केंद्रीय भूमि जल बोर्ड

जल संसाधन, नदी विकास और गंगा संरक्षण मंत्रालय

भारत सरकार

Central Ground Water Board

Ministry of Water Resources, River Development and Ganga Rejuvenation

Government of India

AQUIFER MAPPING AND MANAGEMENT PLAN REPORT

Parts of Karbi Anglong District, Assam

उत्तरी पूर्वी क्षेत्र, गुवाहाटी

North Eastern Region, Guwahati

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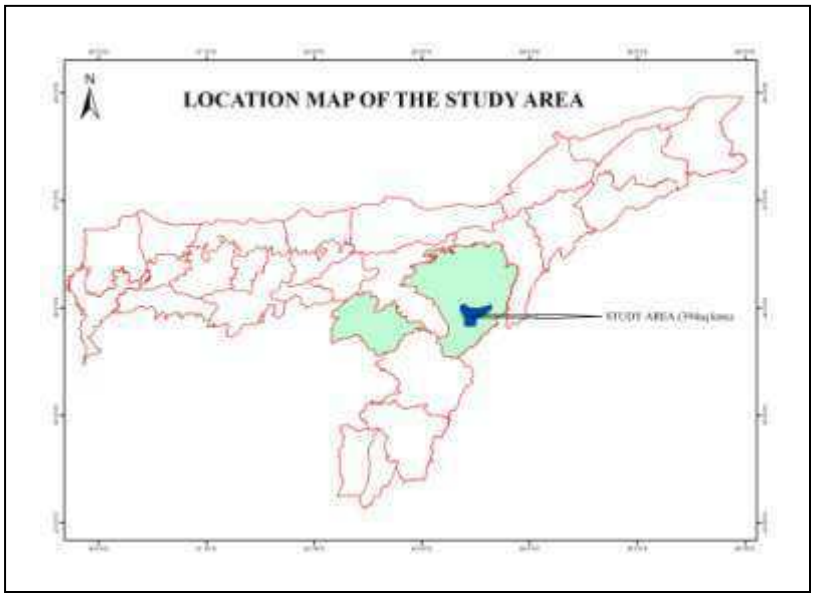
Govt. of India
Central Ground Water Board
Ministry of Water Resources, River Development & Ganga Rejuvenation

REPORT ON AQUIFER MAPPING AND MANAGEMENT IN PARTS OF LUMBAJAN AND BOKAJAN BLOCKS, KARBI ANGLONG DISTRICTS, ASSAM (AAP 2015-16)



North Eastern Region
Guwahati
June 2016

CONTENTS

ABBREVIATIONS

AAP	Annual Action Plan
BIS	Bureau of Indian Standards
BDL	Below detectable level
CGWB	Central Ground Water Board
DTW	depth to water table
EC	Electrical Conductivity
EW	Exploratory Well
Ha	hectare
ham	hectare meter
Km	kilometer
lps	liters per seconds
mbgl	meter below ground level
mcm	million cubic meter
m	meter
mm	millimeter
mg/l	milligram per litre
OW	Observation well
^{o}C	degree Celsius
PHED	Public Health Engineering Department
ppm	parts per million equivalents to mg/l
Pz	Piezometer
Qn	Quintal
sq. km	square kilometer
TDS	Total dissolved solids
VES	Vertical Electrical Sounding
WL	Water level

1. INTRODUCTION

As per Annual Action Plan, 2015-16 of Central Ground Water Board, North Eastern Region, Guwahati has covered an area 394 sq kms of Karbi Anglong district, Assam under National Aquifer Mapping Programme. The study area falls in parts of Lumbajan and Bokajan blocks of the district.

The study area falls mostly in the southern part of the Jamuna River. The main drainage systems in the area are the Diphu and Dillai rivers. The area falls under the Survey of India toposheets no. 83 G/5, 83 G/9 and 83 F/8 lying between North latitudes 25º50' & 26º03' and East longitudes 93º21' & 93º39'.

The total population of the Karbi-Anglong district is as per 2011 Census is 9,56,313, with 6,55,630 male and 6,04,789 females. The total population in Lumbajan block is 93,914 with 48,847 females and 45,067 males. Bokajan block has a total population of 1,44,917 with 69,997 females and 74,920 males.

The study area broadly is characterized by valley plain area except for very few low altitude hills representing an association of varied geological formations ranging in age from Archaean to Recent. The assemblages of different formations play an important role in controlling the occurrence, distribution and movement of ground water which is underlain by the Archaean Gneissic complex (inselbergs) and Quaternary Alluvial formations. The Archaean gneissic complex includes metamorphic complex of gneiss, schist, phyllite intruded by acid/basic intrusive. The North Western part of the study area is covered by Jamuna River

Geologically the area is underlain by Archean gneissic and granite comprising of minerals like **fluorite, biotite, apatite, hornblende, sillimanite, epidote, with younger pegmatite**. These rocks are overlain by Tertiary rocks. Semi consolidated formations of Tertiary age occupy the sothern portion of the area. Ground water mainly occurs under semi-confined to confined conditions. In general, the depth to water level vary from 1-8 m bgl. the ground water zones comprise of sand and clay. The production zones are found to occur upto 100m down.

There are six agro-climatic zones in the state – 1.North Bank plain zone 2. Upper Brahmaputra valley, 3. Central Brahmaputra valley, 4.Lower Brahmaputra valley, 5. Barak

Valley, 6. Hill zone. The study area falls under the Hill Zone. This zone has potential for agriculture and irrigation. The climate in the study area is moderate during the winter and it is hot during summer. Onset of monsoon occurs in the month of June and it continues till mid September. Heavy rainfall occurs during monsoon season. The average annual rainfall in the area varies from 1500 to 1800 mm. The climate of the Karbi-Anglong District is mostly humid with the average annual rainfall of 2550 mm.

2. DATA COLLECTION AND GENERATION

2.1 Depth to Water Level:-

A total of 16 key observation wells including the existing CGWB monitoring stations (Dug wells) were established in the study area covering parts of Lumbajan and Bokajan block. These key observation wells were monitored on a seasonal basis to study the water level and its behavior in the area.

2.2 Ground Water Exploration:-

Under aquifer mapping Central Ground water Board (C.G.W.B) four exploratory wells have been drilled in the study area covering Lumbajan and Bokajan blocks. This is to find the vertical and horizontal delineation of aquifer system and their hydrogeological properties.

2.3 Geophysical studies:-

Surface Geophysical studies were carried out to assess the feasibility of construction of exploratory tube well at selected sites in the study area and to get information on subsurface geology at particular places. Accordingly, surface geophysical studies were conducted during AAP 15-16.

2.4 Ground water quality:-

Pre-monsoon water samples from the key wells in Lumbajan and Bokajan blocks (AAP 2015-16) were collected and analysed in the Regional Laboratory of CGWB, NER. A total of 14 samples from the dug wells were collected and the results are given in Table no.04

3. DATA INTERPRETATION, INTEGRATION AND AQUIFER MAPPING

3.1 Depth to Water Level:-

A total of 16 key wells have been monitored in Lumbajan and Bokajan (AAP 15-16) during the aquifer mapping studies. It has been obseved that the water level during pre-monsoon ranges from 1.02 to 22.40 m bgl and during the post monsoon water level ranges from 0.75 to 16.80 m bgl . The maximum depth to water level during pre monsoon is of 22.41 m bgl at Diphu. In the study area seasonal fluctuation varies from 0.27 m at Borjan area to 9.15 m at Diphu area. The details of key wells is given in table no.1

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3.2 Ground Water Exploration:-

The explorationin Lumbajan block has revealed the presence of granular zones ranging in depth ranging between 45 m to 93 m. Based on the lithology of the exploratory wells drilled in the study area covering parts of Lumbajan block it has been percieved that a mono aquifer system exists in the area on a regional scale. This sandy aquifer comprising of medium to coarse sand has clay intercalations in places. Due to the presence of clay intercalations in some places more than one granular zones occur in the study area. The separation of two or more granular zones by the clay beds often leads to misinterpretation of the aquifers as a multiple aquifer system. However, these clay beds are mostly in lensoid shape and they pinches out within a short distance.

In the hard rock area in Bokajan block the exploration data reveals the presence of semi-confined to confined, moderate to deep aquifer system comprising of fractured hard rocks like shale and limestone. Potential fractures were encountered between a depth of 54 – 117 m bgl.

3.3 Geophysical studies:-

The surface geophysical studies were conducted during APP-2015-16. According to the results of interpretation of VES curves, correlation of the data with hydrogeological details of exploratory boreholes and taking into account the apparent resistivities following conclusions have been drawn in respect of Lumbajan block**.**

The top soil comprising top soil with clays / hard clays etc shows a resistivity in the range of 21 and 92 Ohm.The resistivity of the underlying layers below the top soil in the range from 16 to 184 Ohm m in general indicating the pesence of sandy formation intercalated with clays / hard clays etc. Comparatively high resistivity above 100 Ohm m is indicative of the hard clay/semi-consolidated or consolidated formation.

Due to unavailability of space and undulating topography in the study area limited space was available for resistivity surveys. Space for the current electrodes spread available was in the range of 120 and 200m. After the survey K, QH and KH type VES curves were obtained. The interpreted results of VES and inferences with respect to possible sub-surface geology are given in Table.No 4.

3.4 Aquifer Geometry:-

The main objective of the study is to delineate the horizontal and vertical disposition of aquifer as well as to study the aquifer character. In this connection 16 key wells including existing CGWB monitoring stations (Dug well) were monitored. Locations of the monitoring stations are shown in Figure No-9 & Table No 1. To know the aquifer disposition in the study area, exploratory wells data, VES data available with CGWB and were utilized. Four exploratory wells (EW) within a depth range of 68 to 104m.

Based on the lithology of the exploratory wells drilled in the study area covering parts of Lumbajan block it has been percieved that a mono aquifer system exists in the area on a regional scale. This sandy aquifer comprising of medium to coarse sand has clay intercalations in places. Due to the presence of clay intercalations in some places more than one granular zones have been found. The separation of two or more granular zones by the clay beds often leads to misinterpretation of the aquifers as a multiple aquifer system. However, these clay beds are mostly in lensoid shape and they pinches out within a short distance.

Thickness of the saturated zone varies from 17 to 33 m within a depth range of 104m.

In the hard rock area in Bokajan block the exploration data reveals the presence of semi-confined to confined, moderate to deep aquifer system comprising of fractured hard rocks like shale and limestone. Fractures were encountered between a depth of 54 – 117 m bgl. Three fracture zones were encountered at the Dillai Exploratory well. The first two occurr between the depth of 54 – 85 m and the third promising fracture zone was encountered below a depth of 110 m. During drilling the fracture zones are found to have discharge of 6.49 liters per second. The depth to water level in this aquifer system was at 5.30 m bgl.

3.5 Ground water quality:-

To find out the different chemical parameters water samples were collected from 14 dug wells and analysed in the Regional Laboratory of CGWB, NER. The samples were tested for 16 physico-chemical parameters like pH, total disolved solids (TDS), Electrical condctivity (EC), sodium, potassium, chloride, fluoride, nitrate, sulphate, total hardnes, calcvium, magnesium, carbpnate, bicarbonate and iron. pH was measured by 1, 10 Phenantroline method using a visible spectrometer (DR-2700, Hach, USA) at 510 nm.

Fluoride in water was determined by SPADNS method (colorimetric) by using a visible spectrometer (DR-2700, Hach, USA) at 570 nm.

The results after analysis shows that there is no general variation in the constituents of chemical radicals all the major anions and cations are within the permissible limit (as per Bureau of Indian Standards) except that of iron. The permissible limit of iron as per BIS standards is 0.3 mg/l. It was found that all the water samples analysed show content of iron more than the permissible limit with values ranging from 0.42 to 11.9 mg/l. The maximum concentration of iron with a value of 11.9 mg/l was detected in Manja Forest.

Table: Summary of chemical analysis data showing concentration of Iron (Fe)

Result of Water samples from dug wells -Fe				Result of Water samples from deep tube wells(Fe)	
SI. No	Fe (mg/l)	No. of samples	% of samples	No. of samples	% of samples
01	0.3-1.00	5	36%	0	0
02	1.00-5.00	7	50%	0	0
03	>5.00	2	14%	0	0

4. Ground Water Resources:-

In the study area covering parts of Lumbajan and Bokajan blocks has ground water availability has been estimated to be 93.93 mcm with existing gross ground water draft for all uses is 5.69 mcm and stage of ground water development is 6 %. The ground water availability for futute irrigation is 86.81 mcm.

It is proposed that for Lumbajan and Bokajan blocks 60% of the net sown area be brought under paddy cultivation and 40% under non-paddy cultivation.

Water requirement for

- Paddy(Δ=1.2m) =4642*0.6*1.2= 3342.24 ham = 33.42 mcm
- Non-paddy(Δ=0.3m) = 4642*0.4*0.3 =557.04 ham = 5.57 mcm

4.1 Nos of tube well feasible in area

4.1.1 Based on available resource-

By utilizing 60% of Balance dynamic groundwater resource 23 mcm and considering unit draft 2.6 ham; **885 no's** of tube wells can be constructed in the area.

4.1.2 Based on spacing

For 4642 ha of un-irrigated land and considering 200m spacing between two well and one shallow tube wells (S.T.W) covering 4 ha area; **1193 no's** of tube wells can be constructed in the area.

4.1.3 Based on command area

As per area (un-irrigated) i.e. 4642 ha unirrigated land and considering command area as per shallow tube well as 3 ha, **1547 no's** of tube wells are feasible.

Table: Dynamic Groundwater Resources, 2011 in the Study Area

(In ham)

District	Blocks	Stage of Ground Water development (%)	Category	Net GW Availability (ham)	Existing Ground Water Draft for Irrigation	Existing Ground Water Draft for I Domestic and Industries	Existing Gross Ground Water Draft for All Uses	Provision for Domestic & Industrial requirement for upto 2025	Balance GW Availability (ham)
Karbi-Anglong	Lumbajan and Bokajan	6	Safe	9393.29	28.69	540.48	569.18	683.40	8681.2

5. Ground Water related Issues:-

5.1. Ground Water Quality:

High Concentration of iron is found to be significantly elevated levels in the study area. Iron is an essential and non-conservative trace element. Significant concentration in drinking water is found due to its abundance in the earth's crust. Its presence in ground water is a direct result of its natural existence in underground rock formations and precipitation water that infiltrates through these formations. As the water moves through the rocks some of the iron dissolves and accumulates in aquifers which serve as a source for ground water. Iron-bearing groundwater is often noticeably orange in colour, causing discoloration of laundry, and has an unpleasant taste, which is apparent in drinking and food preparation.

5.2 Ground Water Development:

The Net sown area of the study area is 4772 ha out of which only a megre area of 130 ha is under irrigation (as per statistical handbook of Assam 2011). This means that out of the total net sown area 97% i.e. 4642 does not have irrigation facility. The stage of ground water

development in the area is 6% and it is apparent that the irrigation facility in the area is very poor. The huge dynamic ground water resources available in the area can be utilized for irrigation purposes. In addition to poor irrigation facilities other related problems are irregular power supply and the poor farmers who are unable to pull up enough capital for developing irrigation facilities.

Table showing total irrigated and unirrigated land in the study area

District (p)	Blocks	Study area (in Ha)	Net Area Sown (in Ha)	Land under Irrigation (in Ha)	Land which can be brought under Irrigation (in Ha)
Karbi-Anglong	Lumbajan and Bokajan	39400	4772	130	4642

6. AQUIFER MANAGEMENT PLAN

6.1 Management Strategies

The study area is having meager irrigation facility. A land of 4642 ha does not have any irrigation facility, which can be brought under irrigation using the huge dynamic groundwater resources available in the area. It is propose to bring 60% of area under paddy and 40% under non-paddy cultivation. Water requirement for paddy cultivation would be 33 mcm while that for non-paddy cultivation would be 6 mcm. Total water requirement to bring this entire uncovered area under irrigation is **39** mcm.

As per the report on dynamic groundwater resources of Assam, 2011 the study area is having a balance groundwater availability for future uses in the order of 86.81 mcm. If a plan is devised to develop 60% of the balance dynamic groundwater resources available (52 mcm) in the area for the irrigation purposes then 2000 ***nos.*** of shallow tube wells (considering a unit draft of 2.6 ham/yr) can be constructed. Whereas, spacing wise ***1150 nos.*** of tube wells (considering 200 m spacing between two tube wells) can be constructed.

CGWB has established that aquifer in the area is having low to moderate yield with heavy drawdown. A tube well yielding 5 $\boldsymbol{m^3/hr}$, runs for 10hrs/day for 120 days will create a draft of 1 ***ham***. To meet the water requirement of 39 mcm, 3900***nos***. of such shallow tube wells will be required (considering a unit draft of 1 ham/yr).

Considering the low ground water potentiality of the aquifer, only 1150 nos. of tube wells can be constructed. From these tube wells 950 ha paddy land or 3800 ha non-paddy land can be brought under assured irrigation. Tube wells can be constructed within a depth of 100 m by tapping 20 m of granular zone with an expected yield of 5 m^3/hr for a drawdown of 5 to 15 m. The tube wells are to be designed in such a way that the supply of water to the well should be steady without causing sand incrush which decreases the efficiency of the well.

According to the lithology of the study area wells can be constructed as per the design criteria given below:-

Casing pipe of 8$^{//}$dia down to 20 to 30m, 6$^{//}$dia 1 to 1.5 mm slot pipes and effective open area of 10% depending upon the average grain size of the aquifer material for tapping 20 m granular zones and 6$^{//}$dia 10 m blank pipe with 3m bail plug.

Since there are, other related problems like irregular power supply and paucity of funds of the farmers for developing irrigation facilities large diameter dug wells may be constructed for irrigation purposes.

Community based irrigation schemes through groundwater may be taken up by Govt., which will greatly boost the socio-economic conditions in the area. In view of the grim power situation in the area, SOLAR PV pumps are the best available option because diesel pumps will be having the high running cost.

Table: Dynamic Groundwater Resources, 2011 in the Study Area

(In ham)

District (p)	Blocks	Stage of Ground Water development (%)	Category	Net GW Availability (ham)	Existing Ground Water Draft for Irrigation	Existing Ground Water Draft for I Domestic and Industries	Existing Gross Ground Water Draft for All Uses	Provision for Domestic & Industrial requirement for upto 2025	Net GW Availability for future irrigation development
Karbi Anglong	Lumbajan and Bokajan	6	Safe	9393.29	28.69	540.48	569.18	683.40	8681.2

6.2 Cost Estimates

One time expenditure to construct 1150 tube wells @ Rs. 4,50,000/= is Rs. 6 crores and installation of 2400 watt Solar PV pump @ Rs. 4,50,000/= is Rs. 6 crores.

6.3 Management Plan

By providing irrigation facilities to 950 ha of paddy land 2750metric tons of food grains (@ 2900 kg/ha) can be produced. This will boost the economy by providing Rs. 5 crores per annum income (Recent minimum price of common paddy Rs. 1800/Qn). Further by providing irrigation facilities to 3800 ha of non-paddy land 2300 metric tons of non-paddy can be produced. This will generate an income of Rs. 1 to 7 crores per annum (recent minimum price of vegetables Rs. 520/Qn to Rs. 3000/ Qn of oilseeds). Total one time expenditure Rs. 12 crores. Benefit Rs. 14 to 17 crores per annum.

The ground water in the area is highly contaminated with Iron. Its concentration is much higher than the permissible limit as per Bureau of Indian Standards. Therefore, remedial measures must be taken to remove the excessive iron in the ground water. It is suggested that aeration/ filtering/ installation of Iron Removal Plant is necessary before consumption of the ground water. At present PHED, Assam is supplying treated drinking water in the area. Apart from this, individual houses are using sand filter to remove iron. Farmer's co-operative societies may be formed which will look after maintenances of the tube wells.

KEY WELLS (DUG WELLS) 2015-16 Table no:01

SI. No	Block	Location	Long	Lat	DTWL in mbgl (Nov 2015)	DTWL in mbgl ((March 2016)	Aquifer group
1	Lumbajan	Diphu, Lumding road	93.40	25.83	16.80	21.21	Phreatic Aquifer
2	Lumbajan	Diphu, Matibung road	93.44	25.84	2.74	3.78	Phreatic Aquifer
3	Lumbajan	Upper Dilaiji	93.45	25.88	3.42	4.85	Phreatic Aquifer
4	Lumbajan	2nd Gate Dillaiji	93.43	25.89	5.70	7.30	Phreatic Aquifer
5	Lumbajan	Nongtu Taralangso	93.42	25.87	11.18	17.15	Phreatic Aquifer
6	Lumbajan	Borjan, Collective Mulberry garden	93.39	26.01	0.75	1.02	Phreatic Aquifer
7	Lumbajan	Shiv Mandir, Mohendejua	93.39	25.99	5.35	7.35	Phreatic Aquifer
8	Lumbajan	Amlokhi	93.48	25.96	0.62	1.75	Phreatic Aquifer
9	Bokajan	Ronglimplam	93.53	25.96	6.20	9.83	Phreatic Aquifer
10	Bokajan	Kkehai Ketok	93.61	25.98	1.50	3.98	Phreatic Aquifer
11	Lumbajan	Terangaon	93.38	26.01	1.3	3.76	Phreatic Aquifer
12	Lumbajan	Mohendejua	93.41	25.99	6.02	9.9	Phreatic Aquifer
13	Lumbajan	Manja Forest	93.44	25.96	2.32	4.53	Phreatic Aquifer
14	Lumbajan	Diphu	93.45	25.84	13.26	22.41	Phreatic Aquifer
15	Bokajan	Dillai	93.58	25.96	3.26	4.21	Phreatic Aquifer
16	Bokajan	Hidipi	93.63	26.01	2.15	6.65	Phreatic Aquifer

DETAILS OF EXPLORATORY DRILLING CARRIED OUT IN THE REGION DURING XII PLAN

Table No-02

S. No	State	Dist	Block	Location	EW/OW/PZ	Hard rock/ Soft Rock	Constructed during AAP-2015-16	Long	Lat	Total depth (m)	Granular zone/ fracture	Aquifer tapped (I/II/III/ combined)	Aquifer/ Fractures tapped		Q (lps)	Remarks
													from (in mbgl)	upto (in mbgl)		
1	ASSAM	Karbi-Anglong	Lumbajan	Donka Bey	EW+OW	Soft rock	2015-16	93.41	25.95	64	Granular zone	I	45	68	6.14	**Semi confined to Confined**
2			Lumbajan	Manja	OW	Soft rock	2015-16	93.44	26.46	91.87	Granular zone	I	38	55	0.4	**Semi confined to Confined**
3			Lumbajan	Taralangso	EW+OW+PZ	Soft rock	2015-16	93.41	25.87	103	Granular zone	Combined	60	93	3.29	**Semi confined to Confined**
4			Lumbajan	Diphu	EW+OW	Soft rock	2015-16	93.43	25.84	104	Granular zone	Combined	62	93	2	**Semi confined to Confined**
5			Bokajan	Dillai	EW+OW	Hard rock	2015-16	93.58	25.96	160.29	Fracture	Combined	54	104	6.49	**Semi confined to Confined**
6			Bokajan	Hidipi	OW	Hard rock	2015-16	93.63	26.01	149	Fracture	I	63.5	65	0.34	**Semi confined to Confined**

RESULT OF CHEMICAL ANALYSIS OF WATER SAMPLES

Table No-03

(in ppm)

State	Location	District	Type of sample	pH	EC (µs/cm) 25C	Turbidity (NTU)	TDS	CO3-2	HCO3 -1	Cl-	SO4-2	NO3-1	F-	Ca+2 (as Ca)	Mg+2 (as Mg)	TH (as CaCO3)	Na	K	Fe
Assam	Diphu, Lumding road	Karbi Anglong	DUG	7.9	582.7	0.3	296.2	40	180	14	1.7	1	0.14	32	1	84	14.6	2.16	0.42
Assam	Diphu, Matibung road	Karbi Anglong	DUG	7.8	439.1	0.3	220.9	24	72	30	5.3	0.9	0.13	22.4	2.9	68	40.5	10.9	0.65
Assam	Upper Dilaiji	Karbi Anglong	DUG	7.6	1182	0.2	608.2	72	76	82	19.8	0.3	0.2	17.6	28.2	160	102.5	76.7	0.71
Assam	2nd Gate Dillaiji	Karbi Anglong	DUG	7.5	477.4	BDL	240.4	24	108	36	3.0	0.2	0.52	14.4	15.5	100	48.32	4.37	1.65
Assam	Nongtu Taralangso	Karbi Anglong	DUG	7.7	774.2	1.2	389.4	96	112	12	2.9	1.1	0.2	16	34.0	180	24.8	3.07	1.31
Assam	Amlokhi	Karbi Anglong	DUG	8.1	1260	0.8	633.9	72	284	74	6.8	0.8	0.38	33.6	19.4	164	116.4	16.6	5.61
Assam	Ronglimplam	Karbi Anglong	DUG	8.2	820.6	1	411.6	88	220	13.9	2.79	1.5	0.99	17.6	8.7	80	142.02	6.4	1.61
Assam	Kkehai Ketok	Karbi Anglong	DUG	7.7	1008	3	513.3	80	152	18	13.1	0.8	0.36	19.2	32.0	180	86.9	3.12	2.17
Assam	Terangaon	Karbi Anglong	DUG	8	362.1	0.1	181.9	40	84	18	1.2	0.8	0.34	33.6	7.8	116	13.04	3.85	1.51
Assam	Mohendejua	Karbi Anglong	DUG	7.1	205.9	BDL	103.5	0	28	32	2.1	0.6	0.05	12.8	1.0	36	14.6	5.5	1.06
Assam	Manja Forest	Karbi Anglong	DUG	7.6	189.4	0.9	93.9	0	52	40	1.2	0.9	0.02	14.4	3.9	52	14.8	2.6	11.93
Assam	Diphu	Karbi Anglong	DUG	7.6	588.8	0.3	295.2	0	160	44	5.1	0.1	0.23	35.2	21.4	176	29.05	3.3	1.21
Assam	Dillai	Karbi Anglong	DUG	7.6	713.5	0.3	357.4	24	100	74	10.1	0.2	0.16	44.8	16.5	180	49.4	5	0.81
Assam	Hidipi	Karbi Anglong	DUG	7.9	474.4	BDL	238.1	72	84	20	1.5	1	0.29	33.6	16.5	152	12.41	10.36	0.7

DETAILS OF V.E.S. CARRIED OUT DURING AQUIFER MAPPING AT KARBI-ANGLONG

Table No-04

S. No	State	District	Block	Location	Depth (m)	Hard rock/ Soft Rock	Conducted during AAP-2014-15	Long	Lat
1	Assam	Karbi Anglong	Lumbajan	Kendriya Vidhyala	**12.6**	Soft Rock	2015-16	93.42	25.84
2	Assam	Karbi Anglong	Lumbajan	Foodball field,nearest gov. boys school	**11**	Soft Rock	2015-16	93.43	25.84
3	Assam	Karbi Anglong	Lumbajan	Foodball field,nearest gov. boys school	**20.4**	Soft Rock	2015-16	93.43	25.83

1. Kendriya Vidyalaya

Unique ID	**VES 1 TRPS**	**Date/Year**	15/07/15
Village	Kendriya Vidyalaya	**Nearby DW/DCBW/BW Depth**	
Taluka/Block	Diphu	**Yield/discharge**	
District	Karbianglong	**Whether borehole was drilled at this point ? if yes,**	
Toposheet No.	83G/5	**Depth Drilled**	
Lat	25°50'41.8"	**Discharge(lps)**	
Long	93°25'18.7"	**Transmissivity(m^2/day)**	
RL(m amsl)		**Storativity**	

Unique ID: VES 1 TRPS

Depth range(m bgl)		**Thickness(m)**	**Resistivity(ohm-m)**	**Inferred Lithology**
From	**To**			
0	**0.6**	**0.6**	**68**	**Top Soil,Sand, Clay ,boulders ,pebbles**
0.6	**2.1**	**1.5**	**54.4**	**Coarse Sands ,Morrum etc.**
2.1	**12.6**	**10.5**	**16.82**	**Clays, Morrum, Sands**
Below 12.5		**-**	**18.4**	Clays ,intercalation of Sand,Morrum etc.

2. Foodball field,near Govt. Boys School

Unique ID	**VES 2 TRPS**	**Date/Year**	15/7/15
Village	Foodball field,nearest govt. boys school	**Nearby DW/DCBW/BW Depth**	
Taluka/Block	Diphu	**Yield/discharge**	
District	Karbianglong	**Whether borehole was drilled at this point ? if yes,**	
Toposheet No.	83G/5	**Depth Drilled**	
Lat	25°50'25.3"	**Discharge(lps)**	
Long	93°26'01.5"	**Transmissivity(m^2/day)**	
RL(m amsl)		**Storativity**	

Unique ID: VES 2 TRPS

Depth range(m bgl)		**Thickness(m)**	**Resistivity(ohm-m)**	**Inferred Lithology**
From	**To**			
0	**1**	**1**	**21**	**Top Soils,Clay, Sand, pebbles**
1	**11**	**10**	**42**	**Clays,Medium Sands etc.**
Below 11			**5.7**	**Clays with Sand etc.**

3. Foodball field,near Govt. Boys School

Unique ID	**VES 3 TRPS**	**Date/Year**	15/07/15
Village	Foodball field,nearest gov. boys school	**Nearby DW/DCBW/BW Depth**	
Taluka/Block	Diphu	**Yield/discharge**	
District	Karbianglong	**Whether borehole was drilled at this point ? if yes,**	
Toposheet No.	83G/5	**Depth Drilled**	
Lat	25°50'23.6"	**Discharge(lps)**	
Long	93°26'00.8"	**Transmissivity(m^2/day)**	
RL(m amsl)		**Storativity**	

Unique ID: VES 3 TRPS

Depth range(m bgl)		**Thickness(m)**	**Resistivity(ohm-m)**	**Inferred Lithology**
From	**To**			
0	**1**	**1**	**92**	**Top Soils,Clay, Sand, pebbles**
1	**3**	**2**	**184**	**Clays,Sands,Sheared /Fractured Rock**
3	**20.4**	**17.4**	**29**	**Clays ,Fine Sand etc.**
Below 20.4		**-**	**145**	**Clays,with Sands etc.**

Figure no: 01

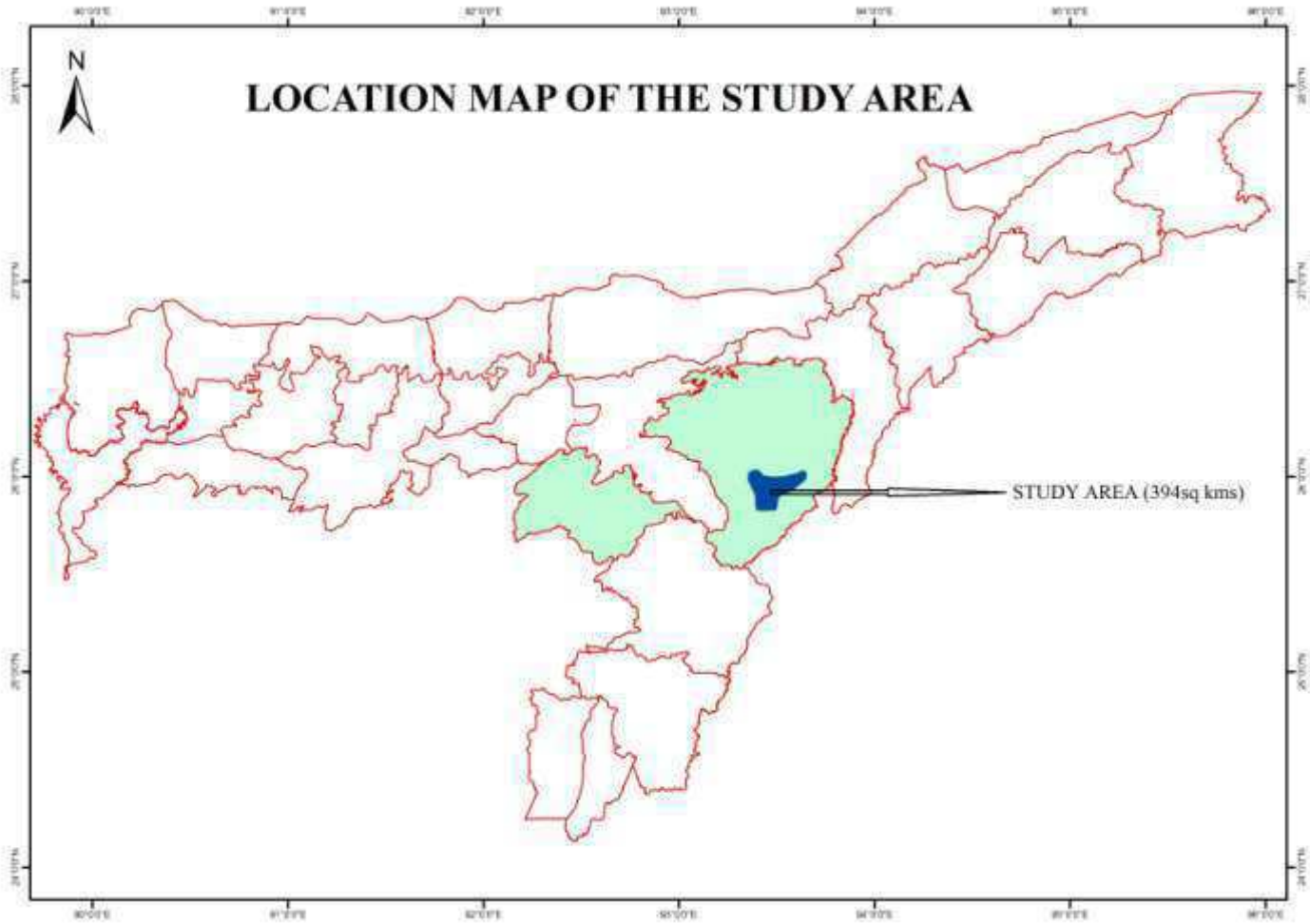


Figure no: 02

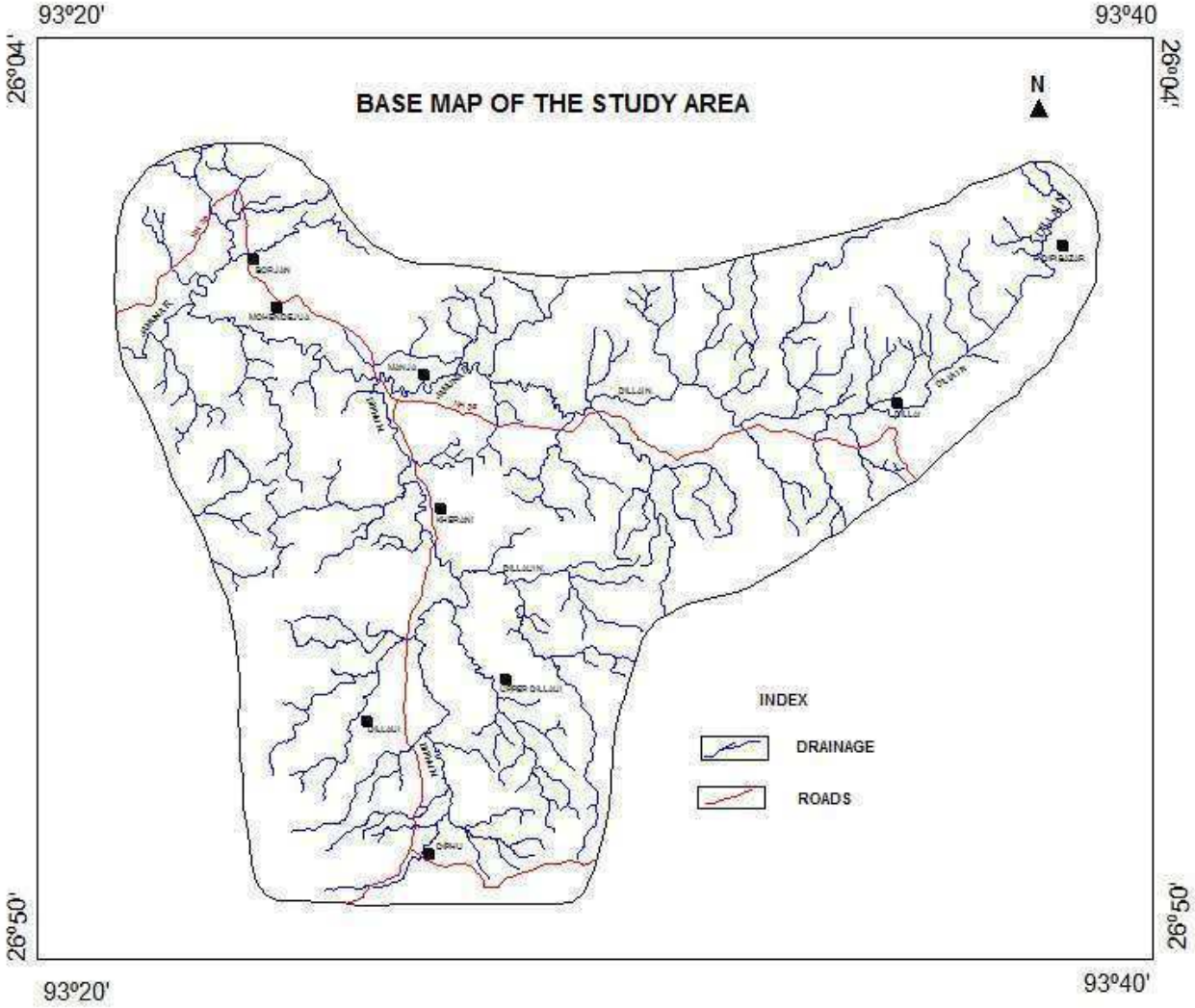

93°20'
93°40
26°04'
26°04'
BASE MAP OF THE STUDY AREA
N
INDEX
DRAINAGE
ROADS
26°50'
26°50'
93°20'
93°40'

Figure no: 03

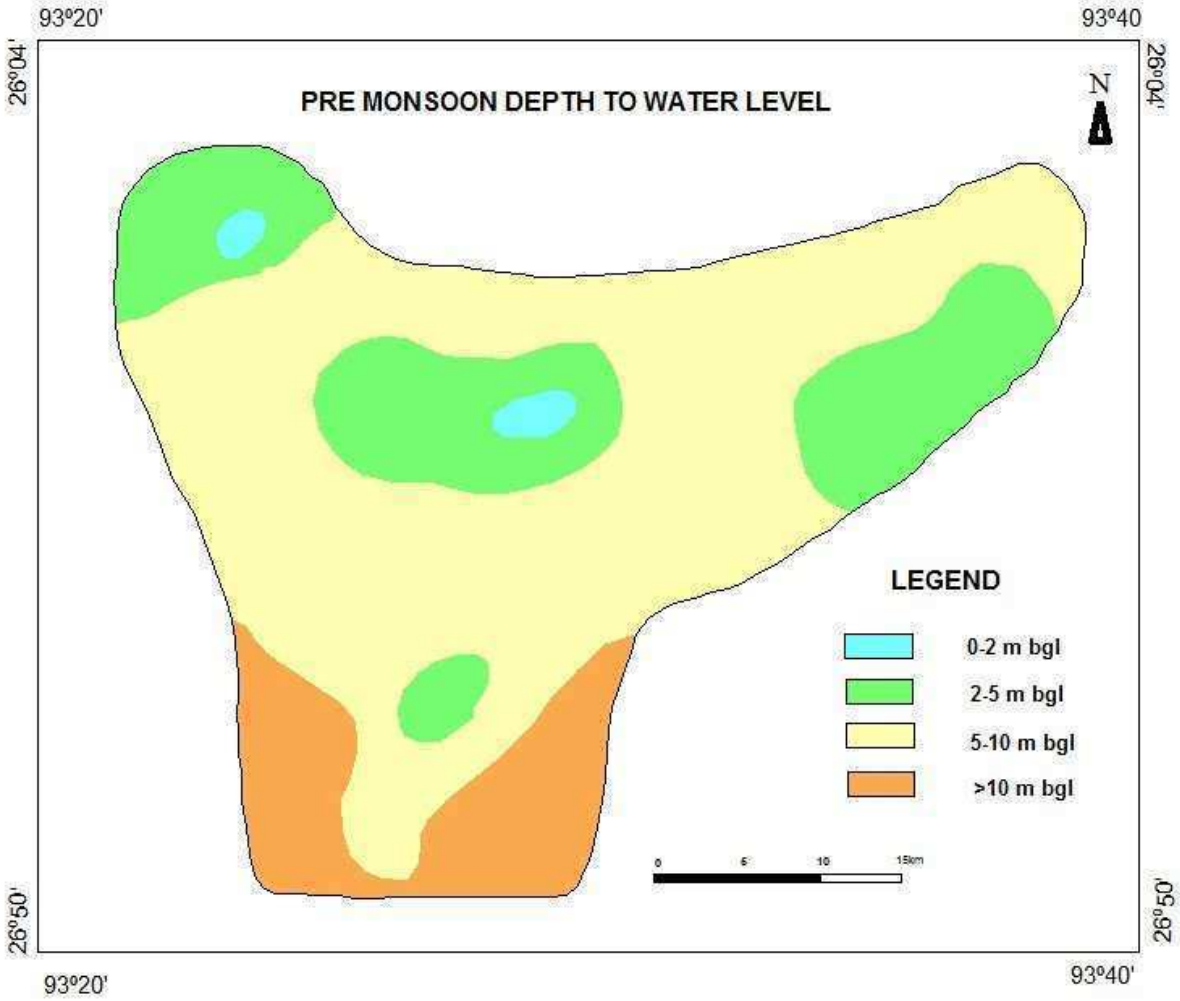
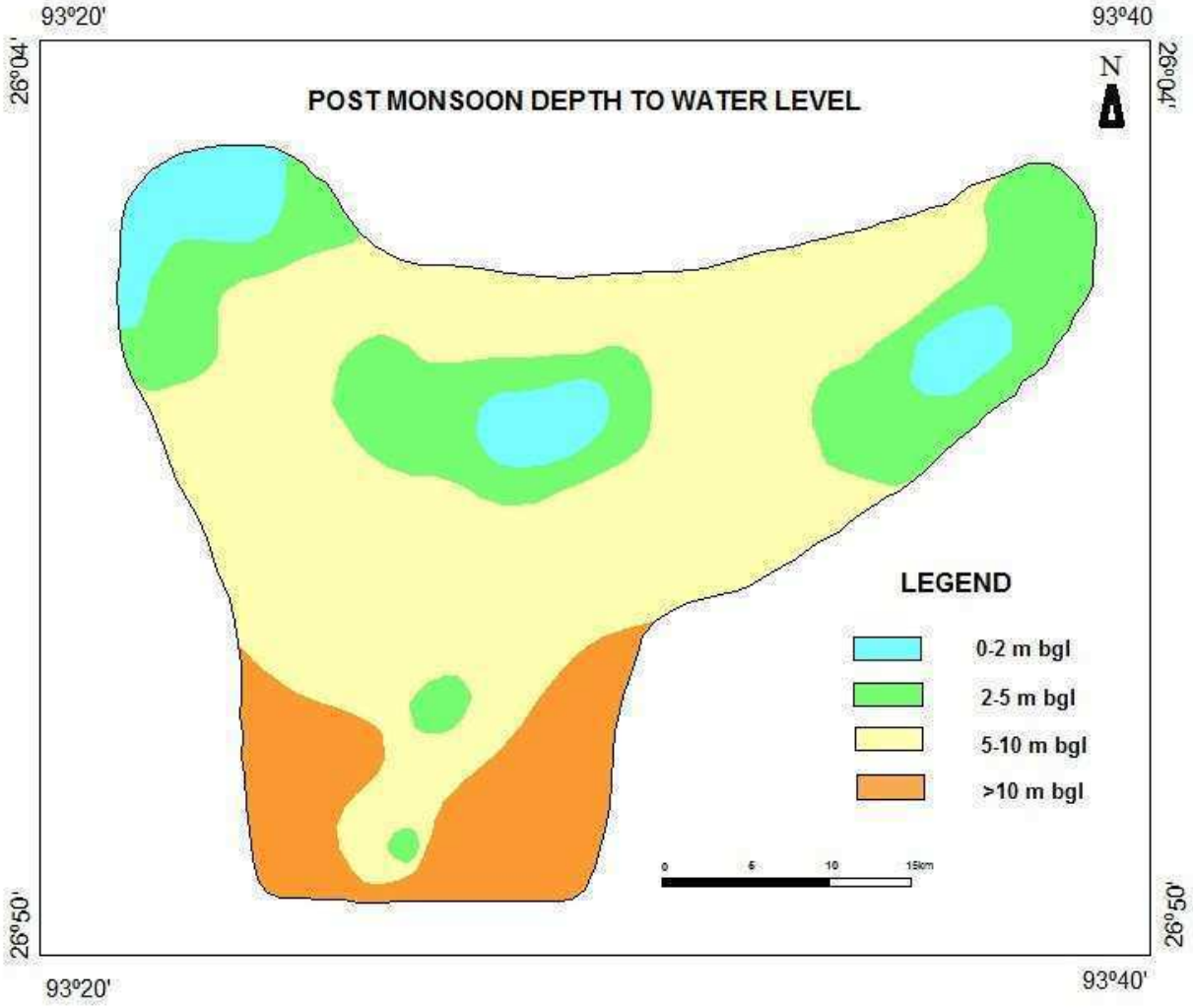

93°20'
93°40
26°04'
26°04'
PRE MONSOON DEPTH TO WATER LEVEL
N
LEGEND
0-2 m bgl
2-5 m bgl
5-10 m bgl
>10 m bgl
0
5
10
15km
26°50'
26°50'
93°20'
93°40'

Figure no: 04


93°20'
93°40
26°04'
26°50'
N
POST MONSOON DEPTH TO WATER LEVEL
LEGEND
0-2 m bgl
2-5 m bgl
5-10 m bgl
>10 m bgl
0
5
10
15km

DISTRIBUTION OF IRON IN THE STUDY AREA

Figure no: 05

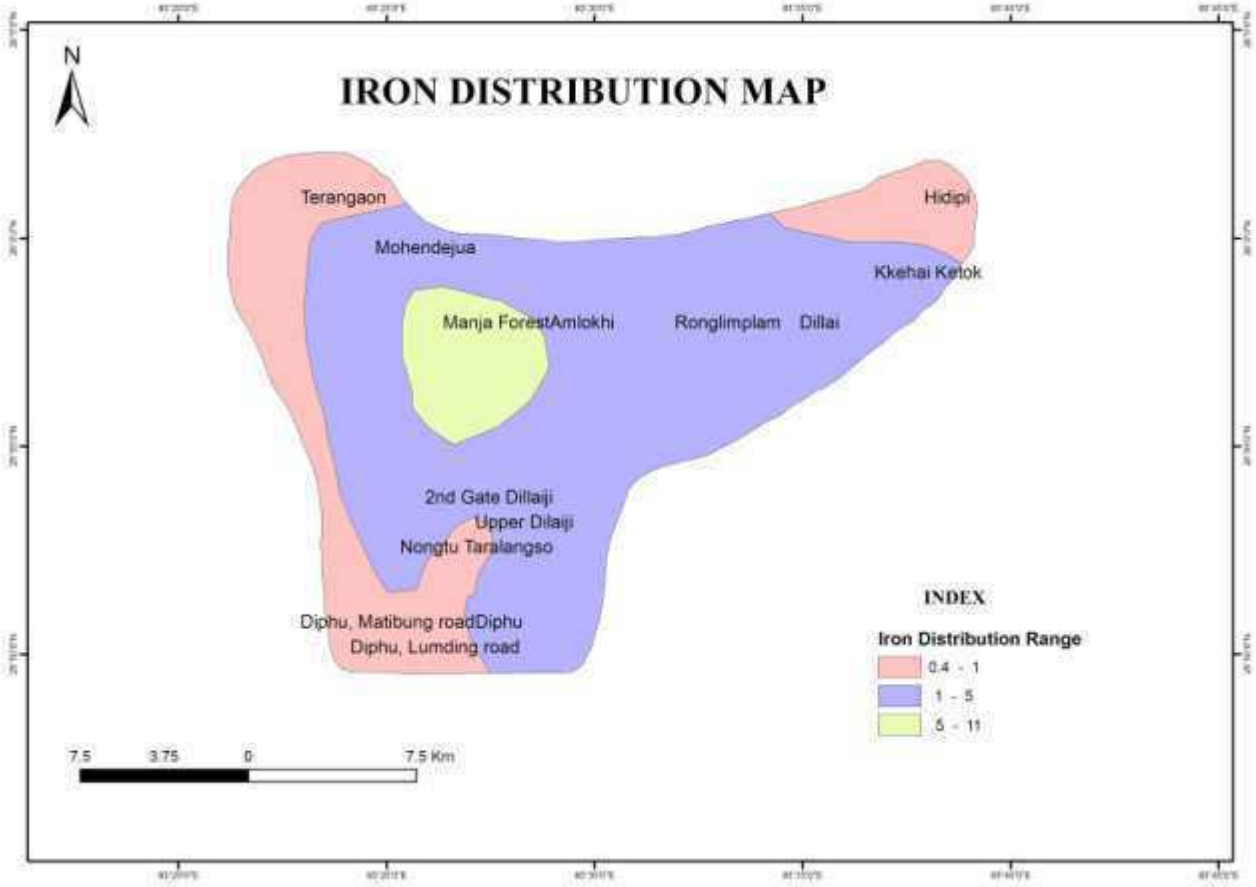


DIAGRAM SHOWING THE DISPOSITION OF AQUIFERS **Figure no 06**

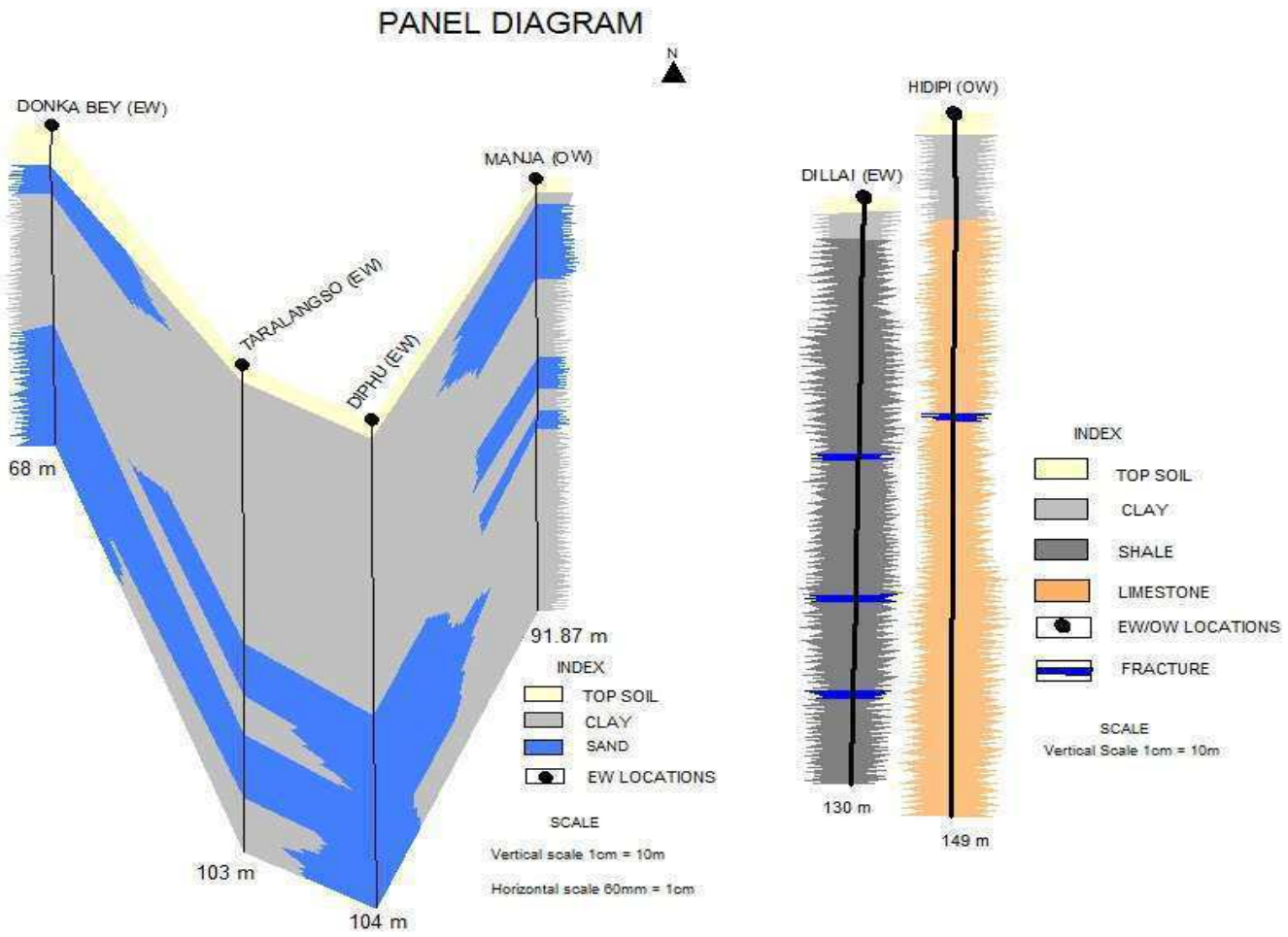


Figure no: 07

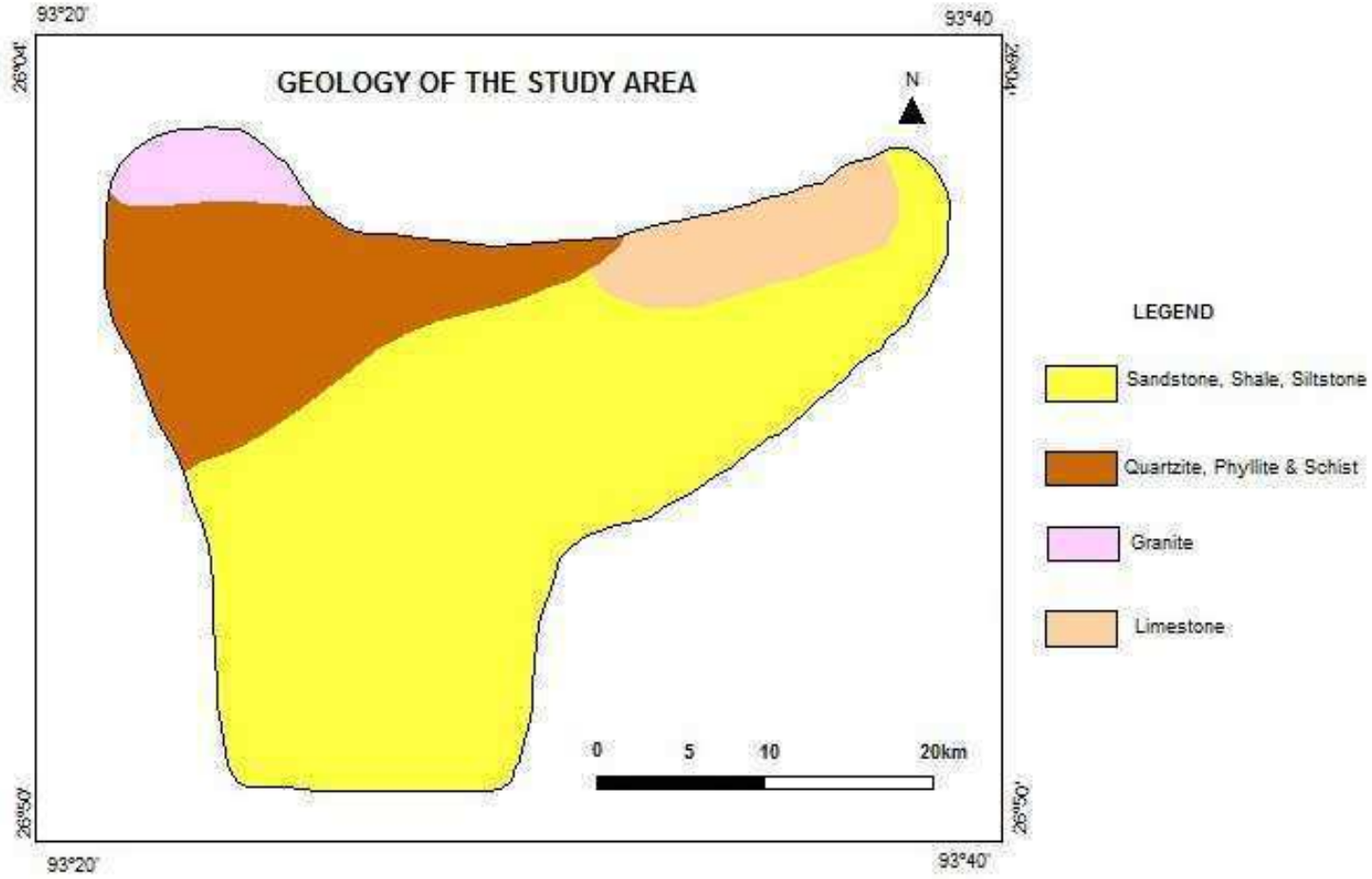

GEOLOGY OF THE STUDY AREA
N
93°20'
93°40'
26°40'
26°50'
0
5
10
20km
LEGEND
Sandstone, Shale, Siltstone
Quartzite, Phyllite & Schist
Granite
Limestone

Figure no: 08

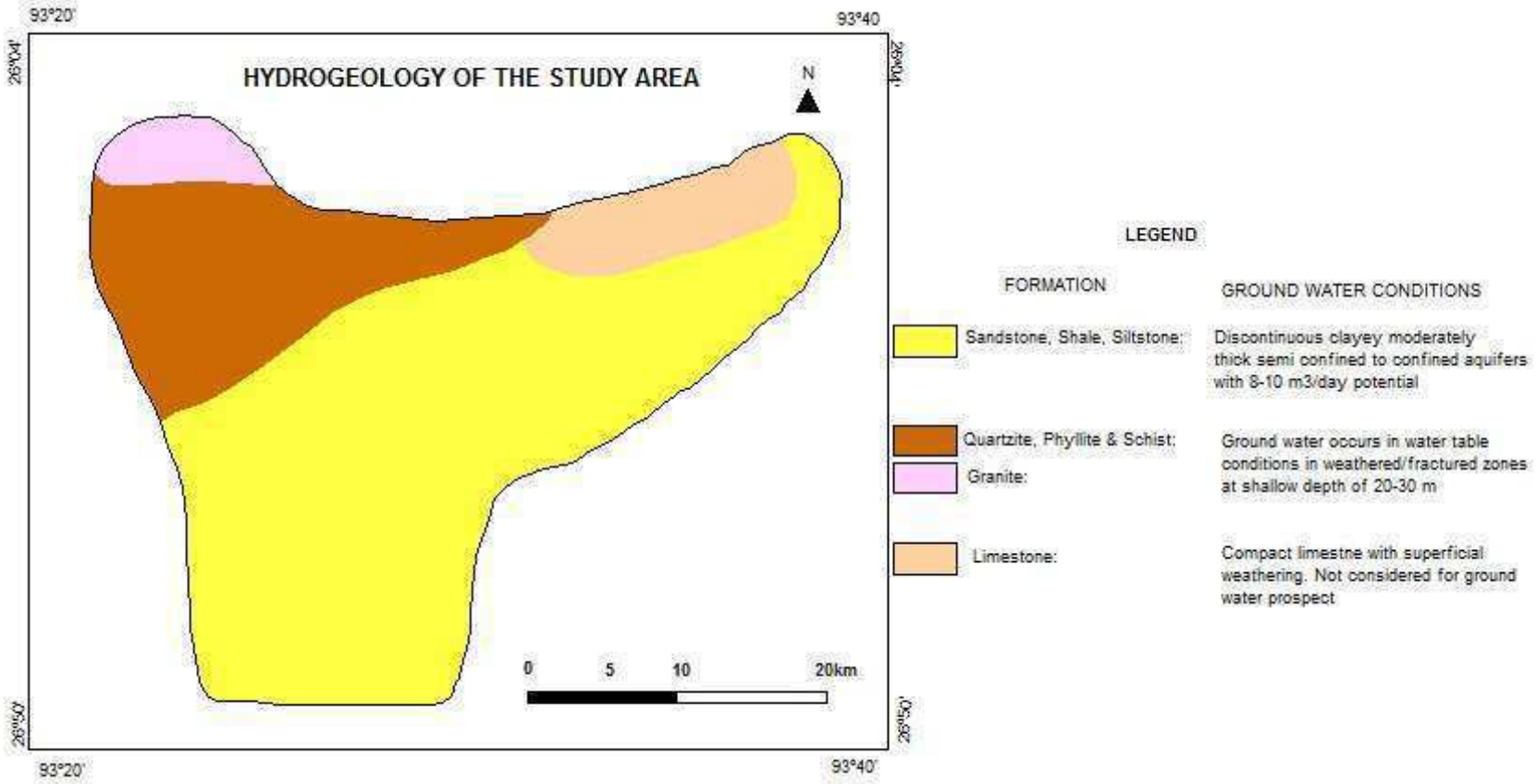
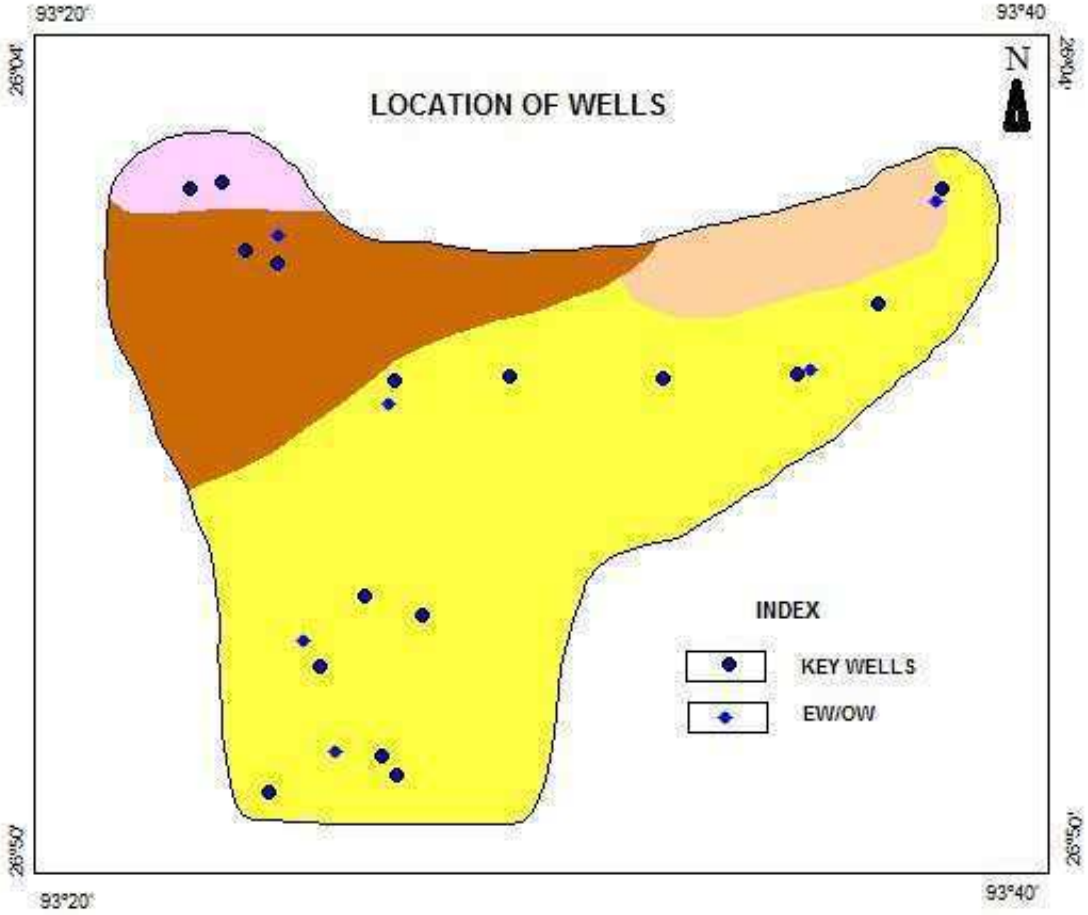

93°20'
93°40'
26°04'
26°50'
HYDROGEOLOGY OF THE STUDY AREA
N
0
5
10
20km
LEGEND
FORMATION
GROUND WATER CONDITIONS
Sandstone, Shale, Siltstone:
Discontinuous clayey moderately thick semi confined to confined aquifers with 8-10 m3/day potential
Quartzite, Phyllite & Schist:
Granite:
Ground water occurs in water table conditions in weathered/fractured zones at shallow depth of 20-30 m
Limestone:
Compact limestne with superficial weathering. Not considered for ground water prospect

Figure no: 09


93°20'
93°40
26°04'
26°04'
N
LOCATION OF WELLS
INDEX
KEY WELLS
EW/OW
26°50'
26°50'
93°20'
93°40'

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