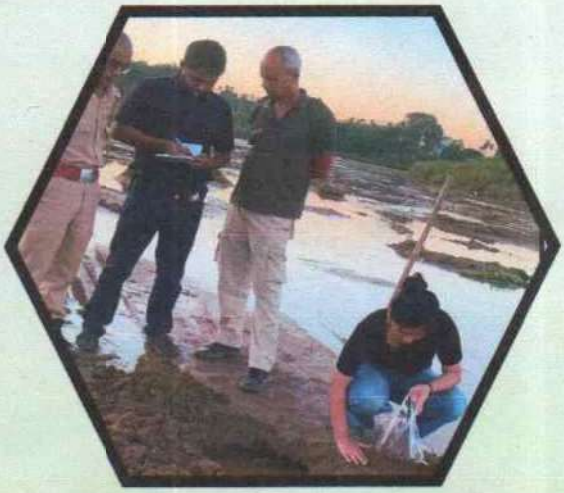
सत्यमेव जयते

DISTRICT SURVEY REPORT JORHAT, ASSAM



As per Sustainable Sand Mining Management Guidelines, 2016 and Enforcement & Monitoring Guidelines for Sand Mining, 2020, Ministry of Environment, Forest and Climate Change (MoEF & CC)

JUNE 2025

Prepared by:

District Level Committee
Jorhat District, Assam

GOVERNMENT OF ASSAM
DEPARTMENT OF ENVIRONMENT & FORESTS
OFFICE OF THE DIVISIONAL FOREST OFFICER
JORHAT DIVISION: JORHAT

Ph: 0376-2950090 **E-mail: dfo.t.jorhat@gmail.com**

Letter No.FJT/B/DSR/25(xix)/2025/2096-98 Date: 18/06/2025

To,

The Member Secretary,
State Expert Appraisal Committee,
Assam, Bamunimaidan, Guwahati-21

Sub: Minutes of the 26th meeting of State Expert Appraisal Committee held on 17th May, 2025.
Ref: Your office memo no. SEAC.33/2013/Pt/519-A dated 23/05/2025

Sir,

With reference to the subject cited above and consequent upon the Minutes of the Meeting of State Expert Appraisal Committee held on 17th May, 2025, I would like to submit herewith the final Draft District Survey Report (DSR) pertaining to Jorhat District, after making all necessary compliances on the observations pointed out in the Minutes of the Meeting. Hence it is requested kindly to further forward this revised final copy of the District Survey Report (DSR) for necessary approval of the State Environment Impact Assessment Authority (SEIAA) for early compliance of the NGT order against O.A No.86/2024/EZ (Pradeep Singh Shekhawat-vs-Union of India & Ors).

This is for favour of your kind information and onward necessary action.

Enclosed: 1. Draft DSR (Soft copy)/Hard copy (five copies)
2. Forwarding letter from District Commissioner, Jorhat.
3. Certificate duly signed by Chairman and Member Secretary, DSR Jorhat District.

Yours faithfully

(P. Monica Kishore, IFS)
Divisional Forest Officer,
Jorhat Division, Jorhat.

Copy to:

1. The District Commissioner, Jorhat District, Jorhat for favour of his kind information.
2. The Managing Director, RSP Green Development & Laboratories Pvt. Ltd. Shibpur, Howrah-711102 for information and necessary action.

Divisional Forest Officer.
Jorhat Division, Jorhat.
Date: 18/06/2025

Letter No.FJT/A/DSR/25(xix)/2024/1622

Copy to:

1. The Principal Chief Conservator of Forests and Head of Forest Force, Assam, Aranya Bhawan, Panjabari, Guwahati-37 for favour of his kind information.

Divisional Forest Officer.
Jorhat Division, Jorhat.

ENVIRONMENT IMPACT ASSESSMENT AUTHORITY APPROVED JORHAT ASSAM

GOVERNMENT OF ASSAM
OFFICE OF THE DISTRICT COMMISSIONER :: JORHAT DISTRICT :: JORHAT
(DEVELOPMENT BRANCH)

Contact No.-0376-2320020 *Email:dc-jorhat@nic.in*

No. DEV-21/31/2023-DEV-JRT/

To,

The Member Secretary,
State Expert Appraisal Committee, Assam

Sub: Submission of District Survey Report for Jorhat District.

Sir,

With reference to the subject cited above, I have the honour to submit herewith the District Survey Report in respect of Jorhat District prepared and verified by the District Level Committee for necessary final approval from your end.

This is for favour of your kind information and necessary action.

Yours faithfully
Digitally signed by
JAY SHIVANI
Date: 01-04-2025
17:13:23
District Commissioner
Jorhat

Enclosure: As stated above.

Memo No. DEV-21/31/2023-DEV-JRT/

Copy to:

1.The Special Chief Secretary (Forests) to the Government of Assam, Environment & Forests Department, Janata Bhawan, Dispur, Guwahati-6 for favour of kind information.
2.The Principal Chief Conservator of Forests & Head of Forest Force, Assam, Guwahati-37 for favour of kind information and needful action.
3. The Divisional Forest Officer, Jorhat Division, Jorhat for information and necessary action.

E-signed
District Commissioner
Jorhat

Recommended to the SEIAA. Assam for approval of the DSR of Jorhat District.

Member
SEAC : Assam

Member
SEAC : Assam

Member
SEAC : Assam

Member
SEAC : Assam

Member
SEAC : Assam

Member
SEAC : Assam

Member Secretary
SEAC : Assam
MOEF & CC, GOI

Chairman
SEAC : Assam
MOEF & CC, GOI

Smti Barnalee Nath,
Jt. Director, DGM, Assam

GOVERNMENT OF ASSAM
DEPARTMENT OF ENVIRONMENT & FORESTS
OFFICE OF THE DIVISIONAL FOREST OFFICER
JORHAT DIVISION: JORHAT

Ph: 0376-2950090

E-mail: dfo.t.jorhat@gmail.com

Acknowledgement

The Office of the Divisional Forest Officer, Jorhat Division, Jorhat, expresses its deepest gratitude to Shri Jay Shivani, IAS, District Commissioner, Jorhat District, Jorhat and Chairman of DSR Committee, Jorhat as well as to all the committee members. We also extend our sincere appreciation to the staff of the District Commissioner's office, Jorhat for their invaluable support in completing the District Survey Report.

The Divisional Forest Officer, Jorhat Division, Jorhat, acknowledges the significant contributions of Range Forest Officers, Beat Officers, and frontline staff of the Forest Department, drivers on duty, and local residents, who directly or indirectly facilitated the field studies.

This in-house prepared District Survey Report acknowledges the expertise and guidance provided by RSP Green Development & Laboratories Pvt. Lyd., Shibpur, Howrah-711102, our knowledge partner, who had helped to shape this report.

Chairman
DSR Committee
Jorhat

Divisional Forest Officer,
Jorhat Division, Jorhat
Cum Member Secretary
DSR Committee, Jorhat

Members:

Sl No	Name of the Member with designation	Signature
1	Shri Khuman Kalita, Executive Engineer, Jorhat Water Resource Department	
2	Shri Abhijit Gogoi, Additional Deputy Commissioner, Jorhat District	
3	Shri C.D. Nath, Senior Geologist, Mines and Minerals Department	Senior Geologist, Directorate of Geology & Mining, Assam, Kahilipara, Guwahati-19
4	Shri Jayanta Dutta, Executive Engineer, Pollution Control Board	Regional Head, Regional Laboratory cum Office, Sivasagar, Pollution Control Board, Assam

APPROVED

Certificate

This is to certify that this District Survey Report for Sand, Gravel & Earth mineral of Jorhat District is prepared in accordance with the prescribed procedure and format vide MoEF & CC Notification S.O. 141 (E), dated 15.01.2016, MoEF & CC Notification S.O.3611 (E) dated 25/07/2018 and is in consonance with the Sustainable Sand Mining Guidelines- January 2020 published by MoEF & CC. There is no discrepancy in information across all submitted documents including hard copy and soft copy of the submitted DSR and whenever specific permissions are required, we will approach the concerned authorities i.e State Expert Appraisal Committee (SEAC), Assam/State Environment Impact Assessment Authority (SEIAA).

The information furnished in the District Survey Report is true and correct to the best of our knowledge/findings.

(Nandha Kumar, IFS)
Divisonal Forest Officer,
Jorhat Division, Jorhat cum
Member Secretary, District Level Committee
For DSR, Jorhat District

(Jay Shivani, IAS)
District Commissioner, cum
Chairman, District Level Committee,
for DSR, Jorhat District

Member
SEIAA, Assam

Chairman
State Level Environment Impact
Assessment Authority, Assam.
Bamunimaidam, Ghty-21

Member Secretary
State Level Environment Impact
Assessment Authority, Assam.
Bamunimaidam, Ghty-21

STATE ENVIRONMENT IMPACT ASSESSMENT AUTHORITY
APPROVED
GUWAHATI : ASSAM

ACKNOWLEDGEMENT

The following district-level committee members have been engaged for the preparation of District Survey report of Jorhat district

SL. No.	Designation of the Officer	Designation in the Committee
1	Shri Jai Shivani, IAS, District Commissioner	Chairman
2	Shri Khuman Kalita, Executive Engineer, Jorhat Water Resource Department	Member
3	Shri Abhijit Gogoi, Additional Deputy Commissioner, Jorhat District	Member
4	Shri C.D. Nath, Senior Geologist, Mines and Minerals Department	Member
5	Shri Jayanta Dutta, Executive Engineer, Pollution Control Board	Member
6	Shri Nandha Kumar, IFS, Jorhat Forest Division	Member Secretary

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ABBREVIATION

ABBREVIATIONS & SYMBOLS USED	:	FULL FORMS
%	:	Percent
'	:	Minute
"	:	Second
<	:	less than (strict inequality)
=	:	Equal to (strict equality)
>	:	greater than (strict inequality)
≈	:	approximately equal
°	:	Degree
°C	:	Degree Centigrade
°F	:	Degree Fahrenheit
ArcGIS	:	ArcGIS is a GIS for working with maps and geographic information maintained by the ESRI.
CD blocks	:	Community development blocks
cm	:	Centimeter
cum	:	Cubic meter
Dec	:	December
SEAC	:	State Level Expert Appraisal Committee
DSR	:	District Survey Report
E	:	East
e.g.,	:	*'exempli gratia'*(Latin phrase) means 'for example'
EC	:	Environmental Clearance
et.al.,	:	*'et alia'* (Latin phrase) means 'and others'
G:2 stage	:	General Exploration (stage of exploration as per UNFC norms)
G:3 stage	:	Prospecting (stage of exploration as per UNFC norms)
GIS	:	Geographical Information System
Govt.	:	Government
GPS	:	Global Positioning System
Ha	:	Hectare
i.e.,	:	*'id est'* (Latin phrase) means 'that is'/'in other words'
ICAR	:	Indian Council of Agricultural Research

ABBREVIATIONS & SYMBOLS USED	:	FULL FORMS
Inch	:	inches
kg/ha	:	Kilogram per hectare
km	:	kilometer
km/ hour	:	Kilometer per hour
km2	:	kilometer square
LANDSAT	:	Land Satellite stands for Low Altitude Satellite
LULC	:	Land use and land cover
m	:	Meter
Mar	:	March
Max.	:	Maximum
mbgl	:	Meter Below Ground Level
Min.	:	Minimum
mm	:	Millimeter
MoEF &CC	:	Ministry of Environment, Forest and Climate Change
N	:	North
NH	:	National Highways
No.(s)	:	Number(s)
RI value	:	River Index value
S	:	South
SEIAA	:	State Environment Impact Assessment Authority
Sept	:	September
sp.	:	species
sq.km	:	Square kilometer
Temp	:	Temperature
viz.,	:	Latin phrase *'videre licet'*, and is used as a synonym for "namely",
W	:	West

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

The District Survey Report of Jorhat District has been prepared as per the guidelines of the Ministry of Environment, Forests, and Climate Change (MoEF& CC), Government of India vide Notification S.O.-1533(E) dated 14th Sept 2006 and subsequent MoEF& CC Notification S.O. 141(E) dated 15th January 2016. This report shall guide the systematic and scientific utilization of natural resources, so that present and future generations may be benefitted at large. Further, MoEF& CC published a notification S.O. 3611(E) Dated 25th July, 2018 and recommended the format for District Survey Report and MoEF & CC, 2020.

The **main objective of DSR** is to identify the areas of aggradations or deposition where mining can be allowed; and identification of areas of erosion and proximity to infrastructural structures and installations where mining should be prohibited and calculation of annual rate of replenishment and allow time for replenishment after mining in that area. The DSR would also help to calculate the annual rate of replenishment wherever applicable and allow time for replenishment.
The objectives of the District Survey Report are as follows:

1. To identify and quantify minor mineral resources for its optimal utilization.
2. To regulate sand and gravel mining, identification of site-specific end-use consumers and reduction in demand and supply gaps.
3. To facilitate use information technology (IT) for surveillance of the sand mining at each step.
4. To enable environmental clearance for cluster of sand and gravel mines.
5. To restrict illegal mining.
6. To reduce occurrences of flood in the area.
7. To maintain the aquatic habitats.
8. To protect groundwater in the area by limiting extraction of material in riverbeds to an elevation above the base flow.
9. To maintain data records viz. details of mineral resource, potential area, leasehold, approved mining plan, co-ordinates of leasehold areas, and revenue collection.
10. To design a scientific mining plan and estimate depth of mining.
11. To frame a comprehensive guideline for mining of sand and other minor minerals.

The District Survey Report (DSR) comprises secondary data on geology, mineral resources, climate, topography, landform, forest, rivers, soil, agriculture, road, transportation, and irrigation, etc. of the district collected from various published and reports as well as various websites. Data on lease and mining activities in the district, revenue etc. have been collected from the DL&LRO office of the district, Central Groundwater Board, Water Resources Department.

❖ Methodology of DSR Preparation

The steps followed during the preparation of the District Survey Report are given below. The individual steps are discussed in the following paragraphs.

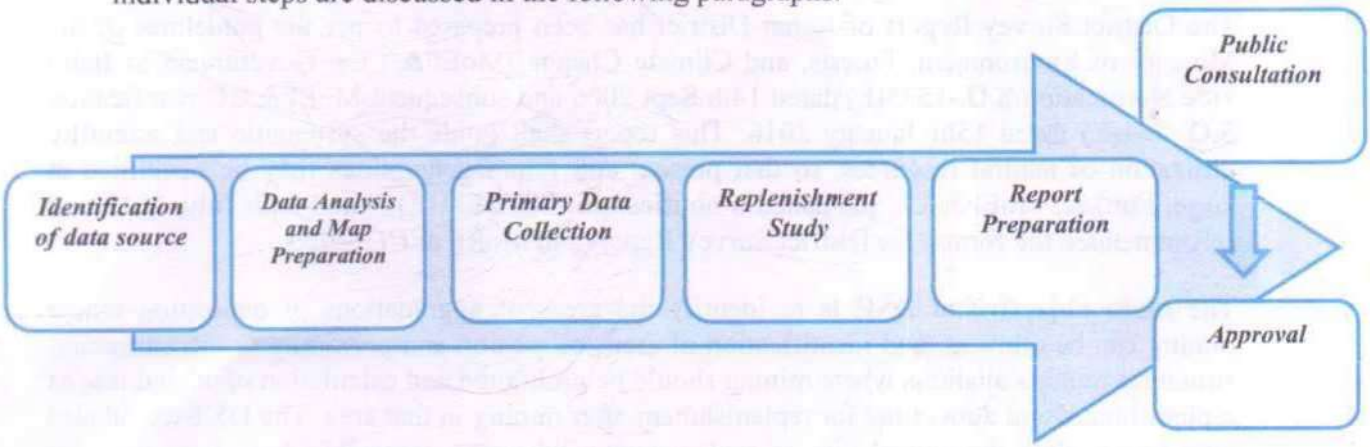


Figure 01: Steps followed in preparation for DSR

1.2 ABOUT THE DISTRICT

Jorhat is an administrative district located in Assam situated in the central part of the Brahmaputra Valley. The administrative boundary of Jorhat district was newly demarcated in 2016, by excluding the Majuli subdivision in the north. The district is bounded by the Brahmaputra River on the north, Nagaland state on the south, Sivasagar district on the east and Golaghat district on the west. The district lies from 26.15° N to 27.12° N Latitude and from 94.05° E to 94.35° E longitude. The district covers a total of 1758 sq. km. area and the mean elevation is 116 meters (381 feet) It falls on the degree sheets numbered 83F and 83J. Jorhat town is the headquarters of the district and is connected with other parts of the state by rail, road, and air link.

1.3 ADMINISTRATIVE UNITS

According to the statistical Handbook, for administrative purposes, the district was divided into two sub-divisions viz, Jorhat (Sadar), and Titabar. Again, each sub-division is divided into revenue circles, and under revenue circles, there are Mauzas comprising villages of all kinds. In the district, there are 05 revenue circles and 600 villages. There are also 6 Community Development Blocks (CDB) out of which 5(Five) CDBs are in the Jorhat Sub-division and 1 (One) CDB is in the Titabar Sub-division). The district has 5 (Five) Legislative Assembly Constituencies, they are Dergaon, Jorhat, Titabar, Mariani and Teok. There are 4 towns present in the district, those are Jorhat, Teok, Titatabar, and Mariani. *(Source: https://jorhat.assam.gov.in, District Statistical Handbook, 2023)*

Table No. 01: Details of blocks in Jorhat district

Sl. No.	Name of the District	NAME OF CD BLOCK
1	Jorhat District	Jorhat Dev. Block (Baghchung)
2		North West Dev. Block (Dhekorgarah)
3		Titabor Dev. Block
4		East Jorhat Dev. Block (Selenghat)
5		Kaliapani Dev. Block
6		Central Jorhat Dev. Block (Chipahikhola)

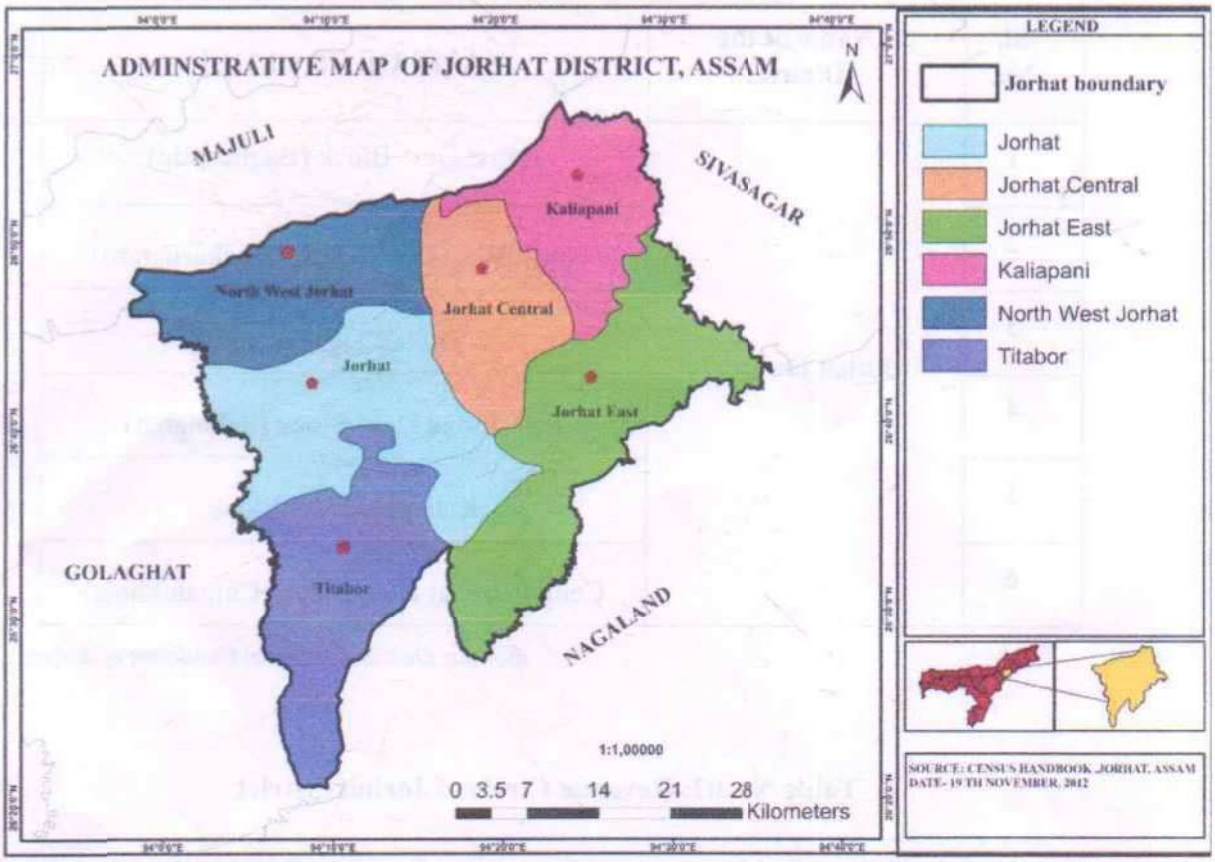
(Source: District Statistical Handbook of Jorhat, 2023)

Table No. 02: Revenue Circle of Jorhat district

Sl. No.	Name of the District	Revenue Circle
1	Jorhat District	Jorhat East
2		Jorhat West
3		Titabar
4		Teok
5		Mariani

(Source: District Statistical Handbook of Jorhat, 2023)

Figure 02: Administrative Map of Jorhat district



1.4 Brief History about the District:

Jorhat was one of the three subdivisions of the erstwhile Sibsagar district. The name – Jorhat has a special significance. The word has two syllables – 'Jor' means twin and 'hat' means markets. The 'hats' were the Phukanor hat and the Machar hat. These two hats were adjacent to Disai. The old name was changed and, in its place, the new name – Jorhat was given for the erstwhile subdivision of the Sibsagar district. The early history of the district relates to the stories of Bodos and Shans. Scholars think that the Bodo Tribes of Sino-Tibetan origin settled and established their settlements over the valley of Brahmaputra fairly early in the 2nd Millennium B.C. Some Austric and possibly Dravidian tribes produced the Mongoloid Bodos in the tract. The area of the Jorhat district along with the Sibsagar district formed part of this tract and was covered by tribal settlements of the Bodo tribes. It is believed that the area of Jorhat district, once upon a time, formed part of the great kingdom of Pragjyotish-Kamrupa whose eastern boundary extended up to the river Dikhow, especially during the time of Varman rulers of Assam in 7th and 8th century. This political status seems to have continued till the decline of the Hindu dynasty. Thereafter several small principalities sprang up under the Barabhuyans and the Bodo Chiefs at the advent of the 12th century A.D. Turning the pages of Modern history and the history of the Ahoms, we find that the fierce and war-like tribe of 'Shans' who passed themselves as 'TAI' were a branch of the Tai-race of East-Asia. Ahom historians propagate that 'Sukapha' – the first Ahom king, entered Assam in 1228 A.D. crossing the high hills called Patkai. At that time, it appears, that the area from Dimapur in the South to the Dili River in the North was under the occupation of Kacharis. They had their capital at Dimapur. According to

one Dimasa Kachari King, Bisarapatipha was said to be the son of Mahadev. He was a contemporary of Sukapha. Sukapha put the eastern part of the territory of the Kachari king under his occupation and drove away the Kachari king to the hills. The Ahoms in a bid to expand their territory fought battles with the Chutiyas and Kacharis. They extended their territory to the east and the west. A major fierce battle took place between the Kacharis and the Ahoms. Ahoms was defeated and driven away as far as Dikhow. But the Kacharis did not get to enjoy the pleasant sense of victory for long. Meanwhile, Suhungmung (1497-1539) popularly known as Dihingia Raja marched up the valley of Dhansiri in 1536 AD and killed the Kachari Raja, and sacked the capital at Dimapur. The area of the present Jorhat district became part of the Ahom territory since then. It was during the reign of Suhung, that the Ahom kingdom reached its greatest expansion and Kamrup and Kamata were liberated from Muslim domination. Suchengpha or Pratap Singha (1603- 1641) succeeded Suklengmung constructed a 'Garh' on the north and south to protect the kingdom. One part of this Garh is called 'Mera Garh' in Majuli and the other is 'Swatalat Garh' in the north and the 'Ladoi Garh' on the south. Jayadhwaj Singha (1648-63) had to face Mirjumla's invasion in 1662. He was succeeded by Chakradhavaj Singha in 1663 who had valiantly earned the laurel of victory over the Mughals in the battle of Saraighat in 1671. On the death of Chakradhavaj Singha, a period of turmoil intervened and as many as seven princes occupied the Ahom throne who were too weak to sustain and as a result, the Ahom monarchy fell to an untimely end. During the reign of Rajeswair Singha Ahom rule became too weak. He married Kuranganayani, a Manipuri Princess, and elevated her to the rank of principal queen. The Mogolu Khat which is at a distance of 6 km from Jorhat on the west was established by Rajeswar Singha. In 1757 Jorhat was honoured by a visit from the Ahom king and he had a temporary royal residence. But the town enjoyed the status of Ahom capital when the Ahoms were driven out from Rongpur by Moamoria rules. The period of Laxmi Singha (1769- 1780) was the signpost of Moamoria's insurrection. The same broke out in a new more devastating form during his successor, Gaurinath Sinha (1780-95) Rongpur was divested by the Morans and the king had shifted the capital from Sibsagar to Jorhat in 1794 A.D. The state of normalcy dawned by the visit of the British at the request of the king. This proved short-lived. Gaurinath Singha was succeeded by Kamleswar Singha (1795-1811) a state of great disorder persisted. After his death his brother Chandra Kanta Singha succeeded the throne. During his royal rule the Ahoms had lost the last vestige of vigour and validity as a powerful military race and the nobles frittered away their energies in unseemly feuds and skirmishing among themselves. Soon the Burmese made it clear and contemplated that they should retain their hold upon Assam by even putting on the throne their puppet which fomented a fresh spurt if violence and resulted in a reign of terror. Fortunately, the Burmese were compelled to renounce all their claims on Assam by the British. As a result, the Treaty of Yandaboo of 24th Feb 1825 came into being. Subsequently, Assam was added to the dominions of East India Company. By a proclamation in 1839 two districts namely Lakhimpur and Sibsagar were formed with Jorhat as a sub-division. Present Jorhat district is formed with two sub-divisions – Majuli and Jorhat. Jorhat is one of the important cities of Assam along with Guwahati, Dibrugarh and Silchar. Jorhat acts as a gateway to upper Assam and to the state of Nagaland. Jorhat has many firsts to its credit in different spheres. Jorhat was the first town of Greater Assam to install an electricity supply in 1923. The first aeroplane on northeastern soil was landed in Jorhat in 1928. Jorhat Gymkhana Club is the oldest golf course in Asia and the third oldest in the world. The first stadium of Assam was built in Jorhat. The world's oldest and largest Tea Experimental Station is located at Jorhat. The first non-government college of Assam J B College was established in Jorhat. The city has many research institutes, including the world's oldest and largest Tea Experimental Station, North East Institute of Science & Technology, Rain & Forest Research Institute, Central Muga Eri Research Institute and universities like Assam Agricultural University & Kaziranga University. Now Jorhat is a rapidly developing city and one of the major business & commercial hubs of

Northeast India. Its population has now increased to more than 0.1 million. The recent urban development of Jorhat has seen the rise of several high-cost apartments and flats with people flocking in from all parts of the state making it truly a cosmopolitan City. It was the last capital of the Ahom Kingdom and home to many historical monuments of Assamese culture. In the north of the district, the Brahmaputra River forms the second largest riverine island of the world, Majuli, which spreads over 924.6 square kilometers with a population of about 150,000. The island, threatened with constant erosion by the mighty and unstable Brahmaputra River, had been the principal place of pilgrimage for Vaishnavites since the age of the Ahom rulers. Several Sattras (monasteries) resembling those of medieval times are headed by Satradhikars teaching Vaishnavism, which was introduced by Srimanta Sankardeva (1449–1568). Each Sattra has an unknown wealth of Vaishnavite scriptures and extensive revenue-free lands cultivated by the Bhakats (celebrated monks) of the Sattras. The cultural diversities that prevailed in Jorhat nearly a century ago have inspired the people to participate in cultural activities through the decades and as a result, Jorhat has been able to produce many creative writers, musicians, actors, historians, and journalists, terming Jorhat "The Cultural Capital of Assam". The city today has evolved to be one of the major commercial and business hubs of the state with growing numbers of shopping malls, restaurants, hotels, residential apartments, and educational institutions. The city also serves as the base for tourism to famous places such as the Kaziranga National Park and the World's largest river island Majuli. Centrally located within the state, the city depicts a vibrant Assamese township and culture, making it one of the most preferred places for local people to conglomerate. This town was a flourishing and commercial metropolis but was destroyed by a series of Burmese invasions of Assam between 1817 and the arrival of the British force in the year 1824 under the stewardship of David Scott and Captain Richard. The British Rule, though not free from rebellions and revolutions, contributed to the reemergence of this historical town. From the very first decade of British rule, revolutionaries like Gomdhar Konwar, Jeuram Medhi, and Piyali Phukan emerged. The British system of administration came into vogue in the year 1839 with an established Police Thana. During the great Sepoy Mutiny, Maniram Dewan and Piyali Barua were hanged in public at this very place in 1858. In 1885, a narrow-gauge railway, Jorhat Provincial Railway, became operational. In time, this contributed to the rapid growth of the tea industry. Although the Civil Sub-division under the Sivasagar district at Jorhat was formed in 1869, it was declared the administrative headquarters of the undivided Sibsagar district in 1911. The undivided Sibsagar District comprised the present Sivasagar, Jorhat, Golaghat district, and parts of Karbi Anglong district. Major A. Play fair served as the first Deputy Commissioner. Presently, Jorhat is being modernized with many new commercial and non-commercial establishments. The old families of this ever-prosperous city have transformed the city into a bustling and well-organized entity. During the Second World War, Jorhat was one of the main supply depots in support of Allied forces fighting in China. 'Flying the Hump' of the Eastern Himalayas out of Jorhat with C-37 cargo planes and P-51 fighter support (Flying Tigers) was a regular occurrence.

*(**Source:** Census Report of Jorhat District, 2011)*

1.5 ARCHAEOLOGICAL SITES IN JORHAT DISTRICT

Archaeological sites are locations where remnants of past human activity are preserved, often including artifacts, structures, and other cultural materials. These sites can vary widely in scale and significance, ranging from ancient ruins of cities and temples to simple campsites or burial grounds. Archaeologists study these sites to gain insights into historical and prehistorical societies, their cultures, and their interactions with the environment. There are several Archeological Sites present in Jorhat District. Those are as follows:

1. **Name: Grave of Bahadur Gaon Burha**
   Geo-Coordinates: 26°75'96.22'' N 94°21'29.53'' E
   Locality: Jorhat Town
   Description: Bahadur Gaon Burha actively participated in the Indian Sepoy Mutiny of 1857. The grave of this patriot of the First War of Indian Independence is located on the road to Jorhat town.
   Status: Protected

Picture of Grave of Bahadur Gaon Burha

2. **Name: Baduli Pukhuri, Majgaon**
   Geo-Coordinates: 26°81'66.54'' N 94°38'60.55'' E
   Locality: Majgaon
   Description: A pukhuri is an Assamese word meaning a water reservoir or a pond. Pakhuris are very common in Assam and have been there for centuries. Pukhuris were built as reservoirs to store water so that there would be no water shortage in the winter and summer seasons. Baduli Pukahuri, also pronounced as Baduli Pukhuri, was built during the reign of King Jayadhvaj Sinha. It is a 18th Century tank and was excavated in memory of Baduli Barphukan who was the brother of Lachit Barphu kan. The tank was built after excavating a large piece of land. The tank lies very close to the Trunk Road at Teok. Teok is located at the eastern end of the Jorhat town near the National Highway 37.
   Status: Protected

Picture of Baduli Pukhuri, Majgaon

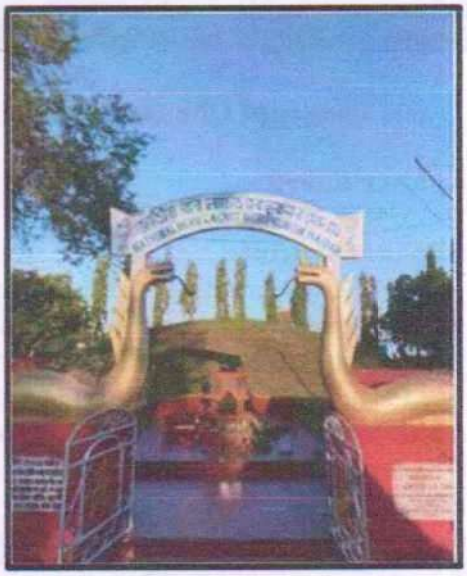
3. **Name: Maidam of Captain Gohain and His Wife**
   Geo-Coordinates: 26°47'38'' N 94°22'56'' E
   Locality: Majgaon
   Description: The Maidam of Captain Gohain/Jong Bahadur and his wife is located at Pirakota Gohain village in Teok, Jorhat district of Assam. The maidam is protected by a concrete boundary wall. Near the maidam another small earthen mound which could be identified as maidam of wife of Captain Gohain.
   Status: Protected

Picture of Maidam of Captain Gohain and His Wife

4. **Name: Buddhist Temple**
   Geo Coordinates: 26°44'10''N 94°13'34'' E
   Locality: Pather Syam Gaon
   Description: It is a 19th Century C.E. Pagoda style stupa.

Picture of Buddhist Temple

5. **Name: Lachit Barphu Kanar Maidam**
   Geo Coordinates: 26°78'23.94'' N 94°32'26.97'' E
   Locality: Narahiloid ari Gaon
   Description:
   It is a 17th Century Maidam. It is an earthen maidam of the ablest General of the Assamese Royal Army Lachit Barphukan during the reign of Swargadeo Chakradhawaj Singha (1663-1670). During the reign of Udayaditya Singha, the next Ahom ruler Lachit came to the rescue of his motherland in the historical battle of Saraighat in 1671. The maidam is dedicated to the legendary Ahom general, Lachit Borphukan, known for his decisive victory over the Mughals. The Maidam not only honors his legacy but also serves as a significant cultural and historical landmark, attracting visitors from far and wide.
   Status: Protected



Picture of Lachit Barphu Kanar Maidam

6. **Name: Chintamoni garh**
   Geo Coordinates: 26°44'43" N 94°29'10" E
   Locality: Chintamoni Garh
   Description: Chintamoni Garh, a village in Jorhat District, Assam, was once a strategic rampart built by the Ahom rulers to protect their capital, Rangpur, which thrived for 32 years. Situated 33 kilometers east of Jorhat, the historic site is surrounded by Gaurisagar, Amguri, and Longchem Tehsils. However, modern construction has severely degraded the rampart with only 1000 meters approximately remaining intact within a tea garden.
   Status: Unprotected

Picture of Chintamonigarh

7. **Name: Gomdhar Konwar Kshetra**
   Geo Coordinates: 26°43'18" N 94°25'40" E
   Locality: Gomdhar Konwar Kshetra
   Description: The historic site, spanning 4 bighas approximately, is nestled among Rajabari village to the north, Borgaon to the west, Dahotia to the south, and Sumuha to the east, honoring Ahom prince Gomdhar Konwar, born in 1809 at Lakwa. In 1827, he ascended to the throne in Rajabari, rallying troops to reclaim Rangpur, the Ahom capital, but was intercepted and imprisoned by British forces. Within the site's campus stands a statue of Gomdhar Konwar and a centuries-old tank, alongside a fragile Unprotected ARCH-ESTT0SITE/22/2024-ESTT-ARCH-Directorate of Archaeology I/780665/2024 wooden log, possibly a pillar, dating back to the 18th century.
   Status: Unprotected

Picture of Gomdhar Konwar Kshetra

8. **Name: Gabharu Parbat**
   Geo Coordinates: 26°42'50'' N 94°29'23'' E
   Locality: Gabharu Parbat
   Description: The site is located on the bank of Norajan, a river stream flowing nearby. The discovery of a centuries-old cannon at the Norajan riverbank site, now meticulously preserved at the Jorhat Museum, has unearthed a fascinating chapter in the rich history of the region. According to local lore, this revered relic is intricately linked to the courageous escape of Ahom King Gadadhar Singh, who bravely traversed the formidable Gabharu Parbat terrain, fleeing the kingdom's capital during a time of turmoil.
   Status: Unprotected

9. **Name: Ladhoigarh**
   Geo Coordinates: 26°59'10.18'' N 94°20'53.81'' E
   Locality: Ladhoigarh
   Description: The Ladhoigarh Rampart historical significance is set to preserved, despite its transformation into a motorable road for public convenience.
   Status: Unprotected

10. **Name: Borbheti Archeological Site**
    Geo Coordinates: 92°15' N 26°15' E
    Locality: Malou Pathar
    Description: The Borbheti Archeological Site is virtually a religious abode in the form of an earthen mound grown with trees and plants of a religious nature. The historical importance and dates back to the Ahom period.
    Status: Unprotected

11. **Name: Maidam of Neog Phukan and his wife**
    Geo Coordinates: 26°47'538" N 94°23'049" E
    Locality: Titabor
    Description: The Maidam of Neog Phukan is located in the Jorhat district amidst paddy field. There are two madams alongside which can be identified as the madam of wife of Neog Phukan.
    Status: Unprotected

12. **Name: Rajmow Pukhuri**
    Geo Coordinate: 27°02'389" N 94°15'482" E
    Locality: Jorhat town
    Description: The site has a historic tank excavated during the Ahom period
    Status: Unprotected

13. **Name: Raja Maidam**
    Geo Coordinate: 26°45'948" N 94°12'491" E
    Locality: Jorhat town
    Description: The site has historical maidams belonging to the Ahom kings Kameshwar Singha and Purandar Singha. A tank is also located in front of the maidams.
    Status: Unprotected

14. **Name: Hatigarh Rampart**
    Geo Cordinate: 26°46'746" N 94°16'115" E
    Locality: Hatigarh

Description: The rampart is 26km in length. It connects the Naga Pahar in the northern side and the Brahmaputra in the western side. The site has a pair of ramparts along with a ditch.
Status: Unprotected

1.6 DEMOGRAPHIC CHARACTERISTICS OF THE DISTRICT

According to the District Statistical Handbook, 2023 Jorhat district had a population of 924952 of which 471239 were males and 453713 females. The Jorhat district population constituted 2.96 percent of the total population of Assam. According to census, 2011. Jorhat had a sex ratio of 937 females for every 1000 males and a literacy percentage of 82.78 %.

Table No. 03: Demographic data table

Description	Statistical Data
Population	924952
Male Population	471239
Female Population	453713
Sex Ratio (Per 1000)	937
Rural Population	704418
Urban Population	220534
Decadal Growth Rate	9.21%
Density of Population	383
Literacy Percentage	73.60 %
Total Population Literates	680818
Total Male Literates	368366
Total Female Literates	312456
Children Age Group (0-6 Age)	102532
Boys Population (0-6 Age)	52104
Girls Population (0-6 Age)	50428

(Source: District Census Handbook Jorhat, 2023)

Figure 03: Distribution of Male & Female Population of Jorhat District

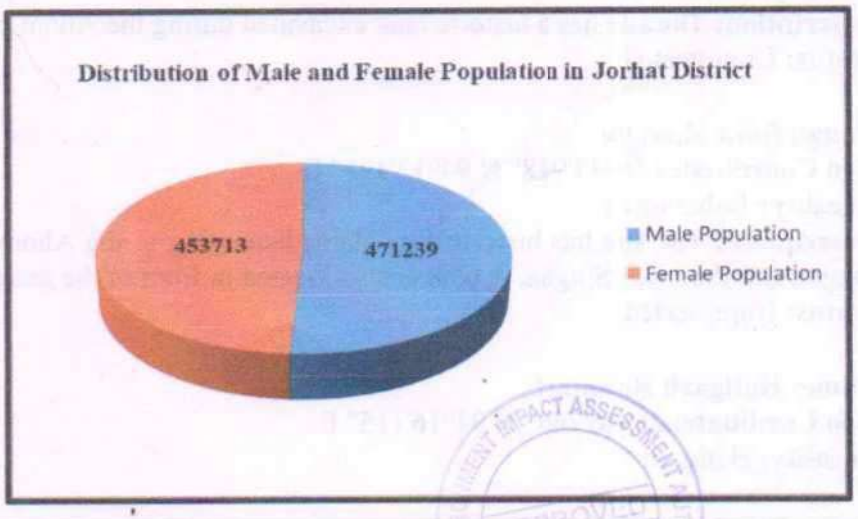


Figure 04: Male and Female Literates in Jorhat district

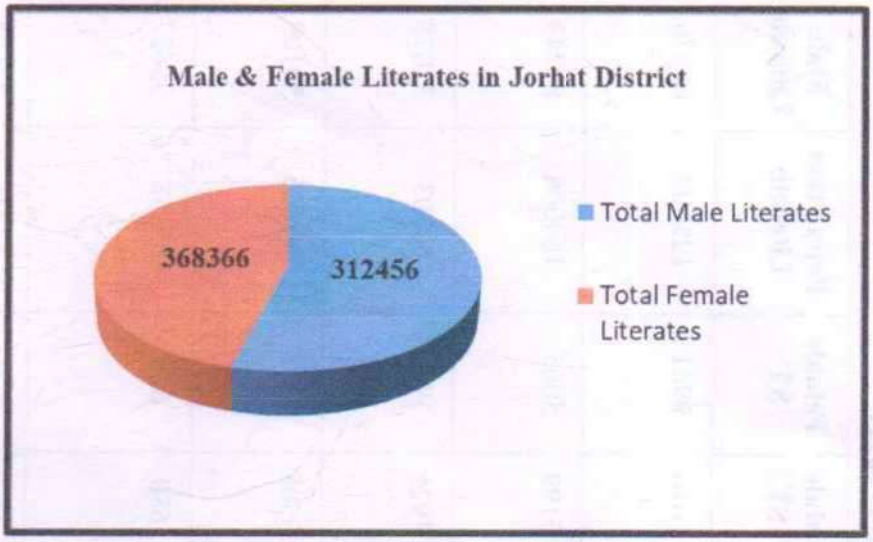


Figure 05: Population in Rural and Urban area of Jorhat District

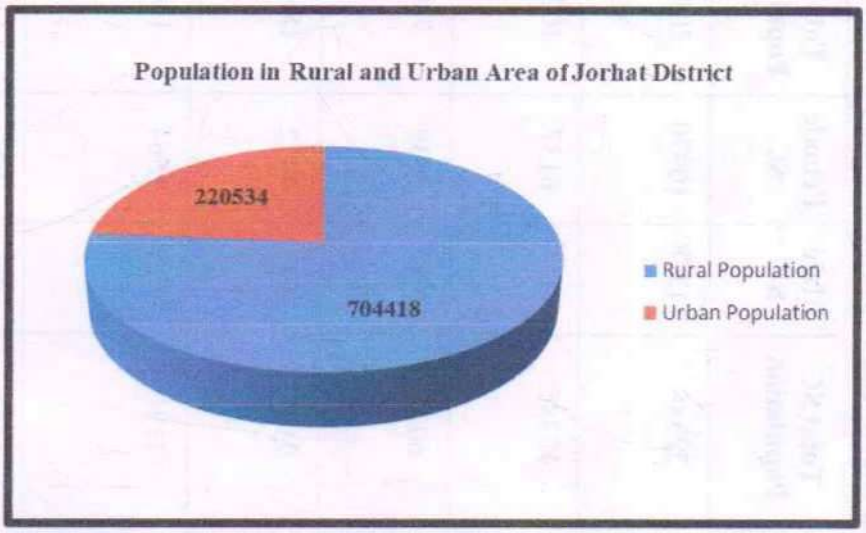


Figure 06: Distribution of Male & Female child population (0-6 years) of Jorhat district

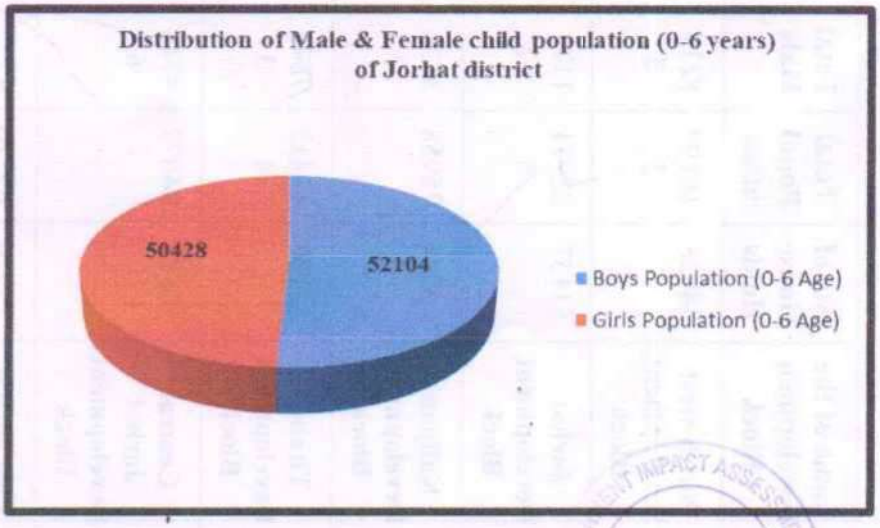


Table No. 04: Development Block-wise distribution of Population in Jorhat District

Development Block-wise Population in Jorhat District (Census 2011)														
Sl. No.	**Name of the Development Block**	**No. of House Holds**	**Total Population**	**Total Male**	**Total Female**	**Total SC Population**	**Male SC**	**Female SC**	**Total ST Population**	**Male ST**	**Female ST**	**Population Literate**	**Male Literate**	**Female Literate**
1	**North-west Development Block**	34828	161993	82183	79810	22348	11378	10970	20145	10164	9981	125602	66476	59126
2	**Jorhat Development Block**	51157	229716	117167	112549	12385	6248	6137	10264	5199	5065	164006	89744	74262
3	**Kalipani Development Block**	16594	75958	38567	37391	6026	3087	2939	7867	3925	3942	60203	32075	28128
4	**Titabor Development Block**	32977	154134	78433	75701	9107	4635	4472	18806	9508	9298	108025	59109	48916
5	**Central Jorhat Development Block**	20672	94077	47466	46611	3191	1627	1564	1303	680	623	65138	35637	0
6	**East Jorhat Development Block**	19924	89776	45357	44419	1906	970	936	1134	562	572	58745	32665	26080
	Total	**176152**	**805654**	**409173**	**396481**	**54963**	**27945**	**27018**	**59519**	**30038**	**29481**	**581719**	**315706**	**236512**

Table No. 05: Revenue Circle -wise distribution of Population in Jorhat District

Revenue Circle -wise Population in Jorhat District (Census 2011)															
Sl. No.	**Name of the Revenue Circles**	**No. of House Holds**	**Total Population**	**Total Male**	**Total Female**	**Age Group 0-6**	**Total SC Population**	**Total Male SC**	**Total Female SC**	**Total ST Population**	**Total Male ST**	**Total Female ST**	**Total Population Literate**	**Total Male Literate**	**Total Female Literate**
1	**Jorhat West Revenue Circle**	45895	211539	107852	103687	23807	23838	12123	11715	20962	10579	10383	159555	85657	73902
2	**Jorhat East Revenue Circle**	44942	195398	100763	94635	18789	16939	8525	8414	4303	2218	2085	159711	84806	74905
3	**Teok Revenue Circle**	40914	184611	93319	91292	20933	8752	4490	4262	8582	4314	4268	132851	72355	60496
4	**Titabor Revenue Circle**	43474	201791	102720	99071	22957	12283	6227	6056	26586	13395	13191	143932	78511	65421
5	**Mariani Revenue Circle**	28801	131613	66585	65028	16046	2975	1566	1409	1935	961	974	84769	47037	37732
	Total	**204026**	**924952**	**471239**	**453713**	**102532**	**64787**	**32931**	**31856**	**62368**	**31467**	**30901**	**680818**	**368366**	**312456**

1.7 NEED FOR DSR

Ministry of Environment, Forest, and Climate Change (MoEF& CC) has published several notifications time to time to formulate and implement the District Survey Report (DSR) for every district. Statutory Framework and its legal aspect with respect to DSR has given in the following table:

Table No. 06: Statutory Framework and guidelines on DSR with time scale

Year	Particulars
1986	The Environment (Protection) act, 1986 was enacted in 1986 by the Ministry of Environment and Forests with the objective of providing for the protection and improvement of the environment
1994	The Ministry of Environment, Forest & Climate Change (MoEF & CC) published the Environmental Impact Assessment Notification 1994 which is only applicable for Major Minerals more than 5 ha.
2006	To cover the minor minerals also into the purview of EIA, the MoEF & CC has issued EIA Notification SO 1533 (E), dated 14th September 2006, made mandatory to obtain environmental clearance for both Major & Minor Mineral more than 5 Ha.
2012	Further, Hon'ble Supreme Court wide order dated the 27th February 2012 in I.A. No.12- 13 of 2011 in Special Leave Petition (C) No.19628-19629 of 2009, in the matter of Deepak Kumar, etc. Vs. State of Haryana and Others etc., ordered that "leases of minor minerals including their renewal for an area of less than five hectares be granted by the States/Union Territories only after getting environmental clearance from MoEF"; and Hon'ble National Green Tribunal, order dated the 13th January, 2015 in the matter regarding sand mining has directed for making a policy on environmental clearance for mining leases in cluster for minor Minerals.
2013	Assam Minor Mineral Concession Rule 2013 recommended rules for regulating the grant of various forms of mineral concessions to prevent illegal mining in the district, The Rules detail restrictions on mining operations near villages, highways, and other structures, and the process for granting mining leases and contracts through competitive bidding or auctions and payments. It also covers General conditions to grant any mineral concession, regulation and control of mining operations, Restoration and Rehabilitation fund, illegal or unauthorised Mining and its consequences. It highlights the significance of scientific mining, detailed reporting, and adherence to environmental and safety regulations. Overall, the Rules aim to ensure responsible mineral extraction, prevent unauthorized activities, and promote sustainable mining practices in Assam, while providing a structured framework for granting and managing mineral concessions in the region.
March 2015	The Mines and Minerals (Development and Regulation) Amendment Act,2015 is an act to amend the Mines and Minerals (Development and Regulation) Act, 1957 which enacted on March 26, 2015,and became effective from January 12,

	2015,it introduced several key amendments, including the establishment of Special Courts for mining-related offenses, the requirement for prior approval from the Central Government for certain mining permits, and the extension of mining leases for captive purposes until March 31, 2030. It also revised provisions regarding the auctioning of expired leases and introduced new clauses related to the District Mineral Foundation payments. Additionally, the Act amended definitions and parameters related to mineral content and the powers of the Central Government in regulating mining activity
September 2015	Ministry of Mines notification on 17th September,2015 focuses on exercise of the powers conferred by sub-sections (5) and (6) of Section 9B of the Mines and Minerals (Development and Regulation) Act, 1957 (67 of 1957), the notification focused on specific rules made by Central Government specifying the amount to be paid by holder of a mining lease or a prospecting license-cum-mining lease, in addition to the royalty, to the District Mineral foundation of the district established by the concerned State Government through notification.
2016	The MoEF&CC in compliance of above Hon'ble Supreme Court's and NGT'S order has prepared "Sustainable Sand Mining Guidelines (SSMG), 2016" in consultation with State governments, detailing the provisions on environmental clearance (EC) for cluster, creation of District Environment Impact Assessment Authority, preparation of District survey report and proper monitoring of minor mineral. There by issued Notification dated 15.01.2016 for making certain amendments in the EIA Notification, 2006, and made mandatory to obtain EC for all minor minerals. Provisions have been made for the preparation of District survey report (DSR) for River bed mining and other minor minerals.
2018	MoEF& CC published a notification S.O. 3611(E) Dated 25th July, 2018 and recommended the format for District Survey Report. The notification stated about the objective of DSR i.e. "Identification of areas of aggradations or deposition where mining can be allowed; and identification of areas of erosion and proximity to infrastructural structures and installations where mining should be prohibited and calculation of annual rate of replenishment and allowing time for replenishment after mining in that area."
2020	Enforcement & Monitoring Guidelines for Sand Mining (EMGSM) 2020 has been published modifying Sustainable Sand Mining Guidelines, 2016 by MoEF& CC for effective enforcement of regulatory provisions and their monitoring. The EMGSM 2020 directed the states to carry out river audits, put detailed survey reports of all mining areas online and in the public domain, conduct replenishment studies of river beds, constantly monitor mining with drones, aerial surveys, ground surveys and set up dedicated task forces at district levels. The guidelines also push for online sales and purchase of sand and other riverbed materials to make the process transparent. They propose night surveillance of mining activity through night-vision drones.
October 2020	(In IA No 40/2020 41/2020, 46/2020, 47/2020) and vide order dated 14th October 2020 NGT also mandates that DSR/Replenishment Study should be prepared by a consultant having accreditation from NABET which further should be appraised by SEAC and approved by SEIAA. The consultant must

	follow procedure laid down under SSMMG-2016 and EMGSM-2020 during preparation of DSR.
February 2021	Government of Assam through Assam Minerals regulation and dealers' rule 2020 proposed rules to regulate the possession, storage, trading and transport of minerals and mineral products to check evasion of royalty or seigniorage fee, to stop illegal mining and transportation in the state of Assam. The rule is applicable to all Minerals Dealers and all industries/factories connected with the sale, purchase, transportation, processing and consumption of minerals for commercial purpose in the state of assam.
October 2021	Assam Minor Mineral Concession (Amendment) Rules, 2021 notified on October 7th, 2021, it focuses to reorganize the royalty payment process for minor minerals utilized by government departments and agencies. It establishes specific rates of royalties based on the project cost, excluding taxes, and mandates that these royalties be deducted at the time of payment to contractors or suppliers. Additionally, the rules introduce a structured collection process for urban local bodies, requiring royalties to be collected in installments throughout the construction phase, thereby ensuring compliance and proper financial management in the use of minor minerals.

1.8 SAND MINING GUIDELINES AND ACTS.

Important statutory provisions of Assam Minor Mineral Concession rule:

Mining operation under mining a mineral concession.

- No person shall undertake any prospecting or mining operation activity in respect of any minerals in any part of the State, except under and in accordance with the terms and conditions of a permit or a prospecting license or a mining lease or a mining contract or a permit, or a concession in any other form, as the case may be, granted.

- Provided that nothing in this sub-rule shall apply to any prospecting operation undertaken by the Geological Survey of India, the Indian Bureau of Mines, and the Atomic Minerals Directorate for Exploration and Research of the Central Government, the Directorate of Geology & Mining, Assam or the Mineral Exploration Corporation Limited.

Restriction on grant of mining lease/contract/ permit.

I. No mining lease/contract /permit shall be granted in respect of any land within a distance of: -

(i) Fifty meters from the outer periphery of the defined limits of any village habitation, National Highway, State Highway and other roads where such excavation does not required use of explosives.

(ii) Two hundred fifty metres for the outer periphery of the defined limits of any village habitation, National Highway, State Highway and other roads where use of explosives if required.

(iii)Five hundred metres from major structures like R.C.C. Bridge, Guide bund etc.

Provided that the Government may relax the above distance parameters, wherever required in the interest of working, mineral conservation or for any unforeseen reasons subject to such condition as may be imposed under the said relaxation.

(2) No mining lease/contract/permit or any other mineral concession shall be granted in respect of any such minor mineral or in respect of any specific or general area which the Government may notify.

Condition on which the Permit for mining/quarrying shall be granted

I. Any mining operation in the case of mining of brick earth or ordinary clay or alluvial deposit below a depth of 1.5 meter shall necessarily require formation of benches for safe mining. The benches would be formed in a manner that the width of the bench is not lesser than the height of the bench.

II. Any quarrying permit granted under these rules shall contain information with regard to the following:

a) Manner, mode and place of payment of rent, royalties, permit money, Rehabilitation and Restoration Fund amount and interest on delayed payments or any other dues as admissible under these rules.

b) Particulars of the receipt heads of the Government to which the payments are to be credited.

c) Grant, compensation of damage to the land owner for the land covered by the permit.

d) Felling the trees, pumping of ground water.

e) Restriction of surface operations in any area provided by any authority.

f) Entering and working in any forest area.

g) Reporting all accidents, use of explosives.

h) Indemnity to the Government against claim of third parties.

i) Mineral to be stacked, measured and dispatched.

j) Applicability of the provisions of all other statutes/rules framed by the Central and State Government.

k) Reclamation or restoration of the mining areas and security thereof.

l) Development and conservation of minerals and environment and ecology of the area.

m) Extent of the area or land from where the minor mineral shall be extracted.

n) Period within which the minor mineral shall be extracted and removed and delivery of possession of land on the expiry of such period or on removal of the quantity of the minor mineral for which the permit is valid/granted.

o) Release of security by the authority issuing permit after having satisfied that the permit holder has fulfilled all the conditions of the permit satisfactorily.

p) Any other condition, as may be found expedient by the competent authority to grant the permit, may be imposed in the interest of scientific mining, mineral conservation and mineral development.

III. In case of the permit holder is not able to remove the whole or any part of the mineral for which he obtained the permit within the permissible time for any reason, whatsoever, he shall not be entitled to claim the refund of permit amount/ royalty or any part thereof.

IV. The permit holders for the brick kilns shall furnish a solvent surety within fifteen days of the issue of the permit by submitting an undertaking of such surety that he would be responsible for deposit of all dues in case the permit holder fails to deposit the same.

Special conditions for river-bed

Following condition shall be application for excavation of minor mineral (s) from river beds in other to ensure safety of river-beds, structures and the adjoining areas:

- No mining would be permissible in a river-bed up to a distance of five times of the span of the bridge on up-stream side and ten times the span of such bridge on down-stream side, subject to minimum of 250 meters on the up-stream side and 500 meters on the down-stream side.
- There shall be maintained an un-mined block of 50 meters width after every block of 1000 meters over which mining is undertaking or at such distance as may be directed by the competent authority.
- The maximum depth of mining in the river-bed shall not exceed three meters measured from the un-mined bed level at any point of time with proper bench formation.
- Mining shall be restricted within the central 3/4th width of the river/ rivulet.
- No mining shall be permissible in an area up to a width specified by the competent authority from the action edges of embankments.
- Any others condition as may be required by the competent authority in public interest.

Sustainable Sand Mining Management Guidelines (SSMMG), 2016 by MoEF & CC.

The sustainable sand Mining Management Guidelines 2016 has been prepared after extensive consultation with the States and Stakeholders over a period of one year. The main objective of the Guideline is to ensure sustainable sand mining and environment friendly management practices in order to restore and maintain the ecology of river and other sand sources.

1. Parts of the river reach that experience deposition or aggradation shall be identified first. The Lease holder/ Environmental Clearance holder may be allowed to extract the sand and gravel deposit in these locations to manage aggradation problem.

2. The distance between sites for sand and gravel mining shall depend on the replenishment rate of the river. Sediment rating curve for the potential sites shall be developed and checked against the extracted volumes of sand and gravel.

3. Sand and gravel may be extracted across the entire active channel during the dry season.

4. Abandoned stream channels on terrace and inactive flood plains be preferred rather than active channels and their deltas and flood plains. Stream should not be diverted to form inactive channel.

5. Layers of sand and gravel which could be removed from the river bed shall depend on the width of the river and replenishment rate of the river.

6. Sand and gravel shall not be allowed to be extracted where erosion may occur, such as at the concave bank.

7. Segments of braided river system should be used preferably falling within the lateral migration area of the river regime that enhances the feasibility of sediment replenishment.

8. Sand and gravel shall not be extracted within 200 to 500 meters from any crucial hydraulic structure such as pumping station, water intakes, and bridges. The exact distance should be ascertained by the local authorities based on local situation. The cross-section survey should cover a minimum distance of 1.0 km upstream and 1.0 km downstream of the potential reach for extraction. The sediment sampling should include the bed material and bed material load before, during and after extraction period. Develop a sediment rating curve at the upstream end of the potential reach using the surveyed cross-section. Using the historical or gauged flow rating curve, determine the suitable period of high flow that can replenish the extracted volume. Calculate the extraction volume based on the sediment rating curve and high flow period after determining the allowable mining depth.

9. Sand and gravel could be extracted from the downstream of the sand bar at river bends. Retaining the upstream one to two-thirds of the bar and riparian vegetation is accepted as a method to promote channel stability.

10. The flood discharge capacity of the river could be maintained in areas where there are significant flood hazards to existing structures or infrastructure. Sand and gravel mining may be allowed to maintain the natural flow capacity based on surveyed cross-section history.

11. Alternatively, off-channel or floodplain extraction is recommended to allow rivers to replenish the quantity taken out during mining.

12. The Piedmont Zone (Bhabhar area) particularly in the Himalayan foothills, where riverbed material is mined, and this sandy-gravelly track constitutes excellent conduits and holds the greater potential for groundwater recharge. Mining in such areas should be preferred in locations selected away from the channel bank stretches.

13. Mining depth should be restricted to 3 meter and distance from the bank should be 3 meters or 10 percent of the river width whichever less.

14. The borrow area should preferably be located on the river side of the proposed embankment, because they get silted up in course of time. For low embankment less than 6 m in height, borrow area should not be selected within 25 m from the toe/heel of the embankment. In case of higher embankment, the distance should not be less than 50 m. In order to obviate the development of flow parallel to embankment, cross bars of width eight times the depth of borrow pits spaced 50 to 60 meters centre-to-centre should be left in the borrow pits.
15. Demarcation of mining area with pillars and geo-referencing should be done prior to start of mining.

- **Enforcement & Monitoring Guidelines for Sand Mining, 2020 (MoEF & CC)**

Ministry of Environment Forest & Climate Change formulated the Sustainable Sand Management Guidelines 2016 which focuses on the Management of Sand Mining in the Country. But in the recent past, it has been observed that apart from management and systematic mining practices there is an urgent need to have a guideline for effective enforcement of regulatory provision and their monitoring. Section 23 C of the MMDR, Act 1957 empowered the State Government to make rules for preventing illegal mining, transportation and storage of minerals. But in the recent past, it has been observed that there was large number of illegal mining cases in the Country and in some cases, many of the officers lost their lives while executing their duties for curbing illegal mining incidence. The illegal and uncontrolled illegal mining leads to loss of revenue to the State and degradation of the environment.

1. Parts of the river reach that experience deposition or aggradation shall be identified. The Leaseholder/ Environmental Clearance holder may be allowed to extract the sand and gravel deposit in these locations to manage aggradation problem.
2. The distance between sites for sand and gravel mining shall depend on the replenishment rate of the river. Sediment rating curve for the potential sites shall be developed and checked against the extracted volumes of sand and gravel.
3. Sand and gravel may be extracted across the entire active channel during the dry season.
4. Abandoned stream channels on the terrace and inactive floodplains be preferred rather than active channels and their deltas and floodplains. The stream should not be diverted to form an inactive channel.
5. Layers of sand and gravel which could be removed from the river bed shall depend on the width of the river and replenishment rate of the river.
6. Sand and gravel shall not be allowed to be extracted where erosion may occur, such as at the concave bank.
7. Segments of the braided river system should be used preferably falling within the lateral migration area of the river regime that enhances the feasibility of sediment replenishment.
8. Sand and gravel shall not be extracted up to a distance of 1kilometre (1 km) from major bridges and highways on both sides, or five times (5x) of the span (x) of a bridge/public

civil structure (including water intake points) on up-stream side and ten times (10x) the span of such bridge on down-stream side, subjected to a minimum of 250 meters on the upstream side and 500 meters on the downstream side.

9. The sediment sampling should include the bed material and bed material load before, during and after the extraction period. Develop a sediment rating curve at the upstream end of the potential reach using the surveyed cross-section. Using the historical or gauged flow rating curve, determine the suitable period of high flow that can replenish the extracted volume.

10. Calculate the extraction volume based on the sediment rating curve and high flow period after determining the allowable mining depth.

11. Sand and gravel could be extracted from the downstream of the sand bar at river bends. Retaining the upstream one to two-thirds of the bar and riparian vegetation is accepted as a method to promote channel stability.

12. The flood discharge capacity of the river could be maintained in areas where there is a significant flood hazard to existing structures or infrastructure. Sand and gravel mining may be allowed to maintain the natural flow capacity based on surveyed cross-section history. Alternatively, off-channel or floodplain extraction is recommended to allow rivers to replenish the quantity taken out during mining.

13. The Piedmont Zone (Bhabhar area) particularly in the Himalayan foothills, where riverbed material is mined, and this sandy-gravelly track constitutes excellent conduits and holds the greater potential for groundwater recharge. Mining in such areas should be preferred in locations selected away from the channel bank stretches.

14. Mining depth should be restricted to 3 meters and distance from the bank should be ¼th of the river width and should not be less than 7.5 meters.

15. The borrow area should preferably be located on the riverside of the proposed embankment because they get silted over time. For low embankment, less than 6 m in height, borrow area should not be selected within 25 m from the toe/heel of the embankment. In the case of the higher embankment, the distance should not be less than 50 m. To obviate the development of flow parallels to the embankment, crossbars of width eight times the depth of borrow pits spaced 50-to-60-meter center-to-center should be left in the borrow pits.

16. Demarcation of mining areas with pillars and geo-referencing should be done prior to the start of mining.

17. A buffer distance /un-mined block of 50 meters after every block of 1000 meter over which mining is undertaken or at such distance as may be directed/prescribed by the regulatory authority shall be maintained.

18. A buffer distance /unmined block of 50 meters after every block of 1000 meters over which mining is undertaken or at such distance as may be directed/prescribed by the regulatory authority shall be maintained.

19. River bed sand mining shall be restricted within the central 3/4th width of the river/rivulet or 7.5 meters (inward) from river banks but up to 10% of the width of the

river, as the case may be and decided by regulatory authority while granting environmental clearance in consultation with irrigation department. Regulating authority while regulating the zone of riverbed mining shall ensure that the objective to minimize the effects of riverbank erosion and consequential channel migration are achieved to the extent possible. In general, the area for removal of minerals shall not exceed 60% of the mine lease area, and any deviation or relaxation in this regard shall be adequately supported by the scientific report.

20. Mining Plan for the mining leases (non-government) on agricultural fields/Patta land shall only be approved if there is a possibility of replenishment of the mineral or when there is no riverbed mining possibility within 5 KM of the Patta land/Khatedari land. For government projects mining could be allowed on Patta land/Khatedari land but the mining should only be done by the Government agency and material should not be used for sale in the open market.

1.9 CONNECTIVITY

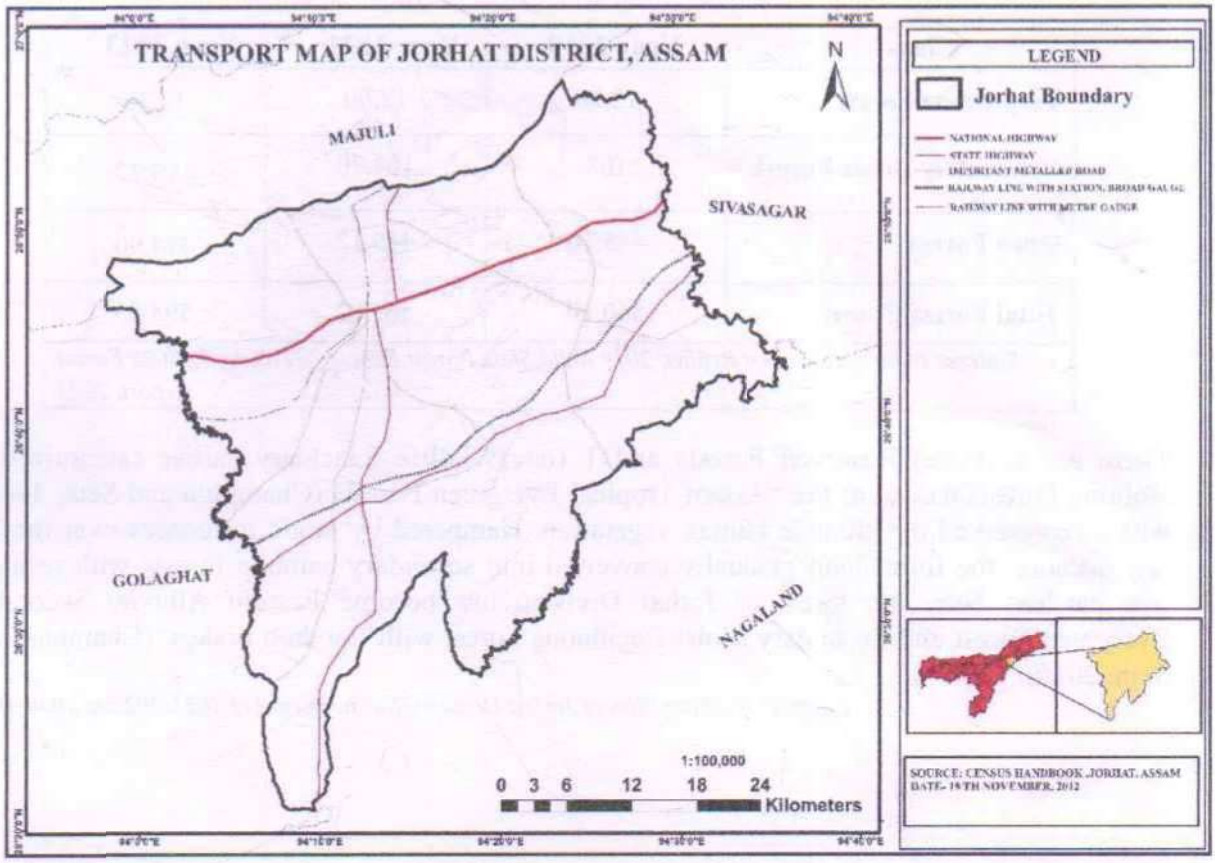
A major road like the National Highway No. 37 runs in the central part of the district. National Highway-37 runs through the district connecting Dergaon with Central Part of Jorhat District and Sibsagar District. Road networks pass through the center of the district connecting the Farkating of Golaghat District, Nazira with Jorhat District. State Highway passes through Golaghat Amguri area and also connects with Nagaland. This district is also well connected with day and night bus services with other places such as Guwahati, Dibrugarh, North Lakhimpur, Tezpur, Tinsukia, Nagaon, Dhemaji etc. There are also private bus services that are used for transportation to and from the place. Guwahati from the district headquarters is about 308 km.

The Northeast Frontier Railway (NFR) passes through the middle of the district. There are 14 railway stations present in this District. The Farkating Mariani branch railway station serves as Jorhat's railway link, offering frequent trains from the city to Guwahati. It has excellent connections to the rest of India and Assam's other main cities.

The Rowriah Airport, also called Jorhat Airport, is conveniently located within the city, making air travel there much more convenient. With daily flights from Guwahati and Kolkata as well as four weekly flights from New Delhi, Jorhat has excellent air connectivity.

Existing sand mining areas of the district are connected with the state highways by blacktop or village/link roads. However, there is a scope for the development of the infrastructural structure. Mining of riverbed sand in the potential areas can generate considerable revenue and can be utilized for the development of the road network and infrastructure of the district.

Figure 07: Transport Map of Jorhat and Jorhat District



(Source: Census Data of Jorhat District,2011)

1.10 Forest Cover Details of the District

According to ISFR 2019, total forest cover of the Jorhat district was 560.10 sq. km in which 12.00 sq. km. belonged to very dense forest, 103 sq. km. was moderately dense forest and 445.10 sq. km. was Open Forest *(ISFR, 2019)*. On the other hand, according to ISFR 2021, total forest cover of the Jorhat district was 565.82 sq. km in which 12 sq. km. belongs to very dense forest, around 104.70 sq. Km. moderately dense forest area and about 565.82 sq. km. are belong to Open Forest *(ISFR, 2021)*. The total area covered by forest in the district in 2023 is 598.53 sq. km. which constitutes 34.04% of the total land area. Dense forest covers 13.36 sq. km., moderately dense forest covers 110.27 sq. km. and open forest constitutes 474.90 sq. km. A wide range of timber and Non-Timber Forest Produce (NTFP) are harvested for both domestic and commercial use. These include cane, industrial wood, fuel, bamboo, thatch and thatching material, bark, gum and resin, fiber and floss, and edible fruits. The State's biodiversity, wildlife, and general ecology are seriously threatened by the high prevalence of biotic and extractive pressure on animal products, compromising their physical and ecological integrity. With the assistance of the Agence Française de Dévelopment, the Government of Assam (GoA) is working to ensure the well-being of the people by conserving and managing natural resources effectively. *(ISFR, 2023)*

Table No. 07: Details of Forest Cover in the district Jorhat (In Sq. Km.)

Class	Year 2019	Year 2021	Year 2023
Very Dense Forest	12.00	12.00	13.36
Moderately Dense Forest	103	104.70	110.27
Open Forest	445.10	449.12	474.90
Total Forest Cover	560.10	565.82	598.53

Source: *India State Forest Report, 2019 India State Forest Report 2021& India State Forest Report, 2023*

There are 3 (three) Reserved Forests and 1 (one)Wildlife Sanctuary earlier categorized as Hollong Forests named as the "Assam Tropical Evergreen Forests (Champion and Seth, 1968)" which represented the climatic climax vegetation. Hampered by biotic influences over the last few decades, the forest land gradually converted into secondary bamboo forests with sporadic tree patches. Now the forest of Jorhat Division has become Eastern Alluvial Secondary Evergreen Forest and Secondary Moist Deciduous Forest with Bamboo brakes. (Champion and Seth, 2016).

(Source: Working Plan of Jorhat Division, for the period of 2021-2022 to 2030-2031)

CHAPTER 2: OVERVIEW OF THE MINING ACTIVITY IN THE DISTRICT

2.1 INTRODUCTION:

Jorhat district has been endowed with various valuable mineral resources. Sand, Silt, and Clay are mined out from the district.

Table No. 08A: Mineral-wise Existing leases in the district

River Bed Mines		
Sl. No.	**River Name**	**No. of Leases**
1	Charaipani River	1
2	Brahmaputra River	6
3	Jhanji River	12
4	Bhogdoi River	21
TOTAL		**40**

Table No. 08B: River-wise Proposed Mineral Zones in the District

Sl. No.	River Name	No. of Zones
1	Bhogdoi River	10
2	Jhanji River	04
3	Brahmaputra River	03
TOTAL		**17**

2.2 DETAILS OF MINERAL BASED ON INDUSTRIES:

Sand is a multi-purpose topographical material. It is known as one of the three fundamental ingredients in concrete, it is extensively used in construction for infrastructure developments. With the increase of urbanization, the demand for sand is growing in the infrastructure sector in our country. The mineral is used for making concrete, filling roads, building sites, brick making, making glass, sandpapers, reclamations etc. Sand is one of the most plentiful natural resources having the ability to replenish itself. This mineral has a huge demand in any infrastructure project within the District as well as within other districts.

CHAPTER 3: DETAILS OF THE MINING LEASE IN THE DISTRICT

3.1 DETAILS OF MINE LEASES IN THE DISTRICT

In the Jorhat district, there are 40 existing leases covering a total area of 106.32Ha. Out of these 40 leases, 21 leases are in Bhogdoi River, 06 leases are in Brahmaputra River, 01 lease is in Charaipani River, and 12 leases in Jhanji River.

There are also 17 river bed zones are proposed in Jorhat District, covering about 92.35 Ha. Out of which, 10 zones are in Bhogdoi River, 04 zones are in Jhanji River and 3 zones are in Brahmaputra River.

Table No.09: Details of Existing Mining Leases (River Bed) in Jorhat District

Sl. No.	Block Identification Code	Name of the Mine	Applicant Details	Village	Allotted Area (In Ha.)	Mining Permit Area (In Ha.)	Geo-coordinate		Mineral Type	Production (In Cum)		Remarks	Running/ Closed
							Latitude	Longitude		Sand	Ordinary Clay/Silt		
Brahmaputra River													
01	ASM_JHT_EXT_BHMP_01	JHANJIMUKH KOMAR GAON SILT MPA	BISWAJIT SHARMA RABI BARUAH CHUK, PO. RABI GAON, TEOK, JORHAT, ASSAM, 785683	Jhanjimukh	4.8	4.8	26°53'58.51" N 26°53'56.19" N 26°53'58.77" N 26°54'1.48" N	94°20'27.43" E 94°20'27.63" E 94°20'50.03" E 94°20'49.13" E	Ordinary Clay	--	12,500	Existing	Running
02	ASM_JHT_EXT_BHMP_02	Brahmaputra River Ordinary Clay/Silt MPA	Sanjay Agarwala, (Director) M P AGARWALA PRIVATE LIMITED 3F, Peace Enclave, Uluhari, Ghy-7, KAMRUP METRO, ASSAM, 781007	Major Chapori	4.9	4.9	26°53'16.84" N 26°53'15.58" N 26°53'25.58" N 26°53'23.32" N	94°19'8.98" E 94°19'12.10" E 94°19'25.08" E 94°19'28.38" E	Ordinary Clay	--	36,000	Existing	Closed
03	ASM_JHT_EXT_BHMP_03	Brahamaputra River MPA-1	Arindom Sarma, ARIPRO Pvt. Ltd, lease permit for 2 yrs	Kokilamukh	5	5	26°50'4.68"N 26°49'58.21"N 26°50'0.19"N 26°50'7.33"N	94°9'44.71"E 94°9'46.63"E 94°9'54.78"E 94°9'52.33"E	Ordinary Clay	--	50000	Existing	Closed
04	ASM_JHT_EXT_BHMP_04	BRAHMAPUTRA RIVER SILT MINING PERMIT AREA, KOKILAMUKH	Arindom Sharma, DBM PLAZA, PO JORHAT, JORHAT, ASSAM, 785001	Kokilamukh	3.23	3.23	26°49'52.38" N 26°49'44.78" N 26°49'46.64" N 26°49'52.97" N	94°9'36.30" E 94°9'33.28" E 94°9'38.26" E 94°9'30.81" E	Ordinary Clay	--	20,000	Existing	Running
05	ASM_JHT_EXT_BHMP_05	BRAHMAPUTRA RIVER ORDINARY CLAY/SILT MPA PLOT-1	BHOBEN GOGOI UJONI JAMUGURI GAON, PO-AAU, JORHAT, PS- JORHAT, Dist. JORHAT, ASSAM, 785013	Kokilamukh	4.85	4.85	26° 49' 55.03" N 26° 49' 55.00" N 26° 49' 43.87" N 26° 49' 43.96" N	94° 09' 5.08" E 94° 09' 10.86" E 94° 09' 12.08" E 94° 09' 7.66" E	Ordinary Clay	--	25,000	Existing	Running
06	ASM_JHT_EXT_BHMP_06	BRAHMAPUTRA RIVER ORDINARY CLAY/SILT MPA - Pt. 2	SADGURU ENGINEERS & ALLIED SERVICES PRIVATE LIMITED	Kokilamukh	4.88	4.88	26°49'50.32" N 26°49'46.15" N 26°49'50.65" N 26°49'46.55" N	94°8'19.34" E 94°8'18.86" E 94°8'32.95" E 94°8'32.80" E	Ordinary Clay	--	36,000	Existing	Closed
Charaipani River													
07	ASM_JHT_EXT_CHRP_01	Charaipani Earth /Clay MPA	Nabajyoti Neog, permit holder, lease period 2 yrs	Tengal Gaon	3	2.35	26°32'56.15"N 26°32'56.00"N 26°33'0.87"N 26°32'50.05"N 26°32'50.40"N	94°12'22.80"E 94°12'22.53"E 94°11'47.40"E 94°11'6.05"E 94°11'5.98"E	Ordinary Clay	--	1500	Existing	Closed

							26°33'1.19"N	94°11'47.47"E					
							Jhanji River						
08	ASM_JHT_EXT_JNJ_01	Jhanji River Laojan MPA	Rahul Neog permit holder, lease period 2yrs	Lawjan	0.3	0.3	26°45'25.99"N 26°45'26.29"N 26°45'24.79"N 26°45'22.69"N 26°45'22.44"N 26°45'24.90"N	94°31'42.49"E 94°31'42.91"E 94°31'45.85"E 94°31'48.44"E 94°31'48.05"E 94°31'44.66"E	Sand	3000	--	Existing	Closed
09	ASM_JHT_EXT_JNJ_02	JHANJI RIVER SELENG TEA BAGISA (LAWJAN) MPA	BHOBEN GOGOI UJONI JAMUGURI GAON, PO-AAU, JORHAT, PS- JORHAT, Dist. JORHAT, ASSAM, 785013	Jamuguri Gaon	1.15	0.86	26° 45' 46.68" N 26° 45' 46.36" N 26° 45' 57.94" N 26° 45' 57.27" N	94° 31' 0.31" E 94° 30' 59.91" E 94° 31' 13.55" E 94° 31' 14.42" E	Sand	6,000	--	Existing	Running
10	ASM_JHT_EXT_JNJ_03	Jhanji Tengabari Dulia MCA No 1	Narayan Chutia LOI holder lease period for 2 yrs	Tengabari Gaon	1.24	1.24	26°46'47.72"N 26°46'47.63"N 26°46'43.58"N 26°46'42.29"N	94°31'0.21"E 94°30'59.51"E 94°31'0.60"E 94°30'58.21"E	Sand	10000	--	Existing	Closed
11	ASM_JHT_EXT_JNJ_04	Jhanji Tengabari Dulia MCA No 2	Narayan Chutia LOI holder lease period for 2 yrs	Tengabari Gaon	1	1	26°47'25.39"N 26°47'25.15"N 26°48'23.53"N 26°47'23.08"N	94°31'19.38"E 94°31'19.43"E 94°31'25.05"E 94°31'24.91"E	Sand	10000	--	Existing	Closed
12	ASM_JHT_EXT_JNJ_05	JHANJI PADUMONI MCA	Divisional Forest Officer, Jorhat Division	Bhuyan Hat	4.69	3.69	26°52'53.23"N 26°52'53.34"N 26°52'26.32"N 26°52'26.47"N	94°29'33.74"E 94°29'34.47"E 94°29'31.07"E 94°29'31.71"E	Sand	10,000	--	Existing	Running
13	ASM_JHT_EXT_JNJ_06	JHANJI - TETELIGURI MCA	Divisional Forest Officer, Jorhat Division	Simalguri Gaon	3.45	2.74	26°51'8.90" N 26°51'9.21" N 26°51'50.13" N 26°51'49.87" N	94°29'25.79" E 94°29'26.74" E 94°29'33.95" E 94°29'34.50" E	Sand	10,000	--	Existing	Running
14	ASM_JHT_EXT_JNJ_07	Jhanji Simaluguri MPA	Samar Gogoi, permit holder lease period 2 yrs	Bamun Moran	0.65	0.65	26°52'53.23"N 26°52'53.34"N 26°52'26.32"N 26°52'26.47"N	94°29'33.74"E 94°29'34.47"E 94°29'31.07"E 94°29'31.71"E	Sand	5000	--	Existing	Closed
15	ASM_JHT_EXT_JNJ_08	Jhanji Tamulisiga Bonai MCA	Pulin Mahanta, LOI holder, Lease period for 2 yrs (Distance is 5.37 Km both GPS point)	Tamulisiga	4.82	4.82	26°52'58.85"N 26°52'52.37"N 26°52'59.32"N 26°52'51.73"N	94°27'02.52"E 94°27'00.41"E 94°27'04.32"E 94°27'01.58"E	Sand	15000	--	Existing	Closed
16	ASM_JHT_EXT_JNJ_09	Jhanji Tamulisiga Bonai MCA		Tamulisiga	2.33	2.33	26°52'55.27"N 26°52'50.84"N 26°52'58.08"N 26°52'51.56"N	94°29'23.01"E 94°29'33.49"E 94°29'35.58"E 94°29'35.59"E	Sand	15000	--	Existing	Closed
17	ASM_JHT_EXT_JNJ_10	Jhanji Tamulisiga MPA	Samudra Gogoi permit holder Lease period 6 months	Tamulisiga Dulia	0.5	0.5	26°53'14.61"N 26°53'15.46"N 26°53'12.97"N 26°53'12.74"N	94°27'50.60"E 94°27'50.86"E 94°27'56.86"E 94°27'56.02"E	Sand	2200	--	Existing	Running
18	ASM_JHT_EXT_JNJ_11	Jhanji Bohotiamukh	Biswajit Sarma, permit holder, lease period 1 yr	Bohotiamukh Gaon	2.4	2.4	26°53'11.93"N 26°53'13.17"N 26°53'22.72"N 26°53'23.88"N	94°27'08.28"E 94°27'07.93"E 94°27'27.79"E 94°27'26.36"E	Sand	7000	--	Existing	Running

19	ASM_JHT_EXT_JNJ_12	Jhanji Bonai MPA	Biswajit Sarma, permit holder, lease period 1 yr	Bonai Gaon	1.4	1.4	26°53'10.91"N 26°53'11.74"N 26°52'56.99"N 26°52'56.63"N	94°26'24.86"E 94°26'25.20"E 94°26'35.00"E 94°26'33.81"E	Sand	2000	--	Existing	Closed
							Bhogdoi River						
20	ASM_JHT_EXT_BGD_01	Bhogdoi River Dessoi Bagan MPA	Manob Dutta, permit holder, lease period 1 yr	Dessoi Gaon	0.65	0.65	26°38'05.32"N 26°38'04.78"N 26°38'00.83"N 26°38'01.50"N	94°22'6.14"E 94°22'5.71"E 94°22'17.21"E 94°22'17.22"E	Sand	5000	--	Existing	Closed
21	ASM_JHT_EXT_BGD_02	Bhogdoi River Nagajanka MPA	Biju Dutta, permit holder, lease period 2 yrs	Dessoi Gaon	0.59	0.59	26°38'11.30"N 26°38'11.39"N 26°38'07.65"N 26°38'07.58"N	94°21'55.08"E 94°21'55.93"E 94°22'00.21"E 94°22'01.48"E	Sand	5000	--	Existing	Closed
22	ASM_JHT_EXT_BGD_03	Bhogdoi River Dhodarali MPA	Suresh Kr. Agarwalla, permit holder, lease period 2 yrs	Gangapur Gaon	3.5	3.5	26°39'02.35"N 26°39'03.52"N 26°38'52.18"N 26°38'53.10"N	94°19'58.35"E 94°19'58.52"E 94°20'14.97"E 94°20'13.43"E	Sand	4100	--	Existing	Running
23	ASM_JHT_EXT_BGD_04	Bhogdoi River Kothalguri MPA	Monaj More, & Shantanu Kalita,permit period for 18 months	Mariani	1.2	1.2	26°39'21.73"N 26°39'22.98"N 26°39'27.77"N 26°39'27.85"N	94°19'32.91"E 94°19'32.65"E 94°19'23.84"E 94°19'22.54"E	Sand	5000	--	Existing	Closed
24	ASM_JHT_EXT_BGD_05	Bhogdoi Kothalguri MPA 1	Priyanka Dutta permit holder, lease period 1 yr	Mariani	0.6	0.6	26°39'30.21"N 26°39'30.91"N 26°39'33.01"N 26°39'32.77"N	94°19'26.17"E 94°19'25.70"E 94°19'32.57"E 94°19'30.34"E	Sand	5000	--	Existing	Closed
25	ASM_JHT_EXT_BGD_06	Bhogdoi River Murmuria 14 No. Line	B.T Supplier, permit h0older, period 2 yrs	Murmuria	2.45	2.45	26°42'49.74"N 26°42'51.60"N 26°42'45.75"N 26°42'47.66"N	94°16'55.48"E 94°16'56.86"E 94°17'08.26"E 94°17'09.52"E	Sand	9000	--	Existing	Closed
26	ASM_JHT_EXT_BGD_07	Bhugdoi River Murmuria MPA (Spot-2)	Ranjan Tasha, permit holder, lease period 2 yrs	Murmuria	0.7	0.7	26°43'53.69"N 26°43'53.43"N 26°43'50.79"N 26°43'50.37"N	94°16'41.76"E 94°16'44.30"E 94°16'39.88"E 94°16'42.41"E	Sand	5000	--	Existing	Closed
27	ASM_JHT_EXT_BGD_08	Bhugdoi River Murmuria MPA (Spot-1)		Dulia Gaon	3.48	3.48	26°44'06.31"N 26°44'08.54"N 26°44'03.11"N 26°44'05.26"N	94°16'25.42"E 94°16'24.89"E 94°16'37.68"E 94°16'38.51"E			--	Existing	Closed
28	ASM_JHT_EXT_BGD_09	BHOGDOI RIVER DULIA GAON SAND MPA	BHOBEN GOGOI UJONI JAMUGURI GAON, PO-AAU, PS-JORHAT, Dist. JORHAT, ASSAM, 785013	Dulia Gaon	1.9	1.9	26° 44' 23.02" N 26° 44' 22.69" N 26° 44' 34.29" N 26° 44' 33.12" N	94° 16' 21.19" E 94° 16' 22.84" E 94° 16' 18.91" E 94° 16' 18.64" E	Sand	10,000	--	Existing and overlapping	Running
29	ASM_JHT_EXT_BGD_10	Bhogdoi River Dulia Gaon MPA	Sumesh Tanti, permit holder, lease period 2 yrs	Bhaskar Nagar	0.86	0.86	26°44'34.77"N 26°44'34.17"N 26°44'24.96"N 26°44'25.16"N	94°16'14.90"E 94°16'15.41"E 94°16'23.11"E 94°16'22.85"E	Sand	5000	--	Existing and overlapping	Closed
30	ASM_JHT_EXT_BGD_11	Bhogdoi Bhaskar Nagar MPA 2	M/S Phoniexx Enterprise, permit holder, lease period 2 yrs	Dulia Gaon	0.55	0.55	26°44'53.42"N 26°44'53.86"N 26°44'47.39"N 26°44'47.77"N	94°15'57.45"E 94°15'58.19"E 94°16'01.49"E 94°16'02.34"E	Sand	7000	--	Existing	Closed

31	ASM_JHT_EXT_BGD_12	Bhogdoi Garmur Dulia Gaon MPA	Bijoy K. Rajkhowa Permit Holder Lease period for 2 years	Garmur	2.73	2.73	26°44'59.69"N 26°44'57.00"N 26°44'59.29"N 26°44'57.35"N	94°15'31.11"E 94°15'30.69"E 94°15'44.66"E 94°15'44.61"E	Sand	4000	--	Existing	Closed
32	ASM_JHT_EXT_BGD_13	Bhogdoi Garmur MCA No.1	Pulin Mahanta, LOI holder, Lease period for 2 yrs	Garmur	4.98	4.98	26°45'8.95"N 26°45'1.98"N 26°45'11.35"N 26°45'4.22"N	94°14'30.30"E 94°15'13.74"E 94°14'55.96"E 94°15'15.21"E	Sand	20000	--	Existing	Closed
33	ASM_JHT_EXT_BGD_14	Bhogdoi Garmur MCA No.2	Pulin Mahanta, LOI holder, Lease period for 2 yrs	Desoi Nagar	4.83	4.83	26°45'21.32"N 26°45'15.26"N 26°45'22.60"N 26°45'13.68"N	94°13'56.97"E 94°14'30.30"E 94°13'58.04"E 94°14'31.13"E	Sand	20000	--	Existing	Closed
34	ASM_JHT_EXT_BGD_15	Bhogdoi Malow Ali By-Pass (Silt) MPA	Prasurjya Kalita, permit holder, lease period 2 yrs	Malow Ali	2.44	2.21	26°47'09.92"N 26°47'07.69"N 26°46'57.11"N 26°46'59.67"N	94°12'04.26"E 94°12'03.06"E 94°12'20.89"E 94°12'24.45"E	Ordinary Clay	--	40000	Existing	Running
35	ASM_JHT_EXT_BGD_16	Bhogdoi Malow Ali Bypass	M/S AMDC, Ghy Lease period for 2 yrs	Dagayan Gaon	3.92	3.92	26°46'43.08"N 26°46'31.41"N 26°46'32.73"N 26°46'44.39"N	94°11'6.96"E 94°10'56.89"E 94°10'56.87"E 94°11'6.74"E	Sand	20000	--	Existing	Closed
36	ASM_JHT_EXT_BGD_17	Bhogdoi Dagayan Gaon 2 No. MPA	Goutam Bora, permit holder, lease period 2 yrs	Pahumora Gaon	3.25	2.44	26°46'48.40"N 26°46'47.21"N 26°46'48.18"N 26°46'46.85"N	94°9'44.78"E 94°9'45.09"E 94°10'10.53"E 94°10'9.98"E	Sand	5000	--	Existing	Closed
37	ASM_JHT_EXT_BGD_18	Bhogdoi River Da Gayan Gaon MPA	Debanga Buragohain, permit holder, lease period 2 yrs	Sahpuria Gaon	1.8	1.8	26°47'03.24"N 26°47'01.75"N 26°46'58.63"N 26°46'59.76"N	94°09'10.81"E 94°09'10.82"E 94°8'56.78"E 94°08'56.87"E	Sand	8000	--	Existing	Closed
38	ASM_JHT_EXT_BGD_19	Bhogdoi River Sand Mining Permit Area	M/S Anupam Nirman Pvt. Ltd, permit holder, lease period 2 yrs	MalowKhat	4.76	4.76	26°47'7.46"N 26°47'7.51"N 26°46'52.75"N 26°46'51.48"N	94°8'16.06"E 94°8'17.05"E 94°8'39.98"E 94°8'41.19"E	Sand	10000	--	Existing	Closed
39	ASM_JHT_EXT_BGD_20	Bhogdoi MalowKhat MPA	Aditya Baishya, permit holder, lease period 2 yrs	Solmora	3.1	3.1	26°47'35.03"N 26°47'35.63"N 26°47'14.07"N 26°47'13.01"N	94°7'39.92"E 94°7'41.10"E 94°8'1.53"E 94°8'1.33"E	Sand	5000	--	Existing	Closed
40	ASM_JHT_EXT_BGD_21	Bhogdoi Solmora MPA (Silt) MPA	Prasurjya Kalita, permit holder, lease period 2 yrs	Dulia Gaon	3.44	3.12	26°47'6.40"N 26°47'5.77"N 26°47'4.05"N 26°47'3.41"N	94°05'59.68"E 94°06'0.73"E 94°06'41.95"E 94°06'43.01"E	Ordinary Clay	--	40000	Existing	Closed
Total					**106.32**	**102.31**							

***Note: Detailed Map of Existing site have been incorporated in the Annexure**

Table No. 10: Proposed River Bed Mineral Zones in the District

Sl. No.	Block Identification Code	Area (In Ha.)	Village	Geo-coordinate		Mineral Type	Depth (In Meters)	Total Resources (In Cum)	Mineable Resources (60% of Total Resources) (In Cum)	Remarks
				Latitude	Longitude					
Bhogdoi River										
1	ASM_JHT_PRO_BGD_01	1	Nagajanka	26°38'3.28"N 26°38'4.07"N 26°38'10.26"N 26°38'9.52"N	94°22'8.37"E 94°22'8.83"E 94°21'58.99"E 94°21'58.33"E	Sand	1	10000	6000	Proposed
2	ASM_JHT_PRO_BGD_02	1	Nagajanka	26°38'11.84"N 26°38'12.55"N 26°38'10.34"N 26°38'9.98"N	94°21'53.35"E 94°21'53.54"E 94°21'41.14"E 94°21'40.91"E	Sand	1	10000	6000	Proposed
3	ASM_JHT_PRO_BGD_03	2.76	Nagajanka	26°38'11.18"N 26°38'11.69"N 26°38'18.08"N 26°38'26.21"N 26°38'26.11"N	94°21'39.07"E 94°21'40.00"E 94°21'36.94"E 94°21'15.82"E 94°21'13.82"E	Sand	1	27600	16560	Proposed
4	ASM_JHT_PRO_BGD_04	2.27	Kalyanpur Gaon	26°38'45.30"N 26°38'37.86"N 26°38'39.02"N 26°38'40.08"N	94°20'40.74"E 94°20'28.13"E 94°20'23.02"E 94°20'23.43"E	Sand	1	22700	13620	Proposed
5	ASM_JHT_PRO_BGD_05	1.61	Dewaguri Chapori	26°39'56.67"N 26°39'56.78"N 26°40'15.47"N 26°40'18.01"N	94°18'49.91"E 94°18'50.96"E 94°18'53.30"E 94°18'51.21"E	Sand	1	16100	9660	Proposed

6	ASM_JHT_PRO_BGD_06	2.71	Murmuria	26°42'23.30"N 26°42'26.14"N 26°42'44.48"N 26°42'42.04"N	94°17'28.68"E 94°17'24.58"E 94°17'31.35"E 94°17'33.45"E	Sand	1	27100	16260	Proposed
7	ASM_JHT_PRO_BGD_07	5.4	Murmuria	26°42'47.97"N 26°42'58.00"N 26°43'9.03"N 26°43'17.56"N 26°43'16.85"N 26°43'9.23"N	94°16'59.52"E 94°16'54.17"E 94°17'4.64"E 94°16'44.19"E 94°16'42.62"E 94°17'2.57"E	Sand	1	54000	32400	Proposed
8	ASM_JHT_PRO_BGD_08	3.34	Mout Gaon	26°43'23.23"N 26°43'23.30"N 26°43'44.16"N 26°43'56.11"N 26°43'55.80"N 26°43'45.65"N	94°16'43.22"E 94°16'42.42"E 94°16'36.71"E 94°16'42.62"E 94°16'44.09"E 94°16'38.05"E	Sand	1	33400	20040	Proposed
9	ASM_JHT_PRO_BGD_09	4.9	Gowala Basti	26°43'57.97"N 26°43'57.76"N 26°44'7.93"N 26°44'9.52"N	94°16'44.20"E 94°16'42.53"E 94°16'19.45"E 94°16'20.66"E	Sand	1	49000	29400	Proposed
10	ASM_JHT_PRO_BGD_10	1.65	Aliamukhia Gaon	26°45'3.79"N 26°45'1.87"N 26°44'59.15"N 26°45'0.97"N	94°15'15.36"E 94°15'14.71"E 94°15'24.67"E 94°15'25.13"E	Sand	1	16500	9900	Proposed
Total								**266400**	**159840**	**Proposed**
Jhanji River										
11	ASM_JHT_PRO_JNJ_01	5.24	Amtolia Gaon	26°45'22.18"N 26°45'21.38"N 26°45'51.24"N 26°45'57.85"N 26°45'58.76"N	94°31'50.40"E 94°31'49.47"E 94°31'34.61"E 94°31'19.17"E 94°31'20.09"E	Sand	1	52400	31440	Proposed

				26°45'35.13"N	94°31'35.68"E					
12	ASM_JHT_PRO_JNJ_02	6.26	Tengabari Gaon	26°46'30.61"N 26°46'30.46"N 26°46'42.58"N 26°47'0.27"N 26°47'3.02"N 26°47'3.23"N 26°46'43.73"N	94°30'40.73"E 94°30'42.32"E 94°31'0.65"E 94°31'0.77"E 94°31'13.55"E 94°31'1.40"E 94°30'58.80"E	Sand	1	62600	37560	Proposed
13	ASM_JHT_PRO_JNJ_03	3.5	Dulia Gaon	26°47'26.62"N 26°47'25.39"N 26°47'25.75"N 26°47'41.34"N 26°47'42.01"N 26°47'28.06"N	94°31'18.81"E 94°31'19.56"E 94°31'7.18"E 94°31'8.85"E 94°31'6.19"E 94°31'4.03"E	Sand	1	35000	21000	Proposed
14	ASM_JHT_PRO_JNJ_04	0.55	Kawoimari Gaon	26°53'12.38"N 26°53'11.73"N 26°53'12.62"N 26°53'13.39"N	94°21'51.79"E 94°21'52.00"E 94°21'43.30"E 94°21'43.59"E	Sand	1	5500	3300	Proposed
Total								**155500**	**93300**	**Proposed**
Brahmaputra River										
15	ASM_JHT_PRO_BHMP_01	18.4	Kokilamukh	26°50'15.27"N 26°50'23.29"N 26°50'12.59"N 26°50'10.31"N	94°9'29.92"E 94°9'49.71"E 94°10'4.05"E 94°9'50.37"E	Ordinary Clay	1	184000	110400	Proposed
16	ASM_JHT_PRO_BHMP_02	3.76	Upper Deroi Gaon	26°50'19.81"N 26°50'19.44"N 26°50'27.55"N	94° 8'19.99"E 94° 8'9.52"E 94° 8'7.03"E	Ordinary Clay	1	37600	22560	Proposed
17	ASM_JHT_PRO_BHMP_03	28	Molai	26°50'59.65"N 26°51'20.70"N 26°51'22.43"N	94°11'22.85"E 94°11'53.50"E 94°11'27.53"E	Ordinary Clay	1	280000	168000	Proposed
Total								**501600**	**300960**	**Proposed**

***Note: Detailed Map of Proposed River Bed Zone have been incorporated in the Annexure**

Table No. 11: Proposed Cluster Zone Table in Jorhat district

Sl. No.	Name of Cluster	Proposed Zone Code	Latitude	Longitude	Area (Ha.)	Total Mineral Resources (In cum)	Mineable Mineral Resources (60% of Total Resources) (In Cum)
1	Cluster-1	ASM_JHT_PRO_BGD_01	26°38'3.28"N 26°38'4.07"N 26°38'10.26"N 26°38'9.52"N	94°22'8.37"E 94°22'8.83"E 94°21'58.99"E 94°21'58.33"E	4.76	47600	28560
		ASM_JHT_PRO_BGD_02	26°38'11.84"N 26°38'12.55"N 26°38'10.34"N 26°38'9.98"N	94°21'53.35"E 94°21'53.54"E 94°21'41.14"E 94°21'40.91"E			
		ASM_JHT_PRO_BGD_03	26°38'11.18"N 26°38'11.69"N 26°38'18.08"N 26°38'26.21"N 26°38'26.11"N	94°21'39.07"E 94°21'40.00"E 94°21'36.94"E 94°21'15.82"E 94°21'13.82"E			
2	Cluster-2	ASM_JHT_PRO_BGD_07	26°42'47.97"N 26°42'58.00"N 26°43'9.03"N 26°43'17.56"N 26°43'16.85"N 26°43'9.23"N	94°16'59.52"E 94°16'54.17"E 94°17'4.64"E 94°16'44.19"E 94°16'42.62"E 94°17'2.57"E	13.64	136400	81840
		ASM_JHT_PRO_BGD_08	26°43'23.23"N 26°43'23.30"N 26°43'44.16"N 26°43'56.11"N 26°43'55.80"N 26°43'45.65"N	94°16'43.22"E 94°16'42.42"E 94°16'36.71"E 94°16'42.62"E 94°16'44.09"E 94°16'38.05"E			
		ASM_JHT_PRO_BGD_09	26°43'57.97"N 26°43'57.76"N 26°44'7.93"N 26°44'9.52"N	94°16'44.20"E 94°16'42.53"E 94°16'19.45"E 94°16'20.66"E			

Note: Detail Map of Proposed Cluster Zone is incorporated in Annexures.

Table No. 12: River- wise Total Mineral Potential in Jorhat district

Name of the River	Total Resources (In Cum)	Mineable Resources (60% of Total Resources) (In Cum)
Bhogdoi River	266400	159840
Jhanji River	155500	93300
Brahmaputra River	501600	300960
Total	**923500**	**554100**

CHAPTER 4: DETAILS OF REVENUE GENERATED FROM MINERAL SECTOR DURING 2022-2024

4.1 REVENUE GENERATION FROM MINERAL SECTOR:

Table No.13A: - Revenue received mineral-wise (minor) in the last three years (2021-22) to (2023-24)

Minor Minerals (Amount in Rs.)						
Sl. No.	District	Financial Year	Sand	Silt	Ordinary Earth	Total
1	Jorhat District	2021-22	58,99,962	1,80,000	21,46,140	**82,26,102.00**
2		2022-23	1,47,42,949.00	5,25,000.00	8,43,885.00	**1,61,11,834.00**
3		2023-24	1,50,82,741.00	3,60,000.00	16,03,035.00	**1,70,45,776.00**
Total (INR)			**3,57,25,652.00**	**10,65,000.00**	**45,93,060.00**	**4,13,83,712.00**

Table No. 13B: Total Royalty and Total Revenue of the District (2021-22 to 2023-24)

Financial Year	Royalty (In Rs.)	Total Revenue (In Rs.)
2021-2022	82,26,102.00	7,79,96,167.00
2022-2023	1,61,11,834.00	8,70,53,757.00
2023-2024	1,70,45,776.00	10,93,42,743.00

CHAPTER 5: DETAILS OF PRODUCTION OF MINOR MINERALS IN THE LAST THREE YEARS

5.1 PRODUCTION OF MINOR MINERALS DURING LAST THREE YEARS:

Table No. 14A: Production details of Sand in the district in Last Three Years

Year	Name of the Mineral	Production (In Cum.)
2021-2022	Sand	25000
2022-2023	Sand	40750
2023-2024	Sand	54500

Table No.14B: Production details of Silt in the district in Last Three Years

Year	Name of the Mineral	Production (In Cum.)
2021-2022	Silt	6000
2022-2023	Silt	17500
2023-2024	Silt	12000

Table No.14C: Production details of Ordinary Earth in the district in Last Three Years

Year	Name of the Mineral	Production (In Cum.)
2021-2022	Ordinary Earth	47692.5
2022-2023	Ordinary Earth	18753
2023-2024	Ordinary Earth	35623

CHAPTER 6: PROCESS OF DEPOSITION OF SEDIMENTS IN THE RIVERS OF THE DISTRICT

6.1 INTRODUCTION

Streams, any running water from a rivulet to a raging river, complete the hydrologic cycle by returning precipitation that falls on land to the oceans. Some of the water moves over the surface and some through the groundwater. Flowing water does the work of both erosion and deposition.

6.2 PROCESS OF DEPOSITION

After erosion, the eroded materials get transported with running water. When the river losses its energy and velocity falls, the eroded material is deposited. A river can lose its energy when rainfall reduces, evaporation increases, friction close to river banks, and when enters a shallow area (flood plain) or towards its mouth where it meets another body of water. Hjulström curve showing the relationship between particle size and the tendency to be eroded, transported, or deposited at different current velocities.

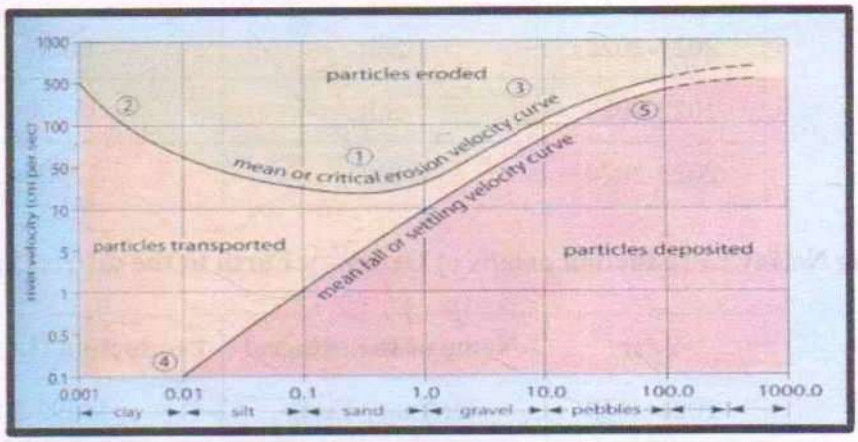


Figure 08: HJULSTRÖM CURVE

***(Source:** Sediment Petrology, Pettijohn)*

In this diagram, X-axis indicates the grain size in mm and Y-axis indicates the flow velocity of the river in cm. s^{-1}. The lower line of the diagram shows the relationship between flow velocity and particles in motion, with pebbles at 20-30 cm. s^{-1}, medium sand grains at 2-3 cm.s^{-1}, and clay particles at 0 cm s^{-1}. The grain size of particles can indicate the velocity at the time of sediment deposition. The upper line shows the flow velocity required to move a particle from rest, with smaller particles needing higher velocity to move them below coarse silt size due to the properties of clay minerals, which dominate the fine fraction in sediment. Clay minerals are cohesive and stick together, making it difficult to entrain them in a flow. The behavior of fine particles in a flow has important consequences for deposition in natural depositional environments. Mud can accumulate in any setting where the flow stops for long enough for clay particles to be deposited, and resumption of flow does not re-entrain the deposited clay unless the velocity is relatively high. Alterations of mud and sand deposition are seen in intermittent environments, such as tidal settings.

6.3 MODE OF SEDIMENT TRANSPORT IN RIVERS

Sediment transport is the transportation of detrital particles via air, water, ice, or gravity. When transported by air and water (fluid transport), grains (which may be sand particles) travel as a bed load (by rolling, sliding, and saltation) or in suspension when the turbulence keeps the grains moving.

The amount and size of sediment moving through a river channel are determined by three fundamental controls: competence, capacity, and sediment supply.

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:

i. Dissolved load

ii. Suspended load

iii. Saltation load

iv. Wash load

v. Bed load

(i) **DISSOLVED LOAD:** The amount of sediment carried in solution by a stream's total sediment load, particularly ions from chemical weathering, is known as the dissolved load. Along with suspended load and bed load, it makes up a significant portion of the overall debris removed from a river's drainage basin.

(ii) **SUSPENDED LOAD:** The term "suspended load" describes the portion of the total sediment transport that is kept suspended by turbulence in the flowing water for extended periods without contact with the stream bottom. Sometimes the particles may float on the surface of the water and thus become part of the fluid mass. The duration of a particle's suspension is determined by the intensity of turbulence and the velocity of the river flow. It is nearly moving at the same speed as the flowing water.

(iii) **SALTATION LOAD:** The portion of the bed load that is moving, either directly or indirectly, as a result of the impact of bouncing, i.e., the intermittent jumping motion of the particles due to the presence of eddies, along the stream bed. The smaller particles show higher lift and longer jump.

(iv) **WASH LOAD:** Particle sizes smaller than those found in substantial amounts in the bed material make up that portion of the suspended load. It is conveyed through the stream without deposition since it is in almost permanent suspension. The discharge of the wash load through a reach is determined solely by the rate at which these particles become available in the catchment area, not by the flow's transport capacity.

(v) **BED LOAD:** Particles that are too large to be carried as suspended load are bumped and pushed along the stream bed as bed load. The larger particles move close to the surface floor by rolling or sliding and occasional low leaps. Bed load sediments do not move continuously. Streams with high velocity and steep gradients do a great deal of downcutting into the stream bed, which is primarily accomplished by the movement of particles that make up the bed load.

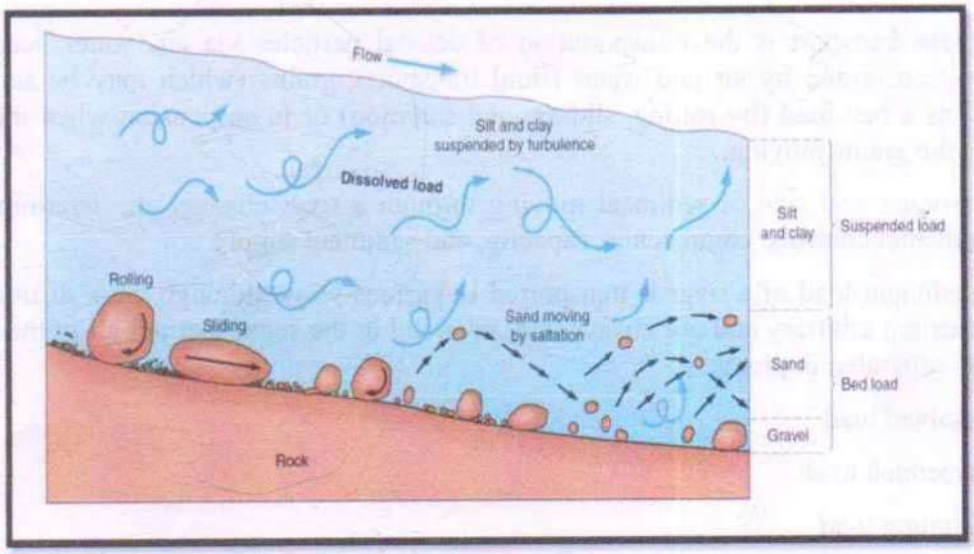


Figure 09: Mode of Sediment Transport in Rivers

Source: https://www.bgs.ac.uk/discovering-geology/geological-processes/deposition/#:~:text=Deposition%20is%20the%20laying%20down, sea%20shells) %20or%20by%20evaporation. (British Geological Survey)

6.4 DRAINAGE SYSTEMS

The drainage pattern of the studied area is the manifestation of the catchment of the Brahmaputra River and its tributaries. The drainage patterns of these rivers are dendritic to sub-parallel in nature and controlled by several structural features and concealed lithology below the surface. During the survey of the investigated area of Jorhat, it was noticed that rivers and rivulets together with their streams of different orders drain the district. All the streams, rivulets, and river courses vary depending on the topography and physiography of the area. The streams, rivulets, and rivers follow the lowest elevation courses for which the drainage courses vary widely in the district. The streams and river courses are in directions from SE-NW in the case of the Bhagdoi River. Brahmaputra River flows through the northern side of the district. Jhanji River is flowing the North-eastern side of the district. The runoff water carries granules, sand, and silt from upstream and is deposited on river beds depending on the water flow rates. At places, their banks are abrupt and broken into deep gullies.

River Brahmaputra and its important tributaries like Jhanji, Bhogdoi and Kakondanga drain the district. The tributaries originate from the Naga-Patkai range and flow northward side to join the Brahmaputra River which develops a sub-parallel type of drainage. In winter, the tributaries retain scanty flow. The rivers and streams are highly meandering in nature and immediate changes in the courses of this river due to heavy siltation and epiorganic movements cause the flood situation. *(CGWB, 2013)*

Kakodonga is an important river bordering the western part of the district and it acts as a natural boundary. The river has become shallow and the meandering course inundates large areas for breaching of embankments at several places. The river serves the purpose of flushing out the excess water from the district Jorhat. After confluencing with Bhogdoi River, this river is named Gelabil and finally falls in the Brahmaputra River. *(Census, 2011)*

Brahmaputra River

The river rises from a height of 5300 meters in the Himalayan Kailash hills. It passes through Tibet before entering India through Arunachal Pradesh, then it passes through Assam and Bangladesh until entering the Bay of Bengal. The river sand found in the plain/ bed of this river is not suitable for construction purposes. A huge amount of silt and Ordinary clay is found in the channel bars and point bars of the Brahmaputra River. The river shows braided nature in the district. The river gives the local inhabitants essential supplies and facilitates transportation and agriculture. In the north of Jorhat district, the Brahmaputra River forms the largest riverine island of the world, Majuli. The river gives the local inhabitants essential supplies and facilitates transportation and agriculture. The total length of Brahmaputra in this district is about 51.4 km. The total area drained by this river in Jorhat District is about 116.42 sq. km.

Bhogdoi River

The river Bhogdoi is one of the major rivers in the district. One of the Brahmaputra's tributaries on the south bank is the Bhogdoi River. Originating in the Naga highlands, the river passes past the city of Jorhat before joining another river to create Gelabill. The entire course of the river is named Disai for the upper course and the lower is known as Bhogdoi. The river bed is full of silts and in winter all these are taken away and used as building materials. Due to the enormity of silts on the riverbed ranging from 2 ft. and more navigation has become simply impossible. Over time, there has been significant pollution in the Bhogdoi River. The total length covered by this river in this district is about 98 km. The river Bhogdoi enters the district's south-eastern side through Aasonghum and flows towards the north-western side covering Mariani, Gar-Ali, Malow Ali, Dulia Gaon, and after Nam deuri and Gual Gaon in the north and ultimately confluence with another river named Kakodonga river near Goria Chapari Gaon. The total area drained by the river is about 497.74 sq.km. in the district.

Jhanji River

Along the boundary of the Assamese districts of Sibsagar and Jorhat, the Jhanji River is one of the southern-bank tributaries of the Brahmaputra River. In the eastern region of Nagaland, the Naga hill range is the source of the river. The Jhanji River has a tributary called the River Mitong. The entire catchment area of Jhanji River is around 1350 sq. km., out of which 477 sq. km. are in Assam while 873 sq. km. are in Nagaland. The river Jhanji flows along the eastern boundary of Jorhat District and finally confluence in Brahmaputra in the northern part of the district. The total length covered by this river is about 62.2km. The total area drained in the district by this river is about 178.27 sq. km.

Charaipani River

It flows from the SE direction to the NW direction of the district. The total length covering this district is about 18.9km. The river originated from Naga Highland with an elevation of about 310m. Charipani River flows from Nagaland and enters the district of the south-eastern side near Bhagyalakhi and flows towards the south-western side, passing through Bongal Gaon, Birina Sayak, and Moria Sayak finally it confluences with Kakodanga River near Mandal Gaon in the south-western part of Jorhat District. The total area drained by the Charaipani River is about 443.67 sq. km. in the district.

(Source: Aquifer Mapping and Management of Ground Water Resources by CGWB,2016; Jorhat, Topography of the Brahmaputra River and its Tributaries by Dr. Gururaj Prabhu K.; 2023)

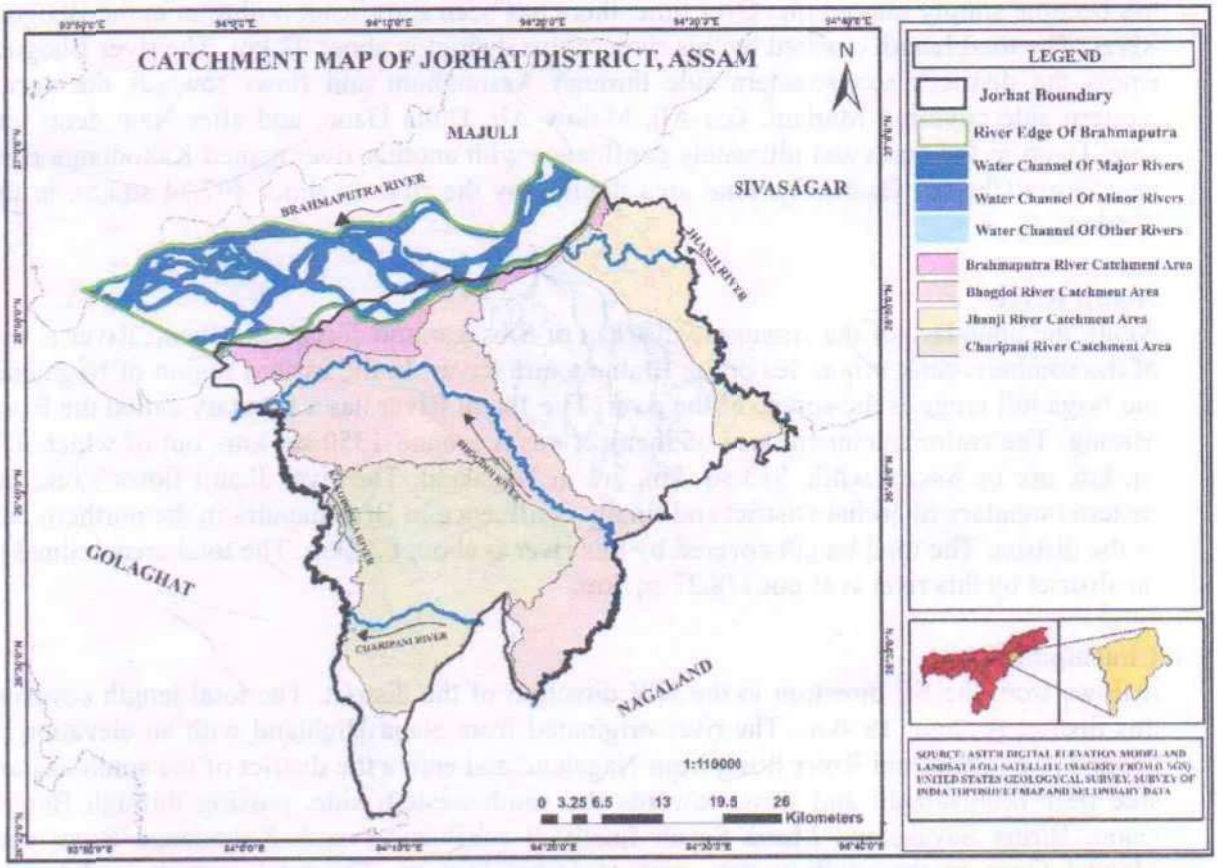
a) Drainage System with description of main rivers

Table No. 15: Drainage system with description of main rivers

Sl. No.	Name of the River	Catchment Area Area drained (sq.km.)	% Area drained in the district
1	Brahmaputra River	116.42	6.62
2	Bhogdoi River	497.74	28.31
3	Jhanji River	178.27	10.14
4	Charipani River	443.67	25.24

(Source: Arc-GIS and Remote Sensing)

Figure 10: Catchment Map Jorhat District



b) Salient Features of important rivers and streams

Table No. 16: Salient Features of important rivers and streams (A)

Sl. No.	Name of the River or Stream	Total Length in the District (in Km.)	Place of Origin	Altitude of Origin(m)
1	Brahmaputra River	51.4	The Himalayan Kailash Hills, Tibet	5300
2	Bhogdoi River	98	Naga highlands	390
3	Jhanji River	62.2	Naga hill	407
4	Charipani River	18.9	Naga highlands	310

(Source: Arc-GIS and Remote Sensing)

Figure 11: Drainage Map of the District

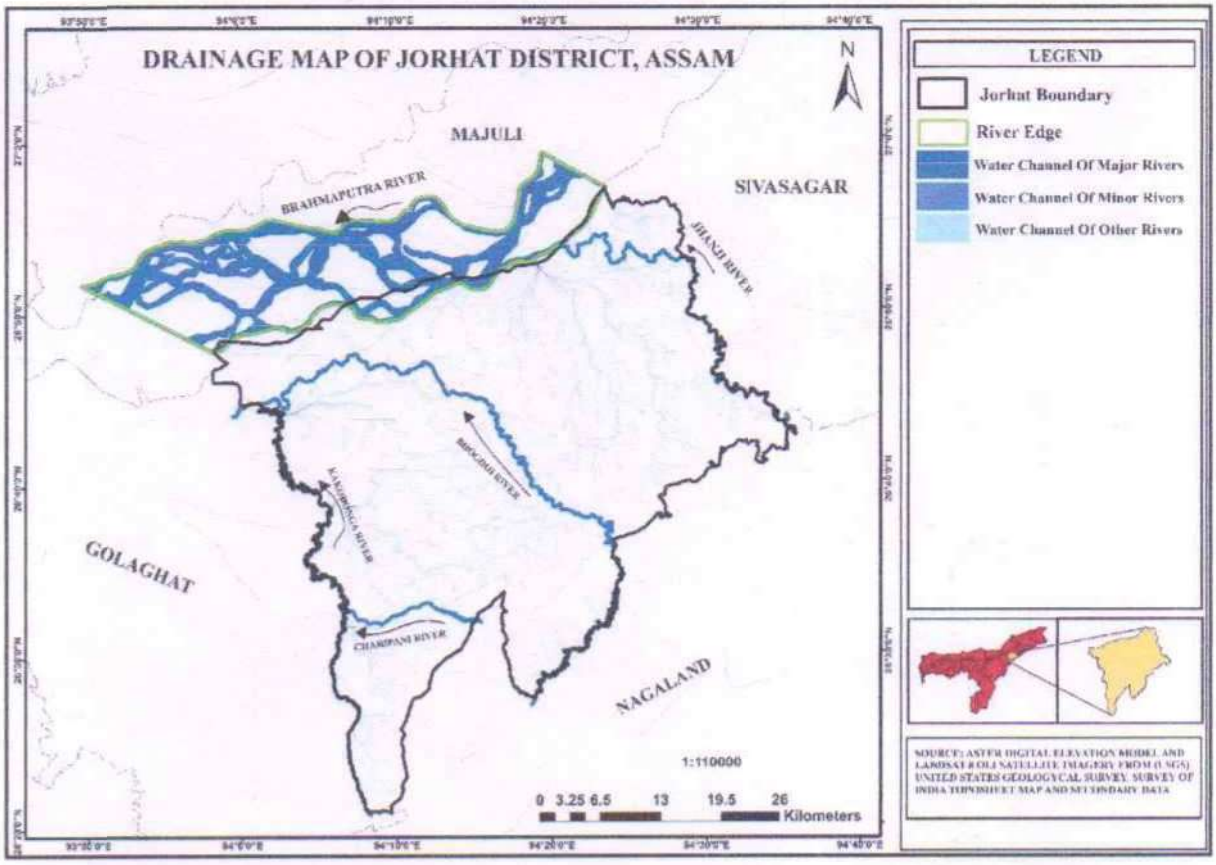


Table No. 17: Salient Features of important rivers and streams (B)

Sl. No.	Name of the River	Place of Origin	Average length of river in the District (In Km.)	Average width of river in the District (In Km.)	Area recommended for mineral concession (In sq. m.)	Mineable Mineral Extraction (In Cum.)
1	Brahmaputra River	The Himalayan Kailash Hills, Tibet	1.48	0.34	501600	159840
2	Bhogdoi River	Naga highlands	4.44	0.06	266400	93300
3	Jhanji River	Naga hill	3.38	0.05	155500	300960
4	Charaipani River	Naga Highlands	2.56	0.03	30000	1500

CHAPTER 7: GENERAL PROFILE OF THE DISTRICT

7.1 INTRODUCTION:

Jorhat is a district of the state of Assam that lies between 26.15° N to 27.12° N Latitude and from 94.05° E to 94.35° E longitude. The district Jorhat belongs to the Upper Assam Division. The district is bounded on the north by the Brahmaputra River; on the south by the state of Nagaland; on the east by the Sivasagar district and on the west by Golaghat district. The district has an area of 1758 sq. km. In this total area, 1665.51 sq. km. area is covered by Rural areas, and 92.18 sq. km. is covered by Urban areas. It has an average elevation of 116 meters (381 feet). It comprises 5 (Five) Revenue Circles with villages 600 villages. The district has 6 (Six) Community Development Blocks. There are 5 (Five) nos. of Assembly Constituency present in the district, out of which 3 (Three) Assembly Constituency are in the Jorhat Sub-division and 2 (Two) Assembly Constituency are in the Titabor Sub-division. In the district, there are also 5 (Five) Census Towns, and 3 (Three) Town Committees. There are also 90 Gaon Panchayats present in the district. Of these, 69 Gaon Panchayats are in Jorhat Sub-Division and 21 Gaon Panchayats are in Titabor Sub-Division. Major drainage of this district is Brahmaputra River, Bhogdoi River, Charipani River, Kakodanga River, etc. *(**Source:** District Statistical Handbook of Jorhat, 2023)*

The total population of the district is about 924952. The population density is 383 persons per sq km. The district has a sex ratio of 937 females among 1000 males. *(**Source:** District Statistical Handbook of Jorhat, 2023)*

Figure 12: Location Map of the District

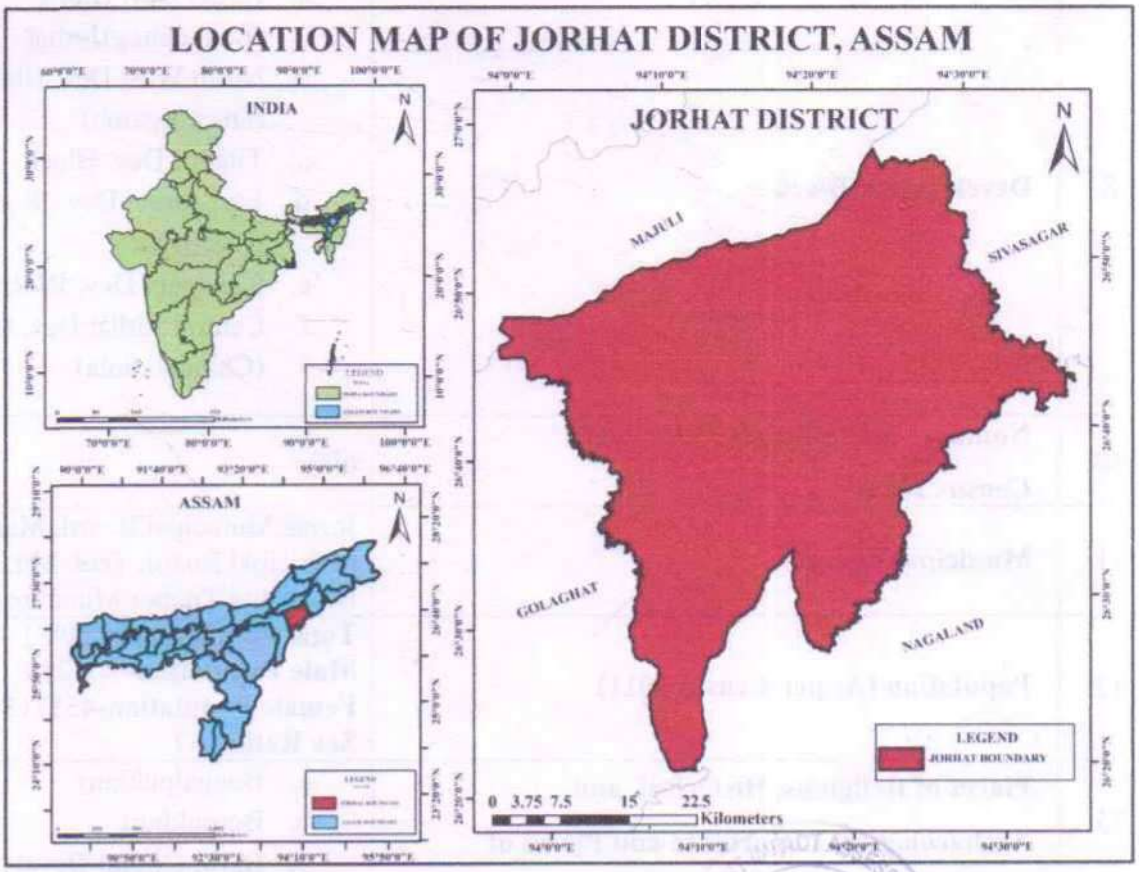


Table No. 18: General Profile of the District

Sl. No.	Particulars	Statistics
1.	**Geographical Area**	1758 sq. km.
2.	**Geographical Location**	26.15° N to 27.12° N, 94.05° E to 94.35° E
3.	**Temperature**	Maximum Temperature 34.6°C (average), Minimum Temperature 6.4°C (average)
4.	**Mean Annual Rainfall (mm)**	1387.4 mm
5.	**Boundaries**	North- Brahmaputra River South- Nagaland State East- Sivasagar District West- Golaghat district
6.	**District Headquarters**	Jorhat
7.	**Revenue Circle**	a. Jorhat East b. Jorhat West c. Titabar d. Teok e. Mariani
8.	**Development Block**	a. Jorhat Dev. Block (Baghchung)Jorhat b. North West Dev. Block (Dhekorgarah) c. Titabor Dev. Block d. East Jorhat Dev. Block (Selenghat) e. Kaliapani Dev. Block f. Central Jorhat Dev. Block (Chipahikhola)
10.	**Number of Villages (As per Census 2011)**	600
11.	**Municipal Board**	Jorhat Municipal Board, Mariani Municipal Board, Teok Municipal Board and Titabor Municipal Board
12.	**Population (As per Census 2011)**	**Total Population**- 924952 **Male Population**- 471239 **Female Population**-453713 **Sex Ratio**-937
13.	**Places of Religious, Historical, and Archaeological Importance and Places of**	a. Bongalpukhuri b. Borpukhuri c. Burhi Gosani Devalaya

	Tourist Interest	d. Majuli e. Dhekiakhowa Bornamghar f. Lachit Borphukan's Maidam g. Raja Maidam h. Jorhat Science Centre & Planetarium i. Jorhat Gymkhana Club j. Chandrakanta Handique Bhavan k. Ayur Sanjeeva l. Thengal Bhawan m. Gibbon Wildlife Sanctuary n. Mulai Forest o. All Saints Church of Cinnamara p. Shri Shri Kamalabari Satra q. Garh Ali r. Bilveswar Siva Temple s. America Baptist Foreign Mission Church t. Baduli Pukhuri u. Borbheti
14.	**Literacy Rate**	**Literacy Percentage-** 73.60 %
15.	**Language**	Primarily Assamese, Others- Bengali, Hindi, English
16.	**Major Physiographic Units**	Flooded Land, Plain Area,
17.	**Major Drainage**	Brahmaputra, Bhogdai, Charipani,

***(Source:** District Statistical Handbook of Jorhat, 2023)*

1.2 BASIC AMENITIES OF JORHAT DISTRICT

The standard of living of people in a particular area is assessed not only by housing conditions but also by the availability of some basic amenities. These include access to safe drinking water, basic education, health services, and social security.

In rural areas, amenities vary significantly. There are 571 nos. of inhabited villages present in the district. Jorhat has a total of 204026 households, of which 152406 are Rural Households and 51620 are Urban Households. There are also 7 (Seven) police stations, 14 police outposts, and 4 (Four) fire stations present in the district.

Table No. 19: Basic Amenities of District

Amenities	Number
Total inhabited villages	571
Total households	204026
Rural Households	152406

Urban Households	51620
No. of Police Out-post	14
No. of Police Station	7
No. of Fire Station	4

*(**Source:** District Statistical Handbook of Jorhat, 2023)*

Educational Facilities:

In Jorhat district, a significant number of Educational Institutions are present. There are 887 numbers of Lower Primary Schools, 163 numbers of Upper Primary Schools, 139 numbers of High Schools, and 40 numbers of Higher Secondary Schools are present. There are also 16 Provincialised Colleges 4 Junior Colleges and 4 Commerce Colleges present in the district.

Table No. 20: Educational Facilities Present in the District

Lower Primary School	Upper Primary School	High Schools	Higher Secondary	Provincialized Colleges	Junior College	Commerce College
887	163	139	40	16	4	4

*(**Source:** Statistical Hand Book of Assam of 2023)*

Medical Facilities:

Medical Facilities are always available in Jorhat District. There are 160 hospitals present in the district along with 36 PHCs (Primary Health Centres) and also 116 PHCs (Sub-Centre).07 Dispensaries are also present in this district.

Table No. 21: Medical Facilities Present in the District

Hospitals (State Govt.)	PHCs	PHCs (Sub Centre)	Hospital beds		Dispensaries
			Sanctioned	**Functional**	
160 (Medical College :1 SDCH: 1 CHC: 6 PHC: 36 AAM/ SC: 111 Urban AAM: 5)	36 BPHC: 6 UPHC: 2 MPHC: 20 SD: 7	116 AAM / Sub Center: 111 UAAM: 5	Jorhat Medical College	840 beds	7 (Bisturam Barua State Dispensary Dohotia State Dispensary Kolbari State Dispensary Ownamukh State Dispensary Janjimukh State Dispensary Jalukonibari State Dispensary
			Titabar SDCH: 100 bedded	100 beds	
			Teok FRU: 30 bedded	30 beds	
			Nakachari MG Model Hopital: 30 bedded	37 beds	
			Chungikahar Model Hopital: 30 Bedded	30 beds	
			Bhogamukh Model Hospital: 30 Bedded	30 beds	
			Nagajanka CHC: 30 Bedded	18 beds	
			Borholla CHC: 30 Bedded	15 beds	
			Attapam MPHC: 6 bedded	1 bed	
			Kachogoral MPHC: 6 bedded	1 bed	
			Pulinaharani MPHC: 6 bedded	6 beds	

			Tankeswar Sarmah MPHC: 6 bedded	1 bed	Tipomia State Dispensary)
			Debnath Sarmah MPHC: 6 bedded	1 bed	
			Dhekorgorah MPHC: 6 bedded	2 beds	
			Garumora MPHC: 6 bedded	1 bed	
			Naborachuk MPHC: 6 bedded	2 beds	
			Pokamura MPHC: 6 bedded	1 bed	
			Mariani MPHC: 6 bedded	6 beds	
			Cenijan MPHC: 6 bedded	6 beds	
			OUGURI MPHC: 6 bedded	4 beds	
			Selenghat MPHC: 6 bedded	6 beds	
			Bekajan MPHC: 6 bedded	3 beds	
			Borbamchungi MPHC: 6 bedded	3 beds	
			Melamati MPHC: 6 bedded	3 beds	
			Mahimabari MPHC: 6 bedded	3 beds	
			Raidangjuri MPHC: 6 bedded	3 beds	
			Samoguri MPHC: 6 bedded	3 beds	
			Urangial MPHC: 6 bedded	3 beds	
			Bisturam Barua State Dispensary: 4 bedded	2 beds	
			Dohotia State Dispensary: 4 bedded	4 beds	
			Kolbari State Dispensary: 4 bedded	4 beds	
			Ownamukh State Dispensary: 4 bedded	1 bed	
			Janjimukh State Dispensary: 4 bedded	3 beds	
			Jalukonibari State Dispensary: 3 bedded	2 beds	
			Tipomia State Dispensary: 4 bedded	3 beds	
			Puronimati SHC: 4 bedded	1 bed	
			Baghchung BPHC: 6 bedded	3 beds	
			Bhogamukh BPHC: 6 bedded	Nil	
			Kakojan BPHC: 6 bedded	6 beds	
			Nakachari BPHC: 6 bedded	7 beds	

			Solmora BPHC: 6 bedded	6 beds	
			Titabar BPHC: 6 bedded	Nil	

*(**Source:** District-Level Committee, Jorhat)*

CHAPTER 8: LAND UTILIZATION PATTERN IN THE DISTRICT

8.1 LAND UTILIZATION PATTERN:

According to the statistical handbook Assam, the total geographical area of the district is 175800 ha. out of which 96803 ha area is cultivable, 10399 ha is under non-agricultural use and 4860 ha is barren/waste land.

- **Land cover** is the physical material at the surface of the earth. Land covers include grass, asphalt, trees, bare ground water, etc. Land cover data documents how much of a region is covered by forests, wetlands, impervious surfaces, agriculture, and other land and water types. Water types include wetlands or open water.

- **Land use** not only shows how people use the landscape but also the utilization of land resources naturally. Therefore, the land of a particular region can be used for infrastructural development, settlements, amusement &recreation, conservation of wildlife and wildlife habitat, agriculture& farming, or mixed uses and can be defined as "land use". Land use applications involve both baseline mapping and subsequent monitoring since timely information is required to know what the current quantity of land is in what type of use and to identify the land use changes from year to year.

- **Forest Area:** The forest area is described as all land designated and governed as forests according to applicable legal frameworks, including both public and private forests. This region is crucial for preserving biodiversity, managing climate, and supplying necessary resources such as timber and non-timber products.

- **Deciduous Forest**: It is mainly dominated by woody vegetation cover, i.e., >60% along with an average plant height of more than 2 meters. The floral communities are dominated by the trees which hold broad leaves with an inimitable feature of the annual cycle of leaf-on and leaf-off periods means the trees shed their leaves at a particular season of each year, mainly in late winter.

- **Mixed forest:** In mixed forests, the vegetation composition principally displays the presence of trees and also includes shrubs and bushes. The mixed type of forest is neither predominated by broad-leaved trees nor by coniferous floral species.

- **Cropland:** Temporarily cropped area followed by harvest and a bare soil period (e.g., single and multiple cropping systems). Different types of crop cultivation and cropping arrangements are specified according to the seasons. Cropland includes areas that are used for common crop production and are also used for the adapted crops for harvest.

- **Built-up land:** The urbanized area, i.e., any land on which buildings and/or non-building structures are present, normally as part of a larger developed environment such as: a developed land lot, rural area, or urban area. The land is covered by buildings and other anthropogenic infrastructures.

- **Fallow land:** Fallow land is farmland without crops and usually needs a year to recover its fertility to grow crops. Such kinds of land are acquired for cultivation temporarily and are kept uncultivated for one or more seasons for its reclamation.
- **Waste land:** Sparsely vegetated land with signs of erosion and land deformation that could be attributed to lack of appropriate water and soil management, or natural causes. These are land identified as currently underutilized and could be reclaimed to productive uses with reasonable effort. Degraded forest (<10% tree cover) with signs of erosion is classified under wasteland. An empty area of land, especially in or near a city, which is not used to grow crops or built on, or used in any way and/or a place, time, or situation containing nothing positive or productive, or completely without a particular quality or activity.
- **Barren & Unculturable Land:** It refers to areas where cultivation is not feasible due to various natural conditions, such as mountain hills, deserts, swamps, silted lands, and sandy lands. These lands are characterized by their inability to support agricultural activities, making them unsuitable for crop production.
- **Land under Miscellaneous Trees and Groves not (not included in the net area sown):** It refers to areas planted with various tree species and crops, such as teak, bamboo, and babul, that yield produce only once in their lifespan. This category excludes land counted in the net area sown, as it primarily focuses on non-cultivated tree crops and groves. These lands contribute to biodiversity and provide resources but are not classified as part of the actively cultivated agricultural area.
- **Permanent Pastures and Other Grazing Land**: This Land encompasses all types of grazing areas, including both permanent pastures and meadows, where livestock can graze throughout the year. This land is crucial for supporting livestock farming and maintaining the livelihoods of pastoral communities. By providing a sustainable source of forage, these grazing lands play an essential role in agricultural systems and contribute to food security and rural economies.

Table No. 22: Land use Pattern in Jorhat District

Land use/ Land cover categories	Total area (Ha.)
Forest Area	25247
Area under crops	106781.50
Area under non-agricultural uses	10399
Barren & Unculturable Land	4860
Permanent Pastures & other grazing land	2442
Land under Misc. tree crops & Groves not included in Net area sown	4837
Culturable waste land	4256
Fallow lands other than current fallows	4456
Current fallow	8024

(Source: Statistical Handbook of Jorhat District, 2023)

Figure 13: Graphical representation of Land use Land Pattern of Jorhat district

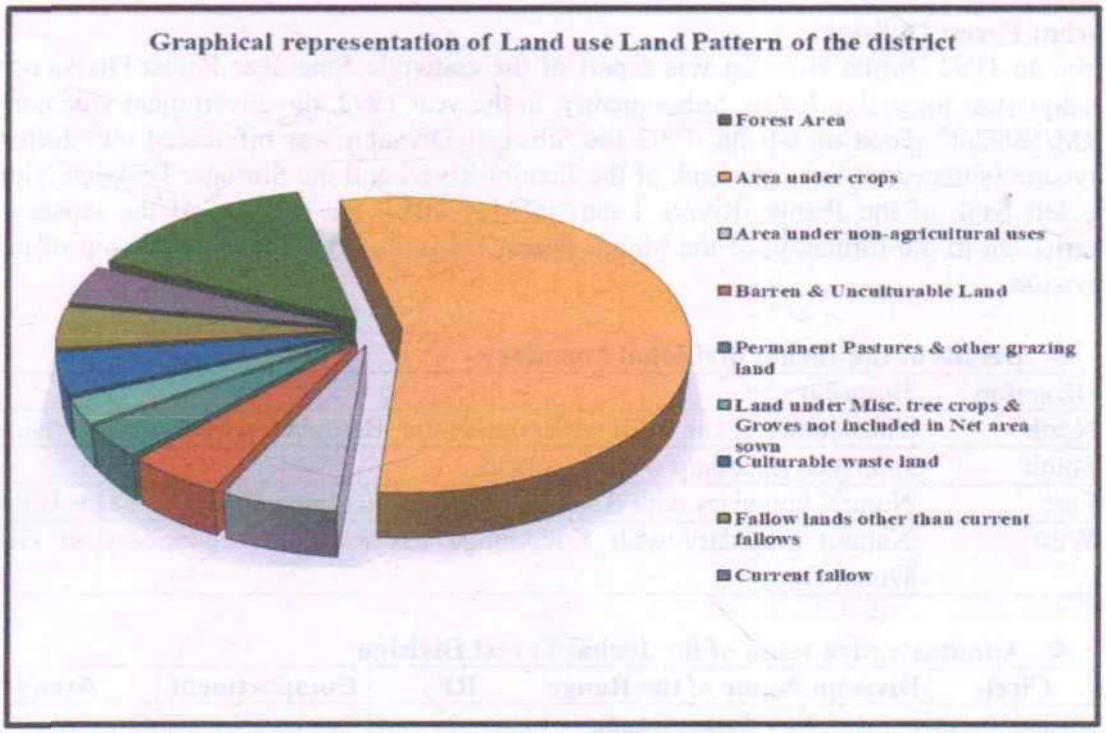
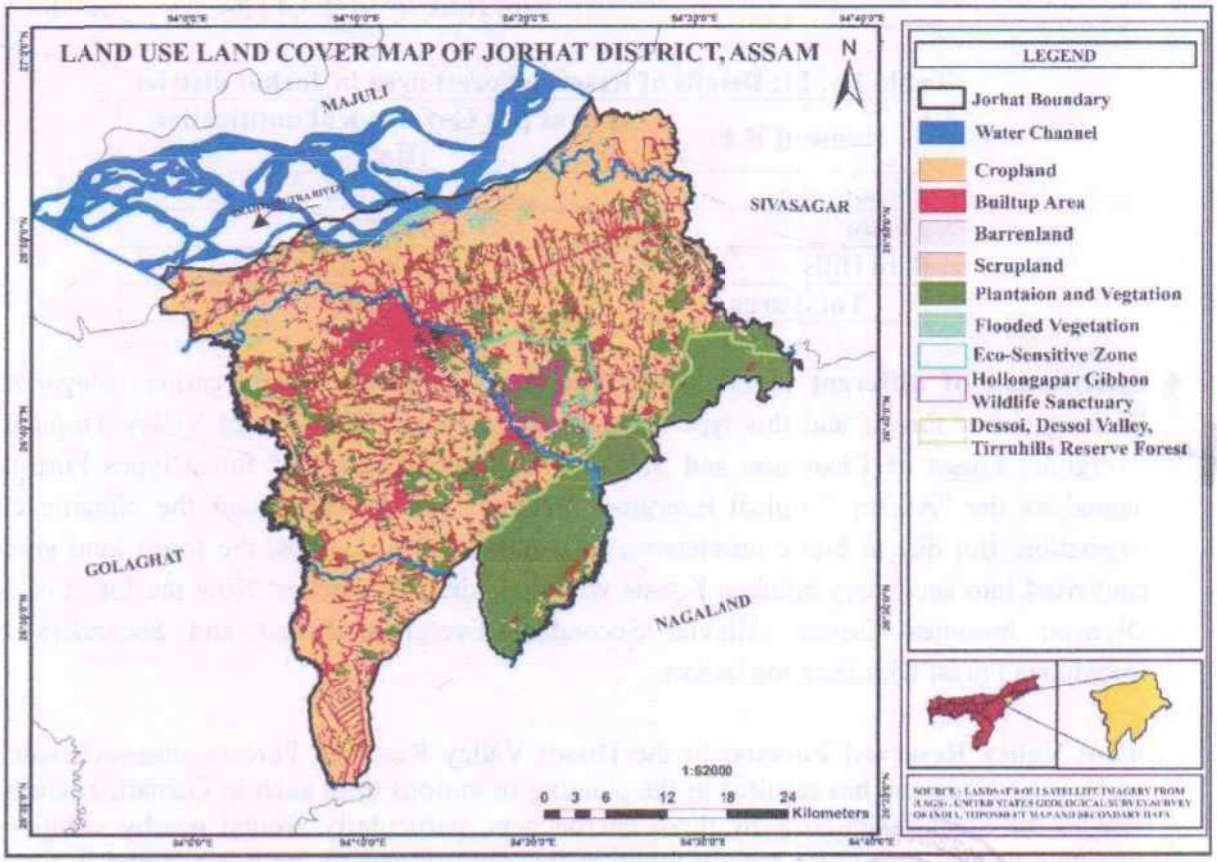


Figure 14: Land Use Land Cover Map of the Jorhat district



8.2 FOREST LAND AND NON-FOREST LAND

Jorhat Forest Division:

Prior to 1992, Jorhat Division was a part of the erstwhile Sibasagar Forest Division, with its headquarters located at Jorhat. Subsequently, in the year 1992, the government vide notification FRM/58/92/42 dated on 04. 08. 1992 the Sibsagar Division was bifurcated into Jorhat Forest Division (situated on the right bank of the Jhanjhi River) and the Sibsagar Division (situated on the left bank of the Jhanjhi River). Later, in May 2017, the creation of the separate Majuli district led to the formation of the Majuli Forest Division, which was carved out of the Jorhat Division.

❖ **Details of the Jorhat divisional boundary**

Direction	Boundary
North	The southern bank of River Brahmaputra, Boundary with Majuli Division
South	Interstate boundary with Nagaland
East	Natural boundary with River Jhanjhi (District boundary of Sibsagar Division)
West	Natural boundary with Kakodunga River (District boundary of Golaghat Division)

❖ **Administrative setup of the Jorhat Forest Division**

Circle	Division	Name of the Range	RF	Compartment	Area (Ha.)
Eastern Assam Circle	Jorhat	Jorhat Range	--	--	--
		Mariani Range	Dissoi valley	1 to 16	17,441.14
			Dissoi	1,2,3,4	2,798.808
			Tiru Hills	1,2,3,4,5,6	5,858.64

Table No. 23: Details of Reserve Forest area in Jorhat district

Name of R.F.	Area as per Government notification (Ha.)
Dissoi valley	17,441.140
Dissoi	2,798.808
Tiru Hills	5,858.640
Total area	**28,197.209**

❖ **Distribution of different forest types:** The three Reserved Forests earlier categorized as Hollong-Nahor forests and this type corresponds to type IB/CI- Assam Valley Tropical Wet Evergreen Forest of Champion and Seth's revised classification of forest types Forests and named as the "Assam Tropical Evergreen Forests" which represented the climatic climax vegetation. But due to biotic interference over the last few decades, the forest land gradually converted into secondary bamboo forests with sporadic tree patches. Now the forest of Jorhat Division becomes Eastern Alluvial Secondary Evergreen Forest and Secondary Moist Deciduous Forest with Bamboo brakes.

Dissoi Valley Reserved Forests: In the Dissoi Valley Reserved Forests, encroachment from neighboring Nagaland has resulted in the planting of various trees such as Gamari, Khokan, and Teak in the areas taken over by these encroachers, particularly around nearby villages. The remaining natural forests are mainly found in the western part of the Reserve and in the gorge areas. Patches of bamboo species such as Wati (*Bambusa pallida*) and Koko (*Dendrocalamus*

hamiltonii) can still be seen within the Reserved Forests. Additionally, Muli Bamboo (*Melocanna baccifera*) is thriving in the northwestern part of the Reserve.

Dissoi Reserved Forests: In Dissoi Reserved Forests, the Hollong tree has disappeared due to illegal logging, and the entire forest turned into a bamboo forest featuring Dolo Bamboo (*Teinostachyum dullooa*) and Muli Bamboo (*Melocanna baccifera*).

Tiru Hills Reserved Forests: Like Dissoi reserved Forests here to the richness of Hollong and Mekai stands vanished and only available species is bamboo. The available bamboo species are kako bamboo (*Dendracalamus hamiltoni*). *(Source: Working Plan of Jorhat Forest Division)*

❖ Wildlife Sanctuary:

➢ Hollongapar Gibbon Wildlife Sanctuary:

The Hollongapar-Gibbon Sanctuary is a significant protected area situated in the Jorhat district, covering an area of 20.98 square kilometers. It was originally declared as the Hollongapar Reserve Forest in 1881. Later, it was upgraded to a sanctuary by the Government of Assam vide Notification No. FRS/37/97/13, dated 30.07.1997. This sanctuary boasts a unique ecological environment, characterized by the perennial Bhogdoi River and numerous seasonal streams. The catchment area, encompassing the Hollongapar and Nakachari Mouzas of Jorhat District, serves as a main water source for the sanctuary's wildlife. The sanctuary consists of rich floral and faunal diversity. The Hollongapar Gibbon Sanctuary is home to the hoolock gibbons, the only gibbons in India, and the Bengal slow loris, the only nocturnal primate in Northeastern India. The Hoolock gibbon is a rare primate and the only ape species present in India It is protected under Schedule-I of the Wildlife (Protection) Act 1972 and has been classified as "Endangered" by the International Union for the Conservation of Nature (IUCN). Seven different species of monkeys can be found in the sanctuary: capped langur, eastern Assamese macaque, northern pig-tailed macaque, western hoolock gibbon, Bengal slow loris, and stump-tailed macaque etc.

Floral diversity includes 74 tree species, 17 species of shrubs and 12 species of climbers. The tree species include Hollong (*Dipterocarpus retusa*), Sam (*Artocarpus chaplasha*), Amari (*Amoora wallichii*), Sopas (*Michelia spp.*), Bhelu (*Tetramelos nudiflora*), Udal (*Sterculia villosa*), Hingori (*Castanopsis sp.*), Nahor (*Musua ferrea*), Bandordima (*Dysoxylum procerum*), Dhuna (*Canarium resiniferum*), Bhomora (*Terminalia belerica*), Ful Gomari (*Gmelina Sp.*), Bon Bogori (*Pterospermum lanceofolum*), Morhal (*Vatica lanceofolia*), Sassi (*Aquilaria agolacha*), Otenga (*Dillenia indica*), Ajar (*Lagerstroemia flos-reginae*), Bon-Am (*Mangifera silvatica*), Amora (*Spondias Mangifera*), Uriam (*Biscofia javanica*), Selleng (*Sapium baccatum*), Mahi thekera (*Garcinia morella*), Katholua (*Palequium obovatium*), Kumbhi (*Careya arborea*), Gahori Sopa (*Magnolia Pealiana*), Gomari (*Gmelina arborea*), Gohora (*Premna bengalensis*), Gondhsoroi (*Cinnamomum glanduliferum*), Salmugra (*Hydrocarpus kurzil*), Poreng (*Elaeocarpus robustus*), Sotiona (*Alostonia scholaris*), Chom (*Machilus odoratissime*), Chewa (*Caryota ureus*), Jutuli (*Altingia exulsa*), Jori (*Ficus benjamina*), Titasopa (*Michelia champaka*), Pan chopa (*Magnolia sphenocarpa*), Bohot (*Artocarpus lakoocha*), Fakdema (*Trema orientalis*), Phul Sopa (*Magnolia hookari*), Borhomthuri (*Talauma Hodgsoni*), Bogi jamuk (*Eugenia kurzii*), Bor jamuk (*Eugenia jambulana*) and others. The shrubs and climber species of the district include Harpagondha (*Rawolfia serpentina*), Guphul (*Lantana camara*), Jarmoni (*Eupotorium odoratum*), Jetuli poka (*Rubus mulucanus*), Tora (*Alpinea allughus*), Dhopattita (*Phloganthus crriviflorus*), Nilaji bon (*Mimosa pudica*), Patidoi

(*Elinogyne dichotoma*), Pochotia (*Buddliria asiatica*), Phutuka (*Osbeckia rastrata*), Bioni Habota (*Desmodium labornifolium*), Bahok tita (*Adhatoda sp.*), Kaupat *(Phrynium sp.*), Makhioti (*Flemingia stricta*), Mejenga (*Viburnum colebookianum*), Amoilota (*Menispernum glabrum*), Harjura lota (*Cissus quadrangularis*), Akashilota (*Trachelospermum fragrans*), Panilota (*Dillenia sarmentosa*), Kolialota (*Merremia umbellata*), Pipoli (*Piper longum*), Latumoni (*Abrus precatorius*), Mekuri chali (*Combretum decandrum*), Jengu bet (*Calamus erectus*), Jati bet (*Calamus tenuis*), Raidang bet (Calamus flagellum) and Lejai bet (*Calamus floribundus*). The important rare species such as *Dipterocarpus retusa*, *Ficus spp.*, *Artocarpus chaplasa*, *Litsea citrata*, *Aquilaria agalocha*, etc. in addition to medicinal climbers, bushes, moss, fern etc. also exist in the sanctuary.

The Sanctuary supports 11 mammals species, 5 species of reptiles and amphibians and 31 avifaunal species including Tiger (stray) (*Panthera tigris*), Asiatic elephant (*Elephus maximus*), Leopard (*Panthera pardus*), Pangolin (*Manis crassicaudata*), Jungle Cat (*Felis chaus*), Indian Civet (*Viverridae sp.*), Giant squirrel (*Retufa bicolor*), Barking Deer (*Muntiacus muntjak*), Sambar deer (*Cervus unicolour*), Wild Pig (*Sus scorfa*), Five-striped palm squirrel (*Funambulus pennanti*), Indian Python (*Genus python*), Common Monitor Lizard (*Varanus grisus*), Indian Tent Turtle (*Kachuga tecta tecta*), Geacko (*Caloductyloids aureus*), Common Cobra (*Naja spp.*), White Winged wood Duck (*Cairina scutulata*), Horn Bill (*Ptilolaemus tickali austeni*), Indian Pied Horn Bill (*Anthracoceros malabaricus*), Osprey (*Pandion haliatetus*), Hill Myna (*Gracula religiosa indica*), Kalij pheasant (*Lophurs leucomala*), Babblers (*Timaliinae spp.*), Barbets (*Capitonidae spp.*), Bitterns (*Ardeidae spp.*), Orioles (Oriolidae), Bulbuls (Pycnonotidae), Owls (Strigidae), Egrets (Aridеidae), Cormorants (Phalacrocoracidae), Mynah (Sturnidae), Cuckoos (Cuculidae), Magpies (Corvidae), Pigeons (Columbidae), Darters (Phalacrocoracidae), Droves (Columbidae), Blue jays (Coraciidae), Teals (Anatidae), Tree Pies (Corvidae), Bayas (Ploceidae), Jungle Fowl (Phasianidae), Minivets (Campephagidae), Munias (Estrildinae), Parakeets (Psittacidae), Wood Peckers (Picidae) and Tits (Paridae).

Figure 15: Wildlife Sanctuary and Reserve Forest Map of the District

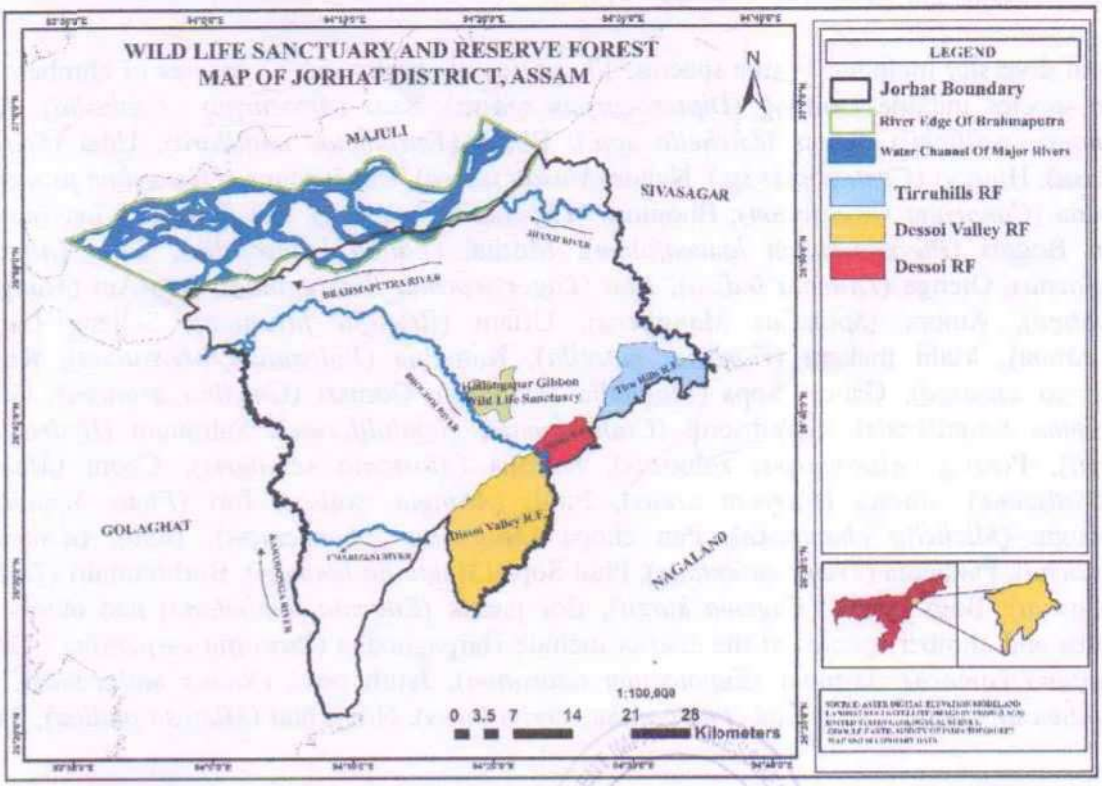
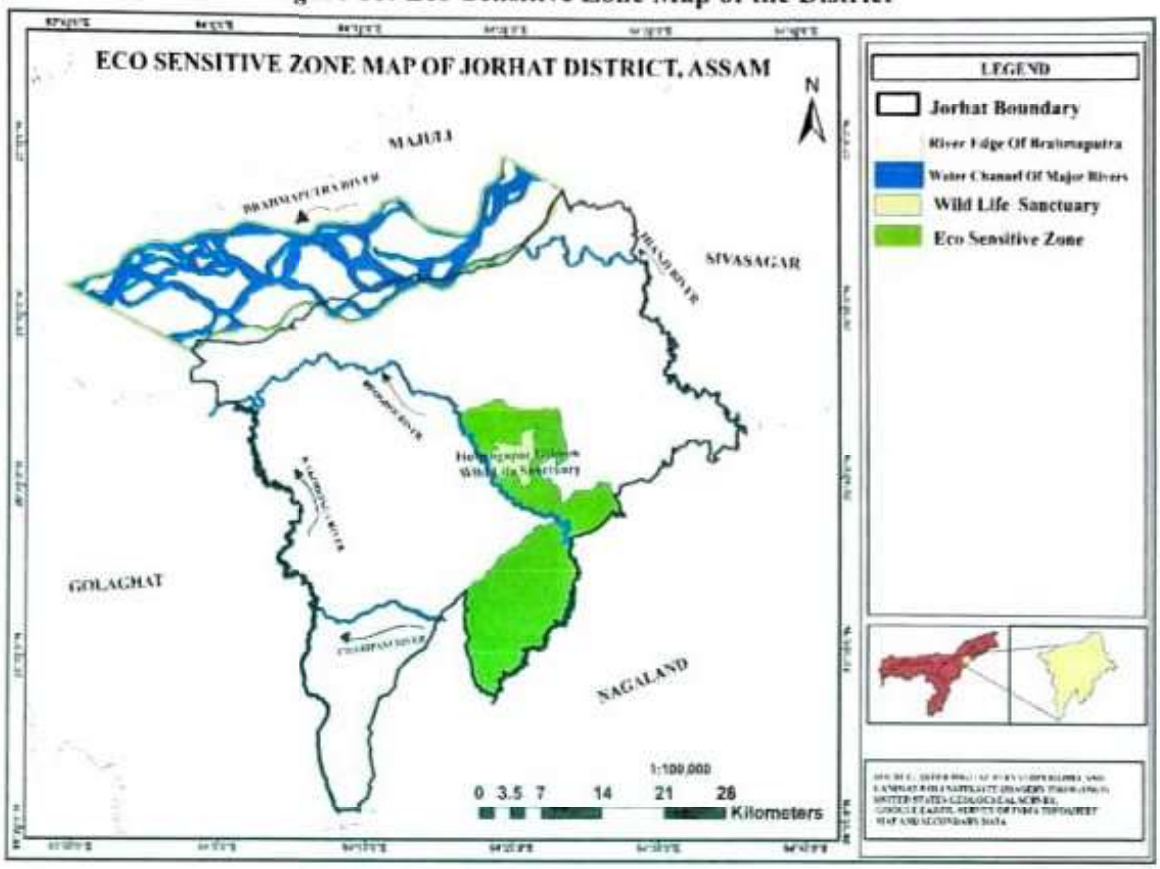


Figure 16: Eco-Sensitive Zone Map of the District



8.3 Agricultural Land

Agriculture is considered as one of the primary sources of income in Jorhat district. It is the main activity of the rural people in the district. The major crops grown in the district are Paddy, maize, jute, pulses, and vegetables. Rice is the common crop that grows in all the areas of the district. The district experiences ample amount of rainfall during the monsoon and even during the post-monsoon period, there occurs some rain from the northeast. More than 70% of the annual rainfall is received from May to September. Rice, and jute are the two principal crops that need a sufficient amount of water. Some minor irrigation projects are executed by the construction of bunds across streams and rivulets, drainage channels, and silt channels to obtain silt deposits in low-lying areas. Lift irrigation with an electric pump was also installed in some parts of the district. Crop Production of the district has been discussed in the following:

Table No. 24: Area and Production of important crops in Jorhat district from the year 2021-22

Sl. No.	Types of Crops	The area under cultivation (Ha)	Production (Tones)
1	Autumn Paddy	299	611
2	Winter Paddy	69341	147002
3	Summer Paddy	571	2489
4	Wheat	1	1
5	Rape & Mustard	1149	497
6	Sugarcane	33	1286
7	Potato	1126	6513
8	Matikalai	491	364

9	Jute	11	133
10	Tobacco	0	0
11	Turmeric	199	205
12	Onion	38	136
13	Niger	2	1
14	Tapioca	5	48
15	Papaya	258	4449
16	Mesta	6	33
17	Banana	2000	38896
18	Areca nut	2567	1658
19	Coconut	327	2418
20	Mug	140	94
21	Masur	34	27
22	Peas	381	242
23	Ginger	121	1187
24	Black Pepper	97	161
25	Chilies	143	127
26	Cotton	6	3
27	Pineapple	101	2039
28	Maize	40	104
29	Orange	50	739
30	Rabi Pulses	1145	777

(Source: Statistical Handbook of Jorhat District, 2023)

8.4 Horticultural Land/Tea Gardens:

Horticulture plays an important role in terms of the growing economy in the district. The plantation and horticulture sectors contribute significantly to the development of the rural economy of a district. The major horticultural crops consist of Papaya, Mesta, Banana, Arecanut, Coconut, Pineapple, Orange and others. Assam is fortunate to have a diverse range of climates that are ideal for growing horticultural crops. Horticultural crops have an abundance of vitamins, minerals, and fibers. It has the potential to grow to improve the lot of small and marginal farmers at the farmer level by generating steady, fast revenue all year round with careful planning. The production of significant horticultural crops in the district has been shown in the following:

Table No. 25: Area and Production of Horticulture crops in Jorhat district, 2019-2020

Sr. No.	Crops	Area in ha	Average Yield/ha	Production
1.	Papaya	180	15880	2858
2.	Mesta	4	982	4
3.	Banana	2236	15495	34647
4.	Arecanut	2880	140	403
5.	Coconut	500	48	24
6.	Black Pepper	120	1459	175
7.	Pineapple	135	16590	2240
8.	Orange	19	12865	244
	Total	**6074**		

(Source: Potential Linked Credit plan of 2023-2024, Jorhat District)

Assam is the world's largest tea-growing region and is not only famous for its quality of tea as well as the natural beauty of the tea plantation area. Beautiful tea estates of Assam cover about 2, 16, 200 hectares of land comprises of more than 100 tea estates. Enormously found mountain region, its greenery and pleasant climate make this location popular not only for its tea but also for being a popular spot for enjoying eco-vacations. The Assam tea bush grows in a lowland region, in the valley of the Brahmaputra River, an area of clay soil rich in the nutrients of the floodplain. The climate varies between a cool, and winter and hot, humid rainy seasons- the conditions ideal for growing tea. Because of its lengthy growing seasons and generous rainfall of about 250-300 mm (during the monsoon season), The tea estates of Jorhat district have been discussed in the following:

Table No 26: Tea Estate of Jorhat district

SL. No.	Name of the district	Name of the Tea Estate
1.	Jorhat district	AKHOIDESA TEA ESTATE
2.		BORHOLLA TEA ESTATE
3.		BAGHSONG TEA ESTATE
4.		BAMUNIBARI TEA ESTATE
5.		BHELAGURI TEA ESTATE
6.		BOISAHABI TEA ESTATE
7.		BAHONI TEA ESTATE
8.		BARUAJAN TEA ESTATE
9.		BORSAIKOTA (S) TEA ESTATE
10.		BORSAIKOTA NORTH TEA ESTATE
11.		BORSAIKOTA (NORTH-B) TEA ESTATE
12.		BOLOMA TEA ESTATE
13.		BOSABARI TEA ESTATE
14..		BOKAHOLA TEA ESTATE
15.		BORBHETA TEA ESTATE
16.		BOIDEHAT TEA ESTATE
17.		CHENIJAN TEA ESTATE
18.		CINNAMORA TEA ESTATE
19.		CHETIABARI TEA ESTATE
20.		CHEPAJAN TEA ESTATE
21.		DAMAYANTI TEA ESTATE
22.		DEHA TEA ESTATE
23.		DAHINGEAPAR TEA ESTATE
24.		DESSOI TEA ESTATE
25.		DUFFALATING TEA ESTATE
26.		DUKLINGIA TEA ESTATE
27.		DURGABARI TEA ESTATE
28.		DHOOLI TEA ESTATE
29.		GREENVIEW TEA ESTATE
30.		GOTOONGA TEA ESTATE
31.		GABROOPARBAT TEA ESTATE
32.		GOHAINBARI TEA ESTATE
33.		GOVINDAPORE TEA ESTATE
34.		GORAJAN TEA ESTATE
35.		HIRAJAN TEA ESTATE

36.		HAROOCHARAI TEA ESTATE
37.		HUNWAL TEA ESTATE
38.		HOOLUNGURIE TEA ESTATE
39.		HEELEAKAH TEA ESTATE
40.		JADAVPORE TEA ESTATE
41.		JUGIBHETA TEA ESTATE
42.		JAGDUAR TEA ESTATE
43.		KHARIKOTIA TEA ESTATE
44.		KAKODONGA TEA ESTATE
45.		KOTHALGURI TEA ESTATE
46.		KAKAJAN TEA ESTATE
47.		KAMALPORE TEA ESTATE
48.		KAMARBOND TEA ESTATE
49.		KONIKAR-DALIM TEA ESTATE
50.		KASOJAN TEA ESTATE
51.		KUHUM TEA ESTATE
52.		LETEKUJAN TEA ESTATE
53.		LOHPOHIA TEA ESTATE
54.		LAKHIBARI TEA ESTATE
55.		LAXMIJAN TEA ESTATE
56.		MASHOPUR TEA ESTATE
57.		MEZENGAH TEA ESTATE
58.		MONMOY TEA ESTATE
59.		MELENG TEA ESTATE
60.		MOABUND TEA ESTATE
61.		NEW SONOWAL TEA ESTATE
62.		NAGANIJAN TEA ESTATE
63.		NAGAJUNKA TEA ESTATE
64.		NARAYANPUR TEA ESTATE
65.		PADAM TEA ESTATE
66.		PANICHAKOA TEA ESTATE
67.		PURANIMATI TEA ESTATE
68.		RAJABARI TEA ESTATE
69.		RANGAJAN TEA ESTATE
70.		SYADBARI TEA ESTATE
71.		SARAIPANI TEA ESTATE
72.		SINGORIJAN TEA ESTATE
73.		SWARNAPUR TEA ESTATE
74.		SELENG TEA ESTATE
75.		SOCKLATING TEA ESTATE
76.		SANGSUA TEA ESTATE
77.		SOLALBARI TEA ESTATE
78.		SOTAI TEA ESTATE
79.		SYCOTTA TEA ESTATE
80.		SEUJIPAM TEA ESTATE
81.		TYROON TEA ESTATE
82.		TIPOMIA TEA ESTATE
83.		THENGAIBARI TEA ESTATE

84.		TIRUAL TEA ESTATE
85.		TEOK TEA ESTATE
86		TOCKLAI TEA ESTATE
87		UDAYJYOTI TEA ESTATE
88		UMABARI TEA ESTATE

(Source: https://ttwd.assam.gov.in/frontimpotentdata/list-of-tea-garden-at-assam)

CHAPTER 9: PHYSIOGRAPHY OF THE DISTRICT

9.1 PHYSIOGRAPHY

General Landform:

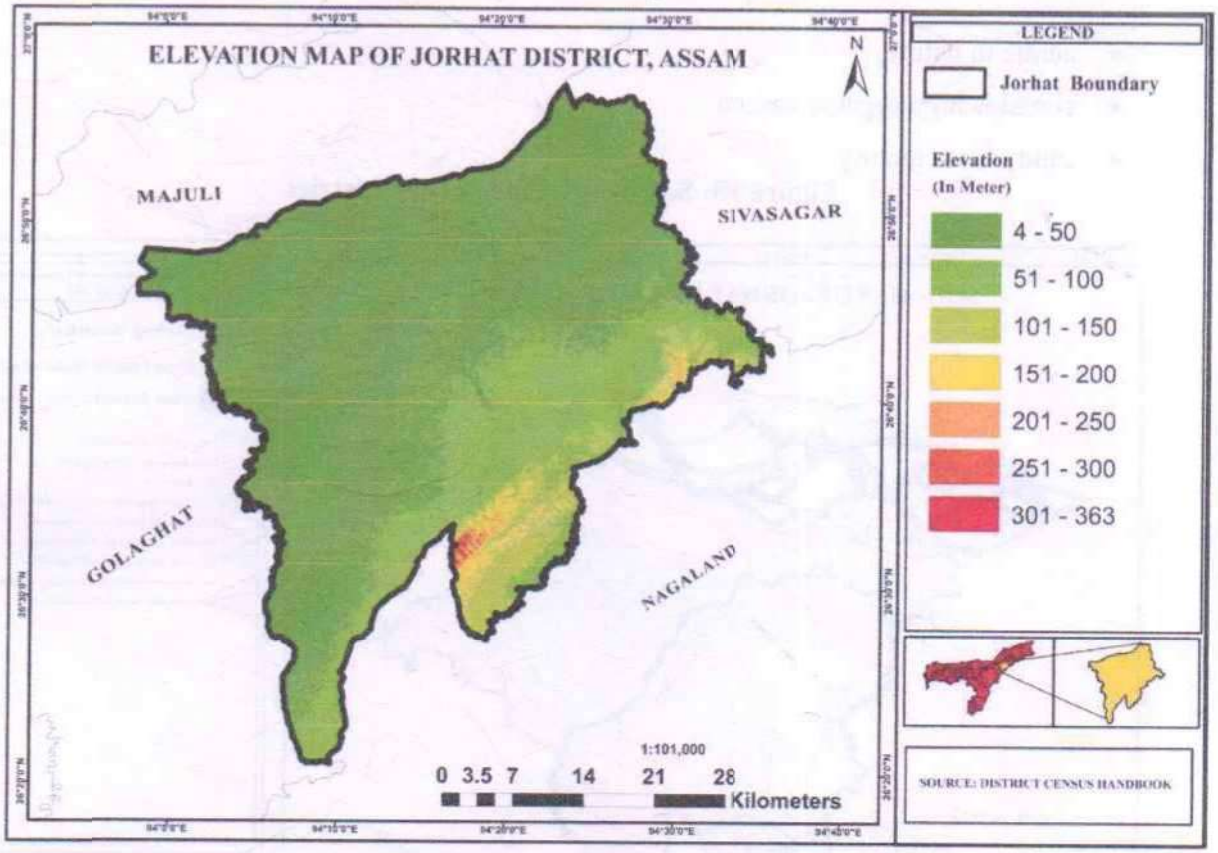
Based on landform patterns, the district of Jorhat can be categorized under five geomorphological units. Such as:

a. The flood plain of the Brahmaputra River in the north
b. The central upland area covering younger alluvial formations
c. The central upland area covering older alluvial formations
d. The southern undulating hill area running along the Naga-Patkai range covering the Piedmont plain
e. Structural hills.

*(**Source**: CGWB, 2013).*

The elevation of the floodplain area varies from 80 to 90 m while in the central upland area, it is 95 to 110 m above Mean Sea Level. The altitude of the hills in the southern and eastern parts of the district is up to 312 m above MSL. The general trend of the mountain is NE-SW and at places to N-S. The Brahmaputra and its important tributaries like Bhogdoi and Kakodonga are flow throughout the district. The tributaries originate from the Naga-Patkai range and flow northward toward the Brahmaputra River almost at right angles. This feature gives rise to a subparallel type of drainage. The rivers and streams are highly meandering in nature and sudden changes in the courses of these rivers possibly due to heavy siltation and epiorogenic movements cause the flood. The young alluvial soils of recent deposition by the rivers are light grey to dark grey in colour and are confined to the floodplain area adjacent to the Brahmaputra River and its tributaries. The older alluvial soil is sandy loam to silty and clay loam. It is light yellowish brown to light brown in colour. The pH level varies between 4.5 and 6.0, which makes it acidic. Because of this, these soils are suitable for tea plantations. The soils of the district are characterized by organic matter available phosphorus and low potash. The soils in the southern parts are derived from the semi-consolidated rocks underlying these areas. *(Source: Groundwater Information Booklet of Jorhat District,2013)*

Figure 17: Elevation Map of Jorhat district



9.2 SOIL & ROCK PATTERN

Not only landform or relief but also different soil-forming factors, climate and vegetation have played significant roles in the formation of soils in the district. Due to this complex interaction of these factors, several kinds of soils are developed which differ distinctly in morphological and physical, and chemical properties. Such characteristics formed the basis for identifying and distinguishing the nature of soils and delineating the extent of different soils in the study area (Soils of Jorhat District (Assam) for Land Use Planning Report). The soils of the hill ranges are moderately deep to very deep, fine-loamy or coarse-textured and gravelly. They are mostly yellowish brown to brownish yellow in color. Soils of upper piedmonts, undulating upland and dissected gently sloping uplands are deep to very deep, coarse-loamy or fine-loamy in texture. They are brown to yellowish brown and occasionally brownish yellow to reddish yellow with reddish brown soft iron nodules.

➢ **Soil Type**

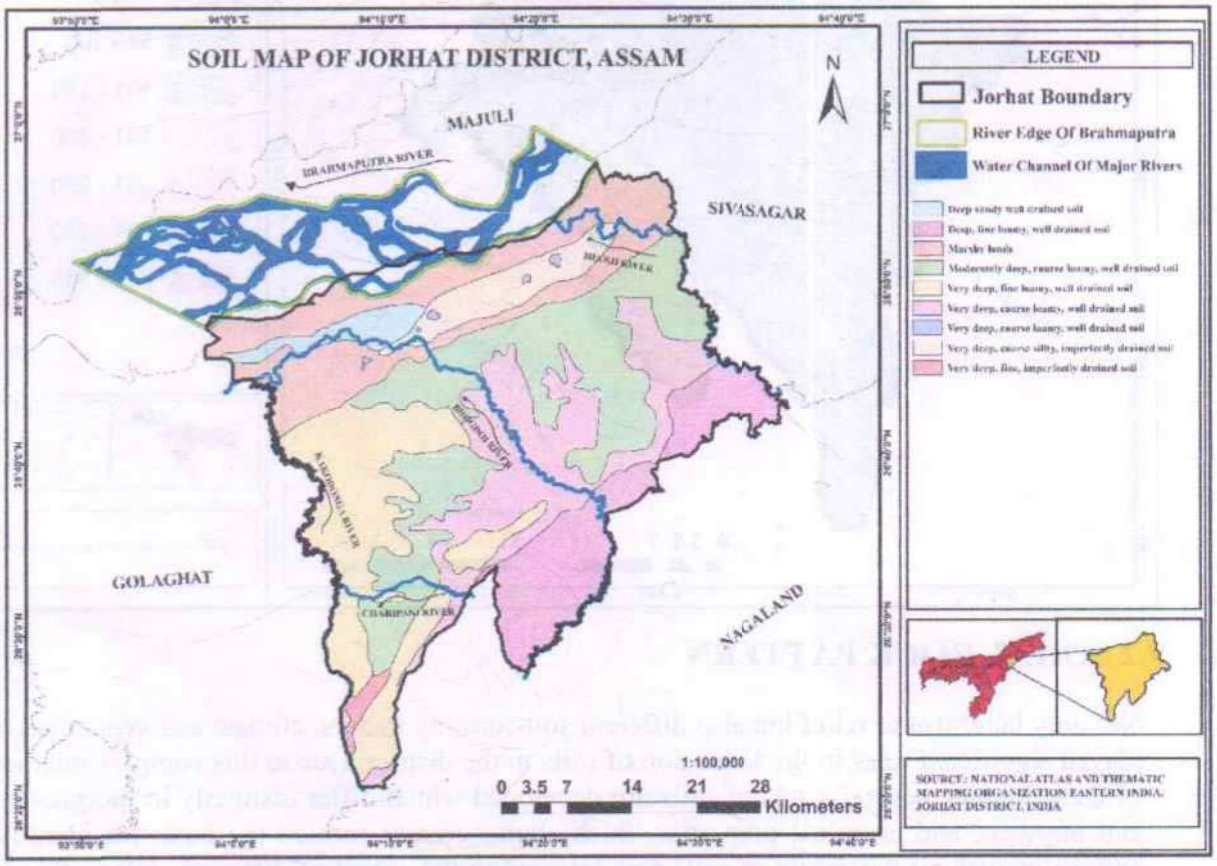
The following types of can be observed throughout the Jorhat district:

- Sandy loam
- Clay loam
- Fine loam
- Coarse loam

➢ **Salient Features of Soil:**

- acidic in nature,
- contains high organic carbon
- sandy loam mainly

Figure 18: Soil Map of the Jorhat District



9.3 SURFACE WATER AND GROUNDWATER SCENARIO OF THE DISTRICT

9.3.1 HYDROGEOLOGY

The area is underlain by unconsolidated alluvial sediments of the Quaternary age, which can be differentiated into Older and Younger alluvium.

The Older alluvium occupies the upland areas with sediments of oxidized and relatively compact nature, while the younger alluvium occurs in the low-lying tracts of the area along the river courses. Groundwater in the district occurs under water table to semi-confined conditions in the near-surface conditions and in the deeper horizon, under semi-confined to confined conditions. A detailed Hydrogeological survey aided by exploratory drilling has been done by CGWB. It has revealed the existence of rich aquifer system down to a depth of 300 m. The aquifer system of the area is broadly divided into three groups: a) 0-50 mbgl, b) 50-200 mbgl, c) 200-300 mbgl.

In the first and the second group, granular zones constitute about 45% and 30% respectively. The granular zones concerning both shallow and deeper aquifers have 10 tendencies to become finer-grained and decrease in thickness towards the southern part of the area. A great deal of facies variations and lateral intercalations are prevalent. Near the surface, groundwater in the

district occurs under water table to semi-confined conditions, whereas in the deeper horizon, it occurs under semi-confined to confined conditions.

Detailed Hydrogeological surveys aided by exploratory drilling by CGWB have revealed the existence of a rich aquifer system down to a depth of 300 m. The aquifer system of the area is broadly divided into three groups.

i) 0-50 m bgl

ii) 50-200 m bgl

iii) 200-300 m bgl

➢ **Aquifer System of Jorhat District**

Granular zones make up around 45% and 30% of the first and second groups, respectively. About both shallow and deeper aquifers, the granular zones tend to diminish in thickness and become finer grained as one moves southward. There are several lateral intercalations and facies variations. Grain size analysis and aquifer performance testing have allowed for the classification of the deeper aquifer into the following groups based on hydraulic conductivity.

Group I: It is defined by hydraulic conductivity that is between 45 and 65 m/day, or more than 20 m/day. This is limited to regions that border the Brahmaputra River and is distinguished by thicker granular zones. The region is appropriate for deep tube wells that have a drawdown of up to 6 meters and a discharge of 100–200 m3/hr.

Group II: It is defined by a hydraulic conductivity of at least 20 m/day (between 30 and 45 m/day). This takes place in the district's center. With greater lifts, this zone is appropriate for deep tube wells as mentioned above.

Group III: defined as having a hydraulic conductivity of less than 20 meters per day. This region is located in the district's southern region. This group contains fine to extremely fine-grained granular zones, particularly close to the Naga Hills, whose delineation necessitates the use of exacting techniques like electrical logging. Medium tube wells up to 70 m3/hr with a drawdown of up to 6 m can be built in these places.

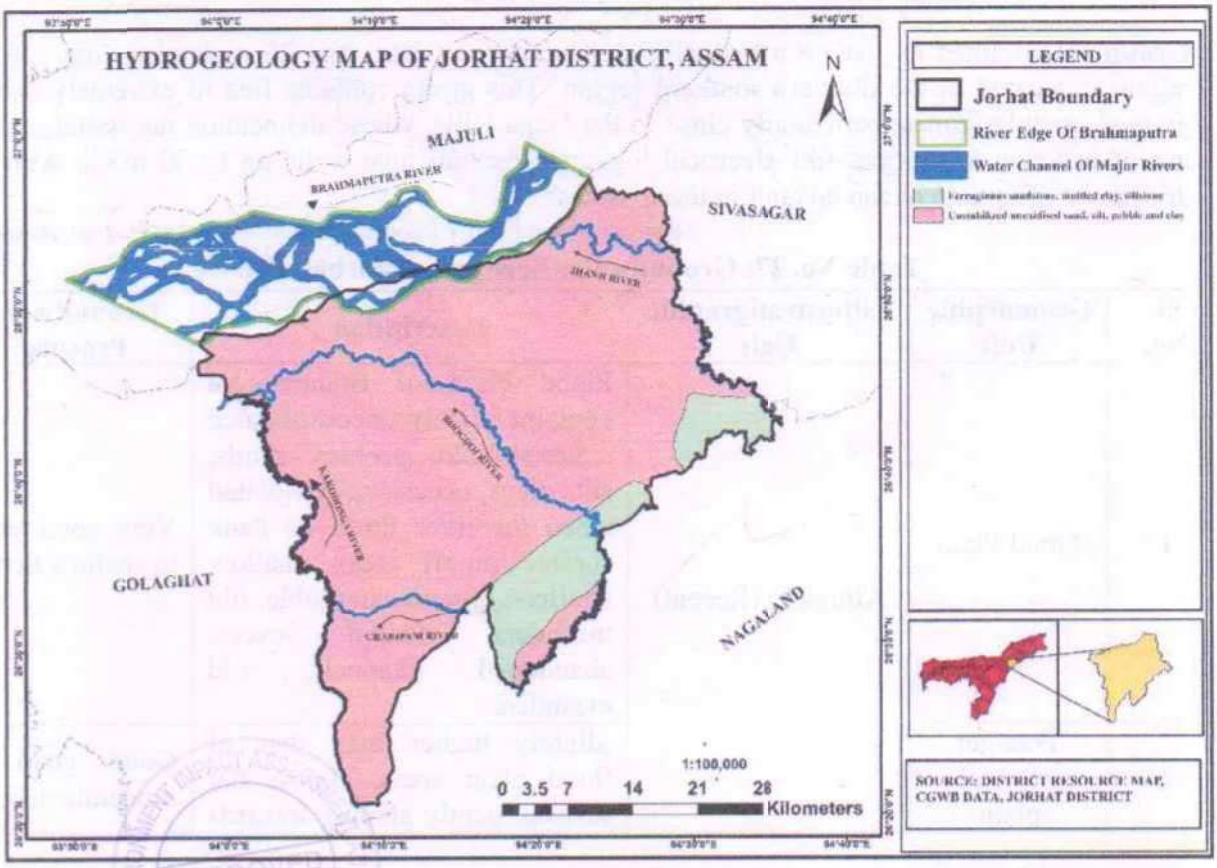
(Source: Ground Water Information Booklet Jorhat District, Assam)

Table No. 27: Groundwater Scenario of Jorhat district

Sl. No.	Geomorphic Unit	Lithostratigraphic Unit	Description	Groundwater Prospect
1	Flood Plain	Alluvium (Recent)	Flood Plain of Brahmaputra contains mainly unconsolidated materials like pebbles, sands, silts clays, occasionally flooded when the river flows its bank surface runoff areas, shallow aquifers, groundwater table, old meanders, natural levees, abandoned channels, old meanders	Very good yield to shallow depth
2	Younger Alluvial plain		Slightly higher than that of flood plain areas, almost flat surface, gently sloping towards	Good yield to moderate depth

			the north, materials consist of fine to medium-grained sand, silt and clay, recharge zone, clay lenses forming aquiclude zones, and Palaeochannels	
3	Older Alluvial Plain	Alluvium (Pleistocene)	Weathered gravels, sands, silt and clay, recharge zone, groundwater water table	Good Yield
4	Piedmont Plain		Mainly pebbles, gravels, sand, silt, and clay, a plain sloping gently towards the north formed by the coalescence of several alluvial fans brought by streams or deposited from the hill slope	Poor to moderate yield
5	Structural Hills	Dihing Group (Boulder Bed)	Mainly consist of boulders, gravels, pebbles, sandstones, run-off zones, moderately dissected, partial recharge along fractures	Poor
6	Structural Hills	Tipam Group (Sandstone)	Mainly medium-grained ferruginous sandstone and shale, run-off zone, partial recharge along fractured and weathered zone,	Poor yield

Figure 19: Hydrogeological Map of Jorhat District



9.3.2 Depth to Water Level:

Near the surface, groundwater in the district occurs under water table to semi-confined conditions, whereas in the deeper horizon, it occurs under semi-confined to confined conditions. The water table zone's depth to water level ranges from 0.41 to 3.07 m bgl during the pre-monsoon season and from 0.56 to 3.41 m bgl during the post-monsoon season. According to a panel diagram created using the subsurface data that is currently available, there are three or four productive aquifer systems in the central regions that extend down to a depth of 300 meters (Plate III). Five to six aquifer systems with varying depths of 400 meters can be found near the Brahmaputra River. Due to the combination of finer sand particles with water, the aquifer system in the southern regions diminishes.

Figure 20: Pre-Monsoon Depth to Water Level Map of Jorhat District

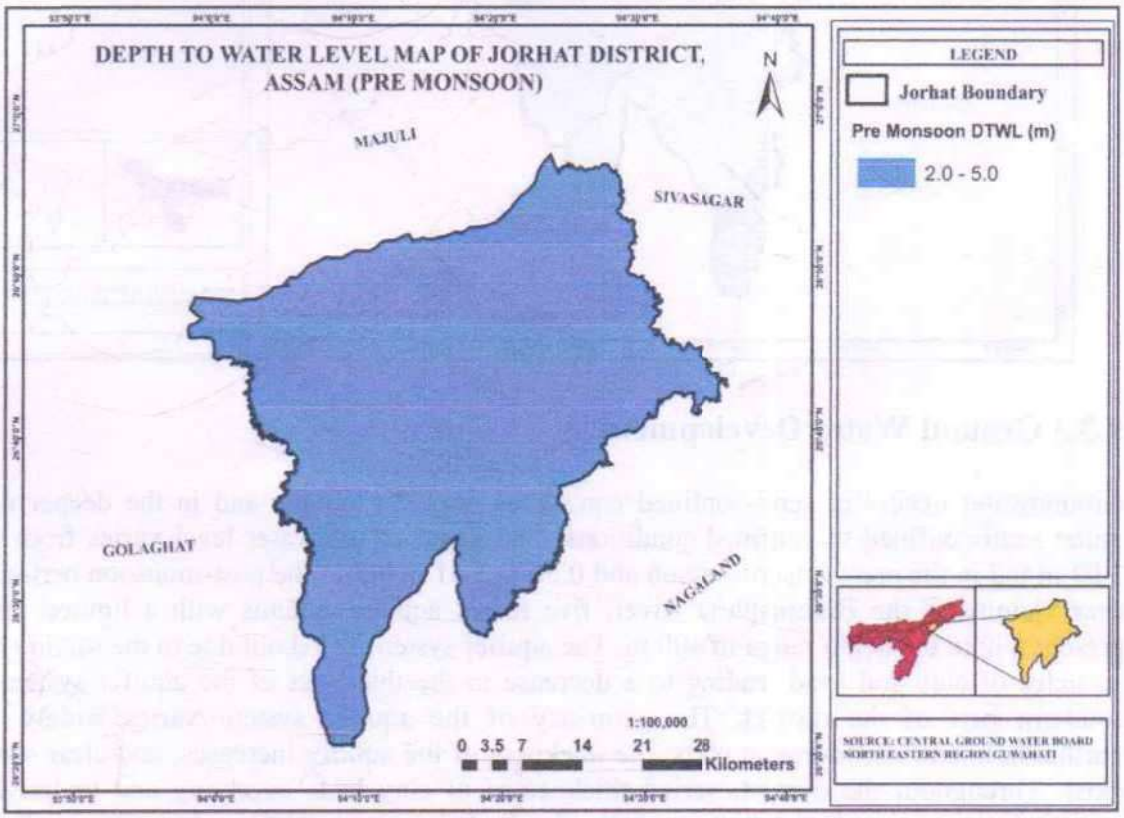
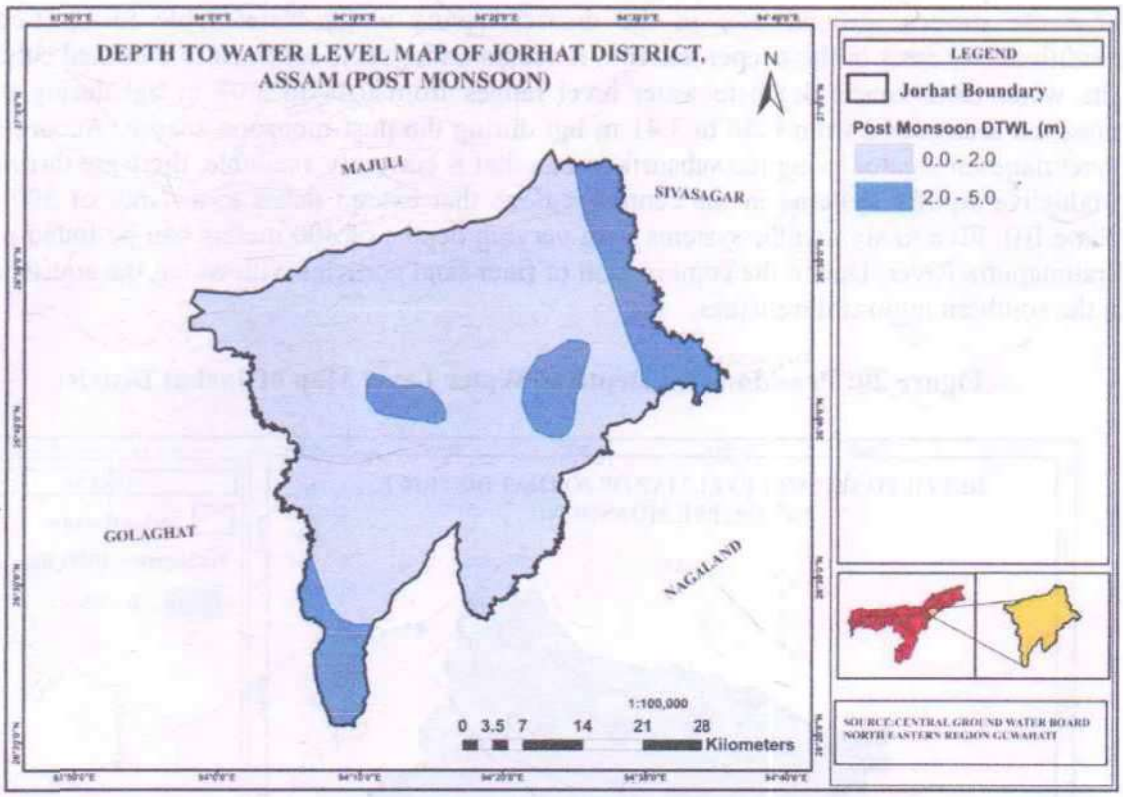


Figure 21: Post-Monsoon Depth to Water Level Map of Jorhat District



9.3.3 Ground Water Development:

Groundwater occurs in semi-confined conditions near the surface and in the deeper horizon, under semi-confined to confined conditions. The depth of the water level varies from 0.41 to 3.07 m bgl in the pre-monsoon season and 0.56 to 3.41 m bgl in the post-monsoon period. In the near vicinity of the Brahmaputra River, five to six aquifer systems with a limited thickness present within the depth range of 400 m. The aquifer system faded out due to the mixing of finer particles of clay and sand leading to a decrease in the thickness of the aquifer system in the southern part of the district. The geometry of the aquifer system varies widely. In the northeastern and northwestern parts, the thickness of the aquifer increases, and clear sand beds exist. Throughout the district, varied thicknesses of clay beds overlying and underlying the aquifer system exist. The thickness of the clay beds increases southwards i.e., towards Titabar where it attains a maximum thickness of 103 m. *(CGWB, 2013)*

The predominance of clay formation in the depth of 30 to 50 m poses a problem in the storage of groundwater in the district, however, local variation in the existence of very limited thickness of sand beds mixed with clay performing as conduits of groundwater is also observed.

9.3.3 Groundwater-Related Issues and Problems:

As per CGWB:

- Major groundwater-related issues found in this area are the low stage of development, shallow groundwater level, and meager irrigational infrastructure in major parts of the study area. Higher concentrations of iron throughout the study area with arsenic concentration above the permissible limit in the shallow aquifer zone in the Titabor block of Jorhat district are important quality issues.

- In 85% of the net sown area, no irrigation facility is available.
- As the district is underlain by approximately 30 to 50 meters of clayey formation, the construction of shallow tube wells poses problems. Even for the construction of deep tube wells in the extreme southern parts of the district, utmost care should be taken for the selection of sites and identification of small alternate beds of fine sand and clay.

9.3.4 Mass Awareness Campaign and Water Management Training Programme by CGWB:

Only one Mass Awareness Programme (MAP) and one Water Management Training Programme (WMTP) were organized on 14th March 2008 (MAP) and 15th March 2008 (WMTP) at Jorhat town.

9.3.5 Groundwater Resource:

Groundwater in Jorhat District is primarily utilized for domestic, irrigation, and industrial purposes, with a stage of Groundwater extraction of 12.61%. The district has a Total Annual Ground Water Recharge of 128467.46 ham. The Assessment unit can be categorized into 4 categories safe, semi-critical, critical, and over-exploited. In Jorhat district stage of groundwater development is 12.61%, which shows under the SAFE category. As the long-term water level trend does not show any major change the whole district may be considered as safe.

Table No. 28: Dynamic Ground Water Resources of Jorhat District in the year 2023

Name of District	Total Annual Ground Water Recharge (ham)	Total Natural Discharges (ham)	Annual Extractable Ground Water Resource (ham)	Current Annual Ground Water Extraction (ham)	Annual GW Allocation for Domestic Use as on 2025 (ham)	Net Ground Water Availability for future use (ham)	Stage of Ground Water Extraction (%)
Jorhat	128467.46	72013.47	56453.99	7121.01	1416.15	49293.35	12.61

Source: Dynamic Groundwater Resources of Assam

9.3.6 Recommendations:

From a detailed study of groundwater of Jorhat district by CGWB, below recommendations can be deduced:

- Ground water development in the district is still in nascent stage. State Organizations like Assam State Minor Irrigation Development Corporation till 1990, Irrigation Department and Agriculture Department have already constructed 5,083 shallow and deep tube wells till March 2004, which are used for irrigation purposes. The draft created by these shallow and deep tube wells is stated to be 132.16 mcm. Based on the balance resource, recommendations is made for construction of shallow/medium duty tube wells within depth range varying from 50 to 70 m along with design aspects and numbers.

- The district has high dependence on ground water to meet the water requirement for domestic uses. However, for irrigation purpose, the ground water development is at low key. There exists enormous potential of ground water development to meet the requirements of the agricultural sector.
- To ensure the long service life of the production wells in the district, optimum care should be exercised while placing the screens to tap the aquifer zones The exploration in the study area has revealed the presence of fine to very fine sands in the prominent aquifer zones and have profound impact upon the hydraulic conductivity of the individual aquifer zones.
- The pre-monsoon depth to water level in the shallow aquifer of the area varies from 3.79 to 8.32 m bgl. The post-monsoon depth to water level ranges from 0.50 to 4.26 m bgl. The fluctuation (pre-post monsoon) is in the range of 3.29 to 4.06 m.
- Agricultural development in the district needs to be given a boost with special emphasis on creation of irrigation schemes particularly by way of constructing 526936 numbers of shallow ground water structures. Ground water development may be stepped up for stabilizing the Rabi irrigation and also for meeting the irrigation demand during the post Rabi period. Ground water abstraction structures that have become sick due to operational hazards and constructional defects should be rejuvenated.

CHAPTER 10: CLIMATE

10.1 CLIMATE

The climate of Jorhat is classified as a mesothermal wet climate and is characterized by a highly humid atmosphere and abundant rainfall. The summer season consists of May to July and the winter season starts in November and ends in January. Heavy rainfall coupled with storms and thunderstorms; the result of the south-west monsoon characterizes the rainy season in the district. Temperature starts falling from November and rises from March every year *(Census, 2011)*

10.2 TEMPERATURE

In this district, January is the coldest month with a temperature of 7.2°C in 2021 & 6.4 °C in 2022. July, August, and September are the hottest periods of the year. In 2023, the hottest month was September with a maximum temperature of 34.6 °C. The average relative humidity in a year is 78.6 percent. The amount of rainfall increases from southwest to northeast. *(Statistical Handbook of Jorhat District, 2023)*

The below table is for the monthly average temperature distribution of the Jorhat district for 2021-2023. It can give us an insight into month-wise temperature trends for a whole year. January is the coldest month and September was the hottest month in the year 2023.

Table No. 29: Monthly Average Temperature (in °C) Distribution (2021-2023) of Jorhat District

Year	Parameters	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2021	Maximum (°C)	23	26.7	28.6	31	30.2	32.3	33.5	33.2	33.9	33.1	28.7	25.6
	Minimum (°C)	7.2	9.2	13.7	15.6	18.8	21.3	22.2	22	21.5	19.9	11.1	8.7
2022	Maximum (°C)	22.9	23.6	31	27	30.7	30.4	34.3	34.2	33.1	30.9	28.9	25.2
	Minimum (°C)	6.4	6.8	12.9	16	19	20.9	21.7	21.9	20.8	17.9	10.6	0
2023	Maximum (°C)	23.7	25.3	27.1	27.1	30.9	32.7	33.4	33.3	34.6	31.6	NA	NA
	Minimum (°C)	NA	14.1	16.3	19.5	21	24.9	26	25.4	25.9	21.8	NA	NA

(Source: Tokolai Experimental Station, Jorhat)

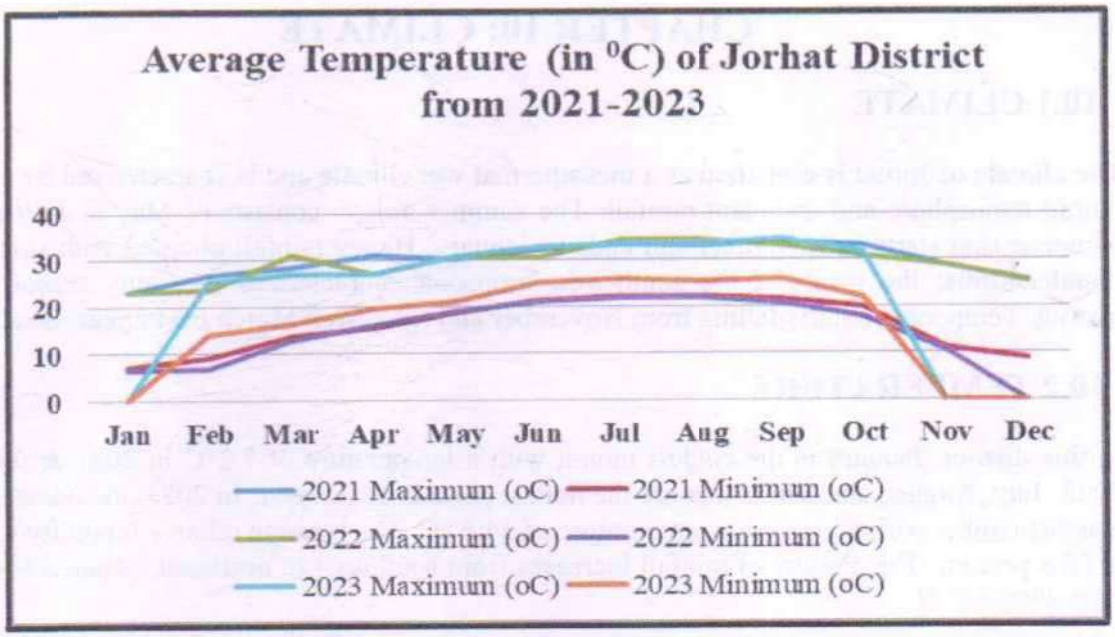


Figure 22: Monthly Average Temperature Distribution of Jorhat District From 2021-2023

10.3 MONTH WISE RAINFALL

Jorhat district in Assam experiences a tropical monsoon climate, characterized by heavy rainfall during the monsoon season (June-September). The rainfall is well distributed all through the year. The major portion is received from March to September. The mean annual rainfall recorded in 2023 was 1387.4 mm (District Statistical Handbook, 2023). The minimum average relative humidity in the 2023 year is 53% in January and the maximum average humidity is about 96% in February. The high humidity of the district favors the infestation problem of pests/diseases in plants and livestock. A tabular representation of Rainfall Data for 3 years (2021-2023) for the Jorhat district has been furnished below:

Table No. 30: Rainfall Data of Jorhat District from 2021-2023

Sl. No.	Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total (mm)
1.	2021	15	7.9	52.9	44.9	196.4	279.2	234.3	169.9	194.3	90.5	30.9	0.8	1309.1
2.	2022	19.8	54.1	39.8	265.8	207.4	339.1	299	261.2	261.2	229.3	NA	1.4	1978.1
3.	2023	N/A	42.4	93.9	147.5	123.1	319.1	321.9	132.7	132.7	74.1	NA	0.0	1387.4

***(Source:** Tokolai Experimental Station, Jorhat)*

Figure 23: Graphical Representation of Rainfall in Jorhat District (2021-2023)

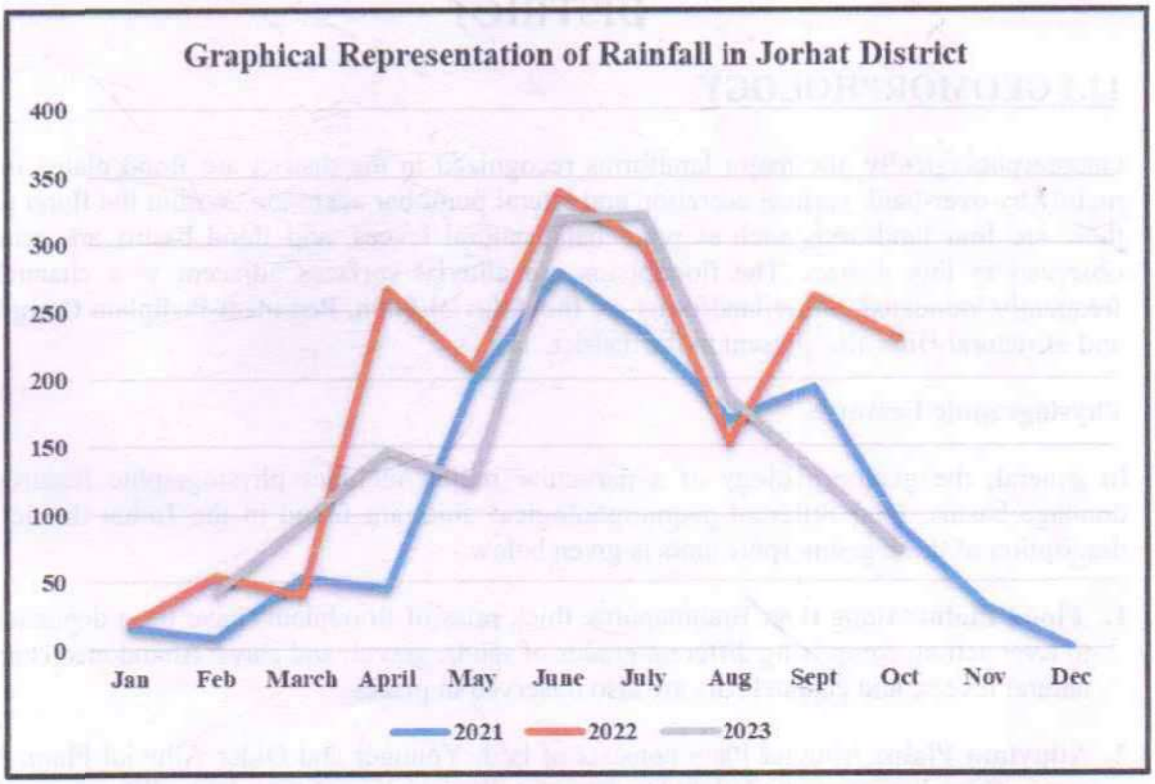


Table No. 31: Average Humidity Percentage (%) of Jorhat district from 2021-2023

Year		Jan	Feb	March	April	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Morning	2021	94	91	91	86	90	92	90	91	91	91	92	96
	2022	96	96	93	95	92	94	92	93	94	95	95	96
	2023	96	97	95	92	90	92	94	94	92	94	NA	NA
Afternoon	2021	61	45	51	46	70	71	71	70	66	63	54	54
	2022	56	59	51	73	69	78	71	69	68	72	55	59
	2023	53	58	58	58	62	72	72	72	66	65	NA	NA

(Source: Tokolai Experimental Station, Jorhat)

CHAPTER 11: GEOMORPHOLOGY & GEOLOGY OF THE DISTRICT

11.1 GEOMORPHOLOGY

Geomorphologically, the major landforms recognized in the district are flood plains formed mainly by over-bank vertical accretion and lateral point bar accretion. Within the flood plains, there are four landforms such as point bars, natural levees, and flood basins are generally observed in this district. The floodplains are alluvial surfaces adjacent to a channel and frequently inundated. Other landforms are the Alluvial Plain, Pediment-Pediplain Complexes, and Structural Hills also present in the district.

Physiographic Features

In general, the geomorphology of a particular region includes physiographic features and drainage basins. Four different geomorphological units are found in the Jorhat district. The description of these geomorphic units is given below -

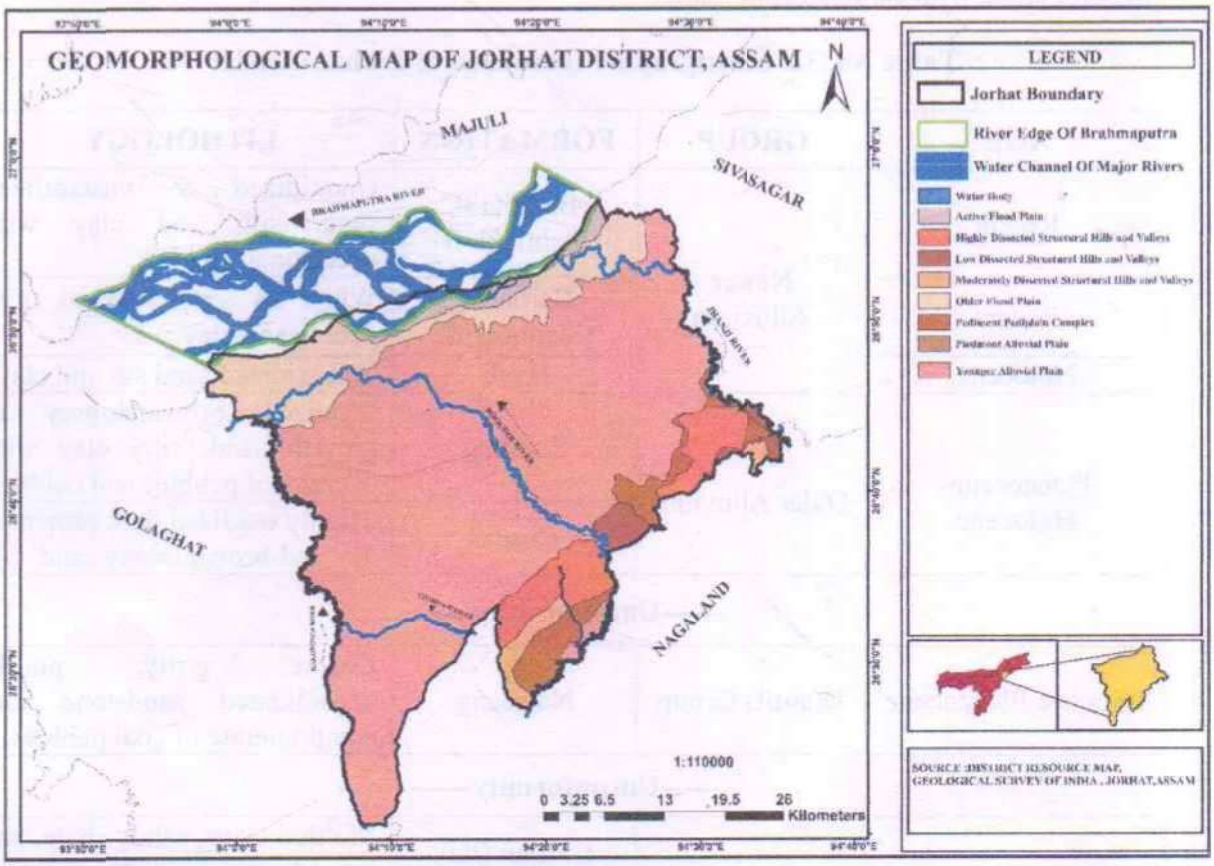
1. **Flood Plain:** Along river Brahmaputra, thick piles of floodplains have been deposited due to river action, comprising different grades of sands, gravel, and clays. Abandoned channels, natural levees, and channel bars are also observed in places.

2. **Alluvium Plain:** Alluvial Plain consists of both Younger and Older Alluvial Plain. Major parts of the district are underlain by younger alluvial plains, comprising different grades of sand, gravel, pebbles, and silts. Old meanders and abandoned channels are also common in the unit. The central part of the district is generally covered by an alluvial plain. These areas occur at slightly higher elevations than younger alluvial plains. The formation is mainly comprised of unconsolidated to semi-consolidated weathered limonitic clay, unsorted boulders, pebbles, gravel, and sand.

3. **Pediment - Pediplain Complex:** This domain represents a transitional zone between the hills and the plains. The pediment is characterized by gently sloping surfaces formed by the erosion of hillsides and pediplain surfaces are the large, flat land formed by accumulations of particles of pediments. They consist of assorted admixture of cobbles, pebbles, sand, and a matrix of clay. The southern and southeastern part of the district is covered by these geomorphic units.

4. **Structural hills:** Hills and Valleys, are formed due to tectonic processes and are highly dissected by the drainage patterns. These hills and valleys are further subdivided into three categories high, moderate, and low dissection depending on the density of joints and drainage. **Highly Dissected Structural Hills** are rugged terrain, steep slopes, and deep valleys. It is primarily composed of older, resistant rocks, making it less suitable for agriculture and human settlement. **Moderately Dissected Structural Hills** are comprised of undulating hills and valleys that were formed by the erosion of older rocks. The terrain is characterized by gentle slopes and moderate relief, and it is frequently covered in forests and agricultural land. **Low Dissected Structural Hills** are relatively low-lying hills that have been heavily eroded and fragmented, with their formation shaped by underlying geological structures like folds, faults, or tilts. These hills and valleys are present in the south and south-eastern part of the district. Only 5% of the total area is covered by highly to low dissected structural hills and valleys.

Figure 24: Geomorphological map of the Jorhat district



11.2 GEOLOGY

Geologically, the district is characterized by Tertiary and Quaternary litho-assemblages ranging from Eocene to Recent age. The oldest litho-unit is the Jenam Formation of Barail Group. This Jenam Formation is composed of carbonaceous shale and sandstone along with coal. It is overlain unconformably by the Tipam Group of rocks. Tipam Formation forms the older boundary of the Tipam Group. It consists of ferruginous sandstone with siltstone and clay of Miocene to Pliocene in age. The upper part of the Tipam group is generally filled with Girujan Formation. This formation is characterized by mottled clay, mudstone, and ferruginous sandstone. Tipam Group is unconformably overlain by the rocks of the Dupitila group making a thrusted contact. The Namsang Group of the Dupitila Formation is characterized by grit, conglomerate, sandstone, and clay with or without coals. The northern and central part of the district is mostly covered by quaternary sediments. These quaternary sediments are classified into two groups i.e., Older and Newer Alluvium. These Quaternary sediments are separated from the rest of the Precambrian rocks by an unconformity. Older Alluvium is classified into two morpho-stratigraphic units i.e., Chapar and Sorbhog. Chapar Formation is composed of highly oxidized dark brown to red-brown loamy sand. Sorbhog Formation is characterized by highly oxidized reddish-brown sand and silty clay with occasional pebbles and cobbles. Newer Alluvium Group is classified into three sub-types i.e., Haul, Barpeta I, and Barpeta II. The oldest formation, Haul is forming the basement of quaternary sediments of Newer Alluvium. It is characterized by oxidized alternate sand and silt, as well as clay with carbonized wood and minor pebbles in flood plains. Barpeta-I comprises white to greyish sand, silt, pebbles, and clay with carbonaceous matter. Barpeta-

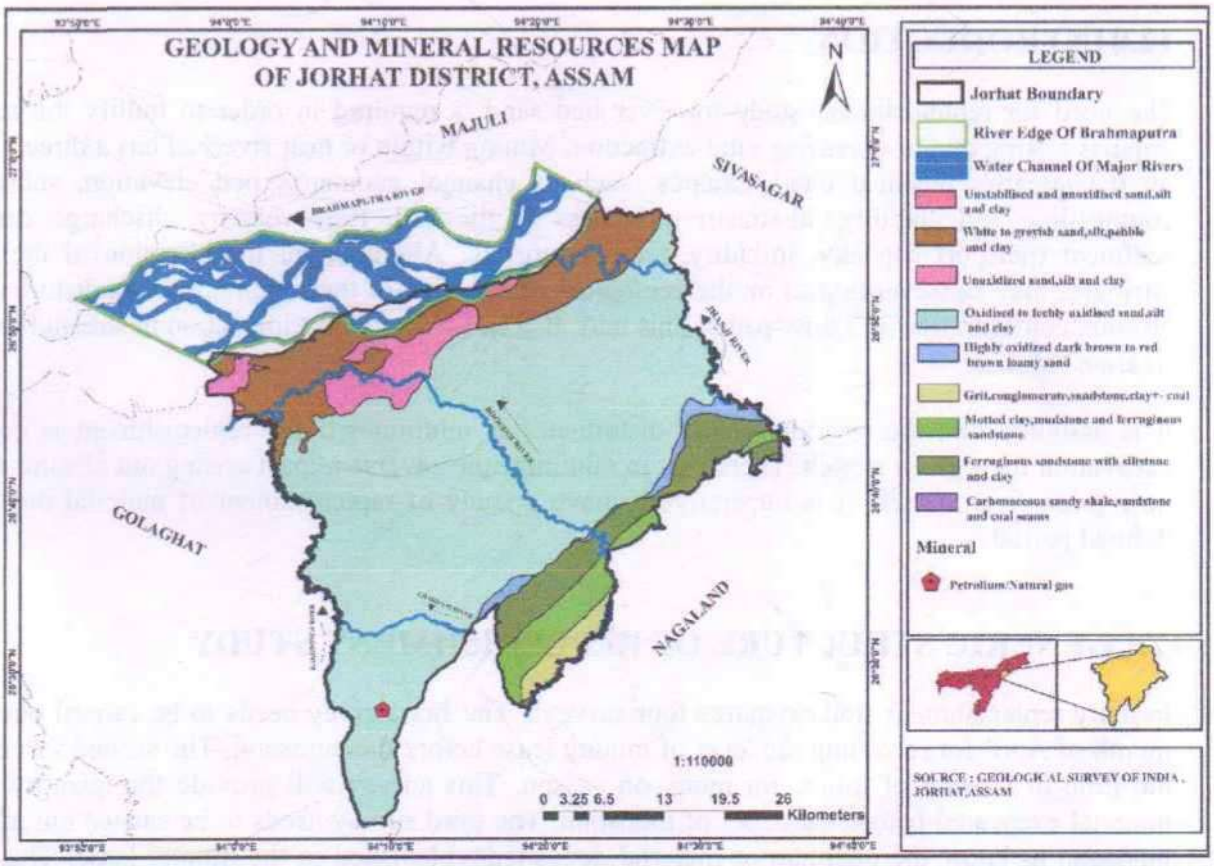
II contains with most recent sediments like unoxidized sand, silt, and clay with occasional pebbles along with carbonaceous matter.

Table No. 32: Stratigraphic succession of Jorhat District

AGE	GROUP	FORMATION	LITHOLOGY
Recent	Newer Alluvium	Barpeta II (Sisimukh II)	Unoxidized & unstabilized sand, silt, and clay with occasional pebbles
Recent		Barpeta I (Sisimukh I)	White to greyish sand, silt, pebble and clay
Holocene		Hauli	Unoxidized sand silt and clay
Pleistocene-Holocene	Older Alluvium	Sorbhog	Oxidized brownish-grey to greyish sand, silty clay with occasional pebbles and cobbles
		Chapar	Highly oxidized dark brown to red-brown loamy sand
------Unconformity------			
Pliocene-Pleistocene	Dupitila Group	Namsang	Coarse, gritty, poorly consolidated sandstone and conglomerate of coal pebbles
------Unconformity------			
Miocene- Pliocene	Tipam Group	Girujan Clay Formation	Mottled clays, sandy shale, and subordinate mottled, coarse to gritty sandstone
		Tipam Sandstone Formation	Bluish grey to greenish, coarse to gritty, false bedded, ferruginous sandstone, clays, shales and conglomerates
------Unconformity------			
Eocene – Oligocene	Barail Group	Jenam	Shale, sandy shale, and carbonaceous shales with interbedded hard sandstone; its equivalent the Bargolai Formation in Upper Assam is marked by thin coal seams

***(Source:** GSI Miscellaneous Publication No. 30 Part IV Vol 2 (i) Assam. (2009)*

Figure 25: Geology and Mineral Map of the Jorhat District



CHAPTER 12: REPLENISHMENT STUDY

12.0 INTRODUCTION

The need for replenishment study for river bed sand is required in order to nullify the adverse impacts arising due to excessing sand extraction. Mining within or near riverbed has a direct impact on the stream's physical characteristics, such as channel geometry, bed elevation, substratum composition and stability, in-stream roughness of the bed, flow velocity, discharge capacity, sediment transport capacity, turbidity, temperature etc. Alteration or modification of the above attributes may cause an impact on the ecological equilibrium of the riverine regime, disturbance in channel configuration and flow-paths. This may also cause an adverse impact on in stream biota and riparian habitats.

It is assumed that the riparian habitat disturbance is minimum if the replenishment is equal to excavation for a given stretch. Therefore, to minimize the adverse impact arising out of sand mining in a given river stretch, it is imperative to have a study of replenishment of material during the defined period.

12.1 GENERIC STRUCTURE OF REPLENISHMENT STUDY

Initially replenishment study requires four surveys. The first survey needs to be carried out in the month of April for recording the level of mining lease before the monsoon. The second survey is at the time of closing of mines for monsoon season. This survey will provide the quantity of the material excavated before the offset of monsoon. The third survey needs to be carried out after the monsoon to know the quantum of material deposited/replenished in the mining lease. The fourth survey at the end of March to know the quantity of material excavated during the financial year. For the subsequent years, there will be a requirement of only three surveys. The results of year-wise surveys help the state government to establish the replenishment rate of the river. Based on the replenishment rate future auction may be planned.

The replenishment period may vary on nature of the channel and season of deposition arising due to variation in the flow. Such period and season may vary on the geographical and precipitation characteristic of the region and requires to be defined by the local agencies preferable with the help of the Central Water Commission and Indian Meteorological Department. The excavation will, therefore, be limited to estimated replenishment estimated with consideration of other regulatory provisions.

12.2 METHODOLOGY FOR REPLENISHMENT STUDY

The replenishment estimation is based on a theoretical empirical formula with the estimation of bed load transport comprising of analytical models to calculate the replenishment estimation. The iso-pluvial maps of IMD can be used for estimation of rainfall. Catchment yield is computed using different standard empirical formulas relevant to the geographical and channel attributes. e.g., Strange's Monsoon runoff curves for runoff coefficient). Peak flood discharge for the study area can be calculated by using Dickens, Jarvis and Rational formula at 25, 50 and 100 years return period. The estimation of bed load transport using Ackers and White Equation or similar can be made. A simulation model is used with basic data generated from the field in the pre-study and post-study period (preferably pre-monsoon and post-monsoon) to estimate the volume of replenished material. The particle size distribution and bulk density of the deposited material are required to be assessed from a NABL recognized laboratory. Considering the bulk density and the

volume, the estimation of replenishment in weight will be calculated after considering safeguards and stability of the slopes and riverine regime. Some of the common methods used for field data acquisition for replenishment study

➢ **COMMON METHODS FOR REPLENISHMENT:**

- List of instruments: DGPS, GPS.
- List of Accessories: Topographic Maps, Satellite Images and Digital Elevation Model Data.
- List of software: ARC GIS, Google Earth, Microsoft and Google Maps.

12.2.1 PHYSICAL SURVEY OF THE FIELD BY THE CONVENTIONAL METHOD

i. The conventional survey technical using DGPS and other survey tools are used to define the topography, contours and offsets of the lease area. The survey should clearly depict the important attributes of the stretch of the river and its nearby important civil and other feature of importance. Such information will provide the eligible spatial area for mining. The contour and the elevation benchmarks will provide the baseline data for assessing the pre- and post- study period scenario.

ii. Physical benchmarks are to be fixed at appropriate intervals (preferable 1 in 30 m) and the Reduced Level (RL) shall be validated from a nearby standard RL. These RL should be engraved on a steel plate (Bench Plate) and shall be fixed and placed at locations which are free from any damages and are available in pre- and post-study period. The bench plates shall be available for use during the mining period as reference for all mining activity. Reference pillar may also be used in place of Bench Plates with visible and readable demarcation on the ground as common reference points to control the topographic survey and mining activity.

iii Baseline data on elevation status for a grid of 10 m x 10 m is preferred to have accuracy in the assessment. It is expected that two consecutive cross-sections in longitudinal and lateral direction should not be more than 10-meter distance apart, however, the regulatory authority may fix these intervals depending on the geographical and site-specific conditions, only and after providing the scientific reason for such deviation.

iv The changes observed in the elevation in per and post scenario at each node should be depicted in graphical forms with an appropriate scale to estimate the area of deposition and erosion. These graphical presentations should depict the active channel regime and the flow bed elevation with other important features required to be considered for estimation of the mining area. The area of deposition and erosion shall be calculated for each cross-section after giving due regard to the stability and safety of active channel banks, and other features of importance. The elevation level shall be in reference to the nearest bench-plates established for the purpose.

v The levels (MSL & RL) of the corner point of each grid should be identifiable and safety barriers (non-Mining) demarcated as restricted in consensus with Mineral Concession Rules of respective State, and the provision mentioned in this Sustainable Sand Mining Management Guidelines.

vi A clear identification is required to be highlighted between grids under mineable and grids under the non-mineable area. These baseline data (pre and post) be subjected to stimulation with the help of data mine software to derive at the replenishment area and corresponding volume and estimated weight.

vii The database should be structured in a tabulated form clearly depicting the nomenclature of the section lines, latitude and longitude of the starting point, chain-age and respective levels of all the points taken on that section line.

viii Net area shall be derived after the summation of the area of deposition minus area of erosion for each cross-section. The volume will be estimated by multiplying the distance between two cross-sections with the average of net area of these two consecutive crosses- sections.

ix One sample per 900 square meters (30 m x 30 m) shall be preferred sample density for assessment of bulk density for estimation of deposition rate. Care should be taken that the sample for assessment of bulk density is taken from the deposition zone and not from erosion. However, depending on the site condition, river morphology and geographical condition, sample density may be adjusted. Reason for such deviation shall be appropriately highlighted in the report with supporting scientific data.

12.2.2 METHODOLOGY USED FOR REPLENISHMENT STUDY FOR THE REGION

Conventional survey technical using DGPS and other survey tools are used to define the topography, contours and offsets of the lease area. The following methodology used for replenishment study of the region which is as follows:

Study of Google Images on time scale for year 2019 to 2024 (Pre and Post Monsoon)

↓

Site visit for physical verification and Geo-tagging of the mine site

↓

Procuring satellite imageries (pre and post monsoon) 2023 & 2024

↓

Contouring of the mine site along both side of river valley of 1 m interval

↓

Identification of replenishment based on the difference in contour value.

↓

Digging of pits on the site to study the physical value

↓

Testing of mineral for knowing exact composition

Methodology used for replenishment study of the region

❖ **REPLENISHMENT STUDY BASED ON SATELLITE IMAGERY**

To delineate the replenishment percentage in the river bed of the district, below mentioned steps have been followed.

➢ **Satellite imagery studies**

Satellite imagery study involves the demarcation of sand/ RBM zones on riverbeds of the district. Both pre and post-monsoon images need to be analyzed to establish potential sand/ RBM zones.

➢ **Field data collation**

Field data collation was carried out during May- June for all the sand/ RBM zones on a continuous basis for the pre-monsoon period and November – December for all the sand/ RBM zones on a continuous basis for the post-monsoon period. In both cases, relative elevation levels were captured through GPS/DGPS/ Electronic Total Station. The thickness of the sand/ RBM zones was measured through sectional profiles. The field survey to collect post-monsoon data was conducted November time period in 2024 while preparing the District Survey Report of Jorhat district.

➢ **Selection of study profiles**

Study profiles are selected based on the occurrence of the sand / RBM zones in the channel profiles. Aerial extents of each of the profiles are mapped from satellite imageries. Frequency distribution was done while selecting the ground truthing of the zones.

➢ **Data compilation:**

The following data were compiled for the generation of this annual replenishment report:

- Elevation levels of the different sand/ RBM zones as measured at the site.
- Extents of the sand/ RBM zones are measured from the pre-monsoon satellite imageries.
- Sand/ RBM zones production data of the district.

All these data were compiled while estimation of the replenished sand/ RBM zones in the district.

❖ **MINE LEASES MAPPING**

Study of Google Images on a time scale for years 2019 to 2024 (Pre and Post Monsoon), thereafter Site visit for physical verification and Geo-tagging of the mine site was done. After that, procuring LISS IV satellite images of 5.8 m resolution, based on this satellite data all the River Bed Mineral and Ordinary Earth/Brick Earth leases in Jorhat district has been mapped are shown below.

In case of River Bed Minerals, the existing mine leases of River Bed Minerals are shown in Purple color boundary with dotted texture, the existing leases of River Bed Minerals of 100m buffer boundary are shown in yellow colour. Proposed River Bed Zones are in violet colour boundary with dotted texture, Proposed zones with 100m buffer boundary is tourmaline green in colour in both Google Image (Figure 26A) and FCC Map (Figure 26B), Eco-sensitive zones are orange colour in Google Image Map (Figure 26A) and tourmaline green in FCC Map (Figure 26B), Hollongapar Wildlife Sanctuary is marked by Dark Purple outline in Google Image Map (Figure 26A) and Faint Purple Outline in FCC Map (Figure 26B). Reserve forests are prominent in light green colour of bold out-line in Google Image Map (Figure 26A) and light green colour of faint out-line in FCC Map (Figure 26B). Hollongapar Gibbon Wild Life Sanctuary is marked in dark purple outline in Google Image Map (Figure 26A) and in faint purple colour outline in FCC Map (Figure 26B).

Figure 26A: Map of all River Bed Mineral Blocks and Zones in the District (Google Image Map)

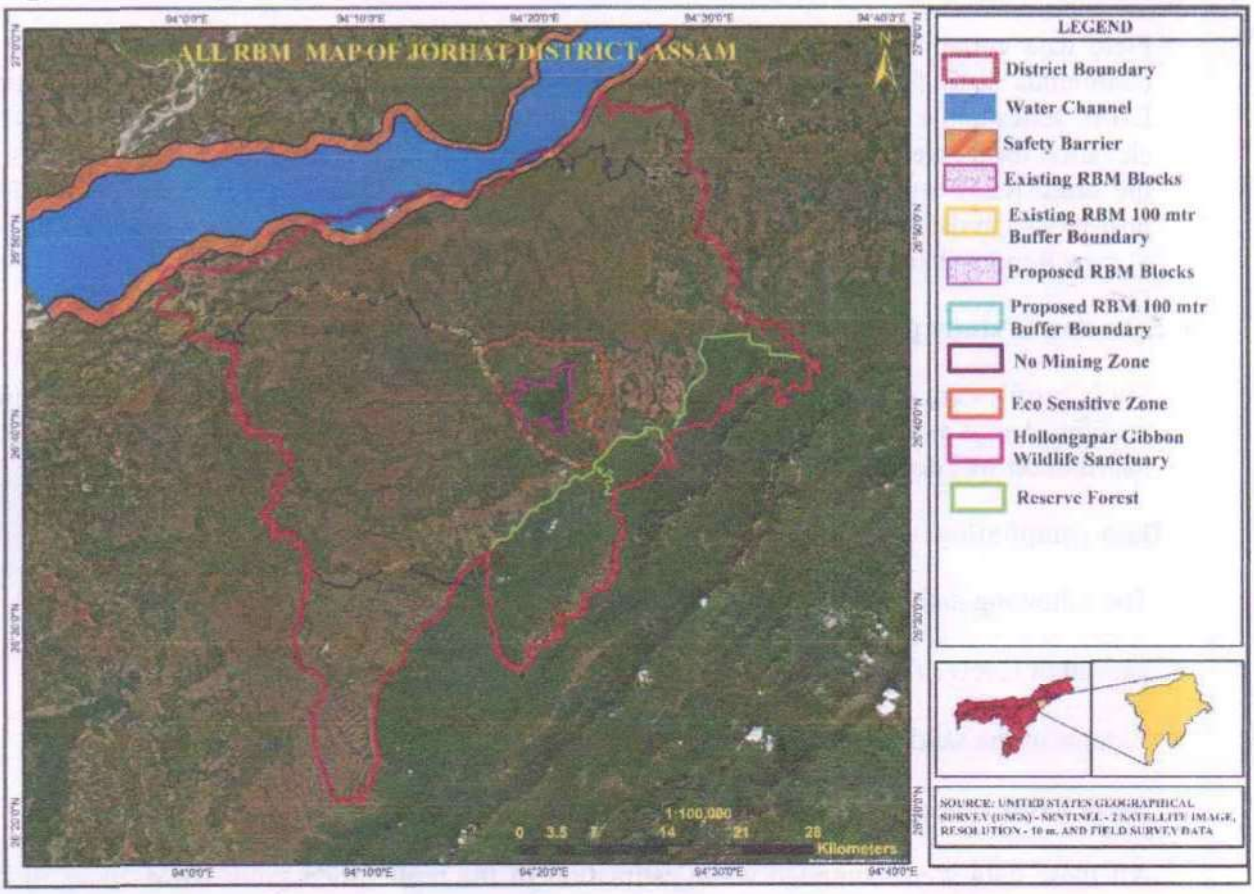
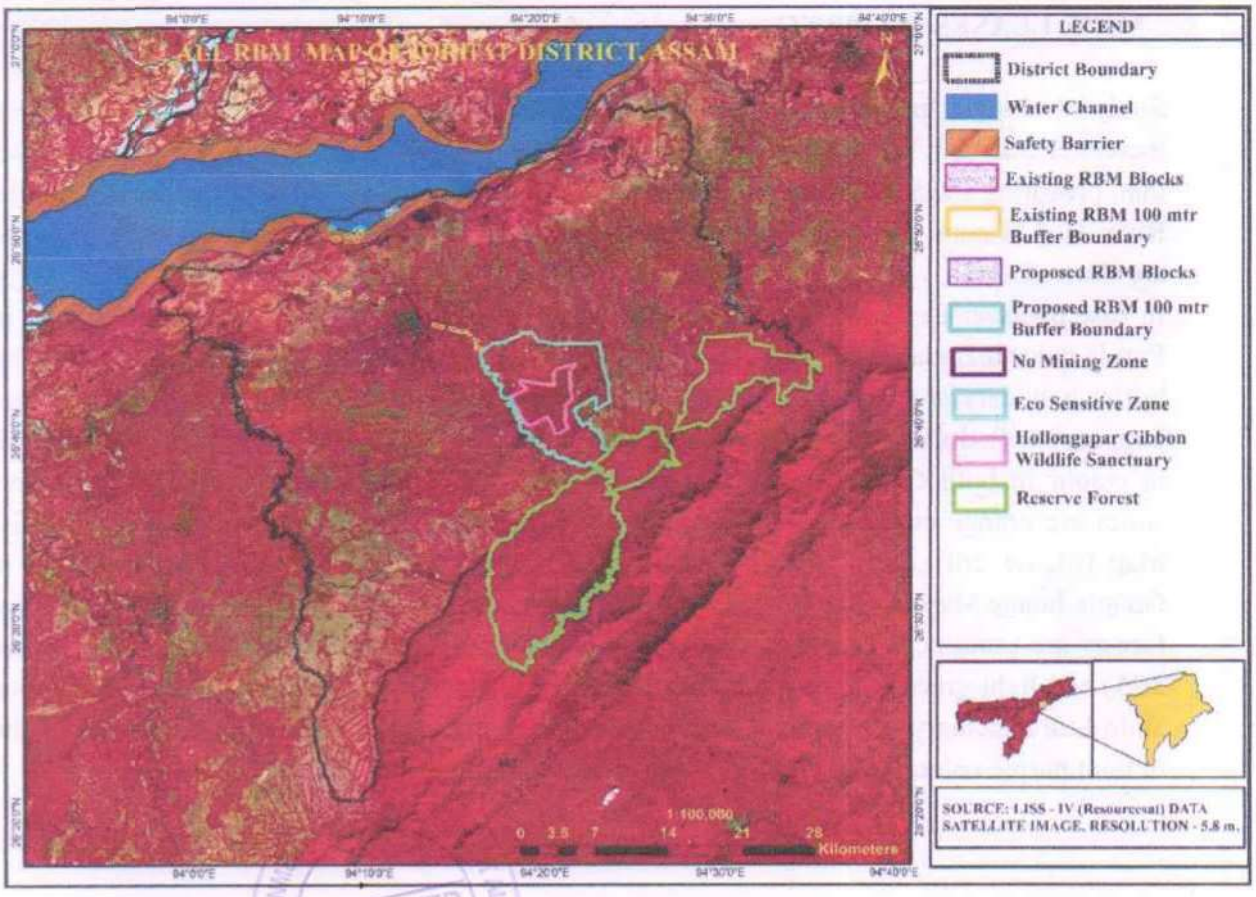


Figure 26B: Map of all River Bed Mineral Blocks and Zones in the District (FCC Map)



➢ METHODOLOGY FOR CALCULATING THE AVERAGE RATE OF REPLENISHMENT

For estimating the reserve of River Bed Material [Sand/Gravel (Minor Mineral)], the following parameters were considered:

a) The volumes of the reserves are calculated on the basis of the established width, thickness, and length of the deposit as per actual field data.

b) The values of the Contour Map of Pre-and Post-Monsoon Data can be studied and calculate the average rate of replenishment.

The same procedure shall be followed for acquiring post-monsoon data of contour Maps, its average replenishment rate is correlated which is given below:

Table No. 33A: Average rate of Replenishment River wise in 2023

Sl. No.	Name of River	Zone Code	Values in Contour Map May 2023 (in meters)			Values in Contour Map October 2023 (in meters)			Average Rate of Replenishment (in meters)
			Min	Max	Difference	Min	Max	Difference	
1.	Bhogdoi River	ASM_JHT_PRO_BGD_01	110	113	3	112	115	3	1 to 3
2.		ASM_JHT_PRO_BGD_02	117	120	3	119	122	3	1 to 3
3.		ASM_JHT_PRO_BGD_03	118	121	3	120	123	3	1 to 3
4.		ASM_JHT_PRO_BGD_04	110	113	3	113	117	3	1 to 3
5.		ASM_JHT_PRO_BGD_05	107	110	3	109	112	3	1 to 3
6.		ASM_JHT_PRO_BGD_06	96	99	3	98	101	3	1 to 3
7.		ASM_JHT_PRO_BGD_07	99	102	3	101	104	3	1 to 3
8.		ASM_JHT_PRO_BGD_08	95	98	3	97	100	3	1 to 3
9.		ASM_JHT_PRO_BGD_09	99	102	3	101	104	3	1 to 3
10.		ASM_JHT_PRO_BGD_10	92	95	3	94	97	3	1 to 3
11.	Jhanji River	ASM_JHT_PRO_JNJ_01	105	108	3	107	110	3	1 to 3
12.		ASM_JHT_PRO_JNJ_02	97	100	3	99	102	3	1 to 3
13.		ASM_JHT_PRO_JNJ_03	99	102	3	101	104	3	1 to 3
14.		ASM_JHT_PRO_JNJ_04	90	93	3	92	95	3	1 to 3
15.	Brahmaputra River	ASM_JHT_PRO_BHMP_01	85	88	3	87	90	3	1 to 3
16.		ASM_JHT_PRO_BHMP_02	76	79	3	78	81	3	1 to 3
17.		ASM_JHT_PRO_BHMP_03	83	86	3	85	88	3	1 to 3

Table No. 33B: Average rate of Replenishment River wise in 2024

Sl. No.	Name of River	Zone Code	Values in Contour Map May 2024 (in meters)			Values in Contour Map October 2024 (in meters)			Average Rate of Replenishment (in meters)
			Min	Max	Difference	Min	Max	Difference	
1.	Bhogdoi River	ASM_JHT_PRO_BGD_01	112.2	115.2	3	113.2	116.2	3	1 to 3
2.		ASM_JHT_PRO_BGD_02	119.2	122.2	3	120.2	123.2	3	1 to 3
3.		ASM_JHT_PRO_BGD_03	120.2	123.2	3	121.2	124.2	3	1 to 3
4.		ASM_JHT_PRO_BGD_04	113.2	117.2	3	114.2	118.2	3	1 to 3
5.		ASM_JHT_PRO_BGD_05	109.2	112.2	3	110.2	113.2	3	1 to 3
6.		ASM_JHT_PRO_BGD_06	98.2	101.2	3	99.2	102.2	3	1 to 3
7.		ASM_JHT_PRO_BGD_07	101.2	104.2	3	102.2	105.2	3	1 to 3
8.		ASM_JHT_PRO_BGD_08	97.2	100.2	3	98.2	101.2	3	1 to 3
9.		ASM_JHT_PRO_BGD_09	101.2	104.2	3	102.2	105.2	3	1 to 3
10.		ASM_JHT_PRO_BGD_10	94.2	97.2	3	95.2	98.2	3	1 to 3
11.	Jhanji River	ASM_JHT_PRO_JNJ_01	107.2	110.2	3	108.2	111.2	3	1 to 3
12.		ASM_JHT_PRO_JNJ_02	99.2	102.2	3	100.2	103.2	3	1 to 3
13.		ASM_JHT_PRO_JNJ_03	101.2	104.2	3	102.2	105.2	3	1 to 3
14.		ASM_JHT_PRO_JNJ_04	92.2	95.2	3	93.2	96.2	3	1 to 3
15.	Brahmaputra River	ASM_JHT_PRO_BHMP_01	87.2	90.2	3	88.2	91.2	3	1 to 3
16.		ASM_JHT_PRO_BHMP_02	78.2	81.2	3	79.2	82.2	3	1 to 3
17.		ASM_JHT_PRO_BHMP_03	85.2	88.2	3	86.2	87.2	3	1 to 3

TOTAL POTENTIAL OF MINOR MINERAL IN THE RIVER BED ANNUAL DEPOSITION

According to the Sustainable Sand Mining Guidelines, 2016 and Enforcement & Monitoring Guidelines, for Sand Mining, 2020 mining depth of the mining zones is 1 meter for hilly areas and 2 meters for plain land.

1. The riverbed minerals zone area recommended for mineral concession in the above table has been calculated as per the Enforcement & Monitoring Guidelines for Sand Mining (EMGSM) 2020.

2. As per guidelines, mining depth has been restricted to 3 meters depth and the distance from the bank is ¼th of the river width and not be less than 7.5 meters.

3. Also, mining is prohibited up to a distance of 1 kilometer (1 km) from major bridges and highways on both sides or five times (5x) of the span (x) of a bridge/public civil structure (including water intake points) on the up-stream side and ten times (10x) the span of such bridge on the down-stream side, subjected to a minimum of 250 meters on the upstream side and 500 meters on the downstream side.

❖ **No mining Zone**

Mining of river bed materials is prohibited is some places on the river channel due to presence of notable landmarks like, sanctuary or national parks, forests, bridge/public civil structure or highways.

A definition of a protected area was established by IUCN in 1994, which is described as

"*An area of land and /or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.*"

As per the Enforcement & Monitoring Guidelines for Sand Mining (EMGSM) 2020 the restricted zone for mining is a distance from the bank is ¼th of river width and not be less than 7.5 meters. Also, there is a no mining zone up to a distance of 1 kilometre (1 km) from major bridges and highways on both sides, or five times (5x) of the span (x) of a bridge/public civil structure (including water intake points) on upstream side and ten times (10x) the span of such bridge on down-stream side, subjected to a minimum of 250 meters on the upstream side and 500 meters on the downstream side.

No mining zone has been marked for an area up to a width of 100 meters from the active edge of embankments. Also, the concave side of the river is marked as no mining zone, as mining is this area will affect the course of river in future and will erode the river bank.

Mining has a range of environmental consequences for protected areas, whether operations are undertaken within them or nearby. The types of impact may be listed as follows:

• Direct land take and loss of vegetation cover in the mined area and other parts directly affected by associated activities such as deposition of tailings, or consequences such as subsidence;

• Pollution affects, especially on water supplies, aggravated by accidents (e.g., to tailing dams);

• Impacts due to access associated with mining (roads, railways, pipelines, power lines etc.), which permit illegal hunting, habitat fragmentation and alien invasions;

• Secondary effects of human immigration in association with real or perceived livelihood opportunities (e.g., on water supplies, illegal hunting, harvesting of vegetation, alien invasions, illegal land settlements);

• Impacts on other protected area values from noise and visual intrusion, arising from both mining and secondary activities, including transportation.

The 2020 guidelines for sand mining stress on protecting rivers and habitats of species including turtles and calls for such sensitive areas to be declared as no-mining zones. It also called for using the latest technology for surveillance of illegal mining as well as estimating minable reserves.

BISWAJIT SHARMA
RABI BARUAH CHUK, PO. RABI GAON, TEOK, JORHAT, ASSAM, 785683, Lease area 4.8 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 01

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Sanjay Agarwala, (Director)

M P AGARWALA PRIVATE LIMITED

3F, Peace Enclave, Ulubari, Ghy-7, KAMRUP METRO, ASSAM, 781007, Lease area 4.9 Ha

Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 02

Google image (different time scale with date)

	
20.12.2018	**18.11.2019**
	
02.03.2020	**15.10.2021**
	
27.05.2022	**23.11.2023**

Kml Co-ordinate Site:

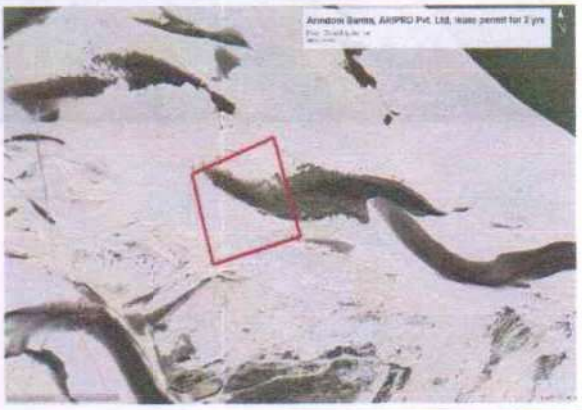
Arindom Sarma, ARIPRO Pvt. Ltd, lease permit for 2 yrs, Lease area 5Ha
Mine Lease Reference in Chapter 3 of DSR: Table No.09, Sl. No. 03

Google image (different time scale with date)

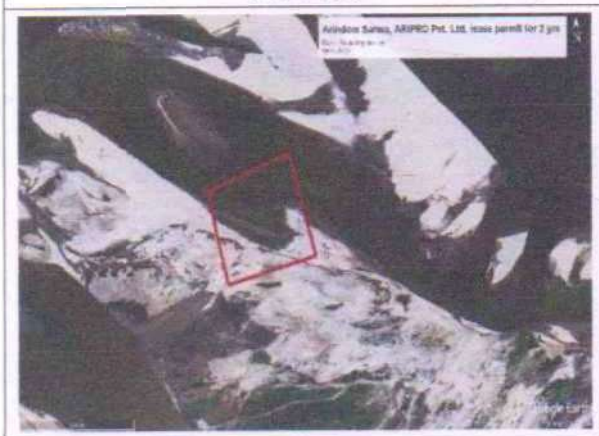
19.12.2018

18.11.2019

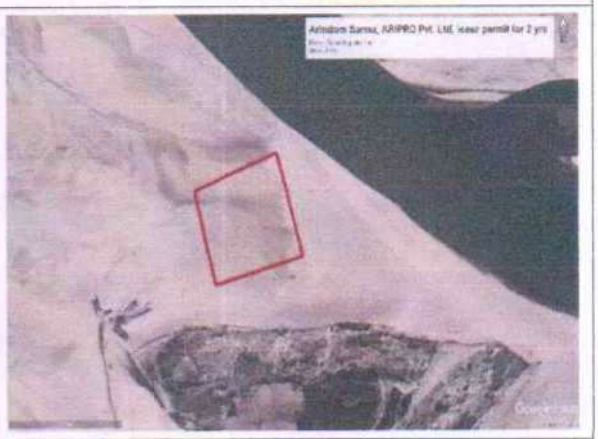
02.04.2020



15.10.2021



27.05.2022



23.11.2023

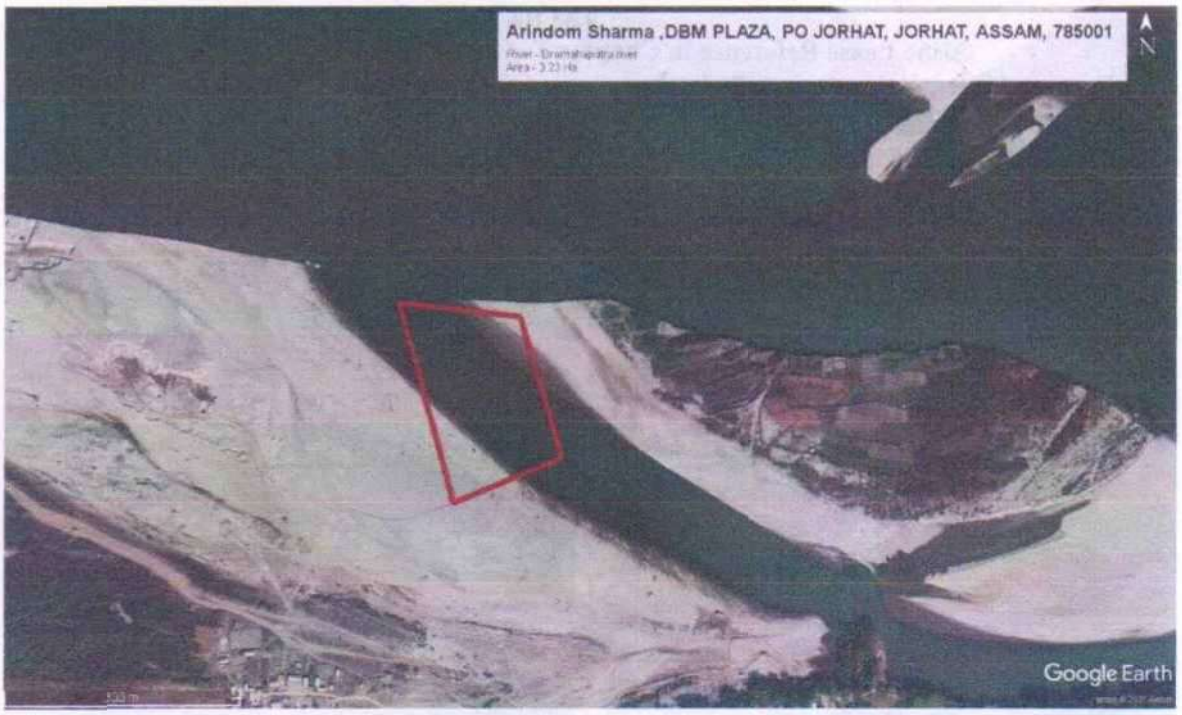
Kml Co-ordinate Site:

Arindom Sharma, DBM PLAZA, PO JORHAT, JORHAT, ASSAM, 785001, Lease area 3.23 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 04

Google image (different time scale with date)

	
20.12.2018	**18.11.2019**
	
02.03.2020	**15.10.2021**
	
27.05.2022	**23.11.2023**

Kml Co-ordinate Site:



BHOBEN GOGOI
UJONI JAMUGURI GAON, PO- AAU, JORHAT, PS- JORHAT, Dist. JORHAT, ASSAM, 785013, Lease area 4.85 Ha

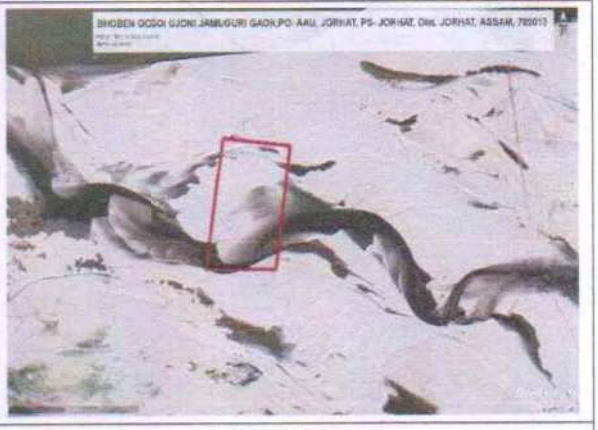
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 05

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

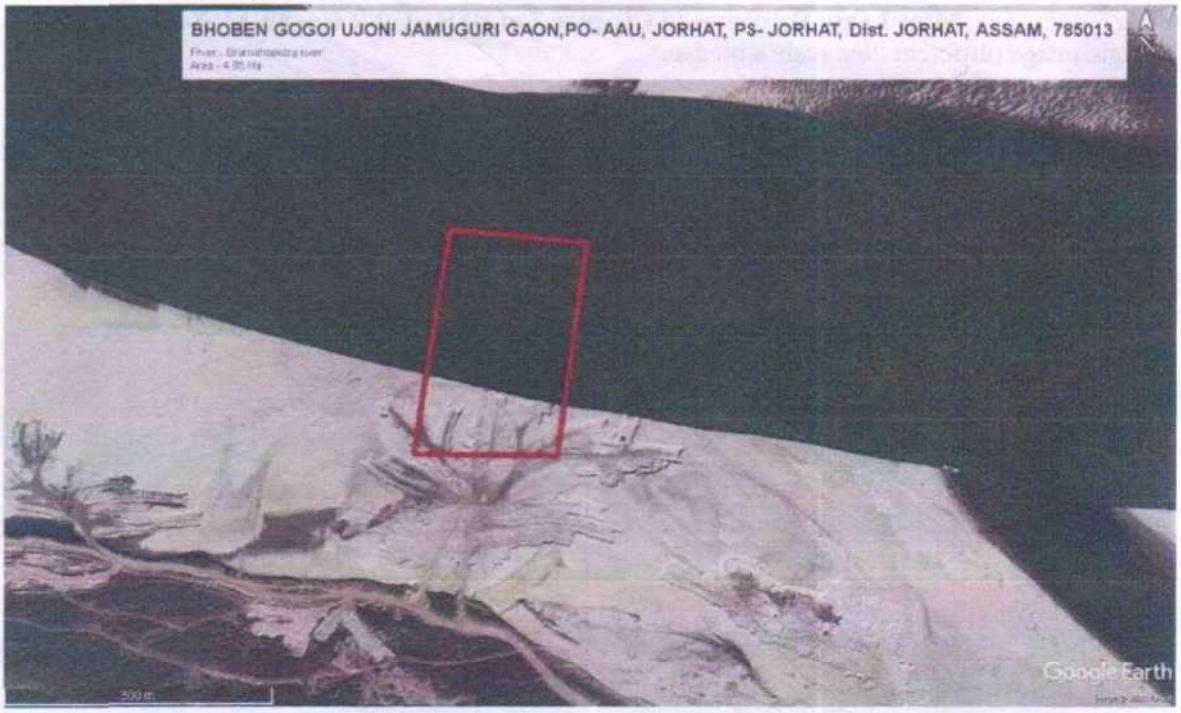


15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:



SADGURU ENGINEERS & ALLIED SERVICES PRIVATE LIMITED, Lease area 4.88 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 06

Google image (different time scale with date)

	
20.12.2018	**18.11.2019**
	
02.03.2020	**15.10.2021**
	
27.05.2022	**23.11.2023**

Kml Co-ordinate Site:

Nabajyoti Neog, permit holder, lease period 2 yrs, Lease area 3 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 07

Google image (different time scale with date)

29.11.2016

02.03.2017

21.01.2020

23.09.2021

20.02.2022

02.01.2023

Kml Co-ordinate Site:

Rahul Neog permit holder, lease period 2yrs, Lease area 0.3Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 08

Google image (different time scale with date)

29.12.2016

02.03.2018

21.02.2020

23.11.2021

23.02.2022

02.01.2023

Kml Co-ordinate Site:

BHOBEN GOGOI
UJONI JAMUGURI GAON, PO- AAU, JORHAT, PS- JORHAT, Dist. JORHAT, ASSAM, 785013,
Lease area 1.15 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 09

Google image (different time scale with date)

29.12.2017

02.11.2018

11.032.2020

23.11.2021

23.05.2022

02.01.2023

Kml Co-ordinate Site:

Narayan Chutia LOI holder lease period for 2 yrs, Lease area 1.24Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 10

Google image (different time scale with date)

	
29.11.2017	**02.03.2018**
	
28.01.2020	**19.09.2021**
	
20.03.2022	**16.01.2024**

Kml Co-ordinate Site:

Narayan Chutia LOI holder lease period for 2 yrs, Lease area 1Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 11

Google image (different time scale with date)

21.12.2016

02.03.2017

09.01.2020

17.09.2021

20.01.2022

08.01.2023

Kml Co-ordinate Site:

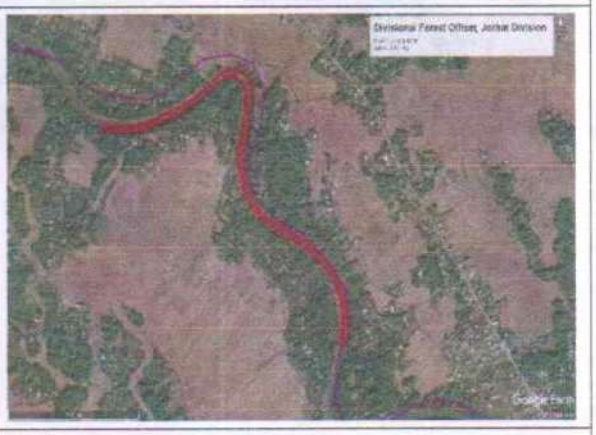
Divisional Forest Officer, Jorhat Division, Lease area 4.69 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 12

Google image (different time scale with date)

29.11.2016

02.03.2017

21.01.2020



23.09.2020

20.02.2021

02.01.2023

Kml Co-ordinate Site:

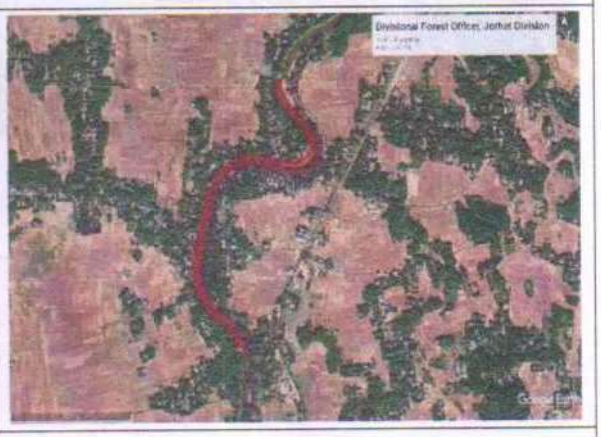
Divisional Forest Officer, Jorhat Division, Lease area 3.45Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 13

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020



15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Samar Gogoi, permit holder lease period 2 yrs, Lease area 0.65Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 14

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Pulin Mahanta, LOI holder, Lease period for 2 yrs (Distance is 5.37 Km both GPS point), Lease area 4.82 Ha

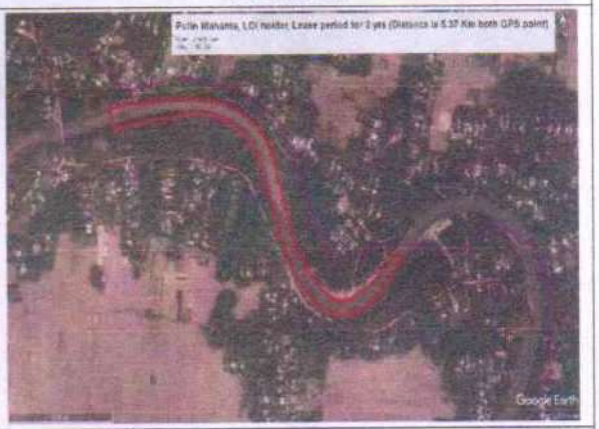
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 15

Google image (different time scale with date)

20.12.2017

18.11.2019

02.03.2020

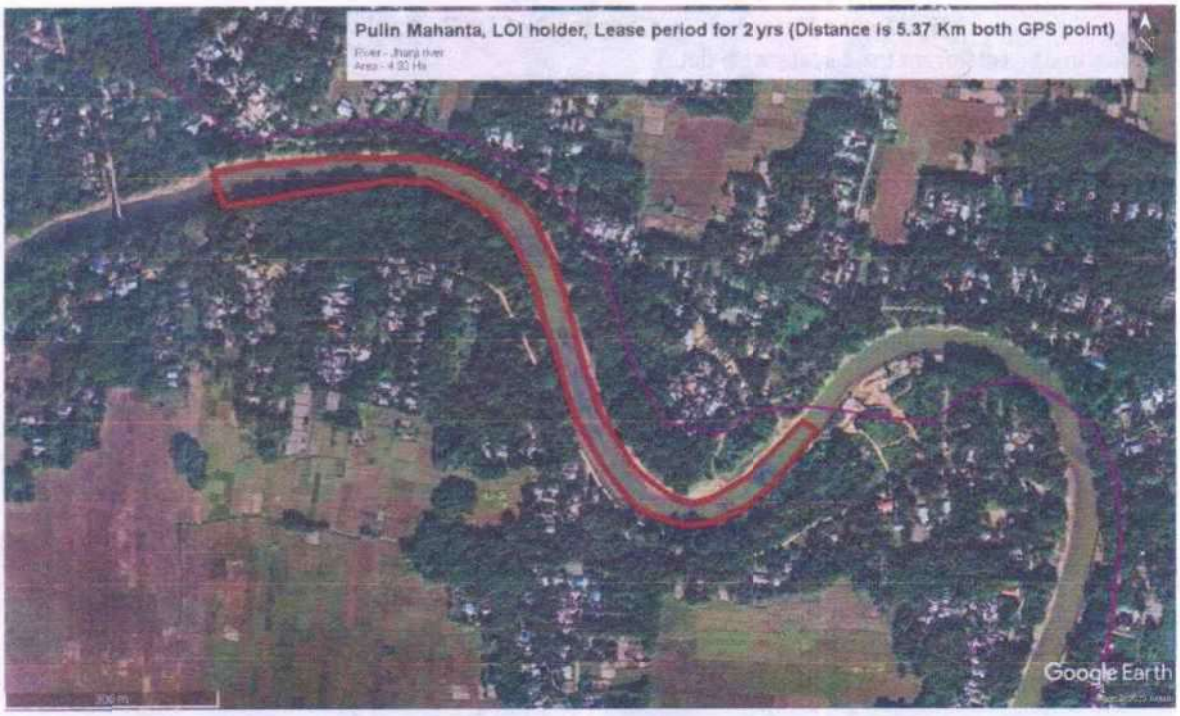


25.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:



Pulin Mahanta, LOI holder, Lease period for 2 yrs (Distance is 5.37 Km both GPS point), Lease area 2.33 Ha

Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 16

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Samudra Gogoi permit holder Lease period 6 months, Lease area 0.5 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 17

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Biswajit Sarma, permit holder, lease period 1 yr, Lease area 2.4 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 18

Google image (different time scale with date)

	
20.12.2018	**18.11.2019**
	
02.03.2020	**15.10.2021**
	
27.05.2022	**23.11.2023**

Kml Co-ordinate Site:

Biswajit Sarma, permit holder, lease period 1 yr, Lease area 1.4 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 19

Google image (different time scale with date)

09.12.2018

18.11.2019

02.05.2020

15.11.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Manob Dutta, permit holder, lease period 1 yr, Lease area 0.65Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 20

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Biju Dutta, permit holder, lease period 2 yrs, Lease area 0.59 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 21

Google image (different time scale with date)

20.12.2018

18.11.2019

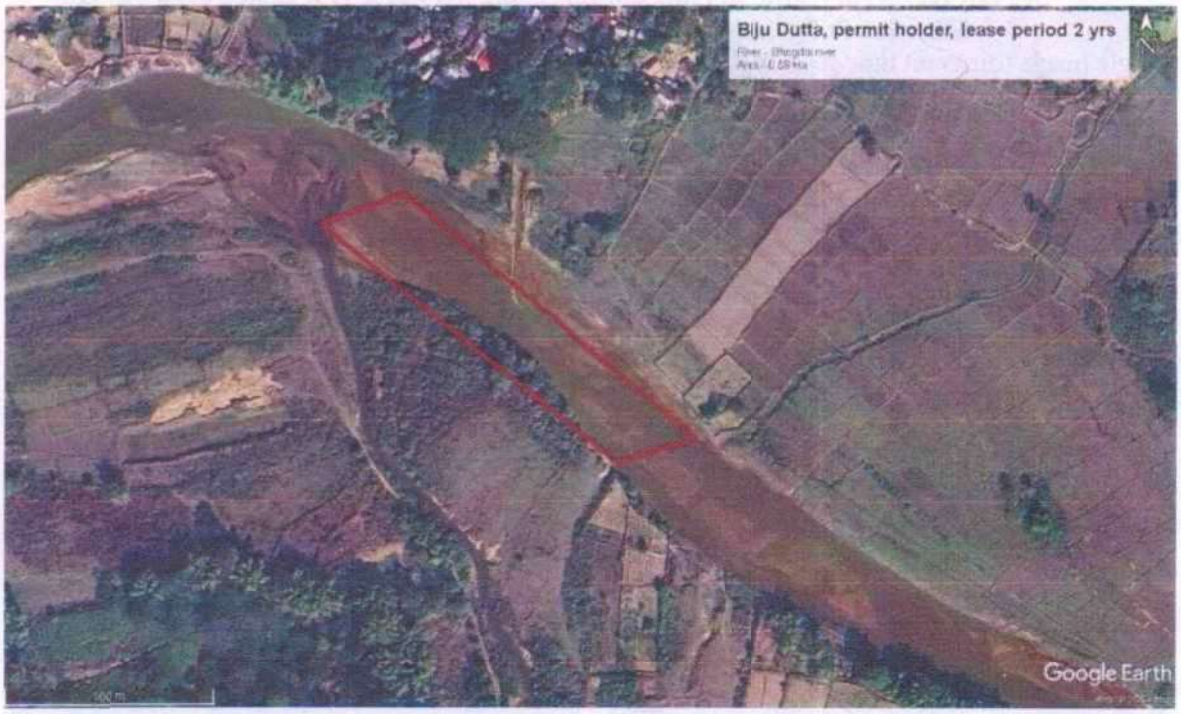
02.03.2020

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:



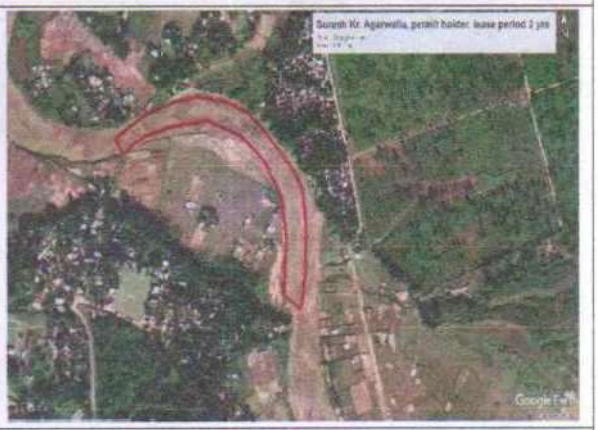
Suresh Kr. Agarwalla, permit holder, lease period 2 yrs, Lease area 3.5 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 22

Google image (different time scale with date)

20.12.2017

28.11.2018

02.03.2020



15.10.2021

27.10.2022

23.11.2023

Kml Co-ordinate Site:

Monaj More, & Shantanu Kalita,permit period for 18 months, Lease area 1.2 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 23

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Priyanka Dutta permit holder, lease period 1 yr, Lease area 0.6 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 24

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

B.T Supplier, permit h0older, period 2 yrs, Lease area 2.45Ha
Mine Lease Reference in Chapter 3 of DSR: Table No.09, Sl. No. 25

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

27.05.2022

23.12.2023

Kml Co-ordinate Site:

Ranjan Tasha, permit holder, lease period 2 yrs, Lease area 0.7 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 26

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Bhugdoi River Murmuria MPA (Spot-1), Lease area 3.48 Ha

Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 27

Google image (different time scale with date)

23.02.2019

18.11.2019

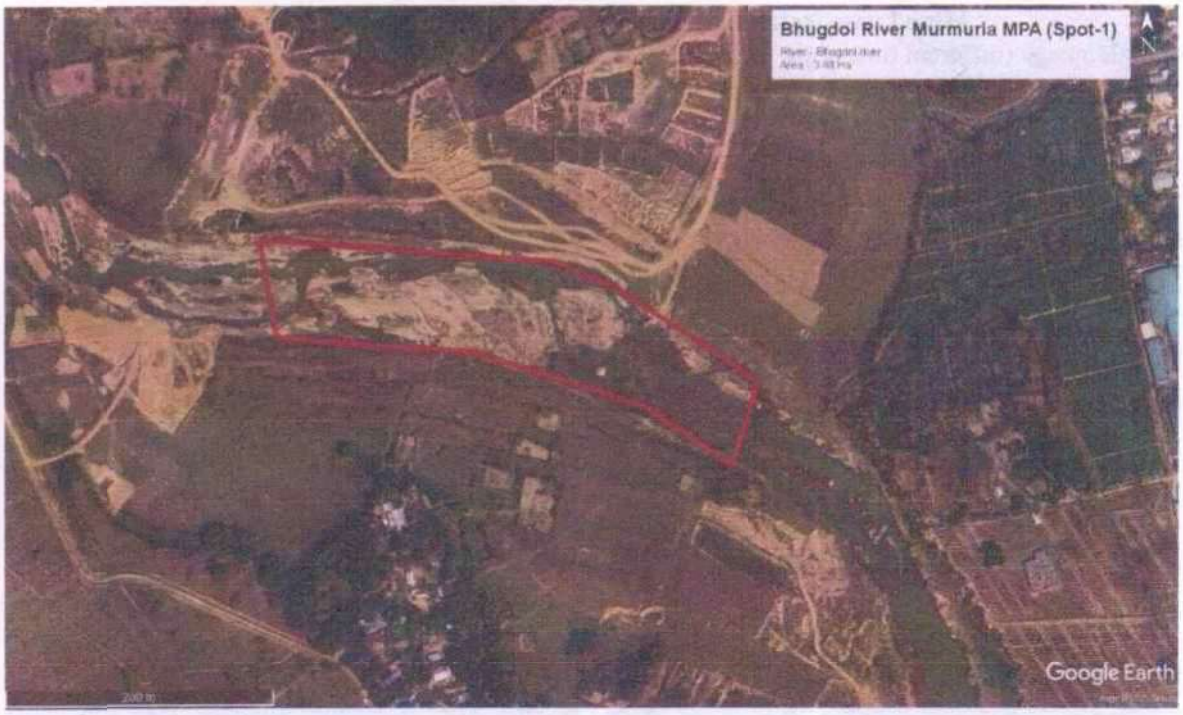
02.03.2020

05.11.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:



BHOBEN GOGOI
UJONI JAMUGURI GAON, PO- AAU, PS- JORHAT, Dist. JORHAT, ASSAM, 785013, Lease area 1.9 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 28

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Sumesh Tanti, permit holder, lease period 2 yrs, Lease area .86 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 29

Google image (different time scale with date)

	
20.12.2018	**18.11.2019**
	
02.03.2020	**15.10.2021**
	
27.05.2022	**23.11.2023**

Kml Co-ordinate Site:

M/S Phoniexx Enterprise, permit holder, lease period 2 yrs, Lease area 0.55 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No.09, Sl. No. 30

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Bijoy K. Rajkhowa Permit Holder Lease period for 2 years, Lease area 2.73 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 31

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

17.12.2022

23.10.2023

Kml Co-ordinate Site:

Pulin Mahanta, LOI holder, Lease period for 2 yrs, Lease area 4.98 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 32

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Pulin Mahanta, LOI holder, Lease period for 2 yrs, Lease area 4.83 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 33

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Prasurjya Kalita, permit holder, lease period 2 yrs, Lease area 2.44 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 34

Google image (different time scale with date)

20.12.2018

18.11.2019

11.03.2021

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

M/S AMDC, Ghy Lease period for 2 yrs, Lease area 3.92 Ha

Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 35

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Goutam Bora, permit holder, lease period 2 yrs, Lease area 3.25 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 36

Google image (different time scale with date)

20.12.2018

18.11.2019

10.05.2020

15.11.2021

27.04.2022

23.11.2023

Kml Co-ordinate Site:

Debanga Buragohain, permit holder, lease period 2 yrs, Lease area 1.8 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 37

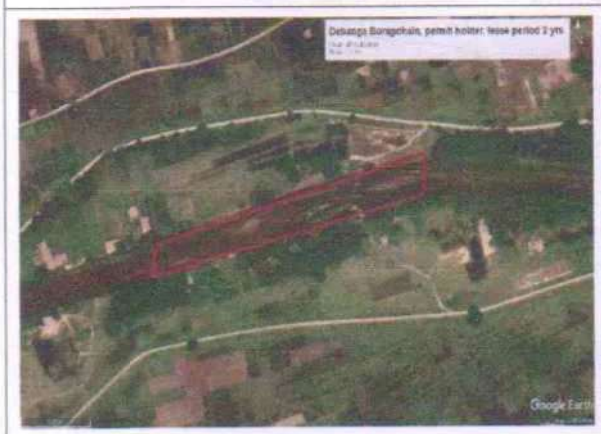
Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021



27.05.2022

23.11.2023

Kml Co-ordinate Site:

M/S Anupam Nirman Pvt. Ltd, permit holder, lease period 2 yrs, Lease area 4.76 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 38

Google image (different time scale with date)

20.12.2018

28.12.2019

02.04.2020

15.11.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Aditya Baishya, permit holder, lease period 2 yrs, Lease area 3.1 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 39

Google image (different time scale with date)

20.12.2018

18.11.2019

02.03.2020

15.10.2021

27.05.2022

23.11.2023

Kml Co-ordinate Site:

Prasurjya Kalita, permit holder, lease period 2 yrs, Lease area 3.44 Ha
Mine Lease Reference in Chapter 3 of DSR: Table No. 09, Sl. No. 40

Google image (different time scale with date)

20.12.2018

18.11.2019

22.05.2020

15.10.2021

27.03.2022

23.11.2023

Kml Co-ordinate Site:

ASM_JHT_PRO_BGD_01, Lease area 1 Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 10, Sl. No. 01

Google image (different time scale with date)

05.11.2017

26.12.2019

13.05.2020

14.10.2021

21.05.2022

17.12.2023

Kml Co-ordinate Site:

ASM_JHT_PRO_BGD_02, Lease area 1Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 10, Sl. No. 02

Google image (different time scale with date)

	
20.11.2018	**26.12.2019**
	
09.04.2020	**14.10.2021**
	
11.05.2022	**27.11.2023**

Kml Co-ordinate Site:

ASM_JHT_PRO_BGD_03, Lease area 2.76 Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 10, Sl. No. 03

Google image (different time scale with date)

20.11.2018

26.12.2019

09.04.2020

22.11.2020

14.05.2021

17.11.2022

Kml Co-ordinate Site:

ASM_JHT_PRO_BGD_04, Lease area 2.27 Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 10, Sl. No. 04

Google image (different time scale with date)

20.11.2018

26.12.2019

09.04.2020

14.10.2021

11.05.2022

27.11.2023

Kml Co-ordinate Site:

ASM_JHT_PRO_BGD_05, Lease area 1.61 Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 10, Sl. No. 05

Google image (different time scale with date)

	
20.11.2018	**26.12.2019**
	
13.05.2020	**24.11.2021**
	
09.05.2022	**27.11.2023**

Kml Co-ordinate Site:

ASM_JHT_PRO_BGD_06, Lease area 2.71 Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 10, Sl. No. 06

Google image (different time scale with date)

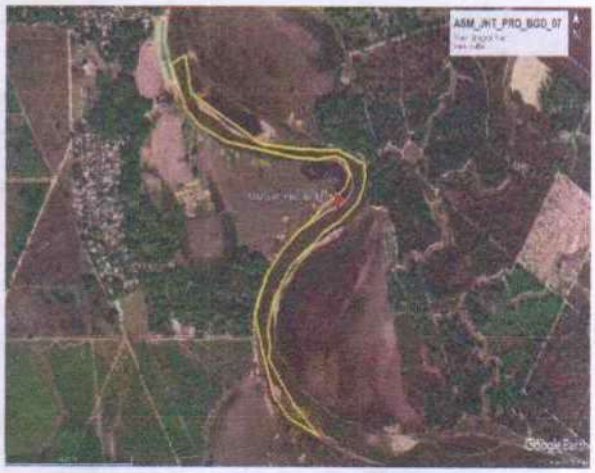
	
20.11.2018	**26.12.2019**
	
09.04.2020	**14.10.2021**
	
11.05.2022	**27.11.2023**

Kml Co-ordinate Site:

ASM_JHT_PRO_BGD_07, Lease area 5.4 Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 10, Sl. No. 07

Google image (different time scale with date)

	
20.11.2018	**26.12.2019**
	
09.04.2020	**14.10.2021**
	
11.05.2022	**27.11.2023**

Kml Co-ordinate Site:

ASM_JHT_PRO_BGD_08, Lease area 3.34 Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 10, Sl. No. 08

Google image (different time scale with date)

	
20.11.2018	**26.12.2019**
	
23.02.2020	**14.11.2021**
	
21.11.2022	**27.11.2023**

Kml Co-ordinate Site:

ASM_JHT_PRO_BGD_09, Lease area 4.9 Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 10, Sl. No. 09

Google image (different time scale with date)

20.11.2018

26.12.2019

09.04.2020

17.05.2021

11.05.2022

27.04.2023

Kml Co-ordinate Site:

ASM_JHT_PRO_BGD_10, Lease area 1.65 Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 10, Sl. No. 10

Google image (different time scale with date)

20.11.2018

26.12.2019

09.04.2020

14.10.2021

11.05.2022

27.11.2023

Kml Co-ordinate Site:

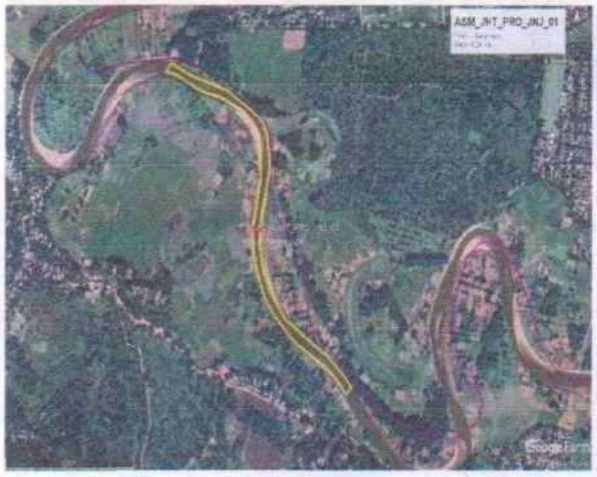
ASM_JHT_PRO_JNJ_01, Lease area 5.24 Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 10, Sl. No. 11

Google image (different time scale with date)

15.11.2018

26.12.2019



13.05.2020

14.10.2021

21.05.2022

27.11.2023

Kml Co-ordinate Site:

ASM_JHT_PRO_JNJ_02, Lease area 6.26 Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 11, Sl. No. 12

Google image (different time scale with date)

20.11.2018

26.12.2019

09.04.2020

14.10.2021

11.05.2022

27.11.2023

Kml Co-ordinate Site:

ASM_JHT_PRO_JNJ_03, Lease area 3.5 Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 11, Sl. No. 13

Google image (different time scale with date)

20.11.2018

26.12.2019

18.02.2020

14.10.2021

11.05.2022

27.11.2023

Kml Co-ordinate Site:

ASM_JHT_PRO_JNJ_04, Lease area 0.55 Ha

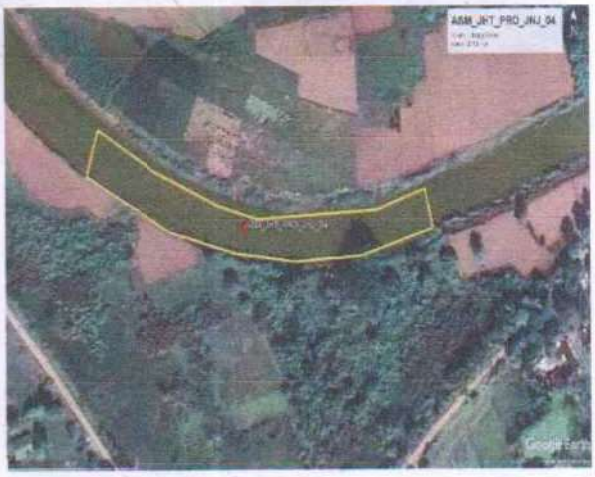
Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 11, Sl. No. 14

Google image (different time scale with date)

20.11.2018

26.12.2019

09.04.2020

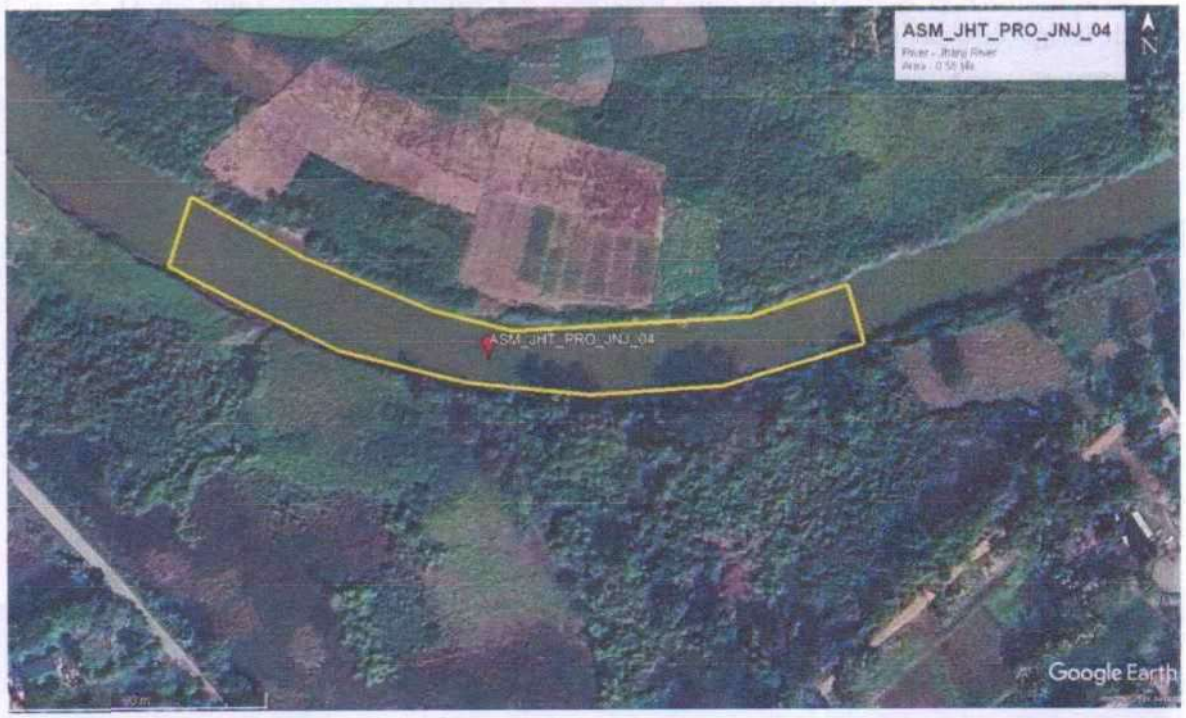


14.10.2021

11.05.2022

27.11.2023

Kml Co-ordinate Site:

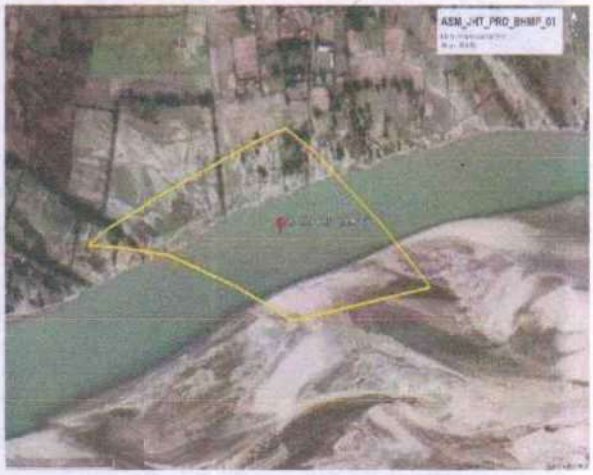


ASM_JHT_PRO_BHMP_01, Lease area 18.4 Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 11, Sl. No. 15

Google image (different time scale with date)

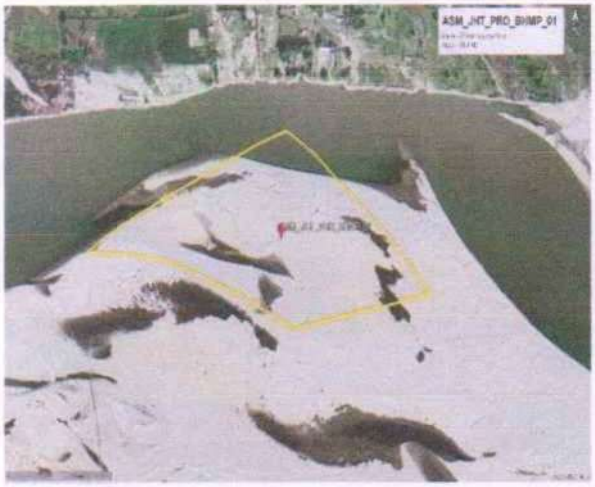
20.11.2018



26.12.2019

09.04.2020

14.10.2021



11.05.2022

27.11.2023

Kml Co-ordinate Site:

ASM_JHT_PRO_BHMP_02, Lease area 3.76 Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 11, Sl. No. 16

Google image (different time scale with date)

17.11.2017

26.12.2019

11.05.2020

14.11.2021

11.04.2022

27.11.2023

Kml Co-ordinate Site:

ASM_JHT_PRO_BHMP_03, Lease area 28 Ha

Proposed River Bed Mineral Zone Reference in Chapter 3 of DSR: Table No. 11, Sl. No. 17

Google image (different time scale with date)

20.11.2018

26.12.2019

09.04.2020

14.10.2021

11.05.2022

27.11.2023

Kml Co-ordinate Site:

CHAPTER 13: ENVIRONMENTAL IMPACT AND MITIGATION MEASURES FOR RIVERBED MINERALS

13.1 Environmental Impact:

Environmental Impact due to Riverbed Mining, the extraction of minor minerals from riverbeds can significantly affect the environment, impacting landforms, water systems, and biological habitats. Riverbed mining activities may lead to alteration of river courses, loss of biodiversity, soil erosion, and water pollution. These impacts can cause long-term damage to the ecosystem, making the adoption of sustainable mining practices and strict regulatory compliance critical. The key impacts are outlined below:

❖ Air Environment

Riverbed mining operations can generate dust and emissions that degrade air quality. Dust is produced during activities like the excavation and transportation of minerals, leading to airborne particulates that affect both workers and nearby communities. Prolonged exposure to such particulates can result in respiratory issues, including asthma and other pulmonary conditions. Furthermore, vehicular emissions associated with the transport of extracted minerals contribute to air pollution through the release of gases such as nitrogen oxides (NOx) and sulfur oxides (SOx). Sustainable practices like regular water sprinkling and the maintenance of vehicle emissions can help mitigate these impacts.

❖ Land Degradation and Habitat Loss

Riverbed mining alters the natural landscape, resulting in land degradation and habitat destruction. The removal of sand, gravel, and other materials from riverbeds can lead to bank erosion, sedimentation, and destabilization of riverbanks. This not only impacts the integrity of the river's course but also destroys habitats for aquatic and riparian species. Furthermore, the loss of topsoil from riverbanks and adjacent areas can compromise soil productivity, affecting the regeneration of vegetation. Reclamation measures, including re-vegetation of mined areas and controlled extraction practices, can minimize these adverse effects.

❖ Atmospheric Dust and Particulates

Riverbed mining contributes significantly to atmospheric dust and particulates. The disturbance caused by excavation and loading activities releases fine particulates into the air, which can settle on nearby vegetation, water bodies, and infrastructure. This dust deposition can hinder plant growth, affect water quality, and pose health risks to human populations in proximity to mining operations. Implementing dust suppression techniques such as water spraying and vegetation buffers can help manage this issue effectively.

❖ Biodiversity Loss and Ecosystem Disruption

Riverbed mining activities often result in significant biodiversity loss and ecosystem disruption. The excavation of riverbed materials can destroy aquatic habitats, displace fish species, and alter the ecological dynamics of rivers. Moreover, the loss of vegetation along riverbanks affects terrestrial species dependent on these habitats. Increased sedimentation and turbidity from mining operations further degrade aquatic ecosystems, making it challenging for sensitive

species to survive. Riverbed mining must adhere to strict environmental regulations, including habitat restoration measures and green belt development, to mitigate these impacts.

❖ **Water Pollution**

Riverbed mining is a major contributor to water pollution. The excavation process disturbs sediments, increasing turbidity and reducing water quality. Furthermore, runoff from mining sites may introduce heavy metals, hydrocarbons, and other pollutants into rivers, lakes, and groundwater sources. These pollutants can harm aquatic organisms, reduce the usability of water for human consumption, and impact agriculture. Adopting sediment control practices, proper wastewater management, and strict monitoring of mining activities can significantly reduce water pollution.

❖ **Social and Economic Impacts**

Riverbed mining has both positive and negative social and economic implications.

Positive Impacts:

- It generates employment opportunities for local communities and contributes to infrastructure development.
- It supports local economies by providing raw materials essential for construction and development projects.

Negative Impacts:

- Health risks arise from increased dust and water pollution, negatively impacting nearby populations.
- Unregulated mining can cause conflicts among stakeholders, including local communities, governments, and mining operators, over resource management.

To ensure a balanced approach, riverbed mining operations in the Jorhat district are carried out in compliance with established guidelines and regulations, focusing on mitigating negative impacts while maximizing socioeconomic benefits.

13.2 Proposed Mitigation Measures:

To minimize the environmental and ecological impacts of riverbed mining, specific mitigation measures must be adopted in accordance with relevant guidelines. These measures aim to ensure sustainable resource extraction while preserving the integrity of river ecosystems and adjacent habitats.

❖ **Regulations on Mining Depth and Distance**

- **Depth Restrictions**: Mining depth is restricted to **2 meters in plainland areas** and **1 meter in hilly terrains** to prevent over-extraction and disruption of the riverbed.
- **Distance from Riverbank**: Mining is permitted only at a distance that is at least **¼th of the river width** or a minimum of **7.5 meters** from the bank, whichever is greater, ensuring minimal impact on riverbank stability.

❖ **Buffer Zones Around Structures and Landmarks**

- **Bridges and Public Civil Structures**:
  - Mining is prohibited up to **1 kilometer (1 km)** on both sides of major bridges and highways.
  - Alternatively, mining is restricted to a distance of **five times (5x)** the span (x) of the bridge/structure on the upstream side and **ten times (10x)** the span on the downstream side.
  - A minimum distance of **250 meters** upstream and **500 meters** downstream is mandatory if the calculated buffer falls below these thresholds.
- **Active Edge of Embankments**: No mining is allowed within **100 meters** from the active edge of embankments to prevent undermining structural integrity.

❖ **No-Mining Zones**

- Mining is strictly prohibited in areas of ecological and cultural significance, including:
  - **Eco-Sensitive Zones (ESZs)** surrounding National Parks, Wildlife Sanctuaries, and Reserve Forests.
  - **Concave Side of Rivers**: Mining on the concave bank can destabilize the river course, accelerating erosion and threatening adjacent ecosystems.
  - **Habitats of Endangered Species**: Sensitive areas identified for species such as turtles, fish, and migratory birds are declared no-mining zones.

❖ **Environmental Impacts and Their Mitigation**

1. **Direct Land Loss and Vegetation Degradation**
   - **Impact**: Mining activities remove vegetation cover and disrupt habitats, leading to biodiversity loss.
   - **Mitigation**: Undertake land reclamation, afforestation, and vegetation restoration in mined areas to recover ecological balance.
2. **Water Pollution and Sedimentation**
   - **Impact**: Mining can increase sediment load and discharge pollutants into water bodies, affecting aquatic life and water quality.
   - **Mitigation**: Implement sediment traps and establish buffer strips to filter runoffs before reaching water bodies. Regular water quality monitoring is essential.
3. **Habitat Fragmentation and Invasive Species**
   - **Impact**: Access roads and mining infrastructure lead to habitat fragmentation, enabling the spread of invasive species and illegal activities like poaching.
   - **Mitigation**: Restrict mining-related infrastructure development and monitor access routes. Employ native plant species for rehabilitation to control invasive flora.
4. **Human Encroachment and Secondary Impacts**
   - **Impact**: Mining activities can attract human settlements, increasing pressure on local resources and causing pollution.
   - **Mitigation**: Conduct strict regulation of settlement activities near mining zones and promote community awareness about sustainable practices.
5. **Noise, Dust, and Visual Intrusions**
   - **Impact**: Mining and associated transportation generate noise and dust, impacting wildlife and human health.
   - **Mitigation**: Install dust suppression measures like water sprinklers and noise barriers. Limit operations during sensitive times for wildlife.

The details of Environmental sensitivity taken as the maximum stipulated distance with reference to AMMCR-2013 and the Order of the NGT in Appeal No. 03/2020 [Original Application No. 85/2019 (WZ) (I.A. No.63/2020)] for individual river in Existing Sites is provided below:

Sl. No.	River Details	Name of the applicant	Allotted Area (Ha)	Mineable Area (Ha)	Area not recommended for NH and Bridges (Ha)	Area not recommended for Railway lines and Bridges (Ha)	Area not recommended due to 100 m buffer from the outer periphery of the defined limits of any village, habitation, State highway and other roads (Ha)	Area not recommended due to 500 m buffer from the irrigation Structure / Reservoir & Submergence Area (Ha)	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Canal/Tank/Lake (Ha)	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Ropeway or ropeway trestle or station (Ha)	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Heritage site, Protected monuments (Ha)	Area not recommended for future Quarry Lease grant due to Eco-sensitive Zone (Ha)	Area not recommended for River safety barrier (Ha)	Total reduced area (Ha)	Remaining Area (Ha)	Previous Area		Reduced Area	
																Latitude	Longitude	Latitude	Longitude
1	Bhogdoi River	Manob Dutta, permit holder, lease period 1 yr	0.65	0.65	0	0	0.19	0	0	0	0	0	0	0.19	0.46	26°38'05.32"N 26°38'04.78"N 26°38'00.83"N 26°38'01.50"N	94°22'6.14"E 94°22'5.71"E 94°22'17.21"E 94°22'17.22"E	26°38'1.48"N 26°38'0.89"N 26°38'1.52"N 26°38'2.10"N 26°38'3.67"N 26°38'3.09"N 26°38'4.78"N 26°38'5.37"N	94°22'17.24"E 94°22'17.19"E 94°22'13.24"E 94°22'13.34"E 94°22'9.31"E 94°22'9.04"E 94°22'5.72"E 94°22'6.16"
2	Bhogdoi River	Biju Dutta, permit holder, lease period 2 yrs	0.59	0.59	0	0	0.21	0	0	0	0	0	0	0.21	0.38	26°38'11.30"N 26°38'11.39"N 26°38'07.65"N 26°38'07.58"N	94°21'55.08"E 94°21'55.93"E 94°22'00.21"E 94°22'01.48"E	26°38'7.66"N 26°38'8.05"N 26°38'10.53"N 26°38'9.78"N	94°22'0.21"E 94°22'1.59"E 94°21'58.27"E 94°21'57.26"E
3	Bhogdoi River	Suresh Kr. Agarwalla, permit holder, lease period 2 yrs	3.5	3.5	3.5	0	0	0	0	0	0	0	0	3.5	0	26°39'02.35"N 26°39'03.52"N 26°38'52.18"N 26°38'53.10"N	94°19'58.35"E 94°19'58.52"E 94°20'14.97"E 94°20'13.43"E	--	--
4	Bhogdoi River	Monaj More, & Shantanu Kalita, permit period for 18 months	1.2	1.2	1.2	0	0	0	0	0	0	0	0	1.2	0	26°39'21.73"N 26°39'22.98"N 26°39'27.77"N 26°39'27.85"N	94°19'32.91"E 94°19'32.65"E 94°19'23.84"E 94°19'22.54"E	--	--
5	Bhogdoi River	Priyanka Dutta permit holder,	0.6	0.6	0	0.6	0	0	0	0	0	0	0	0.6	0	26°39'30.21"N 26°39'30.91"N 26°39'33.01"N 26°39'32.77"N	94°19'26.17"E 94°19'25.70"E 94°19'32.57"E 94°19'30.34"E	--	--

		lease period 1 yr															
6	Bhogdoi River	B.T Supplier, permit h0older, period 2 yrs	2.45	2.45	0	0	0	0	0	0	0	1.24	0	1.24	1.21	26°42'49.74"N 26°42'51.60"N 26°42'45.75"N 26°42'47.66"N	94°16'55.48"E 94°16'56.86"E 94°17'08.26"E 94°17'09.52"E	26°42'47.33"N 26°42'45.79"N 26°42'49.78"N 26°42'50.95"N 26°42'47.83"N	94°17'9.26"E 94°17'8.27"E 94°16'55.55"E 94°16'56.39"E 94°16'59.82"E
7	Bhogdoi River	Ranjan Tasha, permit holder, lease period 2 yrs	0.7	0.7	0	0	0.18	0	0	0	0	0	0.027	0.207	0.49	26°43'53.69"N 26°43'53.43"N 26°43'50.79"N 26°43'50.37"N	94°16'41.76"E 94°16'44.30"E 94°16'39.88"E 94°16'42.41"E	26°43'53.68"N 26°43'53.52"N 26°43'49.84"N 26°43'50.52"N	94°16'41.76"E 94°16'43.45"E 94°16'40.81"E 94°16'39.78"E
8	Bhogdoi River	Ranjan Tasha, permit holder, lease period 2 yrs	3.48	3.48	0	0	0	0	0	0	0	0	0.78	0.78	2.7	26°44'06.31"N 26°44'08.54"N 26°44'03.11"N 26°44'05.26"N	94°16'25.42"E 94°16'24.89"E 94°16'37.68"E 94°16'38.51"E	26°44'3.26"N 26°44'5.24"N 26°44'7.90"N 26°44'8.70"N 26°44'6.37"N	94°16'37.70"E 94°16'38.43"E 94°16'33.54"E 94°16'24.94"E 94°16'25.41"E
9	Bhogdoi River	BHOBEN GOGOI UJONI JAMUGURI GAON, PO-AAU, PS-JORHAT, Dist. JORHAT, ASSAM, 785013	1.9	1.9	0	0	0.49	0	0	0	0	0	0.04	0.53	1.37	26°44'23.02"N 26°44'22.69"N 26°44'34.29"N 26°44'33.12"N	94°16'21.19" E 94°16'22.84" E 94°16'18.91"E 94°16'18.64" E	26°44'22.69"N 26°44'23.02"N 26°44'29.13"N 26°44'31.45"N 26°44'32.66"N 26°44'27.26"N	94°16'22.83"E 94°16'21.24"E 94°16'25.01"E 94°16'21.94"E 94°16'22.55"E 94°16'26.45"E
10	Bhogdoi River	Sumesh Tanti, permit holder, lease period 2 yrs	0.86	0.86	0	0	0.23	0	0	0	0	0	0	0.23	0.63	26°44'34.77"N 26°44'34.17"N 26°44'24.96"N 26°44'25.16"N	94°16'14.90"E 94°16'15.41"E 94°16'23.11"E 94°16'22.85"E	--	--

11	Bhogdoi River	M/S Phonie xx Enterprise, permit holder, lease period 2 yrs	0.55	0.55	0	0	0.4	0	0	0	0	0	0.15	0.55	0	26°44'53.42"N 26°44'53.86"N 26°44'47.39"N 26°44'47.77"N	94°15'57.45"E 94°15'58.19"E 94°16'01.49"E 94°16'02.34"E	--	--
12	Bhogdoi River	Bijoy K. Rajkhowa Permit Holder Lease period for 2 years	2.73	2.73	0	0	0.3	0	0	0	0	0	0.57	0.87	1.86	26°44'59.69"N 26°44'57.00"N 26°44'59.29"N 26°44'57.35"N	94°15'31.11"E 94°15'30.69"E 94°15'44.66"E 94°15'44.61"E	26°44'59.29"N 26°44'57.51"N 26°44'57.96"N 26°44'59.71"N	94°15'44.66"E 94°15'44.57"E 94°15'30.85"E 94°15'31.13"E
13	Bhogdoi River	Pulin Mahanta, LOI holder, Lease period for 2 yrs	4.98	4.98	0	0	2.5	0	0	0	0	0	0.36	2.86	2.12	26°45'8.95"N 26°45'1.98"N 26°45'11.35"N 26°45'4.22"N	94°14'30.30"E 94°15'13.74"E 94°14'55.96"E 94°15'15.21"E	26°45'4.88"N 26°45'4.75"N 26°45'6.61"N 26°45'11.19"N 26°45'9.30"N	94°15'13.39"E 94°15'6.75"E 94°15'2.04"E 94°14'55.70"E 94°15'1.78"E
14	Bhogdoi River	Pulin Mahanta, LOI holder, Lease period for 2 yrs	4.83	4.83	0	0	1.99	0	0	0	0	0	0.35	2.34	2.49	26°45'21.32"N 26°45'15.26"N 26°45'22.60"N 26°45'13.68"N	94°13'56.97"E 94°14'30.30"E 94°13'58.04"E 94°14'31.13"E	26°45'15.23"N 26°45'13.59"N 26°45'12.38"N 26°45'15.63"N	94°14'30.39"E 94°14'31.03"E 94°14'23.01"E 94°14'15.27"E
15	Bhogdoi River	Prasurjya Kalita, permit holder, lease period 2 yrs	2.44	2.21	2.21	0	0	0	0	0	0	0	0	2.21	0	26°47'09.92"N 26°47'07.69"N 26°46'57.11"N 26°46'59.67"N	94°12'04.26"E 94°12'03.06"E 94°12'20.89"E 94°12'24.45"E	--	--
16	Bhogdoi River	M/S AMDC, Ghy Lease period for 2 yrs	3.92	3.92	3.92	0	0	0	0	0	0	0	0	3.92	0	26°46'43.08"N 26°46'31.41"N 26°46'32.73"N 26°46'44.39"N	94°11'6.96"E 94°10'56.89"E 94°10'56.87"E 94°11'6.74"E	--	--

17	Bhogdoi River	Goutam Bora, permit holder, lease period 2 yrs	3.25	2.44	0	0	0.42	0	0	0	0	0	0.147	0.567	1.873	26°46'48.40"N 26°46'47.21"N 26°46'48.18"N 26°46'46.85"N	94°9'44.78"E 94°9'45.09"E 94°10'10.53"E 94°10'9.98"E	26°46'46.87"N 26°46'48.23"N 26°46'53.63"N 26°46'52.52"N 26°46'51.55"N 26°46'52.77"N 26°46'49.99"N 26°46'49.30"N 26°46'47.39"N 26°46'48.50"N	94°10'9.98"E 94°10'10.55"E 94° 9'58.75"E 94° 9'53.98"E 94° 9'54.56"E 94° 9'59.67"E 94° 9'49.04"E 94° 9'49.47"E 94° 9'45.12"E 94° 9'44.80"E
18	Bhogdoi River	Debanga Buragohain, permit holder, lease period 2 yrs	1.8	1.8	0	0	0	0	0	0	0	0	0.22	0.22	1.58	26°47'03.24"N 26°47'01.75"N 26°46'58.63"N 26°46'59.76"N	94°09'10.81"E 94°09'10.82"E 94°8'56.78"E 94°08'56.87"E	26°47'3.05"N 26°47'1.80"N 26°46'58.60"N 26°46'59.64"N	94° 9'10.83"E 94° 9'10.89"E 94° 8'56.75"E 94° 8'56.87"E
19	Bhogdoi River	M/S Anupam Nirman Pvt. Ltd, permit holder, lease period 2 yrs	4.76	4.76	0	0	1.2	0	0	0	0	0	0	1.2	3.56	26°47'7.46"N 26°47'7.51"N 26°46'52.75"N 26°46'51.48"N	94°8'16.06"E 94°8'17.05"E 94°8'39.98"E 94°8'41.19"E	26°46'58.24"N 26°46'57.11"N 26°46'46.11"N 26°46'48.53"N 26°46'46.86"N 26°46'51.55"N 26°46'51.04"N 26°46'54.36"N 26°46'54.67"N 26°46'58.88"N 26°46'59.11"N 26°47'7.53"N 26°47'7.56"N	94° 8'50.61"E 94° 8'51.04"E 94° 8'29.92"E 94° 8'27.32"E 94° 8'31.23"E 94° 8'23.14"E 94° 8'22.43"E 94° 8'20.24"E 94° 8'20.89"E 94° 8'18.47"E 94° 8'17.09"E 94° 8'16.11"E 94° 8'17.25"E
20	Bhogdoi River	Aditya Baishya, permit holder, lease period 2 yrs	3.1	3.1	0	0	0	0	0	0	0	0	0.3	0.3	2.8	26°47'35.03"N 26°47'35.63"N 26°47'14.07"N 26°47'13.01"N	94°7'39.92"E 94°7'41.10"E 94°8'1.53"E 94°8'1.33"E	26°47'14.15"N 26°47'13.13"N 26°47'35.02"N 26°47'35.63"N	94° 8'1.69"E 94° 8'1.29"E 94° 7'39.93"E 94° 7'41.03"E
21	Bhogdoi River	Prasurjya Kalita, permit holder, lease period 2 yrs	3.44	3.12	0	0	0.99	0	0	0	0	0	0.56	1.55	1.57	26°47'6.40"N 26°47'5.77"N 26°47'4.05"N 26°47'3.41"N	94°05'59.68"E 94°06'0.73"E 94°06'41.95"E 94°06'43.01"E	26°47'4.13"N 26°47'3.47"N 26°47'2.63"N 26°47'3.91"N 26°47'3.43"N 26°47'7.08"N 26°47'6.65"N 26°47'12.55"N 26°47'12.98"N 26°47'16.88"N 26°47'16.38"N 26°47'9.58"N 26°47'9.87"N	94° 6'41.98"E 94° 6'42.94"E 94° 6'39.57"E 94° 6'35.93"E 94° 6'35.71"E 94° 6'31.17"E 94° 6'30.99"E 94° 6'19.45"E 94° 6'19.61"E 94° 6'6.61"E 94° 6'6.87"E 94° 6'2.18"E 94° 6'1.71"E

22	Jhanji River	Rahul Neog permit holder, lease period 2yrs	0.3	0.3	0	0	0	0	0	0	0	0	0.3	0.3	0	26°45'25.99"N 26°45'26.29"N 26°45'24.79"N 26°45'22.69"N 26°45'22.44"N 26°45'24.90"N	94°31'42.49"E 94°31'42.91"E 94°31'45.85"E 94°31'48.44"E 94°31'48.05"E 94°31'44.66"E	--	--
23	Jhanji River	BHOBEN GOGOI UJONI JAMUGURI GAON, PO-AAU, JORHAT, PS-JORHAT, Dist. JORHAT, ASSAM, 785013	1.15	0.86	0	0	0.16	0	0	0	0	0	0.1	0.26	0.6	26°45'46.68"N 26°45'46.36"N 26°45'57.94"N 26°45'57.27"N	94°31'0.31"E 94°30'59.91"E 94°31'13.55"E 94°31'14.42" E	26°45'58.05"N 26°45'57.27"N 26°45'46.84"N 26°45'47.59"N	94°31'13.50"E 94°31'14.53"E 94°31'3.76"E 94°31'3.17"E
24	Jhanji River	Narayan Chutia LOI holder lease period for 2 yrs	1.24	1.24	0	0	0	0	0	0	0	0	0.14	0.14	1.1	26°46'47.72"N 26°46'47.63"N 26°46'43.58"N 26°46'42.29"N	94°31'0.21"E 94°30'59.51"E 94°31'0.60"E 94°30'58.21"E	26°46'42.29"N 26°46'43.62"N 26°46'47.72"N 26°46'47.65"N	94°30'58.23"E 94°31'0.58"E 94°31'0.20"E 94°30'59.53"E
25	Jhanji River		1	1	0	0	0.8	0	0	0	0	0	0.2	1	0	26°47'25.39"N 26°47'25.15"N 26°48'23.53"N 26°47'23.08"N	94°31'19.38"E 94°31'19.43"E 94°31'25.05"E 94°31'24.91"E	--	--
26	Jhanji River	Divisional Forest Officer, Jorhat Division	4.69	3.69	3.69	0	0	0	0	0	0	0	0	3.69	0	26°49'27.575"N 26°49'28.309"N 26°48'56.610"N 26°48'56.507"N	94°29'48.031"E 94°29'48.232" E 94°30'33.715" E 94°30'34.465" E	--	--
27	Jhanji River	Divisional Forest Officer, Jorhat Division	3.45	2.74	2.74	0	0	0	0	0	0	0	0	2.74	0	26°51'8.90"N 26°51'9.21"N 26°51'50.13"N 26°51'49.87"N	94°29'25.79"E 94°29'26.74"E 94°29'33.95"E 94°29'34.50"E	--	--

28	Jhanji River	Samar Gogoi, permit holder lease period 2 yrs	0.65	0.65	0	0	0.65	0	0	0	0	0	0	0.65	0	26°52'53.23"N 26°52'53.34"N 26°52'26.32"N 26°52'26.47"N	94°29'33.74"E 94°29'34.47"E 94°29'31.07"E 94°29'31.71"E	--	--
29	Jhanji River	Pulin Mahanta, LOI holder, Lease period for 2 yrs (Distance is 5.37 Km both GPS point)	4.82	4.82	0	0	4.82	0	0	0	0	0	0	4.82	0	26°52'58.85"N 26°52'52.37"N 26°52'59.32"N 26°52'51.73"N	94°27'02.52"E 94°27'00.41"E 94°27'04.32"E 94°27'01.58"E	--	--
30	Jhanji River		2.33	2.33	0	0	0.33	0	0	0	0	0	0	0.33	2	26°52'55.27"N 26°52'50.84"N 26°52'58.08"N 26°52'51.56"N	94°29'23.01"E 94°29'33.49"E 94°29'35.58"E 94°29'35.58"E	94°27'56.91"E 26°53'12.75"N 26°53'14.39"N 26°53'15.46"N 26°53'15.22"N	26°53'13.06"N 94°27'55.99"E 94°27'51.69"E 94°27'50.85"E 94°27'55.15"E
31	Jhanji River	Samudra Gogoi permit holder Lease period 6 months	0.5	0.5	0	0	0.5	0	0	0	0	0	0	0.5	0	26°53'14.61"N 26°53'15.46"N 26°53'12.97"N 26°53'12.74"N	94°27'50.60"E 94°27'50.86"E 94°27'56.86"E 94°27'56.02"E	--	--
32	Jhanji River	Biswajit Sarma, permit holder, lease period 1 yr	2.4	2.4	0	0	2.4	0	0	0	0	0	0	2.4	0	26°53'11.93"N 26°53'13.17"N 26°53'22.72"N 26°53'23.88"N	94°27'08.28"E 94°27'07.93"E 94°27'27.79"E 94°27'26.36"E	--	--
33	Jhanji River	Biswajit Sarma, permit holder, lease period 1 yr	1.4	1.4	0	0	1.4	0	0	0	0	0	0	1.4	0	26°53'10.91"N 26°53'11.74"N 26°52'56.99"N 26°52'56.63"N	94°26'24.86"E 94°26'25.20"E 94°26'35.00"E 94°26'33.81"E	--	--
34	Charipani River	Nabajyoti Neog, permit holder, lease period 2 yrs	3	2.35	0	2.35	0	0	0	0	0	0	0	2.35	0	26°32'56.15"N 26°32'56.00"N 26°33'0.87"N 26°32'50.05"N 26°32'50.40"N 26°33'1.19"N	94°12'22.80"E 94°12'22.53"E 94°11'47.40"E 94°11'6.05"E 94°11'5.98"E 94°11'47.47"E	--	--

35	Brahmaputra River	BISWAJIT SHARMA RABI BARUAH CHUK, PO. RABI GAON, TEOK, JORHAT, ASSAM, 785683	4.8	4.8	0	0	0	0	0	0	0	0	4.8	4.8	0	26°53'58.51"N 26°53'56.19"N 26°53'58.77"N 26°54'1.48" N	94°20'27.43" E 94°20'27.63" E 94°20'50.03" E 94°20'49.13" E	--	--
36	Brahmaputra River	Sanjay Agarwala, (Director) M P AGARWALA PRIVATE LIMITED 3F, Peace Enclave, Ulubari, Ghy-7, KAMRUP METRO, ASSAM, 781007	4.9	4.9	0	0	0	0	0	0	0	0	4.8	4.8	0.1	26°53'16.84"N 26°53'15.58"N 26°53'25.58"N 26°53'23.32"N	94°19'8.98" E 94°19'12.10" E 94°19'25.08" E 94°19'28.38" E	--	--
37	Brahmaputra River	Arindom Sarma, ARIPRO Pvt. Ltd, lease permit	5	5	0	0	0	0	0	0	0	0	5	5	0	26°50'4.68"N 26°49'58.21"N 26°50'0.19"N 26°50'7.33"N	94°9'44.71"E 94°9'46.63"E 94°9'54.78"E 94°9'52.33"E	--	--

		for 2 yrs																
38	Brahmaputra River	Arindom Sharma, DBM PLAZA, PO JORHAT, JORHAT, ASSAM, 785001	3.23	3.23	0	0	0	0	0	0	0	0	3.23	3.23	0	26°49'52.38"N 26°49'44.78"N 26°49'46.64"N 26°49'52.97"N	94°9'36.30"E 94°9'33.28"E 94°9'38.26"E 94°9'30.81"E	--	--
39	Brahmaputra River	BHOBEN GOGOI UJONI JAMUGURI GAON, PO-AAU, JORHAT, PS-JORHAT, Dist. JORHAT, ASSAM, 785013	4.85	4.85	0	0	0	0	0	0	0	0	4.85	4.85	0	26°49'55.03"N 26°49'55.00"N 26°49'43.87"N 26°49'43.96"N	94°09'5.08"E 94°09'10.86"E 94°09'12.08"E 94°09'7.66"E	--	--
40	Brahmaputra River	SADGURU ENGINEERS & ALLIED SERVICES PRIVATE LIMITED	4.88	4.88	0	0	0	0	0	0	0	0	4.88	4.88	0	26°49'50.32"N 26°49'46.15"N 26°49'50.65"N 26°49'46.55"N	94°8'19.34"E 94°8'18.86"E 94°8'32.95"E 94°8'32.80"E	--	--

The details of Environmental sensitivity taken as the maximum stipulated distance with reference to AMMCR-2013 and the Order of the NGT in Appeal No. 03/2020 [Original Application No. 85/2019 (WZ) (I.A. No.63/2020)] for individual river in Proposed Zones are provided below:

Sl. No.	River Details	Zone Code	Area (Ha)	Area not recommended for NH and Bridges (Ha)	Area not recommended for Railway lines and Bridges (Ha)	Area not recommended due to 100 m buffer from the outer periphery of the defined limits of any village, habitation, State highway and other roads (Ha)	Area not recommended due to 500 m buffer from the irrigation Structure / Reservoir & Submergence Area (Ha)	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Canal/Tank/Lake (Ha)	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Ropeway or ropeway trestle or station (Ha)	Area not recommended for future Quarry Lease grant due to 100 m buffer from the Heritage site, Protected monuments (Ha)	Area not recommended for future Quarry Lease grant due to Eco-sensitive Zone (Ha)	Area not recommended for River safety barrier (Ha)	Total Reduced Area (Ha)
1	Bhogdoi River	ASM_JHT_PRO_BGD_01	1	0	0	0	0	0	0	0	0	0	0
2	Bhogdoi River	ASM_JHT_PRO_BGD_02	1	0	0	0	0	0	0	0	0	0	0
3	Bhogdoi River	ASM_JHT_PRO_BGD_03	2.76	0	0	0	0	0	0	0	0	0	0
4	Bhogdoi River	ASM_JHT_PRO_BGD_04	2.27	0	0	0	0	0	0	0	0	0	0
5	Bhogdoi River	ASM_JHT_PRO_BGD_05	1.61	0	0	0	0	0	0	0	0	0	0
6	Bhogdoi River	ASM_JHT_PRO_BGD_06	2.71	0	0	0	0	0	0	0	0	0	0
7	Bhogdoi River	ASM_JHT_PRO_BGD_07	5.4	0	0	0	0	0	0	0	0	0	0
8	Bhogdoi River	ASM_JHT_PRO_BGD_08	3.34	0	0	0	0	0	0	0	0	0	0

9	Bhogdoi River	ASM_JHT_PRO_BGD_09	4.9	0	0	0	0	0	0	0	0	0	0
10	Bhogdoi River	ASM_JHT_PRO_BGD_10	1.65	0	0	0	0	0	0	0	0	0	0
11	Jhanji River	ASM_JHT_PRO_JNJ_01	5.24	0	0	0	0	0	0	0	0	0	0
12	Jhanji River	ASM_JHT_PRO_JNJ_02	6.26	0	0	0	0	0	0	0	0	0	0
13	Jhanji River	ASM_JHT_PRO_JNJ_03	3.5	0	0	0	0	0	0	0	0	0	0
14	Jhanji River	ASM_JHT_PRO_JNJ_04	0.55	0	0	0	0	0	0	0	0	0	0
15	Brahamaputra River	ASM_JHT_PRO_BHMP_01	18.4	0	0	0	0	0	0	0	0	0	0
16	Brahamaputra River	ASM_JHT_PRO_BHMP_02	3.76	0	0	0	0	0	0	0	0	0	0
17	Brahamaputra River	ASM_JHT_PRO_BHMP_03	28	0	0	0	0	0	0	0	0	0	0

13.3 Monitoring Mechanism:

❖ Overview

A robust monitoring mechanism is essential to ensure that riverbed mining activities in Jorhat District are conducted sustainably and in compliance with legal regulations. This multi-tiered approach will include inspections, technological surveillance, community participation, and collaboration with relevant authorities to oversee mining operations and mitigate environmental impacts.

❖ Inspection and Field Visits

Regular field inspections by Forest Department officials and collaborating agencies, including the District Mining Officer and Pollution Control Board, will assess the impact of mining on riverbanks, water quality, air pollution, and ecosystems. Specific focus will be on compliance with depth and distance regulations.

❖ Use of Technology for Surveillance

Drones, remote sensing, and GPS technology will be employed to monitor mining activities in real time. Drones will capture high-resolution images, while remote sensing will track riverbed erosion, land degradation, and water quality changes. GPS tracking will ensure mining occurs only in authorized areas.

❖ Water and Air Quality Monitoring

Routine water and air quality assessments will be conducted to detect contaminants from mining activities. Water samples will be tested for pollutants like heavy metals, and air quality will be monitored to ensure dust levels remain within permissible limits.

❖ Community Involvement and Reporting

A community-based reporting mechanism will allow locals to report violations and environmental damage. Outreach programs will educate communities on sustainable mining practices and involve them in tracking restoration efforts.

❖ Coordination with Environmental Agencies

The Forest Department will coordinate with the Assam State Pollution Control Board, District Mining Office, and law enforcement to ensure legal compliance. Joint reviews will be held to assess monitoring effectiveness and make necessary adjustments.

❖ **Reporting and Documentation**

All findings, including inspection reports and water/air quality data, will be documented and submitted to the Divisional Forest Officer. This documentation will serve as a basis for corrective actions and penalties, ensuring transparency.

❖ **Compliance Checks and Penalties**

Routine checks will verify compliance with regulations. Violations will result in fines, operation suspensions, or license cancellations, with legal actions taken as necessary, based on the Assam Forest Regulation and EMGSM 2020.

❖ **Periodic Review and Evaluation**

The monitoring mechanism will undergo periodic reviews to evaluate its effectiveness, ensuring that it adapts to evolving environmental conditions, legal frameworks, and technological advancements.

13.4 Reclamation and Restoration Plans:

❖ **Reclamation of Mined-out Areas**

The reclamation and restoration of riverbed mining areas must be carried out progressively during the mining operations to ensure the site is restored before the mining activities cease. This process aims to rehabilitate the impacted areas and transform them into ecologically balanced and sustainable landscapes. The key objective is to minimize long-term environmental impacts such as erosion, habitat loss, and soil degradation.

A detailed reclamation plan will be developed, outlining the steps for the restoration and rehabilitation of mining-affected areas. The plan should include measures for soil conservation, re-vegetation, and habitat restoration. Additionally, planting of vegetation should extend beyond the lease boundary to prevent soil erosion and support ecological stability. A qualified environmentalist familiar with the region's native flora should prepare a planting scheme for the restoration of areas such as roads and other disturbed zones.

❖ **Legal and Regulatory Framework**

As per the Ministry of Environment, Forest and Climate Change (MOEF&CC) Office Memorandum No: F. No. 22-34/2018-IA-III, dated 16 January 2020, the mining leaseholder is required to restore mined areas by re-grassing and ensuring that the land is fit for the growth of flora, fauna, and fodder after mining operations conclude. This directive aims to prevent long-term degradation and maintain the biodiversity of the area.

In accordance with the Assam Minor Mineral Concession Rule, 2013, mining leaseholders are also obligated to deposit an additional amount equal to 10% of the royalty or dead rent along with the payment of royalties every month. This deposit is to ensure compliance with reclamation and restoration works. The amount will be refunded once the restoration work is

completed satisfactorily, as per the Mine Closure Plan. If the lessee fails to meet the restoration standards, the deposited amount will be forfeited and used for the restoration of the mining area.

❖ **Sustainable Land Use Post-Mining**

Post-mining, the rehabilitated areas should be managed for sustainable use, which may include afforestation, agroforestry, or recreational purposes, depending on the site's location and surrounding ecosystem. This approach ensures that the mining-affected lands contribute positively to the community and environment in the long term. Furthermore, monitoring of the restored areas will be essential to assess the effectiveness of the restoration efforts and make necessary adjustments for improved ecological outcomes.

Through the implementation of these reclamation and restoration plans, riverbed mining in Jorhat district can be carried out in a manner that minimizes environmental degradation and maximizes ecological recovery, supporting the long-term sustainability of the region.

13.5 Compliance with Legal and Regulatory Frameworks:

In order to protect the district's environment from any kind of forest degradation, such as encroachment, illegal felling, lopping, grazing, illegal collection of NTFP, illegal removal of minor minerals, etc., the primary legal frameworks which have been adhered while preparing the District Survey Report of Jorhat district are:

- The Environment (Protection) Acts1986/Rules 1986
- The Wild Life (Protection) Act, 1972
- The Water (Prevention & Control of Pollution) Acts1974/ Rules1975
- The Air (Prevention & Control of Pollution) Acts 1981/ Rules1982
- Biological Diversity Act of 2002
- Assam Biodiversity Rules, 2010