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विभाग, जल शक्ति मंत्रालय

भारत सरकार

Central Ground Water Board

Department of Water Resources, River Development and Ganga Rejuvenation,

Ministry of Jal Shakti

Government of India

AQUIFER MAPPING AND MANAGEMENT OF GROUND WATER RESOURCES

SOUTH TRIPURA DISTRICT, TRIPURA

उत्तर पूर्वी क्षेत्र, गुवाहाटी

North Eastern Region, Guwahati

GOVERNMENT OF INDIA
MINISTRY OF JAL SHAKTI
DEPARTMENT OF WATER RESOURCES, RIVER DEVELOPMENT &
GANGA REJUVENATION
CENTRAL GROUND WATER BOARD

REPORT
ON
"AQUIFER MAPPING AND MANAGEMENT PLAN OF SOUTH TRIPURA DISTRICT, TRIPURA"
(AAP 2017-18)

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ABBREVIATION

AAP	Annual Action Plan
CGWB	Central Ground Water Board
NER	North Eastern Region
NAQUIM	National Aquifer Mapping and Management Plan
GL	Ground Level
IMD	Indian Meteorological Department
LPM	Litres per minute
LPS	Litres per second
GSI	Geological Survey of India
m	Metre
mbgl	Meters below ground level
MCM	Million Cubic Meter
Mm	Milli meter
mg/l	milligram/litre
m amsl	Metre above mean sea level
Sq.Km	Square Kilometre
µS/cm	Microsimens/centimetre
AMP	Aquifer Management Plan
AQM	Aquifer Mapping
BIS	Bureau of Indian Standards
BDL	Below detectable level
BCM	Billion Cubic Metres
DTW	Depth to water table
DW	Dug Well
BW	Bore well
EC	Electrical Conductivity
EW	Exploratory Well
GEC	Ground water Estimation Commitee
Ha	Hectare
Ham	Hectare meter
Km	Kilometer
MP	Measuring Point
OW	Observation Well
°C	Degree Celsius

Ppm	Parts per million equivalents to mg/l
Pz	Piezometer
SWL	Static water level
TDS	Total dissolved solid
VES	Vertical Electrical Sounding
GWMW	Ground water monitoring well
PWD(WR)	Public Work Department (Water Resources)
PWD(DWS)	Public Work Department (Drinking Water & Sanitation)

1. INTRODUCTION

Central Ground Water Board, North Eastern Region has carried out Aquifer mapping and management plan in South Tripura district, Tripura during AAP 2014-15 (559 sq.km) .& AAP 2016-17 (1459 sq.km.) covering **2118 sq.km** out of total geographical area of **3074.78** sq.km. Under National Aquifer Mapping and Management (NAQUIM) program, combination of geologic, geophysical, hydrologic and hydro chemical information is applied to characterize the quantity, quality and sustainability of ground water aquifers. Systematic aquifer mapping will improve our understanding of the geologic framework of aquifers, their hydrogeologic characteristics, quality and also quantifying the available ground water resources potential and proposing plans appropriate to the scale of demand and the institutional arrangements for management. Aquifer mapping at the appropriate scale can help prepare, implement and monitor the efficacy of various management interventions aimed at long-term sustainability of our precious ground water resources, which, in turn, will help achieve drinking water security, improved irrigation facilities and sustainability in water resources development.

1.1 Objectives

The objectives of this project are to understand the aquifer systems up to 200 m depth, to define the aquifer geometry, type of aquifers, ground water regime behaviours, hydraulic characteristics and to establish groundwater quantity, quality, and sustainability, and to estimate the dynamic and static resources accurately through a multidisciplinary scientific approach on 1:50,000 scale and finally formulate a complete, sustainable and effective management plan for ground water development.

1.2 Scope of the Study

The activities of the Aquifer Mapping and Management Program can be envisaged as follows:

1.2.1 Data Compilation & Data Gap Analysis: One of the important aspect of the aquifer mapping programme was the synthesis of the large volume of data already collected during specific studies carried out by Central Ground Water Board and various Government organizations with a new data set generated that broadly describe an aquifer system. The data were assembled, analysed, examined, synthesized and interpreted from available sources. These sources were predominantly non computerized data, which was converted into computer based GIS data sets. On the basis of available data, Data Gaps were identified.

1.2.2 Data Generation: There was also a strong need for generating additional data to fill the data gaps to achieve the task of aquifer mapping. This was achieved by multiple activities such as exploratory drilling, geophysical techniques, hydro-geochemical analysis, remote sensing, besides detailed hydrogeological surveys to delineate multi aquifer system; to bring out the efficacy of various geophysical techniques and a protocol for use of geophysical techniques for aquifer mapping in different hydrogeological environs.

1.2.3. Aquifer Map Preparation: On the basis of integration of data generated from various studies of hydrogeology & geophysics, aquifers have been delineated and characterized in terms of quality and potential. Various maps have been prepared bringing out Characterization of Aquifers, which can be termed as Aquifer maps providing spatial variation (lateral & vertical) in reference aquifer extremities, quality, water level, potential and vulnerability (quality & quantity).

1.2.4. Aquifer Management Plan Formulation: Aquifer Maps and ground water regime scenario will be utilized to identify a suitable strategy for sustainable development of the aquifer in the area.

1.3 Approach and Methodology: Aquifer mapping has been carried out by adopting a multi-disciplinary approach :

(i) Geophysical Surveys through Vertical Electrical Sounding (VES),

(ii) Exploratory drilling and construction of tube wells tapping various groups of aquifers,

(iii) Ground Water Regime monitoring by establishing monitoring wells tapping different aquifers at different depths for long term monitoring of water level and quality,

(iv) Pumping test, soil infiltration test, specific yield determination, slug tests for determination of ground water recharge scope, intensity and potentials and also to determine the characteristics and performances of existing aquifers at various depths

(v) Collection of various relevant technical data from the field in South Tripura district and also from the concerned State Govt. Agencies and other Institutes dealing with ground water and incorporating these data along with CGWB data for final output.

(vi) Preparations of a micro level mapping of existing aquifers, their potentials depth wise and sideways in 2D and 3D forms viewed from different angles by various GIS Layers.

1.4 Area Details :

Aquifer mapping and management programme has been taken up during Annual Action Plan 2017–18 in South Tripura district (recently divided into Gomati and South Tripura districts) covering Matabari, Tepania, Kakraban, Killa, Amarpur, Ompi, Karbook, Silachari, Bogafa, Jolaibari, Hrishyamukh, Rajnagar, Bharatchandra Nagar, Satchand, Poyangbari and Rupaichari blocks in order to delineate the available aquifers. The district headquarter of Gomati district is Udaipur and for South Tripura district is Belonia. As per Census 2011, the South Tripura district is having a total population of 8,72,289 dominated by SC, ST and OBCs.

The district lies in the Southern most part of Tripura State and is confined within North Latitudes $23^0 46'$ and $22^0 50'$ and East Longitudes of $91^0 53'$ and $92^0 18'$ covering Survey of India Toposheet Number 79M/6, 79M/10, 79M/14, 79M/7, 79M/11, 79M/18, 79M/8, 79M/12, 79M/16 and 79N/9. The area is bounded in the East, South and West by the international boundary with Bangladesh and in the North by West Tripura District. Fig 1 depicts the base map of the NAQUIM area.

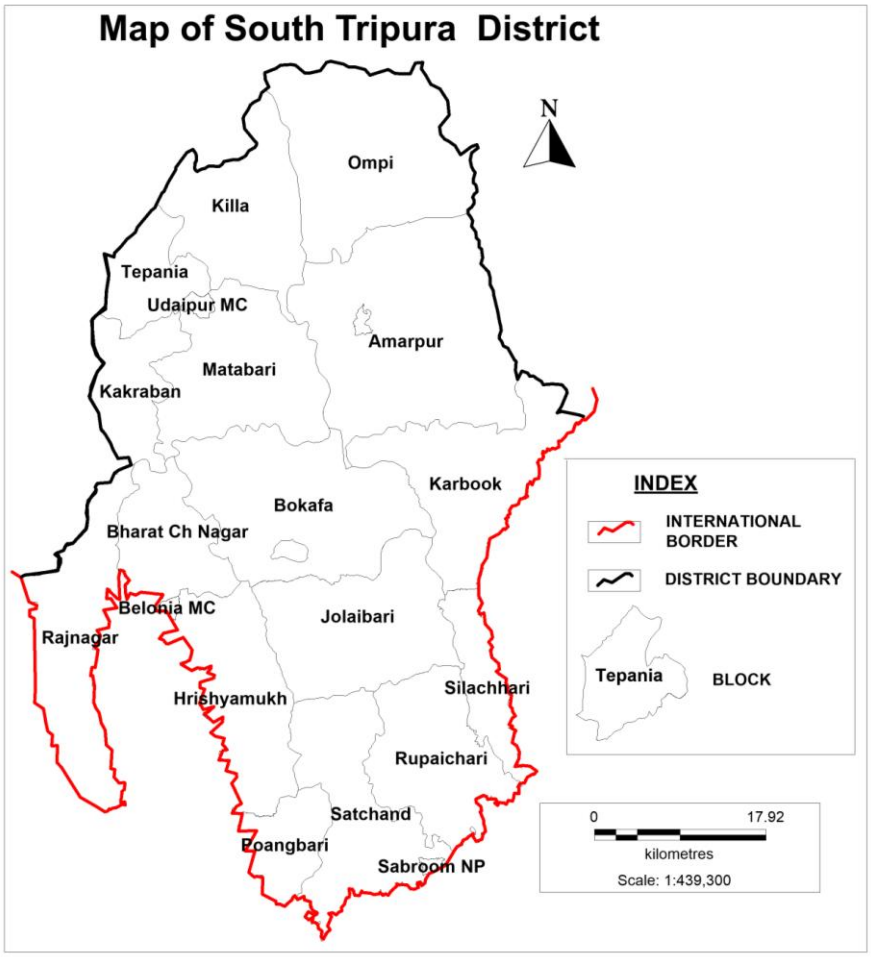

Fig 1.1: Base Map of South Tripura District

1.5 Data Availability & Data Adequacy before conducting Aquifer Mapping:

Hydrogeological, geophysical and ground water exploration data available in the district are as follows:

- **Exploration Data**: CGWB has constructed 18 (Eighteen) exploratory wells in South Tripura district. Details of these drilling operations, aquifer parameters are furnished in the Table (Annexure – 2). State govt. has also drilled about hundreds of tube wells in the district.

- **Geophysical Survey (VES) Data**: Neither CGWB nor the State Govt. Departments have conducted any VES survey in this district till 2015. However, CGWB had carried out 30 (Thirty) VES survey during 2015-16.

- **Ground Water Level Monitoring Data :** CGWB has 27 (Twenty seven) GWM wells at Amarpur , Ampi colony , Bampur , Dhawajnagar, Gorjee Bazar, Kankraban, Noabari,Taichakma,Jatanbari, PurbaBagafa (Santir Bazar), Gardhang, Manur Mukh,

Jhajhari, Hrishyamukh, Rajnagar, Radhanagar, Rangamura, Kashari, Kalachhara, Manubazar, Sabroom, Tuichama EW, Tuichama EW, Rajib Nagar EW, Rajib Nagar OW, Paschim Jalefa EW, Paschim Jalefa OW where water levels are measured 4 times in a year. State ground water user departments, viz., PWD (WR), PWD (DWS) do not have any ground water monitoring station.

Table-1.1. Details of GWM wells in South Tripura District

Location	Well Type	MP (magl)	Latitude	Longitude	RL(amsl)
Amarpur	Dug	0.89	23˚ 30' 49.4"	91˚ 39' 24"	39.96
Ampi Colony	Dug	0.85	23˚ 40' 17"	91˚ 38' 30"	
Bampur	Dug	0.96	23˚ 33' 44"	91˚ 38' 7.5"	
Dhawajanagar	Dug	1.36	23˚ 33' 13.5"	91˚ 27' 54.8"	
Gorjee Bazar	Dug	0.8	23˚ 25' 36"	91˚ 30' 21.8"	32.67
Kankraban	Dug	0.87	23˚ 29' 15"	91˚ 24' 07"	
Naobari	Dug	0.83	23˚ 30' 43.6"	91˚ 33' 57.5"	
Taichakma	Dug	0.72			
Purba Bagafa (Santir Bazar)	Dug	0.77	23˚ 19' 03"	91˚ 35' 13.7"	
Jatanbari	Dug	0.77	23˚25'12.8"	91˚45'30.1"	
Gardhang	Dug	0.74	23˚ 17' 50"	91˚ 31' 56.6"	10
Manur Mukh	Dug	1	23˚ 15' 56"	91˚ 29' 17.3"	13
Jhajhari	Dug	0.77	23˚ 13' 49"	91˚ 29' 31"	
Hrishyamukh	Dug	0.8	23° 08' 30"	91° 32' 00"	23.65
Rajnagar	Dug	1.35	23˚ 13' 56.8"	91˚ 23' 30.8"	
Radhanagar	Dug	0.88	23˚ 13' 32"	91˚ 19' 46"	
Rangamura	Dug	0.9	23˚ 15' 47"	91˚ 19' 31"	
Kashari	Dug	0.85	23˚ 17' 46"	91˚ 23' 17"	
Kalachhara	Dug	0.9	23˚ 08' 27.3"	91˚ 37' 37.5"	
Manubazar	Dug	0.66	23˚ 03' 51"	91˚ 38' 55.7"	
Sabroom	Dug	0.83	23˚ 00' 22.4"	91˚ 43' 25.7"	18.49
Tuichama OW	DTW	0.68	23^0 09′ 24″	91^0 39′ 42″	
Tuichama EW	DTW	0.77	23^0 09′ 24″	91^0 39′ 42″	
Rajib Nagar EW	DTW	0.80	23˚ 03' 25.04"	91˚ 39' 23.75"	25
Rajib Nagar OW	DTW	0.87	23˚ 03' 25.22"	91˚ 39'24.076"	25
Paschim Jalefa EW	DTW	25	23^0 02′ 00″	91^0 41′ 13″	
Paschim Jalefa OW	DTW		23^0 02′ 00″	91^0 41′ 13″	

- **Ground Water Quality Monitoring Data**: CGWB collects water samples from 21 GWM wells and carried out chemical analysis in its regional laboratory at Guwahati.

1.6 Data Gap Analysis & Data Generation :

1.6.1 Data Gap Analysis:

- **Exploration Data Gap :**

CGWB, NER has constructed 9 (Nine) exploratory well and 2 (Two) deposit wells in the said district. Based on this drilling work, hydrogeological data have been gathered

- **VES and Profiling Data Gap :**

Data gap related to Resistivity Surveys i.e., VES and Profiling was extended over the Parts South Tripura district as no such Geophysical survey had ever been carried out by CGWB or by any State Govt. Departments.

- **Ground Water Level Monitoring Data Gap :**

Earlier there were only 21 (Twenty one) GWM wells at Amarpur , Ampi colony , Bampur , Dhawajnagar, Gorjee Bazar, Kankraban, Noabari, Taichakma, Jatanbari, PurbaBagafa (Santir Bazar), Gardhang, Manur Mukh, Jhajhari, Hrishyamukh, Rajnagar, Radhanagar, Rangamura, Kashari, Kalachhara, Manubazar, Sabroom where water level were measured four times in a year. Hence it may be concluded that there is a data gap in the area and 30 (Thirty) new Key wells were suggested to established.

- **Ground Water Quality Monitoring Data Gap :**

Generally, water samples were collected and analyzed from all the 21 (Twenty one) GWM wells falling in the district. There was small gap in data in terms of ground water quality monitoring

1.6.2 Recommendation on Data Generation :

The following quantity of various kinds of data had been suggested to be generated:

- **Recommendation for Exploration :**

According to the data gap analysis, 6 nos. of deep tube well in Tuichama, Rajibnagar & paschim Jalefa (piercing both Aquifer Group – I & Aquifer Group – II) was suggested. So the construction of a total 6 nos. of wells were recommended for further exploratory data generation in South Tripura district as per the existing norm in this regard.

- **Recommendation for VES and Profiling:**

From the data gap analysis it appears that 30 nos. of VES were required mainly to ascertain the depth and thickness of the individual aquifers as per the recommended norms of additional data generation. Thus a total 30 numbers of VES with a maximum electrode separation (AB) preferably ranging from 500 to 900 meter were recommended for geophysical data generation.

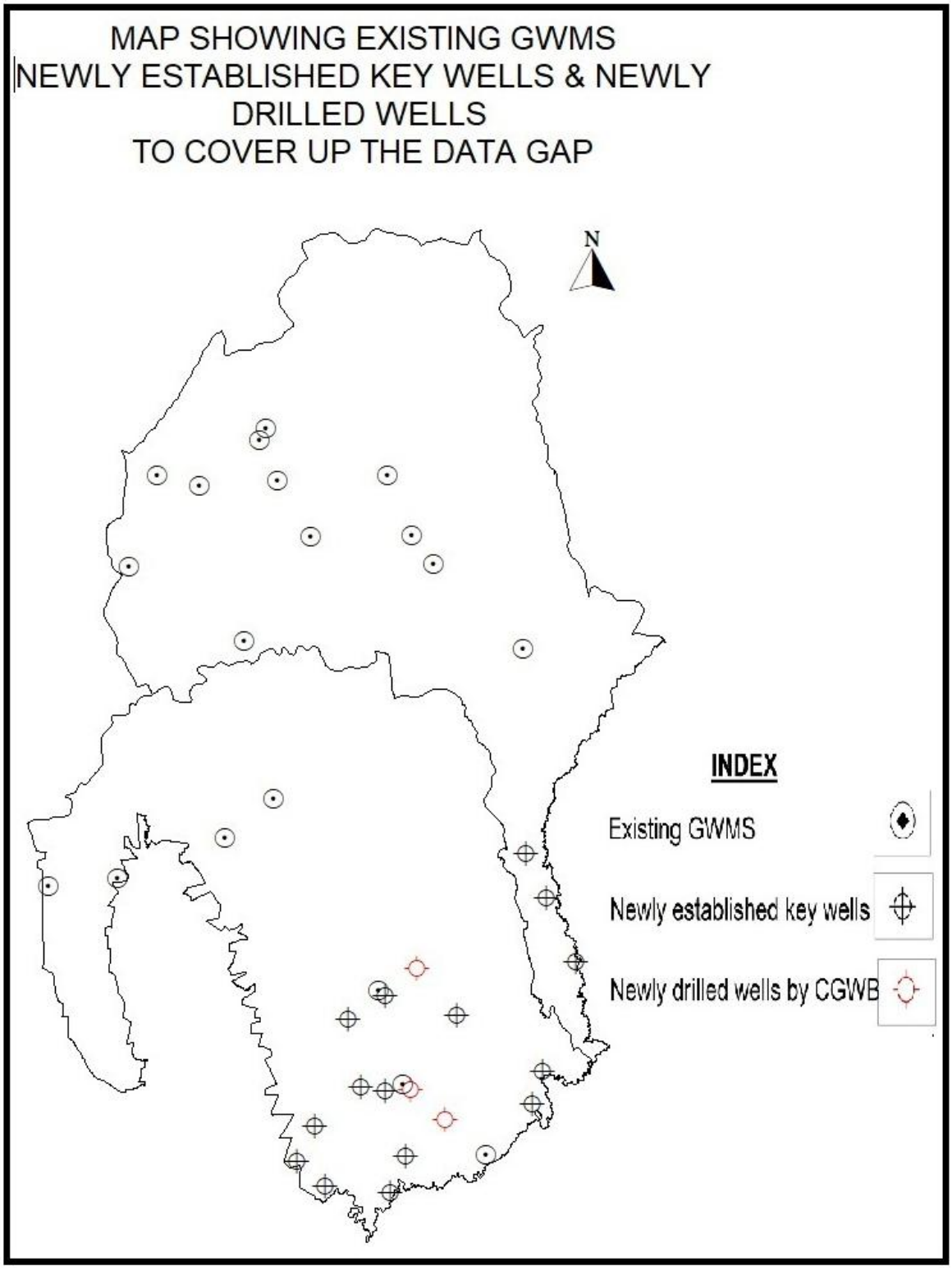

Fig 1.2: Map showing data gap and data generated of the NAQUIM area.

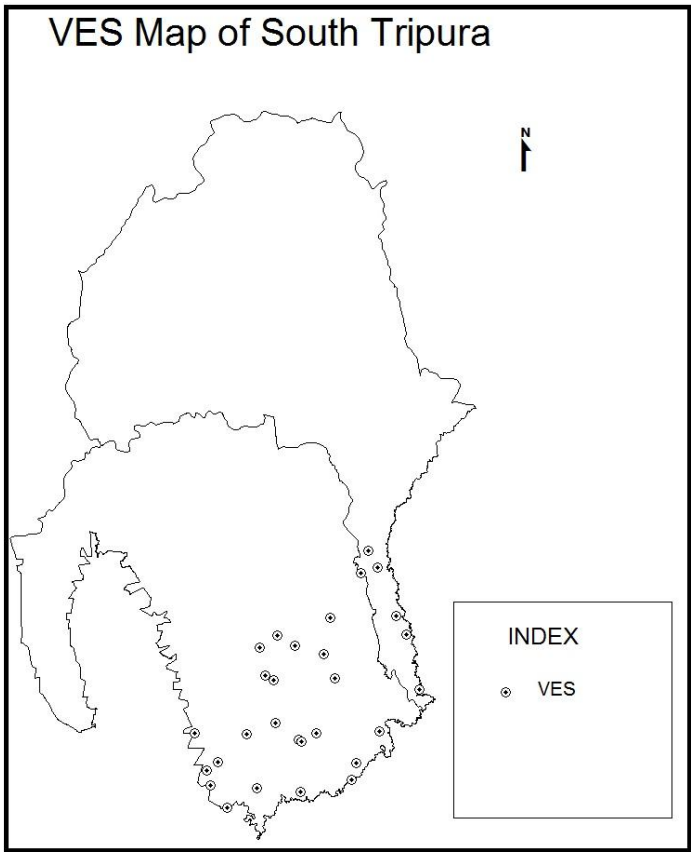

Fig 1.3: VES map of South Tripura district

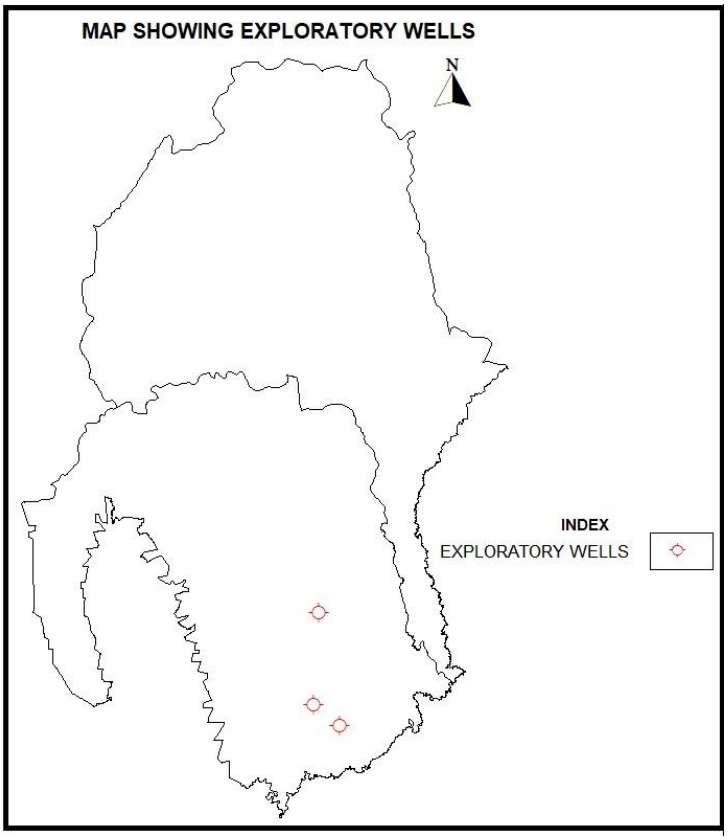

Fig 1.4: Map showing newly drilled exploratory wells in South Tripura

1.7 Rainfall Distribution

The study area receives rainfall mainly from S–W monsoon which commences in the month of May and lasts till September. Rainfall data from 3 rain gauge stations viz, Belonia, Sabroom and Bogafa were collected. The average annual rainfall of Belonia , Sabroom and Bogafa rain gauge stations for last 5 years (2012 – 2016) are 2207.78 mm, 2310.52 mm and 2179.54 mm respectively. The average nos. of rainy days of Belonia, Sabroom and Bogafa rain gauge stations are 90.4, 82.8 and 91.8 respectively.

The climate of the aquifer mapping area is humid subtropical, mostly warm and having moderate temperatures with high humidity.

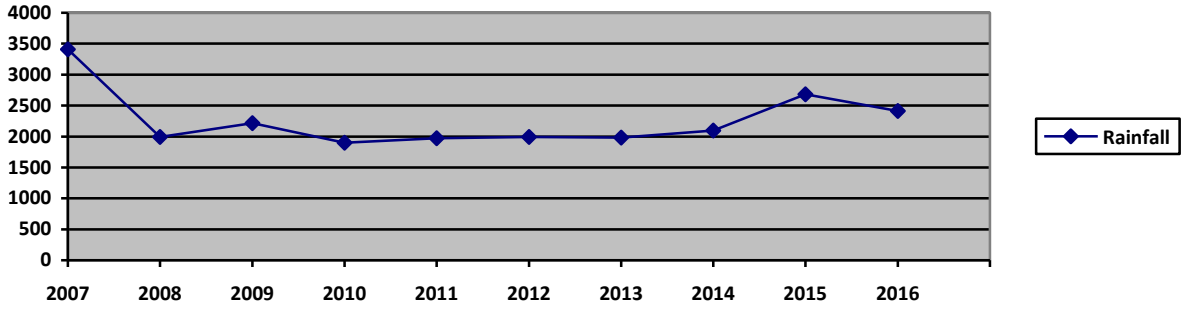

Fig 1.5: The average annual rainfall for the last 10 years

1.8 Physiography:

Physiographically, the area can be divided into two parts

(1) Anticlinal Hill Ranges and

(2) Synclinal flat bottomed valleys.

The important hill ranges in the study area are Baramura and Atharamura. The hill ranges are tightly folded. The trend of the hill ranges is almost N – S. The height of the hill ranges increases from west to east. The altitude of the hill ranges in general varying from 150 – 480 m above MSL. The broad synclinal valleys occurring in the study area are

(1) Udaipur – Sabroom valley,

(2) Belonia valley and

(3) Amarpur valley

The major valley is Udaipur – Sabroom (or simply Udaipur valley) and is situated on the western part of Baramura hill ranges. The valleys are gently undulating with intermittent flood plains of rivers and streams. The undulation formed by 10 – 30 m high mounds with gullies in between them, locally called "loonga."

1.9 Geomorphology:

Geomorphologically, the area can be defined as a second order morpho-structural land system similar to that of "**Ridge and Valley Province**" of USA. The erosional and depositional units of land system are confined mainly to the structural valleys. Genetic geomorphological map by GSI enables recognition of 3 genetic types of landform units : (i) units of structural origin, (ii) units of denudational origin and (iii) units of fluvial origin, which can be shown in relation to their bedrock geology and structural pattern.

Units of structural origin characterize the structural pattern of folded rock bodies and include features occurring only in anticlinal hill ranges. Units of denudational origin are confined to structural valleys, where erosional processes predominate, developing an eroded topography, represented by residual hillocks/mounds and an incised net of stream beds. Incised stream beds form the conspicuous geomorphic feature of valley landscape partly filled by alluvial materials derived from adjacent hill slopes. Units of fluvial origin include only the flood plains of major rivers confined to the flat part of structural valleys.

There are two fundamentally different landform domains : **(i) Neogene Fold Ridges**, which constitute the roughly N-S aligned anticlinal ridges with rounded to nearly flat top; (ii) **Terraced alluvial terrain**, on the basis of characteristic relief, slope, degree of dissection, soil character, landform assemblage and nature of alluvial fill, is again divisible into three groups in chronological order : **(1)** table lands (tilla lands) and rolling mounds formed by the Upper Pleistocene terraces characterized by maximum dissection, drainage density and weathering; **(2)** low lands ('loonga') of Holocene terrace comprising stabilized, undissected, higher flood plains; **(3)** recent flood plains constituting the present-day flood-prone belts fringing the rivers. 3 distinct physiographic zones i.e. terrains are **(i)** N-S Hill Ranges, **(ii)** Undulating Plateau Land and High Lands **(iii)** Low lying Alluvial Plains on valleys.

1.10 Land Use :

Based on the land utilization, the total area is divided into various types of landforms such as forest, cultivable land, fallows lands, crop area etc. which in turn reflects the degree of development of agricultural activities and cultivation potential.

Table 1.2: Block wise land utilization of the South Tripura District (as on 2013)

Name of Block	Geogra-phical Area	Area under Forest	Land not Avail -able for Agri-cultural Use		Perma-nent Pasture & other Grazing Land	Land under Misc. Tree crops & Groves (Not included in Net Sown Area)	Culti-vable Waste Land	Fallow Land other than Current Fallow	Current Fallow	Net Area Sown	Single Crops Area	Double Crops Area	Tripple Crop-ped Area	Total Crop-ped Area	Area Sown more than once	Total Culti-vable Area	Crop-ping Inten-city
			Land put to non-agri cultural use	Barren uncul-tivable Land													
SOUTH TRIURA																	
Matabari	29265	17330	2156	42	7	2	2	3	2	9868	3121	4520	2227	18842	6747	9884	191
Kakraban	11030	2578	1523	17	4	10	2	3	2	7073	1755	3213	2105	14496	5318	7094	205
Kila	25501	19185	1585	31	2	3	2	4	5	4867	2437	1932	498	7795	2430	4883	160
Amarpur	43070	33177	2528	41	21	14	1	26	5	7372	2326	2786	2260	14678	5046	7439	199
Ampi	22606	16563	587	56	25	78	1	12	9	5549	2520	1614	1415	9993	3029	5674	180
Karbook	17439	11871	364	48	21	27	1	20	5	5457	2585	1632	1240	9569	2872	5531	175
Bagafa	55256	37943	3272	15	0	42	1	16	3	14283	5732	4559	3992	26826	8551	14345	188
Rajnagar	31979	19160	1982	14	0	11	2	2	3	11046	2464	6502	2080	21708	8582	11064	197
Hrishyamukh	25412	16548	3450	7	0	6	2	2	2	5604	1477	2889	1238	10969	4127	5616	196
Satchand	28709	19235	1308	72	41	176	10	16	9	8340	3804	3307	1229	14105	4536	8592	169
Rupaichhari	17211	12985	622	0	0	179	2	11	13	3781	1987	1229	565	6140	1794	3986	162
ST District Total	**307478**	**206575**	**19377**	**343**	**121**	**548**	**26**	**115**	**58**	**83240**	**30208**	**34183**	**18849**	**155121**	**53032**	**84108**	**184**

1.11 Soil :

In general, soils of the district are acidic in nature. The pH of soil ranges from 5.50 to 5.68. Nitrogen and phosphate is low, available potash is medium to high, calcium, magnesium and sulfur are deficient in these soils.

In the district, lateritic soil is found in tilla (hilly / small mounds) area, younger soils or river valley soils are found along all major river courses, clayey soils are found in paddy fields. Apart from these, sandy loam, clayey loam and loamy soils are also available.

1.12 Drainage :

The anticlinal hill ranges forms the watersheds from which various drainage channels emerged. The common drainage patterns are sub-parallel to parallel and dendritic. Up to 4th order streams are found in the area. The major rivers in the area are Gomti, Muhuri, Fenny, Manu and Dhalai.

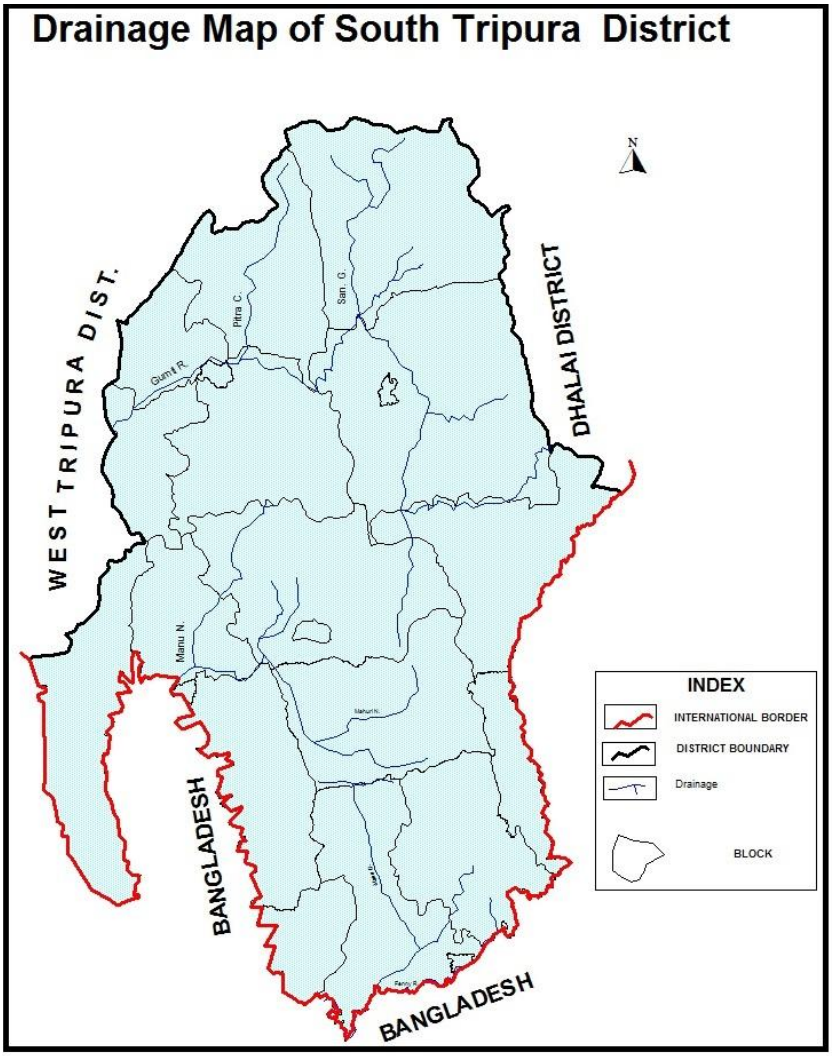

Fig 1.6: Drainage Map of South Tripura

1.13 Agriculture:

Agriculture in South Tripura district depends mainly on the timely monsoon. Fertile soils of the valleys and the abundant rainfall are very conducive to growing of better-quality agricultural and horticultural crops. Net area under agriculture (net area sown) is **83240** ha (in 2013-14), which is 27.07 % of total geographical area (**307478** ha).

Economy of the area is basically agrarian and about 55 % of the population is dependent on agriculture and allied activities for their livelihood as agricultural work is the single largest provider of employment to the rural people of South Tripura district. Favorable agro-climatic conditions, fertile soils, sub-tropical climate with pockets of temperate zones, large 'tilla' lands and high rainfall also promotes growing of horticultural plants like fruits, vegetables, spices, floriculture, medicinal and aromatic plants etc.

People cultivate on high hill slopes by practicing traditional '**JHUM'** process (shifting cultivation) to grow mainly rice in the monsoon.

The main crop is paddy; all three i.e. summer paddy (Aus), monsoon paddy (Aman) and winter paddy (Boro) are being raised, which are followed by maize, wheat, mesta, jute, cotton, pulses and oilseeds. Over a limited area cashew nut and pineapple are also grown. Rubber and tea plantations are also seen in a large scale on small mounds and foothills.

Table 1.3 : Principal Crop Area(Ha), Production (Met ton) & Yield (Kg/Ha or Bales/Ha) ,2011-12

Agricultural Sub- Division	Aush Paddy		Aman Paddy		Boro Paddy		'Jhum' Paddy		Maize		Wheat		Kharif Pulses		Rabi Pulses	
	A	**Y**	**A**	**Y**	**A**	**Y**	**A**	**Y**	**A**	**Y**	**A**	**Y**	**A**	**Y**	**A**	**Y**
Matabari	1002	2183	252	2966	11405	3137	514	839	190	1147	10	2100	113	685	303	904
Amarpur	1209	2275	31	2813	3419	3056	1870	982	282	1145	8	2375	58	665	225	858
Bagafa	1122	2421	139	2926	4648	3119	451	914	122	1246	5	1600	50	669	258	829
Rajnagar	1552	2416	345	2847	5385	2937	231	1017	209	1158	5	1600	54	620	353	720
Satchand	535	2301	69	2698	3083	2921	196	1122	120	1325	5	1400	35	646	116	741
Rupaichari	263	1973	0	2307	875	2759	340	941	132	1083	0	0	23	639	69	739
Total	**5683**	**2315**	**836**	**2853**	**28815**	**3053**	**3602**	**959**	**1055**	**1173**	**33**	**1909**	**333**	**657**	**1324**	**810**

Agricultural Sub- Division	Sesamum		Kharif Ground Nut		Rabi Ground Nut		Reap & Mustard		Jute (P :Bales) (Y : Bales/Ha)		Mesta(P:Bales) (Y : Bales/Ha)		Cotton (P : Bales) (Y : Bales/Ha)	
	A	**Y**	**A**	**Y**	**A**	**Y**	**A**	**Y**	**A**	**Y**	**A**	**Y**	**A**	**Y**
Matabari	122	549	11	1182	21	1190	87	908	92	8.42	45	8.13	32	1.49
Amarpur	92	641	6	667	12	1083	112	866	105	9.75	91	9.36	110	1.44
Bagafa	105	676	13	1000	4	1000	131	870	17	8.53	18	7.11	21	1.18
Rajnagar	134	634	17	1059	81	1296	108	778	17	8.18	15	7.87	20	1.39
Satchand	58	500	13	1000	18	1222	86	721	48	7.17	36	8.17	18	1.30
Rupaichari	45	511	0	0	5	1000	81	691	21	7.33	18	7.94	0	0.00
Total	**556**	**601**	**60**	**1017**	**141**	**1234**	**605**	**813**	**300**	**8.60**	**223**	**8.52**	**201**	**1.40**

A – Area (Ha); P – Production (MT); Y – Yield (Kg/Bales per Ha)

1.14 Irrigation :

Crop irrigation is mainly dependent on the minor surface water irrigation schemes like lift irrigation schemes on perennial rivers and streams; diversion schemes with surface water; pick-up weirs (mainly by PWD,WR); sluice gates; small 5 HP pump sets attached to rivers/cheras/streams; tank and ponds; water harvesting and watershed management works like seasonal and permanent bundhs on small nalas, cherras, streams etc. and to some extent on ground water from deep tube wells, small bore tube wells, shallow tube wells and artesian wells. The ground water potential is high but the yield of the tube wells is low.

In 2013-14, total cultivable land is **157131** ha, land brought under cultivation (net area sown) is **83240** ha. Irrigated area under different crops in South Tripura District (Area in Ha) is shown in annexure 6.

Table 1.4: Irrigated area under different crops in South Tripura District, 2013-14

Rice	Wheat	Total Pulses	Sugar cane	Fruits & Vegitables	Total	Non- Food Crops			Total Irrigation Area Under All Crops
						Total Oil Seed	Other Non-Food Crops	Total	
73601	15	2496	-	19750	95862	1715	677	1892	97754

1.15 Irrigation Projects: Major, Medium and Minor

Agriculture is dependent on minor irrigation schemes only. There is no major irrigation project in the district. Various types of minor irrigation projects present in the district area lift irrigation, diversion, sluice gates, pick up weirs, deep tube wells, shallow tube wells etc. Amongst them the most important is (river) lift irrigation projects. Farmers also construct permanent or seasonal bund across cherras / nalas/ streamlets to collect the water and cater for irrigation through pump sets.

Table 1.5: Structure wise Irrigation Potential Created by PWD (WR) and Potential Utilisation (as on March 2013)

Potential Created (ha)				Total Potential Created (ha)	Net Potential Utilised (ha)
Lift Irrigation (LI + HPLI)	DTW	Diversion	Low/High Pickup Weir		
16090	1245	2230	3289	22854	15997.80

Table 1. 6: Block wise Nos. of different Irrigation Structures and Irrigation Coverage Area (as on March 2013)

Block	Lift Irrigation (LI)	High Power Lift Irrigation (HPLI)	Diversion	Low & Medium Pick-up Weir	Deep Tube Well	Small Bore TW/ Mini Deep TW (80 - 100 m)	Shallow Tube Well	Artesian Well
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Matabari	57 (2140)	1 (120)	2 (220)	Medium (2221)	14 (399)	28	---	---
Kakraban	55 (1857)	---	1 (190)	Medium (1062)	8 (184)	22	---	---
Kila	26 (892)	---	1 (52)	---	2 (64)	18	---	---
Amarpur	88 (2653)	---	3 (330)	---	2 (68)	21	---	---
Ampi	49 (1168)	---	---	---	---	18	---	---
Karbook	40 (1178)	---	---	---	---	19	---	---
Jolaibari	41 (842)	---	---	---	1 (16)	10	---	---
Bagafa	34 (942)	---	3 (124)	---	8 (147)	26	---	---
Rajnagar	41 (1083)	---	2 (90)	---	9 (186)	25	---	---
Hrishyamukh	24 (824)	---	6 (595)	---	3 (70)	21	---	---
Satchand	71 (1855)	---	3 (452)	---	4 (85)	26	---	---
Rupaichhari	24 (656)	---	2 (177)	---	1 (26)	13	---	---
South Tripura dist. Total	**550 (16090)**	1 (120)	**23 (2230)**	**3283**	**52 (1245)**	247	---	---

Table 1.7: Irrigated area under different crops in South Tripura District, 2013-14

Rice	Wheat	Total Pulses	Fruits & Vegetables	Total	Non- Food Crops			Total Irrigation Area Under All Crops
					Total Oil Seed	Other Non-Food Crops	Total	
73601	15	2496	19750	95862	1715	677	1892	97754

1.16 Ponds, Tanks and other Water Conservation Structures

There are thousands of small ponds available in the district. These ponds are used mainly for fish cultivation and also used for domestic purpose like washing, bathing, water for cattle's etc. But rarely these ponds are used for irrigation purpose as these ponds do not have much water during summer periods. Farmers rarely use these ponds for irrigation.

1.17 Cropping Pattern :

The cropping pattern of the district is mainly paddy oriented and production amount of paddy is more than any other crop. Depending on the period of its growth the paddy is divided into three varieties – (i) monsoon paddy (Aman), (ii) winter paddy (Boro) and (iii) summer paddy (Aush). Aush is cultivated in a very limited area. After the cultivation of Aman paddy and before the cultivation of Boro paddy, different vegetables viz. potato, cabbage, gourds etc., oil seeds and pulses are cultivated. After Boro paddy, jute is also grown in a small scale. In most of the cultivable land only one paddy (Aman) is grown. In double-cropped areas, two paddies are grown (Aman & Boro) but in some places one paddy (Aman) and vegetables are grown. Triple cropped area is very limited and here the cropping pattern is two paddies and one vegetable or one paddy with two times vegetables. Cropping pattern not only depends on fertility of land and availability of water but also depends on individual cultivator. Over a limited area, orchards of pineapples, jackfruits, mangoes, cashew are raised. Rubber plantations are also in vogue on small mounds and foothills over a considerable area, which is ever increasing.

The cropping pattern of the district shows that among paddy varieties Aman paddy is cultivated in maximum area followed by Boro, 'Jhum' paddy (cultivated on the hill slopes by the village tribals) and Aush. After paddy, vegetables which includes potato followed by pulses are the major cultivated crops in the area.

1.18 Prevailing Water Conservation/Recharge Practices :

In South Tripura district, small/medium check dams are highly feasible to be constructed in foothill areas to store water which can be used during lean periods. Forest, Agricultural, Rural Development Department, Block Development Offices have constructed many rain water harvesting structures like ponds, check dams, nala bundhs.

1.19 General Geology:

Geologically, the study area is occupied by Quaternary & Upper Tertiary groups of rocks. The geological succession of the area is given in table below.

Table 1.8: Geological Succession in the study area

Age	Group	Formation	Lithology
Quarternary	Recent	Recent	Alluvium, represented by unconsolidated pale to dirty gray, silt, sand, clay, silty clay, sandy clay etc and yellowish brown coarse river sand, gravels & concretions.
	---------- UNCONFORMITY----------		
Upper Tertiary	Dupitila	Dupitila	Brown to buff sandy clay with grayish sandy loam, clayey sandstone with ferruginous materials & laterites.
	---------- UNCONFORMITY----------		
	Tipam	Champaknagar	Massive medium to coarse sandstone with sandy shale.
		Manubazar	Fairly bedded fine to medium sub-arkosic sandstone with sandy shale and siltstone.
	---------- UNCONFORMITY----------		
	Surma	Bokabil	Thinly laminated, bedded sandstone and silt (repetition) with ferruginous material, medium to coarse micaceous sandstone with mudstone.
		Bhuban	Intruded, hard compact, both massive & well-bedded sandstone, dark to olive shale repeated.
Base not known			

The distribution of the geological formations is described as under:

a) Surma Group: The Surma Group is represented by Upper Bhuban and Bokabil Formations. The rocks of Bhuban Formation, constituting compact sandstones and shales, which are exposed in the core of the anticlines of the district, viz SakhanTlang, Jampui hills and Longtarai etc. These formations usually form high hills with steep slopes and are conformably overlain by Bokabil Formation. The rocks of Bokabil Formation are predominantly of argillaceous composition and are exposed on both limbs of the anticlines.

b) Tipam Group: The Tipam Formations are conformable and transitional to the underlying Bokabil Formation. These Formations are arenaceous in nature and comprised of fine to medium grained, yellow to light buff and brownish yellow colour, friable sandstones, and occur along the outer flanks of the anticlinal hill ranges with moderate dip to near horizontal disposition. The sequence of these formations shows variations due to facies changes within the group. The maximum thickness of these formations is estimated to be around 1400m, the minimum being 400m.

c) Dupitila Group: The Dupitila sediments consisting of earthy brown to buff sandy clay, mottled clay, clayey sandstone and coarse to gritty ferruginous sandstone unconformably overlie the Tipam Formation, and are well developed in central portion of the synclinal valleys. These formations occur in the form of disconnected mounds. The thickness of this formation varies from 10 – 30m.

d) Recent Group: Recent alluvium occurs along the streams and the flood plains of major rivers. It consists of coarse sand, sandy clay, silt, silty clay and clay etc.

1.20 Sub-Surface Geology

It has been interpreted on the basis of the lithological logs of boreholes drilled by Central Ground Water Board and various state government Agencies. The sub-surface configurations of different granular zones have been shown in two panel diagrams. The granular zones encountered down to 300m depths belong to semi-consolidated Tipam and Dupitila groups and constitute medium to coarse grained, sub-rounded quartz, feldspathic material. The occurrence and thickness of these zones very laterally as well as vertically.

In Udaipur – Subroom valley, the first granular zone occurs between 40 – 56 m bgl and second granular zone occurs between 60 – 140 m bgl. In Udaipur, Rajapur and Tulamura area three alternating layers of sandstone and shale occur between 20 – 250 m bgl. In Baikhora and Satchand area the sandstone is quite thick and it forms almost a single aquifer system. In Subroom – Manubazar area 60 – 90 m thick granular zone occur between 35 – 135 m bgl.

In Amarpur valley, the disposition of sandstone horizons is more or less uniform in Amarpur – Ompinagar area where four prominent zones are discernible. The first aquifer is occurring below 30 to 40 m thick clay / shale bed and the granular zones having the thickness of 6 – 10 m. The second horizon which is encountered at the depth of 40 – 50 m, the thickness of granular zone is almost 30 – 40 m. Below 160 to 180 m depth the sediment is prominently clayey down to the depth of 250m or more.

2. DATA COLLECTION & GENERATION

- **Actual achievement in generating exploratory drilling data :**

Total 6 nos. of deep tube wells (DTW) including 3 nos. of exploratory tube wells (production well) and 3 nos. of observation wells (for water level measuring only) were constructed in Satchand block under Toposheet 79 M/12.

- **Actual achievement in generating geophysical survey data :**

30 nos. of Vertical Electrical Soundings (VES) at 30 nos. of different site spread all over the aquifer mapping area of Satchand have been conducted and locations of VES sites were depicted in map 8.

- **Actual achievement in generating Water Level data :**

In addition to previously existing 16 nos. of NHNS dug wells, 2 new Dug Wells under NHNS & 21 other dug wells have been established as NAQUIM Key Wells and since pre-monsoon of 2014-15. Also the 6 no.s of Deep Wells (DTW) have been added to the NHNS monitoring wells. Water levels from these total 45 nos. of wells are being monitored four times in a year.

- **Actual achievement in generating Water Quality data :**

In addition to previously existing 16 nos. of NHNS dug wells, 2 new Dug Wells under NHNS & 21 other dug wells have been established as NAQUIM Key Wells and since pre-monsoon of 2014-15, water samples from these 39 wells are being collected twice in a year during pre and post-monsoon period. Distribution of iron, pH and Ec in groundwater in the NAQUIM area is depicted in map 10, map 11 and map 12 respectively.

- **Exploratory drilling**

CGWB has drilled 10 DTWs down to the depth of 255 m bgl. 6 nos. of newDeep Tube Wells (DTW) including 3 nos. of Exploratory Tube Wells (Production Well) and 3 nos. of Observation Wells (for Water Level Measuring only) were constructed in Satchand block under Toposheet 79 M/12. It is observed that tube wells constructed down to a depth from 179 to 255 m and tapping 36 – 79 m cumulative thickness of aquifer are capable to yield 12 to 264 m^3/hr for a maximum drawdown up to 26.3 m. The transmissivity of the aquifer is calculated as 47 to 1577 m^2/day and permeability as 0.87 to 22.4 m/day. Storativity

calculated at Dhuptali, Matai And Haripur exploratory wells are 4.2×10^{-4} , 2.25×10^{-5} and 2.4×10^{-3} respectively. Artesian flowing wells are found in the paddy fields of Kalapania, Sindukpathar, Manubazar, Kaladhepa and Gardhang Gram Panchayats. These artesian wells were constructed within a depth range of 100 to 180m, piezometric head is upto 1 m agl and discharge is less than 1 lps.

Hydrogeological surveys and exploratory drillings carried out by the Central Ground Water Board down to a depth of 250 m bgl have revealed that the area is underlain by potential water-bearing formation of Tipam Group comprising of medium to fine grained, semi-consolidated, friable, soft, sandstones. Based on the results of explorations, the aquifer can be broadly divided into two groups, viz. shallow aquifer zone within a depth of 50 m bgl and deeper aquifer between 50 m bgl to 260m bgl.

Out of the 16 wells one exploratory well and one Observation Well drilled at Pashim Jalefa School premises under Satchand block of South Tripura district became artesian.

3. DATA INTERPRETATION, INTEGRATION AND AQUIFER MAPPING

3.1 Depth to water level: The ground water occurs in unconfined condition in the shallow aquifer and in semi -confined to confined condition in deeper aquifer. The main potential zone is formed by Tipam sandstone. Depth to water level during March, 2017 monitored from dug wells (first Aquifer) ranges from 1.05 to 10.30 m bgl while in Nov, 2017 depth to water level ranges from 0.50 to 9.33 m bgl. Depth to water level during March, 2017 and November, 2017 has been shown in Fig 3.1 and Fig 3.2.

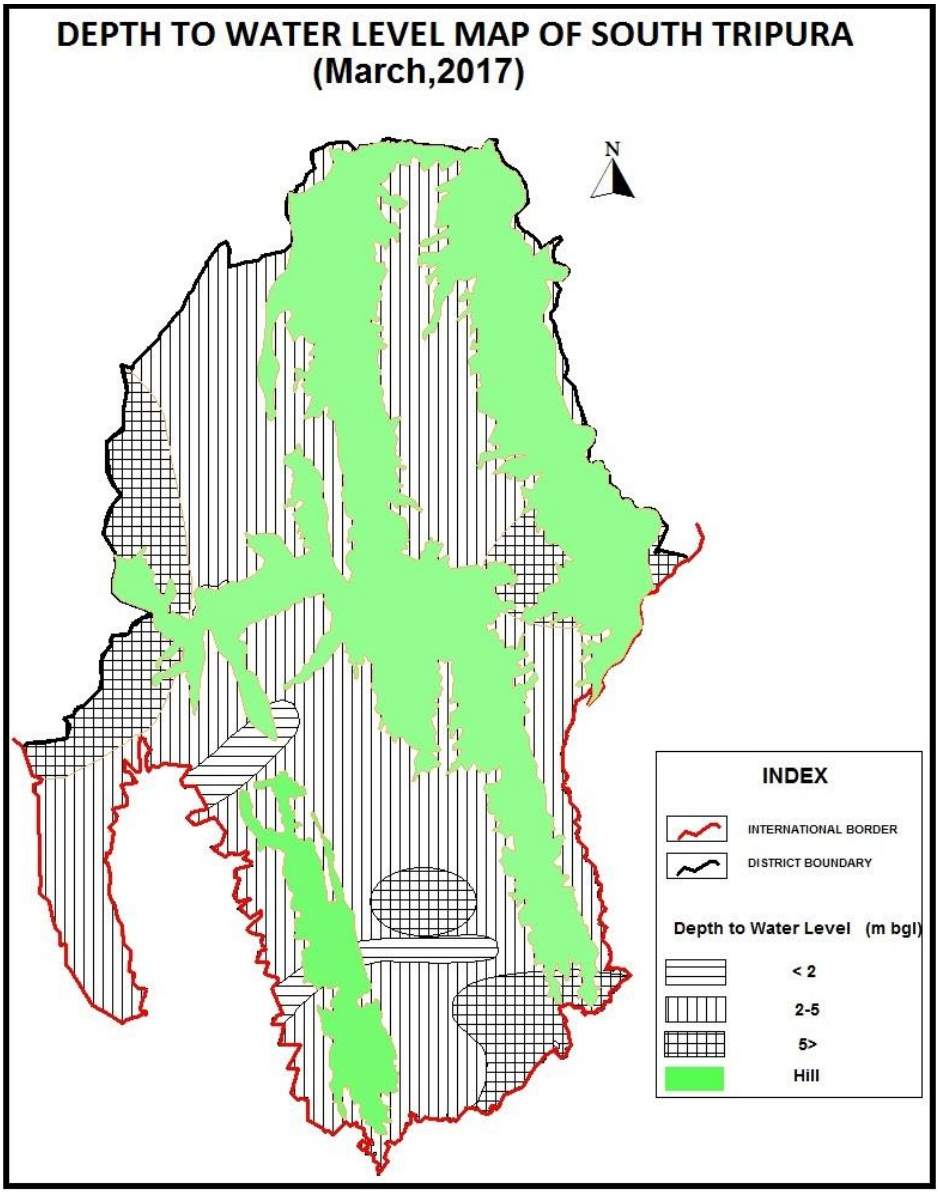

Fig 3.1: Depth to water level map of South Tripura (March, 2017)

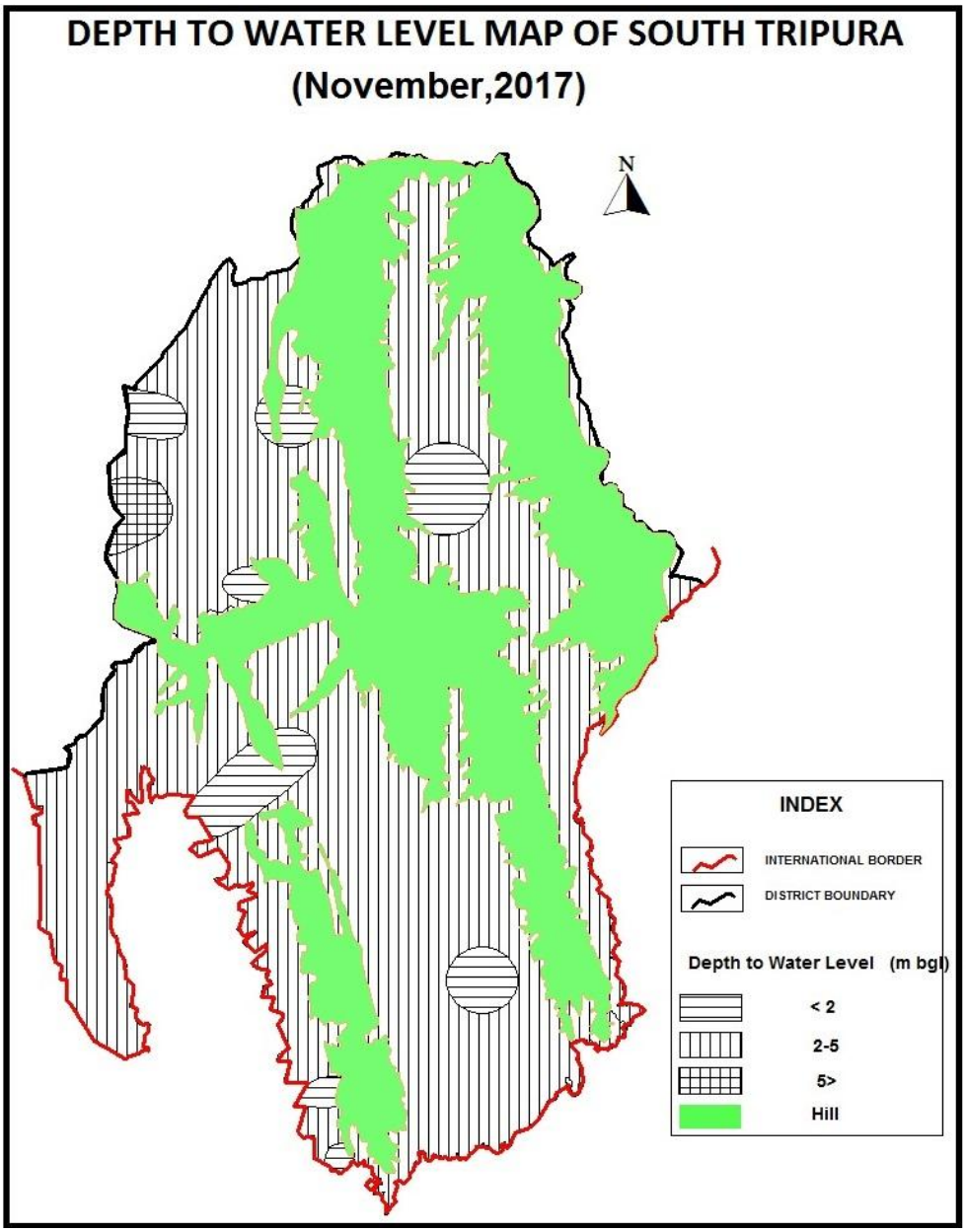

Fig 3.2: Depth to water level map of South Tripura (November, 2017)

3.2 General Hydrogeology and Occurrences of Ground Water:

The main hydrogeological formation of the aquifer mapping area is Quarternary to Tertiary semi-consolidated formations, more specifically Recent Alluvium of Quarternary age and Dupitila & Tipam formation of Tertiary age. The fine to medium grained semi-compact buff colored thick Tipam Sandstone forms the principal aquifer in the area. The ground water in this aquifer mapping area occurs under unconfined, semi-confined and confined conditions. Study of dug wells, shallow tube wells and deep exploration data of CGWB reveals the presence of phreatic, shallow and deeper aquifers in the Aquifer Mapping area. Hydrogeological map of the study area is shown in map 5.

3.2.1 Occurrences of Ground Water in Shallow Aquifers:

Shallow aquifers generally extend within the depth range of 5 to 30 m bgl. In shallow aquifer, ground water generally occurs under unconfined condition and sometimes under semi-confined to confined conditions. In major part of the area, ground water in shallow depths occurs under unconfined condition but it occurs under confined condition within shallow depths in small isolated zones in the southern part (Jalefa – Harina area). Ground water from shallow aquifers is exploited through different types of ground water abstraction structures such as dug wells (Kachha dug wells, RCC ring wells, Mark II/III fitted RCC ring wells), shallow tube wells (ordinary hand pump fitted, mark II/III hand pump fitted, electric/diesel pump fitted shallow tube wells). Shallow tube wells fitted with electric/diesel pumps are used for irrigation purpose and the others are used for drinking and domestic purposes. Ring/Dug wells are found to be tapping unconfined aquifer generally down to 4 – 10 m bgl.

3.2.2 Occurrences of Ground Water in Deeper Aquifers:

In deeper aquifers ground water occurs under semi-confined to confined conditions. Most of the heavy duty ground water abstraction structures for different purposes are tapping these deeper aquifers. At some places on the Satchand to Manubazar tract, the aquifer under Group – II is continuing from 50 m to 150 m bgl uninterruptedly with some localized thin impermeable clay layer/lenses. Deep tube wells constructed by CGWB for exploration at Satchand and Paschim Jalefa in Satchand block is in artesian condition. Artesian flowing wells are found in the paddy fields of Kalapania, Sindukpathar, Manubazar, Kaladhepa and Gardhang Gram Panchayats. These artesian wells were constructed within a depth range of 100 to 180m, piezometric head is upto 1 m agl and discharge is less than 1 lps.

3.2.3 Aquifer character:

The aquifers mostly consist of sedimentary formations of Tertiary age. Three hydrogeological units/ water bearing formations identified in the area are Alluvial formation, Dupitila formation, Tipam formation and Bokabil formation.

(A) Alluvial Formation : It occurs along the banks of main rivers and thickness varies from 5 to 10 m. Ground water occurs under unconfined condition and its development is not very significant because of high clay and sandy clay content of this formation. Ground water is developed through dug wells and shallow tube wells fitted with hand pumps.

(B) Dupitila Formation: Dupitila formation is nearly horizontal in disposition and its thickness varies from 10 to 30 m. The formation consists of mainly clay and silt with some intercalations of gritty & ferruginous sandstones. It is exposed in the western middle part of Udaipur - Subroom valley. Due to high clay content, it has low permeability, low storage capacity and the ground water extraction occurs through dug wells and shallow tube wells fitted with hand pumps.

(C) Tipam Formation: Sandstones of Tipam formation forms the principal aquifer system in mapping area. Permeability of this sandstone is much higher than that of Dupitila sandstone or Bokabil (Surma Group) sandstones. This formation consists of sub-rounded, fine to medium grained, friable sandstone with intercalated clay. The recharge area of these sandstones is in the neighboring anticlinal hills. Ground water occurs under unconfined, semi-confined to confined conditions. Sandstones are mostly developed by deep tube wells, mini deep tube wells, shallow tube wells and dug wells.

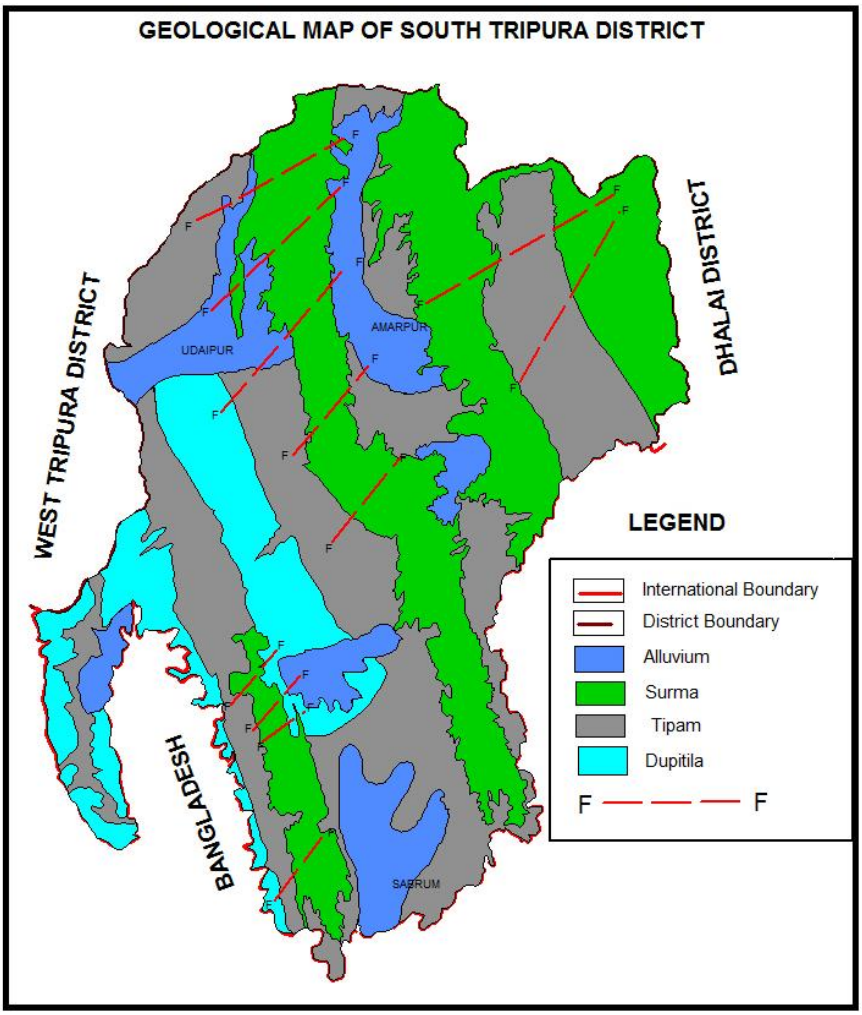

Fig 3.3: Geological map of South Tripura District

3.3 Aquifer geometry

The aquifer system of the area is divided into two groups, viz, shallow aquifer and deep aquifer. Shallow aquifer occurs within 50 m bgl and deeper aquifer occurs between 50 to 300 m bgl.

- **Udaipur – Subroom valley:**

This valley is a southern extension of Agartala valley. This valley is dominated by thick sandstone horizons with thin intervening shale / clay horizons particularly in the northern and southern part. In the central part, around Baikhora and Satchand the sandstone is quite thick and forms almost a single aquifer system. In Rajapur – Tulamura – Udaipur area four aquifers can be identified. The first granular zone is encountered in the depth range of 25 to 56 m bgl. The thickness of the zone varies from 14 to 25 m. The second granular zone occurs between 60 – 140 m bgl. In Subroom – Manubazar area 60 – 90 m thick granular zone occur between 35 – 135 m bgl and second granular zone encountered at a depth of 150 – 195 m bgl. In the southern part of Belonia and eastern part of Manu Bhanga hill range (around Srinagar area) the sediment is more argillaceous.

- **Amarpur valley:**

In Amarpur valley, the disposition of sandstone horizons is more or less uniform in Amarpur – Ompinagar area where four prominent zones are discernible. The first aquifer occurring below 30 to 40 m having clay / shale bed is hardly 6 – 10 m thick. The second horizon is encountered at depth of 40 – 50 m is almost 30 – 40 m thick. Below 160 to 180 m depth the sediment is predominantly clayey down to the depth of 250m or more.

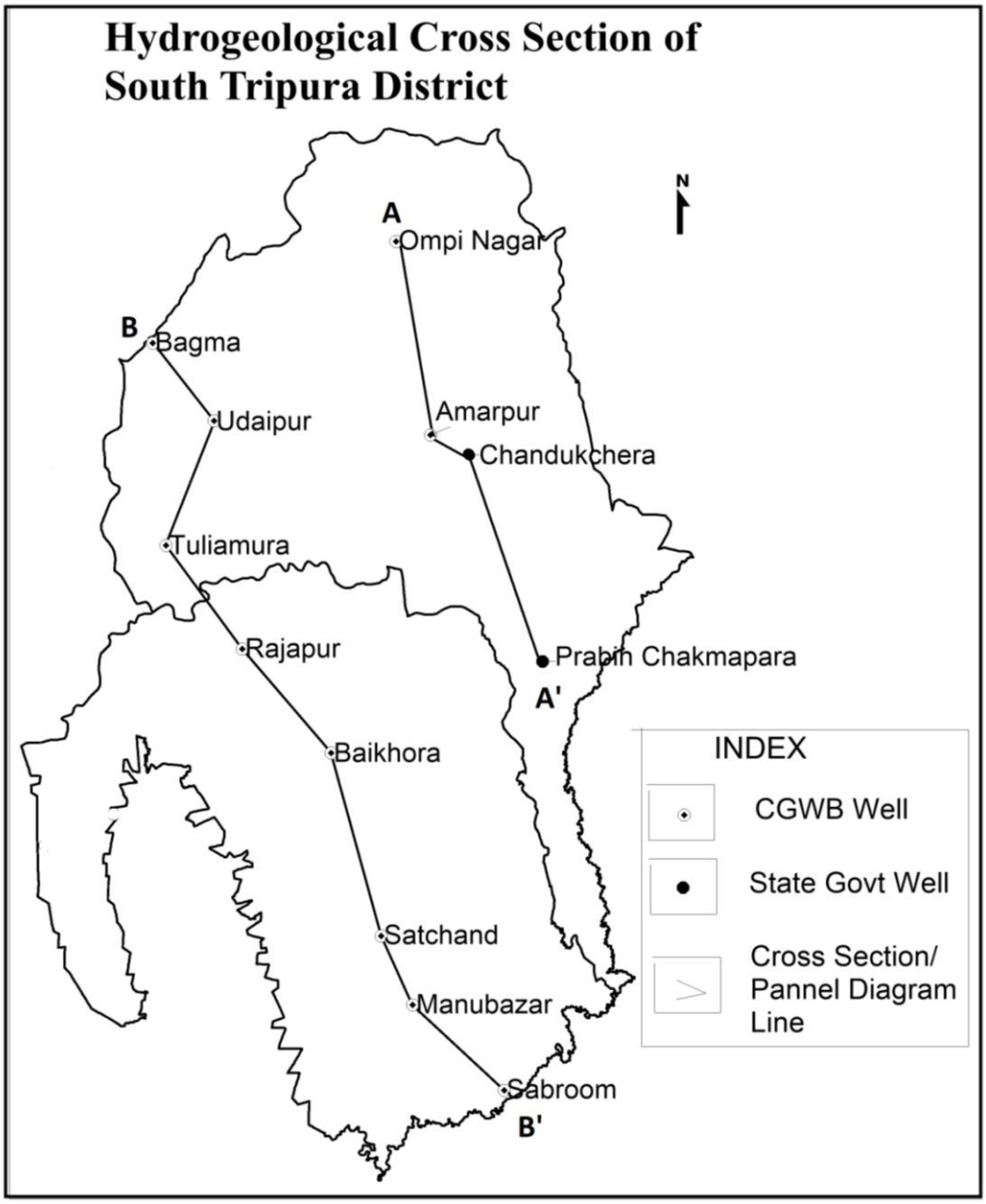

Fig 3.4: Hydrogeological Cross section of South Tripura District

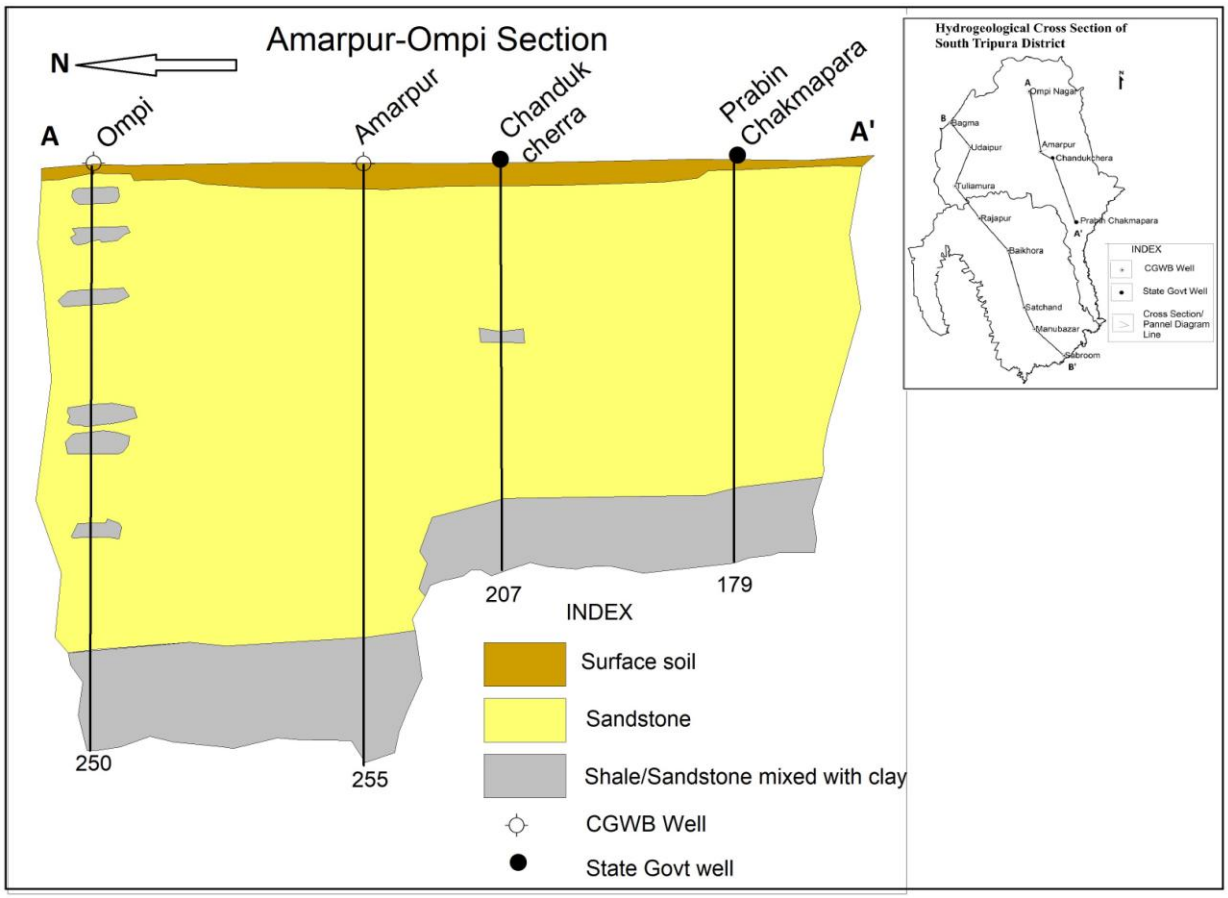

Fig 3.5: Panel diagram AA' showing sub-surface geology of Amarpur valley

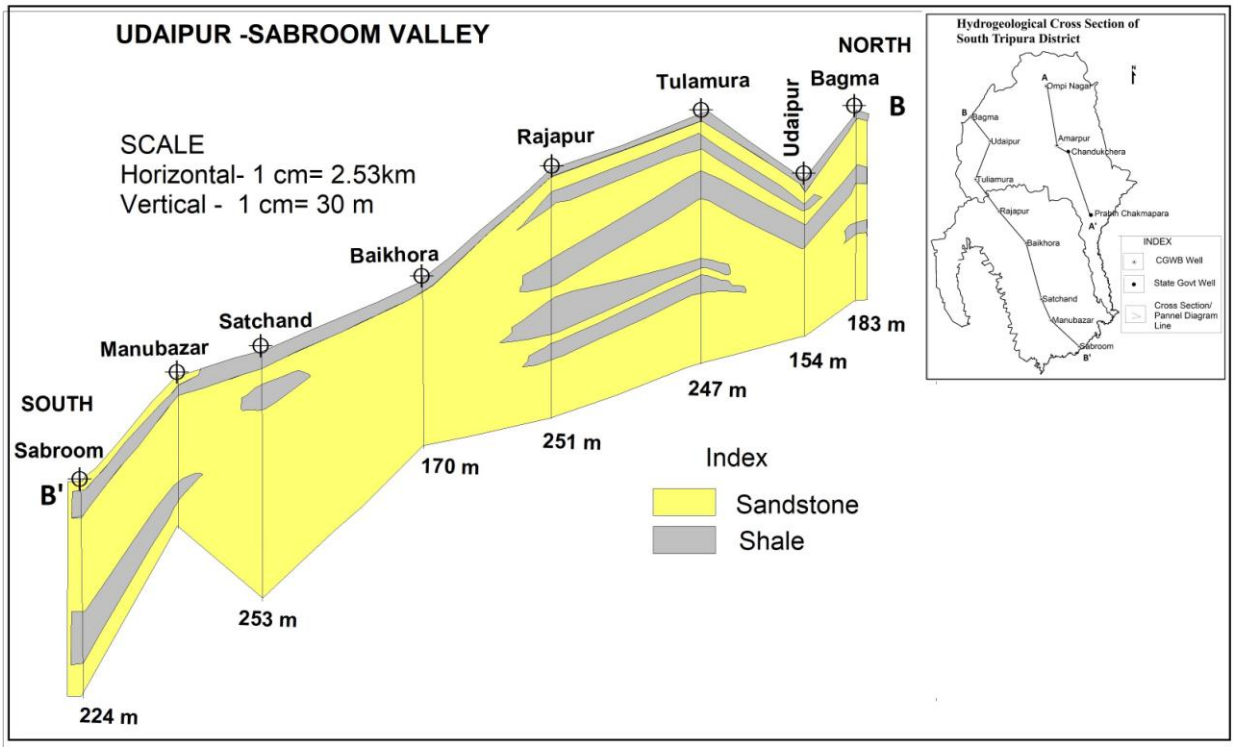

Fig 3.6: Panel diagram BB' showing sub-surface geology of Udaipur-Sabroom valley

3.4 Geophysical Studies

As per the target assigned in AAP 2014-15 and AAP 2015-16 under aquifer mapping studies, Surface Geophysical studies were to be carried out at select sites in South Tripura district and assess subsurface geology at particular places assumed to be location of data gaps under aquifer mapping assignment. Accordingly the surface geophysical studies were conducted during June-July' 2014 and September 2015 by Sri P.P.Dookia, STA (Geophysics). The sites covered were selected by the concerned hydrogeologists assigned for aquifer mapping studies.

Cultivation, crops availability and very high undulation in the study area resulting in limited spaces for resistivity surveys and only the current electrodes spread available was in the range of 200 and 800m. The VES observed can be located on the co-ordinates given along with results. H, KH, K, HK, HKH, HKQ, KHK, Q, QH type VES curves were obtained. Study area cover the toposheet No. 79 M/12, 79 M/15, 79M/16, 79N/9. The following tables describe the interpreted results of VES and inferences with respect to possible sub-surface geology. Results of the Geophysical studies has been incorporated in Annexure 7.

3.5 Ground Water quality

The pH values of the ground water ranges from 7.27 to 8.40 for shallow aquifer and is around 6.98 for deeper aquifer. The BIS has recommended acceptable range of pH from 6.5 to 8.5 for domestic use. Ground water quality in the area is potable and range of all the chemical constituents are within the permissible limit set by BIS , except iron. In shallow aquifer EC values ranges from 55.88 to 500.20 and in deeper aquifer it is around 190.8. Fluoride content in ground water from shallow aquifer ranges from 0.10 to 0.58 ppm and in deeper aquifer it is around 0.55ppm. Ground water of the area is characterized by a generally high iron content which ranges from 0.00 to 10.97 ppm.

Block-wise concentration range of chemical constituents in ground water is given in Annexure 1.

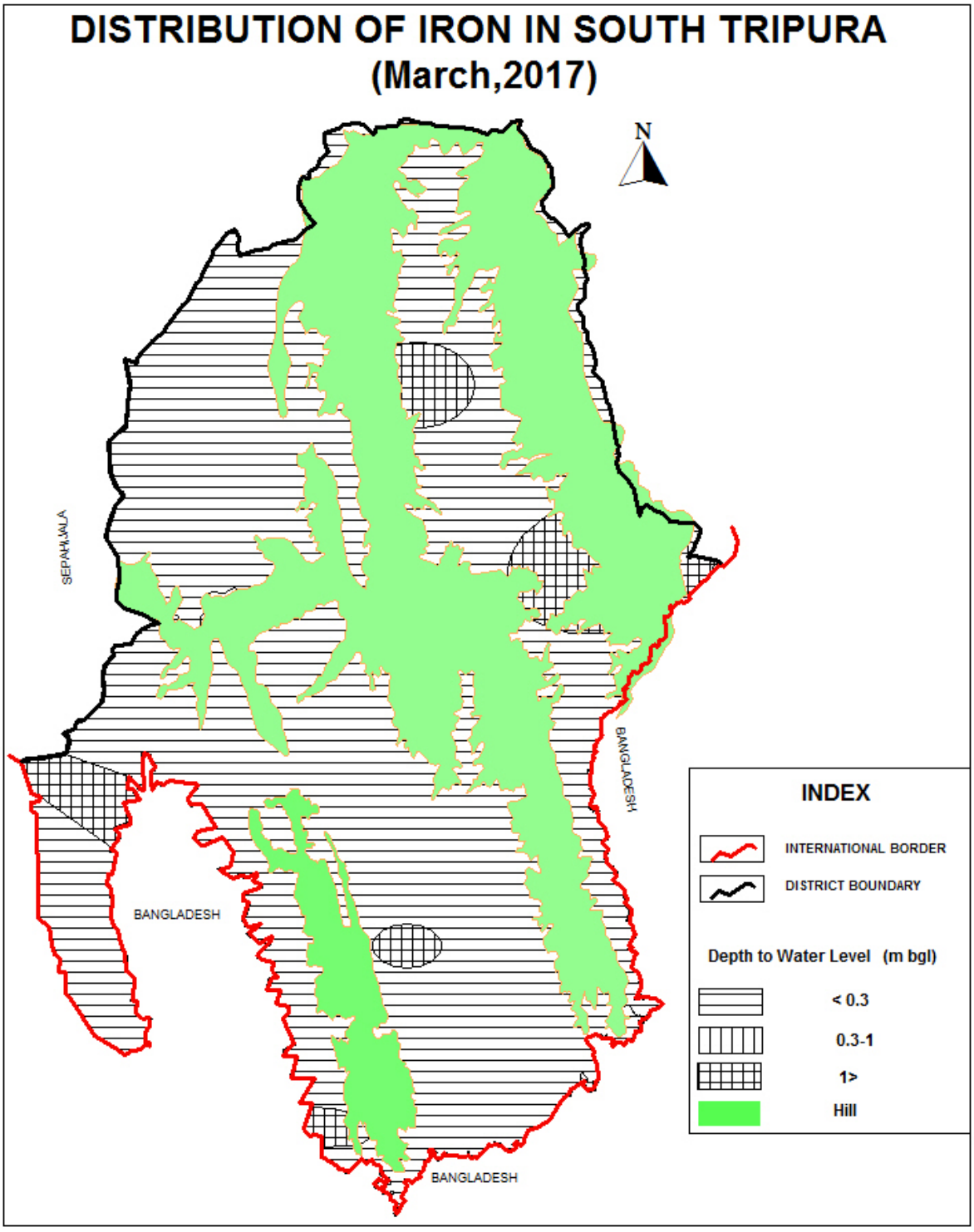

Fig 3.7: Map showing distribution of iron in South Tripura District

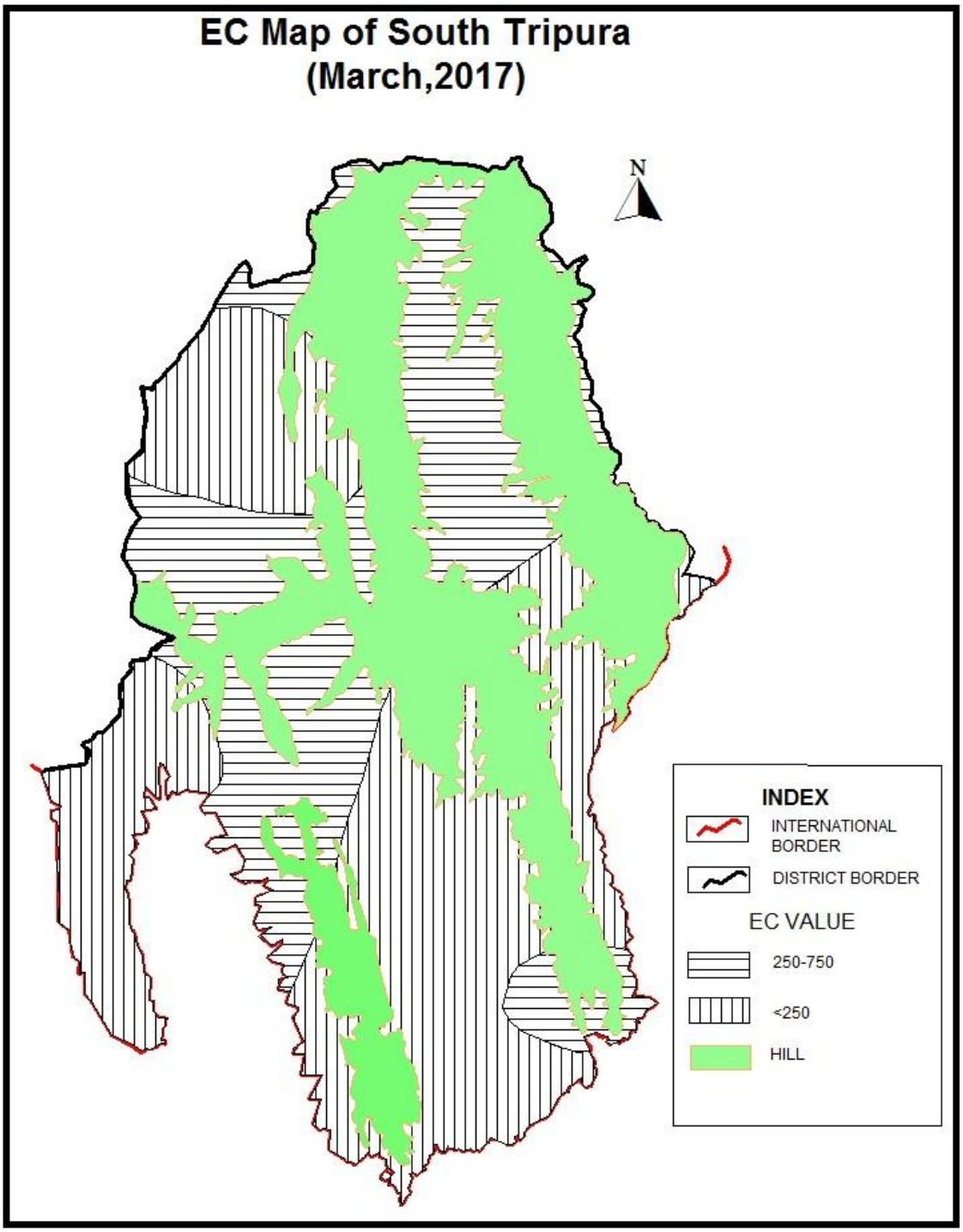

Fig 3.8: EC Map of South Tripura district

4. GROUND WATER RESOURCES

Estimation of Ground Water Resources in the South Tripura district has been carried out based on the methodology recommended by Ground water Estimation Committee (GEC'97), where two approaches are recommended: (i) water level fluctuation method and (ii) rainfall infiltration method. The latest dynamic resource computation based on the basis of various available technical data, the results of exploratory drilling and other hydrogeological testing by CGWB and State Govt. departments such as PWD (Water Resources), PWD (DWS) & Agriculture Dept., Govt. of Tripura, is done for the year 2012 – 2013 (1st April, 2012 to 31st March, 2013), where the smallest and undisputed administrative unit, the rural development block is taken as the unit of computation in absence of actually GEC-97 recommended assessment unit watershed wise number of ground water structures, amount of ground water draft, population and other vital geographical and economical figures or statistics. Hydrogeological formations comprising Sandstones and Shales named as Dupitila, Tipam and Surma Formations of Upper Tertiary age are spread all over the South Tripura district and all are considered as a single hydrogeological unit. Area with more than 20% slope has been excluded for the recharge computation. The dynamic reserve which is seasonally renewable in response to monsoon recharge has been assessed based on the seasonal fluctuation of water table and specific yield of shallow aquifer materials and also based on rainfall recharge by infiltration. The main potential aquifer in the South Tripura district is Tipam sandstone and the specific yield value for Tipam sandstone is taken here as 0.08 (GEC'97). As the upper aquifers are made up of medium to fine grained sandstone, which are very porous and permeable, the rainfall infiltration factor is here taken as 0.16 and the value is approved by the R&D advisory committee on Dynamic Ground Water Resource Estimation.

Dynamic resources of ground water, extent of current utilization, balance available for further development have been calculated in this procedure. There is no saline/brackish water aquifer or any other poor ground water quality area. There is no major or medium canal irrigation scheme and thus the whole South Tripura district has been considered as a non-command area.

Table 4.1: Ground water resources of South Tripura District (2012-13)

District (p)	**Stage of Ground Water development (%)**	**Net GW Availability (ham)**	**Existing Ground Water Draft for Irrigation**	**Existing Gross Ground Water Draft for All Uses**	**Provision for Domestic & Industrial requirement for upto 2025**	**GW Availability for Future Irrigation@ 60% Net GW Availability (ham)**
Satchand	5.65	8495.78	288.00	479.71	603.92	7603.86
Rupaichari	2.27	4286.49	0.00	97.27	389.80	3896.69
Hrishyamukh	2.43	5013.14	15.00	121.99	165.82	4832.32
Rajnagar	14.37	5766.82	597.00	828.70	403.34	4766.48
Bagafa	14.15	8224.78	885.00	1163.71	1374.92	5964.85
Matabari	4.86	7604.87	42.00	369.92	2014.23	5548.64
Kakraban	5.06	5685.58	135.00	287.76	233.26	5317.32
Killa	1.86	5417.43	18.00	101.00	152.61	5246.82
Karbuk	1.51	6088.04	0.00	92.00	192.72	5895.32
Amarpur & Ompi	3.03	7111.21	0.00	215.14	94.01	7017.20
South Tripura district	**5.90**	**63694.14**	**1980.00**	**3757.21**	**5624.64**	**56089.50**

Table 4.2: Assessment of Dynamic Ground Water Resources of South Tripura District Unit-wise Categorization(2012-13)

Sl. No.	**Assessment Unit**	**Stage of Ground Water Development (%)**	Pre-monsoon		Post-monsoon		**Category (Safe/ Semi-critical/ Critical/ Over-exploited)**
1	2	16	Water level Trend	Is there a significant decline **(Yes/ No)**	Water level Trend	Is there a significant decline **(Yes/ No)**	
1	**Satchand**	5.65	-	No	Falling	No	Safe
2	**Rupaichari**	2.27	-	No	Falling	No	Safe
3	**Hrishyamukh**	2.43	Falling	No	Falling	No	Safe
4	**Rajnagar**	14.37	Rising	No	Rising	No	Safe
4	**Bagafa**	14.15	-	No	Falling	No	Safe
6	**Matabari**	4.86	Falling	No	Rising	No	Safe
7	**Kakraban**	5.06	-	No	-	No	Safe
8	**Killa**	1.86	-	No	-	No	Safe
9	**Karbuk**	1.51	-	No	-	No	Safe
10	**Amarpur & Ompi**	3.03	-	No	-	No	Safe
South Tripura district		**5.90**	-	No	-	No	Safe

5. GROUNDWATER ISSUES

- **Ground Water quality problem**

Ground water of the area is characterized by a generally high iron content which ranges from 0.00 to 10.97 ppm. The concentration of iron in ground water is generally much above the prescribed desirable limit of 0.3 ppm and maximum permissible of 1 ppm. The iron concentration in water from open well is comparatively less than that of tube wells. This is due to the fact that the scope of aeration is more in open wells allowing the precipitation of ferrous iron as ferric iron. The enrichment of iron in water of the area is due to the ferruginous nature of Tipam sandstones, which forms the major aquifers. The high contents of iron renders ground water unsuitable for drinking purpose, hence the level of concentration should be brought down to the desirable limit before use for drinking purpose, to avoid any health hazards. . The iron concentration in ground water from shallow aquifer ranges from 0 to 10.97 ppm and in deeper aquifer it ranges from 0.043 ppm to 5 ppm. In deeper aquifers also the iron concentration is relatively less in the discharge areas of Satchand (at Kalir bazar - 0.06 ppm) & Rupaichhari (at Rupaichhari - 0.175 ppm) blocks.

- **Drilling Problems**

In the area shallow tube wells are drilled manually. It is reported that construction of shallow tube wells is difficult in the foothills and hilly areas of the district due to the presence of hard shale.

As per dynamic ground water resource estimation 2013, by CGWB, the stage of ground water development is only **5.90** % for South Tripura District. Therefore, there is enough scope for future development of ground water in the study area to bring more area under irrigation practice. Though there is enough ground water resources available in the study area and CGWB has constructed a few successful bore wells in valley areas that does not mean that the above bore holes constructed anywhere will yield required ground water. Before construction of bore wells sites are to be selected scientifically.

The area annually receives nearly 1890.72 mm of rainfall yet people suffer for drinking water during lean periods. It has been observed that 70 to 80 percent of rainfall occur between May to September and within a few hours most of the rainwater goes as run-off and finally enters Bangladesh. Suitable water storage structures may be constructed for utilization of water during lean periods.

Major ground water related issues can be summarized as under:

- Low stage of groundwater development (**5.90** %).
- Less Tube well / bore well /irrigation wells in the entire area
- Higher concentration of iron both in shallow and deeper aquifer

6. MANAGEMENT STRATEGY

As per dynamic ground water resource estimation of South Tripura district for 2012-13, net ground water availability is 63694ham and stage of development is only 5.90%. The district is having balance net ground water availability for future irrigation use in the tune of 56089ham. If an irrigation plan is made to develop 60% of the balance dynamic ground water resources available, then 33653 ham of groundwater resources is available in the district for the future irrigation uses. From this available resource (planned for future development) 14000 nos. of shallow tube wells (considering a unit draft of 2.4 ham/year) can be constructed. Therefore, there is enough scope for future development of ground water in the district to bring more area under irrigation practice.

During Kharif season, land under cultivation (field crops only) in the district is 52,306 ha. Land use data for 2014-15 shows that cropping intensity in the district is 188%. During Rabi season, land under cultivation (field crops only) in the district is 46,395 ha. Irrigation potential created in the district is 39,576 ha. It can be seen that land cultivated during rabi season is more than the irrigation potential created. This may due to the fact that apart from the assured minor irrigation projects farmers use pump sets to collect water directly from rivers and some artesian wells; in some narrow valleys during dry season also water seeps from hills, some temporary bunds are constructed on small rivers / streamlets for irrigation in the district, which were not accounted.

After Kharif crops are over a part of this cultivable area remains fallow during Rabi season. Gap between area cultivated during Kharif season and Rabi season is 5,911 ha. The intention of this plan is to utilize this fallow land of about 5,911 ha under assured irrigation during Rabi season which will help to increase gross cropped area to 11,822ha. This will help to increase gross cropped area and thereby increase cropping intensity up to 200%. Since stage of dynamic ground water is only about 6%, this area of 5,911 ha can easily be covered by constructing ground water based irrigation projects. To use the groundwater for irrigation purpose a cropping plan has been designed for the district by using CROPWAT model developed by FAO. A suitable cropping plan for the district was prepared and is presented in Table 6.1.

In rice fallow, potato, mustard, pulses and rabi vegetables can be grown with the support of irrigation. Present cropping pattern, proposed cropping pattern, targeted increase in cropping intensity were shown in Table 6.2a and 6.2b.

Crop-wise and month-wise irrigation water requirement (Precipitation deficit) has been estimated from CROPWAT after giving necessary meteorological, soil, crop plan inputs and the same has been shown in Table 6.3. Crop-wise and month-wise Irrigation water requirement in ham has been further calculated in Table 6.4.

Table 6.1 : Cropping Pattern data for South Tripura District

CROPPING PATTERN DATA
(File: C:\ProgramData\CROPWAT\data\sessions\Udaipur.PAT)

Cropping pattern name:

No.	Crop file	Crop name	Planting date	Harvest date	Area %
1	...Data\CROPWAT\data	Rice	04/06	01/10	10
2	...Data\CROPWAT\data	Rice	11/06	08/10	15
3	...Data\CROPWAT\data	Rice	18/06	15/10	15
4	...Data\CROPWAT\data	Rice	25/06	22/10	10
5	...a\CROPWAT\data\cr	Pulses	15/11	04/03	12
6	rape___mustard.CRO	Mustard	25/11	08/04	13
7	...\CROPWAT\data\cro	Potato	07/12	15/04	12
8	...CROPWAT\data\crop	Small Vegetables	15/12	19/03	13

Source: CROPWAT

Table 6.2 a: Proposed cropping pattern with water deficit months and IWR, South Tripura district

Crop	**Growing period (Months)**	**Periods/months of water deficit**	**Irrigation requirement (ha m)**
Rice	4	1 – 3	1024
Potato	5	4	233
Mustard	6	5	273
Vegetables	4	4	312
Pulses	4	4	267

The total area of rice cultivation is comprised of (5911 ha). During kharif season, rice is cultivated from June to mid-July. Since this huge area cannot be cultivated in a single day (one planting date), so it is considered/ planned to cultivate rice in two to four stages during this period.

It is planned to utilize rice fallow of 5,911 ha for the cultivation of pulses, potato, mustard and vegetables. It is considered to cultivate the proposed crops 1478 ha each.

The peak water requirement for irrigation for rice is in the months of May-June, for mustard and pulses it is in the month of January, for potato it is in the month of March and for vegetables it is during February.

Table 6.2 b: Cropping pattern, proposed cropping pattern, intended cropping intensity, for mono-cropped un-irrigated area in South Tripura district.

Mono-cropped Un-irrigated area in South Tripura district (new)				
Rice based cropping pattern				
1. Rice-Potato 2. Rice-Mustard 3. Rice-Vegetables 4. Rice-Pulses	Present Cultivated area (**ha**)	Area to be cultivated (**%**)	Area to be cultivated (**ha**)	Irrigation requirement (**ha m**)
	1	**2**	**3(= % of 1)**	**4**
Rice (main crop)	5911	5911		1024
Vegetables	0	1478	25	233
Mustard	0	1477	25	273
Pulses	0	1478	25	312
Potato		1478	25	267
Net cultivated area	5911	**5911**		
Gross cultivated area (1+potato/+mustard/+Veg/+Pulses)	5911	**11822**		
Total irrigation requirement				**2109**
Cropping intensity	**100% (Present)**	**200% (Intended)**		

Table 6.3: Crop-wise and month-wise precipitation deficit (mm) using CROPWAT 8 for South Tripura District.

Crops	Precipitation deficit (mm)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. Rice	0	0	0	0	147.7	62.9	0	0	0	3.1	0	0
2. Rice	0	0	0	0	49.5	98	0	0	0	0	0	0
3. Rice	0	0	0	0	61.8	123.5	0	0	0	0	0	0
4. Rice	0	0	0	0	0	147.4	0	0	0	6	0	0
5. Pulses	69.6	47.3	0	0	0	0	0	0	0	0	6.3	40.9
6. Mustard	54.6	46	39.3	0	0	0	0	0	0	0	3	34.9
7. Potato	50.1	62.2	78.2	5.7	0	0	0	0	0	0	0	23.5
8. Small Vegetables	51.3	55.3	42.8	0	0	0	0	0	0	0	0	24.5

Table 6.4: Irrigation water requirement (ham) of South Tripura district

Crops	% of total area of 11822 ha	Precipitation deficit												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1. Rice	10	0.0	0.0	0.0	0.0	174.6	74.4	0.0	0.0	0.0	3.7	0.0	0.0	252.6
2. Rice	15	0.0	0.0	0.0	0.0	87.8	173.8	0.0	0.0	0.0	0.0	0.0	0.0	261.6
3. Rice	15	0.0	0.0	0.0	0.0	109.6	219.0	0.0	0.0	0.0	0.0	0.0	0.0	328.6
4. Rice	10	0.0	0.0	0.0	0.0	0.0	174.3	0.0	0.0	0.0	7.1	0.0	0.0	181.3
5. Pulses	12	98.7	67.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.9	58.0	232.8
6. Mustard	13	83.9	70.7	60.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	53.6	273.3
7. Potato	12	71.1	88.2	110.9	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	311.7
8. Small Vegetables	13	78.8	85.0	65.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.7	267.3
		332.6	311.0	237.1	8.1	372.0	641.4	0.0	0.0	0.0	10.8	13.5	182.6	2109.1

Under ground water exploration programme, CGWB has drilled 22 nos. of exploratory (including observation wells) tube wells in the district down to the depth of 300 m bgl. It has established that the aquifer in most part of the valleys in the district is having moderate to high potentiality, having an average discharge of about 88 m^3/hr and can be sustainably developed and use for irrigation purpose. Shallow tube wells within 50m depth can be constructed through 150/100mm diameter well assembly tapping 20 – 30m granular zones having 25m housing and 12-15m slotted portion. The annular space between the borehole and the well assembly should be shrouded preferably with 100mm thick zone of pea gravels. The yield of such tube wells in central part of the valleys is expected to be 15 – 20 m^3/hr at 5 to 10 m drawdown and in foothills yield of such tube wells is expected to be 10 – 15 m^3/hr at draw down 5 – 10m. Shallow tube wells in valley portions where draw down is less than 5m and where non-pumping water level is less than 2 m bgl, enable the use of centrifugal pumps.

A shallow tube well in the district is expected to yield 20 m^3/hr. If such a tube well runs for 10 hrs/day for 120 days, then it will create a draft of 2.4ham.

In the considered area of 5,911 ha, 1475 nos. of shallow tube wells can be constructed (considering 200m distance between any two shallow bore well). 1475 nos. of tube wells can extract 3540ham of water annually.

Annual irrigation water requirement is 2109 ham while irrigation water requirement during dry season spanning from October to March it is 1088 ham. However, proportionate dynamic groundwater resources available for future irrigation use (proposed to use 60% of availability) in 5,911 ha in the district is 1875 ham. Therefore, this rice fallow area can be irrigated by constructing ground water abstraction structures and can bring under double cropped area. This amount of groundwater resources can be harnessed by constructing 880 tube wells. It is also proposed to construct water harvesting structures at suitable places. As per available ground water resources (60% availability) 14000 nos. of tube wells can be constructed and State Govt. has already constructed 23 deep tube wells, 150 mini deep tube wells and 58 shallow tube wells for irrigation purpose. For drinking purposes also there is thousands of shallow tube wells drilled by State Govt. and by public/private. Still there is scope for further drilling of 880 tube wells.

Groundwater in the area is infested with iron, therefore before consumption aeration/ filtering/ installation of Iron Removal Plant is necessary.

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ANNEXURE 1 : BLOCK-WISE WATER QUALITY DATA OF SOUTH TRIPURA DISTRICT FOR THE YEAR 2016

Sl.No	Location	Block	Source	pH	EC µS/cm at 25°C	TRBD (NTU)	TDS	CO_3	HCO_3	TA	Cl^-	SO_4^{-2}	NO_3^{-1}	F^-	Ca^{+2}	Mg^{+2}	TH	Na^+	K^+	Fe
								Mg/l.												
1	Dhwajnagar	Matabari	DW	7.27	141.90	0.80	71.65	0	65	65	12.50	14.94	2.60	0.26	16	3.64	55	8.71	11.44	0.59
2	Amarpur	Amarpur	DW	8.30	500.20	1.40	259.20	30	125	155	39.99	24.54	2.50	0.35	20	6.07	75	69.99	7.20	0.29
3	Bampur	Amarpur	DW	8.30	299.70	0.90	162.10	20	130	150	19.99	2.71	1.70	0.33	38	3.64	110	15.00	15.86	3.35
4	Ampi Colony	Ampi	DW	8.30	333.80	1.50	173.30	10	105	115	37.49	15.98	1.80	0.26	22	3.64	70	50.30	4.62	0.41
5	Taichakma	Ampi	DW	7.43	148.40	BDL	78.08	0	35	35	19.99	29.46	7.90	0.18	14	8.50	70	11.35	2.90	0.27
6	Jatanbari	Amarpur	DW	7.58	129.60	BDL	67.02	0	25	25	29.99	46.07	2.50	0.19	6	1.21	20	20.90	6.74	28.00
7	Garjee Bazar	Matabari	DW	7.30	446.30	BDL	234.60	0	30	30	84.97	45.00	7.40	0.28	14	10.92	80	56.98	7.33	0.09
8	Manurmukh	Bagafa	DW	8.37	337.80	BDL	196.40	20	155	175	19.99	24.24	0.60	0.41	20	14.56	110	55.89	2.43	0.32
9	Jhajhari	Hrishya-mukh	DW	7.80	253.60	BDL	133.20	0	60	60	47.49	16.39	0.90	0.18	18	6.07	70	29.46	5.54	0.34
10	Rajnagar	Rajnagar	DW	7.99	173.60	BDL	93.90	0	70	70	27.49	18.57	1.00	0.10	20	6.07	75	11.87	3.44	10.97
11	Radhanagar	Rajnagar	DW	7.75	105.60	BDL	55.76	0	20	20	29.99	2.85	3.10	0.11	4	4.85	30	12.05	9.04	0.58
12	Rangamura	Rajnagar	DW	8.12	245.10	BDL	129.10	0	55	55	37.49	18.90	4.90	0.18	24	3.64	75	21.53	4.61	4.04
13	Kashari	Rajnagar	DW	8.21	199.80	BDL	105.70	10	65	75	19.99	21.75	1.50	0.32	20	6.07	75	20.83	7.34	0.33
14	Kalacharra	Satchand	DW	7.91	60.80	BDL	32.09	0	30	30	17.49	8.25	1.00	0.25	4	3.64	25	10.70	7.84	3.29
15	Sabroom	Satchand	DW	7.76	125.90	BDL	67.59	0	35	35	19.99	18.80	3.00	0.22	10	4.85	45	15.60	1.95	0.69
16	Kalir Bazar	Satchand	DW	7.30	260.60	0.60	131.60	0	40	40	69.99	43.75	0.90	0.56	18	20.63	130	26.26	6.82	0.12
17	Rajib Nagar	Satchand	DW	7.38	75.28	0.90	38.02	0	40	40	24.99	2.27	1.10	0.35	8	7.28	50	10.95	2.11	0.68
18	Pashchim Jalefa	Satchand	DW	7.85	207.20	1.20	105.20	0	95	95	22.49	5.25	1.20	0.30	22	8.50	90	13.27	5.82	0.45

Sl.No	Location	Block	Source	pH	EC µS/cm at 25°C	TRBD (NTU)	TDS	CO3	HCO3	TA	Cl-	SO4-2	NO3-1	F-	Ca+2	Mg+2	TH	Na+	K+	Fe
								Mg/l.												
19	Baishnabpur	Rupaichhari	DW	7.38	55.88	0.80	27.90	0	20	20	24.99	5.26	1.10	0.27	4	4.85	30	13.36	1.11	1.11
20	Magroom	Rupaichhari	DW	7.62	341.90	1.30	173.20	0	45	45	69.98	42.73	1.30	0.25	14	14.56	95	43.82	7.58	0.22
21	Bijoynagar	Satchand	DW	7.82	183.70	0.60	93.54	0	60	60	24.99	38.12	1.50	0.29	14	14.56	95	17.14	5.09	0.26
22	Mothu Mogpara	Satchand	DW	8.38	312.20	1.20	159.30	20	30	50	55.99	56.49	1.00	0.50	30	24.27	175	13.86	1.61	0.04
23	Shashichandra para	Satchand	DW	8.34	409.50	1.00	209.80	20	125	145	32.49	25.30	1.60	0.40	38	18.20	170	22.01	7.50	0.00
24	Amlighat	Poangbari	DW	7.99	197.20	0.70	100.20	0	80	80	19.99	30.13	1.30	0.46	14	15.78	100	15.44	4.01	0.79
25	Srinagar	Poangbari	DW	8.15	62.22	0.40	31.43	0	25	25	17.49	2.26	13.60	0.25	2	4.85	25	10.81	4.65	5.88
26	Poangbari	Poangbari	DW	7.64	343.40	0.90	175.90	0	50	50	44.99	37.43	0.90	0.58	20	10.92	95	26.02	7.26	0.00
27	Purba Takka	Poangbari	DW	7.90	157.20	1.00	83.24	0	75	75	57.49	53.56	1.20	0.35	16	37.62	195	9.11	3.21	0.84
28	Tuisama	Satchand	DW	8.03	169.80	0.80	89.77	0	70	70	24.99	37.62	0.90	0.34	16	16.99	110	14.36	3.26	0.68
29	Bankul Mahamuni	Rupaichhari	DW	7.76	99.43	0.60	53.99	0	50	50	17.49	12.79		0.33	12	9.71	70	3.32	1.94	1.58
30	Ghorakhappa	Silachhari	DW	7.74	144.80	BDL	77.66	0	50	50	32.49	22.15	1.00	0.29	6	10.92	60	22.42	2.50	1.46
31	Ailmara	Silachhari	DW	7.82	258.20	BDL	135.80	0	50	50	47.49	27.75	1.40	0.29	10	15.78	90	24.50	7.13	0.00
32	Kalir Bazar	Satchand	DW	7.50	68.57	BDL	36.21	0	35	35	22.49	2.37	1.40	0.26	4	4.85	30	17.68	1.84	0.20
33	Rajib Nagar	Satchand	DW	7.78	184.97	BDL	87.90	0	65	65	19.99	5.52	2.30	0.48	10	8.50	60	11.89	8.67	0.00
34	Baishnabpur	Rupaichhari	DW	7.28	76.15	BDL	40.01	0	20	20	22.49	23.31	2.10	0.27	4	8.50	45	10.10	3.97	0.28
35	Magroom	Rupaichhari	DW	7.76	337.00	BDL	178.70	0	45	45	64.98	33.50	1.40	0.28	22	10.92	100	32.90	7.09	0.46
36	Bijoynagar	Satchand	DW	7.89	189.50	BDL	100.40	0	60	60	22.49	28.80	1.40	0.34	10	10.92	70	20.15	5.03	0.19
37	Mothu Mogpara	Satchand	DW	8.30	164.60	BDL	87.04	10	75	85	17.49	4.61	1.20	0.41	14	13.35	90	11.85	0.59	0.08
38	Shashichandra para	Satchand	DW	7.94	179.80	0.10	96.12	0	70	70	22.49	18.07	1.60	1.29	16	8.50	75	15.68	7.03	0.31
39	Amlighat	Poangbari	DW	7.86	120.90	BDL	63.21	0	55	55	17.49	16.18	0.90	0.35	10	9.71	65	9.66	2.25	0.96
40	Srinagar	Poangbari	DW	7.53	59.63	BDL	31.38	0	35	35	19.99	5.86	11.10	0.19	4	6.07	35	16.12	2.27	0.00

Sl.No	Location	Block	Source	pH	EC µS/cm at 25°C	TRBD (NTU)	TDS	CO_3	HCO_3	TA	Cl^-	SO_4^{-2}	NO_3^{-1}	F^-	Ca^{+2}	Mg^{+2}	TH	Na^+	K^+	Fe
								Mg/l.												
41	Purba Takka	Poangbari	DW	7.94	183.40	BDL	97.81	0	60	60	32.49	33.57	1.10	0.34	8	9.71	60	37.47	1.25	0.41
42	Ghorakhappa	Silachhari	DW	8.40	292.30	0.50	154.20	20	125	145	24.99	15.65	1.80	0.48	28	20.63	155	21.95	2.77	0.27
43	Ailmara	Silachhari	DW	7.63	110.10	BDL	58.17	0	15	15	57.49	37.81	2.90	0.26	6	23.06	110	14.54	1.84	1.59
44	Tuisama	Silachhari	DW	7.70	166.80	BDL	87.57	0	65	65	22.49	42.81	2.60	0.34	12	14.56	90	21.28	3.79	2.57
45	Rajib Nagar	Satchand	DW	7.70	208.50	BDL	109.90	0	10	10	37.49	44.46	5.50	0.20	6	8.50	50	30.76	4.72	0.23
46	N. C. Para	Rupaichhari	DW	6.90	106.60	BDL	56.02	0	10	10	24.99	44.39	3.30	0.29	8	10.92	65	14.79	1.81	1.85
47	Purba Takka	Poangbari	DW	7.94	183.40	BDL	97.81	0	60	60	32.49	33.57	1.10	0.34	8	9.71	60	37.47	1.25	0.41
48	Dhwajnagar	Matabari	DW	7.27	141.90	0.80	71.65	0	65	65	12.50	14.94	2.60	0.26	16	3.64	55	8.71	11.44	0.59
49	Amarpur	Amarpur	DW	8.30	500.20	1.40	259.20	30	125	155	39.99	24.54	2.50	0.35	20	6.07	75	69.99	7.20	0.29
50	Bampur	Amarpur	DW	8.30	299.70	0.90	162.10	20	130	150	19.99	2.71	1.70	0.33	38	3.64	110	15.00	15.86	3.35
51	Ampi Colony	Ampi	DW	8.30	333.80	1.50	173.30	10	105	115	37.49	15.98	1.80	0.26	22	3.64	70	50.30	4.62	0.41
52	Taichakma	Ampi	DW	7.43	148.40	BDL	78.08	0	35	35	19.99	29.46	7.90	0.18	14	8.50	70	11.35	2.90	0.27
53	Jatanbari	Amarpur	DW	7.58	129.60	BDL	67.02	0	25	25	29.99	46.07	2.50	0.19	6	1.21	20	20.90	6.74	28.00
54	Garjee Bazar	Matabari	DW	7.30	446.30	BDL	234.60	0	30	30	84.97	45.00	7.40	0.28	14	10.92	80	56.98	7.33	0.09
55	Manurmukh	Bagafa	DW	8.37	337.80	BDL	196.40	20	155	175	19.99	24.24	0.60	0.41	20	14.56	110	55.89	2.43	0.32
56	Jhajhari	Hrishya-mukh	DW	7.80	253.60	BDL	133.20	0	60	60	47.49	16.39	0.90	0.18	18	6.07	70	29.46	5.54	0.34

Sl.N	Location	Block	Source	pH	EC µS/cm at 25°C	TRBD (NTU)	TDS	CO_3	HCO_3	TA	Cl^-	SO_4^{-2}	NO_3^{-1}	F^-	Ca^{+2}	Mg^{+2}	TH	Na^+	K^+	Fe
								Mg/l.												
57	Rajnagar	Rajnagar	DW	7.99	173.60	BDL	93.90	0	70	70	27.49	18.57	1.00	0.10	20	6.07	75	11.87	3.44	10.97
58	Radhanagar	Rajnagar	DW	7.75	105.60	BDL	55.76	0	20	20	29.99	2.85	3.10	0.11	4	4.85	30	12.05	9.04	0.58
59	Rangamura	Rajnagar	DW	8.12	245.10	BDL	129.10	0	55	55	37.49	18.90	4.90	0.18	24	3.64	75	21.53	4.61	4.04
60	Kashari	Rajnagar	DW	8.21	199.80	BDL	105.70	10	65	75	19.99	21.75	1.50	0.32	20	6.07	75	20.83	7.34	0.33
61	Kalacharra	Satchand	DW	7.91	60.80	BDL	32.09	0	30	30	17.49	8.25	1.00	0.25	4	3.64	25	10.70	7.84	3.29
62	Sabroom	Satchand	DW	7.76	125.90	BDL	67.59	0	35	35	19.99	18.80	3.00	0.22	10	4.85	45	15.60	1.95	0.69
63	Kalir Bazar	Satchand	DW	7.30	260.60	0.60	131.60	0	40	40	69.99	43.75	0.90	0.56	18	20.63	130	26.26	6.82	0.12
64	Rajib Nagar	Satchand	DW	7.38	75.28	0.90	38.02	0	40	40	24.99	2.27	1.10	0.35	8	7.28	50	10.95	2.11	0.68
65	Pashchim Jalefa	Satchand	DW	7.85	207.20	1.20	105.20	0	95	95	22.49	5.25	1.20	0.30	22	8.50	90	13.27	5.82	0.45
66	Baishnabpur	Rupaichhari	DW	7.38	55.88	0.80	27.90	0	20	20	24.99	5.26	1.10	0.27	4	4.85	30	13.36	1.11	1.11
67	Magroom	Rupaichhari	DW	7.62	341.90	1.30	173.20	0	45	45	69.98	42.73	1.30	0.25	14	14.56	95	43.82	7.58	0.22
68	Bijoynagar	Satchand	DW	7.82	183.70	0.60	93.54	0	60	60	24.99	38.12	1.50	0.29	14	14.56	95	17.14	5.09	0.26
69	Mothu Mogpara	Satchand	DW	8.38	312.20	1.20	159.30	20	30	50	55.99	56.49	1.00	0.50	30	24.27	175	13.86	1.61	0.04
70	Shashichandra para	Satchand	DW	8.34	409.50	1.00	209.80	20	125	145	32.49	25.30	1.60	0.40	38	18.20	170	22.01	7.50	0.00
71	Amlighat	Poangbari	DW	7.99	197.20	0.70	100.20	0	80	80	19.99	30.13	1.30	0.46	14	15.78	100	15.44	4.01	0.79
72	Srinagar	Poangbari	DW	8.15	62.22	0.40	31.43	0	25	25	17.49	2.26	13.60	0.25	2	4.85	25	10.81	4.65	5.88
73	Poangbari	Poangbari	DW	7.64	343.40	0.90	175.90	0	50	50	44.99	37.43	0.90	0.58	20	10.92	95	26.02	7.26	0.00

Sl.No	Location	Block	Source	pH	EC µS/cm at 25°C	TRBD (NTU)	TDS	CO3	HCO3	TA	Cl-	SO4-2	NO3-1	F-	Ca+2	Mg+2	TH	Na+	K+	Fe
								Mg/l.												
74	Purba Takka	Poangbari	DW	7.90	157.20	1.00	83.24	0	75	75	57.49	53.56	1.20	0.35	16	37.62	195	9.11	3.21	0.84
75	Tuisama	Satchand	DW	8.03	169.80	0.80	89.77	0	70	70	24.99	37.62	0.90	0.34	16	16.99	110	14.36	3.26	0.68
76	Bankul Mahamuni	Rupaichhari	DW	7.76	99.43	0.60	53.99	0	50	50	17.49	12.79		0.33	12	9.71	70	3.32	1.94	1.58
77	Ghorakhappa	Silachhari	DW	7.74	144.80	BDL	77.66	0	50	50	32.49	22.15	1.00	0.29	6	10.92	60	22.42	2.50	1.46
78	Ailmara	Silachhari	DW	7.82	258.20	BDL	135.80	0	50	50	47.49	27.75	1.40	0.29	10	15.78	90	24.50	7.13	0.00
79	Kalir Bazar	Satchand	DW	7.50	68.57	BDL	36.21	0	35	35	22.49	2.37	1.40	0.26	4	4.85	30	17.68	1.84	0.20
80	Rajib Nagar	Satchand	DW	7.78	184.97	BDL	87.90	0	65	65	19.99	5.52	2.30	0.48	10	8.50	60	11.89	8.67	0.00
81	Baishnabpur	Rupaichhari	DW	7.28	76.15	BDL	40.01	0	20	20	22.49	23.31	2.10	0.27	4	8.50	45	10.10	3.97	0.28
82	Magroom	Rupaichhari	DW	7.76	337.00	BDL	178.70	0	45	45	64.98	33.50	1.40	0.28	22	10.92	100	32.90	7.09	0.46
83	Bijoynagar	Satchand	DW	7.89	189.50	BDL	100.40	0	60	60	22.49	28.80	1.40	0.34	10	10.92	70	20.15	5.03	0.19
84	Mothu Mogpara	Satchand	DW	8.30	164.60	BDL	87.04	10	75	85	17.49	4.61	1.20	0.41	14	13.35	90	11.85	0.59	0.08
85	Shashichandra para	Satchand	DW	7.94	179.80	0.10	96.12	0	70	70	22.49	18.07	1.60	1.29	16	8.50	75	15.68	7.03	0.31
86	Amlighat	Poangbari	DW	7.86	120.90	BDL	63.21	0	55	55	17.49	16.18	0.90	0.35	10	9.71	65	9.66	2.25	0.96
87	Srinagar	Poangbari	DW	7.53	59.63	BDL	31.38	0	35	35	19.99	5.86	11.10	0.19	4	6.07	35	16.12	2.27	0.00
88	Purba Takka	Poangbari	DW	7.94	183.40	BDL	97.81	0	60	60	32.49	33.57	1.10	0.34	8	9.71	60	37.47	1.25	0.41
89	Ghorakhappa	Silachhari	DW	8.40	292.30	0.50	154.20	20	125	145	24.99	15.65	1.80	0.48	28	20.63	155	21.95	2.77	0.27
90	Ailmara	Silachhari	DW	7.63	110.10	BDL	58.17	0	15	15	57.49	37.81	2.90	0.26	6	23.06	110	14.54	1.84	1.59
91	Tuisama	Satchand	DW	7.70	166.80	BDL	87.57	0	65	65	22.49	42.81	2.60	0.34	12	14.56	90	21.28	3.79	2.57
92	Rajib Nagar	Satchand	DW	7.70	208.50	BDL	109.90	0	10	10	37.49	44.46	5.50	0.20	6	8.50	50	30.76	4.72	0.23
93	N. C. Para	Rupaichhari	DW	6.90	106.60	BDL	56.02	0	10	10	24.99	44.39	3.30	0.29	8	10.92	65	14.79	1.81	1.85
94	Purba Takka	Poangbari	DW	7.94	183.40	BDL	97.81	0	60	60	32.49	33.57	1.10	0.34	8	9.71	60	37.47	1.25	0.41

ANNEXURE 2 : DETAILS OF EXPLORATORY WELLS DRILLED BY CGWB

UDAIPUR-SABRUM VALLEY, SOUTH TRIPURA DISTRICT

Sl. No.	Well Location / Year of construction	Depth Drilled/ Assembly lowered (m)	Granular zones tapped (m)	Thickness of aquifer tapped (m)	Discharge (m^3/hr) / Drawdown (m)	SWL	Specific Capacity (lpm/m/dd)	Transmissivity (m^2/day)	Permeability (m/day)	Storativity	Remarks
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	Bagma	201 / 162	64 – 70 115 – 133	36	48.6 / 26.3	4.5 m bgl	30.8	330.0	9.0	–	Deposit well
2	Tulamura / 1980	247 / 212.6	75 – 81 85 – 91 99 – 111 179 – 191 197 – 210	48	112.0 / 24.0	0.18 m agl	78.0	246.0	4.6	–	Exploratory Tubewell (Auto flow)
3	Dhupthali / 1990 – 91	208 / 132	56 – 80 92 – 104 110 – 128	54	36 / 6.80	1.50 m agl	88	259	4.8	4.2×10^{-4}	- do -
4	Rajapur	252 / 215	56 – 59 65 – 70 75 – 86 119 – 126 150 – 155 162 – 165 169 – 174 197 – 212	56	143 / 10.30	5.30 m bgl	232	1577	28	–	Exploratory Tubewell
5	Rajnagar / 1980	252 / 186	51 – 93 113 – 125 136 – 148 157 – 163 171 – 183	54	151 / 25.0	2.0 m agl	101	222	4.1	–	Exploratory Tubewell (Auto flow)
6	Matai	232 / 200	64 – 82 140 – 152 161 – 173 183 – 195	54	12 / 17.6	3.60 m bgl	11.4	47.4	0.87	2.25×10^{-5}	Exploratory Tubewell
7	Ghoshkhamar	220 / 206	52 – 58 79 – 97 130 – 142 154 – 166 186 – 192 197 – 203	60	12 / 11.30	1.48 m bgl	17.7	164.0	2.7	–	Exploratory Tubewell
8	Haripur / 1990 – 91	202 / 187	80 – 92 104 – 110 144 – 150 160 – 184	48	30 / 7.12	1.93 m bgl	70.2	410.0	8.5	2.4×10^{-3}	Exploratory Tubewell

Contd…

1	2	3	4	5	6	7	8	9	10	11	12
9	Bagafa BSF Campus / 2005	197.50	103 – 106 109 – 114 116 – 119 123 – 131 138 – 150 158 – 164	37	36.79 / 14.34	20.92 m bgl	42.76	752.45	20.34	–	Exploratory Tubewell
10	Satchand / 1980	253 / 200	60 – 63 83 – 88 93 – 99 117 – 120 130 – 133 147 – 153 168 – 180 183 – 189 192 – 198	50	91 / 12.4	0.42 m agl	121.2	887.7	17.7	–	Exploratory Tubewell (Auto flow)
11	Birchandra Manu	233 / 208	87 – 106 117 – 120 162 – 168 193 – 205	40	79.5 / 5.40	19.95 m bgl	245.4	897	22.4	–	Deposit well

AMARPUR VALLEY, SOUTH TRIPURA DISTRICT

Sl. No.	Well Location / Year of Construction	Depth Drilled/ Assembly lowered (m)	Granular zones tapped (m)	Thickness of aquifer tapped (m)	Discharge (m^3/hr) / Drawdown (m)	SWL	Specific Capacity (lpm/m)	Transmissivity (m^2/day)	Permeability (m/day)	Storativity	Remark
1	Amarpur / 1975	255 / 178	35 – 42 72 – 83 92 – 115 125 – 140 153 – 176	79	158 / 19.7	9.9 m bgl	133.6	794.5	10.7	–	Exploratory Tubewell
2	Ompinagar / 1976	250 / 153	55 – 73 111 – 130 140 – 150	47	264 / 24.3	0.7 m bgl	181.0	387.2	7.1	–	Exploratory Tubewell
3	Nutanbazar	250 / 60.0	30 – 56	27	12 / 8.5	2.53 m bgl	23.5	–	–	–	Exploratory Tubewell
4	Rangkhang	190 / 181	47 – 56 65 – 68 108 – 114 144 – 147 156 – 168 172 – 178	39	85.1 / 10.6	10.4 m bgl	134.0	329.0	8.4	–	Deposit well
5	Duluma	208 / 158	63 – 75 86 – 98 112 – 121 142 – 151	42	96.5 / 14.4	10.6 m bgl	112.0	326.2	7.76	–	Deposit well

ANNEXURE 3: WATER LEVEL DATA OF GROUND WATER MONITORING STATIONS OF SOUTH TRIPURA(March, 2017)

S.N	Well No	District*	Block*	Village	Lat*	Long*	Well* Type	MP*	RL*	Depth*	Dia*	Water Level (mbmp) Mar-17*	Water Level (mbgl) Mar-17*
1	TRST 15	Gomti	Amarpur	Amarpur	23˚30'49.4"	91˚ 39' 24"	DUG	0.89	39.96	5.43	1.2	**3.02**	2.13
2	TRST 16	Gomti	Amarpur	Bampur	23˚ 33' 44"	91˚ 38' 7.5"	DUG	0.96		6.78	1.9	**5.02**	4.06
3	TRST 04	Gomti	Matabari	Dhawajnagar	23˚33'13.5"	91˚27'54.8"	DUG	1.36				**5.25**	3.89
4	TRST 06	Gomti	Matabari	Gorjee Bazar	23˚ 25' 36"	91˚30'21.8"	DUG	0.8	32.67			**4.26**	3.46
5	TRST 22	Gomti	Kankra-ban	Kankraban	23˚ 29' 15"	91˚ 24' 07"	DUG	0.87		12.75	1.17	**11.17**	10.3
6	TRST 14	Gomti	Matabari	Noabari	23˚30'43.6"	91˚33'57.5"	DUG	0.83		8.63	2	**3.06**	2.23
7	TRST 26	Gomti	Ampi	Taichakma			DUG	0.72		7.02	1.1	**5.08**	4.36
8	TRST 27	Gomti	Amarpur	Jatanbari	23˚25'12.8"	91˚45'30.1"	DUG	0.77		8.9	1.35	**6.71**	5.94
10	TRST 21	South Tripura	Bagafa	Gardhang	23˚ 17' 50"	91˚31'56.6"	DUG	0.74		3.87	1.25	**2.69**	1.95
11	TRST03A	South Tripura	Bagafa	Manur Mukh	23˚ 15' 56"	91˚29'17.3"	DUG	1				**2.05**	1.05
14	TRST 13	South Tripura	Rajnagar	Rajnagar	23˚13'56.8"	91˚23'30.8"	DUG	1.35				**4.73**	3.38
15	TRST 23	South Tripura	Rajnagar	Radhanagar	23˚ 13' 32"	91˚ 19' 46"	DUG	0.88				**3.82**	2.94
16	TRST 25	South Tripura	Rajnagar	Rangamura	23˚ 15' 47"	91˚ 19' 31"	DUG	0.9		7.12	1.20	**6.36**	5.46
17	TRST 24	South Tripura	Rajnagar	Kashari	23˚ 17' 46"	91˚ 23' 17"	DUG	0.85		10.45	1.20	**9.56**	8.71
18	TRST 20	South Tripura	Satchand	Kalachhara	23˚08'27.3"	91˚37'37.5"	DUG	0.9		6.67	1.20	**6.72**	5.82
19	TRST 19	South Tripura	Satchand	Manubazar	23˚ 03' 51"	91˚ 38' 5.7"	DUG	0.66		6.22	1.20	**5.09**	4.43
20	TRST 12	South Tripura	Satchand	Sabroom	23˚00'22.4"	91˚43'25.7"	DUG	0.83	18.49			**6.78**	5.95

ANNEXURE 4 : WATER LEVEL DATA OF KEY WELLS OF SOUTH TRIPURA(March, 2013)

S.N	Well No	District*	Block*	Village	Lat*	Long*	Well* Type	MP*	RL*	Depth*	Dia*	Water Level (mbmp) Mar-17*	Water Level (mbgl) Mar-17*
1		South Tripura	Satchand	KALIRBAZAR	23°06.888´	91° 35990´	DUG	0.90		5.38	1.20	**2.69**	1.79
2		South Tripura	Satchand	Kalachhara	23° 08´3.7″	91°37´990´	DUG	0.90		6.67	1.20	**6.74**	5.84
3		South Tripura	Satchand	Manubazar	23°03´23.7″	91°38´55.7´	DUG	0.66		6.22	1.20	**5.12**	4.46
4		South Tripura	Satchand	Rajibnagar	23° 03.817´	91° 39.371´	DUG	0.75		4.70	1.25	**4.82**	4.07
5		South Tripura	Satchand	Pachim Jalefa	23° 01.824´	91° 42.002´	DUG	0.70		5.72	1.25	**5.19**	4.49
6		South Tripura	Rupaichhari	Baishnabpur	23° 02.728´	91° 45.965´	DUG	0.70		13	2.95	**6.72**	6.02
7		South Tripura	Rupaichhari	Magroom	23° 04.378´	91° 46.531´	DUG	0.95		10.31	1.20	**9.95**	9.00
8		South Tripura	Satchand	Bijaynagar	22° 59.378´	91° 40.600´	DUG	0.72		6.02	1.80	**3.87**	3.15
10		South Tripura	Satchand	Fulsingpara	23° 01.682´	91° 39.223´	DUG	0.85		6.12	1.20	**5.31**	4.46
11		South Tripura	Satchand	Motu Mogpara	23° 00.170´	91° 39.103´	DUG	0.9		6.16	1.30	**4.35**	3.45
14		South Tripura	Satchand	SHASHI-CHANDRAPUR	22°58.389´	91° 38.248´	DUG	0.87		7.09	1.20	**2.93**	2.06
15		South Tripura	Poangbari	AMLI GHAT	22° 58.730´	91° 34.747´	DUG	0.93		6.43	1.20	**4.52**	3.59
16		South Tripura	Poangbari	SRINAGAR	22° 59.931´	91° 33.218´	DUG	1.05		8.16	2.20	**4.11**	3.06
17		South Tripura	Poangbari	POANGBARI	23° 01.654´	91° 34.206’	DUG	0.92		7.15	1.20	**5.07**	4.15

S.N	Well No	District*	Block*	Village	Lat*	Long*	Well* Type	MP*	RL*	Depth*	Dia*	Water Level (mbmp) Mar-17*	Water Level (mbgl) Mar-17*
STATE : TRIPURA													
18		South Tripura	Rupaichhari	BANKUL MAHAMUNI	23° 07.095´	91° 41.873’	DUG	0.95		5.55	1.20	**2.68**	1.73
19		South Tripura	Rupaichhari	CHATAKCHARI	23° 04.070´	91° 41.696’ E	DUG	0.8		6.12	1.25	**6.83**	6.03
20		South Tripura	Silachhari	GHORAKHAPPA	23° 09.726´	91° 48.301’ E	DUG	0.95		6.74	1.30	**5.72**	4.77
21		South Tripura	Silachhari	ANANDA BANDHU PARA	23° 12.839"	91° 46.745"	DUG	0.87		6.76	1.20	**6.02**	5.15
22		South Tripura	Silachhari	AILMARA	23° 15.023´	91° 45.615’ E	DUG	0.6		6.62	1.20	**5.41**	4.81

ANNEXURE 5: LIST OF THE WATER SAMPLES COLLECTED DURING NOVEMBER, 2017

Sl No.	Location	Co-Ordinates		Type (E.W. or Dug Well)	Date of Collection	No. of water Samples Collected		
						Partial	Iron	Heavy Metal
1	Dhwajnagar	23° 33' 13.5"	91° 27' 54.8"	Dug	15.11.17	1 Litre	250 ml	500 ml
2	Noabari	23° 30' 43.6"	91° 33' 57.5"	Dug	15.11.17	1 Litre	250 ml	500 ml
3	Bagma Bazar	23°33′ 43.5″	91°25′ 35″	Dug	18.11.17	1 Litre	250 ml	500 ml
4	Noabari-2	23°35′ 28.2″	91°31′10.82″	Dug	18.11.17	1 Litre	250 ml	500 ml
5	Dewanbari	23°33′ 28.82″	91°32′ 7.23″	Dug	18.11.17	1 Litre	250 ml	500 ml
6	Manurmukh	23° 15' 56"	91° 29' 17.3"	Dug	16.11.17	1 Litre	250 ml	500 ml
7	Gardhang	23° 17' 50"	91° 31' 56.6"	Dug	13.11.17	1 Litre	250 ml	500 ml
8	Baishnabpur	23° 02.728′	91° 45.965′	Dug	12.11.17	1 Litre	250 ml	500 ml
9	Kalacharra	23° 08′3.7″	91° 37′990′	Dug	12.11.17	1 Litre	250 ml	500 ml
10	Goragappa	23° 09.726′	91° 48.301’	Dug	09.11.17	1 Litre	250 ml	500 ml
11	Kalirbazar	23° 06.888′	91° 35990′	Dug	12.11.17	1 Litre	250 ml	500 ml
12	Gorjee Bazar	23° 25' 36"	91° 30' 21.8"	Dug	08.11.17	1 Litre	250 ml	500 ml
13	Bankul Mahamuni	23° 07.095′	91° 41.873’	Dug	12.11.17	1 Litre	250 ml	500 ml
14	Amlighat	22° 58.730′	91° 34.747′	Dug	10.11.17	1 Litre	250 ml	500 ml
15	Manubazar	23° 03′23.7″	91° 38′55.7′	Dug	11.11.17	1 Litre	250 ml	500 ml
16	Poangbari	23° 01.654′	91° 34.206’	Dug	11.11.17	1 Litre	250 ml	500 ml
17	Purbatakka	23° 03.598′	91° 36.689’	Dug	11.11.17	1 Litre	250 ml	500 ml
18	Rajnagar	23° 13' 56.8"	91° 23' 30.8"	Dug	16.11.17	1 Litre	250 ml	500 ml
19	Kankraban	23° 29' 15"	91° 24' 07"	Dug	15.11.17	1 Litre	250 ml	500 ml
20	Radhanagar	23° 13' 32"	91° 19' 46"	Dug	16.11.17	1 Litre	250 ml	500 ml
21	Ampi colony	23° 40' 17"	91° 38' 30"	Dug	15.11.17	1 Litre	250 ml	500 ml
22	Bijaynagar	22° 59.378′	91° 40.600′	Dug	10.11.17	1 Litre	250 ml	500 ml
23	Srinagar	22° 59.931′	91° 33.218′	Dug	10.11.17	1 Litre	250 ml	500 ml
24	Anandabandhupara	23° 12.839"	91° 46.745"	Dug	09.11.17	1 Litre	250 ml	500 ml
25	Bampur	23° 33' 44"	91° 38' 7.5"	Dug	15.11.17	1 Litre	250 ml	500 ml
26	Magroom	23° 04.378′	91° 46.531′	Dug	12.11.17	1 Litre	250 ml	500 ml
27	Jatanbari	23°25'12.8"	91°45'30.1"	Dug	15.11.17	1 Litre	250 ml	500 ml
28	Matumagpara	23° 00.170′	91° 39.103′	Dug	11.11.17	1 Litre	250 ml	500 ml
29	Joinkami	23°36′ 4.2″	91°31′ 30.2″	Dug	18.11.17	1 Litre	250 ml	500 ml
30	Sachichandrapur	22° 58.389′	91° 38.248′	Dug	11.11.17	1 Litre	250 ml	500 ml
31	Amarpur	23° 30' 49.4"	91° 39' 24"	Dug	15.11.17	1 Litre	250 ml	500 ml
32	Tufaniamura	23° 41' 55.5"	91° 24' 25.5"	Dug	15.11.17	1 Litre	250 ml	500 ml
33	Sabroom	23° 00' 22.4"	91° 43' 25.7"	Dug	08.11.17	1 Litre	250 ml	500 ml
34	Sabroom	23° 00' 22.4"	91° 43' 25.7"	Dug	08.11.17	1 Litre	250 ml	500 ml
35	Rajnagar	23° 13' 56.8"	91° 23' 30.8"	Dug	16.11.17	1 Litre	250 ml	500 ml
36	Tufaniamura	23° 41' 55.5"	91° 24' 25.5"	Dug	15.11.17	1 Litre	250 ml	500 ml
37	Gorjee Bazar	23° 25' 36"	91° 30' 21.8"	Dug	08.11.17	1 Litre	250 ml	500 ml

ANNEXURE 6: LITHOLOG

1. Tube well - 1

Village: Satchand
Latitude: 23^0 07' 45" N
Longitude : 91^0 38' 10" E

Depth Range (m bgl)		Thick-ness (m)	Lithology
From	To		
00.00	3.00	3.00	**Surface soil**, brown sandy loam
3.00	7.00	4.00	**Clay** (i.e. semi-consolidated Shale), brownish, sticky
7.00	13.40	6.40	**Sandy Clay** (i.e. Sandy Claystone/Shale), brownish sticky mixed with fine to medium grained sand (i.e. Sandstone)
13.40	34.40	21.00	**Sand** (i.e. Sandstone), brown to light brown, fine grained, micaceous
34.40	58.40	24.00	**Sandy Clay** (i.e. Sandy Claystone/Shale), grey sticky with fine to medium sub-rounded quartzitic sand (i.e. Sandstone)
58.40	64.40	6.00	**Sand** (i.e. Sandstone), grey, fine to medium grained, micaceous
64.40	70.40	6.00	**Sandy Clay** (i.e. Sandy Claystone/Shale), grey sticky with fine to medium grained sub-rounded sand (i.e. Sandstone)
70.40	235.40	165.00	**Sand** (Sandstone), light grey, mostly fine to minor medium, micaceous
235.40	238.40	3.00	**Sandy Clay** (i.e. Sandy Claystone/Shale), grey, sticky mixed with fine grained sand (i.e. Sandstone)
238.40	253.40	15.00	**Sand** (i.e. Sandstone), grey, fine grained, micaceous

2. Tube well - 2

Village: Manu Bazar
Latitude : 23^0 04' 34" N
Longitude: 91^0 38' 35" E

Depth Range (m bgl)		Thick-ness (m)	Lithology
From	To		
0.00	6.10	6.10	**Hard clay** (i.e. Shale), yellow
6.10	12.20	6.10	**Sand** (i.e. sandstone), fine grained, brownish
12.20	24.40	12.20	**Sand** (i.e. sandstone), fine grained, grayish mixed with **clay** gray (i.e. shale)
24.40	30.40	6.00	**Sand** (i.e. sandstone), fine grained, deep gray
30.40	48.80	18.40	**Sand** (i.e.sandstone), fine grained, grayish white, transparent, off-white, brown
48.80	85.35	36.55	**Sand** (i.e. sandstone), fine grained, grayish mixed with **clay** gray (i.e. shale)
85.35	91.50	6.15	**Sand** (i.e. sandstone), fine grained, deep gray
91.50	118.90	27.40	**Sand** (i.e. sandstone), fine grained, gray
118.90	233.00	114.10	**Sand** (i.e. sandstone), fine to medium grained, gray

3. Tube well – 3.a

Village: Paschim Jalefa (Exploratory Well)
Latitude: 23^0 02′ 00″ N
Longitude: 91^0 41′ 13″ E

Depth Range (m bgl)		Thick-ness (m)	Lithology
From	To		
0.00	3.50	3.50	**Top Soil with Silt and Clay**, Top Soil comprising clay yellowish brown, semi sticky and minor very fine sand and silt.
3.50	6.80	3.30	**Clay**, steel grey hard sticky
6.80	15.90	9.10	**Clay**, yellowish grey semi sticky
15.90	19.00	3.10	**Clay**, yellow semi sticky
19.00	25.10	6.10	**Sand** fine to medium, yellow with minor clay greyish yellow semi-sticky with a few brown ferruginous concretions.
25.10	31.20	6.10	**Sand** medium to coarse, mainly yellow and slightly greyish yellow with a few brown ferruginous concretions.
31.20	34.20	3.00	**Sand** medium to coarse, light grey, transparent, yellowish grey with a few brown ferruginous concretions and rock fragments with quartz
34.20	40.30	6.10	**Sand clayey :** sand fine to medium, light grey to minor yellowish grey & dark grey clay
40.30	55.60	15.30	**Sand**, medium to coarse and colour varied from yellow, light yellow and greyish yellow to yellowish grey and then grey mixed with a significant amount of brown ferruginous kankar and rock fragments including quartz
55.60	64.70	9.10	**Sand,** fine to medium, light yellow, greyish yellow, yellowish grey and light grey with a few rock fragments including shale and quartz
64.70	73.90	9.20	**Sand** medium to coarse, light yellow, yellow and greyish yellow with minor amount of medium gravel sized rock fragments and brown ferruginous kankar
73.90	122.70	48.80	**Sand** fine to medium, transparent, light yellow, greyish yellow, yellowish grey, grey with a few large quartz fragments, brown ferruginous kankar and other rock fragments
122.70	128.80	6.10	**Sand** very fine to medium**,** transparent, light yellow, greyish yellow, yellowish grey with little clay yellowish grey to earthy
128.80	134.90	6.10	**Clay** grey to dark grey, semi-sticky with minor sand very fine to fine, yellowish grey to grey & transparent.
134.90	137.90	3.00	**Sandy Clay**, clay semi-sticky, grey to light grey with minor sand, very fine to fine, minor medium sized, yellowish grey, transparent, grey
137.90	153.20	15.30	**Sand**, fine to medium, yellow, light yellow, greyish yellow, beige, transparent, off-white, mainly quartzitic and minor blackish grey to dark brown ferruginous grains.
153.20	156.20	3.00	**Sand**, medium grained, yellow, light yellow, off-white, transparent mixed with appreciable amount of semi-sticky variegated clay in the form of pellets
156.20	165.40	9.20	**Sand**, medium, yellow, light yellow, beige, mixed with rock fragments (mainly brown chert nodules/kankar, transparent & white quartz fragments) & little variegated clay
165.40	175.50	10.10	**Sand**, fine to medium grained, light grey, yellowish grey and transparent mixed with rock fragments, ferruginous concretion/kankars

3. Tube well – 3.b

Village: Paschim Jalefa (Observation Well)
Latitude: 23^0 02′ 00″ N
Longitude: 91^0 41′ 13″ E

Unique ID	
Village	**Paschim Jalefa (OW)**
Taluka/Block	Satchand
District	South Tripura
Toposheet No.	79 M/12
Latitude	23^0 02′ 00″ N
Longitude	91^0 41′ 13″ E
RL (m amsl)	--
Drilled Depth	158.60 m
Casing	151 m (4”)
SWL (m bgl)	0.25 m agl (auto-flowing)
Discharge (lps)	4.58
Date/year	2014-15

Depth Range (m bgl)		**Thickness (m)**	**Lithology**
From	**To**		
0.00	3.50	3.50	**Top Soil with Silt and Clay**, Top Soil comprising clay yellowish brown, semisticky and minor very fine sand and silt.
3.50	6.80	3.30	**Clay**, steel grey hard sticky
6.80	15.90	9.10	**Clay**, yellowish grey semisticky
15.90	19.00	3.10	**Clay**, yellow semisticky
19.00	25.10	6.10	**Sand** fine to medium, yellow with minor clay greyish yellow semi-sticky with a few brown ferruginous concretions.
25.10	31.20	6.10	**Sand** medium to coarse, mainly yellow and slightly greyish yellow with a few brown ferruginous concretions.
31.20	34.20	3.00	**Sand** medium to coarse, light grey, transparent, yellowish grey with a few brown ferruginous concretions and rock fragments with quartz
34.20	40.30	6.10	**Sand clayey :** sand fine to medium, light grey to minor yellowish grey and dark grey clay
40.30	55.60	15.30	**Sand**, medium to coarse and colour varied from yellow, light yellow and greyish yellow to yellowish grey and then grey mixed with a significant amount of brown ferruginous kankar and rock fragments including quartz
55.60	64.70	9.10	**Sand,** fine to medium, light yellow, greyish yellow, yellowish grey and light grey with a few rock fragments including shale and quartz
64.70	73.90	9.20	**Sand** medium to coarse, light yellow, yellow and greyish yellow with minor amount of medium gravel sized rock fragments and brown ferruginous kankar
73.90	122.70	48.80	**Sand** fine to medium, transparent, light yellow, greyish yellow, yellowish grey, grey with a few large quartz fragments, brown ferruginous kankar

			and other rock fragments
122.70	128.80	6.10	**Sand** very fine to medium**,** transparent, light yellow, greyish yellow, yellowish grey with little clay yellowish grey to earthy
128.80	134.90	6.10	**Clay** grey to dark grey, semi-sticky with minor sand very fine to fine, yellowish grey to grey & transparent.
134.90	137.90	3.00	**Sandy Clay**, clay semi-sticky, grey to light grey with minor sand, very fine to fine, minor medium sized, yellowish grey, transparent, grey
137.90	153.20	15.30	**Sand**, fine to medium, yellow, light yellow, greyish yellow, beige, transparent, off-white etc. mainly quartzitic and minor amount of blackish grey to dark brown ferruginous grains.
153.20	156.20	3.00	**Sand**, medium grained, yellow, light yellow, off-white, transparent mixed with appreciable amount of semi-sticky variegated clay in the form of pellets
156.20	165.40	9.20	**Sand**, medium, yellow, light yellow, beige, with rock fragments (mainly brown chert nodule /kankar and transparent & white quartz fragments) and little variegated clay pellets.
165.40	175.50	10.10	**Sand**, fine to medium grained, light grey, yellowish grey and transparent mixed with rock fragments, ferruginous concretion/kankars

4. Tube well – 4.a

Village: Tuisama (Exploratory Well)
Latitude: 23^0 09′ 24″ N
Longitude: 91^0 39′ 42″ E

Depth (m bgl)		Thick-ness(m)	Lithology
From	To		
0.00	6.80	6.80	**Top Soil lateritic comprising Sand, Silt and Clay**: Sand very fine to fine, brown and yellowish brown and minor silt and clay semi-sticky brown and reddish brown.
6.80	9.80	3.00	**Clay:** very hard, sticky with variegated colour (brown, reddish brown, yellow, off-white, beige, grey)
9.80	12.80	3.00	**Sand:** medium to fine, quartzitic, yellow, brownish yellow etc.
12.80	19.00	6.20	**Sand:** fine to coarse, quartzitic, yellow, orangish yellow, brownish yellow mixed with minor amount of small to medium gravel (sub-angular to sub-rounded quartz fragments and brown chert nodules)
19.00	23.50	4.50	**Gravel :** medium to large quartzitic, sub-angular to sub-rounded (white, off-white, yellowish white, yellow, brownish yellow, transparent) and ferruginous chert, sub-rounded to rounded, brown
23.50	34.10	10.60	**Clay :** very hard, sticky, variegated colour (brown, reddish brown, yellow, off-white, beige, grey)
34.10	37.30	3.20	**Sand clayey :** fine, light yellow, yellow, transparent, minor clay yellow and brown ferruginous kankar
37.30	40.40	3.10	**Sand :** fine to medium, little clay yellow and sizeable chert nodules, light brown to brown
40.40	43.50	3.10	**Sand** : fine yellow mixed with little gravel
43.50	46.50	3.00	**Sand :** fine to medium, buff, pinkish white, white with gravel small quartzitic and chert nodules
46.50	49.50	3.00	**Sand :** fine to medium, yellow, yellowish white, white, orangish white, off-white, brownish yellow
49.50	58.50	9.00	**Sandy Clay :** Clay plastic semi-sticky, yellowish, yellowish brown and sometimes variegated with minor sand fine, yellow, brownish yellow, light yellow, off-white etc.

58.50	61.60	3.10	**Clayey Sand :** Sand fine with clay, yellow, yellowish brown and variegated at places
61.60	67.70	6.10	**Clayey Sand :** Sand fine to medium, quartzitic, light yellow, yellow, brownish yellow, off-white, transparent with minor clay variegated (light brown, yellow, yellowish brown, off-white, light grey)
67.70	70.80	3.10	**Sand with Clay :** Sand fine to medium, quartzitic, light yellow, brownish yellow, transparent, off-white; variegated clay light brown, yellow, yellowish brown, off-white, light grey; minor small to medium gravel
70.80	92.20	21.40	**Sand :** fine to medium, deep yellow, yellowish transparent, orangish yellow, yellowish white and minor white sand; little brown ferruginous kankar and quartz frags. white & yellowish transparent.
92.20	95.20	3.00	**Sand** : medium to coarse, yellow, light yellow, yellowish transparent, yellowish white, transparent mainly quartzitic and minor amount of deep brown to brown ferruginous cherts of coarse sand size.
95.20	98.50	3.30	**Sandy Clay** : plastic, nonsticky, light yellow with minor sand fine to medium, light yellow, yellowish transparent, yellowish white, transparent and chert fragments, small gravel sized, deep brown.
98.50	101.00	2.50	**Sand** : fine to medium, light yellow, yellowish transparent, yellowish white, transparent with little gravel small sized (mainly brown chert nodules/kankar and transparent & white quartz fragments).
101.00	104.50	3.50	**Sand** : fine to medium grained, mostly light yellow, yellowish transparent , off-white, orangish light yellow coloured and also some white and transparent grains
104.50	113.50	9.00	**Clayey Sand :** Sand fine, light yellow, yellowish transparent, off-white, orangish yellow and some white and transparent grains with little clay, non-sticky, plastic, light grey, beige, yellowish grey.
113.50	116.50	3.00	**Sand :** fine, light yellow, yellowish transparent , off-white, orangish white with few white, deep brown & transparent grains mixed with a few ferruginous nodules, reddish to dark brown & white quartz.
116.50	128.80	12.30	**Sand :** fine to medium, mainly yellow, yellowish transparent, orangish yellow, off-white, deep yellow, reddish yellow with a few ferruginous nodules, minor coarse sand and little small gravels.
128.80	135.00	6.20	**Sand :** medium to coarse, light yellow, greyish yellow, light grey, off-white, white mixed with abundant small to medium gravel sized brown to deep brown chert & little quartz, white, yellow, yellowish white.
135.00	140.30	5.40	**Sand with Chert Nodules :** medium to coarse, light yellow, off-white and minor amount of white, reddish yellow, brownish yellow and small to medium gravel sized brown to deep brown chert nodues
140.30	147.10	6.60	**Sand :** fine to medium, light yellow, off-white, reddish & brownish yellow, little clay light yellow, plastic
147.10	153.20	6.10	**Sand :** mainly medium and minor fine grained, light yellow, greyish yellow, yellowish transparent, off-white and less reddish yellow and brownish yellow.
153.20	159.50	6.30	**Sand :** fine, light yellow, yellow, orangish yellow, off-white, yellowish transparent
159.50	171.50	12.00	**Clay :** semi-sticky, plastic, light yellow to greyish yellow with minor sand, fine, light yellow, yellow, orangish yellow, off-white, yellowish transparent and very little chert
171.50	174.50	3.00	**Sand :** fine, orangish yellow, light yellow, off-white, yellowish transparent; trace clay

4 Tube Well - 4.b

Village: Tuisama (Observation Well)
Latitude: 23^0 09′ 24″ N
Longitude: 91^0 39′ 42″ E

Depth Range (m bgl)		Thick-ness (m)	Lithology
From	To		
0.00	6.80	6.80	**Top Soil lateritic comprising Sand, Silt and Clay**: Sand very fine to fine, brown and yellowish brown, minor silt and clay semi-sticky yellowish brown and reddish brown.
6.80	9.80	3.00	**Clay:** hard, sticky with variegated colour (brown, reddish brown, yellow, off-white, beige, grey, light grey etc.)
9.80	13.00	3.20	**Sand:** medium to fine, quartzitic, yellow, brownish yellow etc.
13.00	19.05	6.05	**Clay** non-sticky brownish yellow with minor sand fine to medium
19.05	22.00	2.95	**Sand** fine to medium with minor clay brownish yellow
22.00	25.50	3.50	**Clay** non-sticky brownish yellow with minor sand fine to medium
25.50	28.00	2.50	**Sand** fine with minor clay brownish yellow
28.00	31.20	3.20	**Sand** fine with clay brownish yellow
31.20	40.40	9.20	**Sand** fine with minor clay earthy yellow
40.40	43.50	3.10	**Sand very** fine to fine with clay earthy yellow
43.50	49.50	6.00	**Sand** fine reddish brown, yellow, light brown, yellowish transparent with trace clay
49.50	52.80	3.30	**Sand** fine reddish brown, yellow, light brown, yellowish transparent with minor clay variegated to yellow to brownish yellow.
52.80	61.80	9.00	**Sand** fine reddish brown, yellow, light brown, yellowish transparent
61.80	67.80	6.00	**Sand** fine to medium yellow, brownish yellow
67.80	74.00	6.20	**Sand** fine to medium yellow, brownish yellow with clay light yelow
74.00	80.00	6.00	**Sand** medium (major), fine (minor), yellow, brownish yellow, yellowish brown, orangish
80.00	98.40	18.40	**Sand** fine to medium, yellow, brownish yellow, yellowish brown, orangish mixed with minor white quartz fragments, brown chert fragments and clay yellow, yellowish brown
98.40	104.30	5.90	**Sand** fine, yellow, light yellow, brownish yellow, yellowish brown, orangish, off-white with minor clay yellowish light brown.
104.30	116.60	12.30	**Sand** fine to medium, light yellow, brownish yellow, yellowish brown, orangish, offwhite
116.60	122.60	6.00	**Sand** fine to medium light yellow, off-white, yellowish transparent, orangish yellow, brownish yellow with trace clay light grey
122.60	128.80	6.20	**Sand** fine to medium greyish yellow, off-white with a few quartz fragments small to large
128.80	141.00	12.20	**Sand** fine to medium light yellow, yellowish transparent, orangish yellow
141.00	147.00	6.00	**Sand** fine to medium light yellow, yellow, brownish yellow, orangish and reddish yellow
147.00	153.00	6.00	**Sand** fine to medium light yellow, yellow, brownish yellow, orangish and

			reddish yellow with minor clay variegated grey, off-white, yellow and brownish yellow
153.00	160.00	7.00	**Sand** medium (major), fine (minor), yellow, light yellow, yellowish transparent, orangish yellow, off-white mixed with minor brown ferruginous kankar/chert nodules

5. Tube Well - 5

Village: Rajibnagar (Exploratory Well)
Latitude: 23^0 03′ 25″ N
Longitude: 91^0 39′ 24″ E

Depth (m bgl)		Thick-ness(m)	Lithology
From	To		
0.00	6.80	6.80	**Top Soil lateritic comprising Sand, Silt and Clay**: Sand very fine to fine, brown and yellowish brown, minor silt and clay semi-sticky yellowish brown and reddish brown.
6.80	9.80	3.00	**Clay:** hard, sticky with variegated colour (brown, reddish brown, yellow, off-white, beige, grey, light grey etc.)
9.80	13.00	3.20	**Sand:** medium to fine, quartzitic, yellow, brownish yellow etc.
13.00	19.05	6.05	**Clay** non-sticky brownish yellow with minor sand fine to medium
19.05	22.00	2.95	**Sand** fine to medium with minor clay brownish yellow
22.00	25.50	3.50	**Clay** non-sticky brownish yellow with minor sand fine to medium
25.50	28.00	2.50	**Sand** fine with minor clay brownish yellow
28.00	31.20	3.20	**Sand** fine with clay brownish yellow
31.20	40.40	9.20	**Sand** fine with minor clay earthy yellow
40.40	43.50	3.10	**Sand very** fine to fine with clay earthy yellow
43.50	49.50	6.00	**Sand** fine reddish brown, yellow, light brown, yellowish transparent with trace clay
49.50	52.80	3.30	**Sand** fine reddish brown, yellow, light brown, yellowish transparent with minor clay variegated to yellow to brownish yellow.
52.80	61.80	9.00	**Sand** fine reddish brown, yellow, light brown, yellowish transparent
61.80	67.80	6.00	**Sand** fine to medium yellow, brownish yellow
67.80	74.00	6.20	**Sand** fine to medium yellow, brownish yellow with clay light yellow
74.00	80.00	6.00	**Sand** medium (major), fine (minor), yellow, brownish yellow, yellowish brown, orangish
80.00	98.40	18.40	**Sand** fine to medium, yellow, brownish yellow, yellowish brown, orangish mixed with minor white quartz fragments, brown chert fragments and clay yellow, yellowish brown
98.40	104.30	5.90	**Sand** fine, yellow, light yellow, brownish yellow, yellowish brown, orangish, off-white with minor clay yellowish light brown.
104.30	116.60	12.30	**Sand** fine to medium, light yellow, brownish yellow, yellowish brown, orangish, offwhite
116.60	122.60	6.00	**Sand** fine to medium light yellow, off-white, yellowish transparent, orangish yellow, brownish yellow with trace clay light grey
122.60	128.80	6.20	**Sand** fine to medium greyish yellow, off-white with a few quartz fragments small to large
128.80	141.00	12.20	**Sand** fine to medium light yellow, yellowish transparent, orangish yellow

141.00	147.00	6.00	**Sand** fine to medium light yellow, yellow, brownish yellow, orangish and reddish yellow
147.00	153.00	6.00	**Sand** fine to medium light yellow, yellow, brownish yellow, orangish and reddish yellow with minor clay variegated grey, off-white, yellow and brownish yellow
153.00	160.00	7.00	**Sand** medium (major), fine (minor), yellow, light yellow, yellowish transparent, orangish yellow, off-white mixed with minor brown ferruginous kankar/chert nodules

6. Tube Well – 6

Village: Rajibnagar (State Govt. W/S Well)

Depth Range (m bgl)		**Thick-ness (m)**	**Lithology**
From	**To**		
0.00	6.80	6.80	**Top Soil lateritic comprising Sand, Silt and Clay**: Sand very fine to fine, brown and yellowish brown, minor silt and clay semi-sticky yellowish brown and reddish brown.
6.80	9.80	3.00	**Clay:** hard, sticky with variegated colour (brown, reddish brown, yellow, off-white, beige, grey, light grey etc.)
9.80	13.00	3.20	**Sand:** medium to fine, quartzitic, yellow, brownish yellow etc.
13.00	19.05	6.05	**Clay** non-sticky brownish yellow with minor sand fine to medium
19.05	22.00	2.95	**Sand** fine to medium with minor clay brownish yellow
22.00	25.50	3.50	**Clay** non-sticky brownish yellow with minor sand fine to medium
25.50	28.00	2.50	**Sand** fine with minor clay brownish yellow
28.00	31.20	3.20	**Sand** fine with clay brownish yellow
31.20	40.40	9.20	**Sand** fine with minor clay earthy yellow
40.40	43.50	3.10	**Sand very** fine to fine with clay earthy yellow
43.50	49.50	6.00	**Sand** fine reddish brown, yellow, light brown, yellowish transparent with trace clay
49.50	52.80	3.30	**Sand** fine reddish brown, yellow, light brown, yellowish transparent with minor clay variegated to yellow to brownish yellow.
52.80	61.80	9.00	**Sand** fine reddish brown, yellow, light brown, yellowish transparent
61.80	67.80	6.00	**Sand** fine to medium yellow, brownish yellow
67.80	74.00	6.20	**Sand** fine to medium yellow, brownish yellow with clay light yelow
74.00	80.00	6.00	**Sand** medium (major), fine (minor), yellow, brownish yellow, yellowish brown, orangish
80.00	98.40	18.40	**Sand** fine to medium, yellow, brownish yellow, yellowish brown, orangish mixed with minor white quartz fragments, brown chert fragments and clay yellow, yellowish brown
98.40	104.30	5.90	**Sand** fine, yellow, light yellow, brownish yellow, yellowish brown, orangish, off-white with minor clay yellowish light brown.
104.30	116.60	12.30	**Sand** fine to medium, light yellow, brownish yellow, yellowish brown, orangish, offwhite
116.60	122.60	6.00	**Sand** fine to medium light yellow, off-white, yellowish transparent, orangish yellow, brownish yellow with trace clay light grey
122.60	128.80	6.20	**Sand** fine to medium greyish yellow, off-white with a few quartz fragments

			small to large
128.80	141.00	12.20	**Sand** fine to medium light yellow, yellowish transparent, orangish yellow
141.00	147.00	6.00	**Sand** fine to medium light yellow, yellow, brownish yellow, orangish and reddish yellow
147.00	153.00	6.00	**Sand** fine to medium light yellow, yellow, brownish yellow, orangish and reddish yellow with minor clay variegated grey, off-white, yellow and brownish yellow
153.00	160.00	7.00	**Sand** medium (major), fine (minor), yellow, light yellow, yellowish transparent, orangish yellow, off-white mixed with minor brown ferruginous kankar/chert nodules

ANNEXURE 7: VERTICAL ELECTRIC SURVEY DETAILS PREPARED BY GEO-PHYSICIST

Unique ID	VES 1TRPS	**Date/Year**		27/06/2014
Village	Ramgua	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Satchand	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.		**Depth Drilled**		
Lat	$23^0$07'19.5"	**Discharge (lps)**		
Long	$91^0$37'30.5"	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 1TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	1.26	1.26	1542	Top soil with pebbles etc
1.26	1.62	0.364	5734	Pebbles, boulders, sands etc
1.62	7.98	6.36	1299	Consolidated sands/sanstone
7.98	17	8.98	7	Clays etc
Below 17		-	1160	Weatherd rock etc.

Unique ID	VES 2 TRPS	**Date/Year**		27/06/2014
Village	Maninder Raiwazapara	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Satchand	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.	79M/12	**Depth Drilled**		
Lat	$23^0$09'21.0"	**Discharge (lps)**		
Long	$91^0$39'44.7"	**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	4.77	4.77	1640	Top soil with sands etc
4.77	9.62	4.85	6000	Consolidated sands.
9.62	21.4	11.7	17	Clays etc. with sands
Below 21.4m		-	2456	Weathered rock etc

Unique ID	VES 3 TRPS	**Date/Year**	27/06/2014
Village	Guwachand	**Nearby DW/DCBW/BW Depth**	
Taluka/Block	Satchand	**Yield / discharge**	
District	South Tripura	**Whether borehole was drilled at this point? If yes,**	
Toposheet No.	79 M/12	**Depth Drilled**	
Lat	$23^0$02’53.2”	**Discharge (lps)**	
Long	$91^0$39’59.2”	**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	0.75	0.75	131	Top soil with sands etc
0.75	3.728	2.978	471	Pebbles, sands, boulders etc.
3.728	8.20	4.472	210	sands with clays etc.
8.20	18.11	9.906	8	Clays etc.
Below 18.11		-	70	Intercalations of Sands with clays etc

Unique ID	VES 4 TRPS	**Date/Year**	28/06/2014
Village	Madhab Nagar	**Nearby DW/DCBW/BW Depth**	
Taluka/Block	Powangbari	**Yield / discharge**	
District	South Tripura	**Whether borehole was drilled at this point? If yes,**	
Toposheet No.	79M/12	**Depth Drilled**	
Lat	$23^0$03’19.3”	**Discharge (lps)**	
Long	$91^0$32’20.4”	**Transmissivity (m^2 /day)**	
RL (m amsl)		**Storativity**	

Unique ID: VES 4 TRPS

Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	1.87	1.87	83	Top soil with clays and sands
1.87	11.6	9.76	26	clays with sand etc.
11.6	60.3	48.7	11	Clays etc
Below 60.3		-	20	Intercalations of Sands with clays etc

Unique ID	VES 5 TRPS	**Date/Year**	28/06/2014
Village	Kalyan Nagar	**Nearby DW/DCBW/BW Depth**	
Taluka/Block	Satchand	**Yield / discharge**	
District	South Tripura	**Whether borehole was drilled at this point? If yes,**	
Toposheet No.	79 N/9	**Depth Drilled**	
Lat	$22^0$59'20.5"	**Discharge (lps)**	
Long	$91^0$40'10.4"	**Transmissivity (m^2 /day)**	
RL (m amsl)		**Storativity**	

Unique ID: VES 5 TRPS

Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	1.221	1.221	128	Top soil with pebbles, sand etc
1.221	3.038	1.817	35	Clays with sand etc
3.038	6.513	3.475	360	Sands etc
6.513	27.75	21.21	37	Clays with sand etc
27.75	48.65	20.93	313	Sands etc
Below 48.65		-	69	Intercalations of Sands with clays etc

Unique ID	VES 6 TRPS	**Date/Year**	28/06/2014
Village	Sabroom	**Nearby DW/DCBW/BW Depth**	
Taluka/Block	Satchand	**Yield / discharge**	
District	South Tripura	**Whether borehole was drilled at this point? If yes,**	
Toposheet No.	79 M/12	**Depth Drilled**	
Lat	$23^0$00'10.5"	**Discharge (lps)**	
Long	$91^0$43'53.9"	**Transmissivity (m^2 /day)**	
RL (m amsl)		**Storativity**	

Unique ID: VES 6 TRPS

Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	4.55	4.55	140	Top soil with pebbles, clays
4.55	6.8	2.25	1566	Sands, boulders, clays etc
Below 6.80		-	143	Intercalations of Sands with clays etc.

Unique ID	VES 7 TRPS	**Date/Year**		28/06/2014
Village	Manu Bankul	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Rupaichari	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.	79 M/12	**Depth Drilled**		
Lat	$23^0$07’07.4”	**Discharge (lps)**		
Long	$91^0$42’41.4”	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 7 TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	1.2	1.2	431	Top soil with pebbles, boulders, sand etc
1.2	11.3	10.1	359	Sand etc
11.3	23.7	12.5	866	Consolidated sands etc
23.7	50	26.3	25	Clays with sand etc
Below 50		-	3680	Sandstone / shale etc

Unique ID	VES 8 TRPS	**Date/Year**		30/06/2014
Village	Kathalcheri	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Satchand	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.	79 M/12	**Depth Drilled**		
Lat	$23^0$01’20.6”	**Discharge (lps)**		
Long	$91^0$44’15.3”	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 8 TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	0.475	0.475	290	Top soil with pebbles, sand etc
0.475	1	0.525	5816	Boulders, pebbles with sands etc
1	14.7	13.7	858	Shale / dry sands etc
14.7	33	18.3	56	Sands etc
Below 33		-	16108	Sandstone / shale

Unique ID	VES 9 TRPS	**Date/Year**	28/06/2014
Village	Vaishnavpur	**Nearby DW/DCBW/BW Depth**	
Taluka/Block	Rupaichari	**Yield / discharge**	
District	South Tripura	**Whether borehole was drilled at this point? If yes,**	
Toposheet No.	79 M/16	**Depth Drilled**	
Lat	$23^0$03'27.8"	**Discharge (lps)**	
Long	$91^0$46'00.0"	**Transmissivity (m^2 /day)**	
RL (m amsl)		**Storativity**	

Unique ID: VES 9 TRPS

Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	1.54	1.54	109	Top soil with pebbles, sand etc
1.54	11.2	9.65	72	Sand etc
11.2	15.9	4.71	11	Clays etc
Below 15.9		-	49	Intercalations of Sands with clays etc

Unique ID	VES 10 TRPS	**Date/Year**	30/06/2014
Village	Bakmara	**Nearby DW/DCBW/BW Depth**	
Taluka/Block	Korbook	**Yield / discharge**	
District	Gomati	**Whether borehole was drilled at this point? If yes,**	
Toposheet No.	79 M/16	**Depth Drilled**	
Lat	$23^0$06'19.5"	**Discharge (lps)**	
Long	$91^0$48'55.6"	**Transmissivity (m^2 /day)**	
RL (m amsl)		**Storativity**	

Unique ID: VES 10 TRPS

Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	0.789	0.789	186	Top soil with pebbles, sand etc
0.789	2.6	1.81	363	Sands, pebbles, boulders, clays etc
2.6	14.4	11.8	263	Sands / Consolidated sands etc
14.4	31.3	16.9	416	Sands (dry)
Below 31.3		-	2	Predominantly clays etc

Unique ID	VES 11 TRPS	**Date/Year**		02/07/2014
Village	Sukantapalli	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Satchand	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.	79 M/12	**Depth Drilled**		
Lat	$23^0$04'01.9"	**Discharge (lps)**		
Long	$91^0$38'19.0"	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 11 TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	0.627	0.627	130	Top soil with pebbles, sand etc
0.627	0.854	0.227	12490	Boulders, pebbles, clays with sand etc
0.854	25.7	24.8	752	Sands etc
25.7	60.5	34.8	32	Clays with sand etc
Below 60.5		-	3924	Shale / Sandstone etc

Unique ID	VES 12 TRPS	**Date/Year**		28/06/2014
Village	Sankartilla	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Powangbari	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.	79 M/12	**Depth Drilled**		
Lat	$23^0$03'18.7"	**Discharge (lps)**		
Long	$91^0$36'08.4"	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 12 TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	0.218	0.218	168	Top soil with pebbles, sand etc
0.218	5.96	5.74	310	Pebbles with sand etc
5.96	14	8.05	622	Dry sands etc
14	115	101	139	Sands, shale etc
Below 115		-	367	Consolidated sands etc

Unique ID	VES 13 TRPS	**Date/Year**	04/07/2015
Village	Sakbari	**Nearby DW/DCBW/BW Depth**	
Taluka/Block	Satchand	**Yield / discharge**	
District	South Tripura	**Whether borehole was drilled at this point? If yes,**	
Toposheet No.	79 M/12	**Depth Drilled**	
Lat	$23^0$10'02.6"	**Discharge (lps)**	
Long	$91^0$38'24.5"	**Transmissivity (m^2 /day)**	
RL (m amsl)		**Storativity**	

Unique ID: VES 13 TRPS

Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	0.224	0.224	512	Top soil with pebbles, sand etc
0.224	5.38	5.16	1159	Shale/dry sand
5.38	21.8	16.4	511	Dry sands etc
Below 21.8		-	89.2	Intercalations of Sands with water etc

Unique ID	VES 14 TRPS	**Date/Year**	04/07/2014
Village	Pilak	**Nearby DW/DCBW/BW Depth**	
Taluka/Block	Santir bazar	**Yield / discharge**	
District	South Tripura	**Whether borehole was drilled at this point? If yes,**	
Toposheet No.	79 M/12	**Depth Drilled**	
Lat	$23^0$11'13.0"	**Discharge (lps)**	
Long	$91^0$42'21.9"	**Transmissivity (m^2 /day)**	
RL (m amsl)		**Storativity**	

Unique ID: VES 14 TRPS

Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	4.78	4.78	1252	Top soil with pebbles, boulders, sand etc
4.78	8.53	3.76	273	Sands etc
8.53	19.1	10.6	3022	Sandstone/Consolidated shale etc
Below 19.1		-	8	Clays with sand etc

Unique ID	VES 15 TRPS	**Date/Year**		05/07/2015
Village	Tulamura	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Korbook(Silachari)	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.	79 M/12	**Depth Drilled**		
Lat	$23^0$14'16.9"	**Discharge (lps)**		
Long	$91^0$44'38.0"	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 15 TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	1.3	1.3	223	Top soil with pebbles, sand etc
1.3	3.49	2.19	77	Coarse sands etc
3.49	16.2	12.7	42	Medium sands etc
Below 16.2		-	87	Coarse sands etc

Unique ID	VES 16 TRPS	**Date/Year**		05/07/2014
Village	Ailmara	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Silachari	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.	79 M/12	**Depth Drilled**		
Lat	$23^0$15'49.3"	**Discharge (lps)**		
Long	$91^0$45'10.6"	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 16 TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	0.637	0.637	47	Top soil with sand etc
0.637	1.019	0.383	177	Sands, pebbles etc
1.019	13.36	12.34	65	Sands etc
Below 13.36		-	29	Intercalations of Sands with clays etc

Unique ID	VES 17 TRPS	**Date/Year**	05/07/2014
Village	Kajoshikmokpara	**Nearby DW/DCBW/BW Depth**	
Taluka/Block	Korbook(Silachari)	**Yield / discharge**	
District	South Tripura	**Whether borehole was drilled at this point? If yes,**	
Toposheet No.	79 M/16	**Depth Drilled**	
Lat	$23^0$14'40.9"	**Discharge (lps)**	
Long	$91^0$45'52.1"	**Transmissivity (m^2 /day)**	
RL (m amsl)		**Storativity**	

Unique ID: VES 17 TRPS

Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	0.749	0.749	77	Top soil with sand etc
0.749	1.58	0.831	897	Sand with pebbles, boulders etc
1.58	3.8	2.22	52	Sands etc
3.8	14.7	10.9	871	Dry sands etc
14.7	46.1	31.4	25	Sands with clays etc
Below 46.1		-	4479	Consolidated shale/sandstone

Unique ID	VES 18 TRPS	**Date/Year**	05/07/2014
Village	Suknachari	**Nearby DW/DCBW/BW Depth**	
Taluka/Block	Korbook	**Yield / discharge**	
District	South Tripura	**Whether borehole was drilled at this point? If yes,**	
Toposheet No.	79 M/12	**Depth Drilled**	
Lat	$23^0$11'20.7"	**Discharge (lps)**	
Long	$91^0$47'11.7"	**Transmissivity (m^2 /day)**	
RL (m amsl)		**Storativity**	

Unique ID: VES 18 TRPS

Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	1.47	1.47	527	Top soil with pebbles, boulders, sand etc
1.47	15.5	14	197	Sand with pebbles etc
15.5	41.1	25.6	39	Sands etc
Below 41.1		-	11726	Consolidated shale / sandstone etc

Unique ID	VES 19 TRPS	**Date/Year**		06/07/2014
Village	Powangbari	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Powanbari	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.	79 M/12	**Depth Drilled**		
Lat	$23^0$01'22.7"	**Discharge (lps)**		
Long	$91^0$34'02.6"	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 19 TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	0.535	0.535	54	Top soil with sand etc
0.535	0.874	0.339	1505	Sand with pebbles, boulders etc
0.874	19.4	272	272	Sands etc
19.4	37.4	18	32	Fine sand with clays etc
Below 37.4		-	43313	Consolidated shale sandstone etc

Unique ID	VES 20 TRPS	**Date/Year**		06/07/2014
Village	Sukanta Colony	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Powangbari	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.	79 N/9	**Depth Drilled**		
Lat	$22^0$59'49.2"	**Discharge (lps)**		
Long	$91^0$33'30.7"	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 20 TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	1.89	1.89	181	Top soil with pebbles, sand etc
1.89	2.94	1.05	1094	Sand with pebbles, boulders etc
Below 2.94		-	59	Intercalations of Sands with clays etc

Unique ID	VES 21 TRPS	**Date/Year**		06/07/2014
Village	Kalirbazar/ Nabagram	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Satchand	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.	79 N/9	**Depth Drilled**		
Lat	$22^0$59'35.0"	**Discharge (lps)**		
Long	$91^0$36'56.8"	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 21 TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	0.465	0.465	212	Top soil with gravel, sand etc
0.465	1.25	0.78	1243	Sand with pebbles, boulders etc
1.25	2.61	1.37	113	Sands with clay etc
2.61	7.07	4.46	714	Dry sand /Consolidated shale etc
7.07	14.2	7.13	83	Sands etc
Below 14.2		-	808	Dry/Consolidated sand

Unique ID	VES 22 TRPS	**Date/Year**		07/07/2014
Village	Silpara	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Rupaichari	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.	79 M/12	**Depth Drilled**		
Lat	$23^0$03'23.3"	**Discharge (lps)**		
Long	$91^0$41'19.7"	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 22 TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	1.03	1.03	823	Top soil with pebbles, sand etc
1.03	2.34	1.31	4000	Sand with pebbles, boulders etc
2.34	4.42	2.08	622	Sands etc
4.42	8.72	4.3	3947	Consolidated shale / sandstone etc
8.72	20.9	12.2	52	Sands with clays etc
20.9	89	68.1	236	Sandstone/dry sand
Below 89		-	6	Sheared/Fractured rock

Unique ID	VES 23 TRPS	**Date/Year**	07/07/2014
Village	Ghorakappa	**Nearby DW/DCBW/BW Depth**	
Taluka/Block	Silachari	**Yield / discharge**	
District	South Tripura	**Whether borehole was drilled at this point? If yes,**	
Toposheet No.	79 M/16	**Depth Drilled**	
Lat	$23^0$10'04.5"	**Discharge (lps)**	
Long	$91^0$47'57.6"	**Transmissivity (m^2 /day)**	
RL (m amsl)		**Storativity**	

Unique ID: VES 23 TRPS

Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	0.75	0.75	82	Top soil with gravel, sand etc
0.75	1.74	0.987	1055	Sand with pebbles, boulders etc
1.74	9.66	7.92	265	Sands etc
9.66	21.9	12.3	714	Consolidated shale / sands etc
Below 21.9		-	2	Sheared/fractured rock/ clay etc

Unique ID	VES 24 TRPS	**Date/Year**	08/07/2014
Village	Chalitabankul	**Nearby DW/DCBW/BW Depth**	
Taluka/Block	Rupaichari	**Yield / discharge**	
District	South Tripura	**Whether borehole was drilled at this point? If yes,**	
Toposheet No.	79 M/12	**Depth Drilled**	
Lat	$23^0$08'45.8"	**Discharge (lps)**	
Long	$91^0$41'53.4"	**Transmissivity (m^2 /day)**	
RL (m amsl)		**Storativity**	

Unique ID: VES 24 TRPS

Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	0.664	0.664	145	Top soil with gravel, sand etc
0.664	2.73	2.07	2648	Sands with pebbles, boulders etc
2.73	38.1	35.4	419	Dry sands / consolidated shale
Below 38.1		-	92	Weathered rock

Unique ID	VES 25 TRPS	**Date/Year**		08/07/2014
Village	Sakbari	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Satchand	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.	79 M/12	**Depth Drilled**		
Lat	$23^0$09'10.9"	**Discharge (lps)**		
Long	$91^0$37'05.9"	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 25 TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	0.75	0.75	634	Top soil with pebbles, sand etc
0.75	3.49	2.74	426	Clays with sand etc
3.49	7.51	4.02	644	Sands (dry)
7.51	16.2	8.66	157	Sand (consolidated) etc
16.2	34.8	18.7	10	Clays etc
Below 34.8		-	56	Intercalations of Sands with clays etc

Unique ID	VES 26TRPS	**Date/Year**		15/09/2015
Village	Bhuratalli	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Satchand	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.		**Depth Drilled**		
Lat	$23^0$07'00.6"	**Discharge (lps)**		
Long	$91^0$38'10.7"	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 26TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	0.85	0.85	69	Top soil with clay, sands etc
0.85	8.585	7.735	55.2	Sands etc
Below 8.585		-	1100	Weathered formation etc.

Unique ID	VES 27TRPS	**Date/Year**		16/09/2015
Village	Srinagar	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Powangbari	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.		**Depth Drilled**		
Lat	$23^0$00’49.2”	**Discharge (lps)**		
Long	$91^0$33’13.2”	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 27TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	1.6	1.6	1400	Top hard soil with pebbles etc
1.6	7.68	6.08	280	Dry sands/shale
7.68	29.44	21.76	120	Sands etc
Below 29.44		-	24	Clay with intercalation of sand etc

Unique ID	VES 28TRPS	**Date/Year**		17/09/2015
Village	Amlighat	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Powangbari	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.		**Depth Drilled**		
Lat	$22^0$58’15.9”	**Discharge (lps)**		
Long	$91^0$34’43.3”	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 28TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	0.8	0.8	1555	Top soil with pebbles, bricks etc
0.8	1.36	0.56	582	Consolidated sands etc
1.36	6.376	5.016	1320	Consolidated shale/ dry sand etc
6.376	40.546	34.17	590	Consolidated sands etc
Below 34.17		-	189	Sands/weathered formation

Unique ID	VES 29TRPS	**Date/Year**		19/09/2015
Village	Motu Mogpara	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Satchand	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.		**Depth Drilled**		
Lat	$23^0$02’47.8”	**Discharge (lps)**		
Long	$91^0$40’12.5”	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 29TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	1.76	1.76	2386	Top soil with roots etc
1.76	15.6	13.8	1246	Consolidated shale/weathered formation
Below 15.6		-	190	Consolidated sands etc

Unique ID	VES 30TRPS	**Date/Year**		30/09/2015
Village	Harina	**Nearby DW/DCBW/BW Depth**		
Taluka/Block	Satchand	**Yield / discharge**		
District	South Tripura	**Whether borehole was drilled at this point? If yes,**		
Toposheet No.		**Depth Drilled**		
Lat	$23^0$02’47.8”	**Discharge (lps)**		
Long	$91^0$40’12.5”	**Transmissivity (m^2 /day)**		
RL (m amsl)		**Storativity**		
Unique ID: VES 30TRPS				
Depth range (m bgl)		**Thickness (m)**	**Resistivity (ohm-m)**	**Inferred Lithology**
From	**To**			
0	1.10	1.10	240	Top soil with small plants etc
1.10	11	9.90	1200	Consolidated shale etc
Below 11		-	180	Consolidated sands etc