DRAFT
DISTRICT SURVEY REPORT
OF
DHUBRI DISTRICT, ASSAM
(For sand or riverbed mining)

CPC Environment Solution Pvt. Ltd.
(A QCI-NABET Accredited Organization)

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PREFACE

The need for a District Survey Report (DSR) has been mandated by the Ministry of Environment, Forest, and Climate Change (MoEF&CC) through Notification No. 125 (Extraordinary, Part II Section 3, Sub-section ii), S.O. 141 (E), dated 15th January 2016. This notification introduced amendments to the EIA Notification 2006, aimed at improving legislative control. As part of these changes, district-level committees were introduced, and the preparation of DSRs became a requirement.

Subsequently, Notification No. 3611 (E), dated 25th July 2018, expanded the DSR's scope to include "Minerals Other than Sand" and provided a specific format for its preparation. The DSR's purpose is to identify areas with mineral potential where mining activities can be permitted, as well as to flag areas where mining should be restricted due to proximity to infrastructure, erosion-prone zones, or environmentally sensitive regions.

The preparation of the DSR involves both primary and secondary data collection. Primary data includes site inspections, surveys, and ground truthing, while secondary data comes from authenticated sources and satellite imagery studies. The secondary data covers information such as the district profile mineralization, and other relevant activities, often compiled from disparate sources.

Key Aspects of District Survey Report (DSR)

Assessment of Resources: The DSR provides a comprehensive evaluation of the mineral resources available in riverbeds within the district. It includes detailed data on the quantity, quality, and distribution of sand and other minor minerals, helping to prevent over-extraction and resource depletion through accurate estimation.

Environmental Impact Analysis: The report analyzes the environmental effects of riverbed mining, addressing changes in river morphology, hydrology, and impacts on aquatic ecosystems and biodiversity. This analysis is vital for mitigating harmful environmental impacts and conserving riverine habitats.

Regulation and Compliance: The DSR serves as a regulatory tool for riverbed mining, outlining standards and guidelines to ensure compliance with national and state environmental laws. It helps to curb illegal mining activities and promotes regulated, lawful mining operations.

Sustainable Mining Practices: The DSR advocates for sustainable mining practices that reduce environmental degradation. Recommendations may include controlled mining depths, designated extraction zones, and periodic studies to maintain the ecological balance of river systems.

Socio-Economic Considerations: The report addresses the socioeconomic implications of riverbed mining, such as employment generation and local government revenue. It also considers the negative impacts on communities, including displacement and loss of livelihoods.

Data-Driven Decision Making: The DSR provides a scientific foundation for decisions regarding riverbed mining. Incorporating geospatial data, remote sensing images, and field surveys enhances the accuracy and reliability of the report, supporting informed policy-making and resource management.

Stakeholder Involvement: The preparation of the DSR involves consultations with various stakeholders, such as government bodies, local communities, environmentalists, and industry representatives. This inclusive approach ensures diverse perspectives which are considered for promoting balanced and equitable mining practices.

1. Introduction of District Survey Report (DSR) of Dhubri District

1.1 Introduction

The District Survey Report (DSR) of Dhubri District has been prepared following the guidelines of the Ministry of Environment, Forests and Climate Change (MoEF&CC), Government of India. This report aligns with the MoEF&CC Notification S.O.-1533(E) dated 14th September 2006 and subsequent notification S.O. 141(E) dated 15th January 2016. It aims to ensure the scientific and systematic utilization of natural resources for the benefit of present and future generations. Furthermore, MoEF&CC's notification S.O. 3611(E) dated 25th July 2018 recommends the format for preparing the DSR.

The main objective of the DSR is to identify areas of aggradation where mining can be allowed, and areas of erosion where mining should be restricted. It also involves the calculation of the annual replenishment rate to maintain ecological balance. Additionally, the DSR includes assessing the development potential of in-situ minor minerals.

Objectives of the DSR:

1. Identification and quantification of minor mineral resources for optimal utilization.
2. Regulation of riverbed mining and reduction of demand-supply gaps.
3. Use of Information Technology (IT) for surveillance of riverbed mining activities.
4. Facilitation of environmental clearance for clusters of mines.
5. Restriction of illegal mining.
6. Reduction of flood occurrences in the area.
7. Preservation of aquatic habitats.
8. Protection of groundwater by limiting extraction to above base flow levels.
9. Maintenance of data records related to mineral resources, leases, and revenue generation.
10. Creation of a scientific mining plan, including ultimate pit/trench limit estimation.
11. Development of comprehensive guidelines for mining minor minerals.

The DSR includes secondary data on the district's geology, climate, mineral resources, and other relevant factors, compiled from published and unpublished reports, as well as government websites.

1.2 Statutory Framework

The MoEF&CC has issued several notifications and guidelines over the years to regulate mining and formulate DSRs for each district. Below is a summary of the legal framework:

Year	**Particulars**
1994	The MoEF&CC issued the Environmental Impact Assessment (EIA) Notification for major minerals covering areas over 5 hectares.
2006	EIA Notification SO 1533 (E) made it mandatory to obtain environmental clearance (EC) for minor minerals exceeding 5 hectares.
2012	The Hon'ble Supreme Court mandated EC for minor minerals, even for areas under 5 hectares.
2016	"Sustainable Sand Mining Guidelines (SSMG)" introduced, requiring EC for all minor minerals and district-level monitoring.
2018	MoEF&CC issued notification S.O. 3611(E) with a recommended DSR format for identifying aggradation areas, replenishment rates, and protected zones.
2020	The "Enforcement and Monitoring Guidelines for Sand Mining (EMGSM)" introduced for improved regulatory enforcement and technological monitoring of sand mining activities.

Enforcement & Monitoring Guidelines, 2020

These guidelines address illegal mining, directing states to implement monitoring mechanisms like river audits, aerial surveys, and drone-based surveillance.

1.3 Utilization and Demand of the minerals

Riverbed minerals like sand, gravel, stone etc. plays an essential role in construction and is widely used in concrete production, glass manufacturing, road base formation, and many more. Riverbed mining is a prevalent practice in Dhubri District, mainly for construction. The rise in real estate and government infrastructure projects has significantly increased the demand for sand and bricks. The minor minerals of Dhubri district come under B-category mining .

Uses of minerals:

1. **Construction**: Sand, gravel, silt, clay and ordinary earth are key ingredients in concrete, mortar and asphalt.
2. **Industrial**: Used in glass production and abrasives.
3. **Environmental**: The minerals can improve traffic safety by providing grip on icy roads, and it helps in soil conditioning for agriculture.
4. **Decorative**: Sand, gravel and stones are used in candles, aquariums, and for enhancing aesthetic appeal in landscaping.
5. **Flood Protection**: Proper management of sand mining helps maintain river flood discharge capacity, reducing the risk of floods.

This DSR aims to provide a well-rounded, data-driven approach for sustainable mineral resource management, ensuring compliance with environmental guidelines and promoting socio-economic benefits for the district.

1.4 Methodology of DSR Preparation

The District Survey Report (DSR) preparation follows a systematic methodology to ensure accuracy and comprehensiveness. The steps involved in the preparation of the DSR are illustrated in Figure 2.1 and are described in detail in the following sections.

a. Data Source Identification

The DSR is based on both primary and secondary data collected from reliable and authoritative sources. Identifying authentic data sources is critical for compiling accurate data. The primary data sources for the DSR are collected through field surveys and replenishment studies. Secondary data sources include publicly available information from government publications, reports, and reputable journals.

- **District Profile**: Information related to the district's demographics and basic statistics is sourced from the **District Census Report, 2011** and the **District Statistical Handbook** published by the Government of Assam.
- **Mineral Resources**: The potential mineral resources of the district are described based on reports published by the **Geological Survey of India (GSI)** or other government agencies
- **Mining Data**: Information on mining leases, lease holders, lease areas, resource allocations, and revenue generation is collected from the **Forest Department.**
- **Satellite Images**: Satellite imagery is utilized to prepare maps related to the district's physiography and land use (LU)/land cover(LC).

b. Data Analysis and Map Preparation

After collecting data, a detailed analysis is conducted to extract relevant insights. This involves analyzing geo-spatial data and preparing maps that depict:

- Geomorphology of the district
- Topography
- Land use patterns
- Mineral resource distribution

These maps help to visualize the key characteristics of the district and identify potential mining areas.

c. *Primary Data Collection*

Primary data is essential for preparing a comprehensive DSR. Fieldwork is conducted across the district to assess mineral resources. This field study provides a detailed understanding of the mineral composition and their distribution in the area.

d. *Replenishment Study*

A key aspect of sustainable mining is ensuring that the amount of sediment removed from riverbeds is replenished naturally. Therefore, replenishment studies are conducted to assess the annual rate of replenishment of riverbed sand. This helps avoid the adverse impacts of excessive sand extraction.

- Physical surveys of the riverbed are carried out using **GPS/DGPS** to define the topography, contours, and offsets.
- The surveys provide a detailed depiction of important features in and around the river, including nearby civil structures and other key landmarks.
- This information helps to define the spatial area eligible for sand mining and estimate the sand reserves.

e. *Report Preparation*

The DSR covers various aspects of the district, including:

- **General Profile**: Overview of the district, including demographics, land use patterns, and economic activities.
- **Geomorphology and Geology**: An assessment of the district's physical landscape, including its geological structure.
- **Mineral Resources**: A detailed account of riverbed sands and other minor minerals in the district, including their distribution and potential for extraction.
- **Mining Block Delineation**: Identification of potential mining blocks and mineral reserves within the district.

- **Production Trends**: An analysis of recent trends to cater light in the production of minor minerals and the revenues generated from the mining sectors.
- **Replenishment Estimation**: The annual replenishment rate of riverbed sand, based on field surveys.
- **Environmental Impact and Mitigation**: An evaluation of the potential environmental impacts of mining activities, along with proposed mitigation measures.
- **Risk Assessment and Disaster Management**: A strategy for managing risks associated with mining and minimizing the impact of any jaw dropping disasters.
- **Reclamation Strategy**: A plan for the reclamation of already mined-out areas to restore the ecological balance.

This structured approach ensures that the DSR not only identifies mineral resources but also emphasizes sustainable mining practices and environmental preservation.

2. Overview of mining activity in the district

In the Dhubri district collection of sand, gravel, stone, clay/silt etc. from riverbed is considered as one of the main minor mineral sources of the district. These materials are primarily used for civil construction purposes.

3. List of existing mining leases of the districts

Details of List of existing mining leases of the districts are furnished in the following table:

Sl. No.	Name of Mahal	Name of the lessee	Location and area of mining lease	Period of lease	Status (working/ closed)
1	Soulmari S & G MM Unit	Biswajit Brahma	Tipkai River 14.00 Ha.	7 years	Running
2	Changbandha-Boalkamri Sand Mahal	Abul Sk.	Tipkai River 4.00 Ha.	2 years	Running
3	Silbari S & G MM Unit	Biswajit Brahma	Tipkai River 14.00 Ha.	7 years	Final Settlement Pending
4	Saptgram-Ghagmari Sand Mahal	Budhbari Brahma	Tipkai River 3.72 Ha.	7 years	Closed
5	Gangadhar River Minor Mineral Units		Gangadhar River 4.90 Ha.	7 years	NIT Pending
6	Tokrabandha Hill Stone Quarry	Babul Nath	Tokrabandha Hill 5.23 Ha.	5 years	Closed
7	Tokrabandha Hill Stone Quarry No.2	Debesh Chandra Roy	Tokrabandha Hill 1.0 Ha.	5 years	Closed

8	Tokrabandha Hill Stone Quarry 'A'		Tokrabandha Hill 4.59 Ha Dhubri	—	Proposed for Mining Plan
9	Brahmaputra River Minor Mineral Unit No. 4	Uttam Choudhury	Brahmaputra River 2.00 Ha Dhubri	7 years	Closed
10	Gaurang River Minor Mineral Unit No.5	Uttam Choudhury	Brahmaputra River 1.0 Ha Dhubri	7 years	Closed
11	Jandu Construction India Pvt. Ltd.	Jandu Construction India Pvt. Ltd.	Aironjongla Part-II 1.30 Ha Dhubri	1 year	Closed
12	Jandu Construction India Pvt. Ltd.	Jandu Construction India Pvt. Ltd.	Dimakuri Part-I 9.50 Ha Golokganj	1 year	Running
13	Jandu Construction India Pvt. Ltd.	Jandu Construction India Pvt. Ltd.	Chagalchara Part-II 2.50 Ha Dhubri	1 year	Running
14	Jandu Construction India Pvt. Ltd.	Jandu Construction India Pvt. Ltd.	Chagalchara Part-II 4.83 Ha	2 year	Running
15	Jandu Construction India Pvt. Ltd.	Jandu Construction India Pvt. Ltd.	Tokrerchara Part-I 2.40 Ha Golokganj	1 year	Closed
16	Jandu Construction India Pvt. Ltd.	Jandu Construction India Pvt. Ltd.	Sahebganj Naicharkuti 2.92 Ha Golokganj	1 year	Running
17	Jandu Construction India Pvt. Ltd.	Jandu Construction India Pvt. Ltd.	Paschim Gaikhowa Part-I 4.82 Ha Golokganj	1 year	Running

18	Jandu Construction India Pvt. Ltd.	Jandu Construction India Pvt. Ltd.	Paschim Gaikhowa Part-I 4.59 Ha Golokganj	1 year	Running
19	Jandu Construction India Pvt. Ltd.	Jandu Construction India Pvt. Ltd.	Paschim Gaikhowa Part-I 4.68 Ha Golokganj	1 year	Closed
20	Jandu Construction India Pvt. Ltd	Jandu Construction India Pvt. Ltd.	West Tokrechara 6.50 Ha Golokganj	1 year	Running
21	Jandu Construction India Pvt. Ltd.	Jandu Construction India Pvt. Ltd.	Kachuarkhas Part I & II 1.01 Ha Dhubri	2 year	Running
22	Jandu Construction India Pvt. Ltd.	Jandu Construction India Pvt. Ltd.	Balajan River 2.83 Ha Golokganj	1 year	Closed
23	Jandu Construction India Pvt. Ltd.	Jandu Construction India Pvt. Ltd.	Borobalarchar 4.58 Ha Agomani	1 year	Running
24	AbulKashem	AbulKashem	Aironjongla & Bhasanirchar 0.94 Ha Dhubri	2 year	Running
25	BRBA Infratech LLP	BRBA Infratech LLP	Baghmara 1.6 Ha Dhubri	2 year	Running
26	Firdus Ali	Firdus Ali	Bagulamari & Chagalchara 1.5 Ha Dhubri	2 year	Running

27	Sekender Ali	Sekender Ali	Tokrabandha 0.96 Ha Chapar (Dhubri)	1 year	Running
28	Simplex Infrastructures Limited	Simplex Infrastructures Limited	Borobalarchar 4.33 Ha	2 year	Running
29	Marocosm Builders	Marocosm Builders	Dimakuri Part-I 1.54 Ha	1 year	Running
30	Larsen & Toubro Limited	Larsen & Toubro Limited	Brahmaputra River 3.91 Ha	1 year	Running
31	Larsen & Toubro Limited	Larsen & Toubro Limited	Brahmaputra River 3.87 Ha	1 year	Running
32	Larsen & Toubro Limited	Larsen & Toubro Limited	Brahmaputra River 3.32 Ha	1 year	Running
33	Larsen & Toubro Limited	Larsen & Toubro Limited	Brahmaputra River 3.88 Ha	1 year	Running
34	Larsen & Toubro Limited	Larsen & Toubro Limited	Brahmaputra River 3.86 Ha	1 year	Running
35	Larsen & Toubro Limited	Larsen & Toubro Limited	Aironjongla Part-II 4.31 Ha	2 year	Closed
36	Larsen & Toubro Limited	Larsen & Toubro Limited	Aironjongla Part-II 4.36 Ha	2 year	Closed
37	Hasanuzzaman Sheikh	Hasanuzzaman Sheikh	Baghdokra 2.34 Ha	2 year	Running

38	Abul Kashem	Abul Kashem	Aironjongla, Bagulamari & Chagalchara		Proposed for mining plan
39	Mohibur Rahman	MohiburRahman	Chagalchara		Proposed for mining plan
40	Shahzamal Hoque	Shahzamal Hoque	Kaliyarkhal & Dudhnath		Proposed for mining plan
41	Amir Rahman	Amir Rahman	Barshi Part-I		Proposed for mining plan
42	Giasuddin Mondal	Giasuddin Mondal	Aironjogla P-I & Chagalchara P-II		Proposed for mining plan
43	Jandu Construction India Pvt. Ltd.	Jandu Construction India Pvt. Ltd.	Barundanga Dhubri		Running
44	M/s Nayan Jyoti Stone Crusher	Sanjit Barman (Proprietor)	Jamduar Dhubri		Running
45	M/s Rudra Stone Crusher	Anupam Kalita (Proprietor)	Jamduar Dhubri		Running
46	M/s Five Star Stone Industry	M/s Five Star Stone Industry	Kaliarkhal Dhubri		Running
47	M/s Dolphin Industries	Mazil Ali (Proprietor)	Chagolia Dhubri		Running
48	Shree Gautam Construction Co. Ltd	Indu Singhi (Proprietor)	Jamduar Dhubri		Running

49	M/s Paul Stone Crusher Unit	Shobha Ranjan Paul (Proprietor)	Tokrabandha Dhubri		Running
50	M/s Barua Stone Crusher	Ishaan Barua (Proprietor)	Mohisbathan Dhubri		Running
51	M/s Barsha Stone Crusher	Mobarak Hussain (Proprietor)	Kaliarkhal Dhubri		License Renewal Pending
52	M/s Nasib Stone Crusher	Noor Mahammed Ali (Proprietor)	Chirakuta Dhubri		License Renewal Pending
53	M/s Milan Crusher Unit	Abdul Jobbar (Proprietor)	Kaliarkhal Dhubri		License Renewal Pending
54	M/s Zia Crusher Unit	Niyad Ali (Proprietor)	Chirakuta Dhubri		License Renewal Pending
55	Rangamati Baghmar Stone MPA	Joydeep Roy	Baghmaa Dhubri 2.00 Ha	2 years	Running

4. Details of revenue generated from mineral sector during last three years

Revenue generated for last 3 years in Dhubri District is furnished in the Table.

(a) Table: District revenue generation from mineral sector (In INR)

Financial Year	Royalty				Total revenue
	Sand	Gravel	Boulder	Earth/Silt/Clay	
2022-23	13467855	9059803	7500000	33210738	63238396
2021-22	4933453	438720	10878200	7907805	24158178
2020-21	8062243	2319237	10668320	1260000	22310000

(b)Table: Detail statement of Seizure of Minor Minerals, Vehicle, Dump & machineries etc

SI No.	Year	Nos. Of Offence Drawn	Nos. Of Vehicle Seized	Nos. Of Machinery Seized	Quantity Seized (in Cu.M)	Amount Realized (in Rs.)	Remarks
1	2020-21	213	119	8	129798.99	1,40,58,457	
2	2021-22	292	194	5	188203.12	3,05,31,034	
3	2022-23	419	285	5	210822.96	6,16.48,643	
4	2023-24	378	236	8	138533.41	2,94,56,037	

5. Detail of Production of Sand or Bajri or minor minerals in last three years

Sl. No	Financial Year	Production(cum)
1	2022-23	792288
2	2021-22	213208
3	2020-21	94824

6. Process of Deposition of Sediments in the rivers of the District of Dhubri

The sediment of a river is commonly considered to be aesthetically displeasing and environmentally degrading. Conversely, part of the sediment (sand and gravel) may represent a natural resource for use by society. The potential usefulness of the sediment is enhanced when it is composed of particle sizes found in deposits on the riverbed that would be replenished by newly transported sediment after mining. As such, river deposits become renewable resources, periodically replaced by sediment transport in the river aftermath of rainy season.

Sediment transport is the movement of organic and inorganic particles by water. In general, the greater the flow, the higher will be the rate of sedimentation. Water flow can be strong enough to suspend particles in the water column as they move downstream, or simply push them along the bottom of a water way. Transported sediment may include mineral matter, chemical sand pollutants, and organic material. Another name for sediment transport is sediment load. The total load includes all particles moving as bed load, suspended load, and wash load. Sediment deposition is the process of settling down of suspended particles to the bottom of a body of water. This settling often occurs when water flow slows down or stops, and heavy particles can no longer be supported by the bed turbulence. Sediment deposition can be found anywhere in a water system, from high mountain streams to rivers, lakes, delta and floodplains.

Sediment transport is critical to grip how rivers work because it is the set of processes that mediates between the flowing water and the channel boundary. Erosion involves removal and transport of sediment (mainly from the boundary) and deposition involves the transport and placement of sediment on the boundary. Erosion and deposition are what form the channel of any alluvial river as well as the flood plain through which it moves. The amount and size of sediment moving through a river channel are determined by three fundamental controls: competence, capacity and sediment supply. Competence refers to the largest size (diameter) of sediment particle or grain that the flow is capable of moving; it is a hydraulic limitation. If a river is sluggish and moving very slowly it simply may not have the power to mobilize and transport sediment of a given size even though such sediment is available to transport. So a river may be competent or incompetent with respect to a given grain size. If it is incompetent it will not transport sediment of the given size.

If it is competent it may transport sediment of that size if such sediment is available (that is, the river is not supply-limited). Capacity refers to the maximum amount of sediment of a given size that a stream can transport in traction as bed load. Given a supply of sediment, capacity depends on channel gradient, discharge and the caliber of the load (the Presence of fines may increase fluid density and increase capacity; the presence of large particles may obstruct the flow and reduce capacity). Capacity transport only occurs when sediment supply is abundant (non- limiting). Sediment supply refers to the amount and size of sediment available for sediment transport. Capacity transport for a given grain size is only achieved if the supply of that caliber of sediment is not limiting (that is, the maximum amount of sediment in stream is capable of transporting is actually available). Because of these two different potential constraints (hydraulic sand sediment supply) distinction is often made between supply-limited and capacity-limited transport.

Much of the material supplied to a stream is so fine (silt and clay) that provided it can be carried in suspension, almost any flow will transport it. Although there must be an upper limit to the capacity of the stream to transport such fines, it is probably never reached in natural channels and the amount moved is limited in supply. In contrast, transport of coarser material (say, coarser than fine sand) is largely capacity limited.

Modes of Sediment Transport: The sediment load of a river is transported in various ways although these distinctions are to some extent arbitrary and not always very practical in the sense that not all of the components can be separated in practice.

The modes are:
1. Dissolved Load.
2. Suspended Load.
3. Intermittent Suspension (Siltation) Load
4. Wash Load
5. Bed Load

7. General Profile of the district

a) General Information

Dhubri District - the gateway of western Assam happened to be in the past a meeting place of different racial groups which mingled together and formed a unique Cultural Heritage and Historical Background. The growth of blended culture in this region particularly in case of Language, Art and Religion is due to continuous process of assimilation of various races, caste & creed of local people, invaders & migrated people. Dhubri District is bounded both by inter-state and international border i.e. West Bengal and Bangladesh in the west, Goalpara and Bogaigoan district of Assam in the east, Kokrajhar district in the north, South Salmara-Mankachar district and state of Meghalaya in the south. Dhubri district is primarily dependent on agriculture and forest products. Main source of income is paddy with surplus production than its requirement Jute and mustard seed occupy the major share of cash crops. From forest mainly timber and bamboo add to the income though boulder and sand also available. Fish, milk, meat and egg have small contribution to the economy.

By Road: Regular buses (both private and government) are plying from Guwahati to Dhubri. The distance is about 290 KMs. and time takes 5.30 to 6.00 hours. Also one can reach Dhubri from Siliguri, Cooch Behar (West Bengal) via road as there a good no. of buses areplying regularly. The distance from Siliguri and Cooch Behar to Dhubri is about 240 KMs and 85 KMs respectively.

By Train: There are two no. of trains from Guwahati to Dhubri. One is Passenger runs regularly and another weekly. From Siliguri also there is one train runs via Cooch Behar on regular basis.

By Air: Nearest Airport is Rupshi-Airport which is situated about 15 km away from District head quarter. Available flights are from Guwahati and Kolkata, flying thrice in a week.

Natural Tourism:

Dhubri District is bestowed with attractive scenic beauties. Both the banks of the River Brahmaputra with its lush green fields, blue hills and hillock is a feast to the eyes of the onlookers. The Gurdwara Tegh Bahadur Shaibji, the Rangamati Mosque, Mahamaya

Dham , Chakrasila Wildlife Sanctuary, Matiabagh, Hawa Mahal, Ramraikuti, Satra, Panch Peer Dargaha, and other royal palaces attract the people for their unique structures, religious sanctity and mythological importance.

People &Culture :

Dhubri possesses a rich Archaeological and Cultural heritage from the ancient time. This region came in contact with the foreign invaders earlier than the rest of Assam. As Dhubri is called the gateway of Assam, people of diverse ethnic identity came to this region with different aims and a major portion of whom settled in this region. As a result of which Dhubri District witnesses the growth of blended culture, particularly in case of language, art and religion due to the continuous process of assimilation of various races, castes and creed of local people , invaders and migrated people.

The main local language of this district is Goalporia, popularly known as "Desi Bhasha". Other than this, Assamese and Bengali languages are simultaneously spoken in the urban areas.

Regarding dress, Sari is commonly used by both urban and rural women folk. In earlier days the rural women wore a piece of unsewn cloth which was called "Patani". This style of clothing is still seen in some rural areas. Male hindus generally wear Dhuti and Lungi is used by Muslims.

The most important ingredient of the cultural built-up of this district is its rich and indigenous folksongs and dances which are very popular from ancient time. The themes of these songs and dances are mainly based on religion and love affairs. Goalporia folk song is the soul of every people of this district.

The material evidences of rich cultural heritage of Dhubri Dist. are marked by the existence of heritage buildings including temples, shrines and some archaeological reins and various crafts which are scattered all over the District.

Dhubri district covers an area of 2012 sq. km. It is situated in the extreme south-west corner of the state and has an international boundary with Bangladesh on west and southwest and is bounded by Kokrajhar district in the north, Goalpara district on the east and north-east, Garo Hills district of Meghalaya on the south and Kochbehar and Jalpaiguri districts of West Bengal on the north-west. The district spreads on both sides of the River Brahmaputra.

As per 2011 census, population of the district is 13,94,144. Density of population is 896 persons/sq. km. As per the land use pattern, the forest area is 291.55 sq. km,culturable waste is 38.72 sq. km.

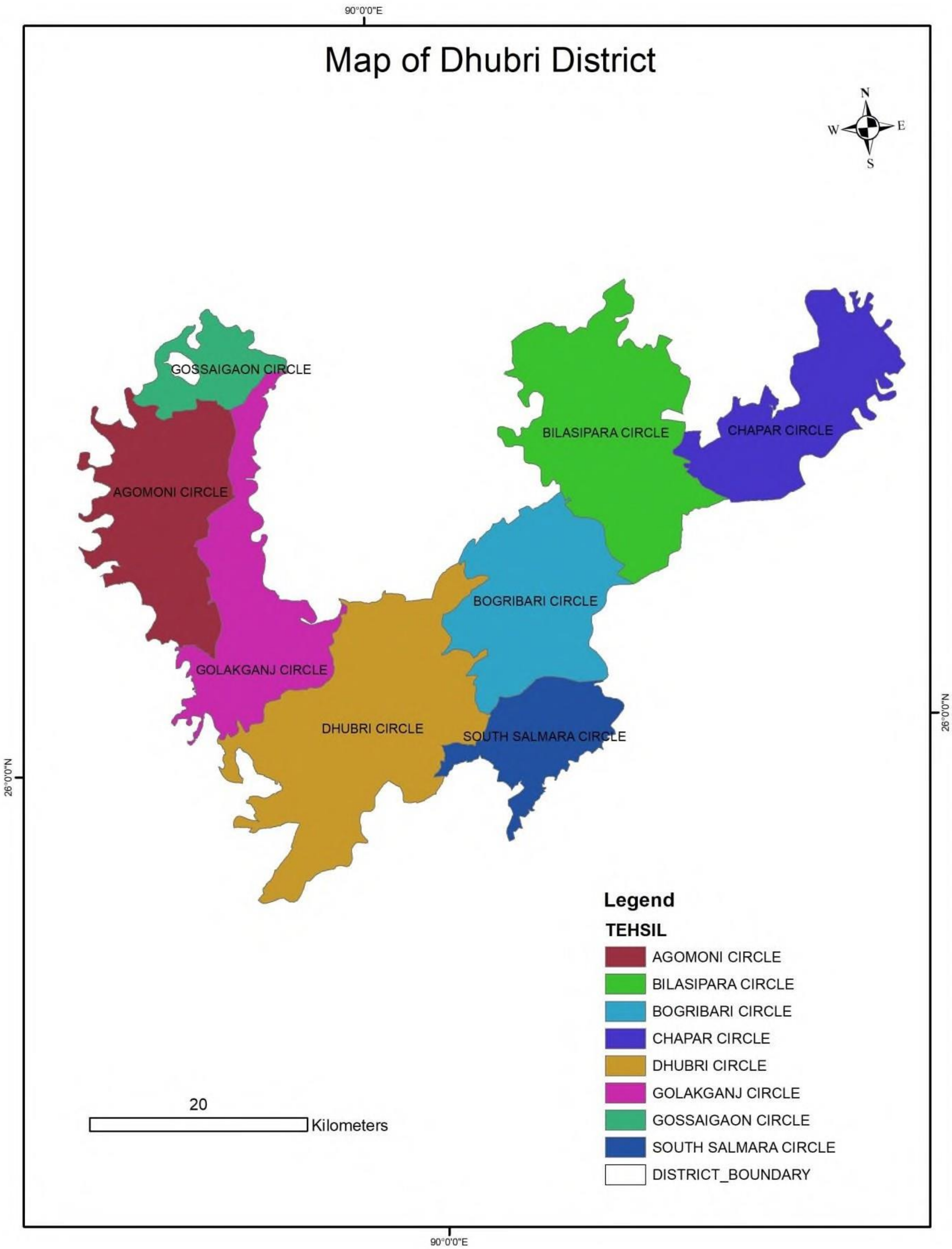
Dhubri lies at 89.5 degree east longitude and 26.1 degree north latitude, and about 34 metres or 110 feet above sea level. Dhubri is covered by rivers on three sides, predominated by mighty Brahmaputra River.

Number of perennial streams flow through the district from north to south and join the Brahmaputra River. The major streams that drain the area are Gadadhar, Sankosh, Silai and Gouranga Rivers.

There are no major irrigation systems in the district. However, minor irrigation schemes, such as lift irrigation schemes are mostly confined to the selected areas.

Administrative setup-

Head Quarter	Dhubri
Division	Lower Assam
Number of Sub-Divisions	2
Number of Revenue Circles/ Tehsils	8
Number of Community Development (C.D.) Blocks	13
Geographical Area	2012 sq. km
Literacy	58.34%
Revenue Villages	983
Panchayats	132



Map: Administrative map of the District

b) Climatic condition

The climate of the district is subtropical and humid characterized by high rainfall. The annual rainfall is 2,173 mm and relative humidity 65 to 85 percent. The district receives SW monsoon rainfall from the month of June and continues up to September/October. The highest rainfall areas of the district are located near the foothills of Arunachal Himalayas, i.e., in the northern part of the district. The maximum temperature goes up to $37.5^{o}C$ during June/ July and minimum temperature falls to $7.6^{o}C$ in December and January.

c) Drainage System

The district has a very busy river port on the bank of the river Brahmaputra, which is used for international trade with the neighbouring Bangladesh. Dhubri is called the “Land of rivers” as it is covered three sides by Brahmaputra and Gadadhar rivers.

Mighty river Brahmaputra is flowing through this district from east to west with its tributaries like Champabati, Gourang, Gadadhar, Gangadhar, Tipkai, Sankosh, Silai, Jinjiram, etc. All the rivers are perennial in nature and are influent type . The over all drainage pattern is dendritic.

Major rivers And Tributaries:

Name of the River/ Tributaries	Origin	Length in Dhubri	Danger Level	Maximum Water Level
Bramhaputra	Tibbet	88 Km.	28.62 m At Dhubri	29.91 m On 30-06-2013
Gangadhar	Bhutan	33 KM,	29.94 m at Golakganj	30.80 m On 20-07-2013

Name of the River/ Tributaries	Origin	Length in Dhubri	Danger Level
Gadadhar	Bhutan	39 K m	—
Tipkai	Bhutan	28 Km	32.26 mtr. At Khoraghat
Gaurang	Bhutan	20 Km.	33.60 mtr. At Bilasipara
Champaboti	Bhutan	24 Km.	33.95 Mtr. At Bahalpur
Kaloo	Garo Hills	22 Km.	—
Jinjiram	Garo Hills	49 Km.	28.70 mtr.AtMolakhowa

d) Irrigation

Agriculture is the backbone of Indian Economy. Around 60-70% of Indian population (directly or indirectly) depends upon agriculture for its livelihood. Irrigation helps to grow agricultural crops, maintain & re-vegetate disturbed soils in dry areas & during periods of less and average rainfall. Water is usually supplied as per requirement of different growing crops in the field. Irrigation works have been classified as major, medium and minor depending on their cultivable command area. Major and Medium Irrigation works are meant for tapping surface water (e.g. Rivers) and minor Irrigation mainly involves ground water development e.g. Tube-wells. Irrigation brings about an increase in the gross cropped area which in turn increases the net yield and also facilitates multiple cropping.

Irrigation potential in Dhubri District is developed both from surface and ground water sources. Currently the net Irrigated area under this Division is 2028 Hect. (approx.). After Re-organisation of Irrigation Department Vide Govt. No. IGN (E) 192/2021/58 dated 03/08/2021 The Goalpara Investigation Division (Irrigation) Goalpara is Re-named as Dhubri-Golakgang Division (Irrigation) Dhubri. The Office is presently Situated at Gauripur Near Kalibari. The email id for communication is.dgdirrigation@gmail.com

Under Dhubri-Golakganj Division (Irrigation) there are 12 no of schemes and 50 Numbers of PMKSY-HKKP Schemes in operation. At present this Division is supplying water to 470 beneficiaries annually during two seasons (i.e Rabi and Pre-Kharif&Kharif season).

Under SOPD, one Solar powered Medium Deep Tube Well Irrigation scheme has been sanctioned under this division at Golakganj under Golakganj Sub-Division (Irrigation) Agomani. The work of this scheme has been successfully completed and currently supplying water to 10 Hect. cultivated fields.

This Division comprises of Two Sub-Divisions:

1. Golakganj Sub-Division, (Irrigation) Agomani.
2. Dhubri Sub-Division, (Irrigation) Dhubri.

Under the above Sub-Divisions there are various schemes such as **Lift Irrigation System, Deep Tube-Well**, **Solar (MDTW) and PMKSY.** The primary responsibility/activity of this Division is to supply cultivable water to the farmers so that they get benefited and can develop their livelihood.

The following public utility services are provided to the users as entrusted by the department from time to time:

1. Water supply to cultivable Land.
2. Farmers training and demonstration.
3. Irrigation Service Charge.
4. Formulation of Scheme/Project.
5. Implementation of the Scheme/Project.

Water is usually supplied as per requirement of different growing crops in the field. The water requirement of crops is not uniform over a large area and varies widely in accordance with variation in climate, particularly in rainfall and soil.

Water Supply to the cultivable land: The main aim of Irrigation Department is to supply water to the farmers. According to Dhubri-Golakganj Division (Irrigation) Dhubri, total Net Irrigated area is 2028 Hect. (approx.) The Irrigation water is supplied to the cultivation field through the Main Canals, Branch Canals, Sub-Canals, and Distributaries. From the Main Canal water is generally not directly supplied to the command area.

Farmers Training and Demonstration: The Training Programme for Operation and Maintenance for Irrigation of schemes to WUA farmers has been taken up.

Irrigation Service Charge: Irrigation Service Charges (Water Tax) is collected from the beneficiaries (farmers) for providing Irrigation water. Under this Division for Rabi and Pre-Kharif crops, a sum of Rs.262.50 & Rs.751.00 per hectare is collected and for kharif crops, a sum of Rs.281.24/Hectare is collected from the beneficiaries accordingly.

Popular Systems of Irrigation under Dhubri-Golakganj Division:

Lift Irrigation System. In this system water is lifted by pumps either from river/reservoir and then diverted to canal network. Such schemes may be electrically operated or diesel driven or powered by solar energy.

Ground Water Irrigation System: Tube well irrigation is the most economical method of utilizing ground water resources. Like above, these types of schemes can also be operated either by electrical, diesel or solar power.

Shallow tube-well :It consists of a bore hole built into ground with the purpose of tapping ground water from porous zones. The tube wells are generally operated for 6 to 8 hours during irrigation season and give yield of 100-300 cubic meters per day.

Deep tube wells: It usually extends to the depth of more than 70 meter and is designed to give a discharge of 100 to 200 cubic meters per hour. Their CCA may go up to 50 hectares.

Solar MDTWS

Irrigation Department introduces a new age technology Solar Pumping System to Dhubri District under this Division. Solar Pumping System to overcome the problem of interruptions in power supply to LIS/DTWS schemes. This Project located at ChagaliaPt-II UnderGolakganj Sub-Division Golokganj LAC.

PMKSY_HKKP

Irrigation Department introduces this successful scheme which is very helpful for the farmers. This project located at 23-Dhubri LAC under Dhubri Sub-Division (Irrigation) Dhubri.

The Advantages of Solar Pumping System are:

- Naturally available abundant source of energy.
- Requires no maintenance.
- No power or fuel cost to operate pump
- Freedom from power cuts and load shedding.
- Environment friendly, pollution and noise free.
- No manpower required to operate the system
- Free from dependence on conventional energy sources

e) Soil resources

Soils in greater part of the district are sandy and silty loam, or clayey loam. It is found to be highly acidic to slightly alkaline in nature and is moderately permeable and characterised by the presence of low organic carbon and low soluble salts. Soils restricted to inselberg areas are more clayey, lateritic and less permeable and are highly acidic in nature. From agriculture point of view, the soils in major part of the area are suitable for all sorts of crops cultivation.

Physiographically, the district constitutes the vast alluvial plains of Brahmaputra River system. The monotony of the flat alluvial tract is interrupted by the presence of Archaean inliers in the form of disconnected hillocks referred to as inselbergs and these occur specially in the eastern and southern parts of the district. These hillocks are joined by the offshoots of Shillong plateau and are found on the north bank near Diplebeel, Sitdangabeel and east of Bilasipara and on the south bank of the foothill portion of Garo Hills along the district boundary. The level difference between the valley and the peaks of the inselbergs ranges from 25 to 455 m. These hillocks are covered by a thick lateritic mante and are occupied by evergreen mixed forest. Terraced alluvial deposits occupy 80% of the district with conspicuous occurrence of buried channels, back swamps, etc. Soils in greater part of the district are sandy and silty loam, or clayey loam. It is found to be highly acidic to slightly alkaline in nature and is moderately permeable and characterised by the presence of low organic carbon and low soluble salts. Soils restricted to inselberg areas are more clayey, lateritic and less permeable and are highly acidic in nature. From agriculture point of view, the soils in major part of the area are suitable for all sorts of crops cultivation.

f) Groundwater prospects in the district

Ground water conditions in the district can be described under two distinct hydrogeological units, i.e. conditions prevailing in the consolidated formations and the conditions prevailing in the unconsolidated formations.

Pre-Cambrian gneiss-schist complex projecting abruptly above the vast stretch of alluvium as isolated hills forms the consolidated formation in the district. These rock formations had been subjected to faulting and fracturing at several places through which water percolates to facilitate weathering. Weathered zone forms as such are restricted to about 10 m thickness and is often lateritic in character. Occurrence of ground water is limited in these formations and is confined to topographic lows and weathered residuum. The movement of ground water is controlled by the presence of fractures and fissures. Extraction of ground water in these zones is possible through large diameter dug wells and bore wells in hydrogeologically suitable areas. Ground water occurs under water table conditions in the weathered zone.

The unconsolidated formation is represented by the alluvial deposits of the recent age. This formation is found spreading on either side of the River Brahmaputra and comprises medium to coarse grained sand, gravel, pebbles, cobbles, etc., with intercalation of silt and clay. It is characterised by the presence of hard compact lateritic followed by coarse sand with pebbles and cobbles. Ground water occurs under water table and semi-confined conditions.

The water table contour follows the topography of the area and lies more or less parallel to the Brahmaputra River. The movement of ground water is from north to south in the north bank and south to north in the south bank of Brahmaputra. An artesian belt also exists around Mankachar in the southern part of the district.

Detailed hydrogeological surveys aided by exploratory drilling revealed the existence of promising aquifer zones down to the depth of maximum 200 m bgl in the northern bank of the River Brahmaputra and more than 100 m in the southern bank. Aquifer displays various degree of lateral and vertical variation of aquifer indicating various degree of depositional environment both in space and time.

Ground Water Resource

As par District Ground Water Booklet,the net ground water availability estimated in the year 2009 is 1635.61 mcm. The existing gross ground water draft 181.12 mcm and the stages of development are 11% only. Future provision for domestic and Industrial use is 65.35mcm and for Irrigation use is 1432.85 mcm.

GROUND WATER RESOURCE ESTIMATION

Net Ground Water Availability	= 1635.61 mcm
Gross Ground Water Draft	= 181.12 mcm
Stage of Ground Water Development	= 11%
Future provision for Domestic & Industrial Use	= 65.35 mcm
Future Provision for Irrigation Use	= 1432.85 mcm

Ground Water Quality

The concentration of major, minor and trace element in the district is generally within the limited range except iron. The iron distribution is abruptly high in and around Tamarhat and Chapar area where it has exceeded the permissible limit of drinking. The ground water is suitable for agricultural and industrial usages.

Ground Water Management Strategy

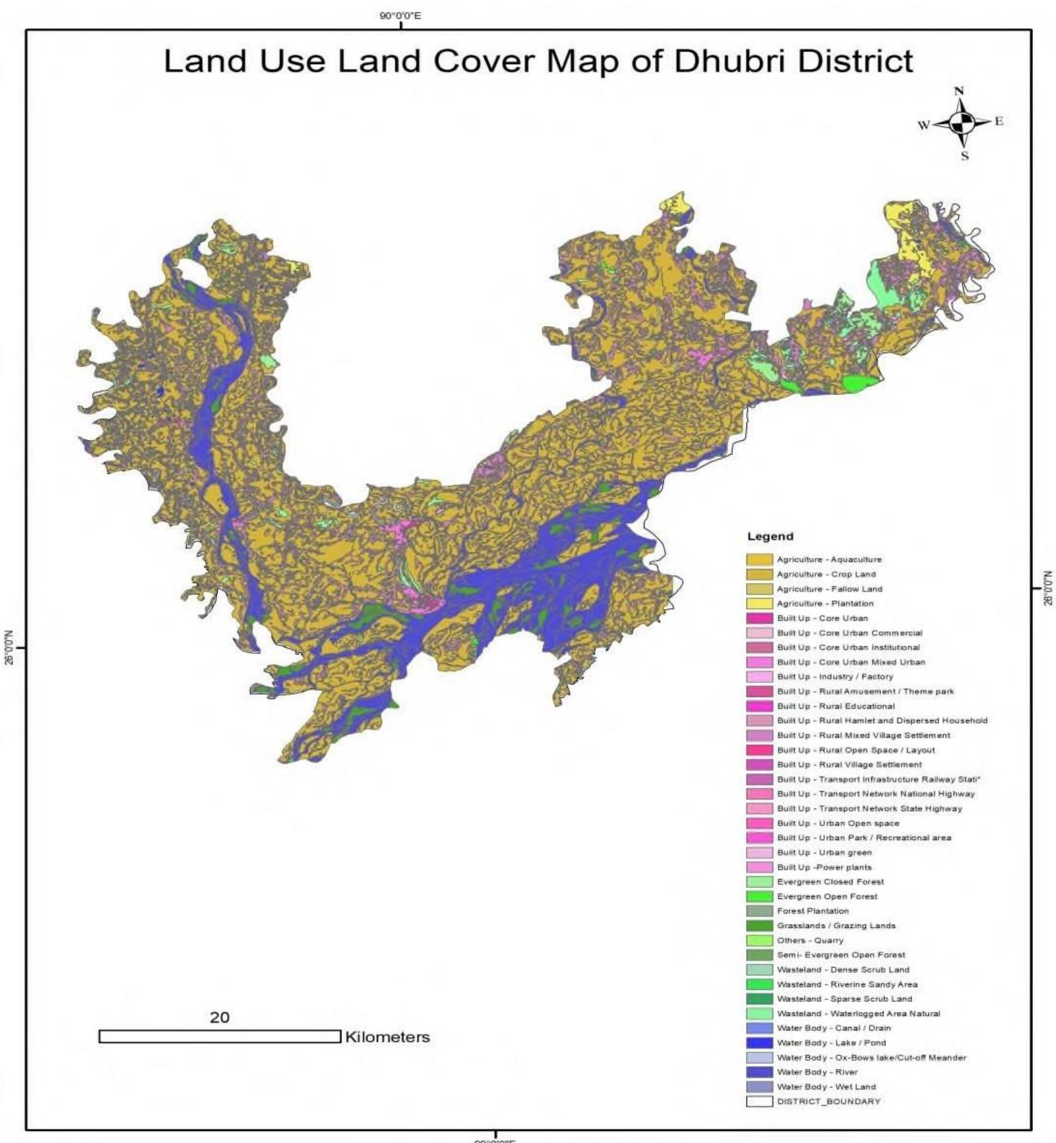
Shallow ground water structures are congenial for construction in the district, as water level and aquifer material are laterally persistent throughout the district. Dug wells and dug-cum-bore wells especially near the inselberg zone are very beneficial. Deep tube wells can be constructed preferably below the depth of 50 m tapping aquifer zone with a discharge varying from 100 - 200 m3 /hr maintaining a spacing of about 1 km. Considering the vast surface water as well as ground water resources in the district, it is recommended that conjunctive use of both these resources may be judiciously done.

Ground Water Related Issues and Problems

Frequent floods devastate the district every year during the monsoon months from May to September. Flood accompanied with soil erosion and sand deposition cause maximum damage to standing crops to the agricultural lands. Other than high iron content, most of the chemical constituents are within the permissible limit.

8. Land and land use pattern:

The total geographical area of the district is 5,32,298 Ha (Census,2011) out of which 31.03% is cultivable, 29.04% is forest, 31.02% is under non- agricultural use, 2.23% is pasture, 4.12% is barren/waste land, 1.42% under miscellaneous plantation and 0.24% is in pasture. Area under pasture is very negligible and marginally productive due to prevailing system of open grazing since long without adding any nutrient. This area is required to be given special attention for corrective treatment to enhance the productivity. The following table gives the block wise information on land use pattern.



Map: Land use land cover map of Dhubri district

9. Physiography of the District

Physiographically, the district constitutes the vast alluvial plains of Brahmaputra River system. The monotony of the flat alluvial tract is interrupted by the presence of Archaean inliers in the form of disconnected hillocks referred to as inselbergs and these occur specially in the eastern and southern parts of the district. These hillocks are joined by the offshoots of Shillong plateau and are found on the north bank near Diplebeel, Sitdangabeel and east of Bilasipara and on the south bank of the foothill portion of Garo Hills along the district boundary. The level difference between the valley and the peaks of the inselbergs ranges from 25 to 455 m. These hillocks are covered by a thick lateritic mante and are occupied by evergreen mixed forest. Terraced alluvial deposits occupy 80% of the district with conspicuous occurrence of buried channels, back swamps, etc.

Physiographically the area can broadly be divided into three parts, i.e., the hilly tract, the foothill region and the extensive flood plain created by the river Brahmaputra and its tributaries. The hilly tracts comprising of Siwalik sediments of lesser Himalayas. The southern limit of the sub-Himalaya is marked by Himalayan Frontal Fold (HFF). The foothill region is characterized by older terrace deposit. These terrace deposits are characterized by undulating surface comprising boulders, pebbles of quartzitic and gneissic rocks with fine sand, silt and clay act as matrix. The alluvial flood plain consists of younger and older alluvial deposits. It represents various sub-features, viz., palaeochannel, swampy/marshy land, river terraces, flood plains, point bars, channel bar and river channel. The general slope of the entire district is from north to south.

10. Rainfall

The climate of the District is very damp and humid due to heavy rains and high temperature. June and July are the months with highest rainfall. Generally the period from May- end to October is considered as flood season.

Climate data for Dhubri													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C	23	26	30	31	30	30	30	30	29	29	27	23	28.2
(°F)	(73)	(79)	(86)	(88)	(86)	(86)	(86)	(86)	(84)	(84)	(81)	(73)	(82.7)
Average low °C	12	13	17	21	23	24	26	26	25	23	18	13	20.1
(°F)	(54)	(55)	(63)	(70)	(73)	(75)	(79)	(79)	(77)	(73)	(64)	(55)	(68.1)

Temperature:

The temperature in the region begins to increase from end of February and reaches highest point during June and July. January is the coldest month of the year. The air is highly humid throughout the year and winds are light in the district. But some of the cyclonic storms and depressions from Bay of Bengal occur in the monsoon and post monsoon periods causes heavy rain. Thunder storms occur during the period from March to May. Fog occurs in the winter months. The complex physical features of this district also contribute a great extent to the occurrence of flood

Dhubri District Average Temperature in summer : 28.65 deg C

Dhubri District Average Temperature in winter : 17.82 deg C

11. a) Geology

(i) Regional Geology:

The Shillong Plateau (approx. 47,614 sq. km) is a Precambrian cratonic block in Northeast India, tectonically separated from the Indian Peninsula. It is bordered by:

- Dauki Fault to the south (dextral strike-slip fault),
- Brahmaputra Lineament to the north,
- Garo-RajmahalGrabenandDhuburi/Madhupur Lineament to the west,
- Belt of Schuppen to the east.

This block is made up of high- to medium-grade Paleoproterozoic basement gneisses and schists, which are classified as the **Basement Gneissic Group (BGG)**. These are overlain by Mesoproterozoicmetasediments and metavolcanics of the **Shillong Group**, intruded by Neoproterozoic acidic intrusives such as:

- Myllem pluton
- South Khasi pluton
- Umroi granite
- Nongpoh pluton

The plateau is composed mainly of orthogneiss and paragneiss with the following geological units:

- Banded gneiss (bimodal character)
- Migmatite
- Augen gneiss
- Banded Iron Formation (BIF)
- Amphibolites
- Pyroxene granulite
- Calc granulite
- High-grade sillimanite-bearing metapelite with cordierite, corundum, spinel, sapphire.
- Intrusives like lamprophyre, diorite, granodiorite, mafic intrusions, andpegmatite veins.

Towards the southern boundary of the Shillong Plateau, Cretaceous–Tertiary sedimentary sequences overlay these basement rocks. The plateau also contains an intra-cratonic basin (approx. 2,500 sq. km) with sedimentary cover.

The Assam Basin to the north represents the cratonic margin with three main tectonic phases:

1. Late Cretaceous to Eocene block faulting and development of a southeasterly dipping shelf.
2. Oligocene uplift and erosion, during which basement faults reactivated.
3. Post-Oligocene phases, marked by sedimentation and structural developments.

The Eocene Sylhet Formation is significant for its varied depositional environments:

- The Lakadong Member (lagoonal environment) contains thin sandstone and interbedded shale and coal.
- The upper part of the Lakadong Formation represents calcareous sandstones formed in a shallow water platform.

(ii) Local Geology

The Singrimari coalfield is located in the Dhubri District of Assam, near the Meghalaya-Assam border, and lies close to the Indo-Bangladesh border. Lower Gondwana rocks are exposed southeast of the coalfield, around Hallidayganj (Singrimari) village, situated at the western tip of the Garo Hills in Meghalaya. To the northwest, the strata dip below alluvial deposits brought by the Brahmaputra River. These Lower Gondwana sequences were previously classified into the Talchir and Karharbari Formations based on lithological characteristics. The entire sequence forming the southeastern margin of the Singrimari Gondwana Basin rests unconformably over the Precambrian basement.

C.S. Fox (1934) reported plant fossils from the Singrimari sandstones of Lower Gondwana age and correlated them to the Barakar series based on the ratio of volatile matter to fixed carbon in the Jharia Coalfield. Acharya and Ghosh (1968) conducted a preliminary survey and tentatively grouped the sequence into the Karharbari Formation. Goswami and Das (1969) classified the sequence as belonging to the Lower Gondwana Formation. Barooah (1977) mapped the area and assigned it an Upper Carboniferous to Permian age. The classification of the sequence has largely been based on litho-assemblage characteristics as per the Stratigraphic Nomenclature of India (1971). In the course of systematic geological mapping, Pahuja et al. (1990) reported carbonaceous shale with coal stringers within the gritty sandstone units of the Karharbari Formation. Regional exploration confirmed the presence of the coal-bearing Karharbari Formation (Chaudhuri, S.N. et al., 1989).

In the Singrimari coalfield, earlier studies reported that the Lower Gondwana rocks belonged to the Talchir and Karharbari Formations. To reevaluate the formational architecture, a detailed study of borehole cores from borehole no. SN-5, drilled during the FS 2012-13, was conducted. About 206 meters of core, previously described as Karharbari Formation beneath 75 meters of alluvial cover (Sahkhar et al., 2012), was analyzed. The study revealed that the coarse to very coarse-grained sandstones are mostly quartzose, not feldspathic as typical Karharbari sandstones. These sandstones exhibit good mineralogical maturity but moderate to poor textural maturity, with poor sorting.

Three to four pebbly sandstone horizons, composed of angular fragments of large feldspars, shale clasts, gneissic rocks, and sub-rounded to highly angular quartz, were identified in a quartzo-feldspathic matrix. These horizons are associated with minor syn-sedimentary faults, fractures, and slickensides. The gritty quartzose sandstone, grey micaceous shale, carbonaceous shale, and coal are more akin to the Lower Barakar Formation, as recorded in other Indian Peninsular Gondwana coalfields. Litho units in the upper part of the borehole are dominated by argillaceous facies, with grey mudstone containing carbonized plant remains and leaf impressions, indicative of floodplain deposits. The sandstone-dominated heterolith, with load structures, suggests levee facies, while interlaminated coarse-grained sandstone with scoured contact represents crevasse splay deposits.

Overall, the rocks are mineralogically moderately mature and texturally poorly sorted and immature. Large sub-rounded K-feldspar grains often show signs of saussuritization, indicating alteration in warm, humid conditions. The presence of anhedral quartz of various sizes, along with other rock fragments, suggests rapid deposition with little or no transportation. Chloritization and sericitization of muscovite indicate formation in alkaline, reducing conditions within a fault-controlled sub-basin. These micro-textural features suggest fault-controlled deposition of fanglomerates.

The previously identified Karharbari Formation, characterized by fresh feldspar-rich sandstone, is absent. Instead, arenitic channel facies sandstone, more akin to the Lower Barakar litho-assemblage of the Peninsular Gondwana basins, predominates. Outcrops and borehole cores show similar fanglomerate facies. These pebbly horizons were likely formed by repeated activation or reactivation of basin-margin faults, leading to deposition as fanglomerates in a small fault-bounded trough with minimal or no transportation. Mega- and micro-floral studies (Bharadwaj, 1966, 1974; Tiwari, 1973; Manju et al., 1977; 4th International Gondwana Symposium) strongly suggest that the Lower Gondwana rocks of the Western Garo Hills belong to the Lower Barakar Formation (Lower Permian). The development of fanglomerates likely limited the formation of coal in the proximal part of the basin. Channel and interchannel facies of the Lower Barakar Formation were intersected in the borehole, indicating vertical and lateral facies variation within a meandering river system.

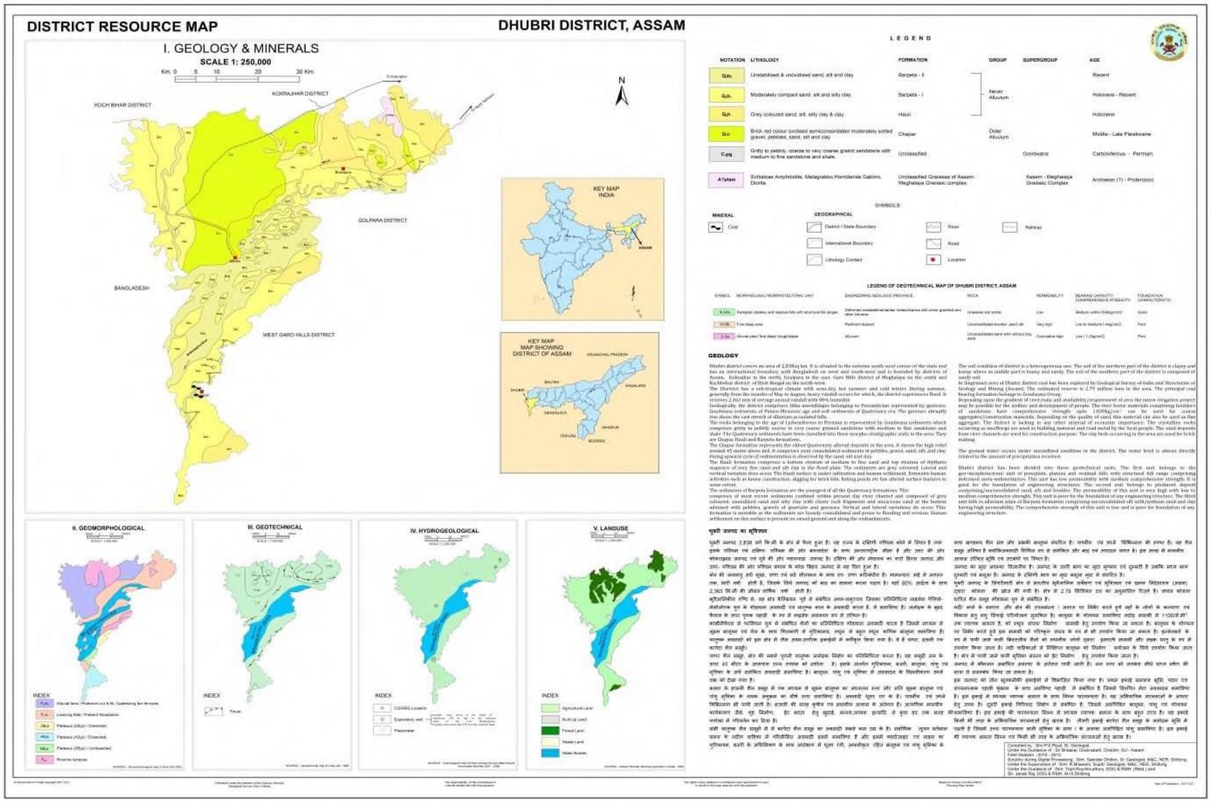


Figure: District Resource Map of Dhubri [District Resource Map, Geological Survey of India, 2013]

11. b) Mineral Wealth

i. Overview of mineral resources:

The geological formation of Dhubri District indicates the presence of minor minerals.

ii. Details of Sand and other riverbed minerals Resources:

The mineral resources of the district whose categorization and estimation have been done are furnished in this section.

12. (a) District wise detail of river or stream and other sand source

i) Drainage system with description of main rivers

S. No.	Name of the river	Area drained (sq. m)	% Area drained in the district

ii) Salient features of important rivers and streams:

S. No.	Name of the river or stream	Total length in the district (in km)	Place of origin	Altitude at origin

(b) District wise availability of sand or gravel or aggregate resources

i) Annual deposition

S. No	River/ stream	Portion of the river/ stream recommended for mineral concession	Length of area recommended for mineral concession (in km)	Average width of area recommended for mineral concession (in m)	Area recommended for mineral concession (in sq. m)	Mineable mineral potential (in metric T) (60% of total mineral potential)
Total for the district						

ii) Mineral potential

Boulder (MT)	Bajari (MT)	Sand (MT)	Total mineable mineral potential (MT)

13. Replenishment Study

Replenishment study for a river solely depends on estimation of sediment load for any river system and the estimation is a time consuming and should be done over a period. The process in general is very slow and hardly measurable on season-to-season basis except otherwise the effect of flood is induced which is again a cyclic phenomenon. Usually, replenishment or sediment deposition quantities can be estimated in the following ways as given below:

A. Replenishment study based on satellite imagery involves demarcation of sand bars potential for riverbed mining. Both pre and post monsoon images need to be analyzed to established potential sand bars. Volume estimation of sand is done by multiplying Depth and Area of the sand bar. The sand bars are interpreted with the help of satellite imagery. Ground truthing has been done for 100% of the total identified sand bars. During ground truthing, width and length of each segment were physically measured. It has also been observed that in few cases, sand bars have attained more than 3 meters height from the average top level of the river beds. Considerations of sand resources have been restricted within 3 meters from the average top surface of the river bed.

B. Direct field measurement of the existing leases involving estimation of the volume difference of sand during pre and post-monsoon period. With systematic data acquisition, a model has developed for calculation of sediment yield and annual replenishment with variable components.

C. The replenishment estimation based on a theoretical empirical formula with the estimation of bed-load transport comprising of analytical models to calculate the replenishment estimation.

Field data collation:

Secondary data were collected for pre- monsoon period and during September 2024 post-monsoon data were collected for the river banks. The relative elevation levels were captured through GPS/DGPS. Thickness of the sand bars was measured through sectional profiles.

REPLENISHMENT STUDY

Sr No	River Name	Mine Name	Area (Ha)	Pre Monsoon			Post Monsoon			
				Total Area (in Sqm)	Average depth of Sand Deposit (in meters)	Total Quantity of Sediment Load (in cum)	Total Area (in Sqm)	Average depth of Sand Deposit (in meters)	Total Quantity of Sediment Load (in cum)	Mineable mineral potential (in Cubic meter) (60% of total mineral potential)

Photoplates:

References:

1. https://dhubri.assam.gov.in

2. https://southsalmaramankachar.assam.gov.in/about-district/district-glance

3. https://www.researchgate.net/publication/270895196_GEOLOGICAL_SURVEY_OF_INDIA_NORTH_EASTERN_REGION_TECTONO SEDIMENTARY_EVOLUTION_AND_RECLASSIFICATION_OF_LOWER_GONDWAN_ROCKS_A_CASE_STUDY_FROM_SINGRIMARI_COALFIELD_DHUBRI_DISTRICT_ASSAM

DRAFT
DISTRICT SURVEY REPORT
OF
DHUBRI DISTRICT, ASSAM

(For Minor minerals other than sand or river bed mining)

CPC Environment Solution Pvt. Ltd.
(A QCI-NABET Accredited Organization)

Table of Content

PREFACE

The need for a District Survey Report (DSR) has been mandated by the Ministry of Environment, Forest, and Climate Change (MoEF&CC) through Notification No. 125 (Extraordinary, Part II Section 3, Sub-section ii), S.O. 141 (E), dated 15th January 2016. This notification introduced amendments to the EIA Notification 2006, aimed at improving legislative control. As part of these changes, district-level committees were introduced, and the preparation of DSRs became a requirement.

Subsequently, Notification No. 3611 (E), dated 25th July 2018, expanded the DSR's scope to include "Minerals Other than Sand" and provided a specific format for its preparation. The DSR's purpose is to identify areas with mineral potential where mining activities can be permitted, as well as to flag areas where mining should be restricted due to proximity to infrastructure, erosion-prone zones, or environmentally sensitive regions.

The preparation of the DSR involves both primary and secondary data collection. Primary data includes site inspections, surveys, and ground truthing, while secondary data comes from authenticated sources and satellite imagery studies. The secondary data covers information such as the district profile, local geology, mineralization, and other relevant activities, often compiled from disparate sources.

Key Aspects of District Survey Report (DSR)

Assessment of Resources: The DSR provides a comprehensive evaluation of the mineral resources available in riverbeds within the district. It includes detailed data on the quantity, quality, and distribution of sand and other minor minerals, helping to prevent over-extraction and resource depletion through accurate estimation.

Environmental Impact Analysis: The report analyzes the environmental effects of riverbed mining, addressing changes in river morphology, hydrology, and impacts on aquatic ecosystems and biodiversity. This analysis is vital for mitigating harmful environmental impacts and conserving riverine habitats.

Regulation and Compliance: The DSR serves as a regulatory tool for riverbed mining, outlining standards and guidelines to ensure compliance with national and state environmental laws. It helps curb illegal mining activities and promotes regulated, lawful mining operations.

Sustainable Mining Practices: The DSR advocates for sustainable mining practices that reduce environmental degradation. Recommendations may include controlled mining depths, designated extraction zones, and periodic studies to maintain the ecological balance of river systems.

Socio-Economic Considerations: The report addresses the socioeconomic implications of riverbed mining, such as employment generation and local government revenue. It also considers the negative impacts on communities, including displacement and loss of livelihoods.

Data-Driven Decision Making: The DSR provides a scientific foundation for decisions regarding riverbed mining. Incorporating geospatial data, remote sensing images, and field surveys enhances the accuracy and reliability of the report, supporting informed policy-making and resource management.

Stakeholder Involvement: The preparation of the DSR involves consultations with various stakeholders, such as government bodies, local communities, environmentalists, and industry representatives. This inclusive approach ensures diverse perspectives are considered, promoting balanced and equitable mining practices.

1. Introduction of District Survey Report (DSR) of Dhubri District

1.1 Introduction

The District Survey Report (DSR) of Dhubri District has been prepared following the guidelines of the Ministry of Environment, Forests and Climate Change (MoEF&CC), Government of India. This report aligns with the MoEF&CC Notification S.O.-1533(E) dated 14th September 2006 and subsequent notification S.O. 141(E) dated 15th January 2016. It aims to ensure the scientific and systematic utilization of natural resources for the benefit of present and future generations. Furthermore, MoEF&CC's notification S.O. 3611(E) dated 25th July 2018 recommends the format for preparing the DSR.

The main objective of the DSR is to identify areas of aggradation where mining can be allowed, and areas of erosion where mining should be restricted. It also involves the calculation of the annual replenishment rate to maintain ecological balance. Additionally, the DSR includes assessing the development potential of in-situ minor minerals.

Objectives of the DSR:

1. Identification and quantification of minor mineral resources for optimal utilization.
2. Regulation of river bed mining, and reduction of demand-supply gaps.
3. Use of Information Technology (IT) for surveillance of river bed mining activities.
4. Facilitation of environmental clearance for clusters of mines.
5. Restriction of illegal mining.
6. Reduction of flood occurrences in the area.
7. Preservation of aquatic habitats.
8. Protection of groundwater by limiting extraction to above base flow levels.
9. Maintenance of data records related to mineral resources, leases, and revenue generation.
10. Creation of a scientific mining plan, including ultimate pit limit estimation.
11. Development of comprehensive guidelines for mining minor minerals.

The DSR includes secondary data on the district's geology, climate, mineral resources, and other relevant factors, compiled from published and unpublished reports, as well as government websites.

1.2 Statutory Framework

The MoEF&CC has issued several notifications and guidelines over the years to regulate mining and formulate DSRs for each district. Below is a summary of the legal framework:

Year	Particulars
1994	The MoEF&CC issued the Environmental Impact Assessment (EIA) Notification for major minerals covering areas over 5 hectares.
2006	EIA Notification SO 1533 (E) made it mandatory to obtain environmental clearance (EC) for minor minerals exceeding 5 hectares.
2012	The Hon'ble Supreme Court mandated EC for minor minerals, even for areas under 5 hectares.
2016	"Sustainable Sand Mining Guidelines (SSMG)" introduced, requiring EC for all minor minerals and district-level monitoring.
2018	MoEF&CC issued notification S.O. 3611(E) with a recommended DSR format for identifying aggradation areas, replenishment rates, and protected zones.
2020	The "Enforcement and Monitoring Guidelines for Sand Mining (EMGSM)" introduced for improved regulatory enforcement and technological monitoring of sand mining activities.

Enforcement & Monitoring Guidelines, 2020

These guidelines address illegal mining, directing states to implement monitoring mechanisms like river audits, aerial surveys, and drone-based surveillance.

1.3 Utilization and Demand of the minerals

River bed minerals like sand, gravel, stone etc. plays an essential role in construction and is widely used in concrete production, glass manufacturing, road base formation, and many more. River bed mining is a prevalent practice in Dhubri District, mainly for construction. The rise in real estate and government infrastructure projects has significantly increased the demand for sand and bricks. The minor minerals of Dhubri district comes under B-category mining and it is included in sub-category B2. All the available minerals are of Y-schedule.

Uses of minerals:

1. **Construction**: Sand, gravel, silt, clay and ordinary earth are key ingredients in concrete, mortar and asphalt.
2. **Industrial**: Used in glass production and abrasives.
3. **Environmental**: The minerals can improve traffic safety by providing grip on icy roads, and it helps in soil conditioning for agriculture.
4. **Decorative**: Sand, gravel and stones are used in candles, aquariums, and for enhancing aesthetic appeal in landscaping.
5. **Flood Protection**: Proper management of sand mining helps maintain river flood discharge capacity, reducing the risk of floods.

This DSR aims to provide a well-rounded, data-driven approach for sustainable mineral resource management, ensuring compliance with environmental guidelines and promoting socio-economic benefits for the district.

1.4 Methodology of DSR Preparation

The District Survey Report (DSR) preparation follows a systematic methodology to ensure accuracy and comprehensiveness. The steps involved in the preparation of the DSR are illustrated in Figure 2.1 and are described in detail in the following sections.

a. Data Source Identification

The DSR is based on both primary and secondary data collected from reliable and authoritative sources. Identifying authentic data sources is critical for compiling accurate data. The primary data sources for the DSR are collected through field surveys and replenishment studies. Secondary data sources include publicly available information from government publications, reports, and reputable journals.

- **District Profile**: Information related to the district's demographics and basic statistics is sourced from the **District Census Report, 2011** and the **District Statistical Handbook** published by the Government of Assam.
- **Mineral Resources**: The potential mineral resources of the district are described based on reports published by the **Geological Survey of India (GSI)** or other government agencies
- **Mining Data**: Information on mining leases, lease holders, lease areas, resource allocations, and revenue generation is collected from the **Forest Department.**
- **Satellite Images**: Satellite imagery is utilized to prepare maps related to the district's physiography and land use/land cover.

b. Data Analysis and Map Preparation

After collecting data, a detailed analysis is conducted to extract relevant insights. This involves analyzing spatial data and preparing maps that depict:

- Geomorphology of the district
- Topography
- Land use patterns
- Mineral resource distribution

These maps help visualize the key characteristics of the district and identify potential mining areas.

c. *Primary Data Collection*

Primary data is essential for preparing a comprehensive DSR. Fieldwork is conducted across the district to assess mineral resources. This field study provides a detailed understanding of the mineral composition and their distribution in the area.

d. *Replenishment Study*

A key aspect of sustainable mining is ensuring that the amount of sediment removed from riverbeds is replenished naturally. Therefore, replenishment studies are conducted to assess the annual rate of replenishment of riverbed sand. This helps avoid the adverse impacts of excessive sand extraction.

- Physical surveys of the riverbed are carried out using **GPS/DGPS** to define the topography, contours, and offsets.
- The surveys provide a detailed depiction of important features in and around the river, including nearby civil structures and other key landmarks.
- This information helps define the spatial area eligible for sand mining and estimate the sand reserves.

e. *Report Preparation*

The DSR covers various aspects of the district, including:

- **General Profile**: A brief overview of the district, including demographics, land use patterns, and economic activities.
- **Geomorphology and Geology**: An assessment of the district's physical landscape, including its geological structure.
- **Mineral Resources**: A detailed account of riverbed sands and other minor minerals in the district, including their distribution and potential for extraction.
- **Mining Block Delineation**: Identification of potential mining blocks and mineral reserves within the district.

- **Production Trends**: An analysis of recent trends in the production of minor minerals and the revenue generated from the mining sector.
- **Replenishment Estimation**: The annual replenishment rate of riverbed sand, based on field surveys.
- **Environmental Impact and Mitigation**: An evaluation of the potential environmental impacts of mining activities, along with proposed mitigation measures.
- **Risk Assessment and Disaster Management**: A strategy for managing risks associated with mining and minimizing the impact of any potential disasters.
- **Reclamation Strategy**: A plan for the reclamation of already mined-out areas to restore the ecological balance.

This structured approach ensures that the DSR not only identifies mineral resources but also emphasizes sustainable mining practices and environmental preservation.

2. Overview of mining activity in the district

In the Dhubri district collection of sand, gravel, stone, clay/silt etc. from river- bed is considered as one of the main minor mineral sources of the district. These materials are primarily utilized for construction purpose.

3. General profile of the district

- **General Information**

Dhubri District - the gateway of western Assam happened to be in the past a meeting place of different racial groups which mingled together and formed a unique Cultural Heritage and Historical Background. The growth of blended culture in this region particularly in case of Language, Art and Religion is due to continuous process of assimilation of various races, caste & creed of local people, invaders & migrated people. Dhubri District is bounded both by inter-state and international border i.e. West Bengal and Bangladesh in the west, Goalpara and Bongaigoan district of Assam in the east, Kokrajhar district in the north, South Salmara- Mankachar district and state of Meghalaya in the south. Dhubri district is primarily dependent on agriculture and forest products. Main source of income is paddy with surplus production than its requirement Jute and mustard seed occupy the major share of cash crops. From forest mainly timber and bamboo add to the income though boulder and sand also available. Fish, milk, meat and egg have small contribution to the economy.

Transport:

By Road: Regular buses (both private and government) are plying from Guwahati to Dhubri. The distance is about 290 KMs. and time takes 5.30 to 6.00 hours. Also one can reach Dhubri from Siliguri, Cooch Behar (West Bengal) via road as there a good no. of buses are plying regularly. The distance from Siliguri and Cooch Behar to Dhubri is about 240 KMs and 85 KMs respectively.

By Train: There are two no. of trains from Guwahati to Dhubri. One is Passenger runs regularly and another weekly. From Siliguri also there is one train runs via Cooch Behar on regular basis.

By Air: Nearest Airport is Rupshi- Airport which is situated about 15 km away from District head quarter. Available flights are from Guwahati and Kolkata, flying thrice in a week.

Dhubri District is bestowed with attractive scenic beauties. Both the banks of the River Brahmaputra with its lush green fields, blue hills and hillock is a feast to the eyes of the onlookers. The Gurdwara Tegh Bahadur Shaibji, the Rangamati Mosque, Mahamaya

Dham , Chakrasila Wildlife Sanctuary, Matiabagh Hawa Mahal, Ramraikuti Satra, Panch Peer Dargaha, and other royal palaces attract the people for their unique structures, religious sanctity and mythological importance.

Dhubri possesses a rich Archaeological and Cultural heritage from the ancient time. This region came in contact with the foreign invaders earlier than the rest of Assam. As Dhubri is called the gateway of Assam, people of diverse ethnic identity came to this region with different aims and a major portion of whom settled in this region. As a result of which Dhubri District witnesses the growth of blended culture, particularly in case of language, art and religion due to the continuous process of assimilation of various races, castes and creed of local people , invaders and migrated people.

The main local language of this district is Goalporia, popularly known as "Desi Bhasha". Other than this, Assamese and Bengali language are simultaneously spoken in the urban area. Regarding dress, Sari is commonly used by both urban and rural women folk. In earlier days the rural women wore a piece of unsewn cloth which was called "Patani". This style of clothing is still seen in some rural areas. Male hindus generally wear Dhuti and Lungi is used by Muslims.

The most important ingredient of the cultural built- up of this district is its rich and indigenous folksongs and dances which are very popular from ancient time. The themes of these songs and dances are mainly based on religion and love affairs. Goalporia folk song is the soul of every people of this district. The material evidences of rich cultural heritage of Dhubri Dist. are marked by the existence of heritage buildings including temples, shrines and some archaeological reins and various crafts which are scattered all over the District

Dhubri district covers an area of 2012 sq. km. It is situated in the extreme south-west corner of the state and has an international boundary with Bangladesh on west and southwest and is bounded by Kokrajhar district in the north, Goalpara district on the east and north- east, Garo Hills district of Meghalaya on the south and Kochbehar and

Jalpaiguri districts of West Bengal on the north- west. The district spreads on both sides of the River Brahmaputra.

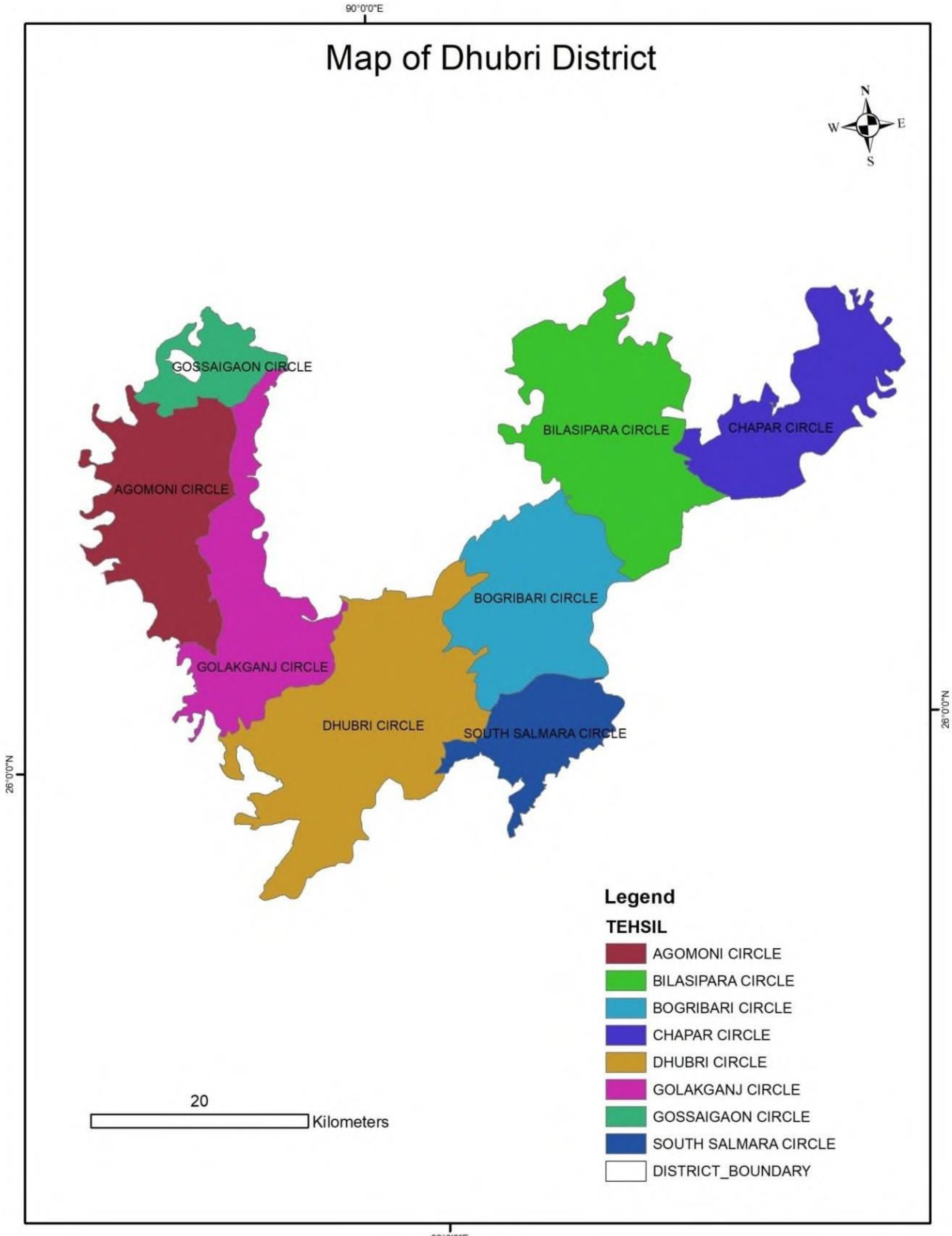
As per 2011 census, population of the district is 19,94,144 . Density of population is 896 persons/sq. km. As per the land use pattern, the forest area is 291.55 sq. km, culturable waste is 38.72 sq. km. Dhubri lies at 89.5 degree east longitude and 26.1 degree north latitude, and about 34 metres or 110 feet above sea level. Dhubri is covered by rivers on three sides, predominated by mighty Brahmaputra River.

Number of perennial streams flow through the district from north to south and join the Brahmaputra River. The major streams that drain the area are Gadadhar, Sankosh, Silai and Gouranga Rivers. There are no major irrigation systems in the district. However, minor irrigation schemes, such as lift irrigation schemes are mostly confined to the selected areas.

Administrative setup-

Head Quarter	Dhubri
Division	Lower Assam
Number of Sub-Divisions	2
Number of Revenue Circles/ Tehsils	8
Number of Community Development (C.D.) Blocks	13
Geographical Area	2012 sq. km
Literacy	58.34%
Revenue Villages	983
Panchayats	132

(to be updated)



Map: Administrative map

4. a) Geology

(i) Regional Geology:

The Shillong Plateau (approx. 47,614 sq. km) is a Precambrian cratonic block in Northeast India, tectonically separated from the Indian Peninsula. It is bordered by:

- Dauki Fault to the south (dextral strike-slip fault),
- Brahmaputra Lineament to the north,
- Garo- Rajmahal Graben and Dhuburi/Madhupur Lineament to the west,
- Belt of Schuppen to the east.

This block is made up of high- to medium-grade Paleoproterozoic basement gneisses and schists, which are classified as the **Basement Gneissic Group (BGG)**. These are overlain by Mesoproterozoic metasediments and metavolcanics of the **Shillong Group**, intruded by Neoproterozoic acidic intrusives such as:

- Myllem pluton
- South Khasi pluton
- Umroi granite
- Nongpoh pluton

The plateau is composed mainly of orthogneiss and paragneiss with the following geological units:

- Banded gneiss (bimodal character)
- Migmatite
- Augen gneiss
- Banded Iron Formation (BIF)
- Amphibolites
- Pyroxene granulite
- Calc granulite
- High- grade sillimanite-bearing metapelite with cordierite, corundum, spinel, sapphirine
- Intrusives like lamprophyre, diorite, granodiorite, mafic intrusions, and pegmatite veins.

Towards the southern boundary of the Shillong Plateau, Cretaceous– Tertiary sedimentary sequences overlay these basement rocks. The plateau also contains an intracratonic basin (approx. 2,500 sq. km) with sedimentary cover.

The Assam Basin to the north represents the cratonic margin with three main tectonic phases:

1. Late Cretaceous to Eocene block faulting and development of a southeasterly dipping shelf.
2. Oligocene uplift and erosion, during which basement faults reactivated.
3. Post- Oligocene phases, marked by sedimentation and structural developments.

The Eocene Sylhet Formation is significant for its varied depositional environments:

- The Lakadong Member (lagoonal environment) contains thin sandstone and interbedded shale and coal.
- The upper part of the Lakadong Formation represents calcareous sandstones formed in a shallow water platform.

(ii) <u>Local Geology</u>

The Singrimari coalfield is located in the Dhubri District of Assam, near the Meghalaya-Assam border, and lies close to the Indo-Bangladesh border. Lower Gondwana rocks are exposed southeast of the coalfield, around Hallidayganj (Singrimari) village, situated at the western tip of the Garo Hills in Meghalaya. To the northwest, the strata dip below alluvial deposits brought by the Brahmaputra River. These Lower Gondwana sequences were previously classified into the Talchir and Karharbari Formations based on lithological characteristics. The entire sequence forming the southeastern margin of the Singrimari Gondwana Basin rests unconformably over the Precambrian basement.

C.S. Fox (1934) reported plant fossils from the Singrimari sandstones of Lower Gondwana age and correlated them to the Barakar series based on the ratio of volatile matter to fixed carbon in the Jharia Coalfield. Acharya and Ghosh (1968) conducted a preliminary survey and tentatively grouped the sequence into the Karharbari Formation. Goswami and Das (1969) classified the sequence as belonging to the Lower Gondwana Formation. Barooah (1977) mapped the area and assigned it an Upper Carboniferous to Permian age. The classification of the sequence has largely been based on litho-assemblage characteristics as per the Stratigraphic Nomenclature of India (1971). In the course of systematic geological mapping, Pahuja et al. (1990) reported carbonaceous shale with coal stringers within the gritty sandstone units of the Karharbari Formation. Regional exploration confirmed the presence of the coal-bearing Karharbari Formation (Chaudhuri, S.N. et al., 1989).

In the Singrimari coalfield, earlier studies reported that the Lower Gondwana rocks belonged to the Talchir and Karharbari Formations. To reevaluate the formational architecture, a detailed study of borehole cores from borehole no. SN-5, drilled during the FS 2012-13, was conducted. About 206 meters of core, previously described as Karharbari Formation beneath 75 meters of alluvial cover (Sahkhar et al., 2012), was analyzed. The study revealed that the coarse to very coarse-grained sandstones are mostly quartzose, not feldspathic as typical Karharbari sandstones. These sandstones exhibit good mineralogical maturity but moderate to poor textural maturity, with poor sorting.

Three to four pebbly sandstone horizons, composed of angular fragments of large feldspars, shale clasts, gneissic rocks, and sub-rounded to highly angular quartz, were identified in a quartzo-feldspathic matrix. These horizons are associated with minor syn-sedimentary faults, fractures, and slickensides. The gritty quartzose sandstone, grey micaceous shale, carbonaceous shale, and coal are more akin to the Lower Barakar Formation, as recorded in other Indian Peninsular Gondwana coalfields. Litho units in the upper part of the borehole are dominated by argillaceous facies, with grey mudstone containing carbonized plant remains and leaf impressions, indicative of floodplain deposits. The sandstone-dominated heterolith, with load structures, suggests levee facies, while interlaminated coarse-grained sandstone with scoured contact represents crevasse splay deposits.

Overall, the rocks are mineralogically moderately mature and texturally poorly sorted and immature. Large sub-rounded K-feldspar grains often show signs of saussuritization, indicating alteration in warm, humid conditions. The presence of anhedral quartz of various sizes, along with other rock fragments, suggests rapid deposition with little or no transportation.

Chloritization and sericitization of muscovite indicate formation in alkaline, reducing conditions within a fault-controlled sub-basin. These micro-textural features suggest fault-controlled deposition of fanglomerates.

The previously identified Karharbari Formation, characterized by fresh feldspar-rich sandstone, is absent. Instead, arenitic channel facies sandstone, more akin to the Lower Barakar litho-assemblage of the Peninsular Gondwana basins, predominates. Outcrops and borehole cores show similar fanglomerate facies. These pebbly horizons were likely formed by repeated activation or reactivation of basin-margin faults, leading to deposition as fanglomerates in a small fault-bounded trough with minimal or no transportation. Mega- and micro-floral studies (Bharadwaj, 1966, 1974; Tiwari, 1973; Manju et al., 1977; 4th International Gondwana Symposium) strongly suggest that the Lower Gondwana rocks of the Western Garo Hills belong to the Lower Barakar Formation (Lower Permian). The development of fanglomerates likely limited the formation of coal in the proximal part of the basin. Channel and interchannel facies of the Lower Barakar Formation were intersected in the borehole, indicating vertical and lateral facies variation within a meandering river system.

5. Drainage of irrigation pattern

The district has a very busy river port on the bank of the river Brahmaputra, which is used for international trade with the neighbouring Bangladesh. Dhubri is called the "Land of rivers" as it is covered three sides by Brahmaputra and Gadadhar rivers.

Mighty river Brahmaputra is flowing through this district from east to west with its tributaries like Champabati, Gourang, Gadadhar, Gangadhar, Tipkai, Sankosh, Silai, Jinjiram, etc.

Major rivers And Tributaries:

Name of the River/Tributaries	Origin	Length in Dhubri	Danger Level	Maximum Water Level
Bramhaputra	Tibbet	88 Km	28.62 m At Dhubri	29.91 m On 30-06-2013
Gangadhar	Bhutan	33 KM	29.94 m at Golakganj	30.80 m On 20-07-2013

Name of the River/ Tributaries	Origin	Length in Dhubri	Danger Level
Gadadhar	Bhutan	39 K m	—
Tipkai	Bhutan	28 Km	32.26 m At Khoraghat
Gaurang	Bhutan	20 Km.	33.60 m At Bilasipara
Champaboti	Bhutan	24 Km.	33.95 m At Bahalpur
Kaloo	Garo Hills	22 Km.	—
Jinjiram	Garo Hills	49 Km.	28.70 m At Molakhowa

Agriculture is the backbone of Indian Economy. Around 60-70% of Indian population (directly or indirectly) depends upon agriculture for its livelihood. Irrigation helps to grow agricultural crops, maintain & re- vegetate disturbed soils in dry areas & during periods of less and average rainfall. Water is usually supplied as per requirement of different growing crops in the field. Irrigation works have been classified as major, medium and minor depending on their cultivable command area. Major and Medium Irrigation works are meant for tapping surface water (e.g. Rivers) and minor Irrigation mainly involves ground water development e.g. Tube- wells.

Irrigation brings about an increase in the gross cropped area which in turn increases the net yield and also facilitates multiple cropping.

Irrigation potential in Dhubri District is developed both from surface and ground water sources. Currently the net Irrigated area under this Division is 2028 Hect. (approx.) After Re-organisation of Irrigation Department Vide Govt. No. IGN (E) 192/2021/58 dated 03/08/2021 The Goalpara Investigation Division (Irrigation) Goalpara is Re- named as Dhubri- Golakgang Division (Irrigation) Dhubri. The Office is presently situated at Gauripur Near Kalibari.

Under Dhubri- Golakganj Division (Irrigation) there are 12 no of schemes and 50 Numbers of PMKSY-HKKP Schemes in operation. At present this Division is supplying water to 470 beneficiaries annually during two seasons (i.e Rabi and Pre- Kharif & Kharif season).

Under SOPD, one Solar powered Medium Deep Tube Well Irrigation scheme has been sanctioned under this division at Golakganj under Golakganj Sub- Division (Irrigation) Agomani. The work of this scheme has been successfully completed and currently supplying water to 10 Hectares cultivated fields.

This Division comprises of Two Sub- Divisions:

1. Golakganj Sub- Division, (Irrigation) Agomani.
2. Dhubri Sub- Division, (Irrigation) Dhubri.

Under the above Sub- Divisions there are various schemes such as **Lift Irrigation System, Deep Tube- Well**, **Solar (MDTW) and PMKSY.** The primary responsibility/activity of this Division is to supply cultivable water to the farmers so that they get benefited and can develop their livelihood.

The following public utility services are provided to the users as entrusted by the department from time to time:

1. Water supply to cultivable Land.
2. Farmers training and demonstration.
3. Irrigation Service Charge.
4. Formulation of Scheme/ Project.
5. Implementation of the Scheme/Project.

Water is usually supplied as per requirement of different growing crops in the field. The water requirement of crops is not uniform over a large area and varies widely in accordance with variation in climate, particularly in rainfall and soil.

Water Supply to the cultivable land: The main aim of Irrigation Department is to supply water to the farmers. According to Dhubri- Golakganj Division (Irrigation) Dhubri, total Net Irrigated area is 2028 Hect. (approx.) The Irrigation water is supplied to the cultivation field through the Main Canals, Branch Canals, Sub- Canals, and Distributaries. From the Main Canal water is generally not directly supplied to the command area.

Maintenance for Irrigation of schemes to WUA farmers has been taken up.

Irrigation Service Charge: Irrigation Service Charges (Water Tax) is collected from the beneficiaries (farmers) for providing Irrigation water. Under this Division for Rabi and Pre- Kharif crops, a sum of Rs.262.50 & Rs.751.00 per hectare is collected and for kharif crops, a sum of Rs.281.24/Hectare is collected from the beneficiaries accordingly.

Popular Systems of Irrigation under Dhubri- Golakganj Division:

Lift Irrigation System: In this system water is lifted by pumps either from river/reservoir and then diverted to canal network. Such schemes may be electrically operated or diesel driven or powered by solar energy.

Ground Water Irrigation System: Tube well irrigation is the most economical method of utilizing ground water resource. Like above, these types of schemes can also be operated either by electrical, diesel or solar power.

Shallow tube- well: It consists of a bore hole built into ground with the purpose of tapping ground water from porous zones. The tube wells are generally operated for 6 to 8 hours during irrigation season and give yield of 100-300 cubic meters per day.

Deep tube wells: It usually extends to the depth of more than 70 meter and is designed to give a discharge of 100 to 200 cubic meters per hour. Their CCA may go up to 50 hectares.

Solar MDTWS

Irrigation Department introduces a new age technology Solar Pumping System to Dhubri District under this Division. Solar Pumping System to overcome the problem of interruptions in power supply to LIS/DTWS schemes. This Project located at Chagalia Pt-II Under Golakganj Sub-Division Golokganj LAC.

PMKSY_HKKP

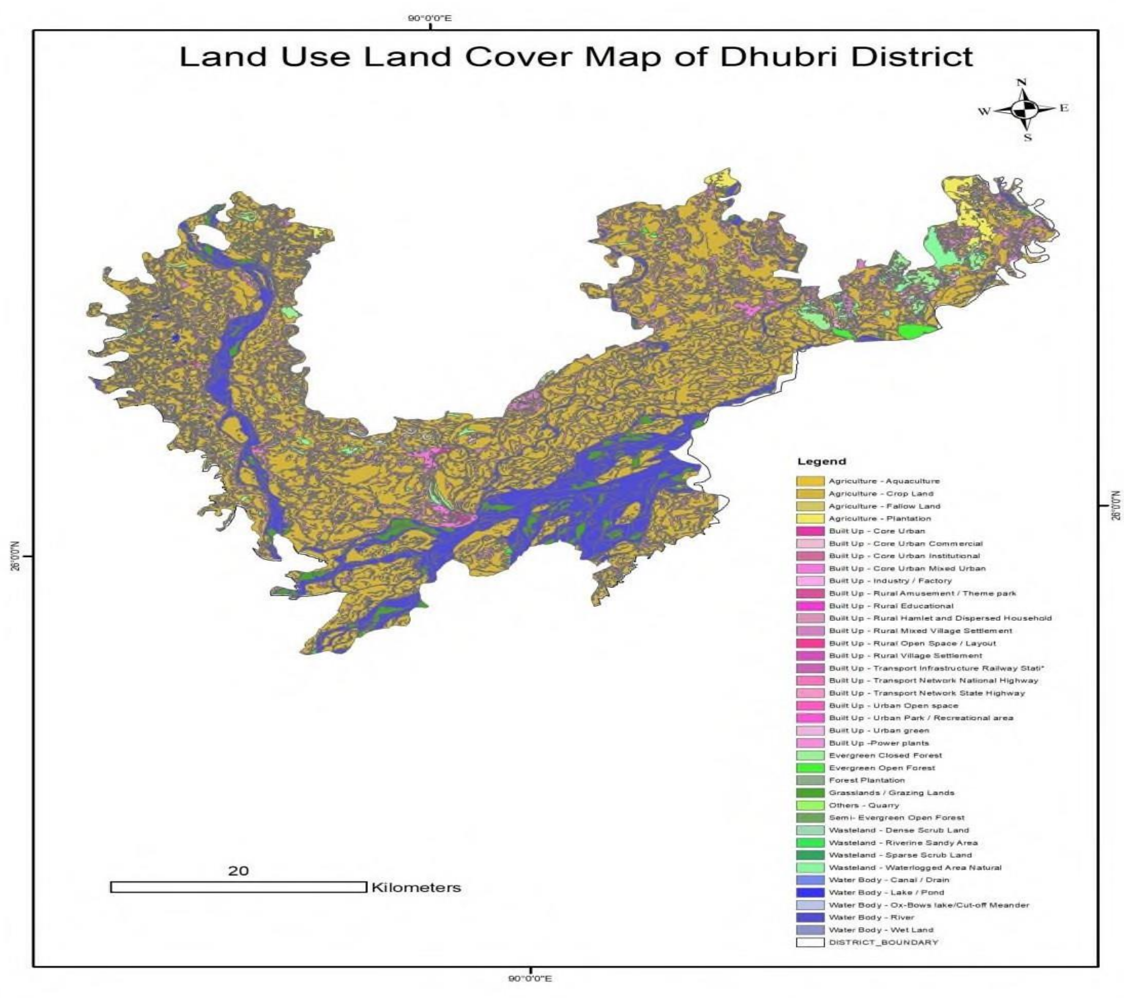
Irrigation Department introduces this successful scheme which is very helpful for the farmers. This project located at 23-Dhubri LAC under Dhubri Sub- Division (Irrigation) Dhubri.

The Advantages of Solar Pumping System are:

- Naturally available abundant source of energy
- Requires no maintenance
- No power or fuel cost to operate pump
- Freedom from power cuts and load shedding
- Environment friendly, pollution and noise free
- No manpower required to operate the system
- Free from dependence on conventional energy sources

6. Land utilization pattern in the district: Forest, Agriculture, Horticulture, Mining :

The total geographical area of the district is 5,32,298 Ha out of which 31.03% is cultivable, 29.04% is forest, 31.02% is under non- agricultural use, 2.23% is pasture, 4.12% is barren/waste land, 1.42% under miscellaneous plantation and 0.24% is in pasture. Area under pasture is very negligible and marginally productive due to prevailing system of open grazing since long without adding any nutrient. This area is required to be given special attention for corrective treatment to enhance the productivity. The following table gives the block wise information on land use pattern.



Map: Land use land cover map of Dhubri district

7. Surface and Groundwater scenario of the district:

Dhubri is called the "Land of rivers" as it is covered three sides by Brhmaputra and Gadadhar rivers. Mighty river Brahmaputra is flowing through this district from east to west with its tributaries like Champabati, Gourang, Gadadhar, Gangadhar, Tipkai, Sankosh, Silai, Jinjiram, etc.

Ground water conditions in the district can be described under two distinct hydrogeological units, i.e. conditions prevailing in the consolidated formations and the conditions prevailing in the unconsolidated formations.

Pre- Cambrian gneiss- schist complex projecting abruptly above the vast stretch of alluvium as isolated hills forms the consolidated formation in the district. These rock formations had been subjected to faulting and fracturing at several places through which water percolates to facilitate weathering. Weathered zone forms as such are restricted to about 10 m thickness and is often lateritic in character. Occurrence of ground water is limited in these formations and is confined to topographic lows and weathered residuum. The movement of ground water is controlled by the presence of fractures and fissures. Extraction of ground water in these zones is possible through large diameter dug wells and bore wells in hydrogeologically suitable areas. Ground water occurs under water table conditions in the weathered zone.

The unconsolidated formation is represented by the alluvial deposits of the recent age. This formation is found spreading on either side of the River Brahmaputra and comprises medium to coarse grained sand, gravel, pebbles, cobbles, etc., with intercalation of silt and clay. It is characterised by the presence of hard compact lateritic clay (Chapar formation) followed by coarse sand with pebbles and cobbles. Ground water occurs under water table and semi-confined conditions.

The water table contour follows the topography of the area and lies more or less parallel to the Brahmaputra River. The movement of ground water is from north to south in the north bank and south to north in the south bank of Brahmaputra. An artesian belt also exists around Mankachar in the southern part of the district.

8. Rainfall of the district and climatic condition

Rainfall

The climate of the District is very damp and humid due to heavy rains and high temperature. June and July are the months with highest rainfall. Generally the period from May- end to October is considered as flood season.

Climate data for Dhubri													
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Average high °C	23	26	30	31	30	30	30	30	29	29	27	23	28.2
(°F)	(73)	(79)	(86)	(88)	(86)	(86)	(86)	(86)	(84)	(84)	(81)	(73)	(82.7)
Average low °C	12	13	17	21	23	24	26	26	25	23	18	13	20.1
(°F)	(54)	(55)	(63)	(70)	(73)	(75)	(79)	(79)	(77)	(73)	(64)	(55)	(68.1)

Temperature:

The temperature in the region begins to increase from end of February and reaches highest point during June and July. January is the coldest month of the year. The air is highly humid throughout the year and winds are light in the district. But some of the cyclonic storms and depressions from Bay of Bengal occur in the monsoon and post monsoon periods causes heavy rain. Thunder storms occur during the period from March to May. Fog occurs in the winter months. The complex physical features of this district also contribute a great extent to the occurrence of flood

Dhubri District Average Temperature in summer : 28.65 deg C
Dhubri District Average Temperature in winter : 17.82 deg C

Climatic condition

The climate of the district is subtropical and humid characterized by high rainfall. The annual rainfall is 2,173 mm and relative humidity 65 to 85 percent. The district receives SW monsoon rainfall from the month of June and continues up to September/October. The highest rainfall areas of the district are located near the foothills of Arunachal Himalayas, i.e., in the northern part of the district. The maximum temperature goes up to $37.5^{o}C$ during June/ July and minimum temperature falls to $7.6^{\circ}C$ in December and January.

9. Details of the mining leases in the district as per the following:

Sl No	Name Of the Mineral	Name of the Lessee	Address & Contact No. Of Lessee	Mining lease Grant Order No. & date	Area of Mining lease (ha)	Period mining lease (Initial)		Period of Mining lease 1st/2nd.. renewal)		Date of commencement of Mining Operation	Status Working/Non-Working/temp. Working for dispatch etc.)	Captive/ Non-Captive	Obtained Environmental Clearance (Yes/No), If Yes Letter no with date of grant of EC	Location of the Mining lease (Latitude & Longitude)	Method of Mining (Opencast/underground)
						From	To	From	To						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1															
2															
3															
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13															
14															
15															

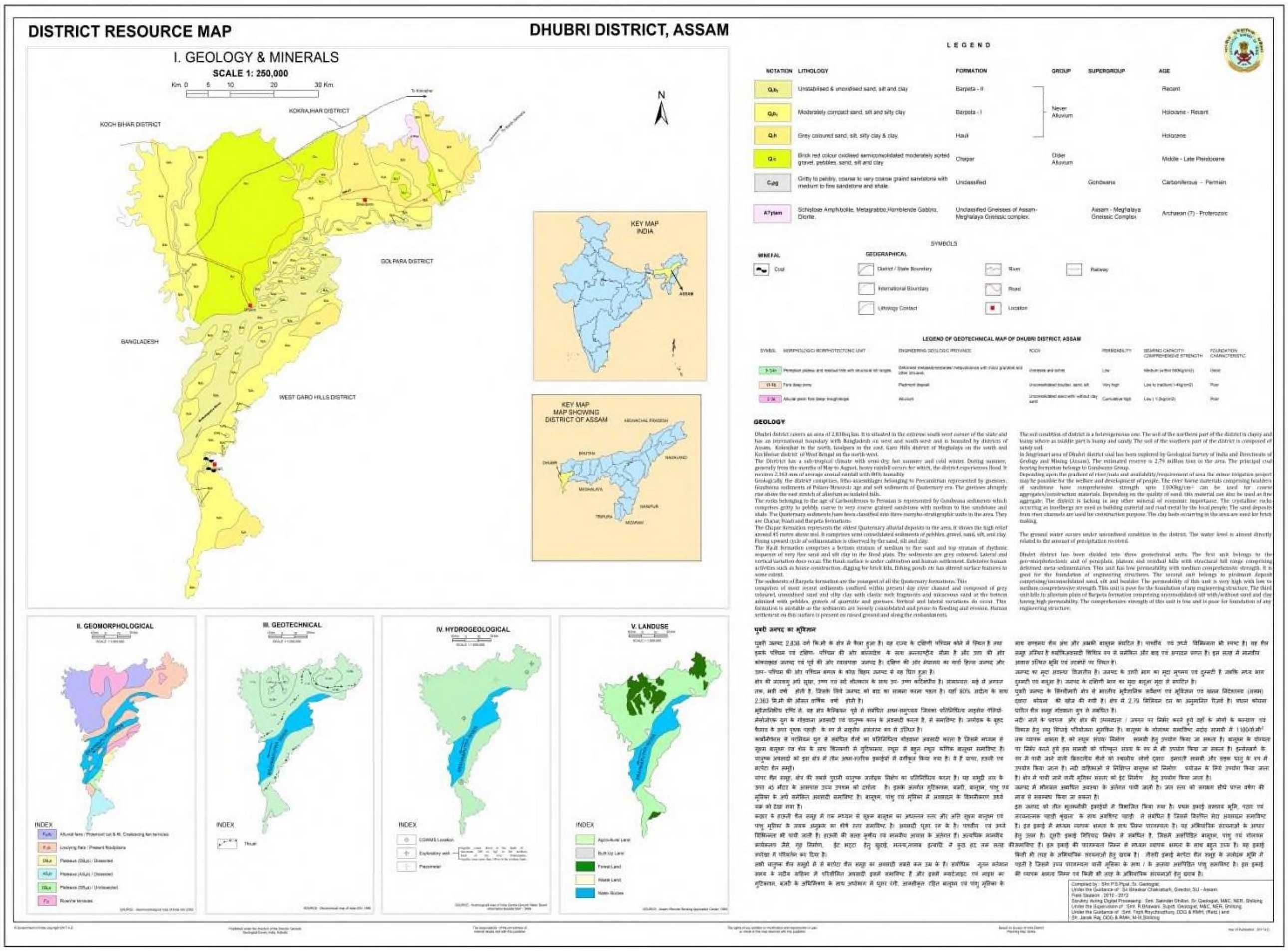
10. Details of Royalty received in last 3 years

Financial Year	Total revenue
2023-24	22,50,000.00
2022-23	75,00,000.00
2021-22	86,25,000.00

11. Details of Production of minor mineral in last 3 years

Sl. No	Financial Year	Production(cum)
1	2023-24	1,969
2	2022-23	9,293
3	2021-22	13,746

12. Mineral Map of the District



13. List of Letter of Intent (LOI) Holders in the District along with its validity

Sl. No.	Name of the Mineral	Name of the Lessee	Address & Contact No. of Letter of Intent Holder	Letter of Intent Grant Order No. & date	Area of Mining lease to be allotted	Validity of LoI	Use (Captive/ NonCaptive)	Location of the Mining lease (Latitude & Longitude)
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

14. Total Mineral Reserve available in the District

15. Quality /Grade of Mineral available in the District

16. Use of Mineral

17. Demand and Supply of the Mineral in the last three years

18. Maps showing Mining leases of the district

19. Details of the area of where there is a cluster of mining leases

20. Details of Eco-Sensitive Area, if any, in the District

21. Impact on the Environment due to mining activity

The demand for sand and gravel continues to increase for the construction of roads and buildings. The impact of mining on environment can occur at local, regional, and global scales through direct and indirect mining practices. Impact on Environment due to mining activities varies based on amount of production rate. Mining can cause erosion, sinkholes, loss of biodiversity, or the contamination of soil, groundwater, and surface water by chemicals emitted from mining processes. These processes also affect the atmosphere through carbon emissions which contributes to climate change. The different activities involved before & during mining can impact the environment. The high growth in population speeds- up economic activities. Meanwhile, it also deteriorates environment as for the high level of economic development, plenty of natural resources are exploited. Similarly, mining activities have considerable impacts on environment.

Excessive instream sand- gravel mining causes the degradation of rivers. Instream mining lowers the stream bottom, which may lead to bank erosion. Depletion of sand in the streambed and along coastal areas causes the deepening of rivers and estuaries, and the enlargement of river mouths and coastal inlets. It may also lead to saline- water intrusion from the nearby sea. The effect of mining is compounded by the effect of sea level rise. Any volume of sand exported from streambeds and coastal areas is a loss to the system.

Excessive instream sand mining is a threat to bridges, river banks and nearby structures. Sand mining also affects the adjoining groundwater system and the uses that local people make of the river. River bed mining impacts include bed degradation, bed coarsening, lowered water tables near the streambed, and channel instability. These physical impacts cause degradation of riparian and aquatic biota and may lead to the undermining of bridges and other structures. Continued extraction may also cause the entire streambed to degrade to the depth of excavation. River bed mining can have other costly effects beyond the immediate mine sites. Many hectares of fertile streamside land are lost annually, as well as valuable timber resources and wildlife habitats in the riparian areas. Degraded stream habitats result in loss of fisheries productivity, biodiversity, and recreational potential. Severely degraded channels may lower land and aesthetic values.

Native species in streams are uniquely adapted to the habitat conditions that existed before humans began large-scale alterations. These have caused major habitat disruptions that favored some species over others and caused overall declines in biological diversity and productivity. In most streams and rivers, habitat quality is strongly linked to the stability of channel bed and banks. Unstable stream channels are inhospitable to most aquatic species. Sand mining generates extra vehicle traffic, which negatively impairs the environment. Where access roads cross riparian areas, the local environment may be impacted.

Degradation of land is one of the significant impacts arising out of mining and quarrying activity which is mainly in the form of alternation of land structure due to excavation, stacking of top soil and loss of the land due to dumping of mine waste and overburden soil. Stone and sand quarrying causes damage to property, depletion of ground water, loss of fertile top soil, degradation of forest land, adverse effect on the biodiversity and public health

Mining and quarrying, either open cast or underground, destroys landscape and forest ecosystems. Air pollution, due to dust from the mines, is a common environmental problem in mines and quarries especially open cast operations.

Immediate impact of stone quarrying is land degradation. It causes landscape alternation due to excavation, water induced soil erosion due to surface runoff water in quarrying site, dumping of waste rock causes loss of land or generation of waste land, over burned soil etc. Soil erosion and soil contamination are common in quarrying sites. In current study area, in many places waste land were generated due to stone quarrying activities. Waste stones are dumped in many places causes blockage of drainage channels. In many sites of the quarry area waste water were stored. This decrease aesthetic value of the site. In many areas, plants are unable to grow and some land completely lost their ability for cultivation because of soil contamination by stone quarrying activities.

Noise pollution occurs due to blasting operation in quarry, noise emitted by stone crusher and transport of stone material by truck, dumper, tractor etc. Loss of peace, fear due to loud noise and vibration, increased heart beat, headache, development of cracks on houses etc. are various effects of quarrying related noise pollution. Stone quarrying activities also goes during night. Stone quarrying occupation is not a suitable alternative livelihood like agriculture, service, business etc.

because of its uncertainty nature. Massive transport of truck and dumper are not safe and there is always chance of accident. Due to short time, seasonal and uncertainty nature, it is not possible to formulate any future planning for employment generation in this field.

Noise pollution is associated with many types of equipment used in mining operations, but blasting is considered as the major source. It also affects stability of infrastructures, building and houses of people living near to these working sites. In this regard, noise pollution may include noise from vehicle engines, power generation, and other sources. Mining operations impact the environment in several ways, and water pollution is a major concern in such operations. For instance quarry dust can change the chemistry of water resources by dissolving in them, it can also settle in water bodies and cause pollution. Furthermore, these operations disrupt the existing movement of surface water and groundwater; they interrupt natural water recharge and can lead to reduced quantity and quality of drinking water for residents and wildlife near or down streams from a quarry site.

As far as impact on surface water is concerned, during mining and transportation, the chances of contamination of surface water resources (pond, well etc.) with dust or by other means.

The labourers working in stone mining come from nearby districts and colonies in the surrounding areas with inadequate facilities for waste disposal. This, in due course, leads to disposal of various things into surface water bodies which in due course of time results into surface water contamination through misuse/mismanagement and decomposition of the trash.

22. Remedial Measures to mitigate the impact of mining on the Environment

Recommendation 1	**Recognise sand as a strategic resource** that delivers critical ecosystem services and underpins the construction of vital infrastructure in expanding towns and cities globally.
Recommendation 2	**Include place-based perspectives for just sand transitions,** ensuring the voices of all impacted people are part of decision-making, agenda-setting and action.
Recommendation 3	**Enable a paradigm shift to a regenerative and circular future.**
Recommendation 4	**Adopt strategic and integrated policy and legal frameworks** horizontally, vertically and intersectionally, in tune with local, national, and regional realities.
Recommendation 5	**Establish ownership and access to sand resources** through mineral rights and consenting.
Recommendation 6	**Map, monitor and report sand resources** for transparent, science-based and data-driven decision-making.
Recommendation 7	**Establish best practices and national standards, and a coherent international framework**
Recommendation 8	**Promote resource efficiency & circularity** by reducing the use of sand, substituting with viable alternatives and recycling products made of sand when possible.
Recommendation 9	**Source responsibly** by actively and consciously procuring sand in an ethical, sustainable, and socially conscious way.
Recommendation 10	**Restore ecosystems and compensate for remaining losses** by advancing knowledge, mainstreaming the mitigation hierarchy, and promoting nature-based solutions.

23. Reclamation of Mined out area

Reclamation entails the re- establishing of viable soils and vegetation at a mine site. Although regulatory agencies may require complex reclamation designs, simple approaches can be very effective. One simple approach depends on adding lime or other materials that will neutralize acidity plus a cover of top soil or suitable growth medium to promote vegetation growth. Modifying slopes and other surfaces and planting vegetation as part of the process stabilizes the soil material and prevents erosion and surface water infiltration. Even this simple approach is likely to cost a few thousand dollars per acre to implement. Where soils have a sustained high acidity, the costs of using this approach can increase, sometimes to tens of thousands of dollars per acre. The challenge to find cost-effective reclamation approaches continues.

Promising reclamation options in the future may include using sludge, "biosolids," from municipal waste water treatment processes as an organic soil amendment, and growing plant species that are more tolerant of acidic conditions.

Soil Treatment

High levels of metals in soils, not just acidity, can be harmful to plants, animals, and, in some cases, people. A common to specially designed repositories. This approach can be very expensive and controversial, but it is sometimes required. With this approach, the volume and toxicity of the soil is not reduced, the soil is just relocated. Effective soil treatment approaches in the future depend upon better understanding of the risks associated with metals in mine wastes. These "natural" metals in minerals may not be as readily available in the biosphere, and therefore, they may not be as toxic as the metals in processed forms, such as lead in gasoline.

Future approaches may include:

- Using chemical methods to stabilize metals in soils, making them less mobile and biologically available.
- Using bacteriacides that stop the bacterial growth that promotes the oxidation of pyrite and the accompanying formation of sulfuric acid.
- Using bioliners, such as low permeability and compacted manure, as barriers at the base of waste piles.

- Permanently flooding waste materials containing pyrite to cut off the source of oxygen, stop the development of acidic conditions, and prevent mobilization of metals.

Water Treatment

The most common treatment for acidic and metal-bearing waters is the addition of a neutralizing material, such as lime, to reduce the acidity. This “active” treatment process, which causes the dissolved metals to precipitate from the water, usually requires the construction of a treatment facility. The ongoing maintenance that such a plant requires makes this treatment technique very expensive.

Aside from the expense, some active treatment plants generate large amounts of sludge. Disposal of the sludge is a major problem. Because of the cost and the physical challenges of dealing with sludge, alternatives to active treatment facilities are needed. Some possible alternatives include:

- Using “passive” wetland systems to treat metal-bearing water. This approach has been successfully used where the volumes and acidity of the water are not too great. Passive wetland systems have the added advantage of creating desirable wildlife habitat.
- Using in-situ treatment zones where reactive materials or electric currents are placed in the subsurface so that water passing through them would be treated.
- Combining treatment with the recovery of useful materials from contaminated water.

24. Risk Assessment & Disaster Management Plan

25. Details of the Occupational Health issues in the District

The negative impacts of dust pollution due to quarrying activities on health revealed by respondent information were respiratory problem, eye infection, cough, sneezing, allergy , chest pain , headache , accumulation of dust on home , and slow growth of fodder for cattle and goats. Negative effects of dust pollution on crop productivity. Two major effects were reduction of agricultural yield due to deposition of dust on crop and secondly availability of ground water and water contamination. Another problem we noticed through interview was many agricultural labour were faced difficulty to work in dusty environment therefore resulting in reduction of agricultural yield indirectly. Many fruit trees also affected by dust pollution resulting in stunted growth and decreased fruit yields. There are also reductions in appearance of insect pollination like butterflies, bees, moths etc. due to dust pollution.

26. Plantation and Green Belt development in respect of leases already granted in the District

Protect natural or semi- natural environments:

- Improve air quality with inurban areas
- Protect the unique character of rural communities that might otherwise be absorbed by expanding suburbs.
- Plants that grow fast should be preferred
- Preference for high canopy covers plants with local varieties
- Perennial and evergreen plants should be preferred
- Plants having a high Air pollution Tolerance Index (APTI) should be preferred.

Greenbelt Development & **Plantation Programme**

Plantation should be developed at 2**M**x2**M** spacing, the rate of survival should be aimed at 80% by regular watering & fencing to keep plants safe from animal grazing. Local species will be planted in consultation with local horticulturist. Diseased plants should be replaced by planting new saplings.

Recommendation for green Belt Development

It is strongly recommended to create greenbelt around the project or incase lease failed the authority should take proper action to stop mining operation or Revoke mining permission with necessary action.

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