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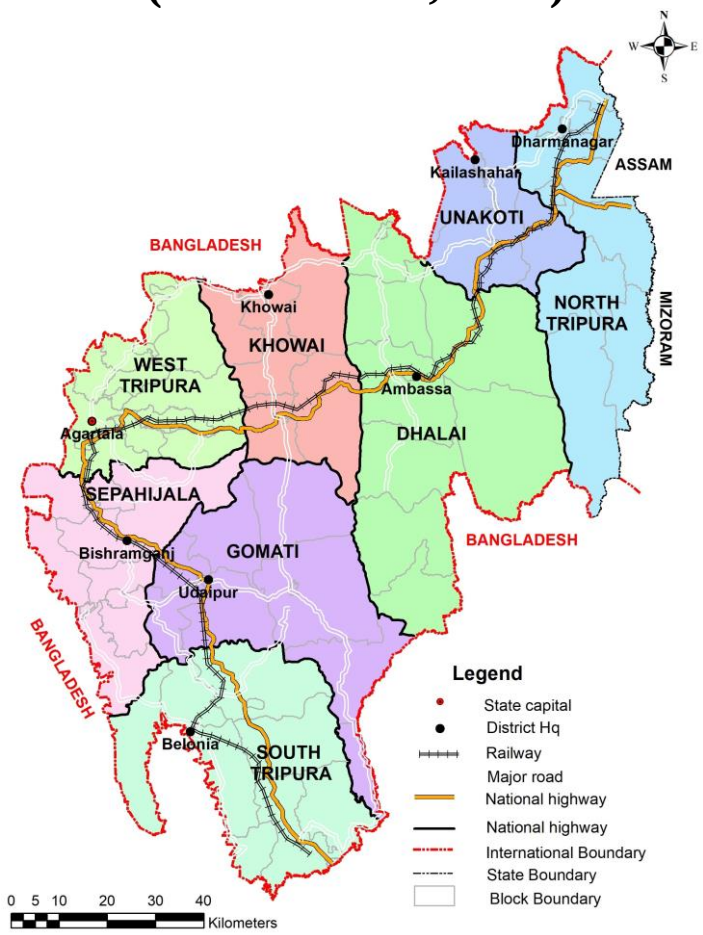
DYNAMIC GROUND WATER RESOURCES OF TRIPURA
(As on March, 2023)



CENTRAL GROUND WATER BOARD
STATE UNIT OFFICE, AGARTALA
October, 2023

केंद्रीय भूमिजल बोर्ड
राज्य इकाई कार्यालय, अगरतला
अक्टूबर, 2023

DYNAMIC GROUND WATER RESOURCES OF TRIPURA

(As on March, 2023)

Prepared by

CENTRAL GROUND WATER BOARD

STATE UNIT OFFICE, AGARTALA

&

PWD (WATER RESOURCES),

GOVERNMENT OF TRIPURA

October, 2023

PREFACE

Tripura is a picturesque state in the north-eastern region of the country. The state is acceded to the Indian Union in 1949 and is bounded on the north, west, south & southeast by the international boundary of Bangladesh. Shallow tube wells with small command area is most suitable in the state.

For a scientific planning and judicious development of dynamic ground water resource potential of the state, estimation of ground water resource has been done based on the latest methodology as recommended by Ground Water Resource Estimation Committee-2015 (GEC-2015) and duly approved by Govt. of India. The estimation of groundwater resource has been done on block wise basis.

The report on dynamic Ground water resource potential has been assessed based on the field data generated by Central Ground Water Board and statistical information collected from other State Departments. The annual ground water recharge, total extractable groundwater resource and total extraction on irrigation and domestic uses, etc, have been estimated for the state. The report also highlights on the net annual ground water availability for future use.

The total annual ground water recharge in the state of Tripura is 1.36 BCM. The Annual Extractable Ground Water Resources of the state is 1.09 BCM after deducting the natural discharge. Present Ground Water Extraction is 0.11 BCM out of which 0.025 BCM extraction is on account of irrigation and the annual domestic extraction is 0.08 BCM. The annual allocation for Domestic and Industrial uses has been made as 0.08 BCM based upon the population data projected up to year 2025. The over-all stage of ground water development of the state is 9.92%.

I strongly believe that the report with its technical data will help in understanding present ground water scenario in Tripura State and prove valuable to policy makers, technical experts, professionals and user agencies for management of ground water development in the state in planned manner.

(Biplab Ray)
REGIONAL DIRECTOR /HOO

CONTENTS

Table of Contents

CONTRIBUTORS

Estimation of Ground Water Resources of Tripura is a collaborative effort of Central Ground Water Board and the State Government Authorities. The report prepared is based on the data provided by the State Nodal Officer, Shri Biswajit Saha, EE, WR Investigation Division, Public Works Department (Water Resources), Govt. of Tripura and from various other Departments such as Public Works Department (Drinking Water and Sanitation); Agriculture Department; Directorate of Economics and Statistics; Department of Fisheries; Forest Department; Rural Development; Urban Development Department; Agartala Municipal Corporation, Government of Tripura, etc. The computation of the resource estimation has been done through the INGRES software and the report is prepared by the officers from the State Unit Office, Agartala, CGWB, namely, Dr. Raja Ram Purohit (Scientist- D & OIC) and Smt. Ritu K. Oraon (Scientist-C). The contribution of Sh. K.M. Debbarma, Officer Surveyor and Sh. A.C. Namasudra, Officer Surveyor for the help in data collection is also duly acknowledged.

1. INTRODUCTION

Tripura is a picturesque state in the northeastern region of the country. The state is acceded to the Indian Union in 1949 and is bounded on the north, west, south & southeast by the international boundary of Bangladesh. In the east, it has a common boundary with Assam & Mizoram. The state lies between North latitudes $22^0 51^{'}$ and $24^0 32^{'}$ and East longitudes $90^0 10^{'}$ and $92^0 21^{'}$. The total geographical area of the state is 10491 sq.km. The state has been divided into 8 districts and 58 blocks and Agartala MC. The state head quarter Agartala does not come under any block.

As per 2011 Census, the total population of the State is 35,05004 as against 31,99,203 in 2001 Census. Total area of Tripura is 10491 sq. km. Population Density of Tripura is 350 persons per sq km which is lower than national average 382 per sq km.

Tripura is basically an Agricultural State with about 64% of its total population depending entirely on Agriculture for their livelihood.

The previous assessment of groundwater resources of Tripura was carried out during 2021-22. The ground water resource of the state has been re-estimated by Central Ground Water Board, North Eastern Region based on GEC 2015 methodology for the assessment year 2022-23. Census figures for population as per 2011 Census are available and whatever data for the year 2022-23 provided by Public Works Department (Water Resources), Govt. of Tripura, Public Works Department (Drinking Water and Sanitation), Govt. of Tripura, Agriculture Department, Govt. of Tripura, Directorate of Economics and Statistics, Govt. of Tripura have been used to update and revise the assessment of groundwater resources of Tripura.

To estimate ground water resources of Tripura for the assessment year 2023, a Permanent State Level Committee (PLSC) under the Chairmanship of Principal Secretary, PWD, Govt. of Tripura has been constituted on 30/01/2023 (Appendix-I). 1st Meeting of the Permanent State Level Committee was held on 27th March, 2023 (Appendix-II)..

The presentation on the finding of GWRE-2023 for the state of Tripura along with its approval from the PSLC was held on 19.09.2023 (Appendix-III).

2. HYDROGEOLGICAL SETUP OF TRIPURA

2.1 Description of rock types with area coverage.

Geologically, Quaternary and Upper Tertiary groups occupy the state. Mobile trough geosynclinal deposition of Barail group followed by flysch type of Surma & Tipam sediments is noticed in the state.

The Surma group of rocks is the oldest group rocks in the state and is represented by Upper Bhuban and Bokabil formations. The rocks of Bhuban formation constituting compact sandstones and shales are exposed in the core of the anticlines viz, Atharamura, Longtarai and Jampui hills of Khowai, Dhalai and North Tripura districts. The Bhuban formation is overlain by Bokabil formation consists mainly of shale.

The Tipam formations are conformable and transitional to the underlying Bokabil formation. These formations are consisting mainly of sandstone with occasional shale. Tipam formations occur in the eight districts of the state. The maximum thickness of this formation is estimated to be around 1400 m and the minimum thickness being 400 m.

The Dupitila formation consisting of earthy brown to buff sandy clay, clayey sandstone and coarse to gritty ferruginous sandstone unconformably overlie the Tipam formation and are well developed in the central portion of the synclinal valleys, specially west of Baramura anticline. The thickness of this formation varies from 10 to 30m.

Most of the longitudinal synclinal valleys of the state are the basins of deposition of recent formation. Recent alluvium occurs along the streams and the flood plains of major rivers. It consists of coarse sand, sandy clay, silt and clay.

2.2 Hydro-meteorological condition

The climate of the state is characterized by moderate temperature and high humid atmosphere. Winter sets in November and lasts till the end of February. Summer season starts from March and lasts up to May and is followed by Southwest monsoon lasting till September. Generally, the maximum summer temperature ranges from 35^0C to 40^0C and average minimum temperature in winter nights is recorded at 6^0C.

The state receives rainfall from Southwest Monsoon. The average annual rainfall over the state is 2128 mm. The intensity of rainfall increases from SW to NE in the state. In West Tripura district the normal monsoon rainfall is 1339 mm and normal annual rainfall is 1925mm. In South Tripura district normal monsoon rainfall is 1806 mm and normal annual rainfall is 2419 mm. In North Tripura district normal monsoon rainfall is 1590 mm and

normal annual rainfall is 2407 mm. In Dhalai district normal monsoon rainfall is 1493 mm and normal annual rainfall is 2212 mm. In Khowai district normal monsoon rainfall is 1412 mm and normal annual rainfall is 2115 mm. In Unakoti district normal monsoon rainfall is 1514 mm and normal annual rainfall is 2308 mm. In Gomati district normal monsoon rainfall is 1306 mm and normal annual rainfall is 1760 mm. In Sepahijala district normal monsoon rainfall is 1401 mm and normal annual rainfall is 2000 mm.

2.3 Description of hydrogeological units, aquifer parameters.

Hydrogeological surveys, aided by exploratory drilling and deposit well programmes carried out by Central Ground Water Board, N.E. Region since 1972 have revealed that there are 3 to 4 major aquifers encountered within 250m depth in the synclinal valleys of the State, and the thickness of the aquifers varies from valley to valley and it decreases considerably in the northern valleys of the State, namely, Kamalpur, Kailasahar & Dharmanagar valleys. The Tipam formation comprising of medium to fine grained, semi-consolidated & friable sandstones, form the aquifer system of the State. The ground water worthiness of the aquifer varies from valley to valley, while in western part of the State the aquifers are of good potential in comparison to northeastern parts towards Dharmanagar, where it is moderately potential. On the basis of drilling, the aquifer zones down to the explored depth of 250m, can be divided into two groups, viz., (1) a shallow aquifer zone within 40m depth from surface & (2) a deeper aquifer zone below 40m depth. The study of sub-surface geology through lithological logs has revealed that the aquifers are discontinuous in nature even within the same valley.

In Tripura, ground water occurs under unconfined condition in Dupitila formation, Recent formation & in Tipam formation. Besides it also occurs under confined to semi-confined conditions in Tipam formation at considerable depth. Recharge areas for the deeper aquifer lies in the adjacent anticlinal hills. Wherever a good thickness of impermeable clay beds underlie & overlie the saturated granular zones, autoflow artesian conditions have been found in the valleys, which are the discharge area. In fact, the geology as well as geomorphology of the State is favourable for such artesian conditions within synclinal valleys. The artesian flowing conditions occur in patches both at shallow depth and at deeper depth. The auto discharge of the flowing wells in the State ranges from 100 to 6000 lph, the maximum auto discharge from deep tube well to the extent of 54000 lph has been found in Khowai valley near Khowai town, where the piezometric head rose up to 7m above ground level. The depth to water level in dug wells varies from 0.75 to 10.30 m bgl during pre-

monsoon period March 2022 and 0.54 to 9.48 m bgl during post-monsoon period November 2022.

Analysis of aquifer performance tests on exploratory/ deposit deep tubewells in the state have shown transmissivity range from 4.5 to 1577 m^2/day and permeability range from 0.1 to 28.4 m/day. The storage co-efficient ranges from 2.25 X 10^{-5} to 2.20 X 10^{-3} showing confined nature of the aquifer.

Table 1: Hydrogeology of Tripura

Age		Group	Formation	Lithology	Aquifer Disposition	Ground Water Potential
Quaternary	**Un-consolidated**	Recent	Recent Alluvium	Clay, Silt and Sand	Limited thickness along river valleys	Yield Prospects very limited due to superficial thickness
Upper Tertiary	**Semi Consolidated**	Dupitila	Dupitila	Coarse to gritty Sandstone with dominated Clay layers	Forms Unconfined aquifer in dug well zones near surface. Maximum thickness : 30 m	Limited yield prospect due to poor permeability
		Tipam	Champaknagar/ Manu Bazar	Fine to coarse Sandstone with intercalations of Shale layers	Forms major aquifer system for shallow and deep tube wells up to 300 m depth at favourable locations.	Moderate yield prospect, yields varies from 20 to 150 m^3/hr for drawdown upto 30 m
		Surma	Bokabil/ Bhuban	Thinly bedded Sandstone, Siltstone and shale	Occurs on anticlinal hill ranges	Not potential for ground water development, due to argillaceous nature of formations

2.4 Ground water level conditions

Ground water regime of Tripura is being monitored through a network of 106 permanent observation stations (GWMS) four times in a year. The depth to water level during pre-monsoon period (March' 22) generally lies between 0.75 to 10.30 m bgl and during post-monsoon period (November' 22) depth to water level lies between 0.54 to 9.48 m bgl. The analysis of long-term water level trend (both pre-monsoon and post-monsoon period) of ground water monitoring stations indicates that there is no significant falling trend of water

level in the state so far.

2.5 Ground water quality

Results of chemical quality of ground water show that ground water in all parts of the State is good for domestic, irrigational & industrial uses. Iron content in ground water, however, is high, which warrants proper treatment before use. The water is encrusting in nature throughout the state. Hence, it is recommended that well screens should be cleaned periodically. Range of chemical contents of Ground Water in Tripura is given in the table below:

Table 2: Range of chemical contents of Ground Water in Tripura

Sl. no	Chemical constituents	Phreatic Aquifer		
			Min	**Max**
1	pH		4.15	9.02
2	EC (µS/cm) at 25°C		50.57	841.10
3	Turbidity (NTU)	mg/l	BDL	0.4
4	TDS		24.83	440.2
5	CO_3		BDL	51
6	HCO_3		12.21	311.35
7	TA (as $CaCO_3$)		12.21	362.35
8	Cl-		7.09	141.8
9	SO_4		BDL	134.01
10	NO_3		BDL	10.73
11	F-		BDL	1.4
12	Ca		2	40.03
13	Mg		2.41	35.19
14	TH (as $CaCO_3$)		25	200
15	Na		2.77	118.55
16	K		0.69	34.69
17	Fe		BDL	6.54

Ground water in the state is acidic to alkaline with pH values ranging from 4.15 to 9.02. The electrical conductivity values for ground water in phreatic aquifer in Tripura range

from 50.57 to 841.10 µs/cm at 25ºC indicating the quality of ground water to be of low salinity and the water is potable. Total hardness (Ca+Mg) expressed as $CaCO_3$ in ppm is small indicating that the water is soft in quality. The other chemical constituents of ground water namely HCO_3, Cl, Ca, Mg, Fe etc. all are within permissible limit according to Bureau of Indian Standard (IS: 10500-2012**).** The chemical analysis of ground water samples from phreatic aquifer reveals that the ground water of Tripura is generally suitable for drinking purposes. Almost all the chemical constituents are within the permissible limits of drinking water standards except for Iron, which is high in isolated locations. Higher concentration of iron above permissible limit in ground water in phreatic aquifer in Tripura is observed in most of the places..

3. GROUND WATER RESOURCES ESTIMATION METHODOLOGY-GEC'2015

The present methodology used for resources assessment is known as Ground Water Resource Estimation Methodology – 2015 (GEC'2015). The revised methodology GEC 2015 recommends aquifer wise ground water resource assessment. Ground water resources have two components – Replenishable ground water resources or Dynamic ground water resources and In-storage resources or Static resources.GEC 2015 recommends estimation of Replenishable and in-storage ground water resources for both unconfined and confined aquifers. In GEC'2015, two approaches are recommended – water level fluctuation method and norms of rainfall infiltration method. The water level fluctuation method is based on the concept of storage change due to difference between various input and output components. Input refers to recharge from rainfall and other sources and subsurface inflow into the unit of assessment. Output refers to ground water draft, ground water evaporation, transpiration, base flow to streams and subsurface outflow from the unit. Since the data on subsurface inflow/ outflow are not readily available, it is advantageous to adopt the unit for ground water assessment as basin/ sub basin/ watershed, as the inflow / outflow across these boundaries may be taken as negligible.

Thus the ground water resources assessment unit is in general watershed particularly in hard rock areas. In case of alluvial areas, administrative block can also be the assessment unit. In each assessment unit, hilly areas having slope more than 20% are deleted from the total area to get the area suitable for recharge. Further, areas where the quality of ground water is beyond the usable limits should be identified and handled separately. The remaining area after deleting the hilly area and separating the area with poor ground water quality is to be delineated into command and non-command areas. Ground water assessment in command and non-command areas are done separately for monsoon and non-monsoon seasons.

3.1 Ground water Recharge

Monsoon season

Recharge from rainfall is estimated by using the following relationship -

Rrf = RFIF * A* (R – a)/1000

Where,

Rrf= Rainfall recharge in ham

A = Area in Hectares

RFIF = Rainfall Infiltration Factor

R = Rainfall in mm

a = Minimum threshold value above which rainfall induces ground water recharge in mm

The threshold limit of minimum and maximum rainfall event which can induce recharge to the aquifer is to be considered while estimating ground water recharge using rainfall infiltration factor method. The minimum threshold limit is in accordance with the relation shown in above equation and the maximum threshold limit is based on the premise that after a certain limit, the rate of storm rain is too high to contribute to infiltration and they will only contribute to surface runoff. It is suggested that 10% of Normal annual rainfall may be taken as minimum rainfall threshold and 3000 mm as maximum rainfall limit.

The resources assessment during monsoon season is estimated as the sum total of the change in storage and gross draft. The change in storage is computed by multiplying water level fluctuation between pre and post monsoon periods with the area of assessment and specific yield. Monsoon recharge can be expressed as –

$$R_{RF} = h \times Sy \times A - R_{OS} \pm VF \pm LF + GE + T + E + B$$

Where,

h = rise in water level in the monsoon season,

A = area for computation of recharge,

Sy = specific yield,

R_{OS}= Other sources of ground water recharge during monsoon season include R_c, R_{sw}, R_t, R_{gw}, R_{wc} which are recharge from seepage from canals, surface water irrigation, tanks and ponds, ground water irrigation, water conservation structures respectively;

LF = Recharge through Lateral flow/ Through flow across assessment unit boundary in the monsoon season for the i^{th} particular year,

VF – Vertical inter aquifer flow in the monsoon season for the i^{th} particular year,

T- Transpiration in the monsoon season for the i^{th} particular year,

E- Evaporation in the monsoon season for the i^{th} particular year,

GE = Ground water extraction in monsoon season for the i^{th} particular year,

B = Base flow the monsoon season for the i^{th} particular year

The monsoon ground water recharge has two components – rainfall recharge and

recharge from other sources. Mathematically it can be represented as –

R (Normal) = R_{RF} (normal) + R_{OS}

Where,

R_{rf} is the normal monsoon rainfall recharge.

R_{OS} is the other sources of ground water recharge during monsoon season include R_c, R_{sw}, R_t, R_{gw}, R_{wc} which are recharge from seepage from canals, surface water irrigation, tanks and ponds, ground water irrigation, water conservation structures respectively

The rainfall recharge during monsoon season computed by Water Level Fluctuation (WLF) method is compared with recharge figures from Rainfall Infiltration Factor (RIF) method. In case the difference between the two sets of data are more than 20%, then RIF figure is considered, otherwise monsoon recharge from WLF is adopted. While adopting the rainfall recharge figures, weightage is to be given to WLF method over adhoc norms method of RIF. Hence, wherever the difference between RIF & WLF is more than 20%, data have to be scrutinized and corrected accordingly.

Non-Monsoon season

During non-Monsoon season, rainfall recharge is computed by using Rainfall Infiltration Factor (RIF) method. Recharge from other sources is then added to get total non-Monsoon recharge. In case of areas receiving less than 10% of the annual rainfall during non-monsoon season, the rainfall recharge is ignored.

Total annual ground water recharge

The total annual ground water recharge of the area is the sum-total of monsoon and non-monsoon recharge. An allowance is kept for natural discharge in the non-monsoon season by deducting 5% of total annual ground water recharge, if WLF method is employed to compute rainfall recharge during monsoon season and 10% of total annual ground water recharge if RIF method is employed. The balance ground water available accounts for existing ground water withdrawal for various uses and potential for future development. This quantity is termed as Annual Extractable Ground Water Resources.

Annual Extractable Ground Water Resources (AEGR) = Annual Ground Water Recharge – Natural discharge during non-monsoon season

Norms for estimation of recharge

GEC'2015 methodology has recommended norms for various parameters being used in ground water recharge estimation. These norms vary depending upon water bearing formations and agro-climatic conditions. While norms for specific yield and recharge from rainfall values are to be adopted within the guidelines of GEC'2015, in case of other parameters like seepage from canals, return flow from irrigation, recharge from tanks & ponds, water conservation structures, results of specific case studies may replace the adhoc norms.

3.2 Ground Water Extraction

The gross yearly ground water extraction is to be calculated for Irrigation, Domestic and Industrial uses. The gross ground water extraction would include the ground water extraction from all existing ground water structures during monsoon as well as during non-monsoon period. While the number of ground water structures should preferably be based on latest well census, the average unit draft from different types of structures should be based on specific studies or ad-hoc norms given in GEC2015 report.

3.3 Stage of ground water Extraction & Categorization of units

The stage of Ground water Development is defined by:

$$\textbf{Stage of Ground water Extraction (\%)} = \frac{\textbf{(Existing Gross Ground water extraction for all uses)}}{\textbf{(Annual Extractable Ground Water Resources (AEGR))}} \textbf{X 100}$$

Validation of Stage of Ground Water Extraction

The assessment based on the stage of ground water extraction has inherent uncertainties. It is desirable to validate the 'Stage of Ground Water Extraction' with long term trend of ground water levels.

If the ground water resource assessment and the trend of long term water levels contradict each other, this anomalous situation requires a review of the ground water resource computation, as well as the reliability of water level data. The mismatch conditions are enumerated below.

SOGWE	Ground Water Level Trend	Remarks
≤70%	Significant decline in trend in	Not acceptable and

	both pre-monsoon and post-monsoon	needs reassessment
>100%	No significant decline in both pre-monsoon and post-monsoon long term trend	Not acceptable and needs reassessment

Categorisation of Assessment Units

As emphasised in the National Water Policy, 2012, a convergence of Quantity and Quality of ground water resources is required while assessing the ground water status in an assessment unit. Therefore, it is recommended to separate estimation of resources where water quality is beyond permissible limits for the parameter salinity.

Categorisation of Assessment Units Based on Quantity

The categorisation based on status of ground water quantity is defined by Stage of Ground Water Extractions given below:

Stage of Ground Water Extraction	**Category**
≤70%	Safe
>70%and ≤90%	Semi-Critical
>90%and ≤100%	Critical
> 100%	Over Exploited

Categorisation of Assessment Units Based on Quality

The committee recommends that each assessment unit, in addition to the quantity based categorisation (safe, semi-critical, critical and over-exploited) should bear a quality hazard identifier. Such quality hazards are to be based on available ground water monitoring data of State Ground Water Departments and/or Central Ground Water Board. If any of the three quality hazards in terms of Arsenic, Fluoride and Salinity are encountered in the assessment sub unit in mappable units, the assessment sub unit may be tagged with the particular quality hazard.

3.4 Allocation of ground water resource for utilization

The net annual ground water availability is to be apportioned between domestic, industrial and irrigation uses. Among these, as per the National Water Policy, 2002,

requirement for domestic water supply is to be accorded priority. The requirement for domestic and industrial water supply is to be kept based on population as projected to the year 2025. The water available for irrigation use is obtained by deducting the allocation for domestic and industrial use, from the net annual ground water availability.

3.5 Poor quality ground water

Computation of ground water recharge in poor quality ground water is to be done on the same line as described above. However, in saline areas, there may be practical difficulty due to non-availability of data, as there will usually be no observation wells in such areas. Recharge assessment in such cases may be done based on rainfall infiltration factor method.

3.6 Apportioning of ground water assessment from watershed to development unit

Where the assessment unit is a watershed, the ground water assessment is converted in terms of an administrative unit such as block/ taluka/ mandal. This is done by converting the volumetric resource into depth unit and then multiplying this depth with the corresponding area of the block.

3.7 Additional Potential Recharge

In shallow water table areas, particularly in discharge areas, rejected recharge would be considerable and water level fluctuation are subdued resulting in under-estimation of recharge component. In the area where the ground water level is less than 5m below ground level or in waterlogged areas, ground water resources have to be estimated upto 5m bgl only based on the following equation -

Potential ground water recharge = (5-D) x A x Sp. Yield

Where,

D = Depth to water table below ground surface in pre-monsoon season in shallow aquifers;

A = Area of shallow water table zone.

The potential recharge from flood plain is estimated based on the same norms as for ponds, tanks and lakes.

4. PROCEDURE FOLLOWED IN THE PRESENT ASSESSMENT INCLUDING ASSUMPTIONS

4.1 Data source for each of the data element and how the data was used in the computation (constraint in the data base, if any)

In the present report, block has been taken as the smallest administrative unit for resources computation.

The following sub-units have been considered for computation of various figures as per GEC-2015 methodology.

The total geographical area of the blocks and block-wise population of 2011 were taken from 2011 Census report. The population data of 2011 is projected for population of 2022 and 2025. Ground water draft for drinking and domestic purposes was calculated as per population. All the data were provided by the nodal department PWD (WR). The monthly rainfall data was used for recharge from rainfall. Block-wise number of ground water abstraction structures for irrigation, drinking and domestic purposes was used for calculating draft as per structures. Deep tube wells and artesian wells were considered to calculate the area under groundwater irrigation. But only shallow tube wells were considered for calculating draft for irrigation from phreatic aquifer. Draft for Industrial extraction has been calculated as per unit draft provided by the firm for issuance of NOC approvals to Central Groundwater Authority. Water level data of CGWB has been utilized for calculating recharge by WLFM and long term water level trend used for categorization of blocks.

Constraints in database- block-wise area irrigated by different structures were not available. Data regarding ground water structures is not complete because there are thousands of private shallow tube wells which have not come under present ground water structure / spot sources survey.

4.2 Changes, if any, applied in the original methodology proposed by GEC along with justification

Return flow from ground water has not been considered for monsoon season, as there is enough rainfall during monsoon and ground water irrigation is not practiced. There is no major or medium irrigation scheme in Tripura. Entire area has been considered as non-command area.

Water spread area, days of water availability (monsoon & non-monsoon) and seepage from ponds & tanks given in the methodology have been used to determine the seepage from ponds & tanks for monsoon & non-monsoon separately. Since the aquifer remains fully

saturated during the periods of intensive rainfall, additional recharge from ponds & tanks during this period is negligible. Recharge from ponds and tanks during non-monsoon period are considered for 212 days. Computation factor for seepage from ponds & tanks is taken as 0.00144 m/day as per GEC-2015 methodology.

Categorization was done based on stage of groundwater extraction and validation. Validation was done.

4.3 Various norms used in the computation

The unit of computation proposed in the methodology is "watershed". However, it also recommends blocks/ tehsil as the unit for the first few years since there can be non-availability of data. In the present report block- the smallest administrative unit is taken as the unit of computation. This is mainly due to lack of data especially on number of ground water structures, draft, population and other vital figures on watershed basis.

The rainfall infiltration factor recommended by GEC 2015 for sandstone is 0.12. For calculating recharge from return flow from irrigation, an average water requirement of 1m & 0.1m for paddy & non-paddy has been taken from Agriculture department, Govt. of Tripura. Computation factor for return flow from ground water irrigation is taken as 0.25 – 0.45 and from surface water irrigation is taken as 0.30 – 0.50 as per GEC'2015 methodology.

Ground water drafts for various uses in the different subunits have been estimated and according to the recommended methodology. Ground water draft for domestic use has been estimated based on the number of different types of ground water abstraction structures and their unit draft per year and also as per population of 2011. The unit draft of dug well is 0.2 ham and unit draft of shallow tubewell (fitted with hand pumps) is 0.12 ham during monsoon and 0.48 ham during non-monsoon period.

Block-wise ground water draft for irrigation was estimated based on the number of structures of shallow tubewell and the unit draft of shallow tubewell fitted with pump. Ground water in the state is mostly used for domestic & irrigational purposes. Groundwater for Industrial extraction has been calculated as per unit draft provided by the firm for issuance of NOC approvals to Central Groundwater Authority.

The major potential aquifer in the state is Tipam sandstone and the specific yield value for Tipam sandstone is taken as 0.05 (from GEC'2015 Methodology).

4.4 Any documented field studies

The summarized results of the soil infiltration test carried out by the State Unit Office, Agartala, CGWB has been given as below. However, no other field study has carried out to measure unit draft of different structures and the data have been collected from the state government resources.

S.No	District	Block	Village	Lat	Long	Date of test	Duration of Test (min)	Soil type	Infiltration rate (cm/hr)
1	West Tripura	Agartala MC	SUO Agartala	23.83658	91.30223	20.11.18	141	Clayey Loam	0.02
2	West Tripura	Mohanpur	Brahma Kund	24.08438	91.3923	27.11.18	125	Sandy clay	3.26
3	Sipahijala	Bishalgarh	Kamla Sagar	23.74152	91.16467	28.11.18	160	Sandy clay	7.12
4	West Tripura	Teliamura	Pashim Hawaibari	23.81006	91.59218	29.11.18	170	Clayey Loam	0.42
5	Shipahijala	Jampuijala	Tufaniamura	23.6987	91.40701	8.02.19	150	Sandy clay	8.04
6	West Tripura	Dukli	Kathaltali	23.7804	91.28609	8.02.19	205	Sandy clay	23.12
7	West Tripura	Bamutia	Berimura	24.06491	91.59514	11.02.19	150	Clayey Loam	0.8
8	Khowai	Khowai NP	Godarghat	24.06491	91.59514	11.02.19	150	Clayey Loam	0.6
9	West Tripura	Jirania	Jirania NIT	23.83586	91.42189	14.02.19	170	Sandy clay	6.6
10	Gomti	Matabari	Bodhupara Gorjee Cherra,	23.42601	91.5129	18.02.19	190	Sandy clay	17.2
11	South Tripura	Satchand Block	Betaga Saduram Para	23.0122	91.66438	19.02.19	190	Sandy clay	7.13
12	South Tripura	Sabroom	Kathalchari	23.01801	91.7441	19.02.20	205	Sandy clay	11.2
13	Sepahijala	Kanthalia RD Block	Baghair Char, Kanthalia Bazar	23.3813	91.3085	20.02.19	190	Sandy clay	18.02
14	Dhalai	Ambassa	Hridaypara, Ambassa	23.9317	91.8566	22.02.19	150	Sandy clay	2.04
15	Dhalai	Durga Chowmuhani	Ghospara	24.1429	91.7893	22.02.19	170	Sandy clay	5.08
16	Khowai	Kalyanpur	Totabari Hr. Sec School	23.9091	91.6201	28.04.18	140	Sandy clay	3.04

5. COMPUTATION OF GROUND WATER RESOURCES IN TRIPURA STATE

Ground water resources of Tripura state have been computed according to the methodology and norms described above. The block-wise details have been provided in Annexures.

a. Salient features of the dynamic ground water resources assessments.

The smallest administrative unit 'block' is taken as the unit of computation. Total number of assessment units in Tripura is 59. The resource computations presented in this report is for the ground water year 2022 – 2023 (1st April, 2022 to 31st March, 2023). Population data of 2011 collected from Census report 2011 and projected population of 2023 and 2025 were worked out. Rainfall data collected for 1993 - 2023. Ground water abstraction structure for irrigation and for drinking and domestic was provided by PWD (WR), and PWD (DWS) Govt. of Tripura.

b. Assessment sub-unit-wise method adopted for computing rainfall recharge during monsoon season (WLF/RIF).

Recharge from Rainfall has been computed separately for monsoon and non-monsoon periods for the entire state. The recharge from rainfall during monsoon season has been computed using both water level fluctuation method (WLFM) and rainfall infiltration method (RIFM). The results from the above two methods (WLFM & RIFM) have been compared using Percent Deviation (PD). After the computation of the percent deviation (PD) it is found that in out of 59 assessment units, 55 units were considered by RIF method and 4 units by WLF method.

c. Total resources of the state, existing development, balance available for future development etc.

Total ground water recharge is estimated after deducting resultant flow from evaporation and transpiration, and it is 1.23 BCM. Annual extractable groundwater resources are estimated after deducting natural discharge, and it is 1.09 BCM. Ground water extraction for various uses has been estimated for all the assessment units of Tripura. Gross annual ground water extraction for all uses in Tripura is 0.11 BCM and allocation for domestic up to year 2025 is 0.087 BCM. Net annual groundwater availability for future use are 0.981 BCM.

The stage of development of Tripura is 9.92 % and all the 59 blocks / assessment units (including 1 non-block, Agartala) in Tripura state falls under **SAFE** category.

d. Spatial variation of the Ground water recharge and development scenario in Tripura

Annual Extractable ground water resources in the state are of the order of 1.09 BCM. Maximum annual extractable ground water resource of 0.2 BCM is found in South Tripura district while the minimum of 0.08 BCM is in Unakoti district.

Ground water extraction is done mainly through dug wells and shallow tubewells from unconfined aquifer in the state. The stage of ground water extraction in Tripura is 9.92%. Agartala MC is having the highest stage of ground water extraction of 60.18% while the minimum is 3.14 %, in Amarpur block.

e. Comparison with earlier ground water resources estimate and reasons for significant departure from earlier estimates.

A comparison is made between the previous estimate as on March 2017, 2020, 2022 and present estimate based on GEC'15 as on 2023, and presented in tabular statement given below.

Comparison between ground water resources estimation for Tripura for current year 2023 with 2017, 2020 and 2022

	Assessment Year	Yr: 2017	Yr: 2020	Yr: 2022	Yr: 2023
1	Monsoon Rainfall Recharge	0.801	0.848	0.811	0.809
2	Monsoon Recharge from Other Sources	0.06	0.339	0.06	0.16
3	Non-Monsoon Rainfall Recharge	0.4	0.059	0.217	0.3
4	Non-Monsoon Recharge from Other Sources	0.26	0.221	0.224	0.06
5	Annual G. W. Recharge {(1+2+3+4))}	1.52	1.469	1.1822	1.23
6	Total Natural discharge	0.287	0.137	0.1186	0.13
7	Resultant Flows (Evaporation-transpiration Loss)	0.18	0.087	0.087	0.13
8	Annual extractable Ground Water Resource [(5- (6+7)]	1.24	1.244	1.063	1.09
9	Annual extractable Ground Water Resource (ham)	1.239	1.244	1.06	1.09
10	Current annual gross G.W. Extraction for domestic use (in BCM)	0.0778	0.078	0.0813	0.08
11	Current annual gross G.W. Extraction for irrigation (in BCM)	0.0197	0.0197	0.0211	0.025

12	Current annual gross G.W. Extraction for industrial use (in BCM)	0	0.0001	0.00006	0.00028
13	Current annual gross G.W. Extraction for All uses (in BCM) (2+3+4)	0.0976	0.098	0.103	0.11
14	Stage of GW Extraction (in %) [(5/1)*100]	7.80%	8%	9.70%	9.92
15	Annual G.W. Allocation for Domestic water supply as on 2025 (in ham)	1.067	0.086	0.086	0.087
16	Net Annual G.W. availability for future use (in ham) (1-(3+4+7))	1.112	1.138	0.955	0.981

f. Ground water recharge in poor ground water quality zone.

As there is no poor quality zone in Tripura so annual ground water recharge for the poor ground water quality area is not assessed.

g. Additional annual potential recharge.

Additional potential recharge is computed for shallow water table areas. Area under shallow water table is calculated from water level maps prepared by CGWB. Additional annual potential recharge in the state is 0.31 BCM.

6. AUTOMATION OF ESTIMATION OF DYNAMIC GROUND WATER RESOURCES USING GEC-2015

The computation of the resource estimation of Tripura for the year 2022-23 is done through IN-GRES software (India Ground Water Resource Estimation System). IN-GRES is the common portal to input, estimate, analyze, and access static and dynamic groundwater resources. India GEC system will take Data Input through Excel as well as through Forms, compute various Ground water components (recharge, draft, flux, etc.), classify assessment unit into appropriate categories and develop visibility dashboards for each of the components. System allows user to view the data in both MIS as well as GIS view. User can also download the reports in formats like CGWB, etc.

India GEC system is divided into 3 modules – Input, Computation and Output.

i. Input module – Input Module refers to the Data Entry module at an Assessment Unit level. Data Input is done via 2 methods i.e.

a. Excel based input – In this, the user needs to download District level data sheet template where he/she can fill the data at an Assessment Unit level. User now needs to upload their fully filled excel sheet into the system.

b. Form based input – In this, the user is shown a form and he/she can fill/edit the data in data sheet in an online mode. Once user is done with editing online, he/she can submit the data file.

ii. Computation module – Computation Module refers to the ground water calculations for an assessment unit. These computations are based on GEC 2015 methodology and are used to calculate Annual Extractable Ground Water Resource, Total Current Annual Ground Water Extraction (utilization) and the percentage of ground water utilization with respect to recharge (stage of Ground Water Extraction) for an assessment unit. Based on these percentages an assessment unit is categorized into SAFE, SEMI-CRITICAL, CRITICAL AND OVEREXPLOITED categories.

iii. Output module Once categorized the data is shown in two views:

a. MIS Dashboard – MIS dashboard shows the results of the assessment for the entire India, and also State wise in tabular form. The MIS dashboard shows all type of recharges, extractions, inflows and outflows computed for both monsoon and non-monsoon

periods of the year and then reflect the overall stage of extraction at the selected Geo-Zoom Level.

b. GIS Dashboard – GIS dashboard shows the data in Web Geo-Server format, implemented in interactive GIS platform allowing user to all GEC related information in the map itself. GIS view represents the data on India map and color codes each block/Assessment unit based on the categorization

APPENDIX

Appendix - I: Constitution of Permanent State Level Committee (PLSC) for Assessment of Dynamic Ground Water Resources as on March 2023

Government of Tripura
PUBLIC WORKS DEPARTMENT(WR)
Kunjaban: Agartala

No.F.15(76)/SE/WRPC/1566-77 **Dated: 30-01-2023**

MEMORANDUM

Sub:- Constitution of Permanent State Level Committee for assessment of Dynamic Ground Water Resourses Estimation.

In accordance with the approval of the Government, a Permanent State Level Committee for assessment of Dynamic Ground Water Resourses Estimation in Tripura, is hereby constituted with the following officials:-

1. Secretary,PWD, Tripura.	Chairman
2. Conservator of Forest, Territorial Tripura.	Member
3. Regional Director,CGWB, NE Region Guwahati.	**Member Secretary**
4. Chief Engineer, PWD (WR),Tripura.	Member
5. Chief Engineer, PWD (DWS),Tripura.	Member
6. Chief Engineer, Agriculture, Tripura.	Member
7. Chief Engineer, RD Deptt. Tripura.	Member
8. Director Industries, Tripura.	Member
9. Scientist-B/Engineer, Tripura Space Application Centre, Gurkhabasti.	Member
10. General Manager, NABARD, Tripura.	Member
11. Officer – in – Charge, CWGB, State Unit Tripura.	Member
12. Executive Engineer, W.R. Investigation Division, PWD(WR), Kunjaban.	**Nodal Officer cum Member**

The broad Terms of Reference of the Committee would be as follows:

i. To estimate annual replenishable ground water resources of the State in accordance with the Ground Water Recourses Estimation Methodology.
ii. To estimate the status of utilization of the annual replenishable ground water resourses.

30/01/2023

DEPUTY SECRETARY
PWD(Water Resourses)

Forwarded to :-

1. The Secretary, PWD,Tripurafor information please.
2. The Conservator of Forest,Territorial, AranyaBhawan, Gurkhabasti, Agartala,for information please.
3. The Regional Director,CGWB, NE Region Guwahati, for information please.
4. The Chief Engineer, PWD (WR) Kunjaban, Agartala,for information please.
5. The Chief Engineer, PWD (DWS) Gurkhabasti, Agartala, for information please.
6. The Chief Engineer, Agriculture, KrishiBhavan, Agartala, for information please.
7. The Chief Engineer, RD Deptt. Gurkhabasti, Agartala, for information please.
8. The Director Industries, Tripura, Agartala, for information please.
9. The Head of Office (DDO),Tripura State Council for Science & Technology, Gurkhabasti, Agartala for information please.
10. The General Manager, NABARD, KhejurBagan, Agartala, for information please.
11. The Officer–in - Charge, State Unit Tripura,CGWB, Agartala, for information please.
12. The Executive Engineer, W.R. Investigation Division PWD(WR), Kunjaban, AgartalaVisvesvaraya Complex for information please.

30/01/2023

DEPUTY SECRETARY
PWD(Water Resourses)

Appendix - II: Minutes of the 1st Meeting of the Permanent State level Committee (PSLC) on of Dynamic Ground Water Resources of Tripura (as on March, 2023), held on 27th March, 2023.

Government of Tripura
Office of the Executive Engineer
Water Resource Investigation Division
Visvesvaraya Complex,
Kunjaban: Agartala

File No. 1(45) /EE/WRID/TECH/2021/3567-88 **Dated: 31-03-2023**

Minutes of the 1st SLC Meeting on Ground Water Resource Estimation 2023 (GWRE-2023) chaired by Secretary, PWD, Government of Tripura, on 27th March, 2023

The 1st meeting of the State Level Committee (SLC) on Ground Water Resource Estimation (GWRE) for the year 2023 was held on the 27th March, 2023 at 12.00 PM at the Conference hall of PWD (WR), Kunjaban, Agartala.

The List of participants are attached at Annexure-I.

The Executive Engineer PWD (WR) also the Nodal Officer cum Member of GWEC initiated the meeting proceedings. The Secretary, PWD, Government of Tripura also the Chairman of SLC on GWRE welcomed all the participants of the meeting. After a quick round of introduction by participating members, Secretary, PWD had a brief round of discussion with the OIC, SUO Agartala, CGWB on the ground water scenario of the State.

With the permission of the Chair, Smt. Ritu K Oraon, Sc-C, SUO Agartala gave a detailed presentation on the GWRE-2022, which was based on the GEC-2015 Methodology and the Data requirement for the GWRE-2023.

Secretary, PWD, Govt. of Tripura showed his concern about the ground water scenario of the state. He urged all the members, especially members from Government of Tripura to plan all the future project scientifically. He also emphasized for geo-tagging of all the GW recharge structures so far completed by the different department.

He also urged his officers to plan future artificial recharge and other water conservation structures in the hilly parts of the states in consultation with CGWB office, Agartala.

After various discussions and deliberations and seeing the volume of data to be required for GW resource estimation, it was decided that:

1. The State Govt. will provide all the requisite data to CGWB as per the required format.
2. Officer from each of the member department may be nominated for closer coordination of the task and supply the data to the Nodal officer.
3. PWD (WR) will be Nodal Agency for all the data compilation.
4. A resource person will be identified from PWD (WR) who will be closely associated with the work and carry out the task in the coming years.
5. Co-opting few additional members (i) Director, GSI, (ii) Commissioner, AMC and Director, Urban Development Deptt. and other relevant offices may be added in the SLC.

Contd. P-2

6. Geo tagging of all the previous & future artificial recharge structures.
7. For completion of GWRE-2023, monthly Tasks is/are to be completed as shown in Timelines sheets.
8. Co-ordination and co-operation from the entire line department for completion of GWRE-2023 is essential.

The meeting ended with thanks to all.

31/3/23

(Er. B. SAHA)
Nodal Officer (GWRE)
Executive Engineer
Water Resource Investigation Division
Kunjaban , Agartala.
Ph 9436135789 Email-
eewrinvdiv@gmail.com

Annexure-I

List of participants for the 1st meeting on SLC for GWRE

Sl No	Name	Designation	Organisation
1	Shri Abhishek Singh (IAS) – in chair	Secretary, PWD (WR)	WRD, Govt of Tripura
2	Sh. Anil Purohit	Dy. General Manager,	NABARD
3	Sh. Animesh Das (IFS)	Dy. Conservator of Forest	Forest Dept., Govt. of Tripura
4	Er. Mahitosh Das	CE, PWD (WR)	PWD (WR), Govt. of Tripura
5	Er. Amit Das	CE, PWD (NH)	PWD (NH), Govt. of Tripura
6	Er. Shyamlal Bhowmik	CE, PWD (DWS)	PWD (DWS), Govt. of Tripura
7	Er. Swapan Kumar Das	CE, RD Dept.	Rural Development Dept., Govt. of Tripura
8	Er. Binay Debbarma	A.E, O/o The CE, Agriculture Dept.	Agriculture & F.N Dept. Govt. of Tripura
9	Smt. Sutirtha Paul	State Geologist (I&C),	State Geologist (I&C), Govt. of Tripura
10	Sh. Biswajit Saha	EE, PWD (WR), Nodal officer, GWEC	PWD(WR) , Govt. of Tripura
11	Dr. Raja Ram Purohit	Scientist-D & OIC, SUO Agartala	SUO Agartala, CGWB
12	Ms. Ritu Kumari Oraon	Scientist-C	SUO Agartala, CGWB
13	Sh.Pranjit Shil,	JE, P&D Unit, PWD(WR)	PWD(WR) Govt. of Tripura
14	Sh. Santanu Sarkar	JE, WR Inv. Division, PWD(WR)	PWD(WR) Govt. of Tripura

Nodal Officer (GWRE)
Executive Engineer
Water Resource Investigation Division
Kunjaban , Agartala

Appendix - III: Approval & Minutes of the meeting of the Permanent State level Committee (PSLC) on of Dynamic Ground Water Resources of Tripura (as on March, 2023), held on 19th Sept. 2023.

Government of Tripura
Office of the Executive Engineer
Water Resource Investigation Division
Visvesvaraya Complex
Kunjaban: Agartala

No.F.1(38)/EE/WRID/TECH/2020/1737-48 Dated:- 26-09-2023

MINUTES OF THE MEETING OF PERMANENT STATE LEVEL COMMITTEE (SLC) ON DYNAMIC GROUNDWATER RESOURCE ESTIMATION OF TRIPURA 2023.

Venue: Chamber of Secretary (PWD) & Chairman SLC, Shri Abhishek Singh, IAS.

A meeting of Permanent State Level Committee (PSLC) on Dynamic Ground Water Resource Assessment of Tripura as on March 2023 was convened on 19th September 2023 at 12.00 hrs. at the Chamber of Secretary (PWD) & Chairman PSLC, Shri Abhishek Singh, IAS, secretariat complex, Agartala.

The meeting was chaired by Shri Abhishek Singh, IAS, Secretary to the Govt. of Tripura, PWD, Tripura & Chairman of SLC. With the permission of Chairman of the PSLC, the meeting started. Dr. Raja Ram Purohit, Scientist-D & OIC SUO Agartala welcomed all the committee members of PSLC present in the meeting. List of members attended in the meeting is enclosed as Annexure.

Sri Biplab Ray, Regional Director & Member secretary, PSLC-GWRA(Tripura) welcomed all the representative members of the SLC. He highlighted that Ground Water Resources of Tripura has been carried out jointly by Central Ground Water Board, SUO, Agartala and PWD (Water Resources), Tripura (State Nodal Department) in coordination with other members/departments of SLC. Member Secretary, SLC briefed about computation of dynamic ground water resources of Tripura through IN-GRES software. Groundwater Resources Estimation System (IN-GRES)" is a software/web-based application developed by CGWB in collaboration with Vassar Lab, IIT-Hyderabad. RESOURCE ESTIMATION SOFTWARE). He also highlighted that socio-economic condition of the state may be enhanced through sustainable development of groundwater by the stakeholders.

With the permission of the Chair, Smt. Ritu Kumari Oraon, Scientist-C, SUO Agartala, CGWB presented the Dynamic ground water resources of Tripura as on March 2023.

The committee members of PSLC discussed in detail on the methodology of resource estimation, various factors utilized / considered as per norm- or otherwise, constrains of non-availability of various field data, source of various field data utilized for resource calculation etc.

It was decided that the Director, GSI Agartala, Director, Dept. of Fisheries and commissioner, AMC will also be included in the Permanent State Level Committee.

Dr. Raja Ram Purohit, Sc-D & OIC, SUO Agartala urged that the nodal dept. of state should have their own groundwater level monitoring mechanism, to start with, at least two (if feasible, 2 Shallow and 2 Deep Pz in each block) in each block so that the data gap can be minimized.

Contd.p/2

P/2

The committee was apprised on the previous work carried out by the State Unit Office, Agartala, CGWB on spring inventory of the Jampui Hills, North Tripura District, and the current work being carried out on the spring inventory in Dhalai dist. under NAQUIM 2. The same was accepted and appreciated by one and all.

After thorough discussion the members of the permanent state Lever committee (SLC) has agreed and accepted upon the figures in the Dynamic Groundwater Resource Assessment as on March 2023.

The meeting ended with Thanks to the Chair and all the members of the PSLC.

26/9/23

Er. Biswajit Saha
(Nodal Officer)
SLC, GWRE
Executive Engineer,
WR Investigation Dept.,
Govt. of Tripura.

Copy to :-

1. The PS to Secretary, PWD, Govt. of Tripura, Secretariat Complex, Agartala, Tripura (W), for favour of his kind information please.
2. The PS to P.C.C.F, Deptt. of Forest, Aranya Bhawan, Gurkhabasti, Agartala, Tripura (W).
3. The Regional Director, CGWB, NE Region, (Member Secretary) Guwahati.
4. The Chief Engineer, PWD (WR) (Member), Visvesvaraya Complex, Kunjaban, Agartala, Tripura (W).
5. The Chief Engineer, PWD (DWS) (Member), Gurkhabasti, Agartala, Tripura (W).
6. The Chief Engineer, Agriculture, (Member), Krishi Bhavan, Agartala, Tripura (W).
7. The Chief Engineer, RD Deptt. (Member) Nehuru Complex, Gurkhabasti, Agartala, Tripura (W).
8. The Director Industries, Tripura, Khejur Bagan, (Member) Agartala, Tripura (W).
9. The Head of Office (DDO),Tripura State Council for Science & Technology, Gurkhabasti, Agartala.
10. The General Manager, NABARD, Tripura, (Member) Khejur Bagan, Agartala, Tripura (W).
11. The Officer – in – Charge, CWGB, (Member) State Unit Tripura, Agartala.
12. The Executive Engineer, Water Resource Investigation Division, PWD (WR), Visvesvaraya Complex, Kunjaban, Agartala .

26/9/23

Er. Biswajit Saha
(Nodal Officer)
SLC, GWRE
Executive Engineer,
WR Investigation Dept.,
Govt. of Tripura.

Approval of the GWRE-2023 by the members of the Permanent State Level Committee for Dynamic Ground Water Resource Estimation, Tripura

The meeting of the Permanent State Level Committee (PSLC) for Dynamic Ground Water Resource Estimation (DGWRE) was held on 19th Sept, 2023 at 12pm at the Secretariat complex, Government of Tripura under the chairmanship of Sh. Abhishek Singh, IAS, Secretary PWD, Government of Tripura. The meeting was attended by Regional Director, North Eastern Region, CGWB along with other esteem members of the PSLC. The State Unit Office Agartala presented the GWRE-2023 of Tripura with the detailed methodology in front of the Committee Members.

The Committee unanimously cleared and accepted the GWRE-2023 for the State of Tripura. The Committee also emphasised the need for GWRE of the deeper aquifer in particular.

(Sh. Abhishek Singh, IAS)
Secretary, PWD
Government of Tripura

(Sh. Biplab Ray)
Regional Director, NER, Guwahati
Central Ground Water Board

19/09/2023
for Conservator of Forest
Territorial, Tripura

19/IX/23
Chief Engineer, PWD (WR)
Government of Tripura

19/9/23
Chief Engineer, PWD (DWS)
Government of Tripura

19-09-2023
Chief Engineer, Agriculture
Government of Tripura

19/9/2023
Chief Engineer, RD Department
Government of Tripura

19/09/2023
Dy General Manager
NABARD, Tripura

19/09/2023
Director Industries
Government of Tripura

19/09/23
Scientist-B/Engineer
TSAC, Tripura

19/9/23
Executive Engineer, WR Inv.Div., PWD (WR),
Government of Tripura

19/9/23
Sc-D & Officer In-charge
State Unit Office, Agartala, CGWB

19/09/23
Scientist-C
State Unit Office, Agartala, CGWB

FIGURES

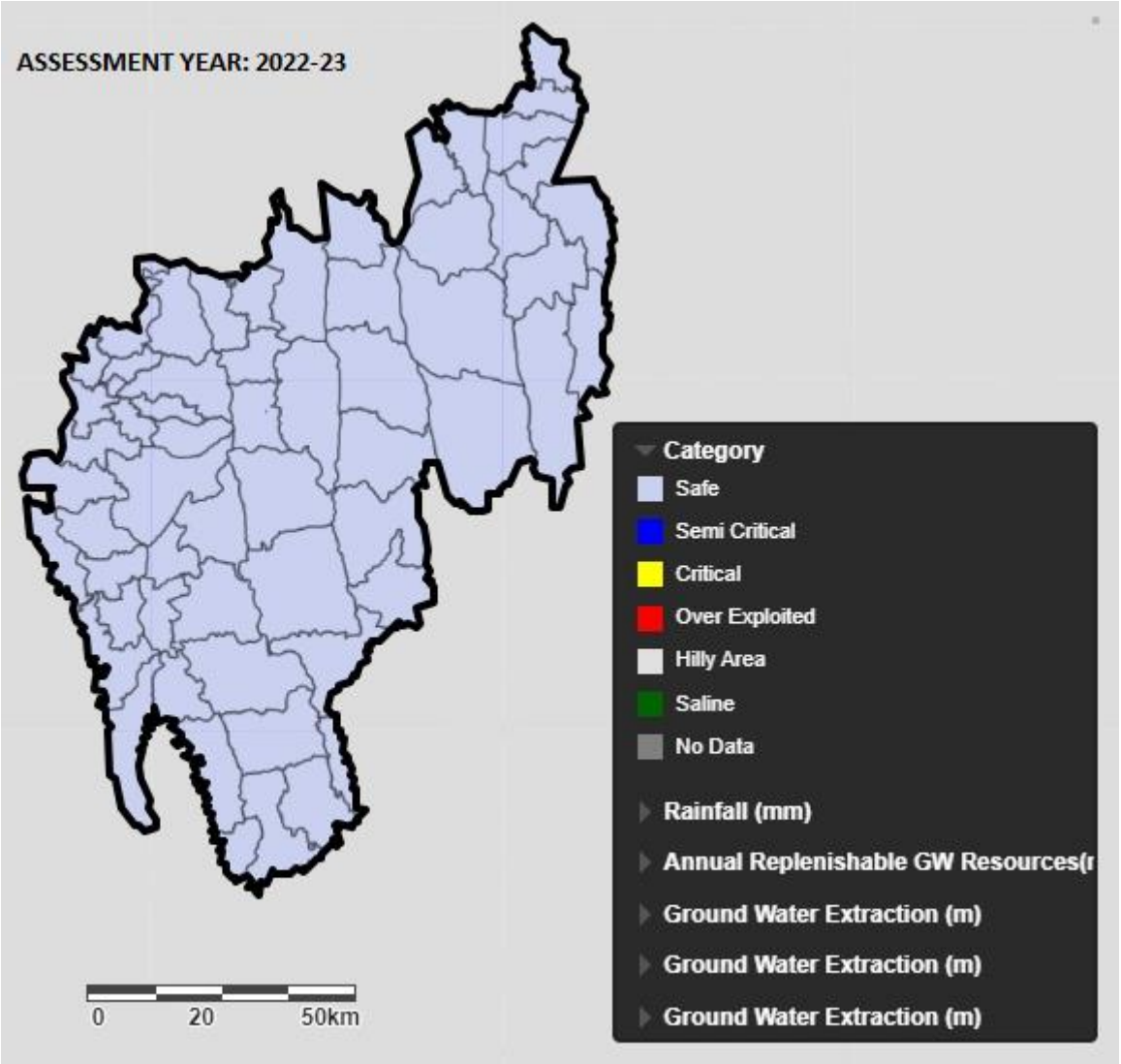


Figure 1: Ground Water Categorization Map of Tripura

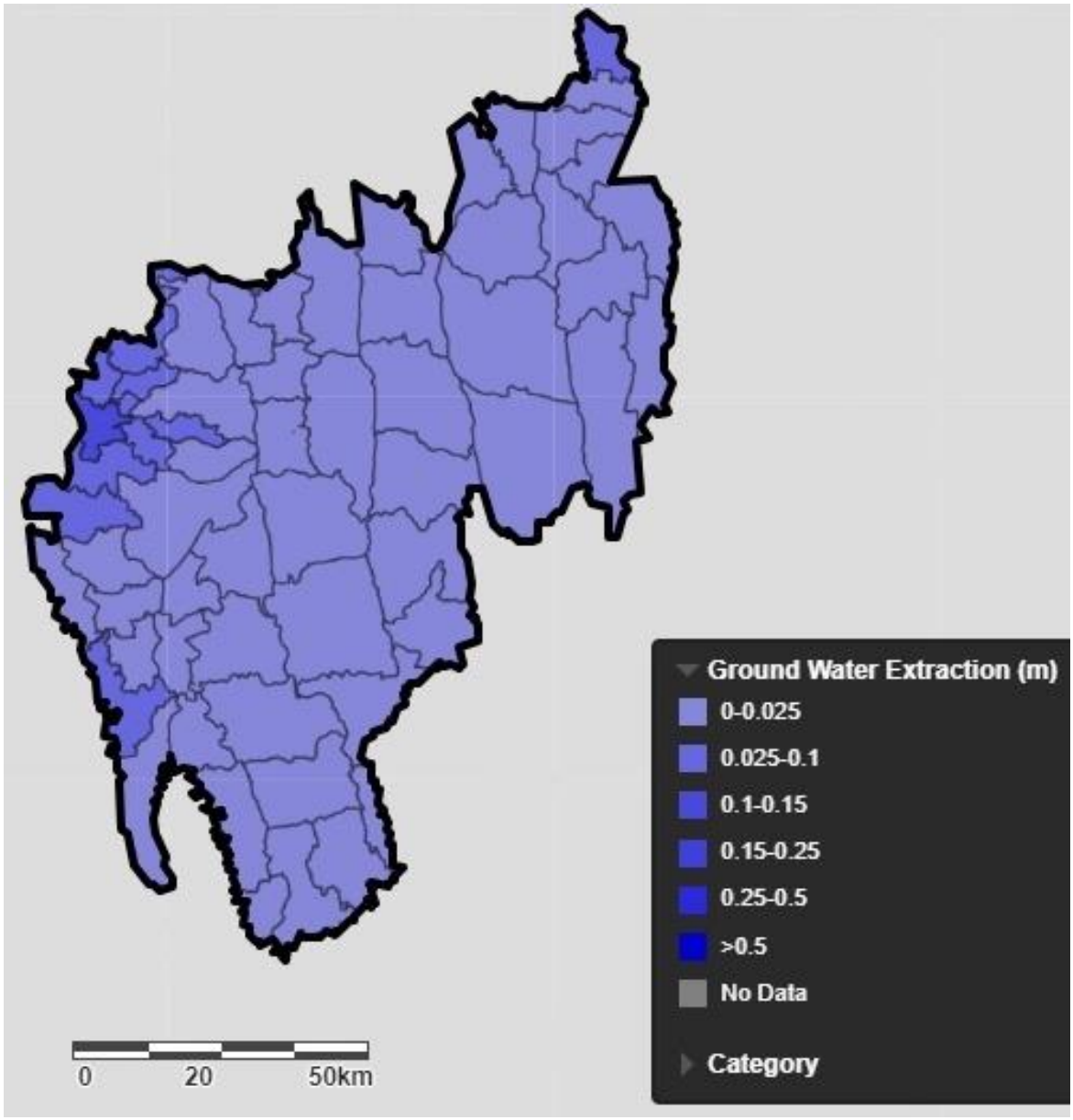


Figure 2: Ground Water Extraction Map of Tripura

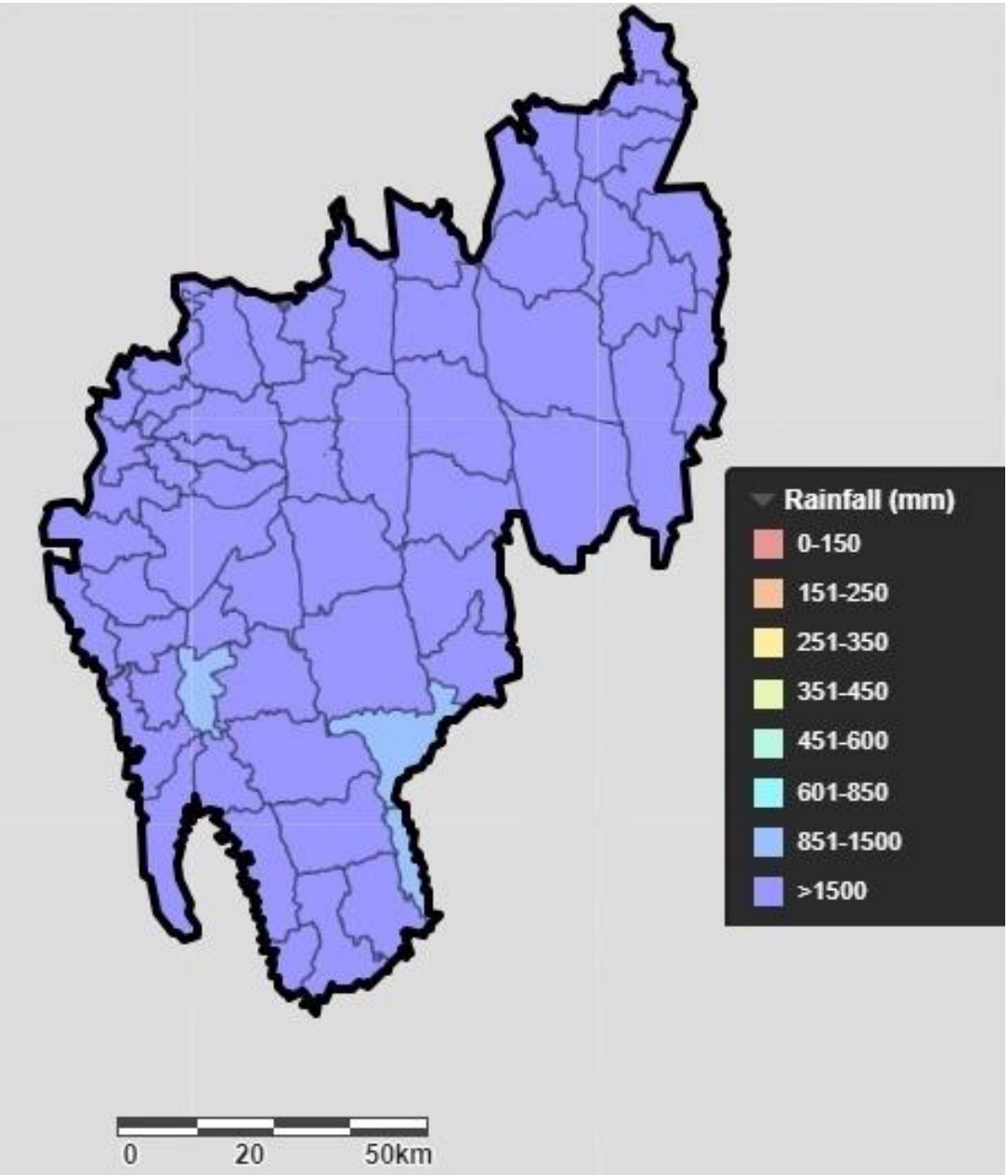


Figure 3: Annual Normal Rainfall Map of Tripura

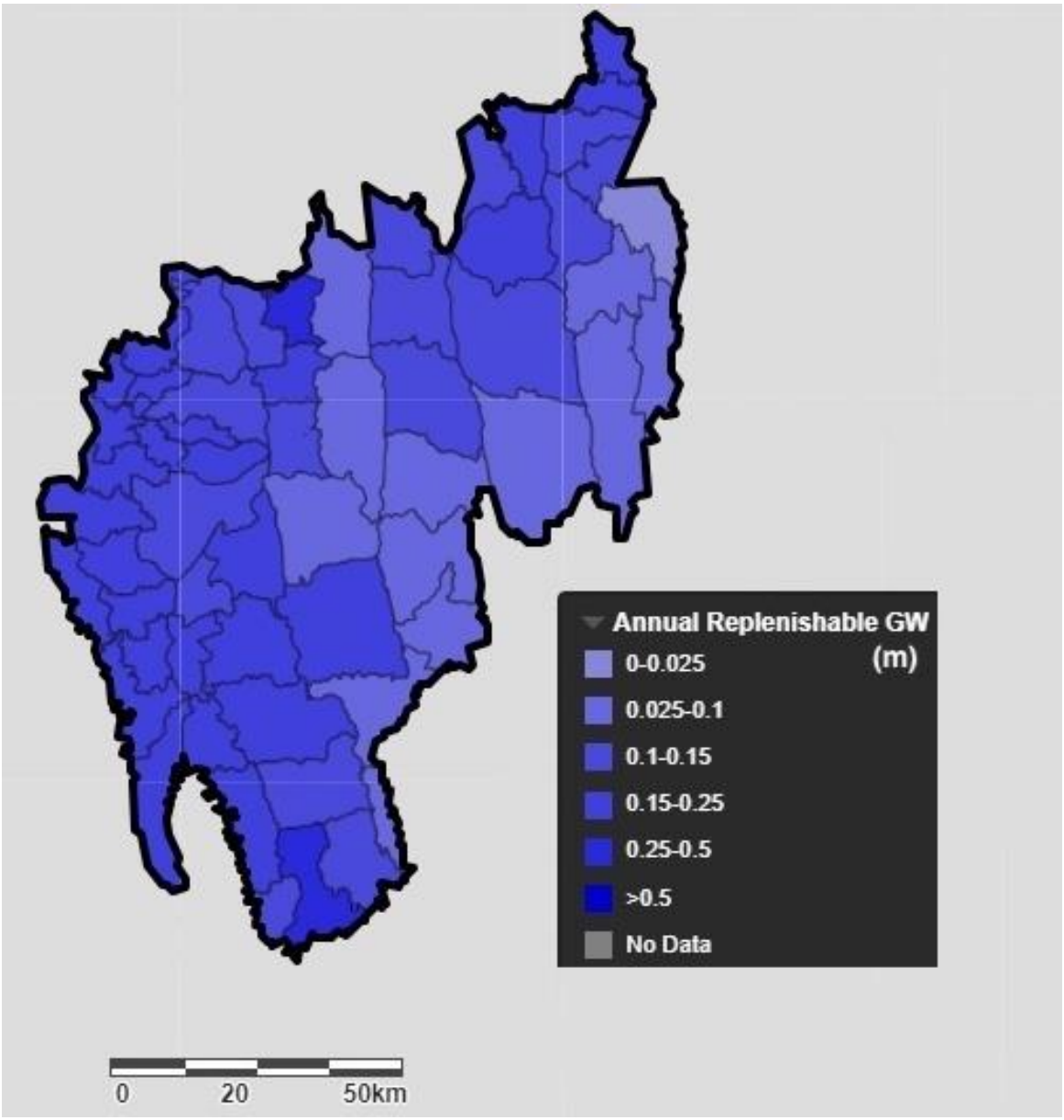


Figure 4: Annual Ground Water Recharge Map of Tripura

ANNEXURE

Annexure A: General description of the Ground Water Assessment Unit of Tripura State (2022-23)

Type of Ground Water Assessment Unit (Watershed/ Block/ Taluka/ Mandal): **Block**

Sl. No	Ground Water Assessment Unit(Block)	Type of rock formation	Areal extent (in hectares)					
			Total geographical area	Hilly area	Ground Water Recharge worthy area			Water logged and shallow water Table
					Command area	Non command area	Poor ground water quality area	
1	2	3	4	5	6	7	8	9
1	AMBASA	Semi consolidated Tertiary Sandstone	30556	17277	0	13279	0	9586.331
2	CHAWMANU	-Do-	45829	29646	0	16183	0	0
3	DUMBURNAGAR	-Do-	28157	15850	0	12307	0	8137.222
4	DURGACHOWMOHANI	-Do-	14587	8685	0	5902	0	5902
5	GANGANAGAR	-Do-	25624	21086	0	4538	0	0
6	MANU	-Do-	46331	20000	0	26331	0	17159.45
7	RAISHYABARI	-Do-	16958	9050	0	7908	0	6254.94
8	SALEMA	-Do-	23447	10314	0	13133	0	6735.903
	DHALAI		**231489**	**131908**		**99581**		**53775.85**
9	AMARPUR	-Do-	41046	14255	0	26791	0	18024.29
10	KAKRABAN	-Do-	10378	3000	0	7378	0	2792.872
11	KARBOOK	-Do-	21468	6083	0	15385	0	8287.26
12	KILLA	-Do-	19372	3075	0	16297	0	5921.817
13	MATABARI	-Do-	22880	5022	0	17858	0	14735.13
14	OMPI	-Do-	30511	15045	0	15466	0	6471.781

15	SILACHHARI	-Do-	7394	2919	0	4475	0	3300
16	TEPANIA	-Do-	8656	2478	0	6178	0	6178
	GOMATI		**161705**	**51877**		**109828**		**65711.15**
17	KALYANPUR	-Do-	10153	2900	0	7253	0	5125.439
18	KHOWAI	-Do-	10173	188	0	9985	0	7289.606
19	MUNGIAKAMI	-Do-	29292	18109	0	11183	0	0
20	PADMABIL	-Do-	11904	5375	0	6529	0	2981.489
21	TELIAMURA	-Do-	13262	7113	0	6149	0	4628.879
22	TULASIKHAR	-Do-	26461	18000	0	8461	0	268.5418
	KHOWAI		**101245**	**51685**		**49560**		**20293.95**
23	DAMCHHERA	-Do-	18510	17100	0	1410	0	1115.437
24	DASDA	-Do-	37545	27146	0	10399	0	5408.466
25	JAMPUI HILL	-Do-	18889	14434	0	4455	0	0
26	JUBARAJNAGAR	-Do-	14386	5635	0	8751	0	8424.596
27	KADAMTALA	-Do-	9578	80	0	9498	0	8271.708
28	KALACHERRA	-Do-	7768	124	0	7644	0	7124.681
29	LALJURI	-Do-	19950	12806	0	7144	0	4813.428
30	PANISAGAR	-Do-	9166	4085	0	5081	0	3387.038
	NORTH TRIPURA		**135792**	**81410**		**54382**		**38545.35**
31	BISHALGARH	-Do-	14998	1266	0	13732	0	10971.12
32	BOXANAGAR	-Do-	11806	754	0	11052	0	10850.18
33	CHARILAM	-Do-	12675	1202	0	11473	0	10077.11
34	JAMPUIJALA	-Do-	30652	5075	0	25577	0	20125.61
35	KANTHALIA	-Do-	15580	3750	0	11830	0	9537.071
36	MOHANBHOG	-Do-	8716	2593	0	6123	0	2618.701
37	NALCHAR	-Do-	9965	2582	0	7383	0	6190.67
	SEPAHIJALA		**104392**	**17222**		**87170**		**70370.46**

38	BAGAFA	-Do-	30219	11209	0	19010	0	11139.06
39	BHARAT CH NAGAR	-Do-	12209	3682	0	8527	0	8225.191
40	HRISHYAMUKH	-Do-	18260	6250	0	12010	0	11217.27
41	JOLAIBARI	-Do-	23601	10941	0	12660	0	11977.18
42	POANGBARI	-Do-	7415	3150	0	4265	0	3336.056
43	RAJNAGAR	-Do-	20822	4640	0	16182	0	9657.491
44	RUPAICHARI	-Do-	18485	10125	0	8360	0	7908.815
45	SATCHAND	-Do-	20190	3101	0	17089	0	14555.09
	SEPAHIJALA		**151201**	**53098**		**98103**		**78016.15**
46	CHANDIPUR	-Do-	12845	4619	0	8226	0	4511.076
47	GOURNAGAR	-Do-	12195	3431	0	8764	0	7668.934
48	KUMARGHAT	-Do-	24697	7175	0	17522	0	15536.98
49	PENCHARTHAL	-Do-	15966	7600	0	8366	0	5502.253
	UNAKOTI		**65703**	**22825**		**42878**		**33219.24**
50	AMC	-Do-	7650	0	0	7650	0	7644.634
51	BAMUTIA	-Do-	5471	0	0	5471	0	5393.427
52	BELBARI	-Do-	9655	2744	0	6911	0	6123.342
53	DUKLI	-Do-	10445	497	0	9948	0	9600.939
54	HEZAMARA	-Do-	18366	7500	0	10866	0	2241.795
55	JIRANIA	-Do-	5630	953	0	4677	0	3866.003
56	LEFUNGA	-Do-	4942	1416	0	3526	0	2182.982
57	MANDWI	-Do-	18073	6250	0	11823	0	10095.69
58	MOHANPUR	-Do-	10886	0	0	10886	0	6209.971
59	OLD AGARTALA	-Do-	6524	0	0	6524	0	6391.899
	WEST TRIPURA		**97642**	**19360**		**78282**		**59750.69**
TOTAL	**TRIPURA**		**1049169**	**429385**	**0**	**619784**	**0**	**359932.2**

Annexure B: Data variables used in Dynamic Ground Water Resources of the Tripura State (2022-23)

Sl.No.	District	Assessment Unit	Command/ Non-command/ Poor GW Quality	Normal Annual Rainfall (mm)	Average Pre-monsoon Water level (mgbl)	Average Post-monsoon Water Level (mgbl)	Average Fluctuation (m)
1	DHALAI	AMBASA	Non command	2652.37	4.56	2.31	2.25
2	DHALAI	CHAWMANU	- Do -	2032.97	3.8	2.19	1.61
3	DHALAI	DUMBURNAGAR	- Do -	1889.94	3.57	1.71	1.86
4	DHALAI	DURGACHOWMOHANI	- Do -	2652.37	3.97	2.48	1.49
5	DHALAI	GANGANAGAR	- Do -	1889.94	3.34	1.9	1.44
6	DHALAI	MANU	- Do -	2032.97	3.8	2.19	1.61
7	DHALAI	RAISHYABARI	- Do -	1889.94	3.57	1.71	1.86
8	DHALAI	SALEMA	- Do -	2652.37	4.56	2.31	2.25
9	GOMATI	AMARPUR	- Do -	2044.28	2.98	2.35	0.63
10	GOMATI	KAKRABAN	- Do -	1217.95	9.95	9.25	0.7
11	GOMATI	KARBOOK	- Do -	1268.38	2.98	2.35	0.63
12	GOMATI	KILLA	- Do -	2079.72	2.78	1.95	0.83
13	GOMATI	MATABARI	- Do -	2079.72	2.88	1.16	1.72
14	GOMATI	OMPI	- Do -	2044.28	2.78	1.95	0.83
15	GOMATI	SILACHHARI	- Do -	1268.38	4.83	3.49	1.34
16	GOMATI	TEPANIA	- Do -	2079.72	3.79	2.43	1.36
17	KHOWAI	KALYANPUR	- Do -	1969.74	4.28	3.93	0.35
18	KHOWAI	KHOWAI	- Do -	2260.82	1.98	1.84	0.14
19	KHOWAI	MUNGIAKAMI	- Do -	1969.74	4.41	2.08	2.33
20	KHOWAI	PADMABIL	- Do -	2260.82	7.28	5.65	1.63
21	KHOWAI	TELIAMURA	- Do -	1969.74	3.53	2.35	1.18

22	KHOWAI	TULASIKHAR	- Do -	2260.82	4.41	2.08	2.33
23	NORTH TRIPURA	DAMCHHERA	- Do -	2355.13	0	0	0
24	NORTH TRIPURA	DASDA	- Do -	2355.13	3.93	2.48	1.45
25	NORTH TRIPURA	JAMPUI HILL	- Do -	2355.13	0	0	0
26	NORTH TRIPURA	JUBARAJNAGAR	- Do -	2459.45	2.72	1.87	0.85
27	NORTH TRIPURA	KADAMTALA	- Do -	2459.45	2.24	1.31	0.93
28	NORTH TRIPURA	KALACHERRA	- Do -	2459.45	1.9	0.86	1.04
29	NORTH TRIPURA	LALJURI	- Do -	2355.13	4.76	3.32	1.44
30	NORTH TRIPURA	PANISAGAR	- Do -	2459.45	4.23	3.04	1.19
31	SEPAHIJALA	BISHALGARH	- Do -	1909.7	3.38	2.19	1.19
32	SEPAHIJALA	BOXANAGAR	- Do -	2068.6	3.61	1.9	1.71
33	SEPAHIJALA	CHARILAM	- Do -	1909.7	3.38	2.19	1.19
34	SEPAHIJALA	JAMPUIJALA	- Do -	1909.7	3.9	2.3	1.6
35	SEPAHIJALA	KANTHALIA	- Do -	2068.6	3.49	1.87	1.62
36	SEPAHIJALA	MOHANBHOG	- Do -	2068.6	3.33	2.4	0.93
37	SEPAHIJALA	NALCHAR	- Do -	2068.6	3.33	2.4	0.93
38	SOUTH TRIPURA	BAGAFA	- Do -	2247.05	4.17	2.93	1.24
39	SOUTH TRIPURA	BHARAT CH NAGAR	- Do -	2247.05	4.09	2.96	1.13
40	SOUTH TRIPURA	HRISHYAMUKH	- Do -	2207.84	4.2	2.87	1.33
41	SOUTH TRIPURA	JOLAIBARI	- Do -	2247.05	4.39	3.31	1.08
42	SOUTH	POANGBARI	- Do -	2731.05	4.33	3.26	1.07

	TRIPURA						
43	SOUTH TRIPURA	RAJNAGAR	- Do -	2207.84	3.38	2.19	1.19
44	SOUTH TRIPURA	RUPAICHARI	- Do -	2731.05	4.83	3.49	1.34
45	SOUTH TRIPURA	SATCHAND	- Do -	2731.05	4.06	3.25	0.81
46	UNAKOTI	CHANDIPUR	- Do -	2307.93	2.03	1.51	0.52
47	UNAKOTI	GOURNAGAR	- Do -	2307.93	5.45	2	3.45
48	UNAKOTI	KUMARGHAT	- Do -	2307.93	4.67	3.24	1.43
49	UNAKOTI	PENCHARTHAL	- Do -	2307.93	5.75	4.04	1.71
50	WEST TRIPURA	AMC	- Do -	2025.35	6.71	4.21	2.5
51	WEST TRIPURA	BAMUTIA	- Do -	2025.35	3.97	2.99	0.98
52	WEST TRIPURA	BELBARI	- Do -	1773.41	3	2.28	0.72
53	WEST TRIPURA	DUKLI	- Do -	2025.35	5.03	3.63	1.4
54	WEST TRIPURA	HEZAMARA	- Do -	2025.35	6.19	4.62	1.57
55	WEST TRIPURA	JIRANIA	- Do -	1773.41	3	2.28	0.72
56	WEST TRIPURA	LEFUNGA	- Do -	2025.35	3.97	2.99	0.98
57	WEST TRIPURA	MANDWI	- Do -	1773.41	5.23	3.73	1.5
58	WEST TRIPURA	MOHANPUR	- Do -	2025.35	3.97	2.99	0.98
59	WEST TRIPURA	OLD AGARTALA	- Do -	1773.41	3	2.28	0.72

Annexure C: Comparison of Ground Water Resources (2021-2022) and (2022-2023)

COMPARISION OF GROUND WATER RESOURCES (2021-2022) and (2022-2023)																	
S.No	District	Total Annual Ground Water Recharge (ham)				Annual Extractable Ground Water Recsource (ham)				Total Current Annual Ground Water Extraction (ham)				Stage of Ground Water Extraction (%)			
		2019-2020	2021-2022	2022-23	Diff	2019-2020	2021-2022	2022-23	Diff	2019-2020	2021-2022	2022-23	Diff	2019-2020	2021-2022	2022-23	Diff
1	AMBASA	3576.76	3423.04	3123.75	-299.29	3217.55	3110.35	2669.84	-440.51	98.53	114.22	114.69	0.47	3.06	3.67	4.30	0.63
2	CHAWMANU	3272.09	2491.62	2844.75	353.13	1932.46	1772.28	2090.1	317.82	79.16	82.07	85.02	2.95	4.1	4.63	4.07	-0.56
3	DUMBURNAGAR	2852.16	2207.19	2017.72	-189.47	1653.66	1791.05	1510.17	-280.88	87.25	93.6	95.19	1.59	5.28	5.23	6.30	1.07
4	DURGA CHOWMOHANI	2107.96	1623.33	1661.62	38.29	1632.9	1081.26	1115.72	34.46	153.77	175.07	175.79	0.72	9.42	16.19	15.76	-0.43
5	GANGANAGAR	866.73	623.21	839.07	215.86	780.06	482.02	687.09	205.07	76.39	79.19	80.58	1.39	9.79	16.43	11.73	-4.70
6	MANU	5630.54	4248.8	4740.98	492.18	4625.72	2939.08	3382.05	442.97	198.1	218.6	232.04	13.44	4.28	7.44	6.86	-0.58
7	RAISHYABARI	1800.9	1395.52	1282.65	-112.87	1088.06	1226.87	1189.41	-37.46	52.55	58.26	58.17	-0.09	4.83	4.75	4.89	0.14
8	SALEMA	3523.05	3522.04	3174.25	-347.79	3166.03	3232.81	2743.68	-489.13	188.91	230.49	233.74	3.25	5.97	7.13	8.52	1.39
9	AMARPUR	5886	6280.12	6205.29	-74.83	4843.97	5408.59	5027.23	-381.36	126.1	150.2	157.77	7.57	2.6	2.78	3.14	0.36
10	KAKRABAN	2209.94	1751.09	1617.05	-134.04	1988.94	1558	1437.35	-120.65	175.05	179.44	196.19	16.75	8.8	11.52	13.65	2.13
11	KARBOOK	3105.71	2884.31	1899.6	-984.71	2739.56	2555.54	1669.3	-886.24	60.08	63.55	66.48	2.93	2.19	2.49	3.98	1.49
12	KILLA	3458.77	2966.74	3183.6	216.86	3101.05	2247.45	2442.62	195.17	151.8	156.71	165.08	8.37	4.9	6.97	6.76	-0.21
13	MATABARI	4625.42	3637.32	4327.44	690.12	4223.23	2567.48	3188.6	621.12	238.46	245.37	248.2	2.83	5.65	9.56	7.78	-1.78
14	OMPI	3137.71	2798.92	2941.65	142.73	2685.78	2485.07	2613.53	128.46	86.12	94.68	97.59	2.91	3.21	3.81	3.73	-0.08
15	SILACHHARI	948.9	743.94	508.58	-235.36	854.01	652.89	441.06	-211.83	41.01	43.34	44.23	0.89	4.8	6.64	10.03	3.39
16	TEPANIA	1357.82	1160.28	1277.68	117.4	1215.35	958.52	1064.18	105.66	65.14	66.71	82.87	16.16	5.36	6.96	7.79	0.83
17	KALYANPUR	2001.79	2075.46	2016.28	-59.18	1801.61	1867.92	1814.65	-53.27	213.2	215.53	227.49	11.96	11.83	11.54	12.54	1.00
18	KHOWAI	2592.16	2871.37	2969.88	98.51	2184.2	2372.76	2461.42	88.66	200.21	203.47	205.08	1.61	9.17	8.57	8.33	-0.24
19	MUNGIAKAMI	2482.72	2454.41	1948.34	-506.07	2358.59	2327.69	1749.51	-578.18	77.19	78.66	80.24	1.58	3.27	3.38	4.59	1.21
20	PADMABIL	1702.1	1344.31	1349.31	5	1617	1267.36	1204.64	-62.72	88.16	89.94	90.83	0.89	5.45	7.1	7.54	0.44

21	TELIAMURA	1698.5	1531.67	1480.44	-51.23	1528.65	1342.1	1295.98	-46.12	255.35	258.78	269.95	11.17	16.7	19.28	20.83	1.55
22	TULASIKHAR	2043.96	2078.31	1763.11	-315.2	1941.76	1841.26	1557.58	-283.68	106.75	108.93	110	1.07	5.5	5.92	7.06	1.14
23	DAMCHHERA	432.63	369.04	373.1	4.06	386.64	307.32	310.97	3.65	65.33	67.2	68.31	1.11	16.9	21.87	21.97	0.10
24	DASDA	2580.42	1809.35	2196.08	386.73	1545.39	827.77	1175.84	348.07	126.49	130.25	132.47	2.22	8.18	15.74	11.27	-4.47
25	JAMPUI HILL	1066.51	785.12	860.16	75.04	959.86	640.24	707.78	67.54	27.17	27.99	28.48	0.49	2.83	4.37	4.02	-0.35
26	JUBARAJNAGAR	2372.05	2108.45	2062.78	-45.67	1796.28	1608.78	1567.68	-41.1	154.92	159.56	162.3	2.74	8.62	9.92	10.35	0.43
27	KADAMTALA	2439.23	2130.89	2110.44	-20.45	1799.59	1363.04	1344.62	-18.42	232	238.29	243.41	5.12	12.89	17.48	18.10	0.62
28	KALACHERRA	1851.27	1375.59	1606.26	230.67	1304.89	826.17	1033.78	207.61	165.48	170.38	173.27	2.89	12.68	20.62	16.76	-3.86
29	LALJURI	1548.3	1249.43	1554.28	304.85	1295.71	929.77	1204.15	274.38	106.16	109.36	111.25	1.89	8.19	11.76	9.24	-2.52
30	PANISAGAR	1739.47	1339.62	1374.19	34.57	1462.66	1122.74	1153.85	31.11	105.21	108.28	110.09	1.81	7.19	9.64	9.54	-0.10
31	BISHALGARH	3328.87	3327.51	3290.48	-37.03	2980.72	2701.46	2668.13	-33.33	416.31	420.31	422.09	1.78	13.97	15.56	15.82	0.26
32	BOXANAGAR	2183.17	2070.66	2108.91	38.25	1606.4	1468.23	1502.66	34.43	180.04	182.64	195.6	12.96	11.21	12.44	13.02	0.58
33	CHARILAM	2271.77	2146.3	2218.82	72.52	2024.41	1653.03	1718.28	65.25	257.75	262.1	264.27	2.17	12.73	15.86	15.38	-0.48
34	JAMPUIJALA	4774.08	4145.6	4374.53	228.93	4243.65	3108.03	3314.08	206.05	127.22	130.11	150.79	20.68	3	4.19	4.55	0.36
35	KANTHALIA	2654.62	2697.67	3043.46	345.79	2329.34	2330.3	2641.51	311.21	434.7	437.84	453.63	15.79	18.66	18.79	17.17	-1.62
36	MOHANBHOG	1707.15	1751.55	1836.11	84.56	1532	1565.29	1641.4	76.11	105.79	108.18	109.37	1.19	6.91	6.91	6.66	-0.25
37	NALCHAR	1980.06	1948.85	2097.63	148.78	1782.05	1537.24	1671.15	133.91	165.52	169.23	182.72	13.49	9.29	11.01	10.93	-0.08
38	BAGAFA	4090.82	3792.79	4855.18	1062.39	3266.47	2567.03	3523.18	956.15	187.26	191.59	206.32	14.73	5.73	7.46	5.86	-1.60
39	BHARAT CH NAGAR	1907.01	1857.56	2314.99	457.43	790.6	1167.99	1579.68	411.69	74.4	92.07	101.9	9.83	9.41	7.88	6.45	-1.43
40	HRISHYAMUKH	2701.85	2908.85	3261.28	352.43	2431.67	2089.89	2407.08	317.19	126.56	139.09	178.89	39.8	5.2	6.66	7.43	0.77
41	JOLAIBARI	3158.45	2987.59	3158.14	170.55	2791.63	2493.15	2646.65	153.5	141.59	144.6	148.45	3.85	5.07	5.8	5.61	-0.19
42	POANGBARI	1029.96	881.07	976.44	95.37	921.59	688.17	774.01	85.84	62.4	63.96	64.72	0.76	6.77	9.29	8.36	-0.93
43	RAJNAGAR	3098.48	3468.85	3185.54	-283.31	2658.29	3115.13	2686.71	-428.42	241.56	245.14	267.48	22.34	9.09	7.87	9.96	2.09
44	RUPAICHARI	2300.23	2004.65	2127.49	122.84	2028.7	1680.12	1790.67	110.55	111.68	114.48	120.6	6.12	5.51	6.81	6.73	-0.08
45	SATCHAND	5014.37	4395.86	5312.23	916.37	4502.27	3781.34	4606.08	824.74	135.93	143.51	153.84	10.33	3.02	3.8	3.34	-0.46
46	CHANDIPUR	2130.36	1708.75	1873.62	164.87	1717.05	1305.54	1453.93	148.39	146.71	151.14	154.65	3.51	8.54	11.58	10.64	-0.94
47	GOURNAGAR	2527.3	2312.54	2017.29	-295.25	2365.03	1940.89	1675.17	-265.72	157.55	162.18	175.22	13.04	6.66	8.36	10.46	2.10
48	KUMARGHAT	4556.67	3597.59	3952.52	354.93	3978.81	3097.38	3416.81	319.43	233.55	240.58	245.86	5.28	5.87	7.77	7.20	-0.57

49	PENCHARTHAL	2353.24	1698.97	1888.78	189.81	2203.17	1513.72	1684.55	170.83	99.46	103.84	104.23	0.39	4.51	6.86	6.19	-0.67
50	AMC	1973.14	1914.79	1884	-30.79	1775.83	1723.31	1789.8	66.49	935.91	960.26	1077.17	116.91	52.7	55.72	60.18	4.46
51	BAMUTIA	1095.63	1010.34	1064.67	54.33	986.06	806.61	855.5	48.89	123.86	128.26	161.78	33.52	12.56	15.9	18.91	3.01
52	BELBARI	1540.03	1416.87	1562.16	145.29	1386.02	1099.36	1230.11	130.75	172.8	179.97	192.99	13.02	12.47	16.37	15.69	-0.68
53	DUKLI	2283.8	2190.47	2267.89	77.42	2055.42	1902.84	2085.9	183.06	449.61	472.2	476.53	4.33	21.87	24.82	22.85	-1.97
54	HEZAMARA	2802.92	2054.68	2035.6	-19.08	2521.3	1916.75	1796.84	-119.91	80.57	83.9	100.31	16.41	3.2	4.38	5.58	1.20
55	JIRANIA	1081.54	1211.6	1184.24	-27.36	973.38	1000.95	976.33	-24.62	185.26	189.42	195.87	6.45	19.03	18.92	20.06	1.14
56	LEFUNGA	786.59	780.76	794.3	13.54	707.93	684.15	696.34	12.19	103.22	119.77	127.2	7.43	14.58	17.51	18.27	0.76
57	MANDWI	2934.67	2139.42	2116.01	-23.41	2787.94	1760.46	1739.39	-21.07	98	124.14	103.47	-20.67	3.52	7.05	5.95	-1.10
58	MOHANPUR	2426.36	2333.63	2377.86	44.23	2164.96	1927.39	1967.21	39.82	320.83	326.51	355.72	29.21	14.82	16.94	18.08	1.14
59	OLD AGARTALA	1345.08	1314.71	1309.11	-5.6	1210.58	1016.78	1011.74	-5.04	203.26	210.47	210.28	-0.19	16.79	20.7	20.78	0.08

Annexure D: Categorization of Districts in Tripura (2022-2023)

CATEGORIZATION OF DISTRICTS/BLOCKS/ MANDALS/ TALUKAS IN TRIPURA (2022-2023)																				
S.No	States / Union Territories	Total 2021-2022	Total 2022-2023	Diff	Safe			Semi-Critical			Critical			Over-Exploited			Saline			
					2021-2022	2022-2023	Diff	2021-2022	2022-2023	Diff	2021-2022	2022-2023	Diff	2021-2022	2022-2023	Diff	2021-2022	2022-2023	Diff	
1	DHALAI	1	1	0	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	
2	GOMATI	1	1	0	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	
3	KHOWAI	1	1	0	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	
4	NORTH TRIPURA	1	1	0	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	
5	SEPAHIJALA	1	1	0	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	
6	SOUTH TRIPURA	1	1	0	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	
7	UNAKOTI	1	1	0	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	
8	WEST TRIPURA	1	1	0	1	1	0	-	-	-	-	-	-	-	-	-	-	-	-	
	TRIPURA	8	8	0	8	8	0	-	-	-	-	-	-	-	-	-	-	-	-	

Annexure E: Attribute Tables for GWRE, 2023, Tripura

District	Assessment Unit Name	Recharge from Rainfall-Monsoon Season	Recharge from Other Sources-Monsoon Season	Recharge from Rainfall-Non Monsoon Season	Recharge from Other Sources-Non Monsoon Season	Total Annual Ground Water (Ham) Recharge	Total Natural DiSemi-Criticalharges (Ham)	Annual Extractable Ground Water Resource (Ham)	Ground Water Extraction for Irrigation Use (Ham)	Ground Water Extraction for Industrial Use (Ham)	Ground Water Extraction for Domestic Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization (Over-Exploited/Critical/Semi-Critical/Safe/Saline)
Dhalai	Ambasa	1809.15	129.09	1119.75	65.76	3123.75	453.91	2669.84	18.6	0	96.09	114.69	103.48	2547.76	4.30	safe
Dhalai	Chawmanu	1803.86	55.95	903.54	81.4	2844.75	754.65	2090.1	1.5	0	83.51	85.02	89.94	1998.65	4.07	safe
Dhalai	Dumburnagar	1415.65	73.83	463.35	64.89	2017.72	507.55	1510.17	3.15	0	92.04	95.19	99.12	1407.9	6.30	safe
Dhalai	Durgachowmohani	804.1	209.54	497.69	150.29	1661.62	545.9	1115.72	51.81	0	123.98	175.79	133.52	930.39	15.76	safe
Dhalai	Ganganagar	639.86	0	170.85	28.36	839.07	151.98	687.09	0	0	80.58	80.58	86.78	600.31	11.73	safe
Dhalai	Manu	2935.02	277.88	1470.13	57.95	4740.98	1358.93	3382.05	23.06311	0	208.98	232.04	225.05	3133.94	6.86	safe
Dhalai	Raishyabari	950.74	6.72	297.73	27.46	1282.65	93.24	1189.41	2.725488	0	55.43	58.17	59.7	1126.97	4.89	safe
Dhalai	Salema	1789.26	188.02	1107.44	89.53	3174.25	430.57	2743.68	34.452	0	199.29	233.74	214.61	2494.62	8.52	safe
Gomati	Amarpur	4037.14	859.11	1220.62	88.42	6205.29	1178.06	5027.23	26.73	0	131.04	157.77	137.21	4863.29	3.14	safe
Gomati	Kakraban	773.94	675.03	88.72	79.36	1617.05	179.7	1437.35	21.78	0	174.41	196.19	182.63	1232.94	13.65	safe
Gomati	Karbook	1372.85	332.46	157.29	37	1899.6	230.3	1669.3	4.05	0	62.43	66.48	65.38	1599.87	3.98	safe
Gomati	Killa	1977.94	306.36	781.32	117.98	3183.6	740.98	2442.62	70.32	0	94.77	165.08	99.23	2273.08	6.76	safe
Gomati	Matabari	2709.25	662.18	856.15	99.86	4327.44	1138.84	3188.6	10.8	0.96	236.44	248.2	247.58	2929.26	7.78	safe
Gomati	Ompi	1864.46	307.98	704.65	64.56	2941.65	328.12	2613.53	8.1	0	89.49	97.59	93.71	2511.72	3.73	safe
Gomati	Silachhari	399.32	22.21	45.75	41.3	508.58	67.52	441.06	1.62	0	42.61	44.23	44.62	394.82	10.03	safe
Gomati	Tepania	749.81	156.62	296.19	75.06	1277.68	213.5	1064.18	20.79	0	62.08	82.87	65	978.39	7.79	safe
Khowai	Kalyanpur	1005.55	461.14	365.96	183.63	2016.28	201.63	1814.65	121.8	0	105.69	227.49	109.9	1582.95	12.54	safe
Khowai	Khowai	1492.23	638.14	674.89	164.62	2969.88	508.46	2461.42	57.6	0	147.48	205.08	153.35	2250.47	8.33	safe
Khowai	Mungiakami	1240.32	94.51	564.25	49.26	1948.34	198.83	1749.51	14.064	0	66.18	80.24	68.81	1666.64	4.59	safe
Khowai	Padmabil	780.59	87.14	441.3	40.28	1349.31	144.67	1204.64	10.2	0	80.63	90.83	83.84	1110.6	7.54	safe

Khowai	Teliamura	681.99	408.66	310.25	79.54	1480.44	184.46	1295.98	112.65	2.4	154.90	269.95	161.07	1019.86	20.83	safe
Khowai	Tulasikhar	1011.58	100.6	571.88	79.05	1763.11	205.53	1557.58	11.4	0	98.61	110	102.54	1443.65	7.06	safe
North Tripura	Damchhera	186.2	23.08	86.04	77.78	373.1	62.13	310.97	3	0	65.31	68.31	69.18	238.79	21.97	safe
North Tripura	Dasda	1373.29	47.95	634.53	140.31	2196.08	1020.24	1175.84	1.8	0	130.67	132.47	138.42	1035.62	11.27	safe
North Tripura	Jampui Hill	588.32	0	271.84	0	860.16	152.38	707.78	0	0	28.48	28.48	30.17	677.61	4.02	safe
North Tripura	Jubarajnagar	1111.42	169.01	676.91	105.44	2062.78	495.1	1567.68	0	1.47	160.83	162.3	170.36	1395.85	10.35	safe
North Tripura	Kadamtala	1206.29	95.79	734.69	73.67	2110.44	765.82	1344.62	21.6	1.38	220.43	243.41	233.5	1088.14	18.10	safe
North Tripura	Kalacherra	970.82	21.71	591.28	22.45	1606.26	572.48	1033.78	2.4	0.36	170.51	173.27	180.62	850.4	16.76	safe
North Tripura	Laljuri	943.43	9.8	435.92	165.13	1554.28	350.13	1204.15	0	0	111.25	111.25	117.84	1086.31	9.24	safe
North Tripura	Panisagar	645.31	215.94	393.02	119.92	1374.19	220.34	1153.85	3.6	0	106.48	110.09	112.79	1037.45	9.54	safe
Sepahijala	Bishalgarh	1487.96	781.25	657.55	363.72	3290.48	622.35	2668.13	241.2	0.288	180.61	422.09	187.8	2238.85	15.82	safe
Sepahijala	Boxanagar	1331.8	175.11	530.02	71.98	2108.91	606.25	1502.66	77.94	0.341	117.32	195.6	122	1302.38	13.02	safe
Sepahijala	Charilam	1243.18	263.27	549.38	162.99	2218.82	500.54	1718.28	66.6	1.05	196.62	264.27	204.45	1446.18	15.38	safe
Sepahijala	Jampuijala	2771.44	346.99	1224.74	31.36	4374.53	1060.45	3314.08	47.142	0	103.65	150.79	107.78	3159.16	4.55	safe
Sepahijala	Kanthalia	1781.94	436.31	567.33	257.88	3043.46	401.95	2641.51	311.856	0	141.79	453.63	147.43	2182.24	17.17	safe
Sepahijala	Mohanbhog	922.3	533.33	293.64	86.84	1836.11	194.71	1641.4	1.2	0	108.17	109.37	112.47	1527.73	6.66	safe
Sepahijala	Nalchar	1112.09	496.54	354.07	134.93	2097.63	426.48	1671.15	15.264	0	167.46	182.72	174.13	1481.76	10.93	safe
South Tripura	Bagafa	3232.2	471.29	868.57	283.12	4855.18	1332	3523.18	34.8	0	171.52	206.32	179.6	3308.78	5.86	safe
South Tripura	Bharat Ch Nagar	1449.81	303.82	389.6	171.76	2314.99	735.31	1579.68	24.624	0.96	76.32	101.9	79.91	1474.19	6.45	safe
South Tripura	Hrishyamukh	2047.37	435.7	498.18	280.03	3261.28	854.2	2407.08	56.736	0	122.15	178.89	127.91	2222.43	7.43	safe
South Tripura	Jolaibari	1722.03	670.68	578.44	186.99	3158.14	511.49	2646.65	29.376	0	119.08	148.45	124.69	2492.59	5.61	safe
South Tripura	Poangbari	739.53	0.27	193.78	42.86	976.44	202.43	774.01	3	0	61.72	64.72	64.63	706.38	8.36	safe
South Tripura	Rajnagar	2206.87	100.48	671.24	206.95	3185.54	498.83	2686.71	124.98	0.6	141.91	267.48	148.59	2412.55	9.96	safe
South Tripura	Rupaichari	1449.59	217.18	379.84	80.88	2127.49	336.82	1790.67	9.552	0	111.06	120.6	116.29	1664.84	6.73	safe

South Tripura	Satchand	3703.96	748.68	776.44	83.15	5312.23	706.15	4606.08	12.228	1.005	140.62	153.84	147.24	4445.62	3.34	safe
Unakoti	Chandipur	1013.05	270.47	556.25	33.85	1873.62	419.69	1453.93	0.9	0	153.75	154.65	162.86	1290.17	10.64	safe
Unakoti	Gournagar	1079.31	184	592.63	161.35	2017.29	342.12	1675.17	15.15	0.05	160.02	175.22	169.5	1490.47	10.46	safe
Unakoti	Kumarghat	2157.88	524.88	1184.86	84.9	3952.52	535.71	3416.81	0	1.1232	244.73	245.86	259.24	3156.44	7.20	safe
Unakoti	Pencharthal	1030.29	140.14	565.72	152.63	1888.78	204.23	1684.55	0	0	104.23	104.23	110.41	1574.14	6.19	safe
West Tripura	AMC	1204.04	22.96	401.38	255.62	1884	94.2	1789.8	35.64	0	1041.53	1077.17	1090.6	663.56	60.18	safe
West Tripura	Bamutia	621.36	109.83	287.05	46.43	1064.67	209.17	855.5	52.8	0	108.98	161.78	114.11	688.59	18.91	safe
West Tripura	Belbari	905.06	355.51	271.52	30.07	1562.16	332.05	1230.11	13.8	1.2	178.00	192.99	186.38	1028.74	15.69	safe
West Tripura	Dukli	1175.9	434.03	521.95	136.01	2267.89	181.99	2085.9	255.732	1.93	218.86	476.53	229.18	1599.05	22.85	safe
West Tripura	Hezamara	1234.08	184.78	570.12	46.62	2035.6	238.76	1796.84	17.79	0	82.53	100.31	86.41	1692.65	5.58	safe
West Tripura	Jirania	490	244.23	183.75	266.26	1184.24	207.91	976.33	103.2	6.097	86.57	195.87	90.65	776.38	20.06	safe
West Tripura	Lefunga	400.46	86.66	185	122.18	794.3	97.96	696.34	15.903	2.32	108.98	127.2	114.11	564.01	18.27	safe
West Tripura	Mandwi	1238.66	322.55	464.5	90.3	2116.01	376.62	1739.39	0	0	103.47	103.47	108.35	1631.04	5.95	safe
West Tripura	Mohanpur	1236.35	335.57	571.17	234.77	2377.86	410.65	1967.21	190.128	4.51	161.09	355.72	168.68	1603.9	18.08	safe
West Tripura	Old Agartala	683.5	217.64	256.32	151.65	1309.11	297.37	1011.74	88.2	0.6	121.48	210.28	127.21	795.73	20.78	safe

***Assessment Units: Block**

Annexure 1:

DYNAMIC GROUND WATER RESOURCES OF TRIPURA, 2023															
TRIPURA (in bcm)															
		Ground Water Recharge					Total Natural Discharges	Annual Extractable Ground Water Resource	Current Annual Ground Water Extraction				Annual GW Allocation for Domestic use as on 2025	Net Ground Water Availability for future use	Stage of Ground Water Extraction (%)
		Monsoon Season		Non-Monsoon Season		Total Annual Ground Water Recharge			Irrigation	Industrial	Domestic	Total			
S.NO	NAME OF STATE/UT	Recharge from rainfall	Recharge from other Sources	Recharge from Rainfall	Recharge from other Sources										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	**TRIPURA**	0.81	0.16	0.32	0.07	1.23	0.13	1.09	0.03	0	0.08	0.11	0.09	0.98	9.92
	Total (bcm)	0.81	0.16	0.32	0.07	1.23	0.13	1.09	0.03	0	0.08	0.11	0.09	0.98	9.92

Annexure 2:

DYNAMIC GROUND WATER RESOURCES OF TRIPURA, 2023

TRIPURA (in Ham)

S.NO	Name of District	Ground Water Recharge					Total Natural Discharges	Annual Extractable Ground Water Resource	Current Annual Ground Water Extraction				Annual GW Allocation for Domestic use as on 2025	Net Ground Water Availability for future use	Stage of Ground Water Extraction(%)
		Monsoon Season		Non-Monsoon Season		Total Annual Ground Water Recharge			Irrigation	Industrial	Domestic	Total			
		Recharge from rainfall	Recharge from other Sources	Recharge from Rainfall	Recharge from other Sources										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	**DHALAI**	12147.64	941.03	6030.48	565.64	17250.44	1862.38	15388.06	135.3	0	939.91	1075.22	1012.2	14240.54	6.99
2	**GOMATI**	13884.71	3321.95	4150.69	603.54	20079.96	2196.09	17883.87	164.19	0.96	893.27	1058.41	935.36	16783.37	5.92
3	**KHOWAI**	6212.26	1790.19	2928.53	596.38	11236.52	1152.74	10083.78	327.71	2.4	653.49	983.59	679.51	9074.17	9.75
4	**NORTH TRIPURA**	7025.08	583.28	3824.23	704.7	9712.38	1213.71	8498.67	32.4	3.21	993.96	1029.58	1052.88	7410.17	12.11
5	**SEPAHIJALA**	10650.71	3032.8	4176.73	1109.7	17054.21	1897	15157.21	761.2	1.68	1015.62	1778.47	1056.06	13338.3	11.73
6	**SOUTH TRIPURA**	16551.36	2948.1	4356.09	1335.74	22533.19	2519.13	20014.06	295.3	2.57	944.37	1242.2	988.86	18727.38	6.21
7	**UNAKOTI**	5280.53	1119.49	2899.46	432.73	9203.69	973.23	8230.46	16.05	1.17	662.73	679.96	702.01	7511.22	8.26
8	**WEST TRIPURA**	9189.41	2313.76	3712.76	1379.91	15601.15	1451.99	14149.16	773.19	16.66	2211.48	3001.32	2315.68	11043.65	21.21
	Total (Ham)	80941.7	16050.6	32078.97	6728.34	122671.54	13266.27	109405.27	2505.35	28.65	8314.84	10848.75	8742.56	98128.8	9.92
	Total (Bcm)	0.81	0.16	0.32	0.07	1.23	0.13	1.09	0.03	0	0.08	0.11	0.09	0.98	9.92

Annexure 3A:

CATEGORIZATION OF BLOCKS/ MANDALS/ TALUKAS IN Tripura (2022-2023)												
S.No	**District**	**Total No. of Assessed Units**	**Safe**		**Semi-Critical**		**Critical**		**Over-Exploited**		**Saline**	
			Nos.	**%**	**Nos.**	**%**	**Nos.**	**%**	**Nos.**	**%**	**Nos.**	**%**
1	DHALAI	8	8	100	-	-	-	-	-	-	-	-
2	GOMATI	8	8	100	-	-	-	-	-	-	-	-
3	KHOWAI	6	6	100	-	-	-	-	-	-	-	-
4	NORTH TRIPURA	8	8	100	-	-	-	-	-	-	-	-
5	SEPAHIJALA	7	7	100	-	-	-	-	-	-	-	-
6	SOUTH TRIPURA	8	8	100	-	-	-	-	-	-	-	-
7	UNAKOTI	4	4	100	-	-	-	-	-	-	-	-
8	WEST TRIPURA	10	10	100	-	-	-	-	-	-	-	-
	Total States	59	59	100	-	-	-	-	-	-	-	-
	Grand Total	59	59	100	-	-	-	-	-	-	-	-

Annexure 3B:

CATEGORIZATION OF BLOCKS/ MANDALS/ TALUKAS IN Tripura (2022-2023)													
S.No	States / Union Territories	Total Geographical Area in 1000 sq km	Recharge Worthy Area in 1000 sq km	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
				Recharge Worthy Area in 1000 sq km	%	Recharge Worthy Area in 1000 sq km	%	Recharge Worthy Area in 1000 sq km	%	Recharge Worthy Area in 1000 sq km	%	Recharge Worthy Area in 1000 sq km	%
1	**DHALAI**	2.31489	0.99581	0.99581	100	-	-	-	-	-	-	-	-
2	**GOMATI**	1.61705	1.09828	1.09828	100	-	-	-	-	-	-	-	-
3	**KHOWAI**	1.01245	0.4956	0.4956	100	-	-	-	-	-	-	-	-
4	**NORTH TRIPURA**	1.35792	0.54382	0.54382	100	-	-	-	-	-	-	-	-
5	**SEPAHIJALA**	1.04392	0.8717	0.8717	100	-	-	-	-	-	-	-	-
6	**SOUTH TRIPURA**	1.51201	0.98103	0.98103	100	-	-	-	-	-	-	-	-
7	**UNAKOTI**	0.65703	0.42878	0.42878	100	-	-	-	-	-	-	-	-
8	**WEST TRIPURA**	0.97642	0.78282	0.78282	100	-	-	-	-	-	-	-	-
	Total States	10.49169	6.19784	6.19784	100	-	-	-	-	-	-	-	-
	Grand Total	10.49169	6.19784	6.19784	100	-	-	-	-	-	-	-	-

Annexure 3 C:

ANNUAL EXTRACTABLE RESOURCE OF ASSESSMENT UNITS UNDER DIFFERENT CATEGORIES, 2023										
S.No	State/Union Territories	Total Annual Extractable Resource of Assessed Units (in mcm)	Safe		Semi-Critical		Critical		Over-Exploited	
			Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%
1	**TRIPURA**	1094.05	1094.05	100	-	-	-	-	-	-
	Total	1094.05	1094.05	100	-	-	-	-	-	-
	Grand Total	1094.05	1094.05	100	-	-	-	-	-	-

Annexure 3 D:

DYNAMIC GROUND WATER RESOURCES OF Tripura, 2023										
TRIPURA										
S.No	Name of District	Total Annual Extractable Resource of Assessed Units (in mcm)	Safe		Semi-Critical		Critical		Over-Exploited	
			Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%
1	**DHALAI**	153.88	153.88	100	-	-	-	-	-	-
2	**NORTH TRIPURA**	84.99	84.99	100	-	-	-	-	-	-
3	**KHOWAI**	100.84	100.84	100	-	-	-	-	-	-
4	**GOMATI**	178.84	178.84	100	-	-	-	-	-	-
5	**WEST TRIPURA**	141.49	141.49	100	-	-	-	-	-	-
6	**UNAKOTI**	82.3	82.3	100	-	-	-	-	-	-
7	**SOUTH TRIPURA**	200.14	200.14	100	-	-	-	-	-	-
8	**SEPAHIJALA**	151.57	151.57	100	-	-	-	-	-	-
	Total	1094.05	1094.05	100	-	-	-	-	-	-
	Grand Total	1094.05	1094.05	100	-	-	-	-	-	-

Annexure 3 E:

AREA OF ASSESSMENT UNITS UNDER DIFFERENT CATEGORIES IN INDIA (2023)													
				Safe		Semi-Critical		Critical		Over-Exploited		Saline	
S.No	States / Union Territories	Total Recharge Worthy Areaof Assessed Units (in sq km)	Recharge Worthy Area (in sq km)	Recharge Worthy Area in sq km	%	Recharge Worthy Area in sq km	%	Recharge Worthy Area in sq km	%	Recharge Worthy Area in sq km	%	Recharge Worthy Area in sq km	%
1	**TRIPURA**	10491.69	6197.84	6197.84	100	-	-	-	-	-	-	-	-
	Total	10491.69	6197.84	6197.84	100	-	-	-	-	-	-	-	-
	Grand Total	10491.69	6197.84	6197.84	100	-	-	-	-	-	-	-	-

Annexure 3 F:

DYNAMIC GROUND WATER RESOURCES OF INDIA, 2023												
TRIPURA												
S.No	Name of District	Total Recharge Worthy Area of Assessed Units (in sq.km)	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%	Recharge Worthy Area of Assessed Units (in sq.km)	%
1	**DHALAI**	995.81	995.81	100.0	-	-	-	-	-	-	-	-
2	**NORTH TRIPURA**	543.82	543.82	100.0	-	-	-	-	-	-	-	-
3	**KHOWAI**	495.6	495.6	100.0	-	-	-	-	-	-	-	-
4	**GOMATI**	1098.28	1098.28	100.0	-	-	-	-	-	-	-	-
5	**WEST TRIPURA**	782.82	782.82	100.0	-	-	-	-	-	-	-	-
6	**UNAKOTI**	428.78	428.78	100.0	-	-	-	-	-	-	-	-
7	**SOUTH TRIPURA**	981.03	981.03	100.0	-	-	-	-	-	-	-	-
8	**SEPAHIJALA**	871.7	871.7	100.0	-	-	-	-	-	-	-	-
	Total	6197.84	6197.0	100.0	-	-	-	-	-	-	-	-

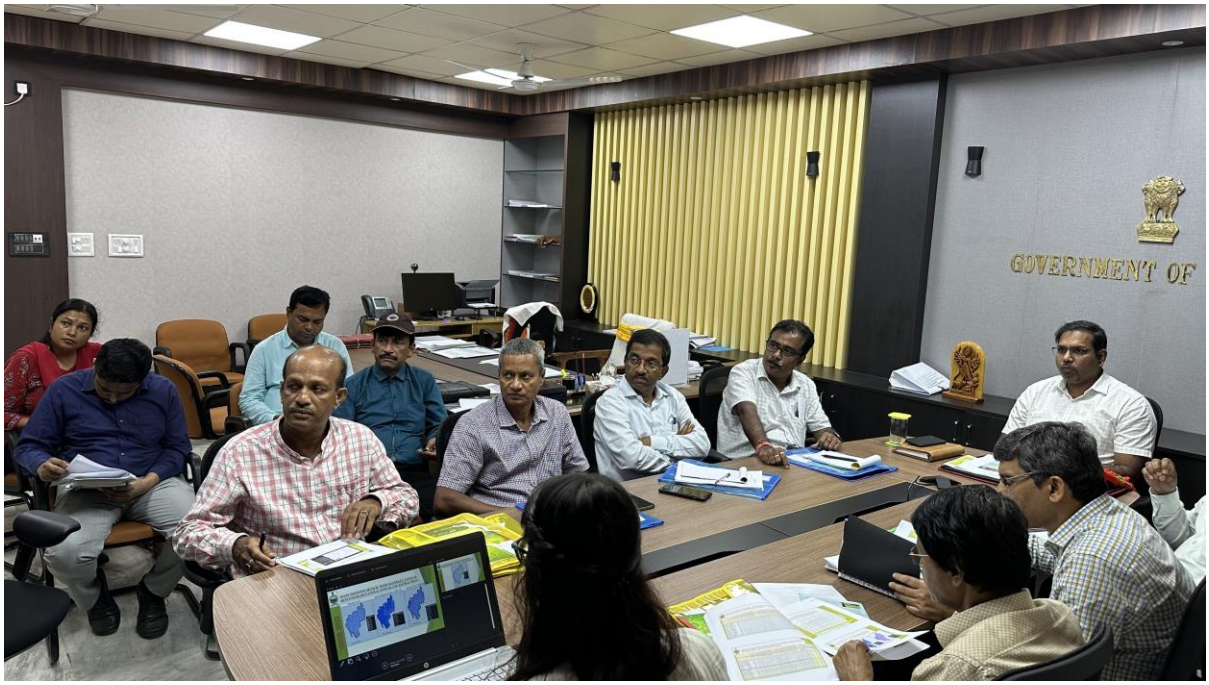
Annexure 4A:

CATEGORISATION OF ASSESSMENT UNIT, 2023							
TRIPURA							
S.NO	Name of District	S.NO	Name of Semi-Critical Assessment Units	S.NO	Name of Critical Assessment Units	S.NO	Name of Over-Exploited Assessment Units
ABSTRACT							
Total No. of Assessed Units		Number of Semicritical Assessment Units		Number of Critical Assessment Units		Number of Over Exploited Assessment Units	
59		0		0		0	

Annexure 4B:

QUALITY PROBLEMS IN ASSESSMENT UNITS, 2023							
TRIPURA							
S.NO	Name of District	S.NO	Name of Assessment Units affected by Fluoride	S.NO	Name of Assessment Units affected by Arsenic	S.NO	Name of Assessment Units affected by Salinity
ABSTRACT							
Total No. of Assessed Units		Number of Assessment Units affected by Fluoride		Number of Assessment Units affected by Arsenic		Number of Assessment Units affected by Salinity	
0		0		0		0	


GOVERNMENT OF TRIPURA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