DRAFT
DISTRICT SURVEY REPORT
OF
UDALGURI 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 Udalguri District

1.1 Introduction

The District Survey Report (DSR) of Udalguri 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 Udalguri 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 Udalguri 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 Udalguri 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.

Udalguri's mining activities, especially the unregulated extraction of sand and gravel, continue to pose a challenge for sustainable development and environmental conservation in the region

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	Bhairabkunda BG Mahal No.1		Dhansiri River 4.64 Ha		Proposal Sent to BTC
2	Bhairabkunda BG Mahal No.3		Dhansiri River 4.85 Ha		Proposal Sent to BTC
3	Tarajuli & Rangapani (North Side) SS Mahal		Dhansiri River 4.52 Ha		Agreement pending
4	Tarajuli SG Mahal		Dhansiri River 4.80 Ha		Running
5	Rangapani SS Mahal		Dhansiri River 4.00 Ha		
6	Dhansiri SG Mahal No.1		Dhansiri River 4.48 Ha		Running
7	Dhansiri SG Mahal		Dhansiri River 4.81 Ha		Court case
8	Rowta Bagan SG Mahal		Dhansiri River 4.50 Ha		Running
9	Lower Dhansiri SS Mahal-A		Dhansiri River 4.00 Ha		Proposal Sent
10	Dhansiri (Balisiya Jargaon) SS Mahal		Dhansiri River 4.85 Ha		Running
11	Lower Dhansiri SS Mahal-B		Dhansiri River 4.88 Ha		EC Pending

12	Monai SS Mahal		Monai River 3.65 Ha		Proposal Sent to BTC
13	Dimasang SG Mahal		Dimasang River 4.81 Ha		Proposal Sent to BTC
14	Rowta SG Mahal		Rowta River 4.45 Ha		Court Case
15	Merebil SS Mahal		Rowta River 4.16 Ha		EC Pending
16	Pagla SG Mahal No.2		Pagla River		Proposal Sent to BTC
17	Pasnoi SS Mahal		Pasnoi River 3.88 Ha		RO Survey report pending
18	Pasnoi River Village Samugaon		Pasnoi River 4.85 Ha		Running
19	Pasnoi River Simliguri		Pasnoi River		MP Pending
20	Baligaon SS Mahal		Pasnoi River 4.00 Ha		EC Pending
21	Golondi Silt Mahal No. 1		Golondi River 4.00 Ha		Running
22	Golondi Silt Mahal No. 2		Golondi River 4.70 Ha		EC Pending

23	Khowrang Boulder Mahal		Khowrang River 4.80 Ha		Proposal Sent to RO
24	Daisam Boulder Mahal		Khowrang River 4.90 Ha		RO Survey report pending
25	Bhorla GSB Mahal No.1 (Santipur)		Bhorla River 4.90 Ha		Proposal Sent to BTC
26	Bhorla GSB Mahal No.2		Bhorla River 4.60 Ha		Proposal Sent to BTC
27	Bhorla GSB Mahal No.3		Bhorla River 3.40 Ha		Proposal Sent to BTC
28	Beltola SS Mahal		Kulsi River 3.80 Ha		EC Pending
29	Nunoi SS Mahal No. 3 (Kulsi)		Kulsi River 3.70 Ha		EC Pending
30	Kulsi Sand Gravel Silt Mahal No.2		Kulsi River 3.29 Ha		Proposal Sent to BTC
31	Bhutiasang SGB Mahal No.1		Nunoi River 4.90 Ha		EC Pending
32	Bhutiasang SGB Mahal No.2		Nunoi River 3.50 Ha		Proposal Sent to BTC
33	Nunoi SS Mahal No.1 (Gitibari)		Nunoi River 4.90 Ha		Running

34	Gitibari SG Mahal No.2		Nunoi River 4.40 Ha		Running
35	Nasanchali Sand Gravel Silt Mahal		Nunoi River 4.75 Ha		Proposal Sent to BTC
36	Bhootbangla Sand Gravel Silt Mahal		Nunoi River 3.50 Ha		Proposal Sent to BTC
37	Sahabasti Sand & Silt Mahal		Nunoi River 3.50 Ha		Proposal Sent to BTC
38	Kalanadi SS No.1		Kalanadi River 4.50 Ha		EC Pending
39	Kalanadi SS No.2		Kalanadi River 3.30 Ha		Mahal surrendered
40	Samarang Newly Gravel Earth Mahal		Samrang River 4.00 Ha		

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

Revenue generated for last 3 years in Udalguri District is furnished in the table:

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

Financial Year	Royalty			Total revenue
	Sand	Gravel	Earth/Silt/Clay	
2022-23				
2021-22				
2020-21				

(NOT PROVIDED)

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

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

(NOT PROVIDED)

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

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 isnot 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

Udalguri district also known as Odalguri, is a district in the Bodoland Territorial Region of the state of Assam in Northeastern India. Udalguri town is the headquarters of the district.

The name Udalguri, denotes a place surrounding the Udal tree (Udal, meaning a tree and Guri meaning surrounding area). Some authors are of the opinion that the name of the place became Udalguri as there was a hermitage of a sage named Uddalak Muni. Yet, another source mentions that the word has origins in the Boro language. From the Bodo words *ordla* and *gundri*, the name became *Ordlagundri* > *Ordlagundi* > *Odalguri* > *Ugalguri*. Bodo people still pronounce the name as Odalguri. In Bodo language *ordla* means wide and spacious and *gundri* means powdered object.

This district was formed on June 14, 2004 as one of the four districts under the Bodoland Territorial Council. This district was carved out by bifurcating Darrang district. The territory of the present district was earlier Udalguri sub-division of the undivided district. There are Hindu, Christians and Muslim population living together in the district. This was a very peaceful place till mid 80s but various communal clashes took place from time to time. Late Jojaram Sharma was one of the prominent India freedom fighters from Assam lived here.

According to the 2011 census Udalguri district's population is 8,31,668, an increase of 9.8%over 2001. The literacy rate is 66.6% and the gender ratio is 966. There are 449inhabitants per square kilometre (1,160/sq mi).Scheduled Castes and Scheduled Tribes make up 4.55% and 32.15% of the population respectively.

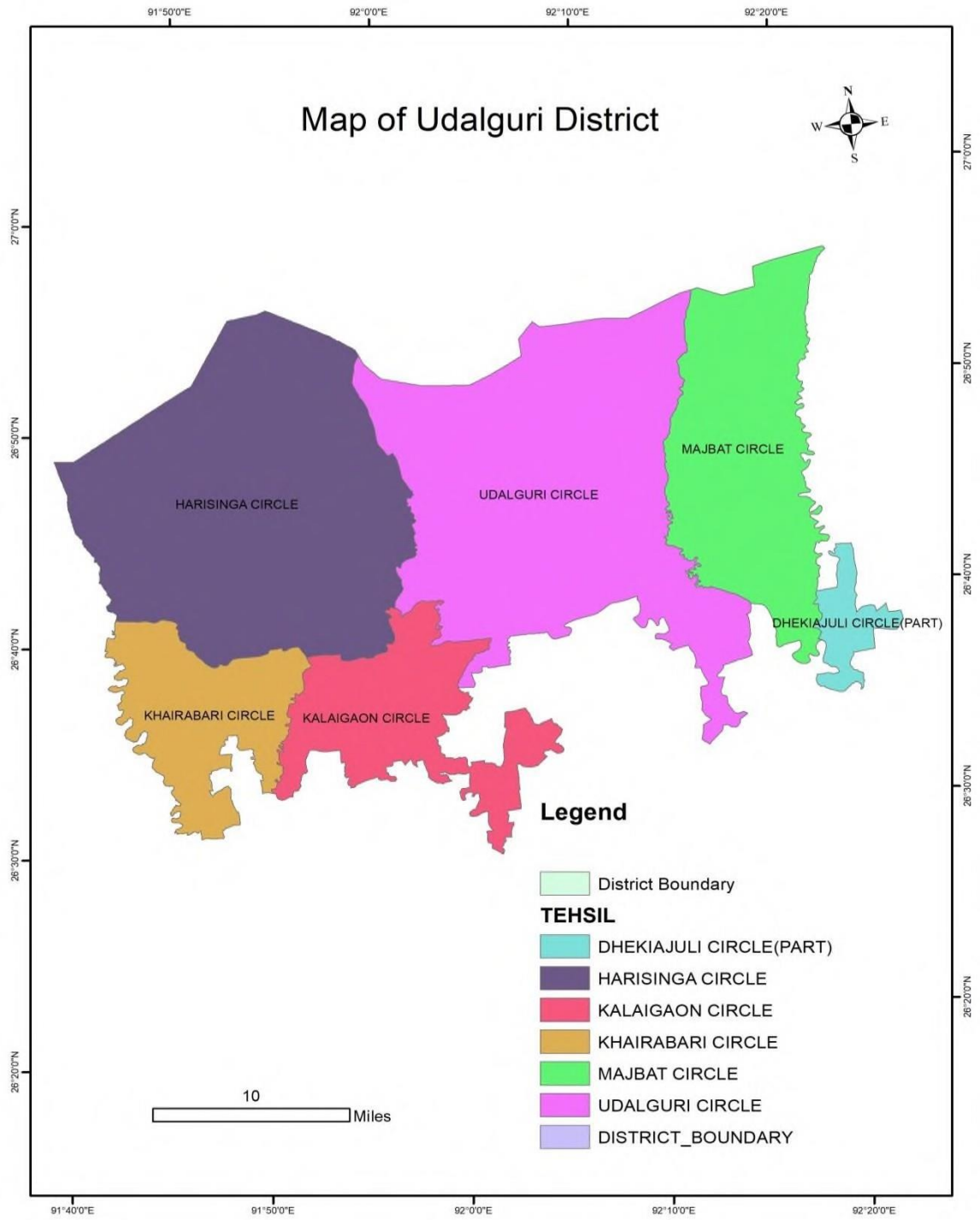
The district is multi-ethnic and multi-religious in nature. Bodos forms the largest ethnic group in the district with 33.76% of the district's population. Other ethnic groups with significant population are Adivasi community with almost 23.12% and Bengali Muslims with 12% of the district's population. Assamese and Bengali Hindus resides mainly in urban areas. There is also a

presence of sizeable Nepali speaking Indian Gorkha community with estimated 5% of the district's population thinly scattered across the Udalguri district.

Udalguri is a district in Assam which shares an international border with Bhutan and also a state border with Arunachal Pradesh at its North. The district was carved out from Darrang district on 14 June, 2004as one of the four districts under Bodoland Territorial Council. Its neighbouring districts are Sonitpur at its East, Baksa at its West and Darrang at its South. Udalguri is easily communicable through road and rail.

Administrative setup-

Head Quarter	Udalguri
Division	North Assam
Number of Sub-Divisions	2(Udalguri, Bhergaon)
Number of Revenue Circles	5 (Udalguri, Majbat, Harisinga, Kalaigaon, Khoirabari)
Number of Develop Blocks	11
Geographical Area	1,985.68 sq. km
Literacy	74 %
Population	8,31,668 according to 2011 census.
Male Population	421617
Female Population	410051



Map: Administrative map of the District

b) Climatic condition

The climate of the district is characterised by the absence of a dry hot summer season, the highest temperatures being experienced during the south-west monsoon season along with abundant rains and highly humid atmosphere throughout the year. Winter starts from December and ends in February, which is followed by a season of thunder storms, from March to May. Next from June and up to the beginning of October is the season of southwest monsoon and October and November are marked as post-monsoon season. Rainfall, mostly as thundershowers, amounting to about a fifth of the annual rainfall is received in the pre-monsoon months of April and May. The southwest monsoons, arrives over the district by about the beginning of June. The rainfall in the period June to September accounts for about two-thirds of the annual rainfall.

The cold season starts towards the end of November when both day and night temperatures begin to decline. January is the coldest month of the year with the mean daily maximum temperature at about 240C and the mean daily minimum at 9^{oC} to 11^{oC}. In association with low pressure waves passing eastwards during the winter season, the district experiences cold spells for a day or two when the minimum temperatures may fall below 50c. Temperature begins to rise from the beginning of March. The rise in temperature continues well into the south-west monsoon season, when temperatures are higher than even in the period March to May. The highest mean daily temperatures experienced in July and August. This together with high humidity (highest during the year) makes the south-west monsoon season rather unpleasant particularly when not raining. With the termination of the monsoon season the weather becomes gradually cooler. The air is highly humid throughout the year, except during the period February to April when the relative humidity are comparatively less(less than 70 percent), particularly in the afternoons. Skies appear heavily clouded to over cast during the south-west monsoon seasons.

There is a decrease in cloudiness after the withdrawal of the monsoon and during the period December to April, skies remain usually clear or lightly clouded. Winds are light throughout the year except for short spells of strong winds during thunderstorms in the period March to May.

c) Drainage System

The different rivers flowing through the district serves as the major drainage system for the district. However, during the heavy monsoon season they seem inadequate. Recurrence of flood during monsoon due to heavy rainfalls in the district and neighboring Arunachal Pradesh and Bhutan causes loss of crops and other properties almost every year. In recent years the District experienced heavy floods, to be precise, flash floods, due to heavy deforestation towards northern part. The people of the district, who mainly depend on rain water for their cultivations, are often badly affected on one hand by floods and on the other hand by occasional dry spell. 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 Barnadi, Kulsi, Na, Noanadi, Bega, Mara Dhansiri, Jiya Dhansiri and Pachnai Rivers. Jia Dhansiri River is one of the important tributaries of the river Brahmaputra in Mangaldoi sub-division. It emanates from the Bhutan hills and has an approximate total length of about 80 kilometres from its source to out-fall. Another river is Noanadi, which also originates from the Bhutan hills, and collects some drainage from the hills before reaching the plains. The river Nunoi also has its origin in the Bhutan range of the Himalayas in the Tongsa province at an elevation of about 1220 meters above the mean sea level. After crossing the Bhutan boundary, the river enters the Udalguri district and traverses through Khalingduar forest where it flows through gorges and rapids till it enters the plains near Bhutiachang village. After flowing about 19 kms from Bhutiachang, the river crosses the North Frontier Railway line near Tangla Railway station. Further flowing towards south, in a curve for a distance of 69 kilometres, the Nunoi joins the Brahmaputra at about 16kms up stream of North-Guhawati. The river Nunoi is approximately 104 Kms in length and has its catchment area of 504 sq. kms.

d) Irrigation

Though the district receives sufficient rain during monsoon season, but major crops like paddy, jute etc., have to depend on some other sources of water during the major part of the year. The system of Jan or dong to irrigate paddy fields by constructing small canals is still in practice in some part of the district. Some minor irrigation projects like construction of bunds across the

streams and rivulets, drainage channels and slit channels etc., are implemented in the district by the government. Lift irrigation with electric pump-sets has also been operated in some parts of the district.

Despite various efforts made in the past, the present status of irrigated agriculture in the district is not satisfactory (compared to the state and the national standard). More and more agricultural land is required to be brought under irrigation on priority basis (there being potentiality), both for increasing production and productivity through intensification of agriculture.

e) Soil resources

Acidity is the general characteristic of the soil of the district and more so in the older alluvium soil. New alluvial soils representing the lands of the river banks are less acidic. These are often neutral and even alkaline. Acidic alluvial soils are suitable for cultivation of tea. Major part of the district, mainly southern part, is Younger alluvial entisols. The central portion is covered by older alluvial alfisols.

f) Groundwater prospects in the district

Based on the behaviour and occurrence of ground water, the regional ground water flow system of district has been described under following categories. i. Shallow aquifer group occurring within 50 m depth. ii. Deeper aquifer group beyond a depth of 50 m and down to 200 m bgl.

i. Shallow Aquifer Group: It is constituted of a mixture of boulder, gravel, sand, silt and clay. The thickness of the aquifer varies from 15 to 40 m. Ground water in this aquifer generally occurs under water table to semi-confined conditions. The development of ground water from this aquifer for both domestic and irrigation purposes is by open wells and shallow tube wells. The boulders are restricted mostly to the northern parts of the district. They occur between GL to 50 m bgl and thickness varies from 20 - 30 m. The thickness increases from south to north. The water level in the major part of the district generally lies between 2 to 4 m bgl. The northern most part occupied by the piedmont zones and the areas adjoining to the inselbergs are having deeper water level. The movement of ground water is southerly towards Brahmaputra River. The water table contour follows the topography of the area and lies more or less parallel to the Brahmaputra River. The hydraulic gradient becomes gentler towards south.

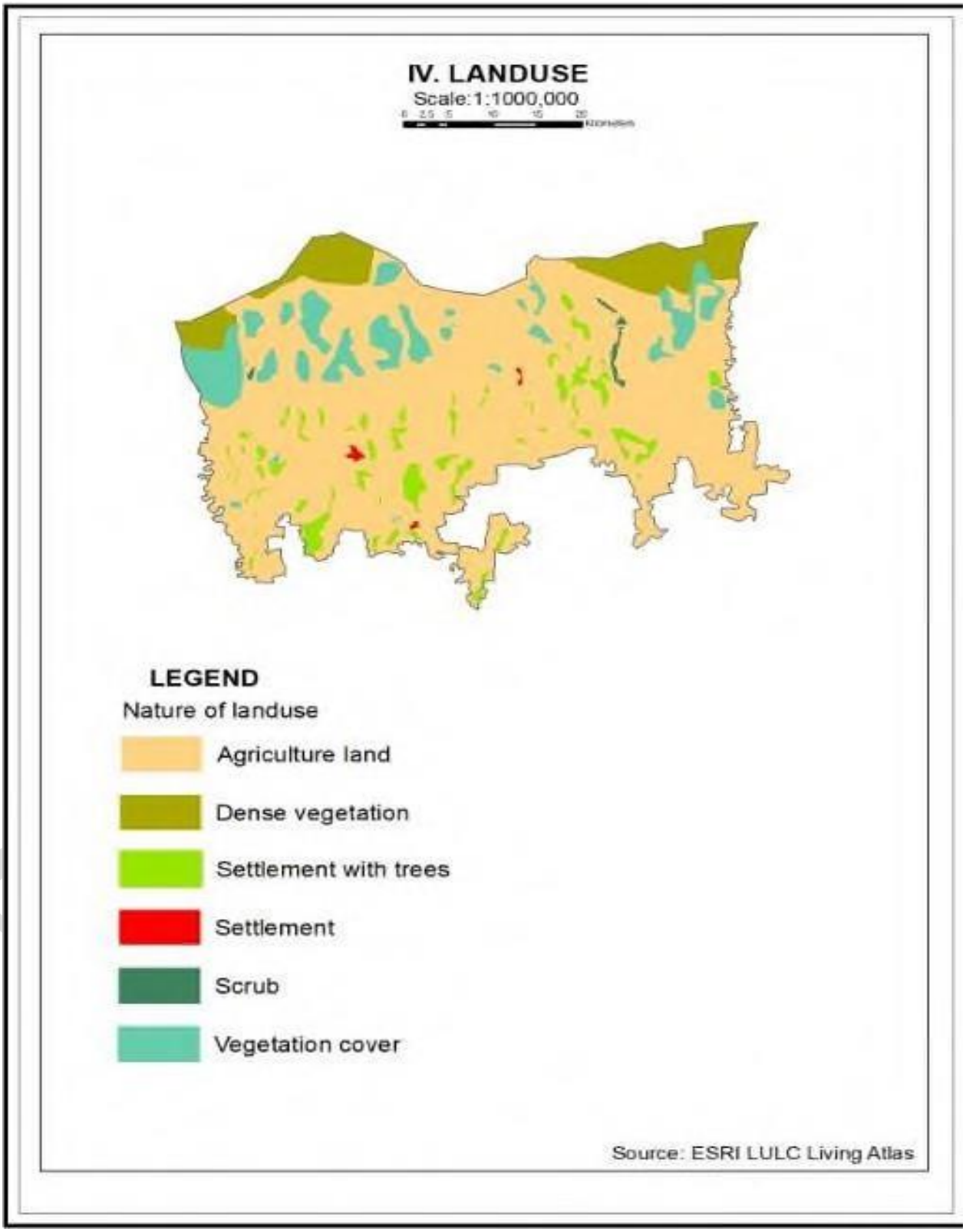
ii. Deeper Aquifer Group: It is constituted of coarse to medium sand with intercalation of clay. Ground water occurs under water table to semi-confined conditions. Detailed hydrogeological surveys aided by exploratory drilling revealed the existence of two to three promising aquifer zones down to the depth of maximum 200 m bgl. Aquifer displays various degree of lateral and vertical variation indicating various degree of depositional environment both in space and time. The piezometric surface is highly variable and the movement of ground water is towards the south.

8. Land and land use pattern:

Land resource is one the most important and valuable free gift of the nature and its proper utilization by the inhabitants is of great value. Land should be fully used as per its capability. Lack of proper or profitable use means wastage of land resource and it results loss of productivity. It therefore requires proper and timely use of this kind of asset. The following table indicates the pattern of land use under various classification of land in Udalguri District.

Sl. No.	Land put to different uses	Area in hectare
1	Total Geographical area	167393
2	Forest area	2240
3	Land not available for cultivation	3043
a	Land put to non-agricultural uses	2348
b	Barren and un-cultural land	694
4	Other non-cultivated land excluding fallow land	1450
a	Permanent pastures and other grazing land	386
b	Land under misc, trees, groves etc. not included in net	706
c	Cultivable waste land	357
5	Fallow land	112
a	Fallow other than current fallow	70
b	Current fallow	42
6	Net area sown	9994
7	Total cropped area	159311
8	Area sown more than once	5936

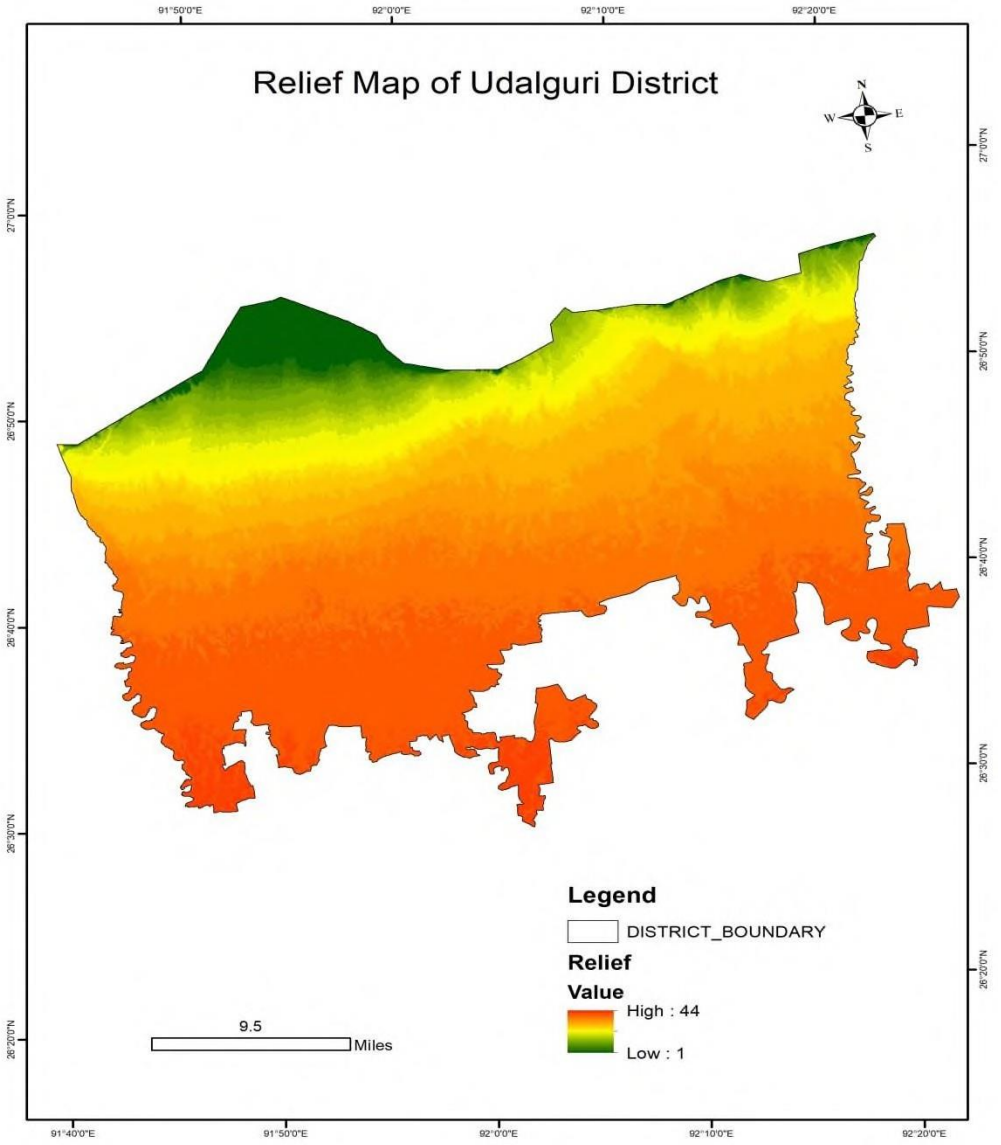
Source: Census, 2011



Map: Land use land cover map of Udalguri district

9. Physiography of the District

The district intersected by numerous hill streams is almost quadrilateral block of alluvial plain. The southern parts of the district are situated on the plains of the Brahmaputra Valley Zone. Major tributaries of the river Brahmaputra viz. Pachnoi, Dhansiri, Jiya Dhansiri, Mora Dhansiri, Noa, Kulsi, Dipila and Bornoi, which originate from the foothills of the Himalayan Range flow through the district and they mainly contribute towards the sustenance of the agrarian economy of the district. Northern part of this area is largely covered by tea gardens fringed here and there by villages of ex-tea garden labourers. . The northern part of the district is generally hilly areas and the southern part of the district is covered with forest and hillocks.



Map: Relief Map of Udalguri District

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.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	R/F	R/F	R/F	R/F	R/F	R/F	R/F	R/F	R/F	R/F	R/F	R/F
2018	0	3.1	71.6	59	265.6	338.4	502.2	325.2	355	63.8	7.4	23
2019	0	49.2	33	207.6	395	347.2	657.5	289.6	357.4	60.2	3.6	11.2
2020	13.9	26.7	28.3		365.2	421.1	439.2	171.4	304.1	125	1.2	0
2021	14.4	1.9	41.4	53.6	218.1	300.2	346.9	144.8	212.8	58.6	0.8	0
2022	16.4	95.7	76.6	425.2	537.8	786.7	210.4	137.4	104.4	178.6	0	1.6

Table: Five year Historical Rainfall of Udalguri District

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.

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-Rajmahal Grabenand 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, 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.

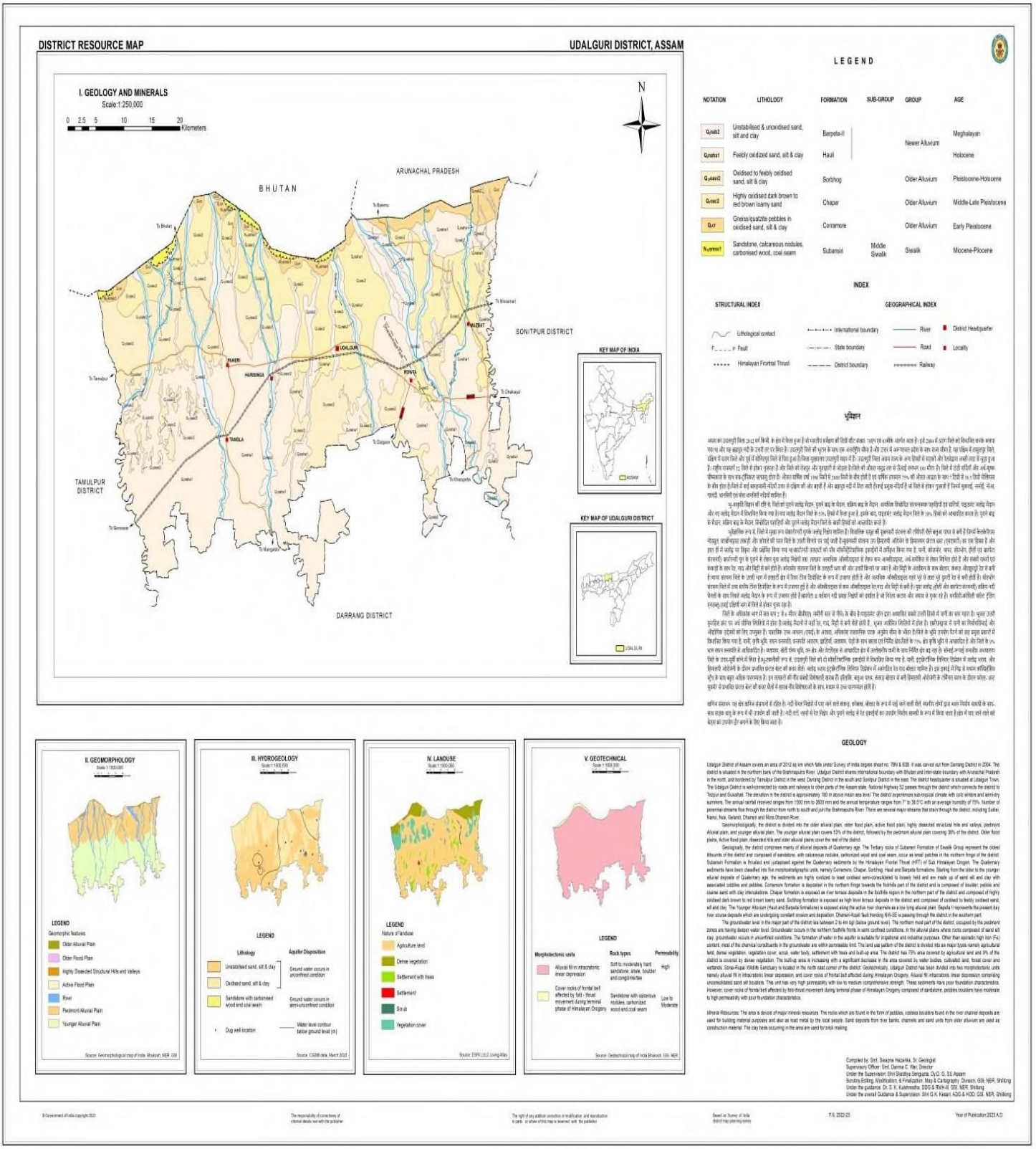


Fig: Resource map of Udalguri District

11. b) Mineral Wealth

i. Overview of mineral resources:

Overview means encapsulation or compendium followed by presence or absence of minor minerals. Mineral deposit consisting of useful concentration or richness that may or may not exceed economic cost for obtaining the desired minor minerals.

Here minor mineral resources especially riverbed sand & gravel & flood- plain sand & gravel deposits are found to occur. The flood plain deposits of sand & gravel occur in the form of fossilized channel. These have intrinsic economic interest in or within the earth's crust in such form, quality & quantity that these are reasonable for eventual economic extraction.

Geological investigation carried out by us at Udalguri reveals that a compatible relationship exists between the geological set up of Udalguri & minor mineral occurrences. To pave the way of minor mineral localisation, G-4 stage of exploration technique (i.e., Reconnaissance Survey) has been adopted here.

Names of minor minerals, found at Udalguri, are elucidated below:
Riverbed Sand, Flood- plain sand & gravel deposits & huge Gravel Deposits under which comes Boulder, Cobble, Pebble & Granule Deposits having variation only in framework or sediment particles diameter**.**

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.

(TO BE UPDATED AFTER FIELD SURVEY)

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
1	Dhansiri		
2	Monai		
3	Dimasang		
4	Pasnoi		
5	Pagla		
6	Golondi		
7	khowrang		
8	Kulsi		
9	Nunoi		
10	Kalanadi		
11	Samrang		
12	Rowta		

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
1	Dhansiri			
2	Monai			
3	Dimasang			
4	Pasnoi			
5	Pagla			
6	Golondi			
7	khowrang			
8	Kulsi			
9	Nunoi			
10	Kalanadi			
11	Samrang			
12	Rowta			

(TO BE COLLECTED)

(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)
1	Dhansiri					
2	Monai					
3	Dimasang					
4	Pasnoi					
5	Pagla					
6	Golondi					
7	khowrang					
8	Kulsi					
9	Nunoi					
10	Kalanadi					
11	Samrang					
12	Rowta					
Total for the district						

(TO BE PREPARED AFTER COLLECTING PRE- MONSOON & POST MONSOON DATA FROM RESPECTIVE DEPARTMENTS)

ii) Mineral potential

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

- **(TO BE PREPARED AFTER COLLECTING PRE- MONSOON & POST MONSOON DATA FROM RESPECTIVE DEPARTMENTS)**

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)

(TO BE PREPARED AFTER COLLECTING PRE- MONSOON & POST MONSOON DATA FROM RESPECTIVE DEPARTMENTS)

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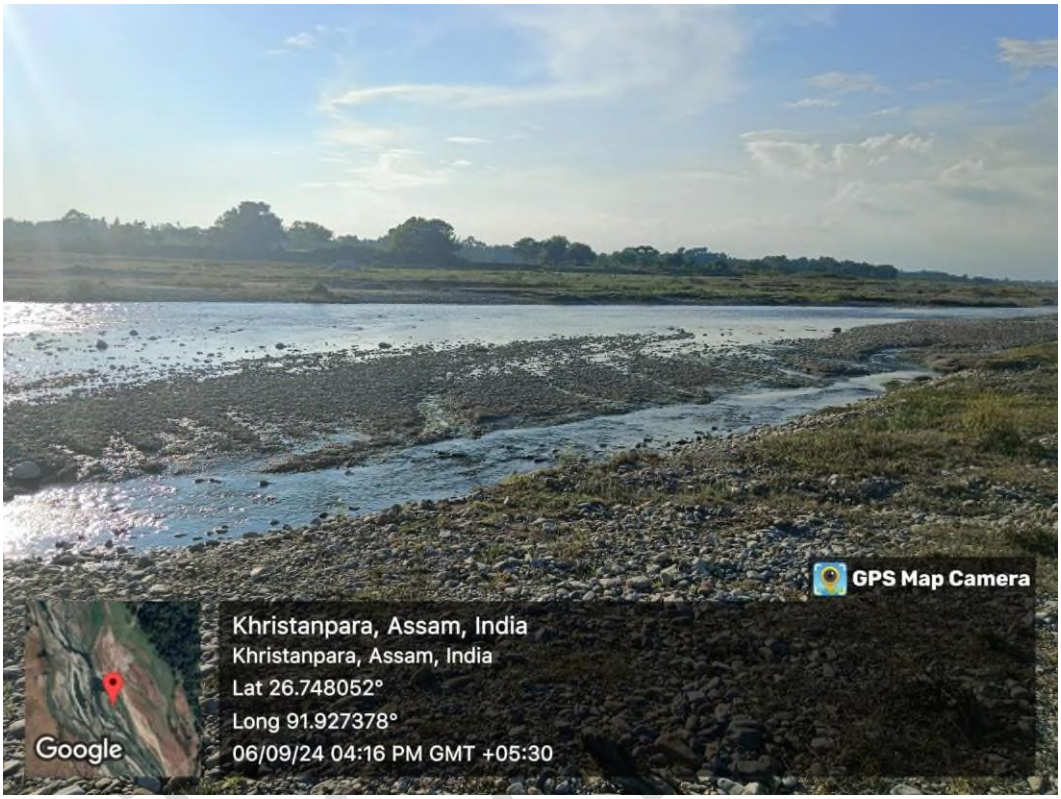

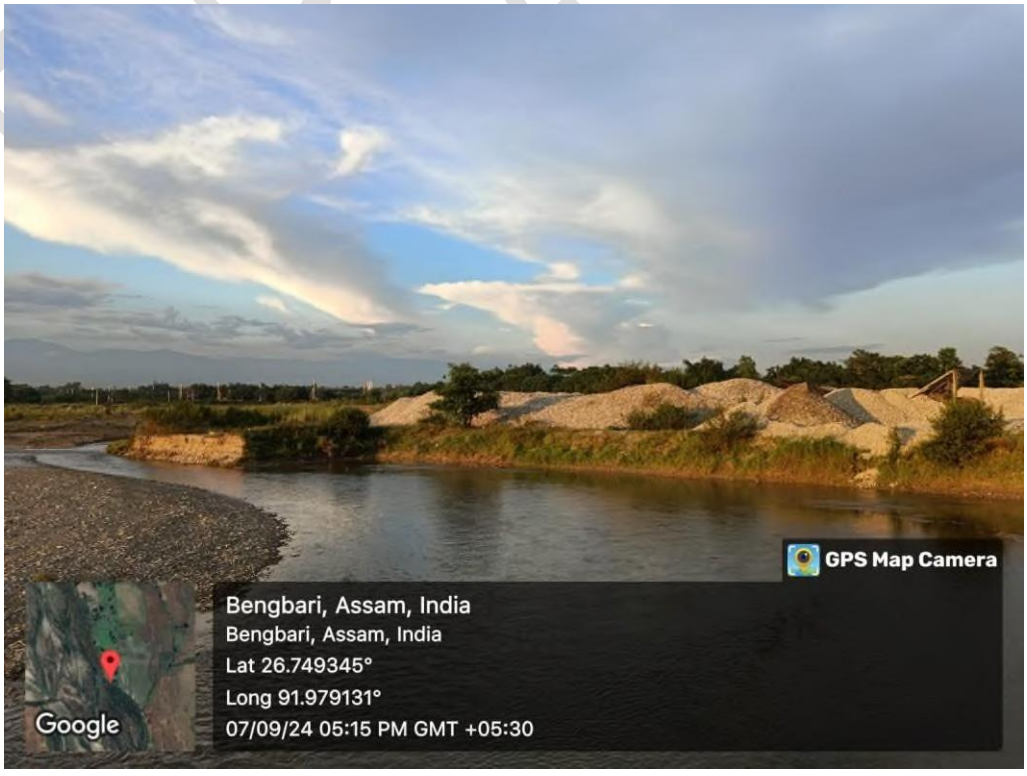


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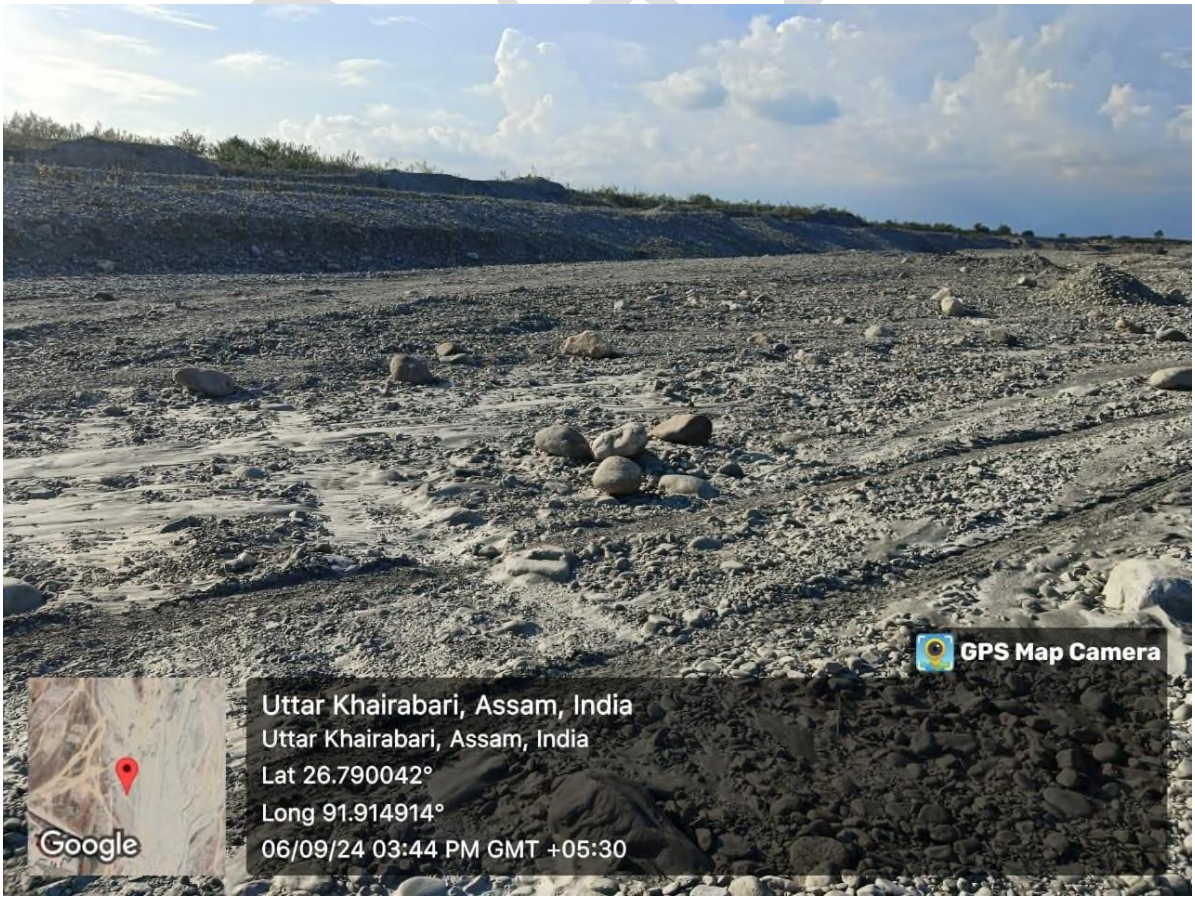
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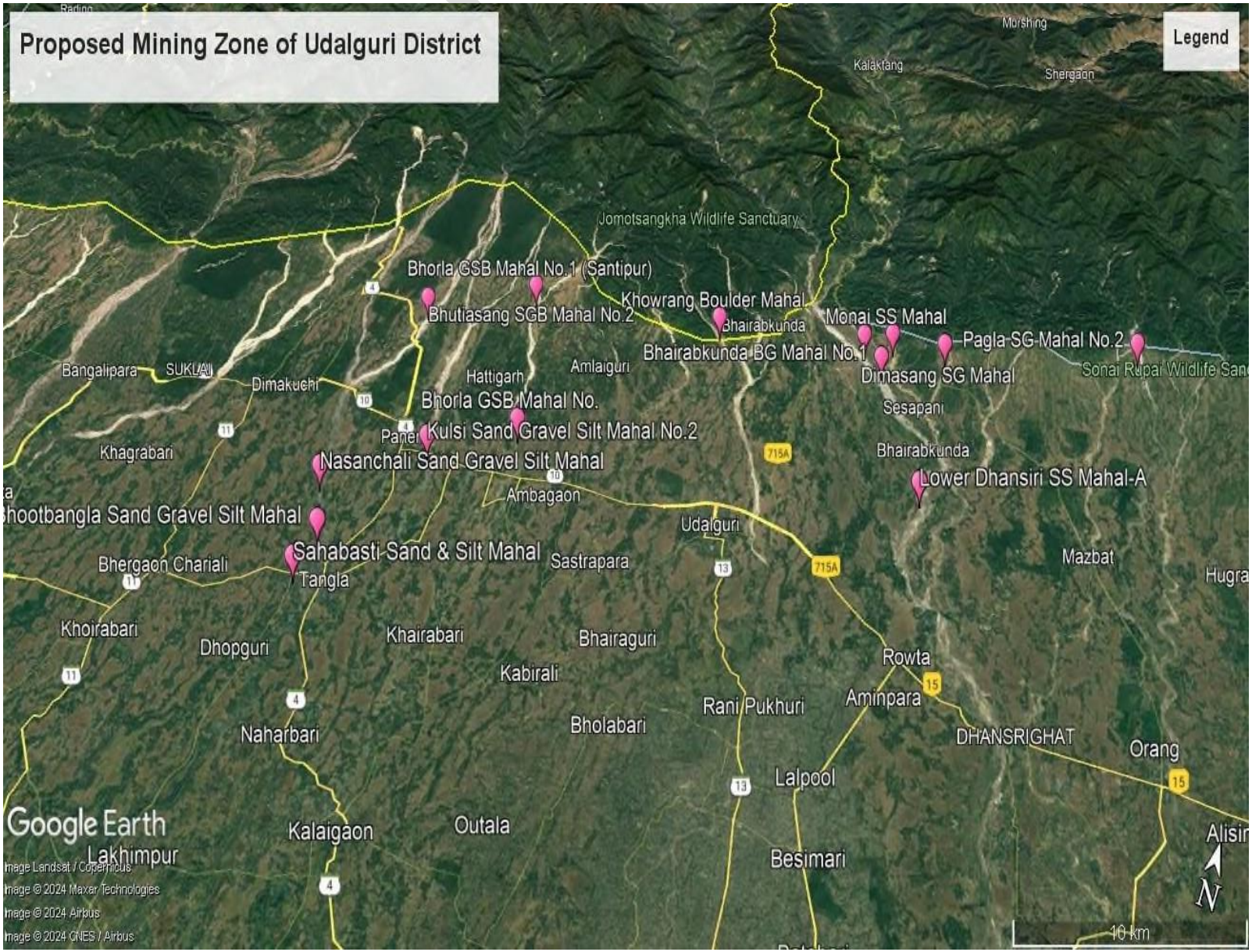
Proposed Mining Zone of Udalguri District
Legend
Jomotsangkha Wildlife Sanctuary
Bhorla GSB Mahal No.1 (Santipur)
Bhutiasang SGB Mahal No.2
Khowrang Boulder Mahal
Bhairabkunda
Monai SS Mahal
Pagla SG Mahal No.2
Bhairabkunda BG Mahal No.1
Dimasang SG Mahal
Sonai Rupai Wildlife San
Bangalipara
SUKUAli
Dimakuchi
Hattigarh
Amlaiguri
Bhorla GSB Mahal No.
Sesapani
Kulsi Sand Gravel Silt Mahal No.2
Khagrabari
Nasanchali Sand Gravel Silt Mahal
Bhairabkunda
Lower Dhansiri SS Mahal-A
Ambagaon
Udalguri
Sahabasti Sand & Silt Mahal
Bhergaon Chariali
Tangla
Sastrapara
Mazbat
Khoirabari
Dhopguri
Khairabari
Bhairaguri
Kabirali
Rowta
Aminpara
Rani Pukhuri
Bholabari
DHANSRIGHAT
Orang
Naharbari
Lalpool
Kalaigaon
Outala
Lakhimpur
Besimari
Google Earth
Image Landsat / Copernicus
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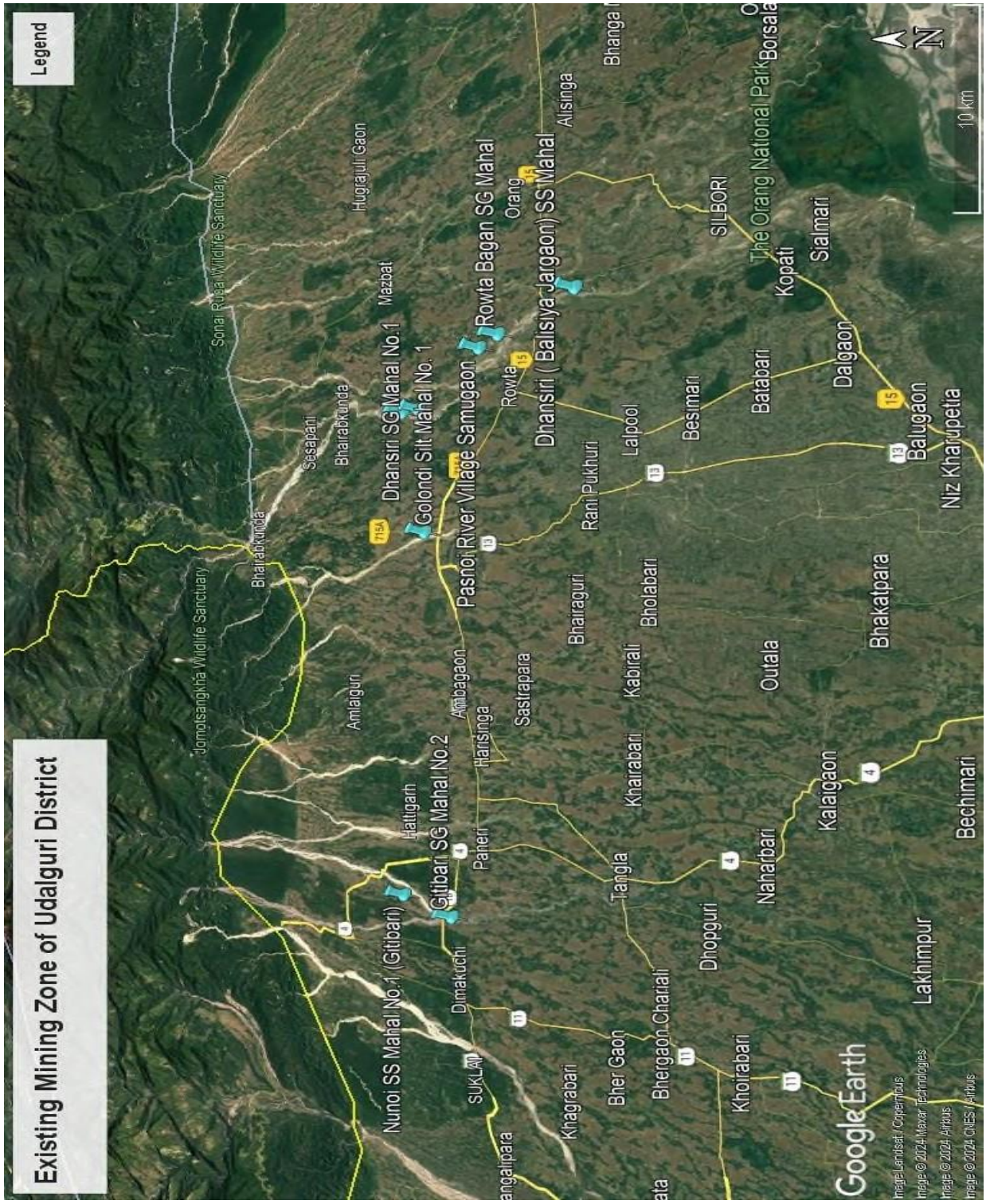
10 km
N


Existing Mining Zone of Udalguri District
Legend
Nunoi SS Mahal No.1 (Gitbari)
Gitbari SG Mahal No.2
Dhansiri SG Mahal No.1
Golondi Silt Mahal No. 1
Rowta Bagan SG Mahal
Dhansiri (Balisiya Jargaon) SS Mahal
Pasnoi River Village Samugaon
Domoisangkha Wildlife Sanctuary
Sonai Rupai Wildlife Sanctuary
The Orang National Park
Hugrajuli Gaon
Mazbat
Sesapani
Bhairabkunda
Amlaguri
Ambagaon
Harisinga
Sastrapara
Bhairaguri
Rani Pukhuri
Lalpool
Besimari
Batabari
Dalgaon
Balugaon
Kopati
Sialmari
SILBORI
Alisinga
Orang
Rowta
Hattigarh
Paneri
Tangla
Khairabari
Kabirali
Bholabari
Outala
Bhakatpara
Kalaigaon
Naharbari
Dhopguri
Bhergaon Chariali
Bher Gaon
Khagrabari
Khoirabari
Dimakuchi
SUKLAI
Lakhimpur
Bechimari
Niz Kharupetia
Google Earth
10 km
N

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