Younger and older alluvium plain
- (c) Structural hill

The soil in the area may be grouped into three broad categories depending upon the origin and occurrence. These are given below :

- (a) Newer alluvial Soil : Flood plain areas of River Brahmaputra and the tributaries in the northern part are characterised by light grey clay with sand and silt.
- (b) Older alluvial Soil : It occurs mainly in the central part with limonite yellow to reddish yellow clay.
- (c) Soil cover in forest and hilly areas : It is deep reddish in colour and occurs over the older geological formation in the southern most part of the district.

## 4.0 GROUND WATER SCENARIO

### 4.1 Hydrogeology

The district can be sub-divided into two broad hydrogeological Units (1) Tertiary Group of Semi-consolidated rocks (2) Quaternary alluvium of Unconsolidated sediments.

Tertiary group of sedimentary rocks are confined to the southern most part of the area where ground water occurs in the shallow weathered zone and this may be developed through large diameter open wells. Ground water occurs in deeper aquifer consisting of Tipam sandstone and in boulders and gravel beds of Dihing group which are suitable for development through deep tube wells.

Alluvial plain covers major part of the district. Ground water occurs in regionally extensive aquifers down to explored depth of 250 m with a very good yield prospect. The aquifers are consisting of sands of various grades and are suitable for both shallow and deep tube wells. Ground water rests at shallow depth and in major part of the district, depth to water level varies from 2 to 5 m bgl during pre-monsoon period and from 1.68 to 4.5 m bgl during post monsoon period. The long term water level trend study shows no significant change of water level in the last 10 years.

The shallow tube wells tapping aquifers within 50 m depth are capable of yielding 20 – 50 m<sup>3</sup>/hr at drawdown of less than 3 m. Medium to heavy duty tube wells constructed down to 100 – 150 m depth tapping 25 – 30 m of granular zones are yielding 50 – 100 m<sup>3</sup>/hr. The summarised results of the exploratory wells constructed by C.G.W.B. in the district are shown in the table – 1.

**Table – 1 Hydrogeological data of Exploratory Wells constructed by C.G.W.B. in Tinsukia district, Assam**

Year of construction	Location	Depth drilled (m)	Aquifer zones tapped (m)	Swl (m bgl)	Discharge m <sup>3</sup> /hr DD (m)	Transmissivity m <sup>2</sup> /day	Hydraulic Conductivity (m/d)	Specific capacity (lpm/m)	Storage Co-efficient (S)	Geology	Sub Basin Sub-basin
1	2	3	4	5	6	7	8	9	10	11	12
1988-89	Hapjan EW=OW 27°29'53" 95°25'45"	<u>248.27</u> 169	36-42, 77-86, 93-99, 104-110, 140-149, 160-166	3.75	<u>108.02</u> 2.90	3248	77.33	620.80	9.54 x 10-4	Alluvium sand fine to coarse, gravel, pebble	Buridihing Buridihing
1990-91	Margherita EW=OW 27°17'29" 95°43'20"	<u>112.43</u> 51.5	30-36, 39-48	2.68	<u>150</u> 1.192	760.54	50.70	2097.32	-	-do-	-do-
1990-91	Philobari EW=OW 27°30'089" 95°40'05"	<u>170.6</u> 140	38-56, 98-108, 128-137	3.15	<u>151.6</u> 2.91	8813.46	89.62	868.27	7.2 x 10.4	-do-	<u>Dibru</u> Dibru
1990-91	Digboi Pz 27°24'10" 95°39'42"	<u>70.95</u> 48.5	35-39, 44.5-46.5	11.02	35	-	-	-	-	-do-	Buridihing Buridihing
1990-91	Dangori Pz EW-OW 27°34'03" 95°42'48"	<u>50.74</u> 36.5	29-35	3.02	29.28	-	-	-	-	-do-	<u>Dibru</u> Dibru
1990-91	Kakopathar Pz 27°29'54" 95°39'14"	<u>53.68</u> 49	30-34, 45-47	4.23	29.28	-	-	-	-	-do-	-do-
1990-91	Hapjan Pz 27°29'54" 94°25'55"	<u>50.09</u> 35	27-33	3.53	22.30	-	-	-	-	-do-	Buridihing Buridihing

1	2	3	4	5	6	7	8	9	10	11	12
1989-99	Lunpuria I EW 95°16'00" 27°16'00"	<u>206</u> 196.5	60-81, 89-85, 112-118, 132-138, 141-155, 178-184, 187-194	-	-	-	-	-	-		
1999-00	Lunpuria II EW 127° 29°00'95" 16'05"	<u>180</u> 156	70-82, 91-97, 101-115, 132-138, 14-153	1.48	<u>64.724</u> 4.84	19.582	391.66	222.73	-	-do-	<u>Dibru</u> Dibru
2001-02	New Settlement Digboi EW 27°24'00" 95°38'15"	<u>157.55</u> 120	33-42, 54-60, 72-78, 93-105, 11-117	6.0	46.33	-	-	-	-	-do-	<u>Dibru</u> Dibru
2001-02	Nazirating EW 27°28'47" 95°37'16"	<u>148.35</u> 136	48-56, 78-89, 93-97, 105-112, 116-133	1.08 m agl	17.04 Free flow	-	-	-	-	-do-	Buridihing Buridihing
2001-02	Golf Field Digboi EW+OW 27°41'45" 95°40'00"	<u>200.60</u> 140	48-52, 63-69, 79-89, 97-106, 133-137	-	-	-	-	-	-	-do-	-do-



## **4.2 Ground Water Resources**

The dynamic ground water resources are estimated based on the methodology adopted as per GEC 1997 following water level fluctuation and rainfall infiltration factor methods.

The annual dynamic ground water resources are estimated to be 159036 ha m, while the net annual ground water draft is 16697 ha m. The stage of ground water development is only 12% percent and the district is still under “safe” category.

The demand of ground water for domestic and industrial use projected till 2025 is estimated to be about 4257 ham and 125230 ham water is still available for future irrigation development.

## **4.3 Ground Water Quality**

To study the quality, ground water samples were collected from GEMSs and EWs of C.G.W.B. and analysed in the Chemical Laboratory of CGWB, NER, Guwahati. The interpretation of the results of the analysis shows that ground water of the district is fresh and suitable for both domestic and irrigation purposes except higher contents of iron in some places, which requires treatment before being used for drinking purposes.

## **4.4 Status of Ground Water Development**

Ground Water development is at low key at Present. Ground water draft for irrigation purpose is 26 mcm against the vast annual dynamic resources of 1107 mcm. The net annual dynamic resources for future irrigation development are estimated to be 940 mcm.

## **5.0 GROUND WATER MANAGEMENT STRATEGY**

Thick and extensive alluvial deposits with rich aquifer system covering major part of the district are suitable for ground water development through open wells, shallow tube well and deep tube wells. For drinking and other requirements of individual households, where limited quantities of water is required, open wells and filter point wells are feasible almost in all parts of the district. Ring wells of 0.80 m to 1.20 m diameter to depth of 5 to 10 m bgl are likely to hold sufficient quantities of water to meet the daily requirement. Filter point wells to depth of about 15 to 20 m bgl are also suitable for extraction of ground water for domestic uses.

For agricultural purpose, shallow tube wells may be constructed in the areas occupied by alluvial formation. A number of shallow tube wells constructed by State Agriculture Department and the performance of the tube wells shows that tube wells constructed to depth of about 30-40 m tapping 9-15 m of granular zones giving discharge of about 600 lpm. Based on the nature of sub-surface geology, a shallow tube well of 30 to 50 m depth, tapping about 10-15 m granular zones expected to yield more than 30 m<sup>3</sup>/hr. 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 RECOMMENDATIONS**

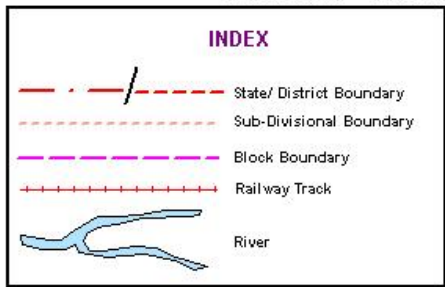
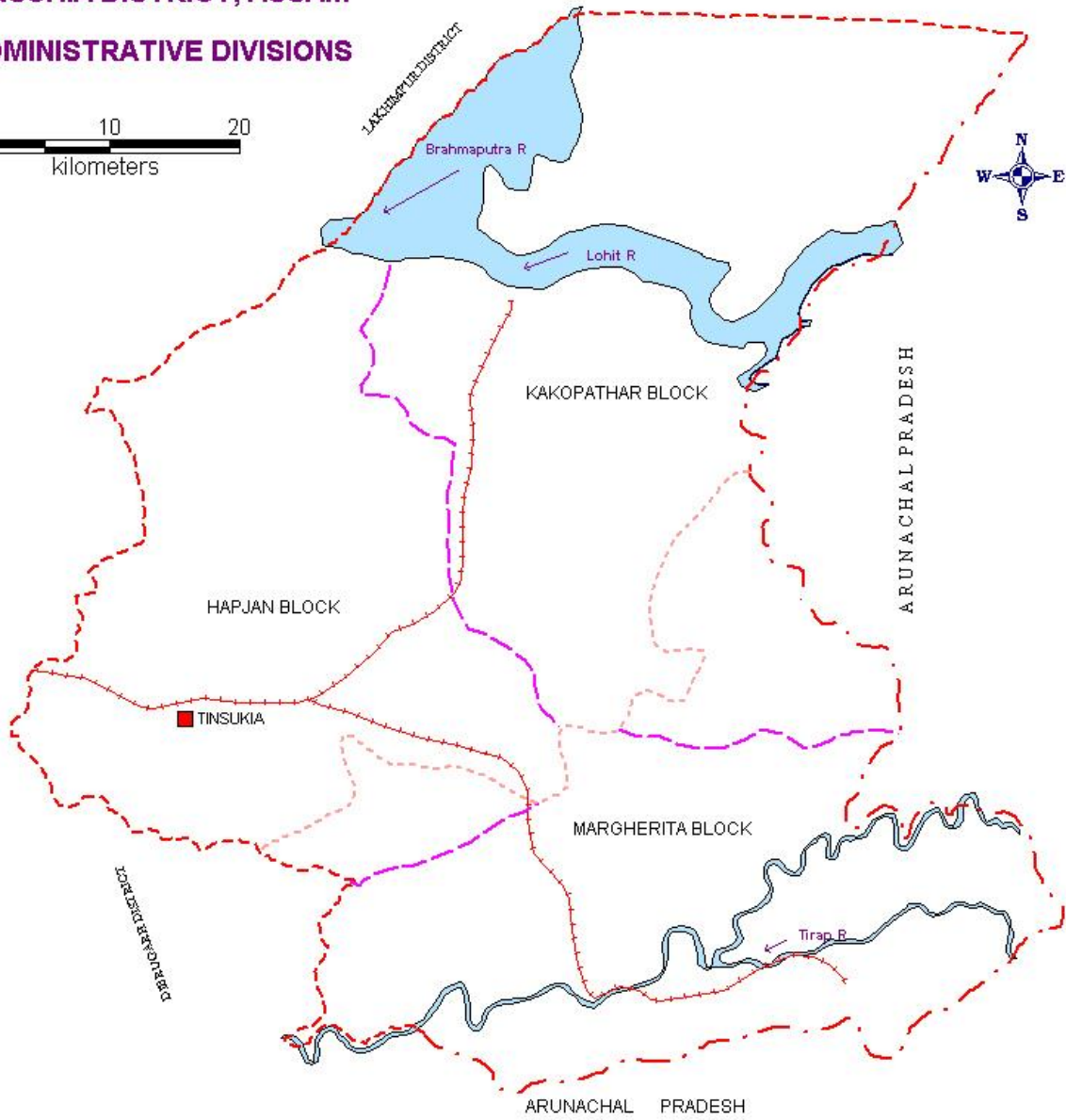
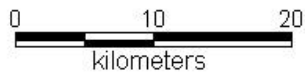
Detailed hydrogeological surveys aided by exploratory drilling carried out by Central Ground Water Board have revealed the existence and persistence of rich aquifer system down to explored depth of 250 m. The major part of the area of the district consists of unconsolidated alluvial formation of Quaternary age and a small part by Semi-consolidated formation of Upper Tertiary age.

The Hydrogeological set up and availability of huge ground water resources indicate that there is much scope for the development of ground water through construction of shallow tube wells for irrigation purposes in a planned way.

\*\*\*

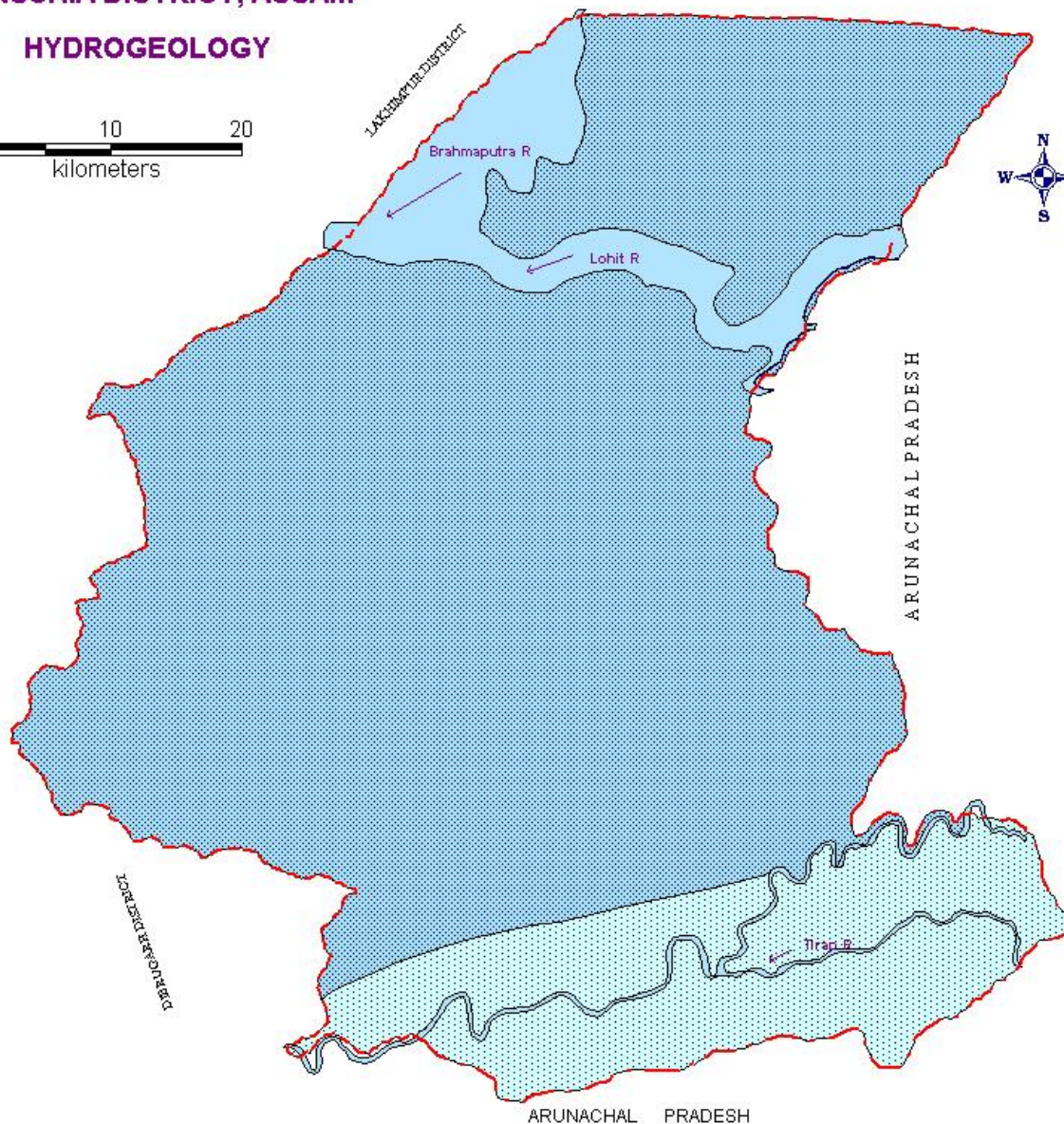
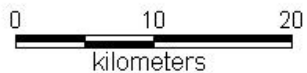
# TINSUKIA DISTRICT, ASSAM

## ADMINISTRATIVE DIVISIONS



# TINSUKIA DISTRICT, ASSAM

## HYDROGEOLOGY



LEGEND			
MAP UNIT	AGE	LITHOLOGY	GROUND WATER PROSPECT
	Quaternary & Upper Tertiary	Recent Alluvium, clay, silt, sand, gravel, pebbles & calcareous concretion	Moderate to high yield, 50-150m <sup>3</sup> /hr with drawdown within 8mbgl
	Tertiary	Siltstone, claystone, grit, sandstone, shale, conglomerate	Moderate yield prospect, 50-150m <sup>3</sup> /hr with drawdown within 16mbgl