



Ground Water Information Booklet Golaghat District, Assam



North Eastern Region
Ministry of Water Resources
Guwahati
August 2013

**.GROUND WATER INFORMATION BOOKLET
GOLAGHAT DISTRICT, ASSAM**

DISTRICT AT AGLANCE

Sl No	Items	Statistics
1	GENERAL INFORMATION i) Geographical Area (in sq.km) ii) Population iii) Average Annual Rainfall (mm)	3,502 10,58,674 2,118.6
2	GEOMORPHOLOGY i) Major physiographic units ii) Major drainages	Brahmaputra plane, marshy land and low altitude structural hills in the extreme south. Brahmaputra River and Dhansiri, Galabil, Desoi, Kakodanga Rivers
3	LAND USE (sq.km) i) Forest area ii) Net area sown iii) Total cropped area iv) Area sown more than once	1,56,905 1,19,046 1,84,497 65,451
4	MAJOR SOIL TYPES	Alluvial and flood plain soils
5	AREA UNDER PRINCIPAL CROPS as on 2006(sq. km)	558.76
6	IRRIGATION BY DIFFERENT SOURCES (sq.km.)	41.49
7	NUMBERS OF GROUND WATER MONITORING STATIONS OF CGWB (as on March 2013).	11
8	PREDOMINANT GEOLOGICAL FORMATIONS	Quaternary formation followed by Tertiary/Pre-Cambrian deposit
9	HYDROGEOLOGY i) Major water bearing formations ii) Pre-monsoon water level during 2007 iii) Post monsoon water level during 2007 iv) Long term water level trend in 10 years(1998-2007) in m/year	Vast alluvial formation of river borne deposit 3.8 -7.96 m bgl 3.31 -6.89 m bgl Rising
10	GROUND WATER EXPLORATION BY CGWB (as on 28.02.2013). i) No of wells drilled ii) Depth range in meters iii) Discharge in lps iv) Transmissivity(m ² /day)	12 (8 EW, 3 OW, 1 PZ) 100 -305 1.33 – 60.00 415-5,041

11	GROUND WATER QUALITY i) Presence of chemical constituents more than permissible limit (mg/l)(i.e.,EC,F,Fe,As)	Fe : 0.10 – 4.60 EC : 56.00 – 820.00
12	DYANMIC GROUND WATER RESOURCES (2009) in mcm. i) Annual replenishable ground water resources ii) Net annual ground water draft iii) Projected demand for domestic and industrial use up to 2025 iv) Stage of ground water development	1462.49 221.43 31.39 17%
13	AWARENESS AND TRAINING ACTIVITY i) Mass awareness programmes organized ii) Date iii) Place	Nil
14	EFFORTS OF ARTIFICIAL RECHARGE AND RAINWATER HARVESTING i) Projects completed by CGWB(no and amount spent) ii) Projects under technical guidance of CGWB(numbers)	Nil
15	GROUND WATER CONTROL AND REGULATION i) Numbers of OE blocks ii) Numbers of critical blocks iii) Numbers of blocks notified	Nil Nil Nil
16	MAJOR GROUND WATER PROBLEMS AND ISSUES	Not emerged so far.

GROUND WATER INFORMATION BOOKLET

GOLAGHAT DISTRICT, ASSAM

1.0 Introduction

Golaghat district of Assam bifurcated from old Jorhat district form a part of the vast alluvial plain of Assam and covers an area of 3,502 sq. km. The district is bounded on the North by the River Brahmaputra, on the South by the Nagaland state, on the East by Jorhat and in the West by Karbi-Anglong and Nagaon districts. The district with its Headquarters at Golaghat has three sub-divisions, eight development blocks and 1,086 villages. The district can be approached by road, rail.

As per 2001 census, the total population of the district is 10,58,674 out of which, rural population is 960892 and urban population is 97782.

2.0 Climate and rainfall

The district enjoys sub-tropical humid climate. Average annual rainfall in the district is 2,012 mm. About 60 to 65% of the annual precipitation is received during south-west monsoon from June to September. The pattern of rainfall varies in the district, from south to north, the intensity of rainfall increases and the maximum rainfall is recorded in the north eastern parts of the district. Annual average temperature of the district during winter period varies from 6 to 14⁰C and during summer, it varies from 29 to 36⁰C .The relative humidity varies from 93 to 95% during morning hours and during afternoon hours it varies from 53 to 75%.

3.0 Geomorphology and drainage

3.1 Geomorphology

Physiographically, the district shows a monotonous plain topography towards north and southeast, while the southwestern part of the area represents an undulating topography.

The general elevation of the elevated area is around 100 meters above Mean Sea Level(MSL) and low lying areas show altitude about 80 m above MSL. Maximum height of about 128 m above MSL is observed in the southern parts of the district, where it merges with the hills of the Nagaland as well as Karbi-Anglong district of Assam. The slope of the district is towards north east from south.

3.2 Drainage

The River Brahmaputra flowing in east-west direction in the extreme northern parts of the district and its tributaries flowing in northerly direction, control the entire drainage system of the district and plays an important role in the ground water occurrence and control of the district. Important Rivers of the district are Dhansiri and Dayang. These rivers have meandering courses with abandoned channels in the form of bils and ox-bow lakes along their courses.

4.0 Land use and soil type

Land use pattern of the district as per Statistical Hand Book of Assam, 2006, reveals that about 40% of the total district area is covered by forest, 18% by uncultivable land, 2% by fallow land, 40% by total cropped area. Principal crop grown in the district is paddy followed by pulses, mustard, sugarcane, potato, vegetables and jute. Tea plantation also is seen in the highlands covered by older alluvium.

Two important soil groups are seen in the district. These are (i) deep reddish coloured soil developed over older geological formation and (ii) light grey to dark grey coloured soil covering the major parts of the district. Low nitrogen, low phosphate, medium to high potash, acidic characters of the soil are representative of the soil cover found in the hills. In the plain areas, the other type of the soil covers is found to be feebly alkaline.

5.0 Ground Water Scenario

5.1 Hydrogeology

Geologically the district is underlain by Quaternary formation followed by Archaean group of rocks. Quaternary formation comprises younger and older alluvial deposits

consisting of different grades of sand, pebbles, cobbles, gravel and clay in the area. Major parts in the north of NH-37 passing in the east-west direction in the district show younger alluvial deposits. The older alluvial deposits occur mainly towards southern parts of the NH-37. The hard crystalline of Archaean age covers extreme southern boundary of the district merging with Karbi-Anglong district. The rock types are granite, granite gneiss and quartzite.

Sub-surface geology as evidenced from available data infers that the potential aquifer pertaining to Quaternary formation exist down to the explored depth of 300 m. The cumulative thickness of aquifer zones has the tendency to increase towards the north and in the southeastern parts, the thickness reverses considerably.

Hydrogeologically, the district is proved to be very potential. Ground water occurs under water table to confined conditions. Depth to water level in major parts of the district varies from 2 to 5 m. In the extreme southern and southwestern parts close to hills, the water level is found to be deeper and generally rests within 5 to 7 m. The movement of ground water is from south to north. The water level trend shows that there is gradual rising of water level in the district.

Central Ground Water Board has so far constructed fourteen exploratory tube wells in the district. The details of the deep tube wells are presented in Table 1. Hydrogeological information collected from these wells indicates that three to nine prolific aquifer system exist in the district. Deep tube wells constructed down to maximum depth of 250 m give variable discharge from 26 to 216 m³/hr for draw down within 13 m. Transmissivity and permeability value varies from 415 to 500 m²/d and 7 to 82 m/day respectively.

Table-1 Details of deep tube wells in Golaghat district

Sl. No	Location	Depth drilled/constructed	Depth range of aquifer	SWL (m bgl)	Discharge in m ³ /Drawdown	Transmissivity (m ² /day)	Permeability (m/day)	Storativity	Aquifer formation
1	Chatiagaon	305.55/55	31.00-52.00	4.61	36.3/4.7	734	34.95	8x10 ⁻⁴	alluvium
2	Kamargaon	212.20/204.00	77-80 84-90 107-112 115-124 136-148 151-156 169-177 185-190 193-201	3.2	206/6.3	5041	83	1.3x10 ⁻³	do

3	Dergaon(pz)	100/50	48-49	-	-	-	-	-	do
4	Rajabahr	300/151	33-81 116-126 142-148	3.43	206/4.6	4416	69	-	do
5	Golaghat(pz)	110/50	30-40	4.5	-	-	-	-	do
6	Boruagaon(sh)	250	-	-	-	-	-	-	do
7	Socialist Pathar(sh)	250	-	-	-	-	-	-	do
8	Ghandkarai	217/125	36-42 85-94 116-122	6.46	72/13.45	415.3	7.8	1.6x10 ⁻⁴	do
9	Bahikhowa	200/154	38-47 59-62 65-68 70-76 84-93 97-100 139-151	3.08	32/1.34	5179	-	-	do
10	Padumani(pz)	133/114	71-74 105-111	0.50agl	216	-	-	-	do
11	Ghiladhari	251.35/229	79-82 113-119 165-171 182-194 220-226	0.7 agl	3.6	-	-	-	do
12	Panidihingia	200/170	41-49 55-70 85-95 101-110 122-137 149-167	3.27	26/0.6	-	-	-	do
13	Balijan(pz)	220/211	196-208	0.48	4.8	-	-	-	do
14	Naojan	205.10/151	79-85 120-126 142-148	8.6	86.28/10.	500	14.0	-	do

6.0 Ground Water Resources

Methodology adopted for ground water resource estimation of Golaghat District of Assam is as per GEC 1997 Report, i.e. Ground Water Level Fluctuation and Rainfall infiltration factor Method.

The net ground water availability estimated in the year 2009 is 1316.24. mcm. The existing gross ground water draft 22.43 mcm and the stages of development are 17% only.

Future provision for domestic and Industrial use is 31.39 mcm and for Irrigation use is 1087.34 mcm.

Assessment unit can be categorized into 4 categories as SAFE, SEMI-CRITICAL, CRITICAL, and OVER-EXPLOITED. In Golaghat district stage of ground water development is 17%, which shows under the SAFE category. As long-term water level trend does not show any major change so the whole district may be considered as SAFE.

CHART OF GROUND WATER RESOURCE ESTIMATION

Net Ground Water Availability	= 1316.24 mcm
Gross Ground Water Draft	= 221.43 mcm
Stage of Ground Water Development	= 17%
Future provision for Domestic & Industrial Use	= 31.39 mcm
Future Provision for Irrigation Use	= 1087.34 mcm

7.0 Ground Water Quality

The analytical report of water samples collected from Ground Water Monitoring Stations as well as Exploratory Wells reveals that by and large, ground water is suitable for domestic, irrigation and industrial purposes. Ground water from shallow aquifer is slightly alkaline whereas ground water from deeper aquifer is slightly acidic in nature. The high concentration of iron beyond permissible limit in ground water in some areas only poses problem, which can be lowered by aeration and filtration method.

8.0 Status of ground water development

The district, in general, is potential from ground water point of view as revealed by the studies carried out by CGWB. The north eastern parts are more potential than that of the other parts of the district. In the southern and north-western parts, ground water potentiality decreases due to presence of semi-consolidated and consolidated formations of Pre-Cambrian and Tertiary age. Exploratory wells constructed down to the depth of 300 m show the presence of two to six prolific aquifer systems in the area. No major and medium irrigation

schemes are implemented so far in the district, however minor irrigation through shallow tube wells have so far created a potential of 16, 273 ha as on 31.3.2005.

9.0 Ground Water Management Strategy

Any kind of ground water abstraction structures can be constructed right from dug well to deep tube wells and bore wells in the hard massive adjacent to north western parts of Karbi-Anglong district. Shallow tube wells constructed by State Authorities down to variable depth range of 30 to 50 m can yield 30 to 35 m³/hr and can irrigate 2 to 2.5 ha of land. An auto flow zone covering south central parts of the district is also identified, where piezometric level of ground water rests within 1 m, which can be developed free of cost for irrigation and other purposes. The yield of deep tube wells varies from place to place depending on availability of potential aquifers. Towards the River Brahmaputra, the discharge factor increases to the tune of 200 m³/hr for variable draw down within 8 m.

10.0 Ground Water Related Issues and Problems

Ground water related problems in the district have not been identified so far. As the development of ground water is less than 21% as on March 2004, the district shows rising trend of ground water level in the northern parts. As such, development of ground water by way of constructing shallow tube wells for irrigation and as well as drinking water by the state Organization is need of the hour. Iron concentration above permissible limit poses problem, which can be lowered by filtration and as well as aeration method.

11.0 Recommendations

The district possesses promising ground water potential to the tune of 1056.26 mcm and net resource of 950.64 mcm. This huge resource can be developed for green revolution and other purposes. Based on the irrigation water availability, additional shallow tube well to the tune of 29,588 can be constructed, which will be able to generate irrigation potential of 739.70 sq. km. The district is having a total cropped area of 1,505.61 sq. km. From ground water alone, 89,200 ha may be irrigated. Conjunctive use of surface and ground water may be done for better ecological conditions in the district. The statistical handbook on Assam

reveals that up to March 2005, only 163 sq. km of land has been covered under assured irrigation, which clearly indicates that the irrigation practice in the district requires immediate attention for socio-economic upliftment of the district.

93° 30'

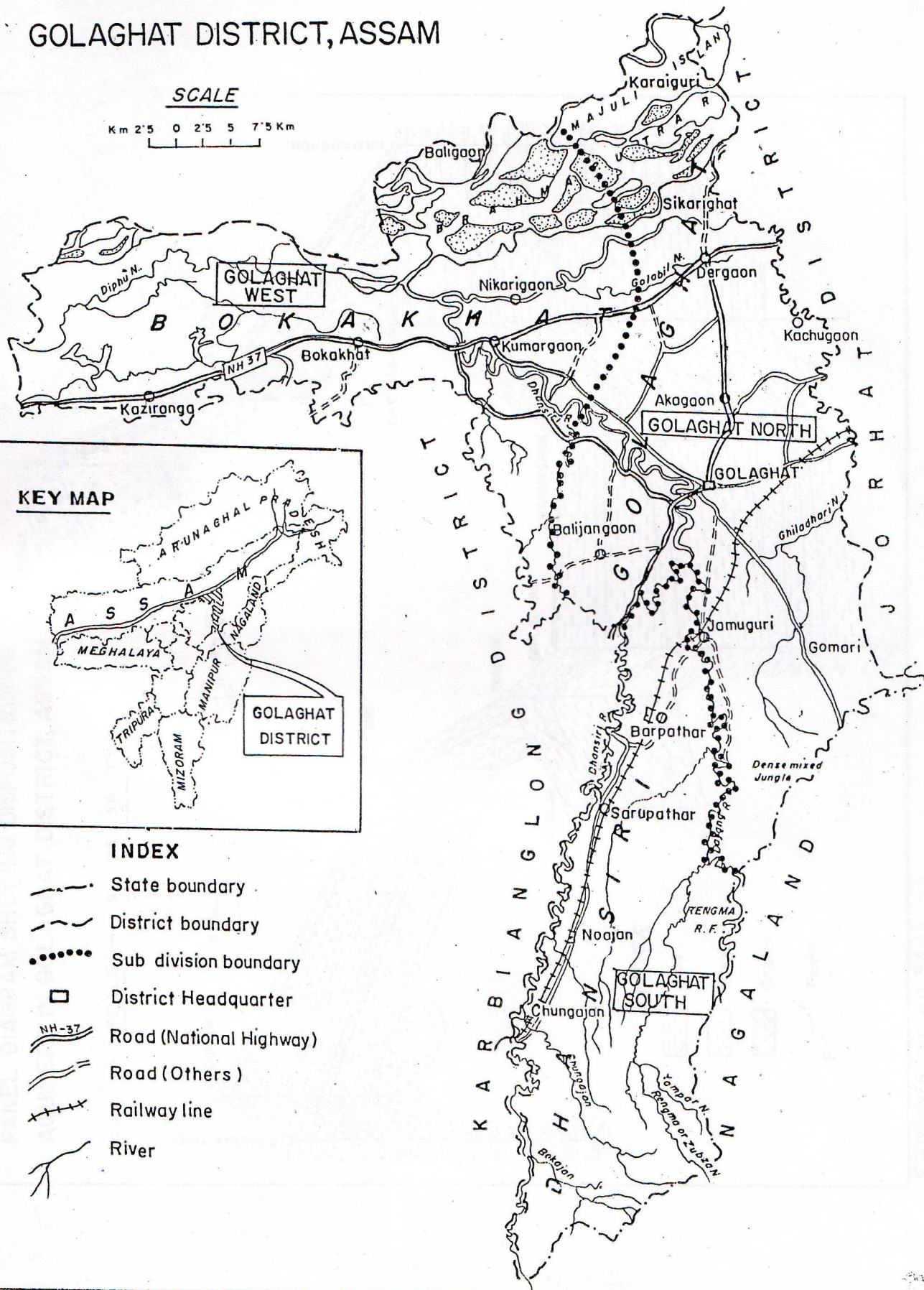
45'

94° 0'

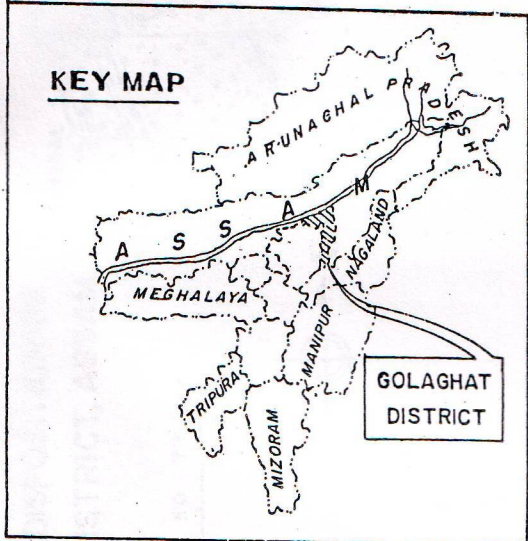
ADMINISTRATIVE DIVISIONS IN GOLAGHAT DISTRICT, ASSAM

SCALE

Km 2.5 0 2.5 5 7.5 Km



KEY MAP



INDEX

- State boundary
- District boundary
- Sub division boundary
- District Headquarter
- Road (National Highway)
- Road (Others)
- Railway line
- River

93° 30'

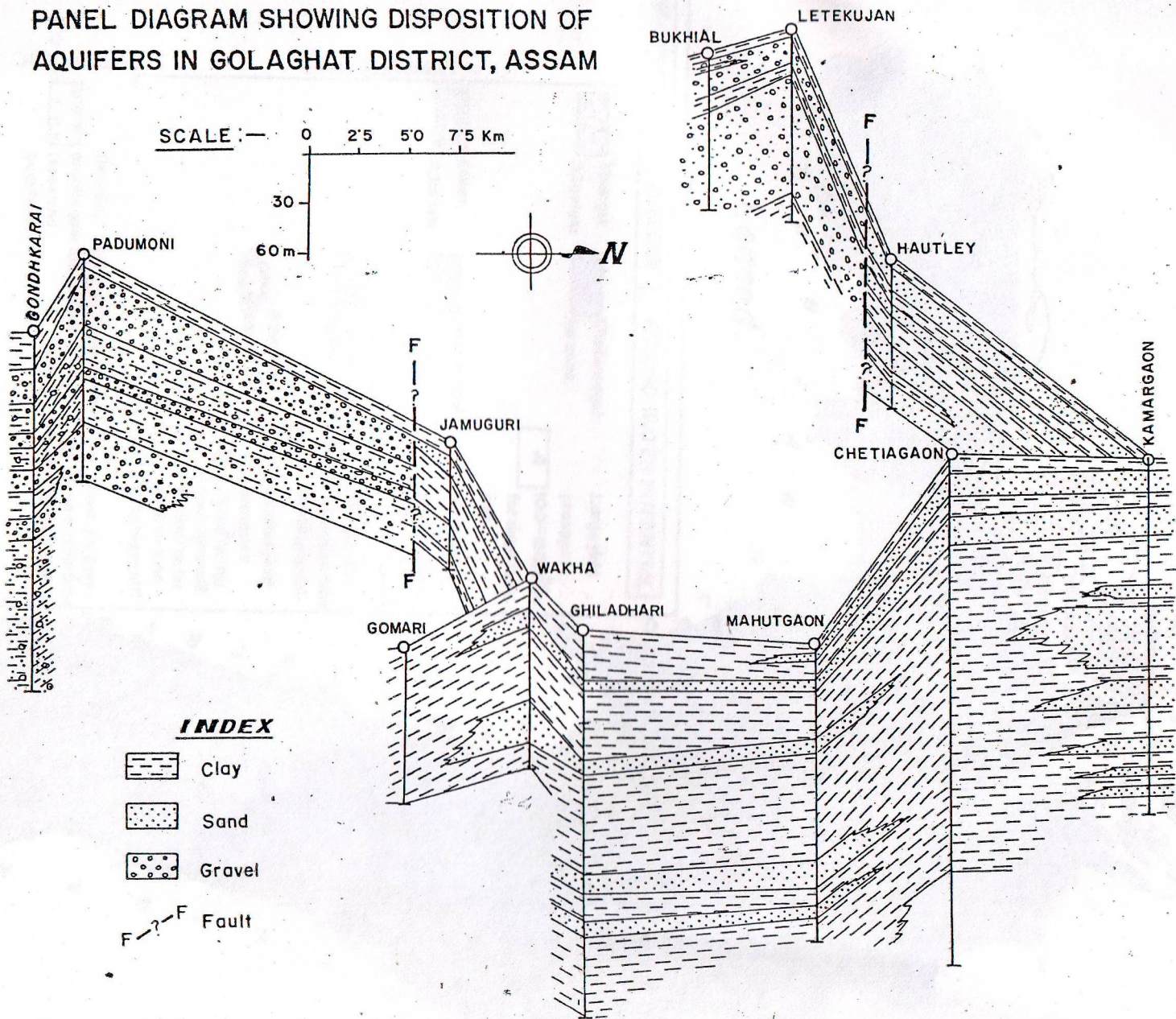
45'

94° 0'

PANEL DIAGRAM SHOWING DISPOSITION OF AQUIFERS IN GOLAGHAT DISTRICT, ASSAM

SCALE :— 0 2.5 5.0 7.5 Km

30
60 m



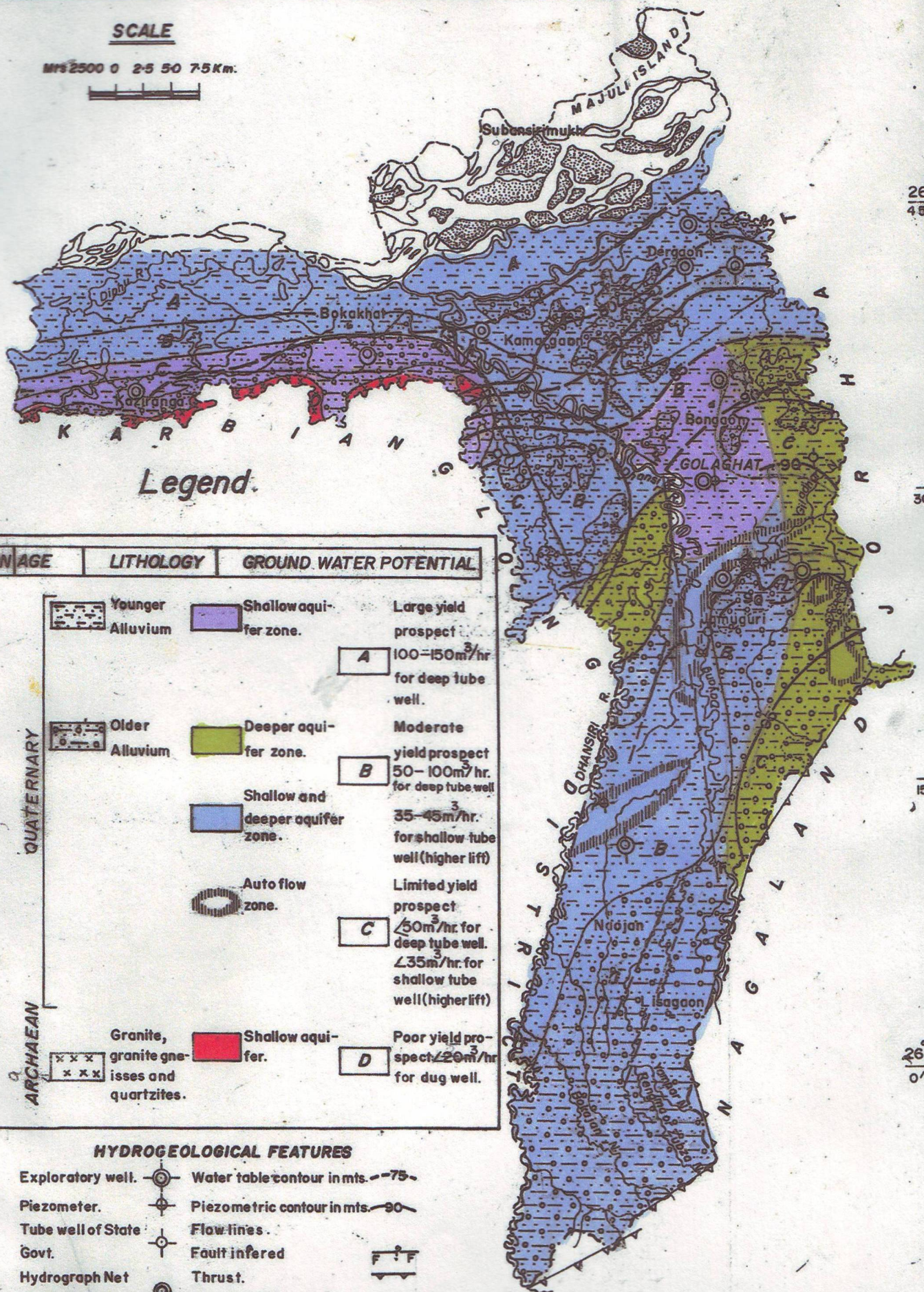
INDEX

- Clay
- Sand
- Gravel
- Fault

HYDROGEOLOGY IN GOLAGHAT DISTRICT, ASSAM

SCALE

MPS 2500 0 2.5 50 7.5 Km.



Legend.

FORMATION AGE	LITHOLOGY	GROUND WATER POTENTIAL
UN-CONSOLIDATED QUATERNARY	Younger Alluvium	Shallow aquifer zone. Large yield prospect. A 100-150m ³ /hr for deep tube well.
	Older Alluvium	Deeper aquifer zone. Moderate yield prospect. B 50-100m ³ /hr for deep tube well.
	Shallow and deeper aquifer zone.	35-45m ³ /hr. for shallow tube well (higher lift)
	Auto flow zone.	Limited yield prospect. C 50m ³ /hr. for deep tube well. 35m ³ /hr. for shallow tube well (higher lift)
CONSOLIDATED ARCHAIC	Granite, granite gneisses and quartzites.	Shallow aquifer. Poor yield prospect. D 20m ³ /hr for dug well.

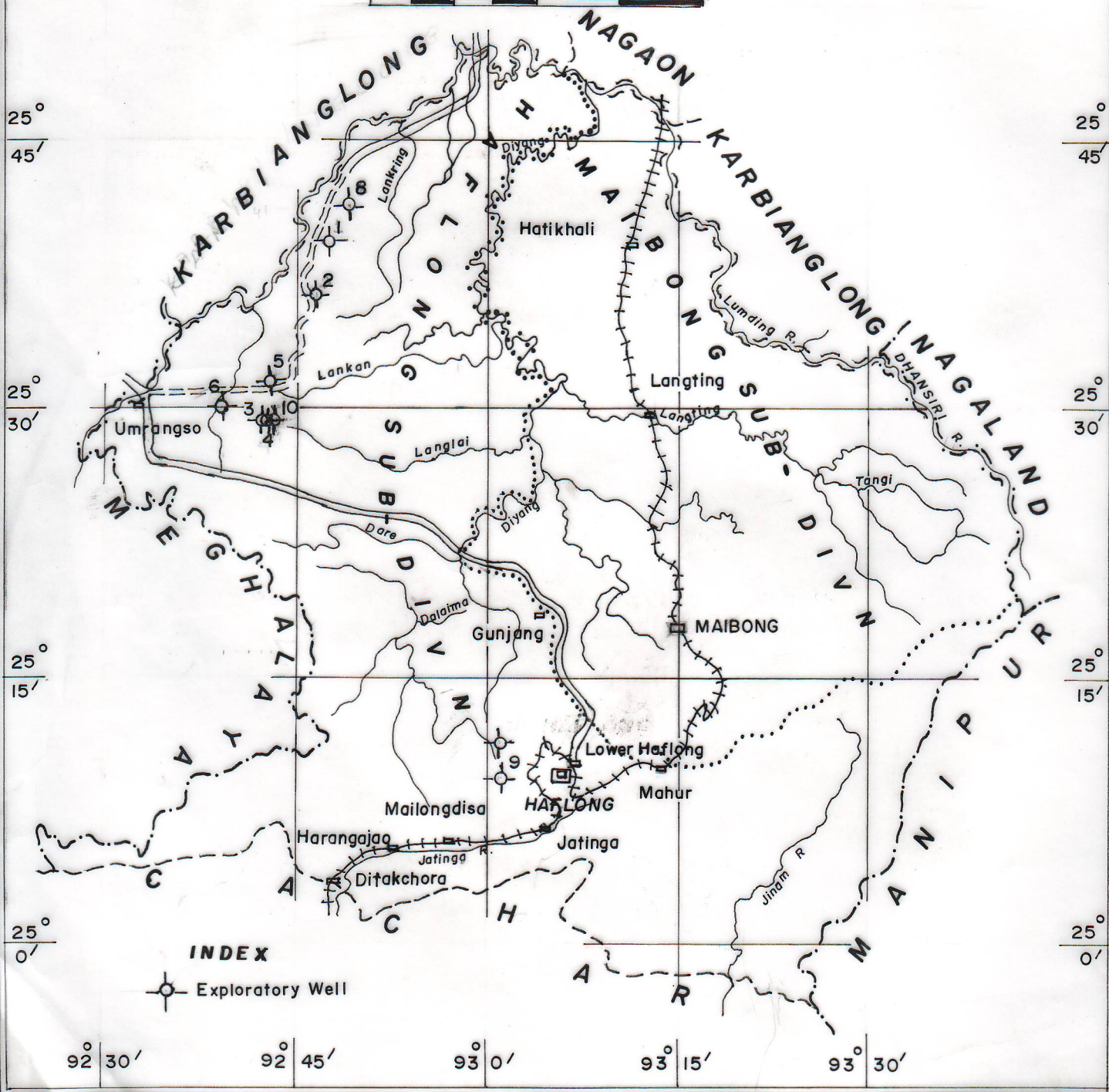
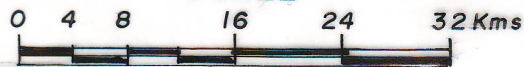
HYDROGEOLOGICAL FEATURES

- Exploratory well.
- Piezometer.
- Tube well of State Govt.
- Hydrograph Net work station.
- Water table contour in mts. -75-
- Piezometric contour in mts. -90-
- Flow lines.
- Fault inferred.
- Thrust.
- Lineament.

92° 30' 92° 45' 93° 0' 93° 15' 93° 30'

STATUS OF EXPLORATORY WELLS AT N.C. HILLS DISTRICT,

ASSAM
SCALE



INDEX

⊙ Exploratory Well

92° 30' 92° 45' 93° 0' 93° 15' 93° 30'