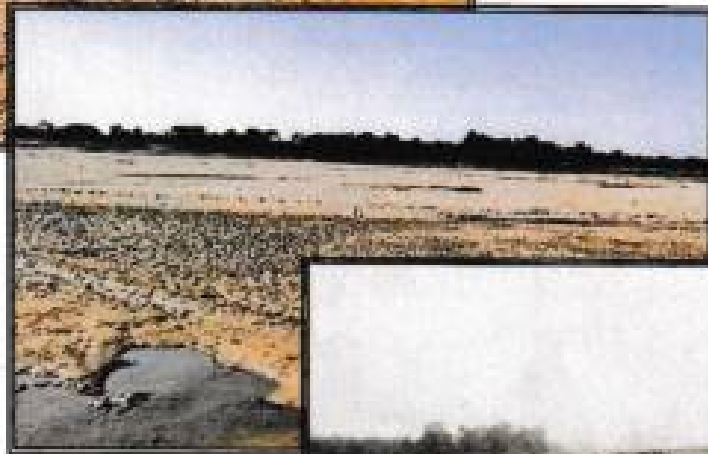
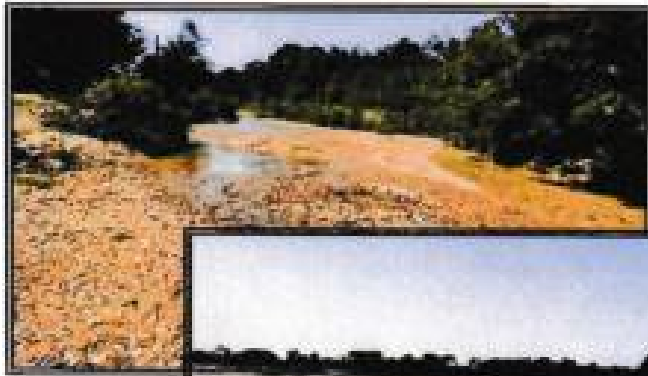


**DISTRICT
SURVEY REPORT
DISTRICT: LAKHIMPUR
STATE: ASSAM**



Prepared by:

**DISTRICT COMMISSIONER
LAKHIMPUR DISTRICT,
GOVERNMENT OF ASSAM**



Minutes of the Meeting of District Survey Report Committee, Lakhimpur District

Venue: Office Chamber of the District Commissioner, Lakhimpur

Date: 26-03-2025

Time: 4:30 PM

Subject: Presentation of the District Survey Report (DSR) of Lakhimpur District for submission to the State Expert Appraisal Committee (SEAC)

Chairman: The District Commissioner cum Chairman, District Survey Report Committee, Lakhimpur District

Members Present:

1. Divisional Forest Officer, Lakhimpur Division, North Lakhimpur cum Member Secretary, District Survey Report Committee.
2. The Executive Engineer, Water Resources, Lakhimpur.
3. The Executive Engineer, Water Resources, Dhakuakhana.
4. The Executive Engineer, PHED, Lakhimpur.
5. The Executive Engineer, PHED, Ghilamora.
6. The Executive Engineer, Irrigation, Lakhimpur.
7. The Executive Engineer, Irrigation, Dhakuakhana.
8. The Representative of Pollution Control Board, Dibrugarh.

Absent:

1. The Representative of Directorate of Geology and Mining, Assam.

Proceedings:


1. The meeting commenced with the Chairman welcoming all members and highlighting the agenda of the meeting, which was to review and approve the District Survey Report (DSR) of Lakhimpur District.
2. The Member Secretary, Divisional Forest Officer (DFO), Lakhimpur Division, presented an overview of the Final DSR, highlighting the corrections made as per the Minutes of Meeting dated 4th January 2025 of the State Expert Appraisal Committee (SEAC).
3. The committee members reviewed the report thoroughly and discussed its contents in detail.
4. The Representative from the Executive Engineer, PHED, Lakhimpur, and the representative from the Executive Engineer, PHED, Ghilamora was unable to attend the meeting. Sri Pratap Sarmah, A.E.(PHE), N.Lakhimpur Division and Sri Pranab Jyoti Gogoi, A.E.(PHE), Ghilamora Division attended the meeting in behalf of their respective department.
5. The Representative from the Directorate of Geology and Mining, Assam, was unable to attend due to ongoing geological mapping work in Upper Deopani, Karbi-Anglong. However, he had reviewed the soft copy of the DSR, found it satisfactory, and conveyed approval through an official letter placed before the committee by the Member Secretary.
6. Reviewing all the contents, the members expressed unanimous agreement with the updated District Survey Report. No additional suggestions or modifications were proposed.
7. The Chairman concluded that the Final District Survey Report Committee approved the updated District Survey Report and agreed that it should be forwarded to the Chairman, SEAC, Assam, Bamunimaidam, Guwahati-21, for necessary approval.

Resolution:










It was resolved that the Final District Survey Report of Lakhimpur District, as rectified and approved by the District Survey Report Committee, will be forwarded by the Chairman, District Survey Report Committee, Lakhimpur District to the Chairman, State Expert Appraisal Committee (SEAC), Assam, Bamunimaidam, Guwahati-21, for necessary approval.

The meeting ended with a vote of thanks to the Chair.


Divisional Forest Officer
Lakhimpur Division
North Lakhimpur

Approved by:

District Commissioner
Cum
Chairman,
District Survey Report Committee,
Lakhimpur, North Lakhimpur

Members present in the District Survey Report Committee Meeting for approval of DSR of Lakhimpur District held in the Office Chamber of the District Commissioner, Lakhimpur on 26-03-2025 at 04.30pm.

Sl. No	Name	Designation	Signature
1	Sri Pronab Jit Kakoty, ACS	District Commissioner Cum Chairman, District Survey Report Committee, Lakhimpur, North Lakhimpur	
2	Munij Kumar Dasgupta AFS	Divisional Forest Officer, Lakhimpur Division cum Member Secretary of District Survey Report Committee.	
3	Sachidhar Pegu	E.E I/c Dhakwahara Division Irrigation	
4	Tridip Patil	EE i/c Lakhimpur North Lakhimpur Div (Irrigation)	
5	Jehrud Islam	AEE, PCBA Regional Office, Dibrugarh	
6	Pranab Jyoti Gogoi	AE (PHE), Gitalama Division, Gitalama	
7	Alim Akhtar	E.E, North Lakhimpur. W.R. Division.	
8	Pijamban Dasgupta	EE, Dhakwahara W.R. Division	
9	Pratap Jyoti	FOE EE (PHE) I/L Division.	
10			


Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

Recommended to the SEIAA for approval
of the DSR of Lakhimpur 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


Smt. Balesabee Nath
Jt. Director, DGM, Assam

Foreword

In Pursuance to the Gazette Notification, published by Ministry of Environment, Forest, and Climate Change (MoEF & CC), the Government of India, Notification No. S. O. 141(E) Appendix-X, Dated 15.01.2016 and S.O. 3611 (E) New Delhi 25th July 2018 laid procedure for preparation of District Survey Report (DSR) of Sand mining or river bed mining and minor mineral other than Sand mining or river bed mining. The notification and guidelines suggest the preparation of District Survey Report for the better management of the Sand, Gravel & Clay/ Silt extraction. The main purpose of District Survey Report (DSR) is "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". This District survey report of Lakhimpur District, Assam State has been prepared as per the guidelines and notification, for the better management of Sand, Gravel & Clay/ Silt. Monitoring Guidelines for Sand Mining (EMGSM) January 2020, issued by the Ministry of Environment, Forest and Climate Change is prepared in consideration of various orders/directions issued by Hon'ble NGT in matters pertaining to illegal sand mining and also based on the reports submitted by expert committees and investigation teams. This DSR has been prepared in conformity with the S O 141 (E), S O 3611 (E), and other sand mining guidelines published by MoEF & CC from time to time as well as the requirement specified in AMMCR, 2013. The main objective of the preparation of District Survey Report (as per the Sustainable Sand Mining Guideline) is to ensure the following: (i) Identification of areas of aggradations or deposition where mining can be allowed; (ii) 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; (iii) Identification of mineral wealth in the district; (iv) Identification of areas where no mining zone



**GOVERNMENT OF ASSAM
OFFICE OF THE DIVISIONAL FOREST OFFICER :LAKHIMPUR DIVISION;
NORTH LAKHIMPUR**

E-mail ID: dfo.lakhimpur@gmail.com

Acknowledgement

This office of the Divisional Forest Officer, Lakhimpur Division, North Lakhimpur is highly grateful to Miss Gayatri Devidas Hyalinge, ACS, District Commissioner, Lakhimpur cum the Chairman, DSR Committee, Lakhimpur and all other members of the committee. We are also thankful to all the concerned staff of Office of the District Commissioner, Lakhimpur for providing all the support needed to complete this District Survey Report.

The Divisional Forest Officer, Lakhimpur Division, North Lakhimpur appreciate the contribution of Range Forest Officers, Beat Forests Officers, Frontline staff of Forests Department, drivers on duty and local people, who directly or indirectly helped in carrying out the field studies

Reliant Foundation Pvt. Ltd., a NABL accredited laboratory, Guwahati and our knowledge partner and its staff members, who helped in shaping the report


(Ashok Kr. Dev Choudhury, AFS)
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur
Cum

Member Secretary, DSR Committee, Lakhimpur

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur

Certificate

This is to certify that this Draft District Survey Report for Ordinary Sand/Gravel/Boulder mineral of Lakhimpur 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 accordance 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 District Survey Report and whenever specific permissions are required, we will approach the concerned authorities i.e. State Level Expert Appraisal Committee (SEAC), Assam / State Level Environment Impact Assessment Authority (SEIAA). The information furnished in the Draft District Survey Report is true and correct to the best of our knowledge /findings.

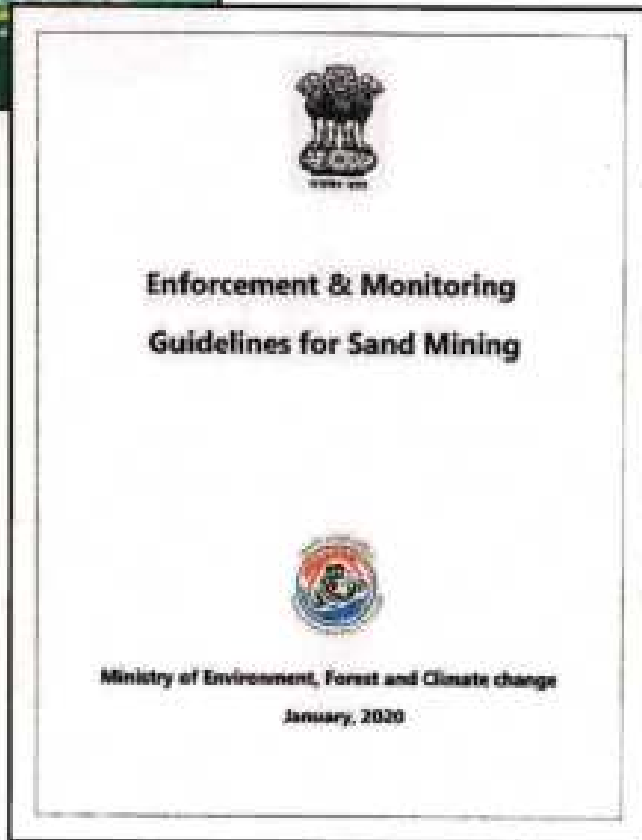
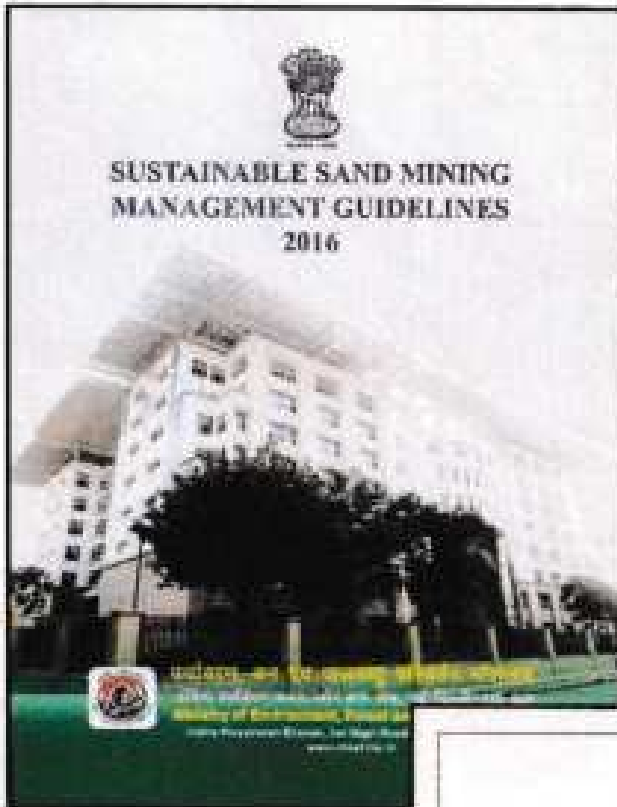

Member
SEIAA, Assam


Divisional Forest Officer
Lakhimpur Division
Lakhimpur.


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


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





Divisional Forest Officer
Laxmi
Jhansi
U.P.



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Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Minerals: Sand, Gravel, Boulder, Ordinary Clay

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CHAPTER 1: PREAMBLE

The Ministry of Environment, Forests & Climate Change (MoEFCC), Government of India, made Environmental Clearance (EC) for mining of minerals mandatory through its Notification of 27th January, 1994 under the provisions of the Environment Protection Act, 1986.

Keeping in view the experience gained in the environmental clearance process over a period of one decade, the MoEFCC came out with Environmental Impact Notification, SO 1533 (E), dated 14th September 2006. It has been made mandatory to obtain environmental clearance for different kinds of development projects as listed in Schedule 1 of the Notification.

Further, in pursuance to the order of the Hon'ble Supreme Court 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., prior environmental clearance has now become mandatory for mining of minor minerals irrespective of the area of mining lease; And also, in view of the 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 Mining Permit/ Contract in the cluster for minor Minerals.

The Ministry of Environment, Forest and Climate Change in consultation with State governments has prepared Guidelines on Sustainable Sand Mining detailing the provisions on environmental clearance for clusters, creation of a District Environment Impact Assessment Authority and proper monitoring of minor mineral mining using information technology and information technology-enabled services to track the mined-out material from source to destination.

The SEIAA and SEAC will scrutinize and recommend the prior environmental clearance of mining of minor minerals on the basis of the District Survey Report. This will be a model and guiding document which is a compendium of available mineral resources, geographical setup, environmental and ecological setup of the district and replenishment of minerals and is based on data from various departments, published reports, journals and websites. The District Survey Report will form the basis for

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the application for environmental clearance, preparation of reports and appraisal of projects. The Report will be updated once every five years. The main objective of the preparation of the District Survey Report (as per the Sustainable Sand Mining Guideline) is to ensure the following –

- (i) Identification of areas of aggradations or deposition where mining can be allowed; and
- (ii) Identification of areas of erosion and proximity to infrastructural structures and installations where mining should be prohibited and calculation of the annual rate of replenishment and allowing time for replenishment after mining in that area.
- (iii) Identification of mineral wealth in the district.

1.1 Sand Mining Guidelines:

In order to ensure sustainable and systematic sand mining with monitored protection of the environment, the guidelines laid down in the following documents are followed:

As per the guidelines prescribed in above said documents, special attention has been given to the following aspects:

1. The permanent boundary pillars need to be erected after the identification of an area of aggradations and deposition outside the bank of the river at a safe location for future surveying. The distance between boundary pillars on both sides of the bank shall not be more than 100 meters.
2. Proper channelization of rivers is to be carried out so as to avoid the possibility of flooding and to maintain the flow of rivers
3. The mining plan should include the original ground level (OGL), available from the District Survey Report (DSR) and to be recorded at an interval not more than 10 m x 10 m along and across the length of the river. The area of aggradations /deposition needs to be ascertained by comparing the level difference between the OGL and water level.

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4. Riverbed 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. The central 3/4th part of the river needs to be identified on a map, out of which the area of deposition/aggradation needs to be identified. The remaining 1/4th area needs to be marked as 'no mining zone'
5. The sediment sampling should include the bed material and bed material load before during and after the extraction period. The above exercise by DSR require four surveys i.e. 1st survey in the month of April, 2nd survey at the time of closing of mines for monsoon, 3rd survey needs to be carried out after monsoon to know the quantum of material deposited/replenished and the 4th survey to be carried out at the end of march to know the quantum of material excavated. The above information will be available in District Survey Report (DSR).
6. The particle size distribution and bulk density of deposited material are required to be assessed by a NABL-recognized laboratory.
7. Depth of mining should be restricted to 3 meters and distance from the bank should be 1/4th at the river width and should not be less than 7.5 meters. Alternatively, the distance from the bank should be 3 meters or 10% of the river width, whichever is less
8. Demarcation of the mining area with pillars and geo referencing should be done prior to the start of the mining operation.
9. A buffer distance/ un-mined block of 50 meters after every block of 1000 meters over which mining is undertaken, shall be maintained.
10. Sand may be extracted across the entire active channel during the dry season only. No sand mining during the monsoon season, as defined in DSR or IMD for each state.
11. Sand shall not be extracted up to a distance of 1 km from major bridges and highways on both sides, or five (5) times the span of a bridge/public civil structure (including water intake points) on the up-stream side and ten (10) times 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

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

13. River mining from outside should not affect rivers. No mining shall be permitted in an area up to a width of 100 meters from the active edge of the embankments or distance prescribed by irrigation department. The mining from area outside river bed shall be permitted subject to a condition that a safety margin of two (2) meters shall be maintained above the groundwater level while undertaking mining operation.

14. Sand shall not be extracted within 200 to 500 meters from any crucial hydraulic structure such as pumping station, water intake.

15. All the sand-carrying vehicles (from source to destination) are to be tracked through GPS or RFID. There should be one entry and exit point for trucks/dumpers. The Project Proponent should carry out effective monitoring of the same. In case of vehicle breakdown, the validity of the transport permit can be extended by State Authority, if so required. In compliance of sand mining guidelines and to adhere to the rule under the Assam Minor Mineral Concession Rules, 2013 there will be provision of installation of weigh-bridge and fitting of GPS in all vehicles carrying minor minerals which are to be treated as violation and breach of agreement. No mining activities shall be allowed without installation of a weighbridge by the mineral concession holders and without fitting of GPS in the vehicles by the vehicle owners involved in the transportation of minor minerals in future.

CHAPTER 2: INTRODUCTION

According to MoEF&CC Notification No. S.O. 3611(E) dated 25 July, 2018 and S.O.141(E) dated 15th January 2016, it is mandatory to have District Survey Report (DSR) for Mining of Minor Minerals. This will ensure environmentally sustainable mining for minor minerals under the close supervision of district authorities. A detailed procedure and format for the preparation of a District Survey Report (DSR) has been discretely discussed under Para 7(iii)(a) and Annexure (x) of the Notification issued by the Ministry of Environment, Forest and Climate Change, Government of India on 15th January 2016.

As per MoEF&CC notification dated 25th July 2018, the preparation of DSR requires both primary and secondary data generation. District Survey Report will cover General information of the district, Demography, Geomorphology, Topography, Forest and Agricultural information, Climate and Rainfall conditions, Land Use pattern, calculation of the total amount of replenishment, details of Royalty and revenue received in last three years etc. etc.

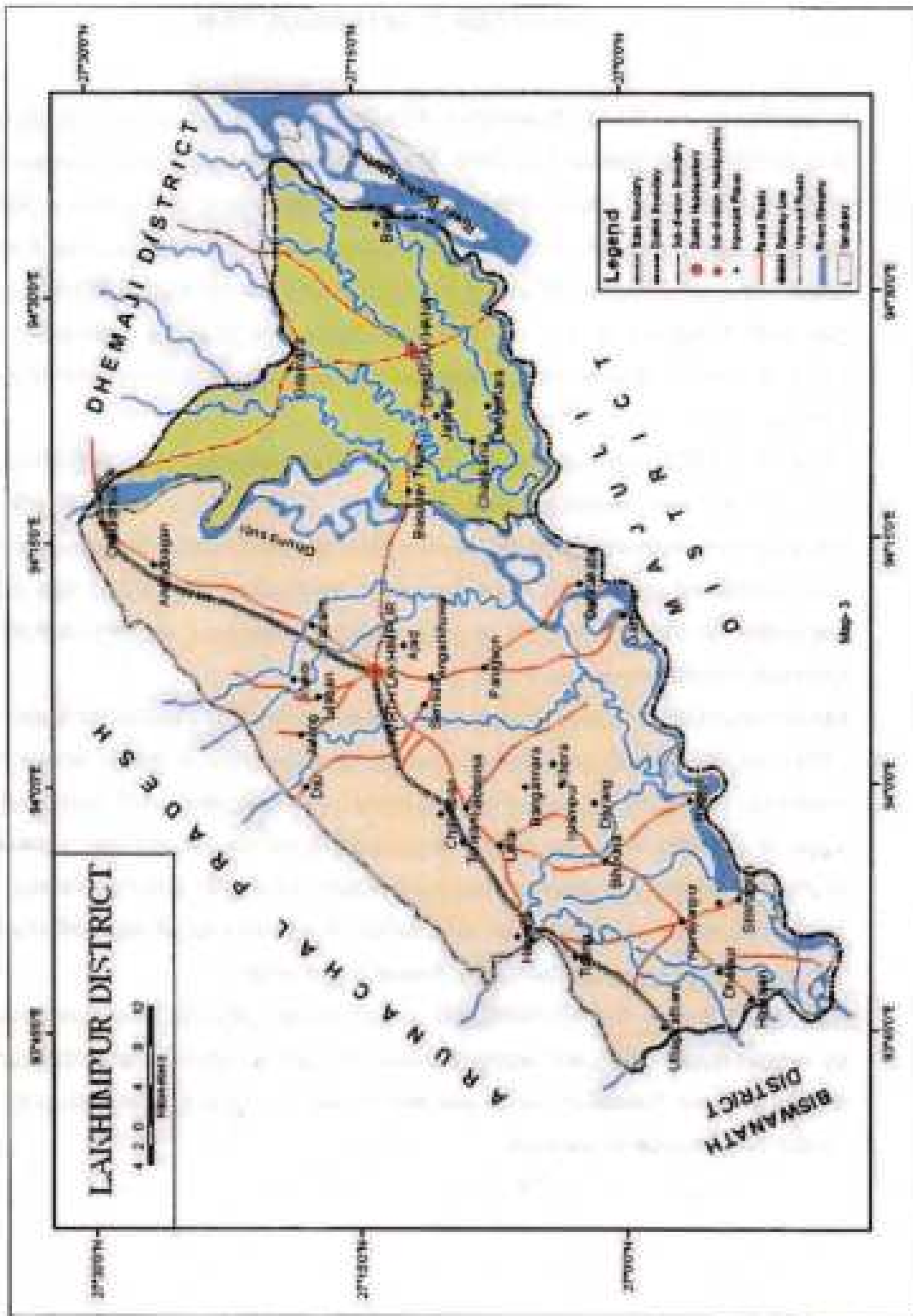
Mineral wise District Survey Report must be prepared in every district for Sand mining / River bed mining and other minor minerals mining in order to obtain environmental clearance. The main purpose of preparing the district survey report. Identification of areas of aggradations or deposition where mining 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".

The District Survey Report (DSR) will contain mainly data published and endorsed by various departments and websites about the Geology of the area, Mineral wealth details of rivers, Details of Lease and Mining activity in the district along with Sand mining and revenue of minerals.

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Map 2.1: Map of Lakhimpur District.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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2.1 Location and Geographical Area:

Lakhimpur district is an administrative district in the state of Assam, located between 26°48'00" and 27°53'00" North Latitude and 93°42'00" and 94°20'00" East Longitude. The district headquarters is located in North Lakhimpur.

The district is bounded on the north by Siang and Papumpare districts of Arunachal Pradesh and in the east by Dhemaji district and Subansiri River. Majuli district stands on the southern side and Biswanath district on the west.

Lakhimpur has a total area of 2277 sq. km.

The nearest Airport is Lilabari Airport, located 5 km away from the district headquarters.

The railway stations located within the Lakhimpur district are Hamuti, North Lakhimpur, Tatibahar, Siajuli, Silanibari, Subansiri, Kathal Pukhuri, Tipling, Uttar Kathani, Baginadi, Lilabari and Tanijan.

2.2 Administrative Units:

Lakhimpur district is an administrative district in the state of Assam in India. The district headquarters is located at North Lakhimpur. The district is bounded on the North by Siang and Papumpare districts of Arunachal Pradesh and on the East by Dhemaji District and Subansiri River. Majuli District stands on the Southern side and Biswanath District is on the West.

Administrative setup: Lakhimpur district covers an area of 2277 Sq.Km (Rural: 2240.85 Sq.Km and Urban 36.15 Sq.Km). The District Commissioner of the district is the overall In-Charge of the administration of the entire district. He also acts as the collector in case of Revenue matters as a District Magistrate in case of maintenance of Law and Order and general administration as a District Election Officer in case of conduct of Election as a Principal Census Officer while conducting Census and so on. A number of officers like Development Commissioners, Additional District Commissioners, Sub-divisional Officers are looking after the administration of the district. For administrative purposes, the entire district is divided into three sub-

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divisions viz. North Lakhimpur (Sadar), Narayanpur- Bihpuria and Dhakuakhana. Lakhimpur district includes the seven revenue circles, which covers 1184 villages. There are nine numbers of development blocks with 81 nos. of Gaon Panchayat. The district has four Towns which are all Statutory Towns.

2.2.1 District Magistrate:

The District Commissioner is the District Magistrate of the District. He is the administrative head of the district and looks after the administration of the entire district including the outlying subdivisions of the district. In discharging his multifarious duties, he is assisted by District Development Commissioner, Additional District Commissioners, SDO(S), SDO(Civil) , ACs, EACs, Election Officer, Circle Offices and other officers of the line departments

2.2.1.1 Administrative Branch:

This branch deals with works pertaining to

- a) Cinema, Loud-Speaker, Cable TV ,Video, and other cinematographic items e
- b) Arms and explosives etc.
- c) Issue of passport, Citizenship etc.
- d) Matters relating to Jail and Publicity and Public relations etc.
- e) Matters Relating to administrative reforms.
- f) Census operation.
- g) Matters relating to Hotels, Dharmasala , Rest House etc.
- h) Record room including forms and stationeries. The branch is under ADC (General) and one EAC/SDO is the branch officer.

2.2.1.2 Civil Defence Branch:

The branch deals with the works under "The Civil Defence Act., 1968" and the Civil Defence regulation , 1968 and all other matters relating to civil defense. The branch is under ADC (General) and the works are looked after by one EAC and branch officer.

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2.2.1.3 Development Branch:

The branch is headed by One ADC (Development) and One EAC / SDO helps him in disposal of the matters. The branch deals with the works of the development departments like –

- Agriculture
- Co-operation
- Education
- Flood control or E&D
- Forest including Social forestry
- Health and Family welfare department
- Industries Department
- Irrigation including minor irrigation
- Labour Department
- Banks and Financial Institution
- Municipalities
- Panchayat and rural development
- Planning and Development Department
- Power(electricity) mines and minerals
- Public works department
- Public health Department
- Sericulture and Handloom Department
- Soil and Conservation
- Town and country planning, Municipalities and town committees
- Banks and Financial Institution
- Transport, tourism and sports department
- Veterinary and Animal Husbandry Department
- Fishery Department
- Social Welfare Department
- Welfare for plain tribes and Backward classes Department
- Works done by S.D.W.O.
- Neheru Yuvak Kandra I.T.I. cultural Department works.
- Matters relating to NCC , Museums and Archaeology



2.2.1.4 Election Branch:

The branch is looked after by the Election Officer as branch officer and District Commissioner as the District Election Officer in the District Headquarters and SDO(Civil) in outlying Sub-divisions. The branch is responsible for revision the electoral role, issuing identity cards to voters, deletion of names of foreigners from the electoral rule, and updating of electoral rule. The branch is also responsible for the implementation of provisions relating to the conduct of elections as contained in the constitution of India and rules and orders under the constitution of India Relating to elections, certain Acts. of parliamentary statutory rules and orders and laws relating to the removal of disqualification.

The branch is also responsible for -

- 1) proper maintenance and storage of ballot boxes, furniture, electoral rules etc. in the godowns of the branch
- 2) for all matters of accounts pertaining to the conduct of election, revision, Photo Identity Card etc.

2.2.1.5 Excise Branch:

The excise branch is headed by the Superintendent of Excise and he has several inspectors. The branch has the following sections -

- a) Licensing and prosecution
- b) Personnel
- c) Accounts

The licensing and prosecution section gives licenses to the public liquor, shops, mahals etc. under different Acts and the prosecution section prosecutes for preparing selling and transporting dangerous psychotropic substances. The personal section deals with matters relating to inspectors and the other staff and the accounts section prepares bills etc. for the staff.

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2.2.1.6 Magisterial Branch:

The magisterial branch deals with -

- a) Procedures for initiating and conducting prosecution
- b) Appointment of Govt. pleaders, public prosecutors and assistant public prosecutors and matters relating thereto
- c) Advice on legal matters
- d) Conduct of Govt. Cases in various courts
- e) Administration of Different Acts and rules under -
 - i) Code of criminal procedure, ii) Public Order Acts, iii) Disturb Areas Acts,
 - iv) Games and Betting Act, v) Unlawful Activities Acts etc.

Besides it also deals with the following :

- Matters relating to law and order
- Black listing of firms and contactors
- Requisition of Vehicles
- Appointments of petition writers
- Reports and Returns to High Courts
- Post mortems
- Crime detection and punishment of offenders
- Matters relating to raising and maintenance of police force.
- Haj, pilgrimage etc.
- Fire service organization
- Matters relating to Assam Police Manual
- Verification of character and antecedents
- Complaints against police in action and co-operation
- Tour programme and tour diaries of police officers

The branch is dealt by SDO/EAC as branch officer who puts up cases to district magistrate through Addl. District Magistrate.

There are four Assam Legislative Assembly constituencies in this district Bihpuria, Naoboicha, Lakhimpur and Dhakuakhana. Dhakuakhana is designated for Scheduled Tribes. Bihpuria is in the Tezpur Lok Sabha Constituency, whilst the other three are in the Lakhimpur Lok Sabha constituency.

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2.3 CONNECTIVITY:

National Highway 15 (NH 15) passes through the Lakhimpur district. It originates from Baihata in Kamrup district of Assam and terminates at Wakro in Lohit district of Arunachal Pradesh. National Highway 715 A (NH- 715A) connects Naorth Lakhimpur to Silapathar, spanning 194 Kilometers.

The two state highways of this district are North Lakhimpur Kamalabari (Sl. No. 27) Road and Gogamukh Ghilamara Butikur Telijan (Sl. No. 27). Besides these, there are numerous PWD and village roads which connect the different parts of the Lakhimpur district with other parts of the country.

Some of the major bridges which have a major impact on the economic activity of the district are rail-cum-road Bogibeel bridge over the Brahmaputra and Dhola-Sadiya bridge. Under construction bridge over Ghunashuti over Subansiri and Kharkati-Fatasuti over Ranganadi, which will further accelerate economic development of the entire northern bank of the Brahmaputra.

In case of intra-district connectivity, three bridges over the Jiadhol, Kumotia and Samorajan rivers in Lakhimpur-Dhemaji inter-district border has a positive impact on the connectivity of the both the districts.

Train and waterways networks are also being developed simultaneously and this will help in socio-economic development of the area.

The railway stations located within the Lakhimpur district are Harmuti, North Lakhimpur, Talbahar, Siajuli, Silanibari, Subansiri, Kathal Pukhuri, Tipling, Uttar Kathani, Baginadi, Lilabari and Tanijan.

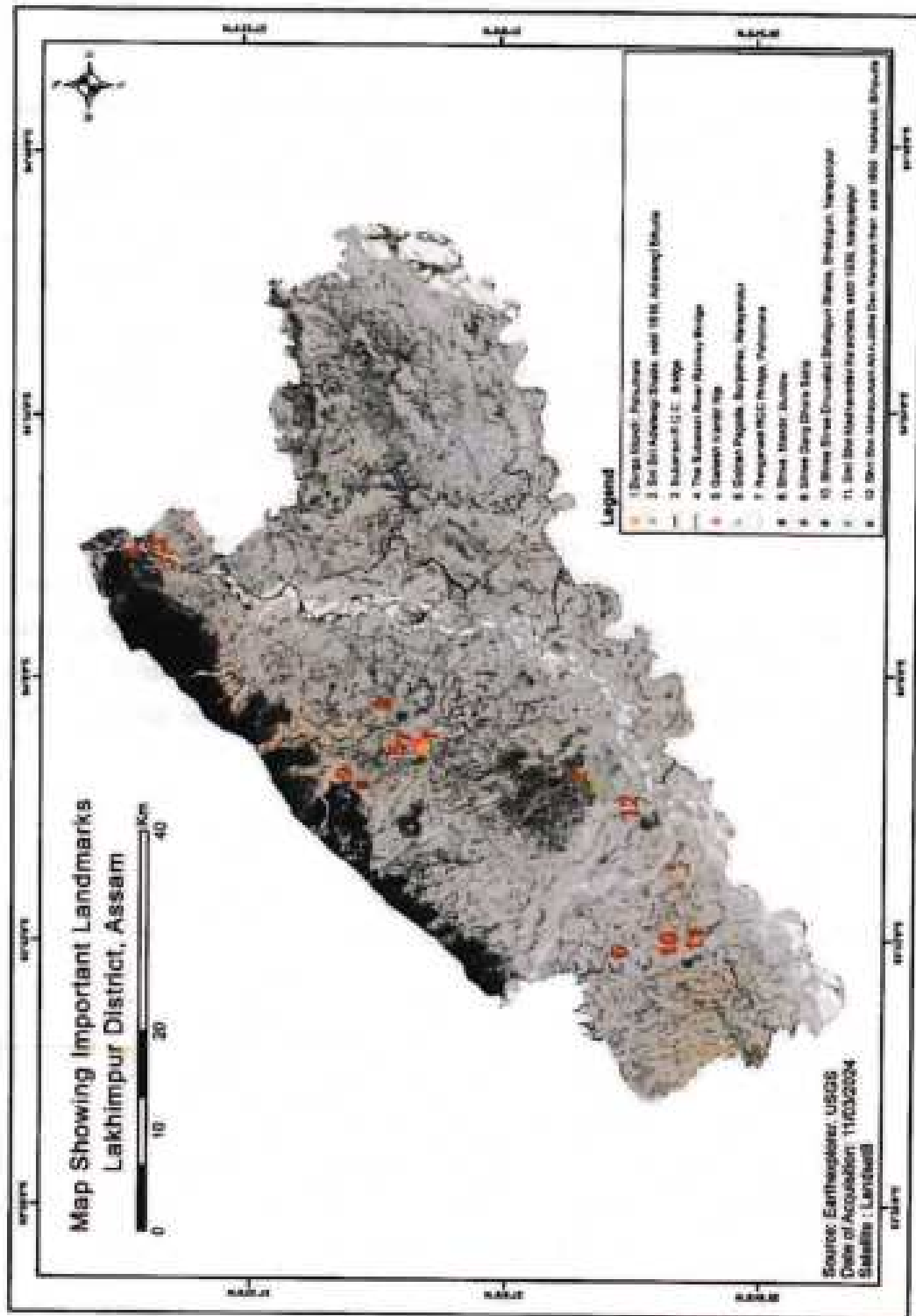
2.4 ASI Monuments:

This is a list of Monuments of National Importance (ASI) as officially recognized by and available through the website of the Archaeological Survey of India in the state of Assam. But there are no such Monuments of National Importance (ASI) available in the Lakhimpur district. Some important locations within this district are shown in Map 2.2.

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Map 2.2: Map showing important land marks of Lakhimpur District.

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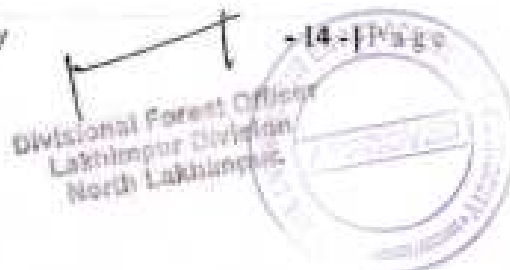


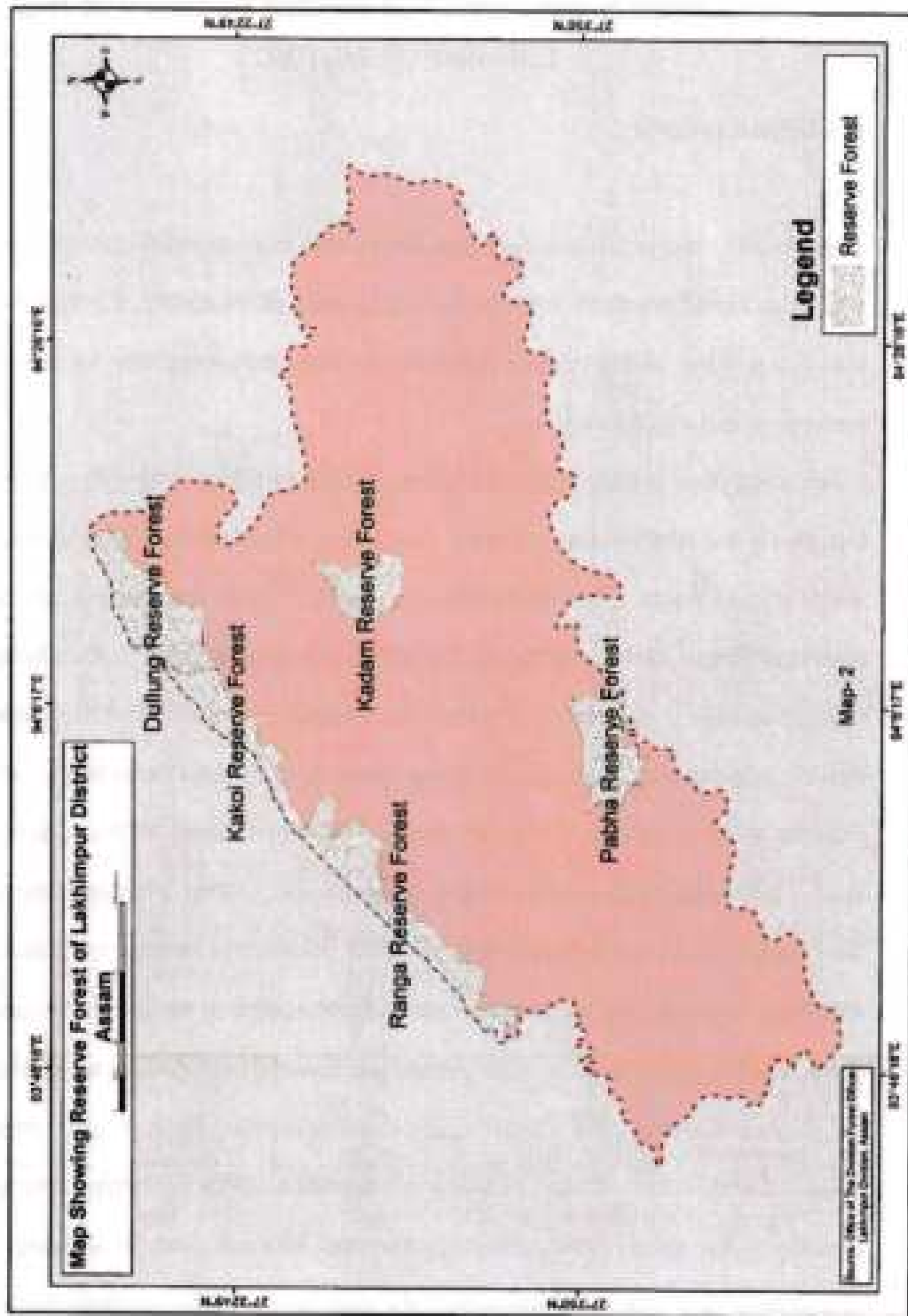
2.5 Forest (National Park/ Sanctuary & Respective ESZ)

The district is rich in forest resources. The area under the forest is 31108 hectares. The forests of the district are mainly tropical rain forests. The important reserved forests of the district are **Ranga Reserve Forest, Kakoi Reserve Forest, Dulung Reserve Forest, Kadam Reserve Forest and Pabha Reserve Forest**. The varieties of tree species grown in the forest area are Hollock (*Terminalia Myriocarpa*), Urlium (*Bicholla Jauvanica*), Nahar (*Mesua Ferrea*), Ajhar (*lagerstroemia speciosa*), Simolu (*Bombax ceiba/Salmalia Malabarica*), Sum (*Machilus*), Sualu, Gomari (*gmelina orborea*), Sissoo (*Dalbergia Sissoo*), Jutuli (*Altingia excelsa*), Silikha (*Terminalia Chebula*), Neem (*Azadirachta Indica*), Sopa (*Magnolia*) etc.

Lakhimpur welcomes tourists wholeheartedly, being quite away from hustle and bustle of city life. A small portion of *Bordolobam Bilmukh Wildlife Sanctuary* is located in Lakhimpur district. Different species of birds like large Whistling Teal, lesser Adjutant stork, Kingfisher, pleasant tailed Jacana, Black-headed Gull, Indian River tern, White Wagtail, Purple Moorhen, Black headed Oriole etc. could be seen in this sanctuary. Additionally, different species of fishes, animals like fishing cat, Porcupine, Hog deer, Otters etc. are also found in this sanctuary.

Minerals: Sand, Gravel, Boulder, Ordinary Clay





Map 2.3: Map showing the Reserved Forests under Lakhimpur District.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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CHAPTER 3: OVERVIEW OF MINING ACTIVITY IN THE LAKHIMPUR DISTRICT

3.1 Introduction:

The rate and the process of quarry operations have been increasing in the Lakhimpur district as it provides much profit to the local people of the district. It should be noted that the number of trucks and dumpers are also increasing day by day with an increase in quarry operations.

Owing to its good quality, quarry materials are in great demand not only in the villages but also in the nearby urban centers. The quarry materials from the site are mainly distributed to centers like Banderdewa, Harmoti, Laluk, Narayanpur, Pahumara, North Lakhimpur, Gohpur, Bihpuria, Ghilamara, Dhakuwakhana etc. Quarrying in the village has been providing employment opportunities to almost 200-500 people either directly or indirectly. Thus, quarrying has been the major source of livelihood for the majority of the people in the nearby areas. The major benefit of this activity is that even the illiterate people of the nearby areas are also getting employed and earning their daily income. Noteworthy that, the local people can access the good quality materials available nearby at low costs without spending much on transportation costs. On the other hand, as quarry materials need to be exported to other parts of the district, therefore, the village/ towns have benefitted from a good network of transport and communication including infrastructure. On the contrary, the laborers working in the quarry sites have to suffer from diseases like fever, cold, cough, pneumonia, skin and other respiratory diseases as they carry out their activities the

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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whole day long in the river water. Again, the villagers, especially those settled along the road through which the dumpers and trucks move also suffer from such diseases. It is important to mention that the excessive quarry activities accelerate river bank erosion due to which people may have to lose their homes and hearths including agricultural fields.

Environmental and Riverine Impacts of Quarrying: Although minor mineral mining in the river valley and its bed has given many benefits to the local people, yet its long-term negative impacts on the riverine environment of the village cannot be denied. With increasing profit and demand for construction works, the increasing intensity of quarrying has created much loss to the aquatic environment. Excessive removal of sand gravel may significantly distort the natural equilibrium of a river. By removing sediment from the active channel bed, instream mines interrupt the continuity of sediment transport through the river system, disrupting the sediment mass balance in the river downstream and inducing channel adjustments extending considerable distances beyond the extracted site itself (MNR and DID, 2009; Chang et al., 2012).

3.2 Overview of Mining Activity:

Lakhimpur district is blessed with minor minerals like sand, gravel, boulders, ordinary clay, ordinary earth etc. The mining activity of the district is restricted to riverbed mining. For major or minor construction-related works, the minor minerals are supplied from the river bed mining. Table 3.1 shows mineral-wise Mining Permit/ Contract in the Lakhimpur district.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Table 3.1: Existing Mineral-wise Mining Permit/ Contract Areas in the rivers under Lakhimpur District.

Sl. No.	River	Total No. of Permit/ Contract Area	Minor Minerals						
			Sand	Sand Gravel & Boulder	Sand & Gravel	Gravel	Sand Gravel & Clay	Boulder	Ordinary Clay
1	Subansiri River	9	0	1	2	0	1	0	5
2	Ranganadi River	9	0	0	3	0	0	0	6
3	Dikrong River	12	0	1	9	0	1	1	0
4	Kakoi River	2	0	0	0	0	1	0	1
5	Kananadi River	2	0	0	2	0	0	0	0
6	Tramjuli River	1	0	0	1	0	0	0	0
7	Bogoli River	2	0	0	2	0	0	0	0
8	Singra River	2	0	0	1	0	0	0	1
9	Durpang River	2	0	0	2	0	0	0	0
10	Joyhing River	1	0	0	1	0	0	0	0
11	Dirgha River	1	0	0	0	0	1	0	0
12	Baghinijan	1	0	0	1	0	0	0	0
13	Dhekia Nala	1	0	0	0	0	1	0	0
14	Baginadi	1	0	0	0	1	0	0	0
15	Ghagar	1	0	0	1	0	0	0	0
	Total	47	0	2	25	1	5	1	13

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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3.3 Details of Mineral Based Industries:

Ordinary Sand, Gravel, Boulders and Ordinary Clay are basic aggregates in the construction work. This mineral has a huge demand in any infrastructure project within the district as well as within other adjoining districts.

3.4 Mining (Administrative) Set up in Assam:

The Directorate of Geology and Mining is a geo-scientific department and the prime responsibilities of the department are the systematic geo-scientific investigation, exploration and survey of minerals as well as the administration of the minerals, mineral oil and natural gas produced in the state. The Mines and Minerals Department is the investigative, administrative, advisory and promotional arm of the Government of Assam in mineral development. At present, the Additional Chief Secretary of the Government of Assam, Mines and Mineral Department is the Head of the Government level and the Director of Geology and Mining, Assam is the Head of the Directorate assisted by Joint Director to Ministerial staff which is under the administrative control of the Mines and Minerals Department, Government of Assam

3.4.1 Assam Mineral Development Corporation:

The Main Objective of Assam Mineral Development Corporation is to search for coal, lignite, limestone, mineral oil and gas, and other minerals and precious stones in the State of Assam and anywhere in India and acquire, by purchase or grant, obtaining licenses/leases or other rights in the lands within the State of Assam and anywhere in India to win, open and work coal, lignite, limestone, mineral oil and gas, and other minerals and precious stones in above and under the said lands, or any of them, or in above and under any other lands over which mining rights may be acquired by the Company; to raise, sell, dispose of coal, lignite, limestone,

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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mineral oil and gas, and other minerals and precious stones to be procured therefrom; and to treat and make marketable and convert such ores into metal, if found expedient to do so, or otherwise to deal with, the produce of the mines, quarries and operations of the Company.

3.5 Mining Policy of the State of Assam

The following Rules and Regulations (amended time to time) guide the Mining Policy of the State of Assam:

- 1) Mines and Minerals (Development & Regulation) Act, 1957,
- 2) Mineral Concession Rule 1960
- 3) Assam Mines & Minerals Concession Rules 2013
- 4) Assam Minerals Regulation and Dealers Rules 2020
- 5) Mineral Conservation and Development Rules, 1988
- 6) The Petroleum and Natural Gas Rules, 1959
- 7) For minerals occurring in Forest Lands, necessary clearance from the MoEF&CC is required.
- 8) Necessary clearance from the State Pollution Control Board.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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CHAPTER 4: DETAILS OF MINING PERMIT/ CONTRACT AREAS IN THE DISTRICT

Lakhimpur district has 47 Mining Permit/ Contract covering 20593.37 hectares of area. 01 lease is of Gravel, 01 lease is of Boulders, 25 are of Sand & Gravel, 02 Mining Permit/ Contract are of Sand, Gravel & Boulder, 5 Mining Permit/ Contract are of Sand, Gravel & Clay and 13 Mining Permit/ Contract are of Ordinary Clay. 19 new areas are identified as potential mining zones for permit /grant in the coming future. In addition, few Ordinary Earth/ Ordinary Clay mines are project-based or need-based in the Lakhimpur district, but it does not pay any royalties to the state. In the future, it is being perceived that there may be a separate permit/patta/lease granted for earth/ clay only. Such list will be bedded to the existing DSR and updated in the list of mine Mining Permit/ Contract in the district.

Table 4.1: Gravel Mining Permit/ Contract Area

Sl. No.	Mine Name	River	Village	Area In Ha	Status of Lease	Current Status
1	Boginadi Gravel MCA	Boginadi	Tarlioni Gaon	8.8	Mining Contract Area	Operational

Table 4.2: Boulder Mining Permit/ Contract Area

Sl. No.	Mine Name	River	Village	Area In Ha	Status of Lease	Current Status
1	Upper Dikrong Boulder MPA	Dikrong	Missing Gaon	1.5	Mining Permit Area	Non-operational

Table 4.3: Sand & Gravel Mining Permit/ Contract Area

Sl. No.	Mine Name	River	Village	Area In Ha	Status of Lease	Current Status
1	Lower Subansiri	Subansiri	Thekeraguri	24	Mining Contract Area	Operational



	Sand & Gravel MCA					
2	Bhimpara Sand & Gravel MPA	Subansiri	Khalhamri	2.5	Mining Permit Area	Non-operational
3	Ranganadi Sand & Gravel MPA	Ranganadi	Joyhing	1.0	Mining Permit Area	Non-operational
4	Ranganadi Sand & Gravel MPA	Ranganadi	Joyhing	4.84	Mining Permit Area	Operational
5	Ranganadi Sand & Gravel MCA	Ranganadi	Ujani Mirigaon	4.95	Mining Contract Area	Operational
6	Upper Dikrong Sand & Gravel MPA	Dikrong	Molual Missing Gaon	2.0	Mining Permit Area	Non-operational
7	Lower Dikrong-Parbatipur Sand & Gravel MPA	Dikrong	Parbatipur	2.2	Mining Permit Area	Non-operational
8	Dikrong Sand & Gravel MPA	Dikrong	Parbatipur	2.0	Mining Permit Area	Non-operational
9	5 No Pithaguri Sand & Gravel MPA	Dikrong	5 No. Pithaguri	2.0	Mining Permit Area	Non-operational
10	Lower Dikrong Sand & Gravel MCA	Dikrong	Merbil	6.0	Mining Contract Area	Operational
11	North Dikrong Sand & Gravel MCA	Dikrong	Gulajuli	4.91	Mining Contract Area	Operational
12	Dikrong River Bagansalla MPA	Dikrong	Parbatipur	1.82	Mining Permit Area	Non-operational
13	Dikrong Sand & Gravel MCA	Dikrong	Parbatipur	10.0	Mining Contract Area	Non-operational
14	2.0 Ha. Kathalguri Sand &	Dikrong	Kathalguri	2.0	Mining Permit Area	Non-operational

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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	Gravel Mining Permit Area					
15	Kananadi Sand & Gravel MPA	Kananadi	Ghagar Nagar Gaon	1.0	Mining Permit Area	Non-operational
16	Kananadi Sand & Gravel MPA	Kananadi	Kananadi	0.68	Mining Permit Area	Non-operational
17	Tramjuli Sand & Gravel MPA	Tramjuli	Garubandha	0.98	Mining Permit Area	Non-operational
18	Durpang Sand & Gravel MCA	Durpang	Durpang	5.2	Mining Contract Area	Non-operational
19	Bogoli Sand & Gravel MCA	Bogoli	Kathani Village	3.0	Mining Contract Area	Operational
20	Bogoli Sand & Gravel MPA	Bogoli	Kathani Village	1.3	Mining Permit Area	Non-operational
21	Singra Sand & Gravel MCA	Singra	Bhitaripam	6.0	Mining Contract Area	Non-operational
22	Durpang (Lower) Sand & Gravel MPA	Durpang	Durpang	1.91	Mining Permit Area	Non-operational
23	Joyhing Sand & Gravel MCA	Joyhing	Joyhing	4.9	Mining Contract Area	Operational
24	Baghiniyan Mining Permit Area (Outside R.F.)	Baghiniyan	Bakulbari	0.90	Mining Permit Area	Non-operational
25	Ghagar Sand & Gravel MPA	Ghagar	Rajgarh Gaon	0.57	Mining Permit Area	Non-operational

Table 4.4: Sand, Gravel & Boulder Mining Permit/ Contract Area

Sl. No.	Mine Name	River	Village	Area in Ha	Status of Lease	Current Status
1	Lower Dikrong Maneha Sand, Gravel & Boulder MPA	Dikrong	Dikronghat Malaha Gaon	2.5	Mining Permit Area	Non-operational



2	Gomari Nala Sand, Gravel & Boulder MPA	Subansiri	Pathalipani	3.0	Mining Permit Area	Operational
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Table 4.5: Sand, Gravel & Ordinary Clay Mining Permit/ Contract Area

Sl. No.	Mine Name	River	Village	Area In Ha	Status of Lease	Current Status
1	Bhimpara Sand, Gravel & Ordinary Clay/ Silt MCA	Subansiri	Khalihamri	9.0	Mining Contract Area	Operational
2	Dikrong River Merbil Sand, Gravel & Ordinary Clay/ Silt MPA	Dikrong	Merbil	2.71	Mining Permit Area	Non- operational
3	Kakoi Sand, Gravel & Ordinary Clay/ Silt MCA	Kakoi	Kakoi Rajgarh Gaon	6.0	Mining Contract Area	Operational
4	Dirgha Sand, Gravel & Ordinary Clay/ Silt MCA	Dirgha	Dirgha Balibasti Gaon	5	Mining Contract Area	Non- operational
5	Dhekianala Sand, Gravel & Ordinary Clay/ Silt MPA	Dhekianala	Joyhing Koilamari	2.2	Mining Permit Area	Non- operational

Table 4.6: Ordinary Clay Mining Permit/ Contract Area

Sl. No.	Mine Name	River	Village	Area In Ha	Status of Lease	Current Status
1	No.2 Chenimora Kongkur Gaon Ordinary Clay MPA (Plot-K)	Subansiri	No.2 Chenimora Kongkur Gaon	39.43	Mining Permit Area	Non- operational
2	Subansiri River Ordinary Clay MPA	Subansiri	Psbhamukh Bhekeli Gaon	21.58	Mining Permit Area	Non- operational
3	No.2 Chenimora Kongkur Gaon Ordinary Clay MPA (Plot-L)	Subansiri	No.2 Chenimora Kongkur Gaon	2.64	Mining Permit Area	Non- operational

4.	Dhunabari Gaon Ordinary Clay MPA (Plot-E)	Subansiri	Dhunabari Gaon	5.03	Mining Permit Area	Non-operational
5	Dhunabari Gaon Ordinary Clay MPA (Plot-F, G, H&I)	Subansiri	Dhunabari Gaon	3.89	Mining Permit Area	Operational
6	Ranganadi Ordinary Clay/ SR MPA	Ranganadi	Pahumora Village	8.73	Mining Permit Area	Non-operational
7	Ranganadi Ordinary Clay/ Silt MPA	Ranganadi	Ujani Pahumora Mirigaon	4.5	Mining Permit Area	Non-operational
8	Ranganadi Ordinary Clay/ Silt MPA	Ranganadi	Nabhogonia Gaon	1.4	Mining Permit Area	Non-operational
9	Ranganadi River Bed Ordinary Clay MPA near Pahumora	Ranganadi	Pahumora	1.2	Mining Permit Area	Operational
10	Ranganadi River Ordinary Clay MPA near Bogolijan	Ranganadi	Bogolijan	1.3	Mining Permit Area	Non-operational
11	Ranganadi River Ordinary Clay MPA	Ranganadi	Pahumora Ahom Gaon	1.67	Mining Permit Area	Operational
12	Kakoi MPA	Kakoi	Kakoi Rajgarh Gaon	2.5	Mining Permit Area	Non-operational
13	Dolohat Singra MPA	Singra	Dolohat Bazar	3.80	Mining Permit Area	Non-operational

Table 4.7: New Area Identified as Potential Mining Zone for Permit/ Contract in coming future.

Sl. No.	Mine Name	Name of Mineral	River	Area in Ha	Status of Lease	Current Status
1	Ghagor Mining Contract Area (RF Area)	Sand, Gravel & Boulder	Ghagor	9.0	Mining Contract Area	Potential Mining Zone for coming future



2	9.0 Ha. Kimin Mining Contract Area (RF Area)	Sand, Gravel & Boulder	Kimin	9.0	Mining Contract Area	Potential Mining Zone for coming future
3	Lower Subansiri 1.5 Ha. Sand & Gravel MPA	Sand & Gravel	Subansiri	1.5	Mining Permit Area	Potential Mining Zone for coming future
4	Borrow Area-R	Ordinary Clay	Subansiri	4.95	Mining Permit Area	Potential Mining Zone for coming future
5	Subansiri River MPA	Ordinary Clay	Subansiri	4.02	Mining Permit Area	Potential Mining Zone for coming future
6	Borrow Area "Q" At Subansiri River Bed	Ordinary Clay	Subansiri	3.58	Mining Permit Area	Potential Mining Zone for coming future
7	Borrow Area "D-1" at Dikrong River Bed	Sand & Gravel	Dikrong	4.91	Mining Permit Area	Potential Mining Zone for coming future
8	Borrow Area "D-2" at Dikrong River Bed	Sand & Gravel	Dikrong	4.64	Mining Permit Area	Potential Mining Zone for coming future
9	Dikrong River Clay Mining Permit Area	Ordinary Clay/ Silt	Dikrong	4.53	Mining Permit Area	Potential Mining Zone for coming future
10	2.33 Ha. Pithaguri Sand & Gravel MPA	Sand & Gravel	Dikrong	2.33	Mining Permit Area	Potential Mining Zone for coming future
11	2.24 Ha. 2 No. Dikrong Chapori Sand	Sand & Gravel	Dikrong	2.24	Mining Permit Area	Potential Mining Zone for coming future

Minerals: Sand, Gravel, Boulder, Ordinary Clay

	& Gravel MPA					coming future
12	Lower Dikrong Dongbil 85/68 Grant Area	Ordinary Clay/ Silt	Dikrong	2.30	Mining Permit Area	Potential Mining Zone for coming future
13	Lower Dikrong Bango Gaon Area	Ordinary Clay/ Silt	Dikrong	2.40	Mining Permit Area	Potential Mining Zone for coming future
14	Dikrong River Sisapathar Hantapur Area	Ordinary Clay/ Silt	Dikrong	2.21	Mining Permit Area	Potential Mining Zone for coming future
15	1.5 ha. Ranganadi MPA	Ordinary Clay/ Silt	Ranganadi	1.5	Mining Permit Area	Potential Mining Zone for coming future
16	3.0 Ha Dirgha MPA	Sand, Gravel & Ordinary Clay/ Silt	Dirgha	3.0	Mining Permit Area	Potential Mining Zone for coming future
17	Boginadi Ordinary Clay/ Silt MPA	Ordinary Clay/ Silt	Boginadi	2.58	Mining Permit Area	Potential Mining Zone for coming future
18	Gabharu River Balgaon Area	Ordinary Clay/ Silt	Gabharu	1.20	Mining Permit Area	Potential Mining Zone for coming future
19	Gabharu River Deori Gaon Area	Ordinary Clay/ Silt	Gabharu	1.20	Mining Permit Area	Potential Mining Zone for coming future

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CHAPTER 5: DETAILS OF ROYALTY OR REVENUE RECEIVED IN THE LAST FIVE YEARS

**Table 5.1: Royalty or Revenue received in the last five years
(2019-20) to (2023-24)**

Sl. No	XIII Forest	2019-20 (in INR)	2020-21 (in INR)	2021-22 (in INR)	2022-23 (in INR)	2023-24 (in INR)	Total (in INR)
1	Receipt From Minor Minerals- (iv)	34619912	27068406	37034769	68333040	72090459	239146586
2	Total: XIII Forests						
3	XIV Mines And Minerals						
4	Royalty on Major Minerals-(I)						
5	Royalty on Minor Minerals-(II)						
6	Sale from Government on Minerals receipts-(III)						
7	Total (in INR)						

**Table 5.2: Revenue received mineral-wise (minor) in the last five years
(2019-20) to (2023-24)**

Sl. No.	Division	Year	Boulder (in INR)	Gravel (in INR)	Sand (in INR)	Earth/ Clay (in INR)
1	Lakhimpur Forest Division	2019-20	0	18391346	8408603	7819963
2		2020-21	0	14476181	7971140	4621085
3		2021-22	0	20529954	14099169	2405646
4		2022-23	0	30836709	32987929	4508402
5		2023-24	0	18287066	22493384	31310009
6		Total (in Rs.)	0	102521256	85960225	50665105

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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

6.1 Introduction:

The process of deposition of sediments in rivers is a vital component of fluvial geomorphology, shaping the landscape and influencing aquatic ecosystems. Sediment deposition occurs when eroded particles, transported by rivers, settle and accumulate due to decreased water energy. This natural process is crucial in forming new landforms, such as deltas, floodplains, and river terraces, and affects water quality, aquatic habitats, and flood patterns. Factors like river discharge, sediment load, and river morphology control the deposition process, which is constantly modified by human activities and tectonic changes. Understanding sediment deposition in rivers is essential for effective river management, flood control, water resource management, and ecosystem conservation.

6.2 Sediments Deposition Process in the River:

Sedimentation in rivers is the process by which soil particles are eroded and transported by flowing water, and then deposited as layers of solid particles in the river. Sedimentation occurs when a river slows down. As and when a river slows down, it deposits sediments, with larger and heavier particles like sand and pebbles being deposited first. Lighter silt and clay settle down only when the water is almost still.

In Assam, the Brahmaputra river carries a large amount of sediment during floods. This causes the river bed to rise and widen, which leads to more erosion. This causes lateral changes in the braided channels, which leads to severe erosion along the banks.

Another reason of sedimentation is shifting of river channel owing to flood and erosion.

Sediment is naturally occurring material, broken down by the process of weathering and erosion and subsequently carried out or transported by the action of wind, tides,

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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water and force of gravity acting upon the particles. Among these, water is the strongest agent for the transportation of sediments and the degree of transportation depends on the strength and velocity of flow. In general, there are three categories of rivers. They are a. Youthful River, b. Mature River and c. Old Age River.

6.2.1 Youthful River:

This river is the most dynamic of all the rivers. Such rivers are found at higher elevations, mainly in mountain areas where the slope of the land is steeper. Water moves very fast over such a landscape. These rivers can also be a tributary of a older and larger river, very far away. They also may be close to the beginning of the larger river.

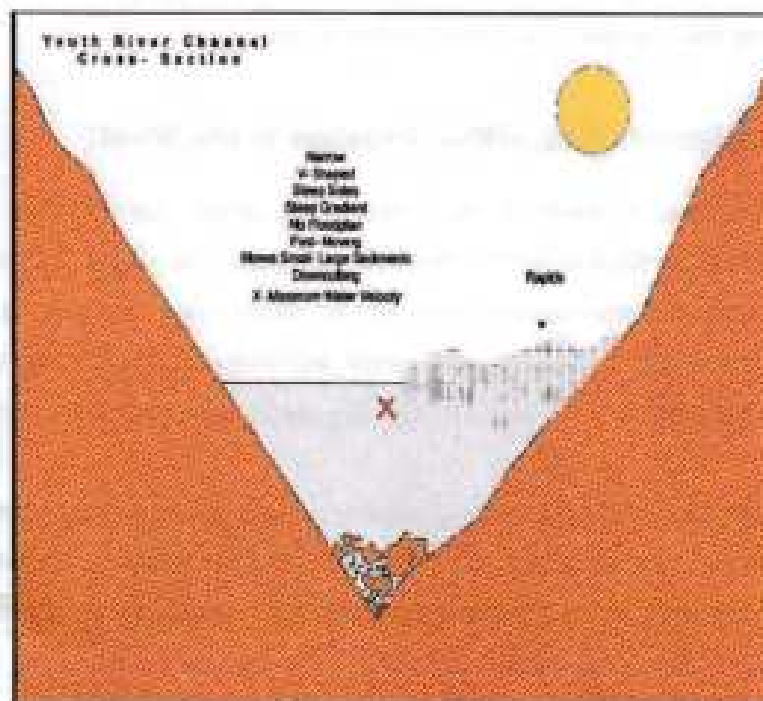


Fig. 6.1: Youth River Channel Cross- Section

6.2.2 Mature River:

Such Rivers down cuts to a much lesser degree than the Youthful Rivers does. They erode laterally but not as extensively as compared to Old Age River. They pass over enough steep landscape that slope of the river creates a velocity capable of moving not only the finer sediments but also larger pebbles and cobbles by way of rolling, bouncing and saltation along the river bed. They may flow through mountainous areas but not as high areas as in case of the Youthful River. The channel of a Mature River is U-shaped, more deep but less wide than Old Age River.

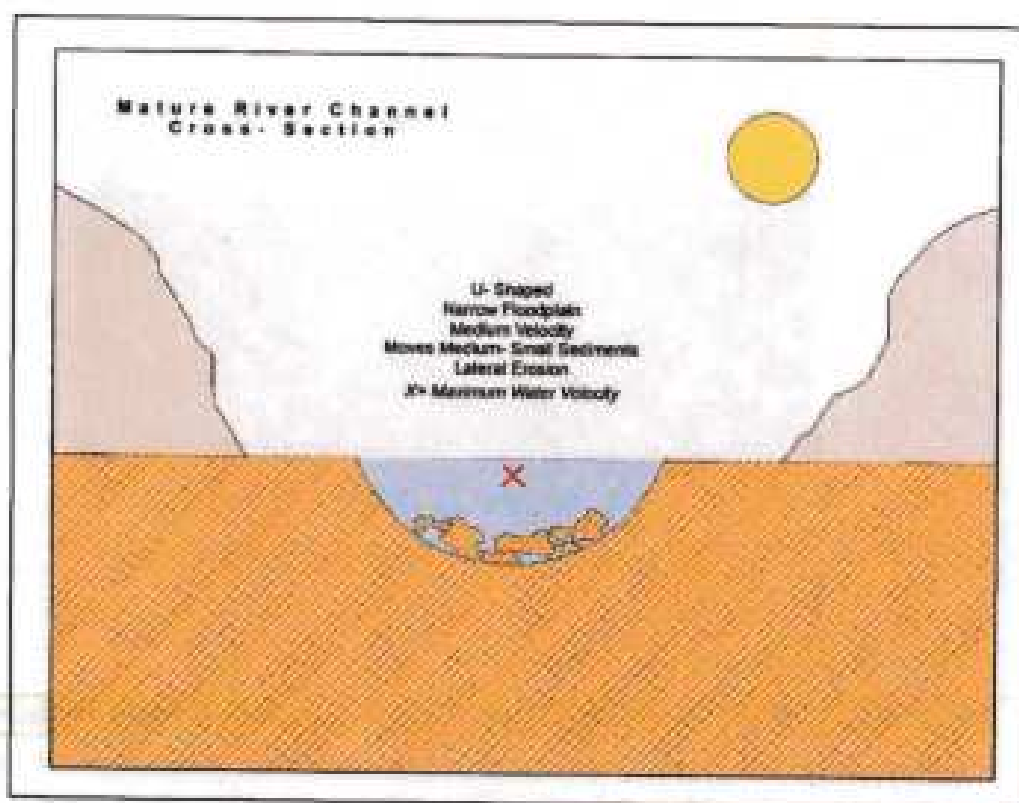
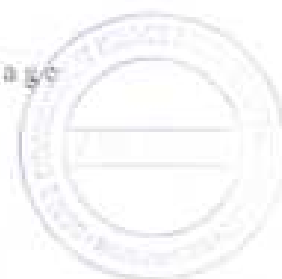


Fig. 6.2: Mature River Channel Cross- Section.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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6.2.3 Old Age River:

An Old Age River rests in an almost flat valley due to many years of erosion that took place over the years. Their course is not straight with widened flood plains. They are the slowest rivers with a high degree of sediments.



Fig. 6.3: Old Age River Channel Cross- Section.

6.3 Sediments Erosion Process in the River:

Sediment erosion in rivers occurs when the force of flowing water detaches and transports particles from the riverbed, banks, or surrounding landscape. The process begins with weathering, where rocks and soil are broken down into smaller particles through chemical, physical, or biological processes. As river flow increases, the energy to erode and transport sediments grows, lifting particles into suspension or moving them as bed load. Erosion occurs through various mechanisms, including abrasion (grinding), attrition (collisions), and hydraulic action (water pressure). The

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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eroded sediments are then transported downstream, eventually depositing at areas of lower energy, such as floodplains, deltas, or ocean basins. The suggested mitigation measures may be riverbank stabilization, afforestation, sedimentation control, watershed management, erosion monitoring etc.

6.4 Typical Particle-size (mm) Distribution Curve:

A stream typically reaches the highest velocity as and when it is close to flooding over its banks (Bank-full Stage). As soon as the flooding stream flows over its banks and occupies the wide area in the flood plain, a larger area becomes available and consequently, the velocity comes down. At this juncture, sediment that was earlier being carried by the high velocity of water gets deposited near the edge of the channel forming a natural bank or levee.

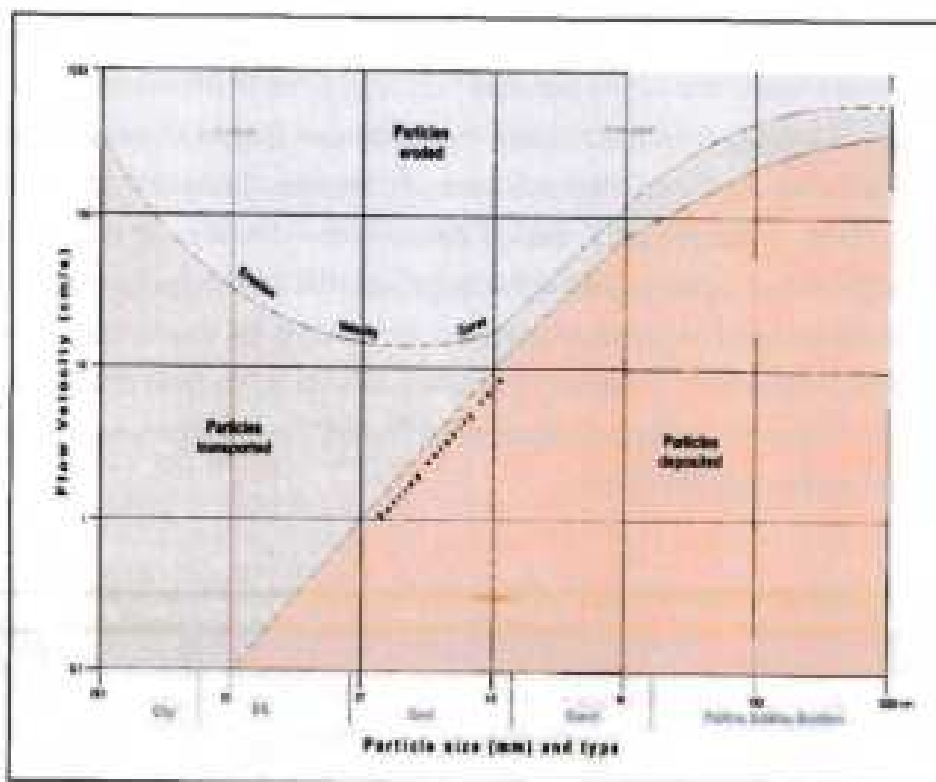


Fig. 6.4: Particle-size (mm) Distribution Curve.

6.5 Drainage Contributing to the Sediment deposition in Lakhimpur

District:

The source of all rivers in the Lakhimpur District is the Arunachal Himalaya. The entire district has a well-defined drainage network.

The major rivers and streams in the district include the Subansiri, Ranganadi, Dikrong and Boginadi. These water bodies play a crucial role in the region's hydrology and agriculture. Overall the drainage network of the area shows an anastomosing pattern. Collectively, the rivers after coming down from hills show a marked tendency to move towards south-westerly direction. This tendency may indicate influence of underlying fracture pattern or this may be due to paleochannels of the Brahmaputra River. Individually, the rivers in the western part of the study area show dendritic drainage patterns and rivers of eastern part show parallel drainage pattern.

A number of rivers enter the area from northeast and northern direction. The Subansiri River, one of the principal tributary of the Brahmaputra flowing through Lower Subansiri district and enters the Lakhimpur District of Assam. All the major drainage, viz., the Kakoi, Boginadi debouches to river Subansiri in the south western part. Before debouching to Subansiri these streams create water logged and marshy condition in the southwest part of the toposheet. The Kawalmari Bill and the Bhimpara Bill are created by these two tributaries of Subansiri in the downstream. The drainage pattern of the area is dendritic. The Subansiri River is the main drainage entering in the area from north-western direction and flowing towards south-eastern direction to meet the Brahmaputra River.

Table: 6.1 Area & length of major rivers drained within Lakhimpur District

Sl No.	Name of River	Area Drained (In Ha)	Length (in km)
1	Subansiri River	16798.03	79.23
2	Ranganadi River	956.93	42.32
3	Dikrong River	1553.17	28.44
4	Kakoi River	183.87	17.36
5	Kananadi River	9.67	2.79

Minerals: Sand, Gravel, Boulder, Ordinary Clay

6	Tranjuli River	4.36	1.40
7	Bogoli River	58.05	5.47
8	Singra River	272.00	25.76
9	Durpang River	24.25	26.24
10	Joyhing River	46.90	6.77
11	Dirgha River	153.77	11.88
12	Baghinijan River	14.81	8.47
13	Baginadi River	390.03	16.90
14	Kimin River	102.59	5.23
15	Ghagar River	40.24	14.67
16	Gabharu River	62.01	9.33

Source: Digitized from Satellite Imagery



CHAPTER 7: GENERAL PROFILE OF LAKHIMPUR DISTRICT

7.1 Introduction:

Lakhimpur is believed to be originated from the word Lakshmi, the goddess of prosperity. The district is mainly dependent upon agriculture and paddy. Paddy is regarded locally as 'Lakhimi'. The word 'pur' means full. Lakhimpur therefore means full of paddy or the place where paddies are grown abundantly. Besides, the soil of the district is alluvial and fertile for which crops flourish without the use of any artificial manure or hard labor.

As per Lakhimpur District Gazette (1976:4), the district was notified as Lakhimpur District through a proclamation issued by then Governor General on July, 1839. On 2nd October, 1971 the district was reorganized with two sub divisions viz. Dhemaji and North Lakhimpur. Later it was again reorganized in the year 1989 with two subdivisions viz. Dhakuakhana and North Lakhimpur leaving Dhemaji as a separate district. The district was earlier regarded as "Koliapani" because there was practically no road communication to this district till 1950. In the year 1954, the temporary aerodrome was started. From 1957 the ASTC buses started plying from Lakhimpur and from 1963 the North East Frontier Railway started train services from this district.

Table 7.1: General Profile of Lakhimpur District

Particular	Statistics
Geographical Area	2277 Sq. km
Geographical Location	26°48' and 27°53' Northern Latitude and 93°42' and 94°20' East Longitude (approx.)
Temperature	Highest Temperature: 34 °C Lowest Temperature: 7 °C
Average Annual Rainfall (mm)	2015 mm
Boundaries	East: Dhemaji district and Subansiri River West: Biswanath district North: Siang and Papumpare districts of Arunachal Pradesh South: Majuli district & river Brahmaputra
District Headquarters	North Lakhimpur
Civil Sub- Division	Two sub-divisions viz. North Lakhimpur and Dhakuakhana

Minerals: Sand, Gravel, Boulder, Ordinary Clay



Development Block	9 nos of Dev. Blocks Viz - Narayanpur (14 nos GP), Bihpuria (4 nos GP), Karunabari (10 nos GP), Naoboicha (10 nos GP), Telahi (6 nos GP), North Lakhimpur (8 nos GP), Boginadi (8 nos GP), Ghilamora (9 nos GP) and Dhakuakhana (12 nos GP) (GP: Gaon Panchayat)
Revenue Circle	7 nos Circles/Tehsils - viz - North Lakhimpur, Kadam, Nowboicha, Bihpuria, Narayanpur, Subansiri and Dhakuakhana.
Municipal Boards	4 nos. viz North Lakhimpur, Bihpuria, Narayanpur and Dhakuakhana
Legislative Assembly Constituency	5 nos LACs, viz, 73-Bihpuria, 74-Rongonadi, 75-Nowboicha, 76-Lakhimpur and 77-Dhakuakhana.
Police Stations	North Lakhimpur Sub-division consists of 6 nos Police Stations viz. North Lakhimpur, Boginadi, Panigaon, Laluk, Narayanpur and Bihpuria. Dhakuakhana Sub Division consists of 2 nos Police Stations viz. Dhakuakhana and Ghilamora.
Airport	Lilabari
Railway Stations	13 nos. viz Harmuti, North Lakhimpur, Tatibahar, Sijuli, Silanibari, Subansiri, Kathal Pukhuri, Tipling, Uttar Kathari, Baginadi, Lilabari and Tanijan.
Number of Villages (As per Census 2011)	1180
Population (As per Census 2011)	Total: 10,42,137 Male: 5,29,674 Female: 5,12,643 Density (per square kilometers): 457 Sex Ratio (No. of female per 1000 male): 965
Literacy Rate	78.22% (rural) and 86.93% (Urban)
Language	Assamese, Missing, Bengali, Sadri, Nepali, Deori and Hindi
Major Physiographic Units	The area can broadly be divided into three parts i.e. the hilly tract, the foothill region and the extensive flood plain created by the river Brahmaputra and its tributaries in southern part. The hilly tracts comprise Siwalik sediments of lesser Himalayas.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Major Drainage	Brahmaputra River, Subansiri river, Ranganadi River and Dikrong River
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(Source: <https://www.lakhimpur.nic.in/Lakhimpur> & Census 2011)

7.2 Infrastructural Facilities and Amenities in Lakhimpur District:

Information on amenities has been provided based on information available in 2011 Census. The Infrastructural facilities and amenities like Education and Health is provided in subsequent paragraphs of this section.

7.2.1 Medical Facilities:

According to the Census-2011, there are 3 Hospitals and 4 Dispensaries/ Health Centres, 3 Family Welfare Centre, 2 Maternity & Child Welfare Centres, 3 Maternity Homes and 2 T.B. Hospitals are present in the district.

Recently, a Medical College is also established in the district.

Table 7.2 Health care Amenities in the District

Medical Facilities, 2009								
Sl. No.	Name of Town	Hospitals (Allopathic & Others)	Dispensaries / Health Centres	Family Welfare Center	Maternity and Child Welfare Center	Maternity Homes	T.B. Hospital/ Clinic	Nursing Homes
1	Narayanpur (TC)	1 Kms.	1(0)	7 Kms.	7 Kms.	7 Kms.	1(0)	54 Kms.
2	Bihpuria (TC)	1(10)	1(0)	1(0)	1(0)	1(10)	40 Kms.	38 Kms.
3	North Lakhimpur (MB)	1(50)	1(0)	1(0)	5 Kms.	1(20)	1(0)	5 Kms.
4	Dhakubhena (TC)	1(30)	1(5)	1(6)	1(0)	1(10)	6 Kms.	5 Kms.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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7.2.2 Educational Facilities:

As per 2011 Census, in the district, the numbers of Primary schools include 77 schools, 48 Govt. Middle Schools, Secondary Schools include 35 schools and Senior Secondary Schools include 17 schools.

Also, there are 7 Arts, Commerce and Science Degree Colleges, 3 Private Vocational Training School/ITI, 6 Government Non-Formal Training Centres and 2 special school for disabled.

Table 7.3 Educational Amenities in the District.

Sr No.	Name of Town	Primary school	Middle school	Secondary school	Senior Secondary school	Arts/ Science/ Commerce colleges (of degree level and above)
1	Narayanpur (TC)	8	4	7	3	1
2	Bihpuria (TC)	8	8	5	4	1
3	North Lakhimpur (MB)	40	18	16	8	3
4	Dhakuakhana (TC)	21	18	7	2	2

7.3 Demography:

According to 2011 census, Lakhimpur district has a population of 1,042,137, roughly equal to the population of Cyprus or US state of Rhode Island.

This gives it a ranking of 435th in India (out of a total of 640).

The district has got a population density 457 inhabitants per square kilometer.

Its population growth rate over the decade 2001-2011 was 17.06%.

Lakhimpur has a sex ratio of 965 females for every thousand males and literacy rate of 78.39% and 8.77% of the population lives in urban areas.

Scheduled castes and Tribes make up 7.85% and 23.93% of the population respectively.



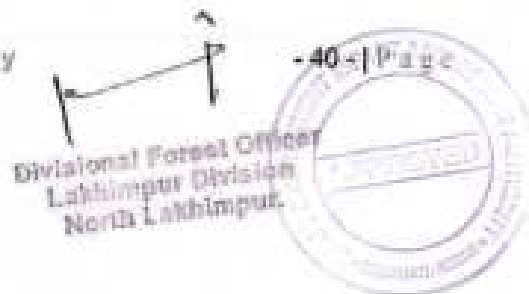
7.3.1 Religion:

According to 2011 census, Hindus - 76.49%, Muslims -18.57%, Christians - 4.43%, Others or not stated - 0.51%, of the population.

7.3.2 Languages:

At the time of the 2011 census, 57.8% of the population spoke Assamese, 17.64% Mishing, 12.96% Bengali, 2.46% Sadri, 2.35% Nepali, 1.21% Deori and 1.17% Hindi as their first language.

Minerals: Sand, Gravel, Boulder, Ordinary Clay



CHAPTER 8: LAND UTILIZATION PATTERN IN THE DISTRICT

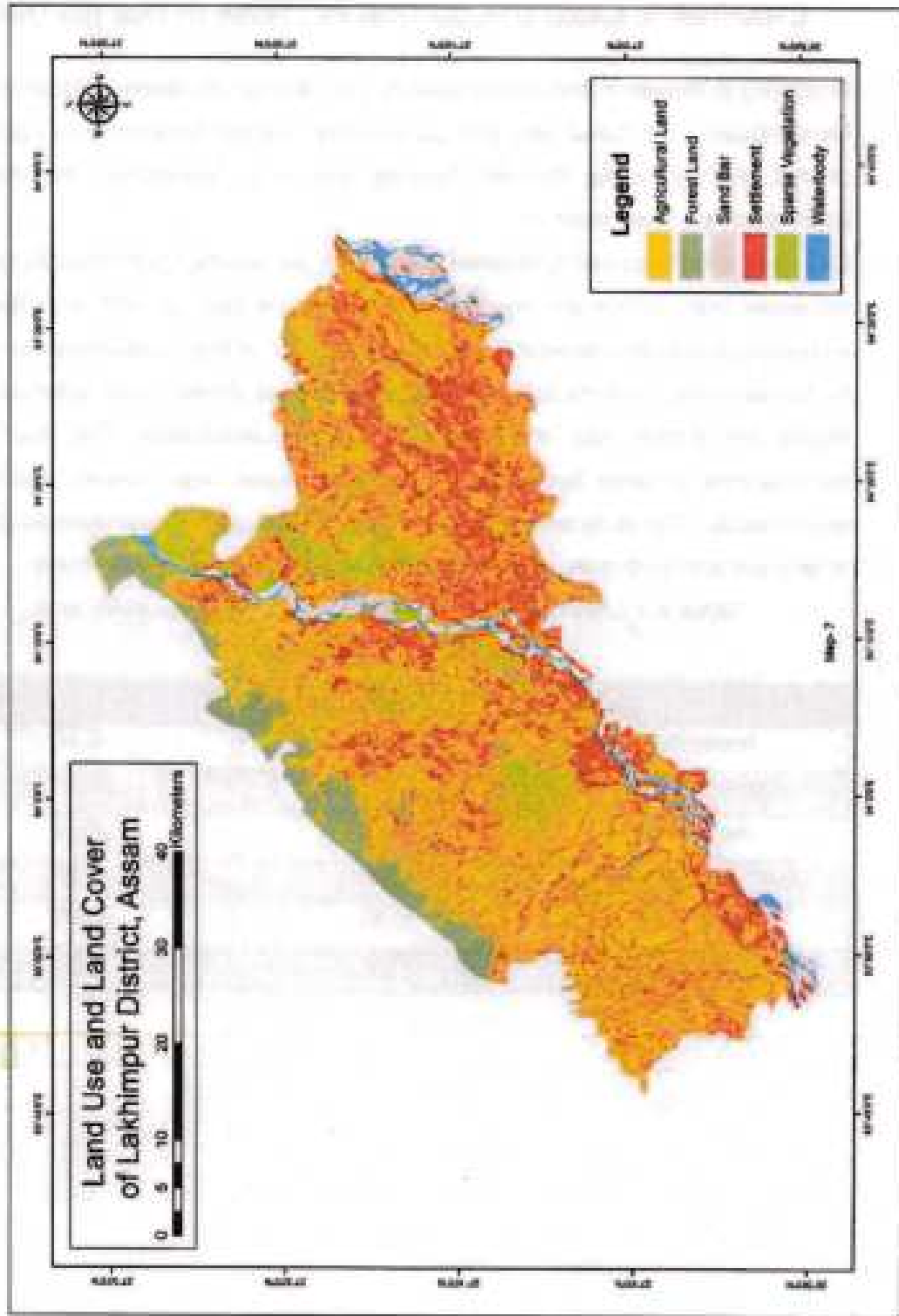
According to Research documents published by Niranjan Bhattacharya and others of Pandu College on "Land Use and Land Cover Change Detections of Lakhimpur District, Assam" using Remote Sensing and GIS Techniques, the following information has been obtained.

Detection of land use and land cover changes for the selected Lakhimpur District has witnessed both positive and negative change over the study of 1998 and 2020. The increasing population demands more things in terms of food, settlement and so on. As human needs have no limitation, it leads to various development activities which results into a rapid rate of urbanization and industrialization. This has led to the clearance of large forest tracts, vegetation cover, water bodies and natural resources etc. The study area Lakhimpur District witnessed several changes in terms of land use and land cover which has negative impacts on its environment.

Table 8.1: Land Use and Land Cover Statistics of the study area
in percentage (1998-2020)

Categories	1998	2020
Water Body	6.77	5.30
Agricultural Land	22.78	31.67
Settlement	10.61	34.30
Sparse Vegetation	15.35	5.54
Sand Bars	7.33	5.85
Total	100	100





Map 8.1: Land use/ Land cover Map of Lakhimpur District.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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CHAPTER 9: PHYSIOGRAPHY & GEOMORPHOLOGY

Physiographically, the area can broadly be divided into three parts i.e. the hilly tract, the foothill region and the extensive flood plain created by the river Brahmaputra and its tributaries in southern part. The hilly tracts comprise Siwalik sediments of lesser Himalayas.

The southern limit of the sub-Himalaya is marked by Himalayan Frontal Fold (HFF). The HFF may be observed near Banderdewa and Harmutti tea garden and further southward almost along Tarajuli – Pisola - Gorubandha track, where the Siwalkik Hills terminate abruptly with steep slope and come in contact with the Brahmaputra plain towards south. Two terrace surfaces have been identified as the Harmutti and Jaysingh surfaces which represent low and high-level terraces. These terrace deposits are characterized by undulating surfaces comprising of boulders, pebbles and quartzitic and gneissic rocks with fine sand, silt and clay act as matrix. The alluvial floodplain consists of younger and older alluvial deposits. It represents various sub-features viz. paleo channel, swampy/marshy land, river terraces, flood plains, point bars, channel bar and river channel. The average altitude in the central and southern flood plain varies from 80 to 85 m above MSL with a very gentle slope throughout. The slope of the entire district drops from the northern and eastern corners towards the south.

The foothill region is characterized by older terrace deposits. Two terrace surfaces have been identified as the Harmutti and Joyhing surfaces which represent high and low level terraces. These terrace deposits are characterized by undulating surfaces comprising of boulders, pebbles of quartzite and gneissic rocks with fine sand, silt and clay act as matrices. The alluvial floodplain consists of younger and older alluvial deposits. It represents various sub-features, viz. paleo channel, swampy/marshy land, and river terraces, flood plains, point bars, channel bars and river channels. The average altitude in the central and southern flood plain varies from 80-85m above MSL with a very gentle slope throughout. The 92 m contour marks the northern limits



of the floodplain area. The slope of the entire district drops from the north and eastern corners towards the south.

A number of rivers enter the area from northeast and northern direction. The Subansiri River is one of the principal tributaries of the Brahmaputra flowing through Lower Subansiri district, Arunachal Pradesh and enters the Lakhimpur district of Assam. Subansiri river flood plain is composed of Quaternary alluvial deposits of Harmutty surface (Formation), Jayhing Surface (Formation), North Lakhimpur Formation and recent floodplain deposits. Deposit of Harmutty surface and Jayhing Surface form the piedmont plain in the north, bordering the southernmost range of Arunachal Himalayas and running, in NE-SW direction, as a narrow strip. North Lakhimpur Formation stands out as an isolated geomorphic high within recent flood plain deposits. Remaining part of the flood plain exposes recent flood plain deposits. This diverse geomorphology makes Lakhimpur a region of significant ecological and agricultural importance.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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CHAPTER 10: CLIMATE AND RAINFALL

The climate of the district is subtropical and humid characterized by high rainfall. The annual rainfall is 3268 mm and relative humidity 74 to 89 percent with a mean of 81 percent. The district receives South-West monsoon rainfall from the month of April and continues up to September/October. The highest rainfall areas of the district are located near the foothills of Arunachal Himalayas, i.e. in the northern part of the district. The maximum temperature goes up to 35°C during June / July and minimum temperature falls to 8°C in December and January.

This district is situated in the eastern part of Assam. The climate of the area is subtropical in nature with hot and humid summer, followed by dry autumn and cold winter. It shows increasing trend from south to north. The area records the maximum temperature of 23°C – 34°C during the summer months, while the months of December and January record the lowest temperature of 7°C – 15°C

Highest Temperature : 34 °C

Lowest Temperature : 7 °C

Table 10.1: Climate Table/ Historical Weather Data of Lakhimpur District

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	18.4	18.5	21.8	24.3	26.2	28.1	28.8	28.8	27.8	25.7	21.4	17.5
Min. Temperature (°C)	10	12.8	16	18.4	22.2	24.8	26.3	26.3	24.4	21.4	15.7	11.2
Max. Temperature (°C)	22.8	24.2	27.7	29.3	30.2	31.7	32.4	32.9	31.5	30	27.1	23.9
Precipitation/ Rainfall (mm)	36	47	112	178	318	318	348	489	444	192	31	22

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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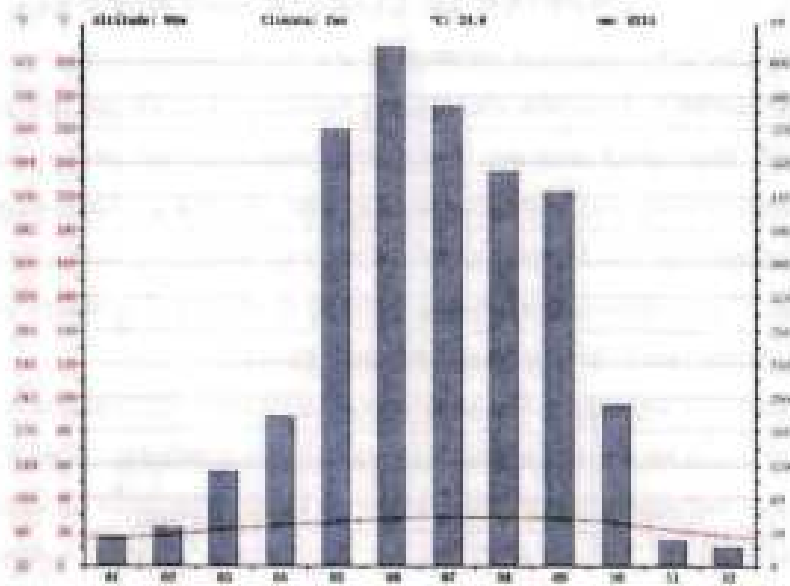


Fig 10.1: Climate Graph of Lakhimpur District

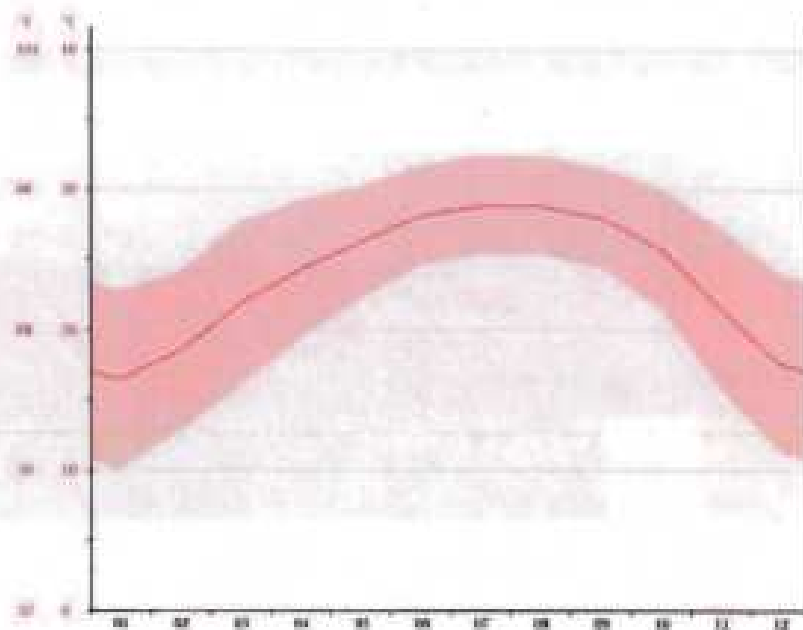


Fig 10.2: Temperature Graph of Lakhimpur District

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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10. 1 Rainfall:

Lakhimpur District recorded 52.5 mm of rainfall on June 2023 which is 147 percent more than the normal of 21.3 mm.

The average humidity is 90% while the average rainfall is 2015 mm.

Heavy downpour from June to September under the influence of south-west monsoon is a common feature of the climate of the region.

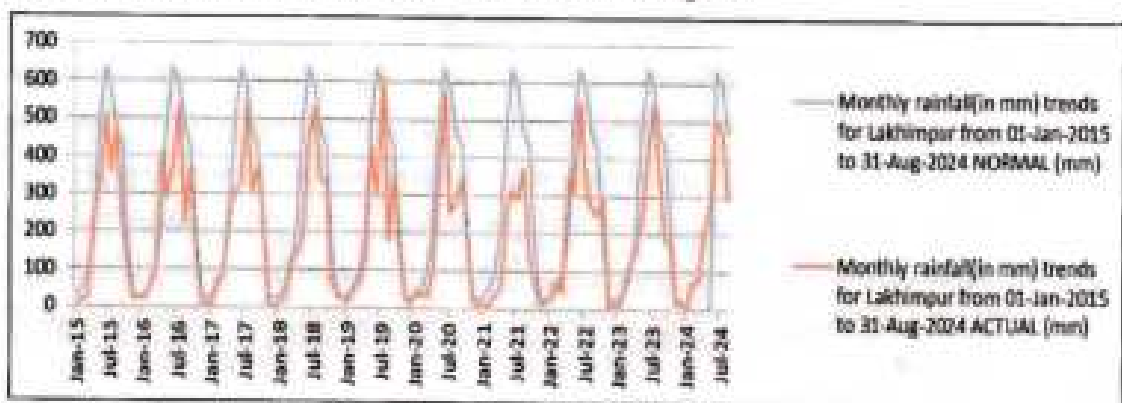


Fig. 10.3: Monthly Rainfall Trend.



CHAPTER 11: GEOLOGY AND MINERAL WEALTH

11.1 Introduction:

The area of Lakhimpur district falls under Survey of India Toposheet No. 83 E/12 (part), 83 E/15 (part), 83 E/16, 83F/13 (part), 83 V2 (part), 83I/3, 4, 6, 7, 8, 11, 83I/12(part) and 83 J/1. The latitude and longitude of the Lakhimpur district are 26°48'00"– 27°53'00" N and 93°42'00" – 94°20'00" E, respectively.

11.2. Geology of Lakhimpur District:

The Lakhimpur District forms part of the Upper Assam Shelf. The northern boundary of the district is marked by Himalayan Frontal Fault (HFF). The Siwalik sediments crop out in the northern fringe area of the district bordering the Arunachal Himalayas where the HFF has passed through the district. The geological succession of the area by Duara and Chatterjee (1972), is as follows:

Age	Formation/Group	Lithology
Recent	Flood Plain	Sand, silt, clay with occasional pebbles, cobbles
Upper Pleistocene	Jayhing Surface (Formation)	Pebbles, grit, coarse to fine sand, silt, silty clay with sand matrix
Pleistocene to Pliocene	Harmutty Surface (Formation)	Boulders, cobbles and pebbles mainly of quartzite, sandstone, gneissic rocks with argillaceous and siliceous matrix.
	Unconformit	
Miocene	Siwalik Group	Sandstones, siltstones, mudstones, shales, conglomerates, etc.

Harmutty Surface: This is the northernmost lithounit of Subansiri flood plain and is overlain by deposits of Jayhing Surface (Formation) to south. It is composed of boulder, cobbles and pebbles, mainly of quartzite, sandstone, gneissic rocks with

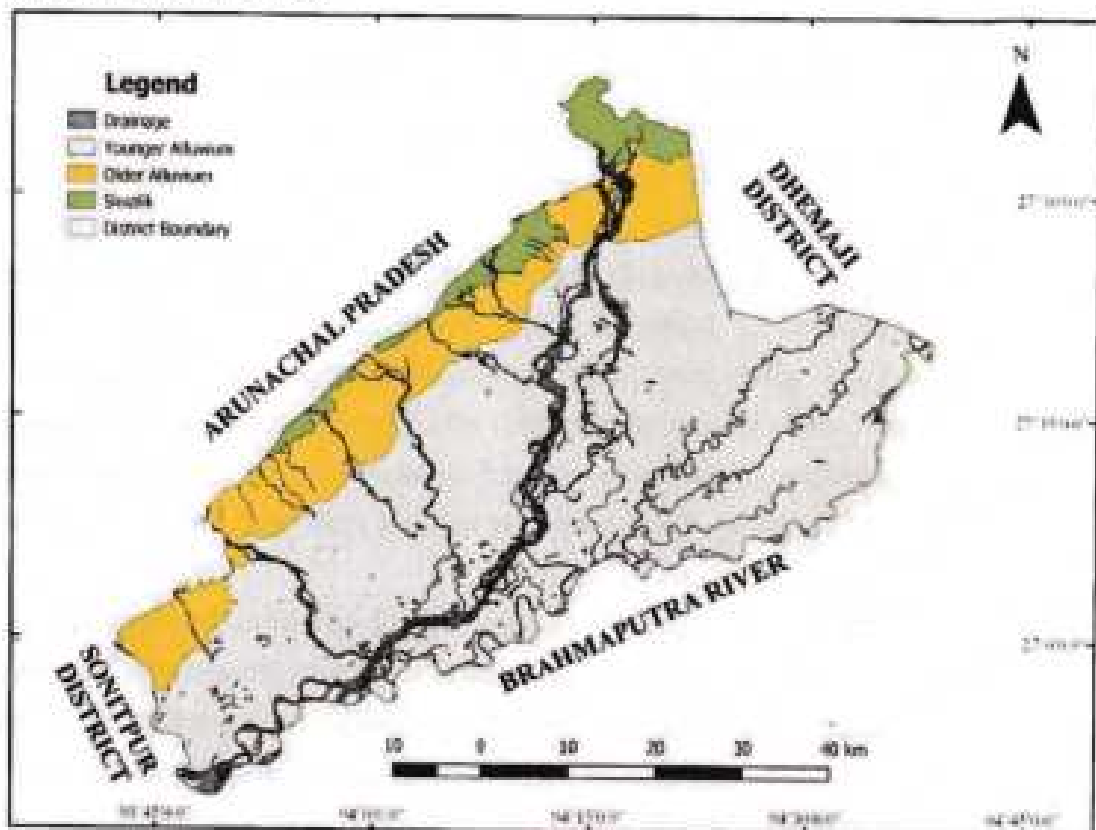
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argillaceous and siliceous matrix and are consolidated. The boulders, cobbles and pebbles are ill-sorted, rounded to subrounded. The top part of the Formation is highly oxidised and shows reddish brown to yellowish colour. It is composed of mainly sand, silt and silty clay. The Formation is well exposed around Harmutty, Diyu and Ananda (Pathalipam) Tea Estate.



Map 11.1: Geological map of Lakhimpur District

Jayhing Surface: Jayhing overlies Harmutty Formation lying to south of the former. This consists of pebbles, grit, coarse to fine sand, silt, clay with sandy matrix. These are semiconsolidated. This does not show any oxidation. Deposits of this Formation slope southward and merge with recent flood plain deposits. These are exposed in Jayhing Tea Estate, south of Diyu Tea Estate, Lilabari, Sionbari Tea Estate and in the section of Kakoi nala.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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North Lakhimpur Formation: This is composed of silt, silty clay and this is compact. This occurs as an inlier within recent flood plain deposits. This is exposed around North Lakhimpur, Bordebam Tea garden and Ghilamara. This does not show any oxidation.

Recent Flood Plain Deposit: The Recent flood plain deposits include both channel deposits and overbank deposits. The Channel deposit comprises Point bars, channel bars and Channel fill deposits. The overbank deposits include natural levee and backswamp deposits.

1. **Point bar deposit:** These are composed of sand and are built at places, up to the level of flood plain.
2. **Channel bars deposit:** These are mostly triangular in shape and these are composed of mainly ill sorted boulders, cobbles, pebbles of quartzite, sandstone with sandy matrix, gneisses in foot hills region. Some of these bars bear a thin blanket of fine sand, silt and clay and are partially stabilised by vegetation. Channelbars, situated further downstream, are mainly composed of sand and silt. These are highly unstable and have a tendency to shift from season to season.
3. **Natural Levee deposit:** These consist of various combinations of silt, silty sand, silty clay forming an impervious top stratum. These overlie the underlying pervious sandy horizon. These are formed by deposition of successive overbank flows. These constitute bulk of the recent flood plain deposits.
4. **Backswamp deposit:** These are formed by vertical accretion of suspended materials in flood basin and are composed mainly of silty clay and clay. These are finely laminated and interbedded. They are characteristically rich in organic materials and are formed behind natural levee deposits.
5. **Channel fill deposit:** These consist mainly of bed load sand, having a top horizon of silt, silty sand and silty clay in variable proportion, formed by vertical accretion. Presently these are under extensive cultivation and hence are not traceable on ground. These represent palaeochannels or remnants of old abandoned channels entirely filled up by sands.



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Subansiri river flood plain is well known for its placer gold occurrences since ancient times. Investigation for the prospect of placer gold in palaeochannels of Subansiri Flood Plain was carried out by Directorate of Geology and Mining, Assam and Geological Survey of India. It is quite difficult to locate palaeochannel on the ground for placer gold targeting, as the flood plain is under extensive cover of cultivation. Pit sampling of some palaeochannels demarcated in the flood plain by photointerpretation and test panning of those alluvial samples were done to check the incidence of placer gold in the said channels.

All the major drainage, viz., the Kakoi, Bagi nadi emerges to river Subansiri in the south western part. Before emerging to Subansiri these streams create water logged and marshy condition in the southwest part of the toposheet. The Kawaimari Bill and the Bhimpara Bill are created by these two tributaries of Subansiri in the downstream. The drainage pattern of the area is dendritic. The Subansiri River is the main drainage entering in the area from north-western direction and flowing towards south-eastern direction to meet the Brahmaputra River. So, Kawaimari beel, Chumani beel, Chakamara beel, etc. are some of the surface water bodies in the area.

Reference:

1. Duara, B. K. and Chatterjee, B.P. (1972): The Subansiri basin. Fluvial processes Geomorphology and Geology, "Contributions to Geomorphology and Geohydrology of the Brahmaputra Valley. G.S.I., Publications. Misc. 32, 1977.
2. <https://www.gsi.gov.in/webcenter/portal/OCBIS>
3. https://www.cgwb.gov.in/old_website/District_Profile/Assam_districtprofile.html
4. Gupta, A.D. and Biswas, A.K., 2000. Geology of Assam. GSI Publications, 2(1)

11.3 General Stratigraphy:

The Assam lies along the continuation of the Archeans of Bihar and comprises Garo, Khasi, Jaintia hills and to its north-east is the detached area of Mikir hills. Tertiary rocks are well developed in the north-eastern and south-eastern part where they exhibit a more or less complete geological succession ranging from Paleocene

to Lower-Pleistocene. The generalized stratigraphic succession of Assam is as follows:

Age	Group	Formation	Description of Litho units	
Quaternary	Recent		Khadar-newer alluvium	
	Unconformity			
	Pleistocene		Bhanger- Older alluvium	
Unconformity				
Tertiary	Pliocene	Dihing	Dihing	
			Pebble bed, sandy clay, clay, conglomerate and sand stone	
	Mio-Pliocene		Dupitla (Surma Valley) & Namsang (Upper Assam)	
			Sandstone, mottled clay, grid, conglomerate bed	
	Unconformity			
	Miocene	Tipam	Girujan	Mottled clay, sandy shale & sandstone
			Tipam	Bluish gray to greenish sandstone, clay, shale, conglomerate etc.
		Surma	Bokabil	Shale, Sandy shale, sandstone etc.
			Bhuban	Alteration of sandstone, sandy shale & conglomerate.
	Unconformity			
Oligocene	Barail	Tikok Parbat	Banded sandstone with thick coal seams	
		Bogolai	Sandstone & shale with numerous thin coal seams, carbonaceous shale, sandstone etc.	
		Naogaon	Thin bedded hard sandstone with shale	
Eocene	Disang		Dark grey shale & sandstone	
		Jayantia	Kopli	
			Sylhet sandstone	Shale, sandstone etc.
		Sylhet Limestone	Sandstone, coal, clay & shale	
			Fossiliferous limestone	
Unconformity				
Mesozoic	Jurassic		Volcanic	
			Trap, basaltic & doleritic rock	

Minerals: Sand, Gravel, Boulder, Ordinary Clay



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Unconformity				
Palaeozoic	Permian	Gondwana	Singimari	Buff coloured fine grained sandstone, shale, carbonaceous shale with coal & conglomerate etc.,
Unconformity				
Proterozoic	Precambrian	Shillong		Granite, pegmatite, alternating bes of clay, quartzite, phyllite, basalt conglomerate etc.
Unconformity				
Azoic	Archean	Gneissic		Granite, pegmatite, metadolerite, amphibolite, biotite, hornblende, gneiss, calc granulite, pyroxenite etc.

(Regional geology is based on Miscellaneous Publication No.1 of Directorate of Geology and Mining, Government of Assam)

11.4 Mineral Resources:

The Lakhimpur District is poor in mineral resources. The Great Subansiri River has legends of once famous gold washing. But as of now, there is no major exploration of minerals in the district, except some minor exploration for petroleum by ONGC near Dhakuakhana. Minor minerals like river bed sand; stone boulders etc. are often exploited. Details of Mining Permit Areas and Mining Contract Areas in Lakhimpur Division have been indicated in following pages.

Adequate infrastructural facilities such as land, industrial accommodation, power, water, financial institutions etc. reduce the investment risk and attract the prospective entrepreneurs to set-up new industrial ventures. As far as infrastructure facilities are concerned, the Lakhimpur District is poorly reflected in the industrial field. There is no large and Public Sector undertaking industries in the district.

The district is rich in traditional artisan talents, particularly in the field of art of Endi silk worm rearing, Eri co-coon spinning and weaving, handloom, cane, bamboo Works.

Agricultural and allied sector like livestock, poultry and pisciculture is the prime occupation of the people living in the district.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Registered Industrial units	526
Registered Medium and Large unit ...	3
Average no. of daily workers in SSI	391
Employment in large and medium Industries	360

(Source: Brief Industrial Profile of Lakhimpur District, Ministry of MSME, Govt. of India)

11.5 Soil/ Silt/ Clay:

The district's soil is primarily alluvial, supporting extensive agricultural activities. The region also has areas of forest land, sparse vegetation, and water bodies. The silt/ clay is available in the river bed. The soils of the district can broadly be classified into the following groups:

1. **Red Loamy Soil:** These are found in the northern border of the district. Type of this soil develops in the hilly slopes under high rainfall conditions. This soil is characterized by low nitrogen, low phosphate and medium to high potash. pH is acidic.
2. **Lateritic Soil:** The lateritic soils are the product of high leaching and found in hilly region. pH of soil is acidic due to intensive leaching of bases and formation of clay materials and ferric hydroxides. The lateritic soil is characterized by brick red to brownish red color and poor plant nutrient.
3. **New Alluvial Soils:** The new alluvial soils are found in the flood plain area and are subjected to occasional floods and consequently receive considerable silt deposit after the flood recedes. These are yellow to yellowish grey in colour and are admixtures of sand, silt and clay in varying proportions. Mineral weathering and geo-chemical changes are normal. But incipient changes in the top layer have been noticed due to biological activity.
Soil pH is feebly alkaline and moderately rich in plant nutrient.
4. **Older Alluvial Soil:** It develops at higher levels and practically unaltered alluvium representing a broad spectrum of sand, silt and humus rich clay depending on landform. The soils are comparatively more acidic than the newer alluvial soil and hence more crop sensitive. The soils of the district as classified by NBBS and ICAR, Nagpur are: Udalfs - Orchapts - Acquepts, Fluvent - Aquepts, Aquepts - Aqualfs - Fluvent.

Major Soils	Area (.000 Ha)	Percent (%) of Total
1 Sandy Soil	33.97	16.19
2 Sandy loam	121.73	70.83
3 Other type of soil	40.37	15.18

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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CHAPTER 12: SURFACE WATER AND GROUND WATER SCENARIO OF LAKHIMPUR DISTRICT

12.1 Hydrogeology:

The Lakhimpur District can be divided into two hydrogeological units viz. Semi-consolidated and unconsolidated formations based on geology and hydrogeological character. The semi-consolidated formation is composed of Neogene Siwalik Group of rocks bordering the northern boundary of the district. The Siwalik rocks are not suitable for ground water development. The major water bearing formations include alluvial sediments in foothills and flood plain that constitute the unconsolidated formation. The piedmont zone extends over 8-10 km from the foothill, which is laterally followed by younger flood plain area extending up to northern bank of the Brahmaputra River in the south the railway line roughly marks the southern boundary of the piedmont zone (Bhabar Belt). The alluvial formations in the foothills are composed of sand, pebble, cobble and boulders. These materials have high permeability. In the flood plain area, little gravel mingles with different grades of sand. Major water bearing formation comprises of sand, gravel and pebbles.

Pre-monsoon depth to water level during 2012 was 1.59 to 5.33 bgl.

Post-monsoon depth to water level during 2012 was 0.39 to 3.60 bgl.

Long term water level trend during 2001 to 2010 (In m / year)

Post-monsoon WL of 59% of GWMS indicate a declining trend of 0.017 to 0.298 meter per year and 41% of GWMS indicate a rising trend of 0.005 to 0.139 meter / year.

12.1.1 Shallow Aquifer:

The water bearing horizons occur within 30-50 mgbl is considered to constitute shallow aquifer system. Ground water in this aquifer occurs under unconfined to semi confined conditions. The aquifer materials comprise sands of different grades with varying proportions of gravels. The grain size of the aquifer materials is found to decrease towards the southern part of the district. The semi-confining layers are not persistent throughout the district. The top-confining layer is consisted of clay with

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interlayer sand and its thickness varies from 15m to nearly 1m. The lower confining layer is generally 3m thick and is not regionally extensive.

12.1.2 Deeper Aquifer:

In the deeper aquifers, ground water occurs under semi-confined to confined conditions. The upper confining layer is generally 3 m to 9 m thick. The aquifer materials are composed of sands and gravels of different size grade. In this district, CGWB and NER had explored the subsurface down to the depth of 200m in Panigaon and Jalukata areas. The cumulative thickness of the granular zones in the deeper aquifer varies from 60m to 150m. There is a clear distinction of grain size of aquifer materials in the northern, southern and western part of the district. Presence of multi-aquifer system in the western part of the district around Dholpur, Narayanpur is deciphered from lithologs.

The confining layers are not persistent. However, towards east, around Panigaon and Dhakuakhana areas, single aquifer zone is found down to the depth of 130 mgbl. The grain size of the aquifer material increases towards south i.e. towards the foothill.

12.2 Depth of Water Level:

CGWB is monitoring 20 ground water wells (GWW) in Lakhimpur District. During 2012, pre-monsoon depth to water level varied from 1.59 to 5.33 m bgl and post monsoon depth to water level varied from 0.36 to 3.60 m bgl.

During pre-monsoon period, about 50% of GWW stations showed water level below 3 m bgl. During post-monsoon period about 10% of GWW stations showed water level above 3 m bgl and rests showed water level below 3 m bgl.

The study of the water level data has revealed that the general fluctuation of water table during pre- and post-monsoon is in between 0 to 2 m in plain area and more than 2 m in areas adjacent to river Dikrang. The major parts of the gross rise in water table during April to July dissipates quickly. Low ground water fluctuation in the area is due to to low ground water draft and rapid ground water movement through the



aquifer where by and large scale draft at one place is compensated by ground water recharge from other places.

Long term ground water level trend for post-monsoon period (Nov. 2001 to 2010) shows that 7 (41%) GWMS indicate rise in water level whereas 11 (59%) GWMS indicate fall. Rise in water level ranges from 0.005 to 0.139 meter per year while fall in water level ranges from 0.017 to 0.298 meter per year.

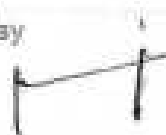
12.3 Ground Water Movement:

As mentioned earlier, the district is bounded in the north by Arunachal Himalayas and in the south by Brahmaputra River. Evidently, the ground water flow direction is from the higher elevation in north towards the plain area in the south. In the western part of the district, the ground water flow is from northwest to southeast. Whereas in the central and eastern part (around Dhakuakhana and Ghilamara area) of the district, the flow is almost north – south. The highest water table is 110 m above mean sea level in the flood plain area towards south. In general, the gradient of flow is high towards west as compared to the gradient in the eastern part. In the northern foothill region, the water table gradient is steeper (1.5m / km) and it forms the recharge zone for the entire district.

12.4 Water Level Fluctuations:

The study of the water level data has revealed that the general fluctuation of water table during pre and post-monsoon is in between 0 to 2 m in plain area and more than 2 m in areas adjacent to river Dikrang. The major parts of the gross rise in water table during April to July dissipates quickly. Low ground water fluctuation in the area is due to low ground water draft and rapid ground water movement through the aquifer where by and large scale draft at one place is compensated by ground water recharge from other places.

Minerals: Sand, Gravel, Boulder, Ordinary Clay



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12.5 Long Term Water Level Trend:

Long term ground water level trend for post-monsoon period (Nov, 2001 to 2010) shows that 7 (41%) GWMS indicate rise in water level whereas 11 (59%) GWMS indicate fall. Rise in water level ranges from 0.005 to 0.139metre/year while fall in water level ranges from 0.017 to 0.298 metre/yr.

12.6 Ground Water Resources:

The dynamic ground water resources estimation of Lakhimpur District has been calculated as per GEC-97 methodology.

Almost entire District is occupied by unconsolidated alluvial sediments, except the hilly areas in the northern part. 65sq.km of hilly area has slope greater than 20% district and this area is excluded from resource calculation as this area is not likely to contribute to groundwater recharge. There is no command area in the district. So entire district has been considered as non-command area and calculation was done for non-command area only. The bottom of the unconfined aquifer is found within 10 to 20mbgl. The total annual ground water recharge of the district estimated as 1,30,597ham. An allowances of 5% of the total was kept for natural discharge and the Net Ground Water Availability in the district has been worked out as 117537ham. The gross yearly ground water draft has been calculated for irrigation, domestic and Industrial uses (Table 4.2). The gross ground water draft for irrigation use during 2009 has been calculated considering the fourth census data of 2006-07 and projected 2% per year. Total number of shallow tube wells are 1758. The annual unit draft of 2.6 ham per tube well has been taken for irrigation purposes. The drafts for domestic and industrial uses are computed by considering the water requirement and dependency on ground water sources. The population figures were collected from Census, 2011. The per capita domestic requirement for the rural population has been considered as 60 lpcd and for urban population, it is 135 lpcd. The dependency on ground water resource for domestic and industrial water supply in rural areas is considered as 90% and for urban areas, the dependency is 50%. The total annual draft calculated for the



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district was 128.76mcm where irrigation draft is 105.98mcm and domestic and industrial draft is 22.78mcm respectively.

Table 12.1 Ground Water Resources Potential of the Lakhimpur District
(as on 31st March 2009)

Total Geographical Area	Area available for recharge	Recharge from rainfall (ham)			Recharge from other sources (ham)			Total Annual Ground Water Recharge (ham)	Natural Discharge (ham)	Net ground Water Availability (ham)
		Mons oon	Non-Mons oon	Total	Mons oon	Non-Mos oon	Total			
227700	227700	80114	48773	128887	3385	856	4214	133128	13313	119815

The net annual ground water availability in the district is to be apportioned between domestic, industrial and irrigation uses. Among these as per the National Water Policy, 2003 requirement for the domestic water supply has been given maximum weightage. The allocation for domestic and industrial water supply up to year 2025 has been worked out to be 32.14 mcm. The balance ground water resources for future irrigation use are 1060.03 mcm. Thus the balance available is 1198.15, mcm.

12.7 Ground Water Quality:

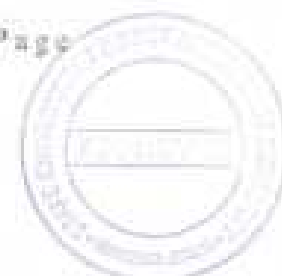
Water samples were collected from Ground Water Monitoring Stations (GWMS) of the district for assessing the chemical quality of ground water and determining the suitability for drinking and irrigation purposes.

From the chemical analysis data of ground water samples, it can be said that the ground water of dug well of the district is slightly acidic to slightly alkaline (pH= 5.83 to 7.11). Electrical conductance (EC) of ground water varies from 89 to 473 detectable limit. However, in Panigaon, Dolonghat Chariali and Kadam GWMS fluoride content are 0.44, 0.18 and 0.11 mg/l respectively, which are within permissible limit. Iron content generally varies from 0.13 to 6.98 mg/l. It is observed

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that iron content is generally high in permanently water-logged areas like Bhogpur Chariali, Bihpuria and Kadam. As per the information available in National Rural Drinking Water Mission, there are 354 habitats affected by iron contamination (source: <http://indiawater.gov.in/NRDMIS> Report).

Table 12.2 Additional Potential Recharge under Specific of the Lakhimpur District (In ham)

District	Potential Recharge		Total Annual Potential G.W. Recharge
	Water logged and shallow water table	Flood prone area	
Lakhimpur	84249	1571	858820

12.8 Ground Water Management Strategy:

The district can be divided into three sectors based on the subsurface geology and yield potential of different groundwater abstraction structures. This division will help to formulate rational and judicious plan for groundwater development in the district.

Sector I: This unit is characterized by unconsolidated sand and gravel of Quaternary alluvium. Sand is fine to coarse and gravel size ranges from granule to pebbles. The grain size decreases southwards. This unit is fairly thick and regionally extensive. The aquifers are unconfined to semi-confined and shallow tube wells down to the depth of 30 to 50mbgl with 30-35m³ /hr yield capacity are feasible. The recommended distance between two shallow tube wells is 200m. Deep tube wells are feasible down to the depth of 200m tapping an average cumulative thickness of 30-35m aquifer with yield 50 to 300m³ /hr for a drawdown of less than 5m. The minimum distance between two adjacent well should not be less than 1000m. In this sector, deployment of rotary or reverse rotary rig is advisable for construction of deeper tube wells.



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Sector II: The aquifers in this sector are discontinuous but thick. The aquifer materials in this unit are comprised of unconsolidated materials of gravel, sand and clay. Gravel size ranges from granule to boulder. The aquifer has very high hydraulic conductivity value. Occurrence of bouldery materials at shallow depth make this unit unsuitable for the construction of shallow tube wells. Deep tube wells are feasible down to the depth of 100-120mbgl, tapping an aquifer thickness of 20-30m. The yield of tube wells are expected to be 40 to 100m³ /hr for drawdown more than 5m. Percussion or combination rig are necessary for construction of deep tube wells.

Sector III: This unit comprises the hilly area and covered by forest and is not suitable for ground water development.

12.9 Water Conservation and Artificial Recharge:

In Lakhimpur district, the foothill region is suffering from sustainable supply of water particularly in lean period. Various types of water conservation structures can be constructed in the foothill regions after conducting a thorough feasibility study. However, in the flood plain area rain water-harvesting structure may be constructed to harvest rainwater for domestic/ drinking uses as also for its use as source water. 10 Since post monsoon water level in this hydrogeologic unit is less than 3mbgl, artificial recharge is not feasible.

12.10 Ground Water Related Issues and Problems:

The area has high Ground Water Resources potential with a net Ground Water availability of 1198.15 mcm. Nearly 37% of the district is under water logging condition throughout the year where there is no sign of water level decline for a decade. The chemical analysis of the water samples collected from the GWMS and established key wells has revealed that the chemical parameters are well within the permissible limits specified by BIS (2003) except high concentration of iron which ranges from 0.16 to 3.76 mg/l in most of the areas. As per information available in National Rural Drinking Water Mission, there are 354 habitats affected by iron contamination.

12.11 Area Notified by CGWB/SGWA:

No area was notified by CGWB or SGWA.

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12.12 Mass Awareness Campaign on Water Management Training Programme by CGWB:

12.11.1 Mass awareness programme (MAP) & Water Management Training programme (WMTP) by CGWB: CGWB has not organized any Mass Awareness (MAP) and Water Management Training Programme (WMTP) in the district.

12.11.2 Participation in Exhibition, Mela, Fair etc.: In the district ground water related exhibition, mela, fair, etc. are not organized.

12.11.3 Presentation & Lectures delivered in public forum/ Radio/ T.V./ Institution of repute/ Grassroots associations/ NGO/ Academic institutions etc.

(Source: "Ground Water Information Booklet Lakhimpur District, Assam" by Central Ground Water Board North Eastern Region, Ministry of Water Resources, Guwahati, November 2013)

12.13 Recommendations:

a. The alluvial tracts of Lakhimpur district form prolific aquifers. Only a scanty amount of the district vast ground water resources are in use for various purposes. Therefore, plan should be formulated for optimum exploitation of this ground water resource which will boost the agricultural economy of the district.

b. The net ground water resource available for future irrigation is estimated to be 1122.93MCM. For optimum utilization of this resource, different ground water abstraction structures can be constructed. Shallow tube wells are feasible large part of the district. If the annual average unit ground water draft for one shallow tube well is considered to be 0.03 MCM then 37431 shallow tube wells are feasible in the district. Construction of these shallow tube wells will irrigate nearly 74862 Ha lands, if the command area created by one shallow tube well is considered to be 2Ha. Construction of deep tube wells should also be emphasized to tap the static ground water resources. However, caution must be exercised in maintaining the spacing norms.

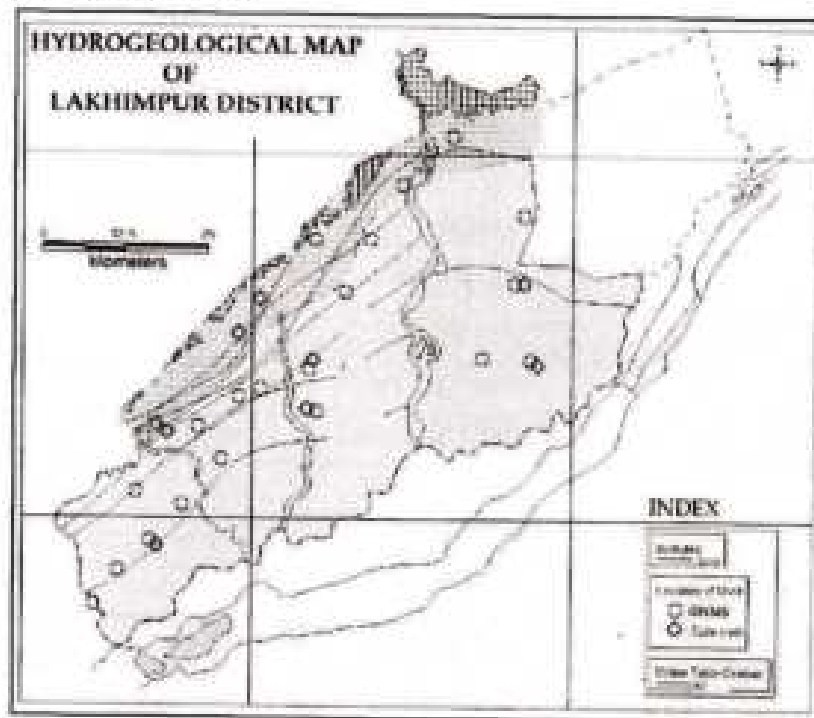
c. Construction of large diameter dug wells, dug-cum-bore wells and deep tube wells are more suitable in the foot hill region for ground water development. 11 Percussion or reverse rotary rig can be deployed to construct deep tube wells of 100-150 depth.

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- d. A considerable area of the district is under water logging condition. To mitigate this problem lowering of water table is very much essential and for this additional number of tube wells should be constructed. Lined irrigation canals should be planned.
- e. Various types of water conservation structures can be constructed in the foothill regions after conducting a thorough feasibility study. People should be encouraged to construct low cost rainwater harvesting structures especially in the iron-affected areas. In Lakhimpur district, it is generally observed that groundwater in the water-logged areas are high in iron.



Map 12.1: Hydrogeological Map of Lakhimpur District.

(Source: "Ground Water Information Booklet, Lakhimpur District, Assam" by Central Ground Water Board, North Eastern Region, Ministry of Water Resources, Guwahati, November 2013)

CHAPTER 13: DISTRICT DETAILS

13.1 Identification of Rivers and Permit/ Contract Areas within Lakhimpur District:

Table: 13.1 Total number of Existing (operational & non-operational) Permit/ Contract Areas within Lakhimpur District.

Sl No.	Name of River	No. of Permit/ Contract Areas
1	Subansiri River	9
2	Ranganadi River	9
3	Dikrong River	12
4	Kakoi River	2
5	Kananadi River	2
6	Tramjull River	1
7	Bogoli River	2
8	Singra River	2
9	Durpang River	2
10	Joyhing River	1
11	Dirgha River	1
12	Baghinijan River	1
13	Dhekia Nala	1
14	Baginadi	1
15	Ghagor	1
Total		47

13.2 Description of individual Rivers:

13.2.1 Subansiri River:

The Subansiri River originates in the Himalayas from Polty Lake in Tibet and flows through Arunachal Pradesh and Assam, India, stretching approximately 435 km. The river gets its name from the fact that gold was mined from the sand of the Subansiri in ancient times. It was also known as Saraswati or Pathaswasti. It's the largest

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tributary of the Brahmaputra River, joining it in Assam. The river forms scenic gorges, valleys, and supports hydroelectric projects, including the Subansiri Lower Dam. The total area of the Subansiri basin is 37,000 Sq. km. Out of this, 10,000 sq. km. falls within Assam and Arunachal Pradesh. The maximum and minimum flows of the river measured at Chauldowa Ghat are 18,799 cubic meters per second and 130 cubic meters per second respectively. The total length of the river is 520 km. The slope of the river is gradually decreasing from 60 cm per km to the south in the foothills.

The main tributaries of this river are Ghagor, Boginodi, Kakoi, Somdiri and Dhol.

13.2.2 Ranganadi River:

This is a very ancient river that flows right through Lakhimpur District. The river is mentioned in the literature of the Vedic period. The Ranganadi mentioned in the Rig Veda and the Somsana River in the Kalika Purana of later times are thought to be the present Ranganadi River.

The source of the Ranganadi is a high mountain called Khorenputu (27°30' N latitude., 93°16' E longitude.) near the western border of the Lower Suwansiri district of Arunachal Pradesh. Ranganadi River basin covers an area of 2170 sq km in Arunachal Pradesh and 766 sq. km in Assam. The total length of the river is 145 km. The slope of the river from the south of the hill to the highway is 5.8 cm per km. 2.36 cm per km from there to the Brahmaputra. According to measurements taken in different years, the river carries an average of 807 to 562 cubic meters of water per second annually. Most of the large-sized sand is found on the banks of the rivers. The Ranganadi has a more stable course than other rivers. The river carries an average of 1380 hectares of flooded sediment annually.

13.2.3 Dikrong River:

The Dikrong River originates in the Chengkeng Geka Mountains (27°13'N, 93°12'E) on the south-western border of Upper Subansiri district of Arunachal Pradesh, and flows through Papum Pare and Lower Subansiri districts. Stretching approximately 95 Km at Arunachal Pradesh, it's a major tributary of the Subansiri River.

The total length of the Dikrang River is 128 Km. Its basin covers an area of 1462 Sq Km in Arunachal Pradesh, and 288 Sq. Km in Assam. According to data from 1955

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to 1959, the flow of water through the river ranged from 434 to 1180 cubic meters per second. The average annual discharge from 1974 to 1993 is 81.21 cubic meters per second.

13.2.4 Kakoi River:

The Chipa and Gangu rivers originate in the southern mountains of Lower Subansiri district of Arunachal Pradesh and each of them flow for about 8 kms. The river flows southeast wards and before entering Assam, they are merged and take the name Kakoi River. It crosses the railway line near Lilabari Tea Estate and flows 13 km in the same direction. Kakoi River crosses the National Highway near Kadam Kachari village. Here the Gam River merges with the Kakoi River which flows parallel to the Kakoi River through the Siajuli and Lilabari Tea Estates. The river flows in the same direction from the highway for about 2 km and falls into the Baginadi River at the south of Kavaimari Beel.

13.2.5 Kananadi River:

Originating from Arunachal Pradesh, Konanadi is a tributary of Ghagor river, flow in north west- south east direction. The majority of the time, the river is almost constantly dry because its water flows under the sand and gravel of the river. Hence the name of the river is Kana River.

13.2.6 Tramjuli River:

The Tramjuli River originates in the Hills of Arunachal Pradesh, India. It flows through Lakhimpur District of Assam before merging with the Durpang River near Tramjuli village. Stretching approximately 30 km, it supports irrigation, agriculture and fishing.

13.2.7 Bogoli River:

The Bogoli River originates in the Eastern Himalayas of Arunachal Pradesh. Flowing through Papum Pare district, it merges with the Subansiri River. Approximately 60 km long, it supports local agriculture, fishing, and irrigation. One of the major tributary of this river is Torasinga.

13.2.8 Singra River:

Singra River is flowing east of Pabho river. The Pechi River originates near Pechi in the lower settlements of Arunachal Pradesh and flows south with the Engrajuli stream

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on the right bank and becomes the Singra River. From there it flows eastwards and enters the plains south of the Ranga Reserved Forest of Assam. The river flows south 3 km east of the inter-state border. At this place, a stream breaks into the Red River and flows eastwards under the name of Singra.

After flowing about 1 Km, it reaches a place called Shingra. Its river flows southeast for 3 Km. They are located in the western part of the Chinibari Tea Estate. The river crosses the railway line on the right bank of a stream east of Kanthalpukhuri railway station. From there it is flowing about 3 Km and crosses the NH at Dolouhat. From the highway, the river flows southeast and reaches Shalmari. From there, head south for 5 km. Arriving at Dharampur, it merges with Pabho River. The Singra River was formerly known as Balijan.

13.2.9 Durpang River:

The Durpang River flows from the mountains of Arunachal Pradesh and enters Assam in the plains along the right bank of the Kalajuli (a tributary of the Singapu River). On the way, it takes Sonamjuli stream on the left bank and reaches Durpang. From there, turn southeast for 6 km and merges with Pichola River.

13.2.10 Joyhing River:

The Joyhing River originated in the foothills of Arunachal Himalaya in Papumpare district and travels approximately 7.5 Km in Assam. In Assam, it flows in between Kollamri Tea Estate and Joyhing Tea Estate and finally merges with the Ranganadi river at the backside of Lakhimpur College of Veterinary Sciences.

13.2.11 Dirgha River:

Originating in the hills of Arunachal Pradesh, the river enters Kakoi Reserve Forest. Then it flows about 7 Kms and merges with the Boginadi near No.2 Senchowa gaon.

13.2.12 Ghagar River:

Ghagar River is a major tributary of the Subansiri River. Originated in Aunachal Himalaya, it enters Assam in Dullung Reserved Forest. It crosses NH near Ananda Tea Estate. After crossing the NH it flows about 3 Kms and is merged with Konadi, a major tributaries of Ghagar, and flows towards south. After covering a distance of

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about 12 Km, it finally merged with Subansiri River near Baligaon. During its course, many tributaries like Boginadi, Padumoni, Kadam, Dhol, Somdiri etc. Before merging with Subansiri River, this river flows through Kadam reserved Forest.

13.2.13 Dhekia Nala:

It is a small river, flowing in between Ranganadi and Joyhing Rivers. It flows along the Joyhing Tea Estate. This river is originated in the Upper Jumi Area of Arunachal Pradesh near the Assam Arunachal Pradesh interstate border. Dhekia Nala joins the Ranganadi and Joyhing River near the Lakhimpur College of Veterinary Sciences. This confluence of Ranganadi, Joyhing River and Dhekia Nala is locally called "Lakshmi Do" and is believed to be a holy place at the Lakhimpur District.

13.2.14 Boginadi River:

Boginodi originates from Dulung Reserved Forest. Two large streams from this forest merge near Bogonodi Beat office and take the name Boginodi. It crosses the railway line near Karambam and reaches Ratanpur. Then Dingha River merges with this river and reaches Boginadi town. Then it flows towards south and some tributaries of this river like Bidia, Kadam, Kakol, and finally merge in Ghagar river.

13.2.15 Baghinijan River:

Baghinijan is a seasonal river, flows during the monsoonal season. The river is completely dried up during the other part of the year. It is originated from the Arunachal Himalaya and enters Assam inside the Dulung Reserved Forest. The channel merges with Kananadi river in the paddy fields near the Bakulbari village.

13.2.15 Gabharu River:

Gabharu river originates from the foothills of Arunachal Pradesh. It enters Lakhimpur District near Kachajuli Beat area of Ranga Reserve Forest. After flowing about 9.33 km in the district, it ends in a paddy field near Laluk after crossing Ratanpur, Madghabpur and Tunijan Villages.

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13.3 Description of Mining Permit/ Contract Area (river wise)

Table 13.2: Status of mining Permit/ Contract Areas (river wise) (Existing & Proposed)

Sl. No.	River Name	No. of Mining Permit/ Contract Area (existing & proposed)	No. of Mining Permit/ Contract Area (Operational)	No. of Mining Permit/ Contract Area (Non-Operational)	New Mining Permit/ Contract Area (Proposed)
1	Subansiri River	13	4	5	4
2	Ranganadi River	10	4	5	1
3	Dikrong River	20	2	10	8
4	Kakoi River	2	1	1	0
5	Kananadi River	2	0	2	0
6	Tramjuli River	1	0	1	0
7	Bogoli River	2	1	1	0
8	Singra River	2	0	2	0
9	Durpang River	2	0	2	0
10	Joyhing River	1	1	0	0
11	Dirgha River	2	0	1	1
12	Ghagar River	2	0	1	1
13	Dhekia Nala (part of Ranganadi River)	1	0	1	0
14	Baginadi River	2	1	0	1
15	Kimin River	1	0	0	1
16	Baghinjan	1	0	1	0
17	Gabharu	2	0	0	2
Total:		66	14	33	19



13.4 Description of Individual Mining Permit/ Contract Area:**13.4.1 Description of Mining Permit/ Contract Areas in Subansiri River:**

Table 13.3: Details of Subansiri River

Sr No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Subansiri River in the district	16798.03	100	0
2	Area already granted in the Subansiri River	111.07	0.66	0.66
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	2.64	0.02	0.68
6	Area not recommended for future Quarry Permit/ Contract Area grant due non-availability of un-mined block	0	0	0

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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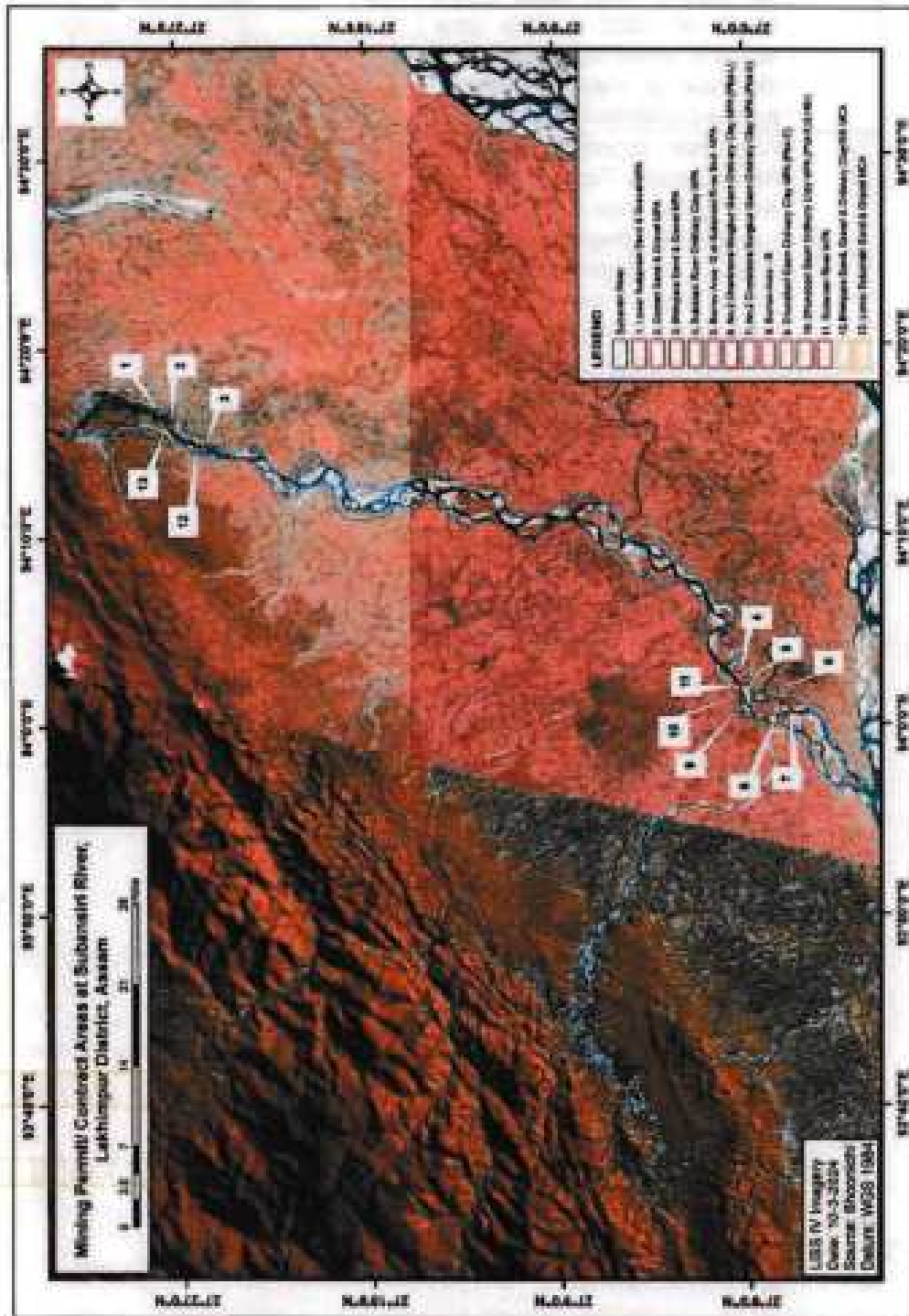


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	50 meters with after every block of 1000 meters over which is undertaken or at such distance as may be directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco-sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	No	-	-

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Map 13.1: Map showing Mining Permit/ Contract Areas within Subansiri River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Table 13.4: Details and Status of Individual Mining Permit/ Contract Areas of Subansiri River

Sl No.	Name	Name of Mineral	Area In Ha.	Area Mining in Ha.	Period (in Year)	Operational/ Non-operational	Coordinate	
							Latitude	Longitude
1	Lower Subansiri Sand & Gravel MCA	Sand & Gravel	24.0	24	7	Operational	N27° 27' 55.14"	E94° 15' 41.34"
							N27° 27' 51.54"	E94° 15' 46.68"
							N27° 27' 23.52"	E94° 15' 17.40"
							N27° 27' 19.02"	E94° 15' 21.30"
2	Bhimpara Sand & Gravel MPA	Sand & Gravel	2.5	2.5	2	Non-operational	N27°25'45.56"	E94°14'58.40"
							N27°25'47.15"	E94°14'54.80"
							N27°25'41.07"	E94°14'50.75"
							N27°25'39.11"	E94°14'54.22"
3	Gomari Nala Sand, Gravel & Boulder MPA	Sand, Gravel & Boulder	3.0	2.97	2	Operational	N27°27'17.70"	E94°16'3.30"
							N27°27'20.06"	E94°16'6.41"
							N27°27'16.89"	E94°16'9.27"
							N27°27'14.81"	E94°16'6.17"
4	Bhimpara Sand, Gravel & Ordinary Clay/ Silt MCA	Sand, Gravel & Ordinary Clay/ Silt	9.0	7.5	7	Operational	N27°26'15.60"	E94°15'18.20"
							N27°26'15.60"	E94°15'13.70"
							N27°26'2.80"	E94°15'13.80"
							N27°26'8.17"	E94°15'15.65"
5	No.2 Chenimora Kongkur Gaon Ordinary	Ordinary Clay/ Silt	39.43	39.43	2	Non-operational	N26°58'12.85"	E94° 1'20.23"
							N26°57'51.22"	E94° 1'14.81"
							N26°57'32.89"	E94° 0'57.60"

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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	Clay MPA (Plot-K)						N26°58'1.16"	E94° 0'57.18"
6	Subansiri River Ordinary Clay MPA	Ordinary Clay/ Silt	21.58	21.58	2	Non- operational	N27.007858°	E94.045176°
							N27.004515°	E94.038464°
							N27.002094°	E94.042004°
							N27.007094°	E94.047173°
7	No.2 Chenimora Kongkur Gaon Ordinary Clay MPA (Plot-L)	Ordinary Clay/ Silt	2.64	2.64	2	Non- operational	N26°58'32.02"	E94° 1'53.68"
							N26°58'42.66"	E94° 1'54.22"
							N26°58'40.83"	E94° 1'48.29"
							N26°58'43.26"	E94° 1'46.09"
8	Dhunabari Gaon Ordinary Clay MPA (Plot-E)	Ordinary Clay/ Silt	5.03	5.03	2	Non- operational	N27°0'10.30"	E94° 1'0.10"
							N27°0'14.95"	E94° 1'5.93"
							N27°0'8.56"	E94° 1'11.34"
							N27°0'4.56"	E94° 1'4.93"
9	Dhunabari Gaon Ordinary Clay MPA (Plot- F,G,H&I)	Ordinary Clay/ Silt	3.89	3.68	2	Operational	Plot F	
							27° 0' 26.690" N	94° 1' 22.120" E
							27° 0' 24.990" N	94° 1' 23.060" E
							27° 0' 25.680" N	94° 1' 26.500" E
							27° 0' 28.040" N	94° 1' 25.180" E
							Plot G	
							27° 0' 28.700" N	94° 1' 25.730" E
							27° 0' 30.750" N	94° 1' 28.920" E
							27° 0' 28.000" N	94° 1' 27.530" E
							27° 0' 27.950" N	94° 1' 31.030" E
							Plot H	
							27° 0' 31.840" N	94° 1' 29.900" E
							27° 0' 32.710" N	94° 1' 33.450" E
							27° 0' 30.210" N	94° 1' 35.980" E
							27° 0' 29.010" N	94° 1' 31.580" E
							Plot I	
27° 0' 33.150" N	94° 1' 34.610" E							
27° 0' 35.250" N	94° 1' 37.670" E							
27° 0' 32.680" N	94° 1' 39.700" E							
27° 0' 30.500" N	94° 1' 37.090" E							

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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**Table 13.5: Details of Individual Mining Permit/ Contract Areas of Subansiri River
(New Mining Area proposed)**

Sr No.	Permit area details	Name of Mineral	Area allotted in Ha.	Coordinate	
				Latitude	Longitude
1	Lower Subansiri 1.5 Ha Sand & Gravel MPA	Sand & Gravel	1.5	27° 27' 40.340" N	94° 16' 21.460" E
				27° 27' 43.693" N	94° 16' 25.411" E
				27° 27' 47.640" N	94° 16' 30.060" E
				27° 27' 48.420" N	94° 16' 28.910" E
				27° 27' 45.409" N	94° 16' 24.928" E
				27° 27' 41.730" N	94° 16' 20.360" E
2	Borrow Area-R	Ordinary Clay/ Silt	4.95	26° 58' 21.641" N	26° 58' 21.641" N
				26° 58' 25.831" N	26° 58' 25.831" N
				26° 58' 32.391" N	26° 58' 32.391" N
				26° 58' 26.351" N	26° 58' 26.351" N
3	Subansiri River MPA	Ordinary Clay/ Silt	4.02	27° 0' 12.527" N	94° 2' 5.540" E
				27° 0' 18.420" N	94° 2' 9.565" E
				27° 0' 21.617" N	94° 2' 3.938" E
				27° 0' 16.612" N	94° 1' 59.449" E
4	Borrow Area "Q" At Subansiri River Bed	Ordinary Clay/ Silt	3.56	27° 0' 0.410" N	94° 2' 25.130" E
				27° 0' 6.329" N	94° 2' 30.019" E
				27° 0' 9.281" N	94° 2' 24.832" E
				27° 0' 3.409" N	94° 2' 20.630" E

Subansiri river area in the district is 16798.03 Ha and area already granted in the River is 111.07 Ha. The riverbed is having a total of 9 mine Permit/ Contract Areas. Out of 9, 2 areas are of mineral-Sand & Gravel, 1 area each of is Sand, Gravel & Boulder and Sand, Gravel & Ordinary Clay and rest 5 are of mineral Ordinary Clay. Out of these 9 Mining Permit/ Contract, 4 areas in the operational condition and 5 areas are in non-operational condition. 4 new areas are identified for future mining project for sand, gravel and Ordinary Clay. No cluster is applicable in the Subansiri River bed.

On the basis of distance criteria, Go- zone and No-Go zone has been identified. Total Go zone area is 122.46 Ha (inclusive of 4 proposed area) and No-Go zone area is 2.64 Ha. No area falls within 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 upstream side and

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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. 1 (one) area falls within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads. Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below (with extraction path).



Minerals: Sand, Gravel, Boulder, Ordinary Clay

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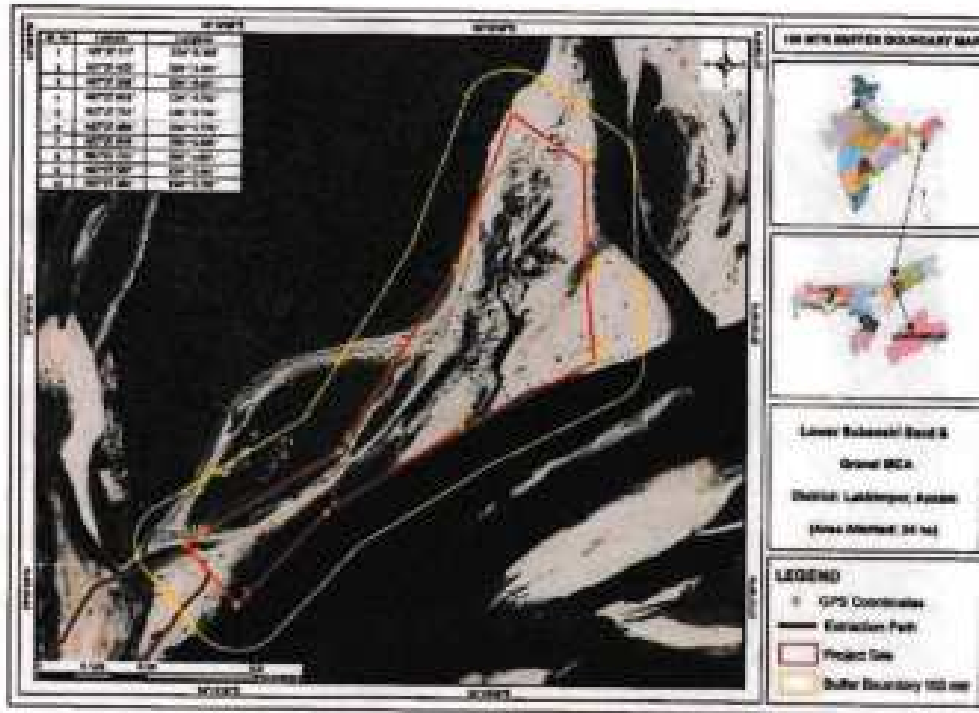


Fig. 13.1 A Lower Subansiri Sand & Gravel MCA, 100m buffer map (Google Image)

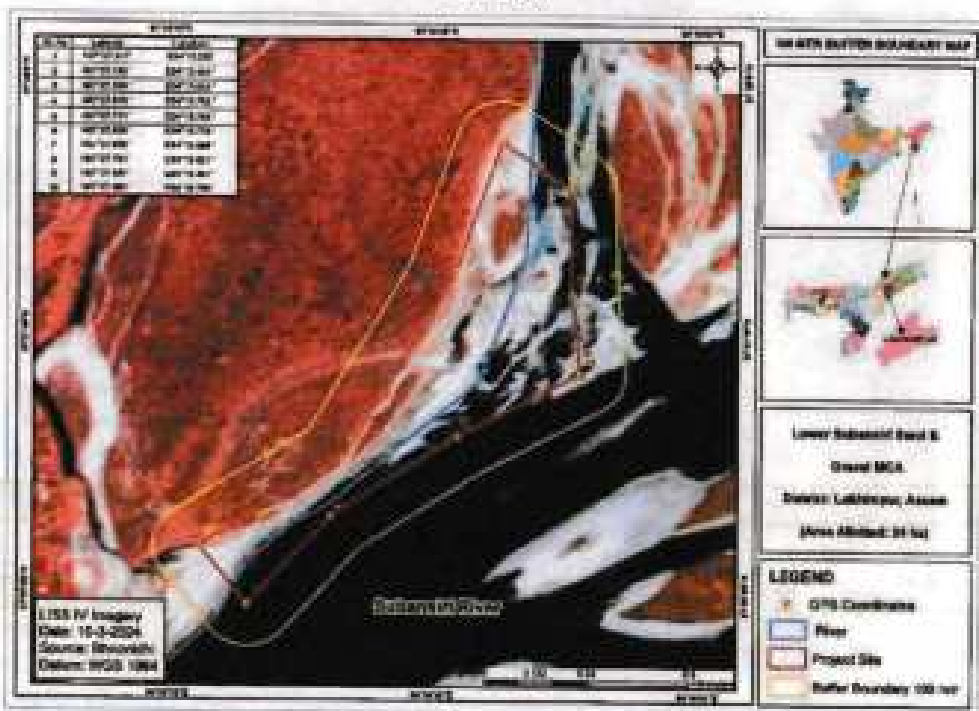


Fig. 13.1 B Lower Subansiri Sand & Gravel MCA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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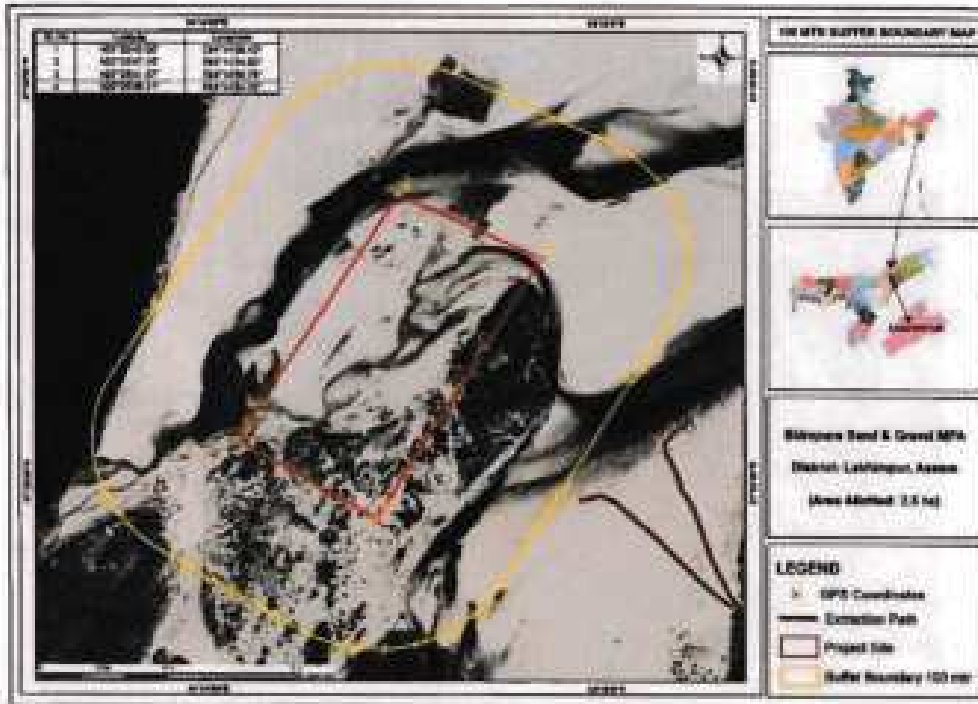


Fig. 13.2 A Bhimpara Sand & Gravel MPA, 100m buffer map (Google Image)

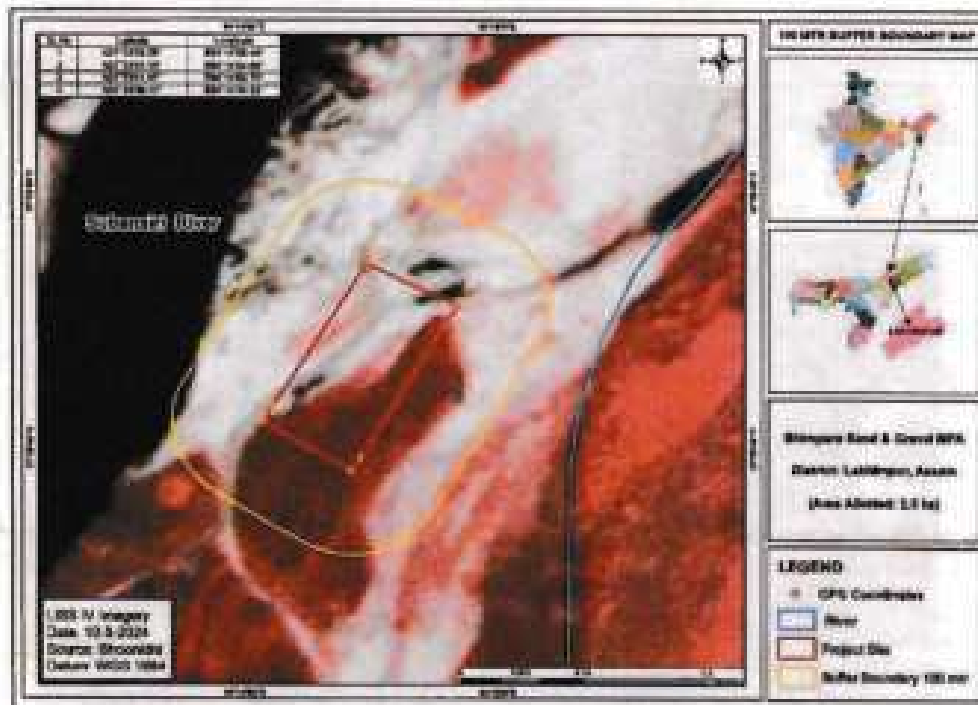


Fig. 13.2 B Bhimpara Sand & Gravel MPA, 100m buffer map (Satellite Image)

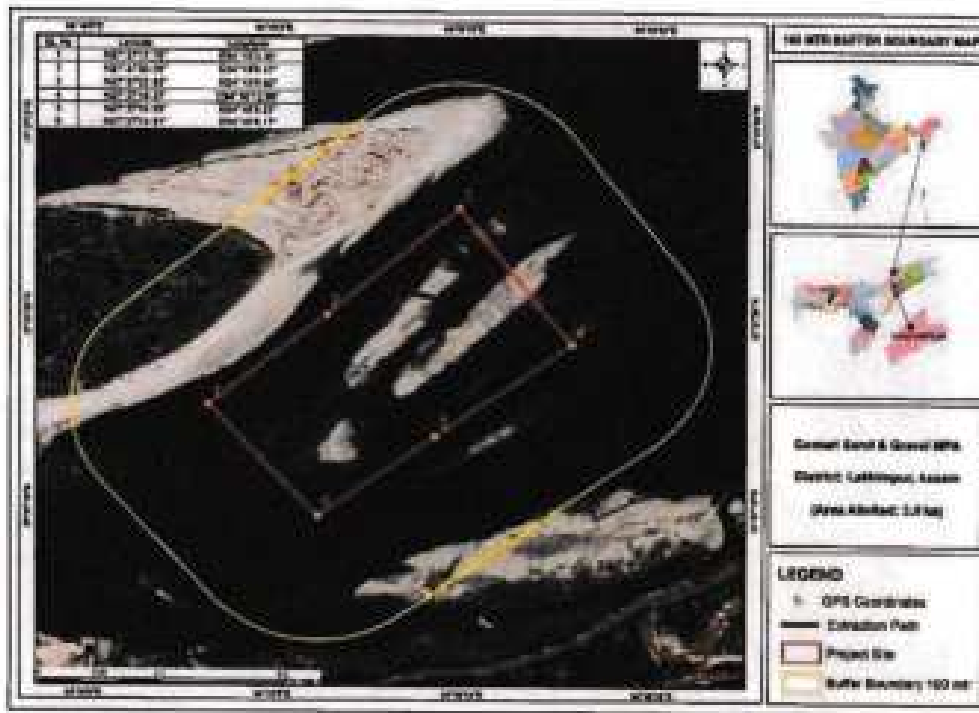


Fig. 13.3 A Gomari Nala Sand, Gravel & Boulder MPA, 100m buffer map (Google Image)

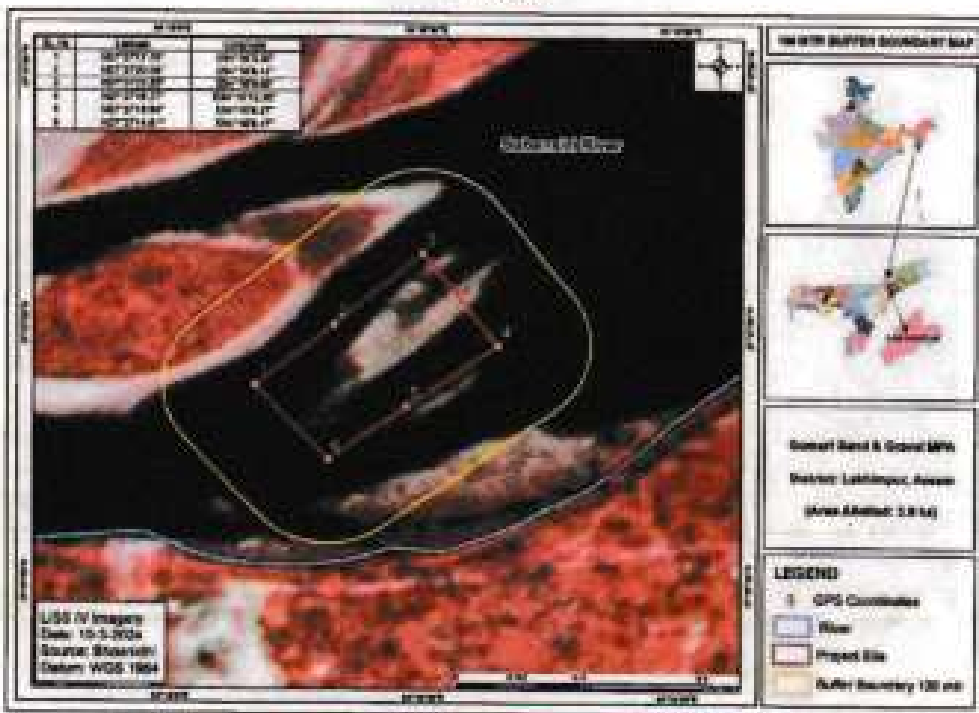


Fig. 13.3 B Gomari Nala Sand, Gravel & Boulder MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay


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Fig. 13.4 A Bhimpara Sand, Gravel & Ordinary Clay/ Silt MCA, 100m buffer map (Google Image)

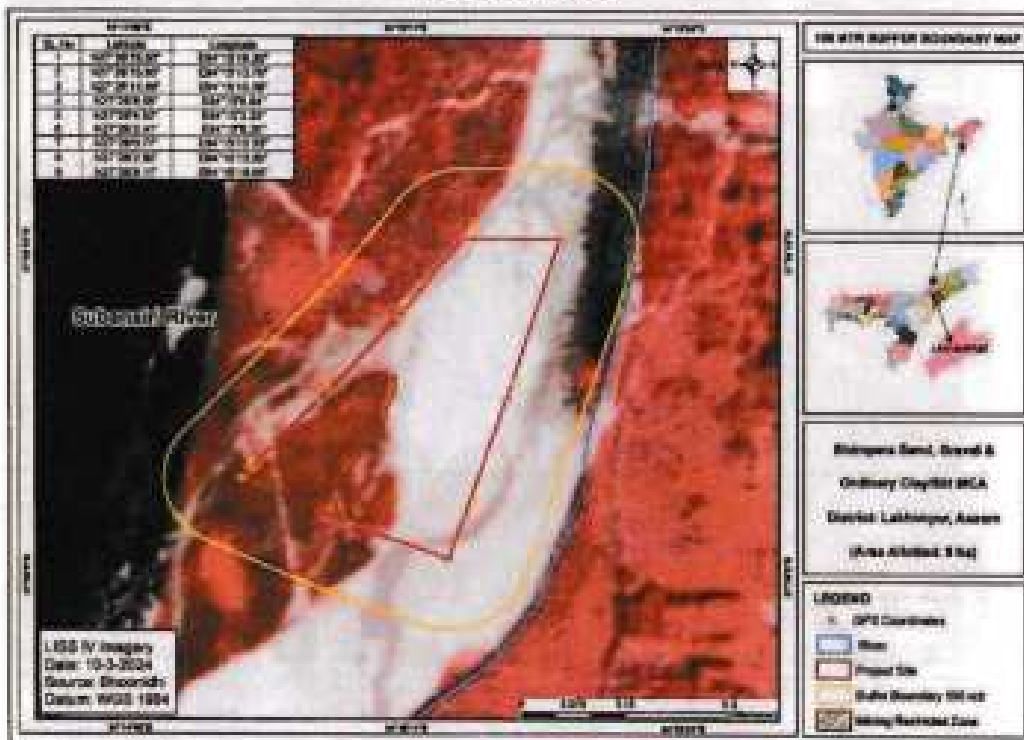


Fig. 13.4 B Bhimpara Sand, Gravel & Ordinary Clay/ Silt MCA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

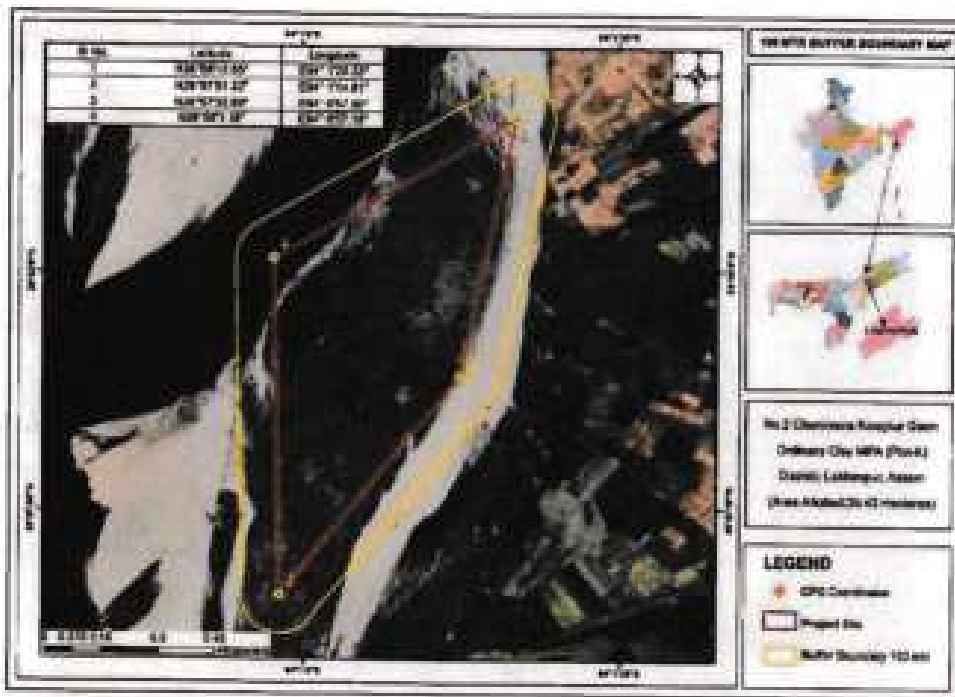


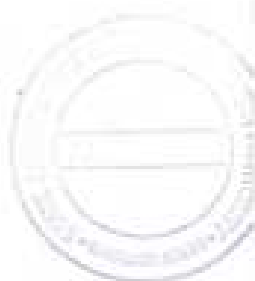
Fig. 13.5 A No.2 Chenimora Kongkur Gaon Ordinary Clay MPA (Plot-K), 100m buffer map (Google Image)



Fig. 13.5 B No.2 Chenimora Kongkur Gaon Ordinary Clay MPA (Plot-K), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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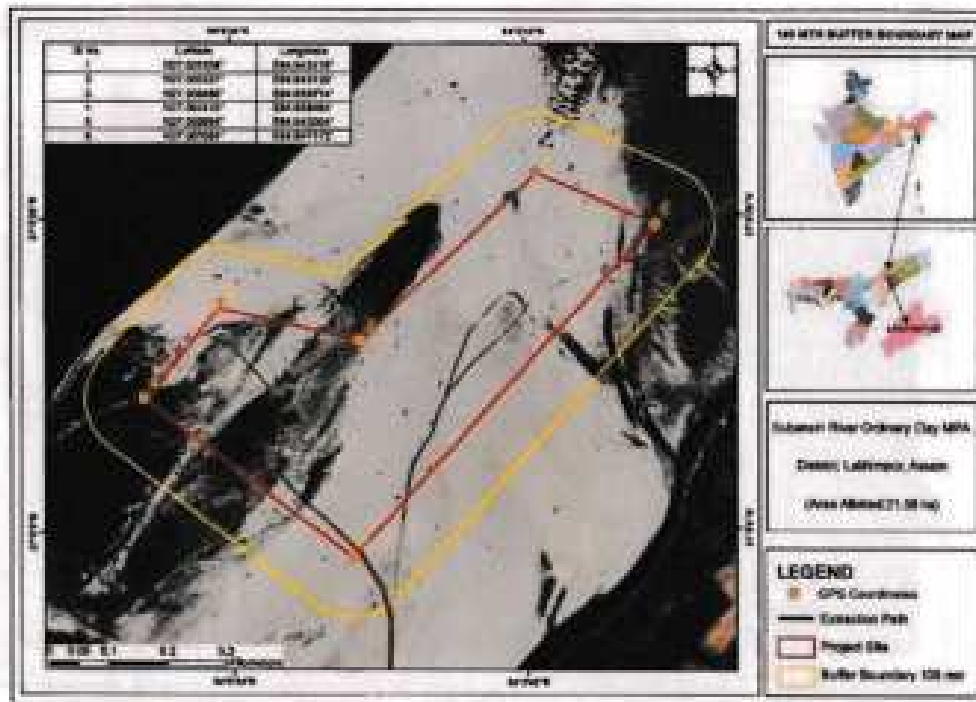


Fig. 13.6 A Subansiri River Ordinary Clay MPA, 100m buffer map (Google Image)



Fig. 13.6 B Subansiri River Ordinary Clay MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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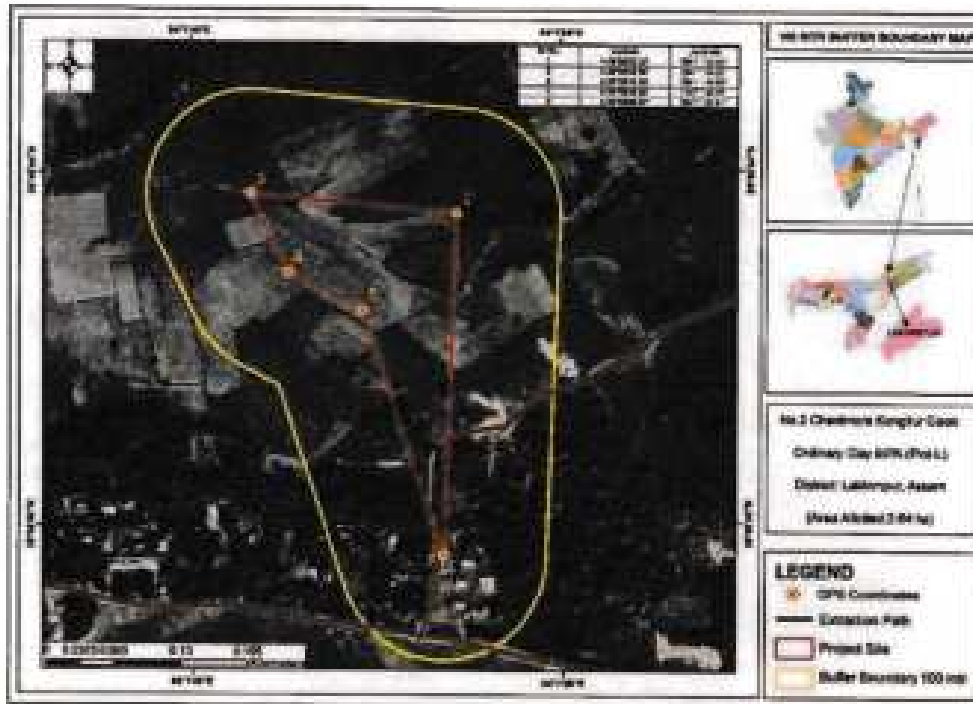


Fig. 13.7 A No.2 Chenimora Kongkur Gaon Ordinary Clay MPA (Plot-L), 100m buffer map (Google Image)

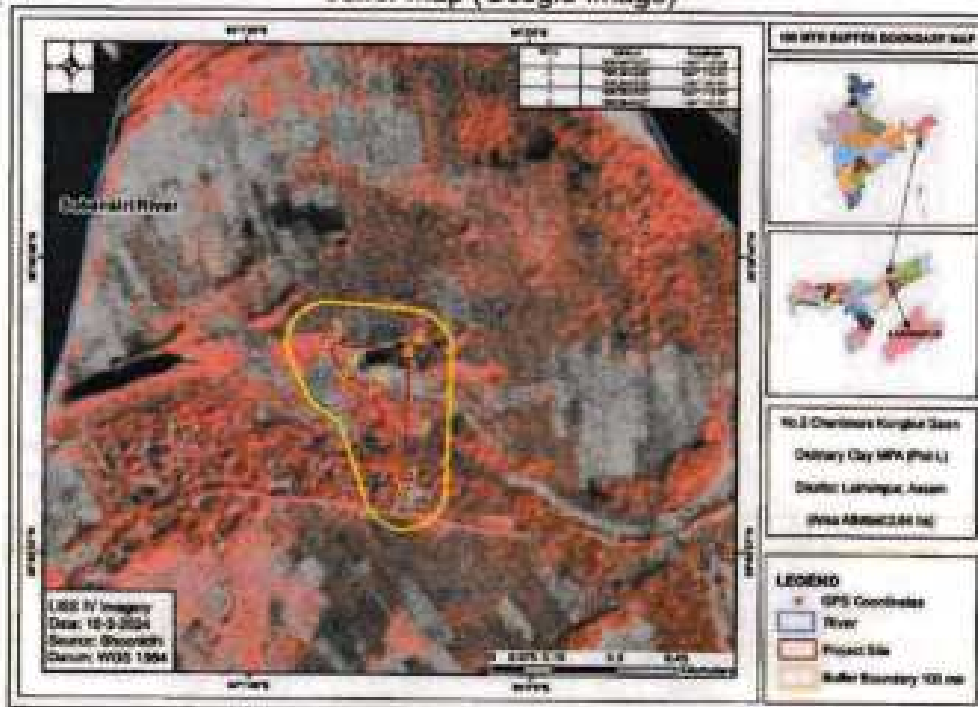


Fig. 13.7 B No.2 Chenimora Kongkur Gaon Ordinary Clay MPA (Plot-L), 100m buffer map (Satellite Image)



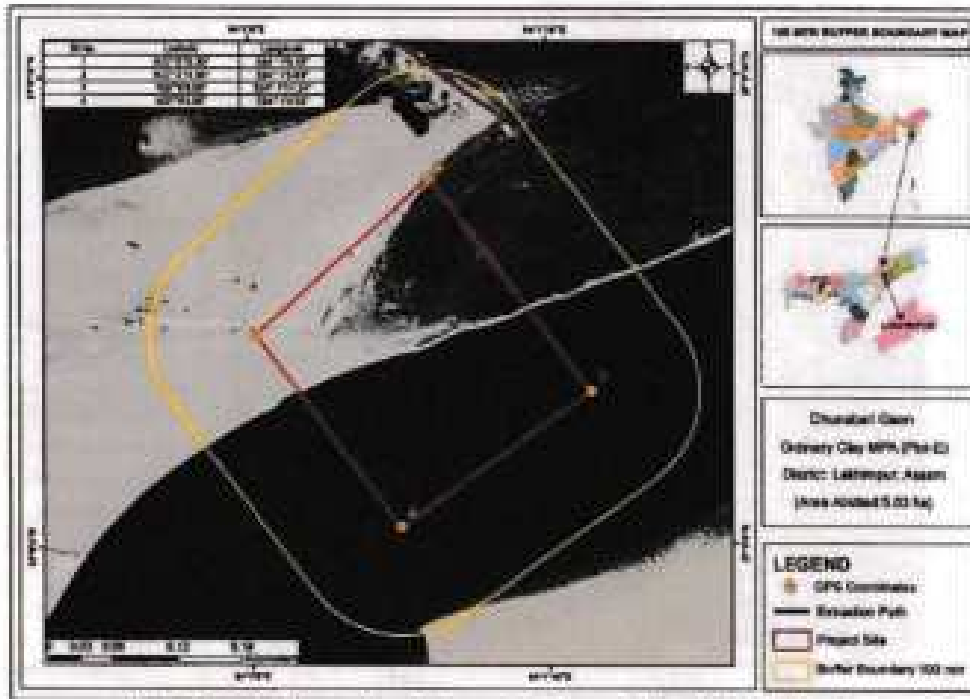


Fig. 13.8 A Dhunabari Gaon Ordinary Clay MPA (Plot-E), 100m buffer map (Google Image)

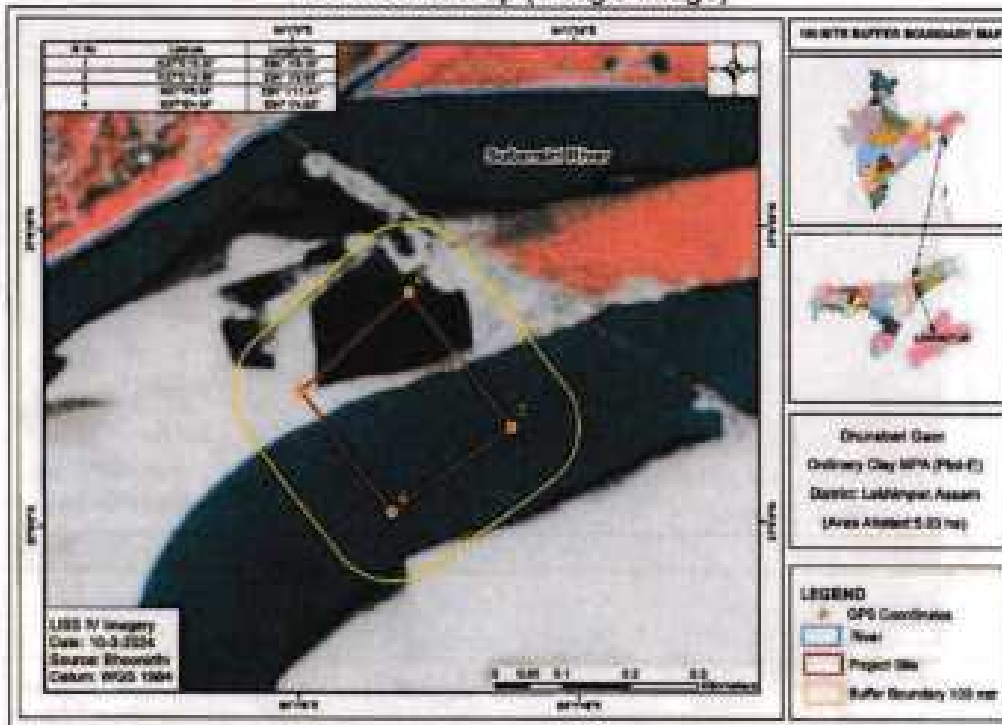


Fig. 13.8 B Dhunabari Gaon Ordinary Clay MPA (Plot-E), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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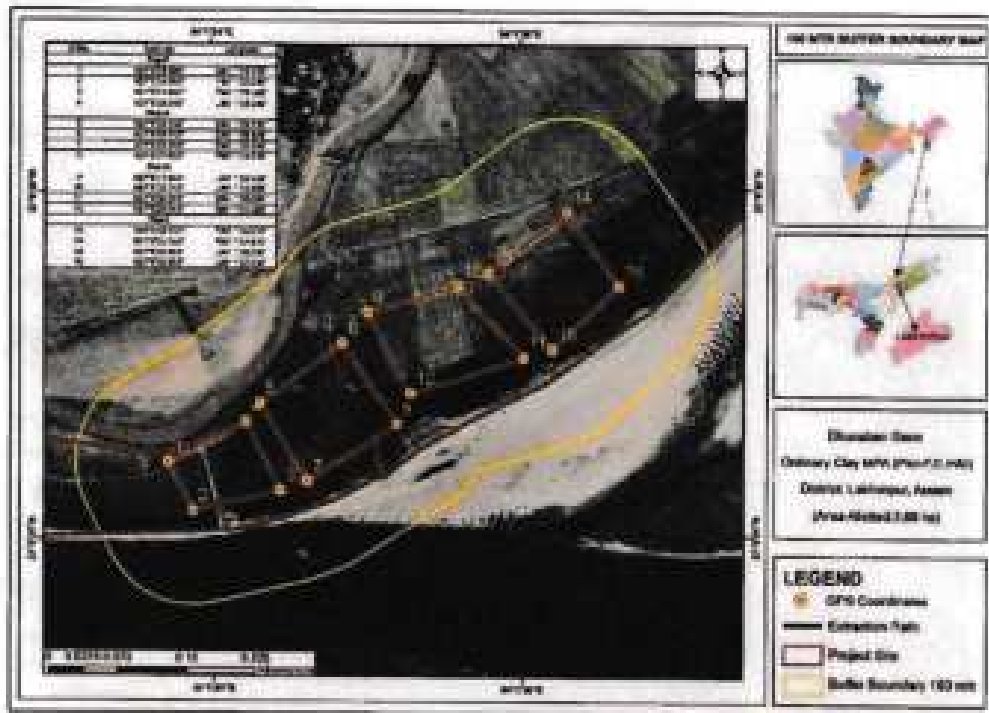


Fig. 13.9 A Dhunabari Gaon Ordinary Clay MPA (Plot-F,G,H&I), 100m buffer map (Google Image)

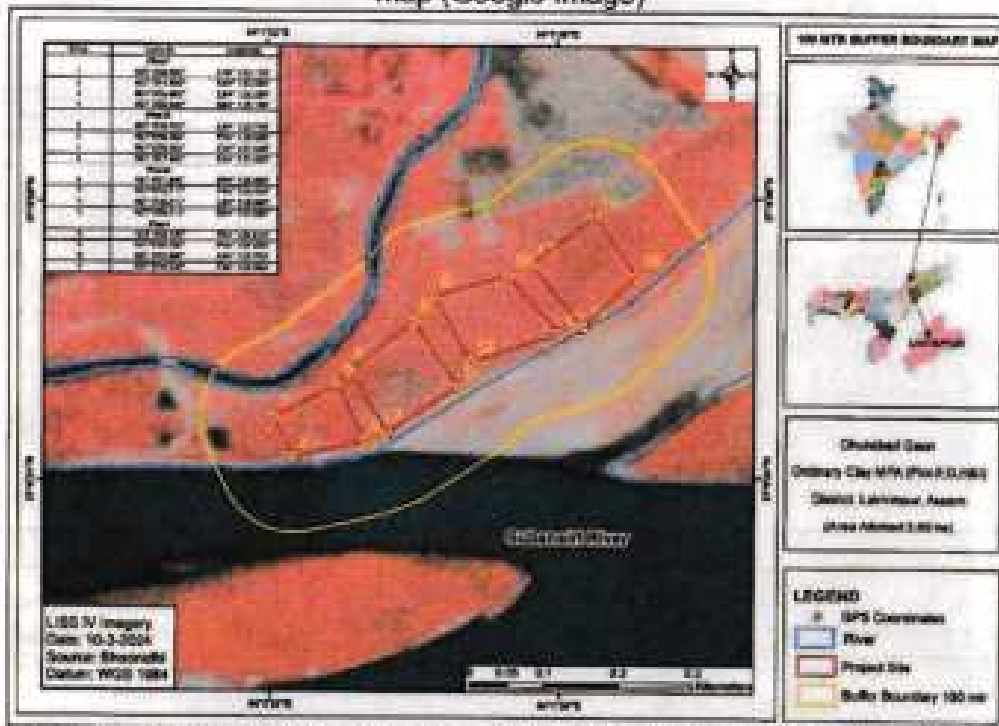


Fig. 13.9 B Dhunabari Gaon Ordinary Clay MPA (Plot-F,G,H&I), 100m buffer map (Satellite Image)

Minerals: Sand, Gavel, Boulder, Ordinary Clay

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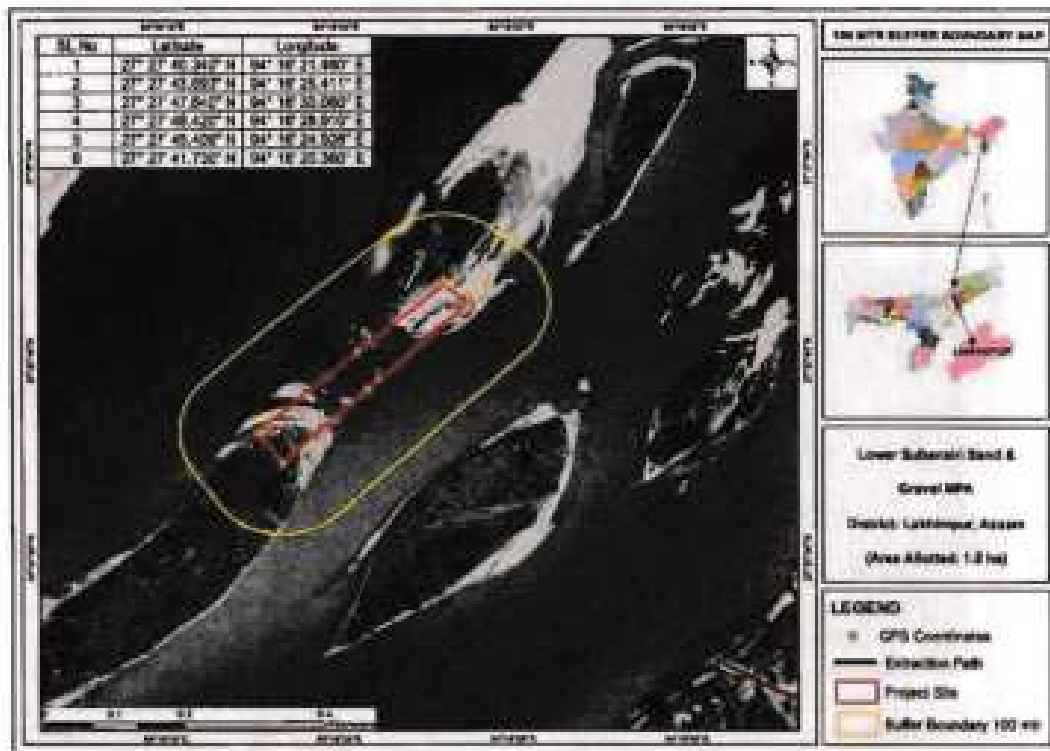


Fig. 13.10 A Lower Subansiri 1.5 Ha Sand & Gravel MPA (Proposed), 100m buffer map (Google Image)

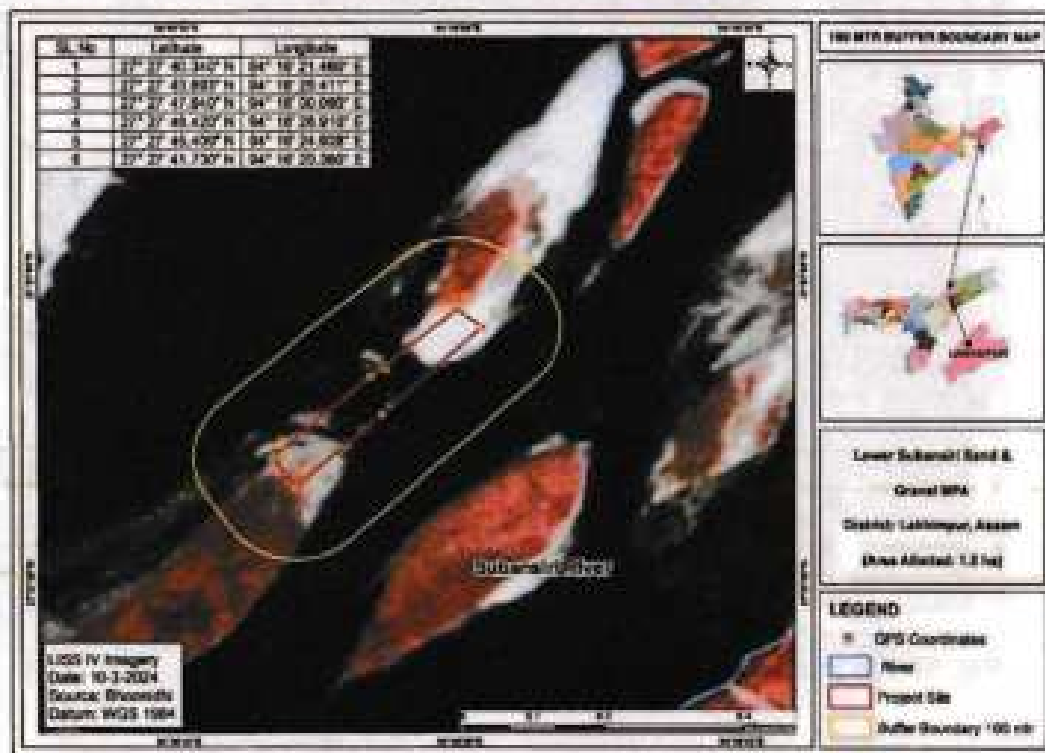


Fig. 13.10 B Lower Subansiri 1.5 Ha Sand & Gravel MPA (Proposed), 100m buffer map ((Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

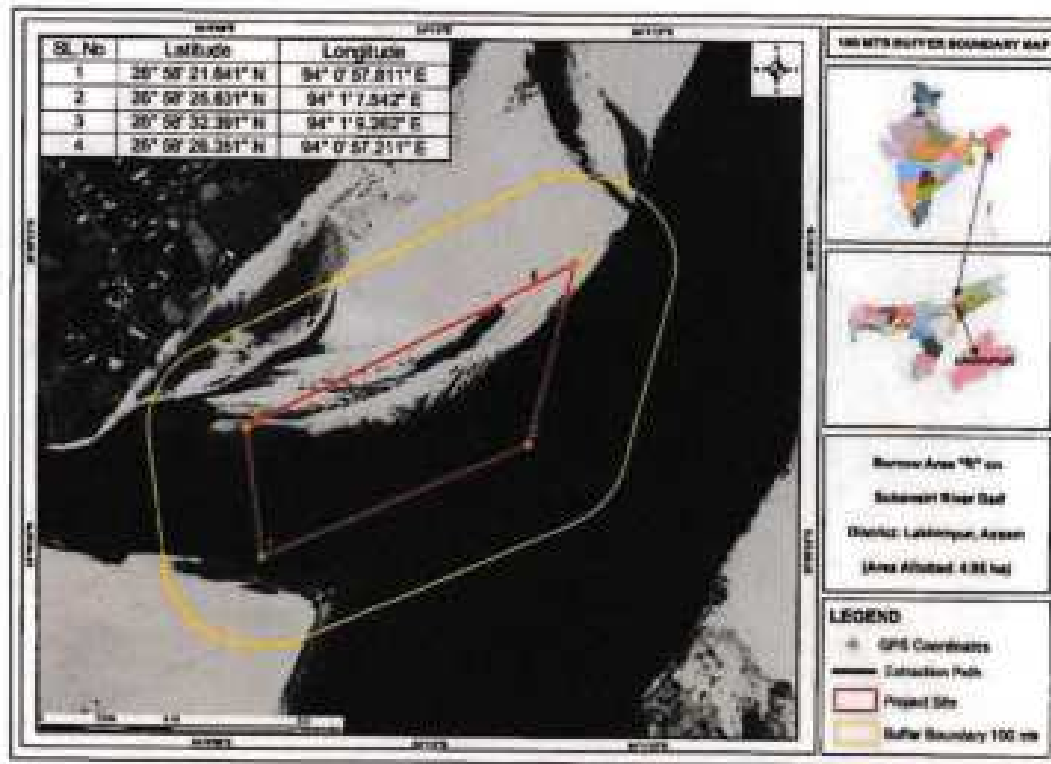


Fig. 13.11 A Borrow Area-R (Proposed),
100m buffer map (Google Image)

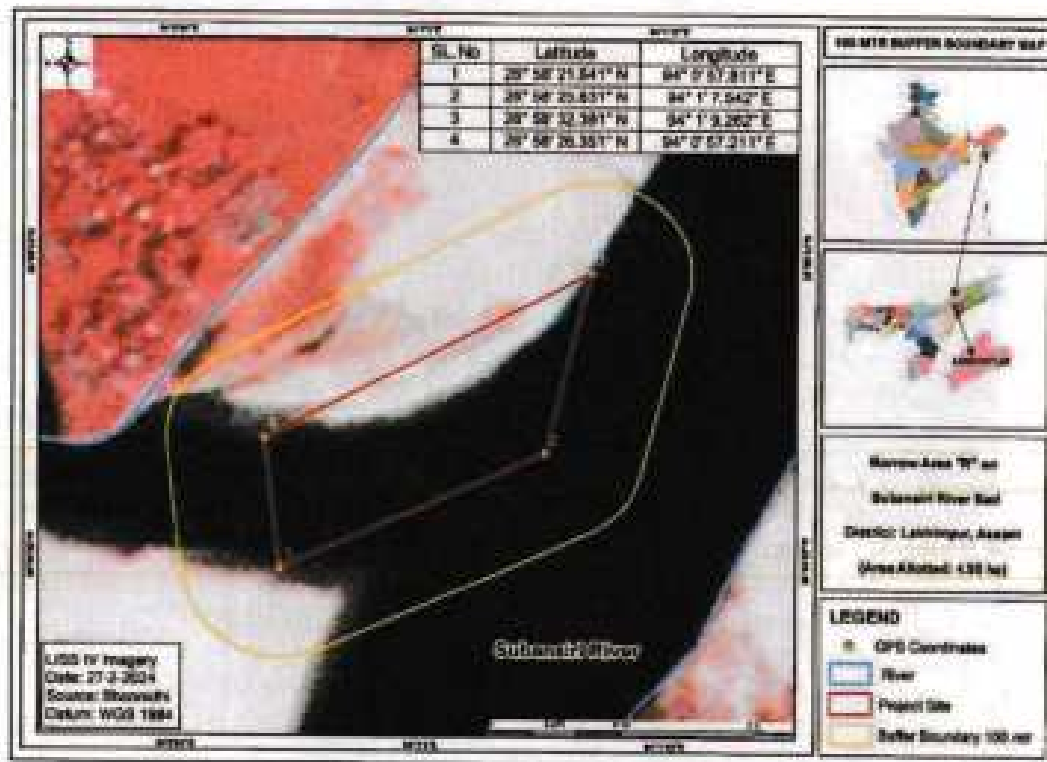


Fig. 13.11 B Borrow Area-R (Proposed),
100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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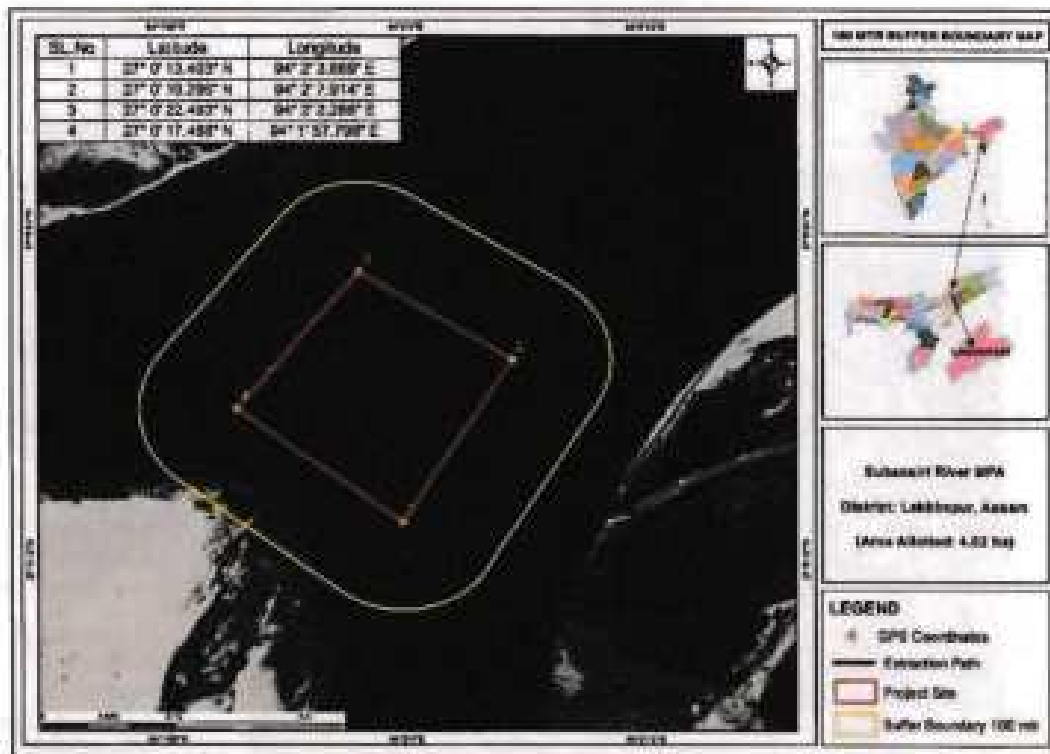


Fig. 13.12 A Subansiri River MPA (Proposed), 100m buffer map (Google Image)

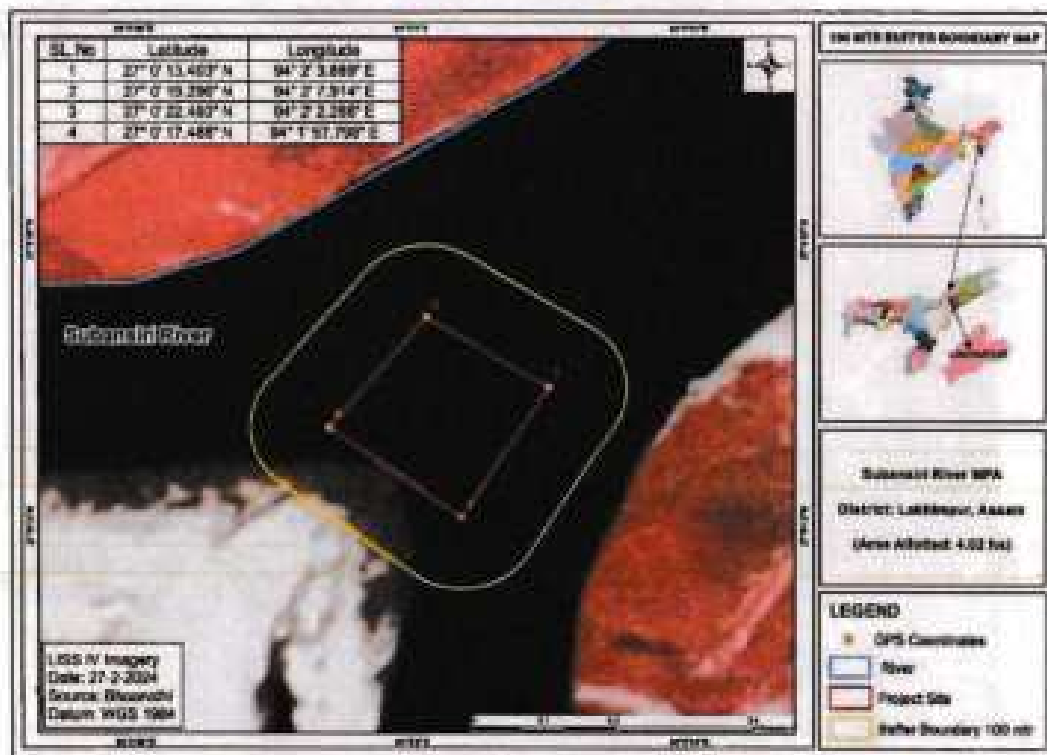


Fig. 13.12 B Subansiri River MPA (Proposed), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

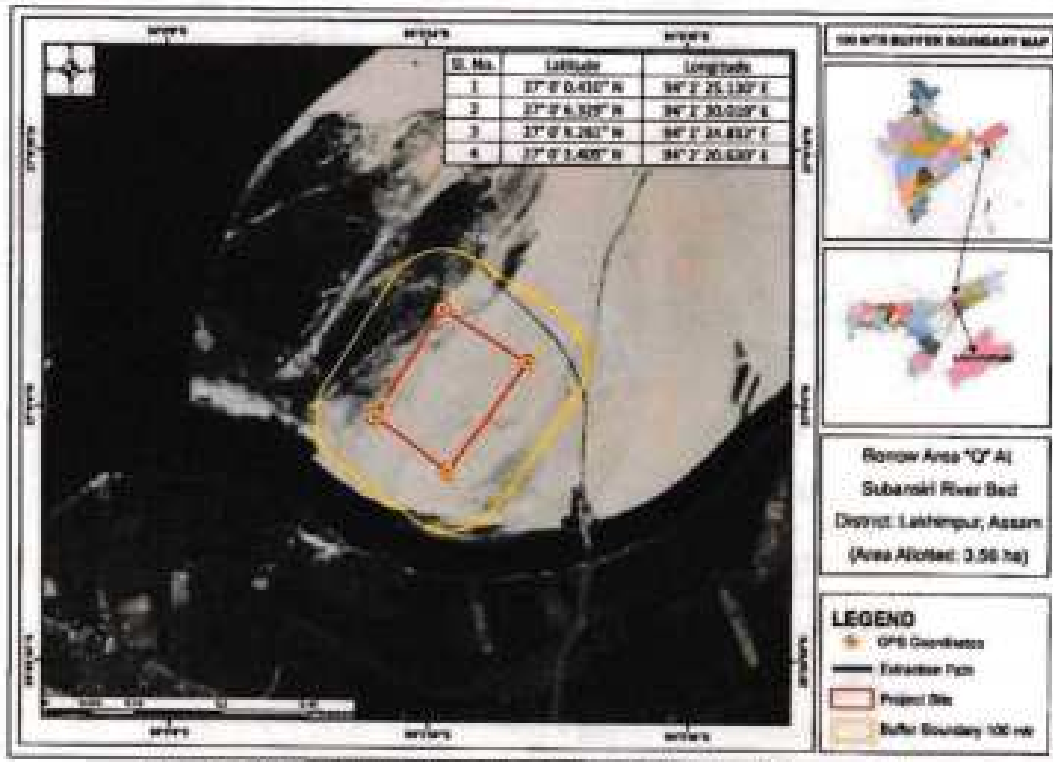


Fig. 13.13 A Borrow Area Q at Subansiri River (Proposed), 100m buffer map (Google Image)

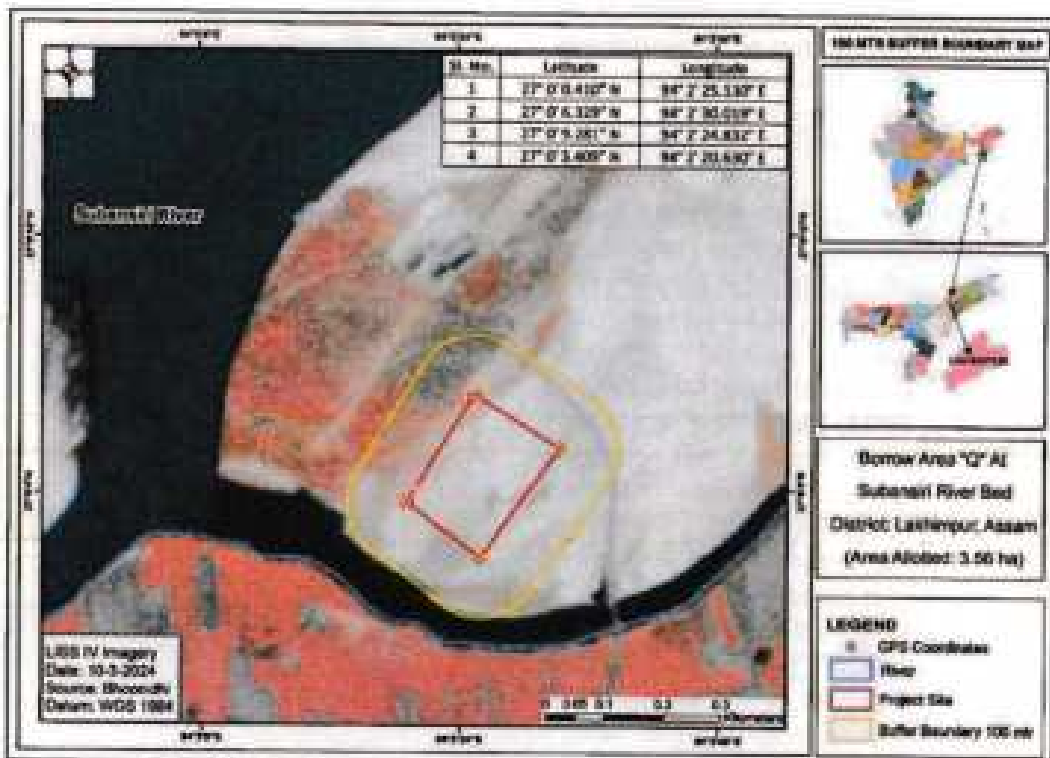


Fig. 13.13 B Borrow Area Q at Subansiri River (Proposed), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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13.4.2 Description of Mining Permit/ Contract Areas in Ranganadi River:

Table 13.6: Details of Ranganadi River

Sr No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Ranganadi River in the district	956.93	100	0
2	Area already granted in the Ranganadi River	31.79	3.32	3.32
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	15.63	1.63	4.95
6	Area not recommended for future Quarry Permit/ Contract Area grant due non- availability of un-mined block 50 meters with after every block of 1000 meters	0	0	0

Minerals: Sand, Gravel, Boulder, Ordinary Clay


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	over which is undertaken or at such distance as may be directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco- sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	Yes (4.84)	0.50	5.45

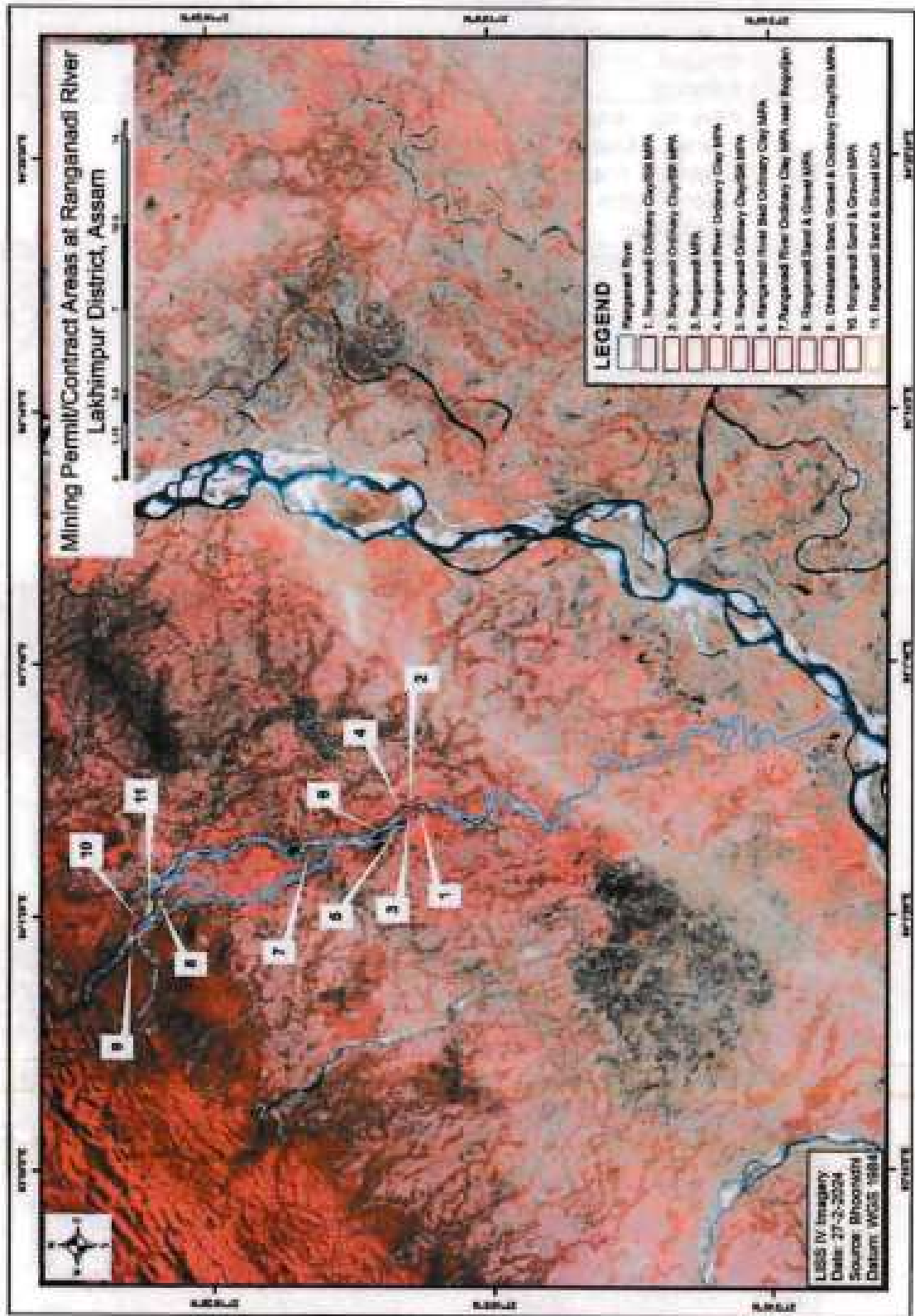
Minerals: Sand, Gravel, Boulder, Ordinary Clay



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Map 13.2: Map showing Mining Permit/ Contract Areas within Ranganadi River

Minerals: Sand, Gravel, Boulder, Ordinary Clay



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Table 13.7: Status of Individual Mining Permit/ Contract Areas of Ranganadi River

Sl No.	Name	Name of Mineral	Area in Ha.	Area allotted in Ha.	Period (in Year)	Operational/ Non-operational	Coordinate	
							Latitude	Longitude
1	Ranganadi Sand & Gravel MPA	Sand & Gravel	1.0	1.0	2	Non-operational	N27°17.585'	E94°01.796'
							N27°17.594'	E94°01.802'
							N27°17.589'	E94°01.883'
							N27°17.573'	E94°01.876'
2	Ranganadi Sand & Gravel MPA	Sand & Gravel	4.84	4.84	2	Operational	N27°19' 28.30"	E94°5' 20.198"
							N27°19' 28.00"	E94°5' 19.900"
							N27°19' 34.20"	E94°5' 08.599"
							N27°19' 34.90"	E94° 5' 10.702"
3	Ranganadi Sand & Gravel MCA	Sand, Gravel & Boulder	4.95	4.95	7	Operational	N27°17'49.13"	E94°01'31.39"
							N27°17'44.09"	E94°01'30.28"
							N27°17'42.55"	E94°01'42.76"
							N27°17'48.60"	E94°01'42.50"
4	Ranganadi Ordinary Clay/ Silt MPA	Ordinary Clay/ Silt	8.73	8.73	2	Non-operational	N27°11'45.450"	E94°3'55.220"
							N27°11'48.280"	E94°4'1.780"
							N27°11'29.179"	E94°4'6.943"
							N27°11'29.430"	E94°3'57.820"
5	Ranganadi Ordinary Clay/ Silt MPA	Ordinary Clay/ Silt	4.5	4.5	2	Non-operational	N27°11'54.09"	E94°3'49.73"
							N27°11'57.32"	E94°3'52.69"
							N27°11'45.89"	E94°3'0.16"
							N27°11'47.89"	E94°3'2.85"
6	Ranganadi Ordinary Clay/ Silt MPA	Ordinary Clay/ Silt	1.4	1.4	2	Non-operational	N27°12'1.62"	E94°3'46.69"
							N27°11'58.33"	E94°3'48.95"
							N27°11'56.49"	E94°3'46.45"
							N27°12'0.04"	E94°3'42.78"
7	Ranganadi River Bed Ordinary Clay MPA near Pahumora	Ordinary Clay/ Silt	1.2	1.2	2	Operational	N27.207228	E94.057042
							N27.206908	E94.056361
							N27.208094	E94.055708
							N27.208483	E94.056431
8	Ranganadi River Ordinary Clay MPA	Ordinary Clay/ Silt	1.3	1.3	2	Non-operational	N27°14'9.70"	E94°3'1.62"
							N27°14'9.73"	E94°3'4.68"
							N27°14'4.57"	E94°3'2.71"

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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	near Bogolljan						N27°14'4.71"	E94°3'5.65"
9	Ranganadi River Ordinary Clay MPA	Ordinary Clay/ Silt	1.67	1.67	2	Operational	N27° 12' 0.525"	E94°3'47.627"
							N27°11'56.709"	E94°3'48.743"
							N27°11'58.325"	E94°3'53.653"
							N27°12'2.011"	E94°3'52.113"
10	Dhekianala Sand, Gravel & Ordinary Clay/ Silt MPA	Sand, Gravel & Ordinary Clay/ Silt	2.2	1.86	2	Non-operational	N27°18.233'	E94°00.925'
							N27°18.197'	E94°00.876'
							N27°18.114'	E94°00.954'
							N27°18.153'	E94°01.001'

Table 13.8: Details of Individual Mining Permit/ Contract of Ranganadi River (New Mining area proposed)

Sr No.	Permit area details	Name of Mineral	Area allotted in Ha.	Coordinate	
				Latitude	Longitude
1	1.5 ha. Ranganadi MPA	Ordinary Clay/ Silt	1.5	N27°11'56.32"	E94°3'54.46"
				N27°11'52.87"	E94°3'58.69"
				N27°11'50.52"	E94°3'56.16"
				N27°11'54.09"	E94°3'52.25"

Ranganadi river area in the district is 956.93 Ha and area already granted in the River is 31.79 Ha. The riverbed is having a total of 10 mine Permit/ Contract Areas. Out of 10, 2 areas are of mineral-Sand & Gravel, 1 area is of Sand, Gravel & Boulder, 1 area is of Sand, Gravel, Boulder & Ordinary Clay/ Silt and rest 6 are of mineral Ordinary Clay. Out of these 10 Mining Permit/ Contract, 4 areas in the operational condition and 6 areas are in non-operational condition. 1 new area is identified for future mining project for Ordinary Clay/ Silt. Cluster is applicable due to presence of 1 (one) mining area within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, Go-zone and No-Go zone has been identified. Total Go zone area is 12.82 Ha (inclusive of 1 proposed area) and No-Go zone

Minerals: Sand, Gravel, Boulder, Ordinary Clay



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area is 20.47 Ha. Out of 31.79 Ha, no area falls within 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 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. 15.63 Ha area falls within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads. 4.84 Ha falls under cluster.

Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below (with extraction path).

Minerals: Sand, Gravel, Boulder, Ordinary Clay



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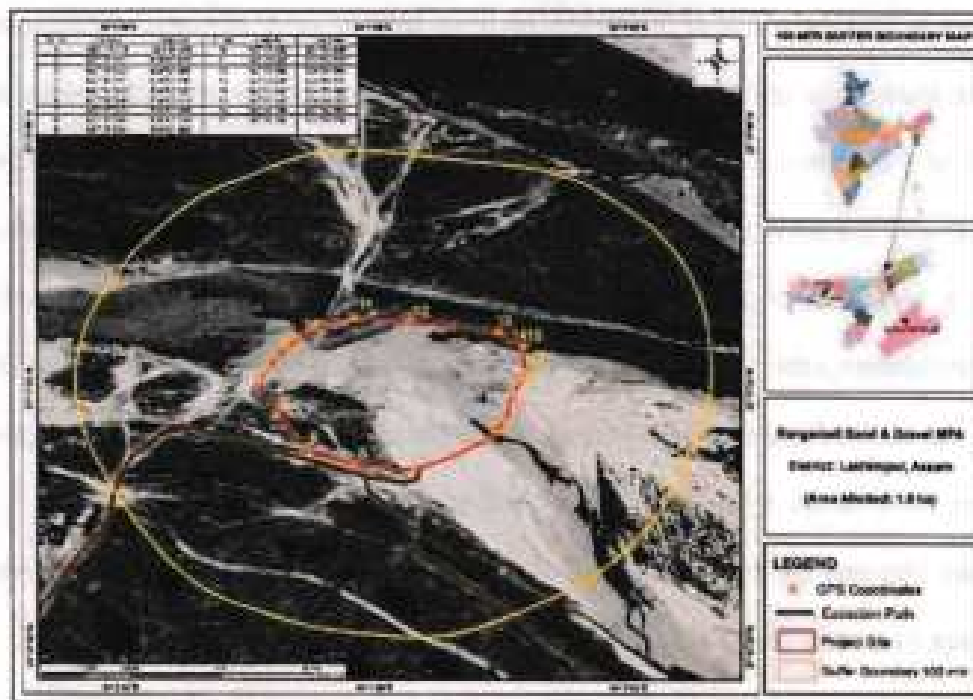


Fig. 13.14 A Ranganadi Sand & Gravel MPA, 100m buffer map (Google Image)

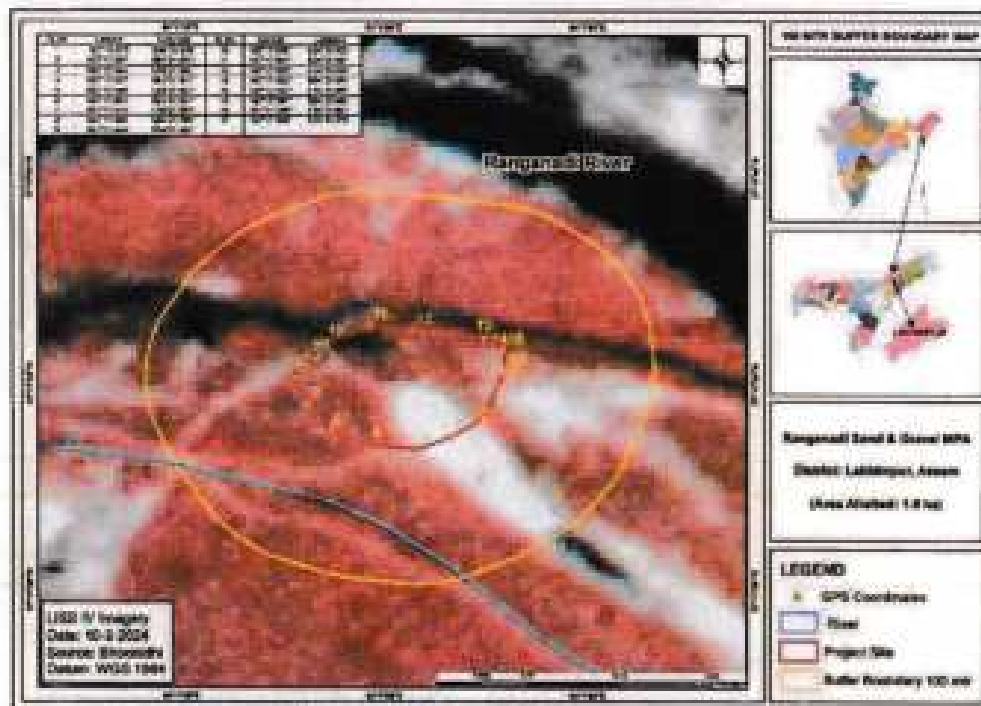


Fig. 13.14 B Ranganadi Sand & Gravel MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay



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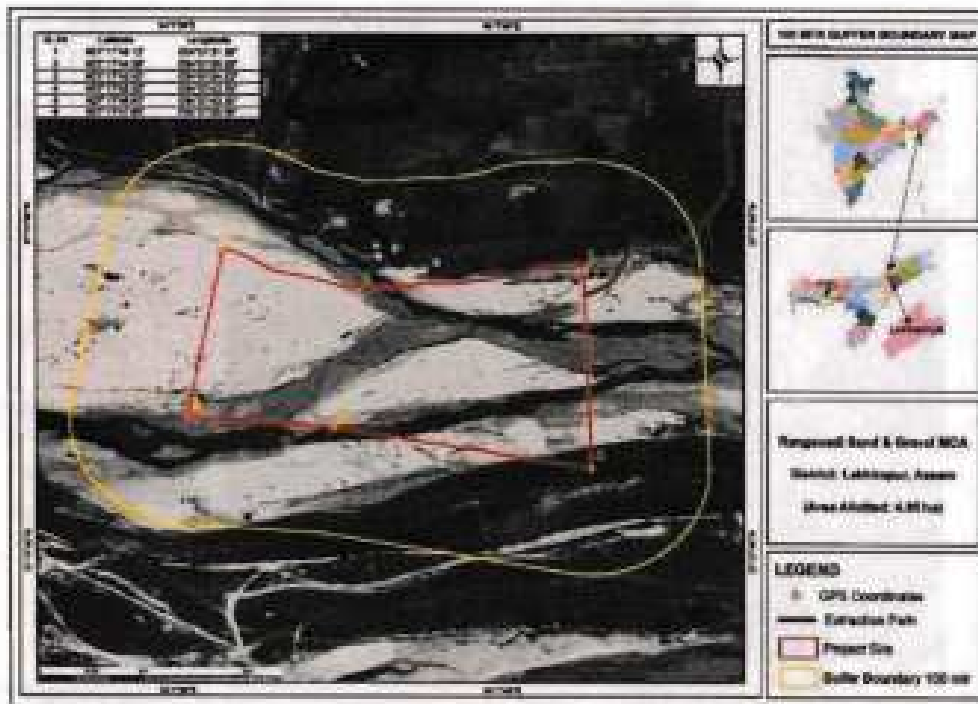


Fig. 13.16 A Ranganadi Sand & Gravel MCA, 100m buffer map (Google Image)

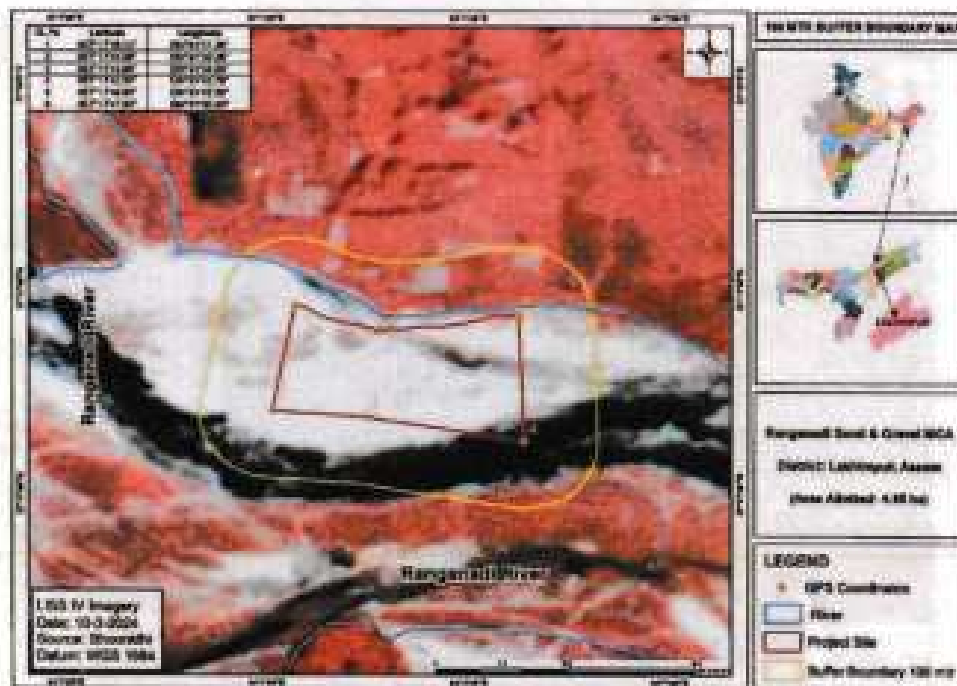


Fig. 13.16 B Ranganadi Sand & Gravel MCA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay



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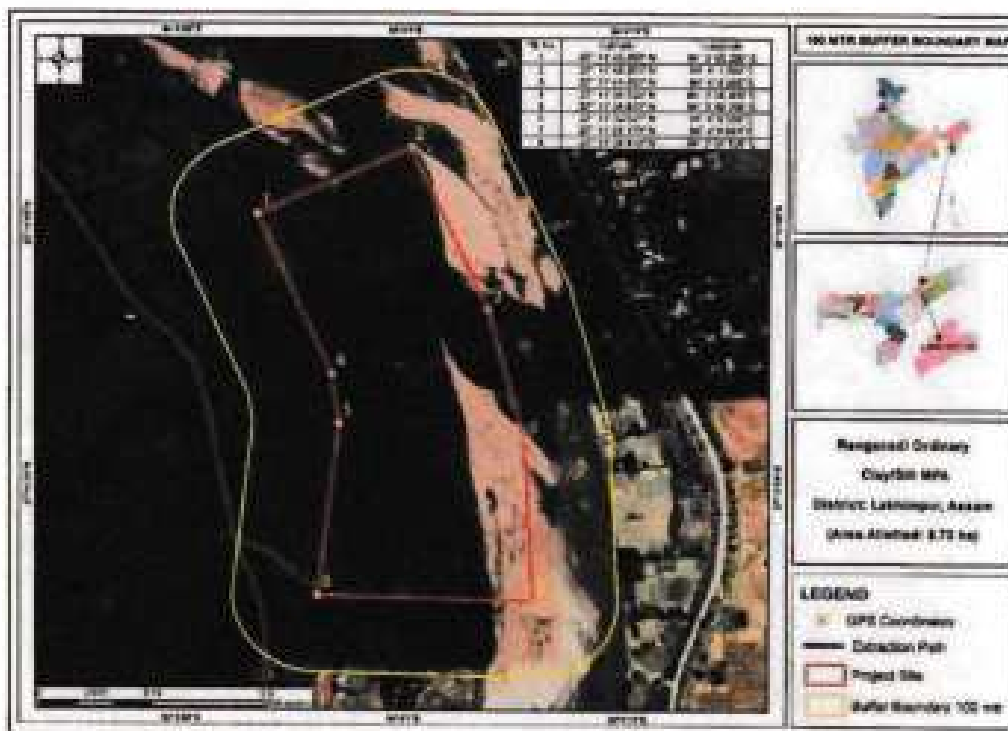


Fig. 13.17 A Ranganadi Ordinary Clay/ Silt MPA, 100m buffer map (Google Image)

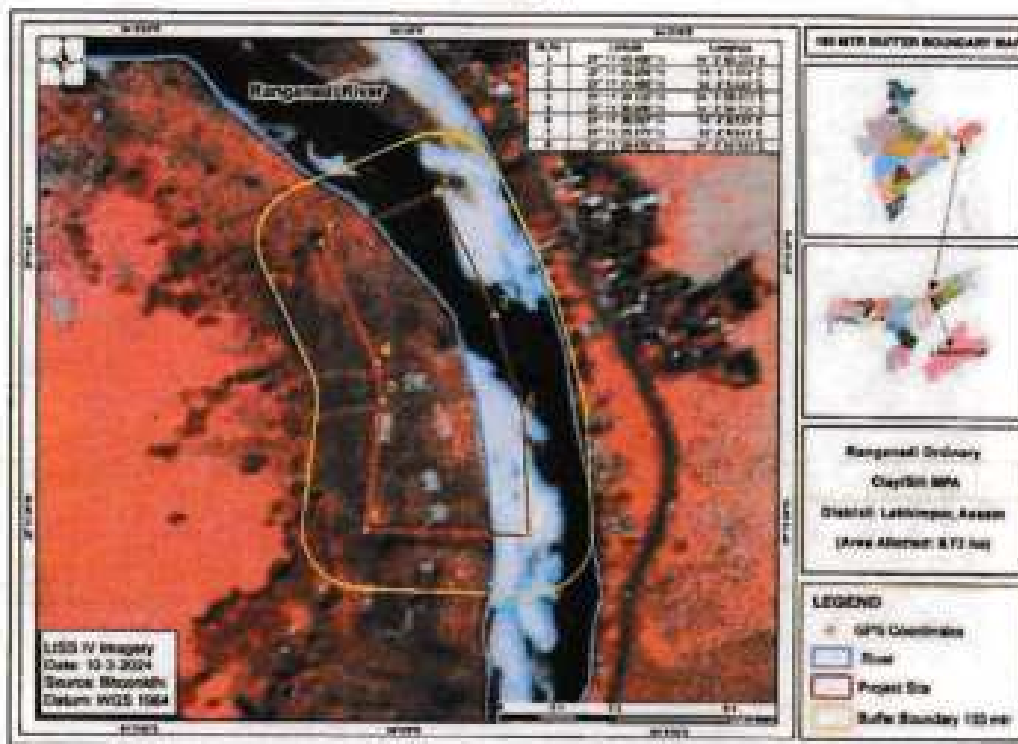


Fig. 13.17 B Ranganadi Ordinary Clay/ Silt MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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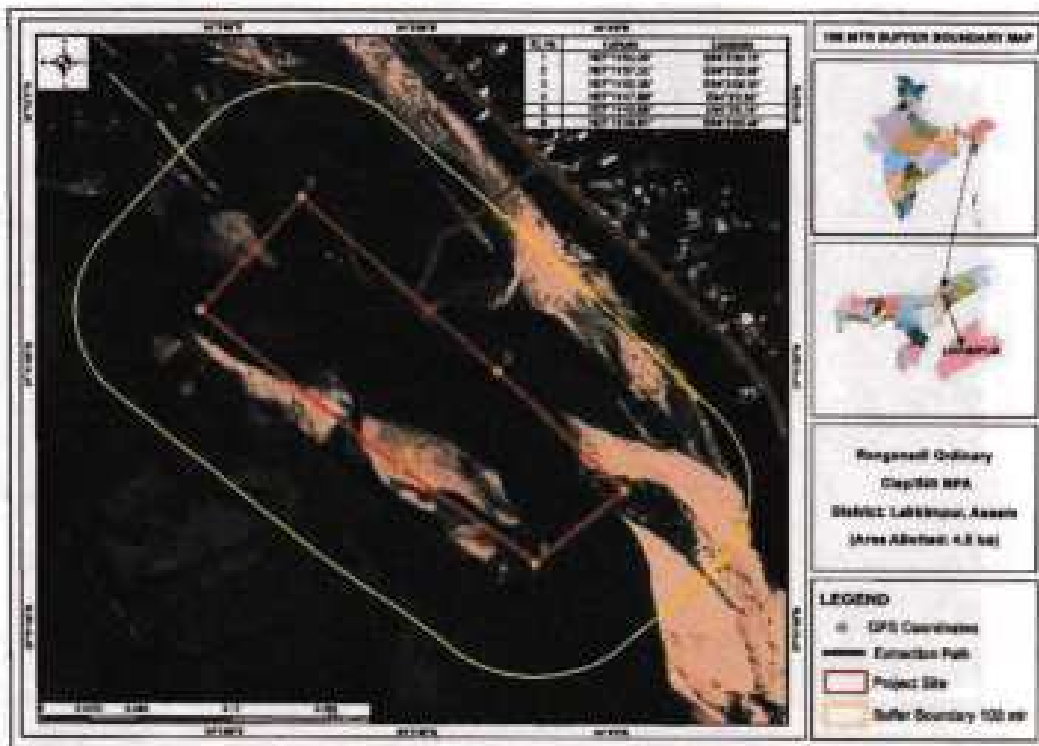


Fig. 13.18 A Ranganadi Ordinary Clay/ Silt MPA, 100m buffer map (Google Image)

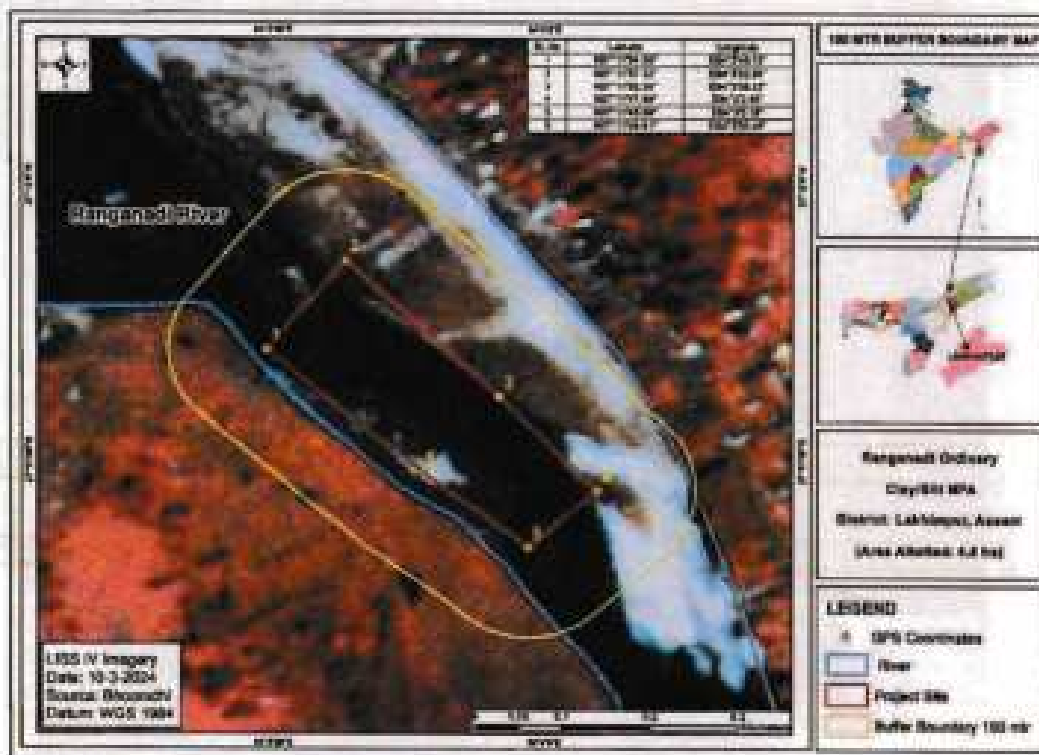


Fig. 13.18 B Ranganadi Ordinary Clay/ Silt MPA, 100m buffer map (Google Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay



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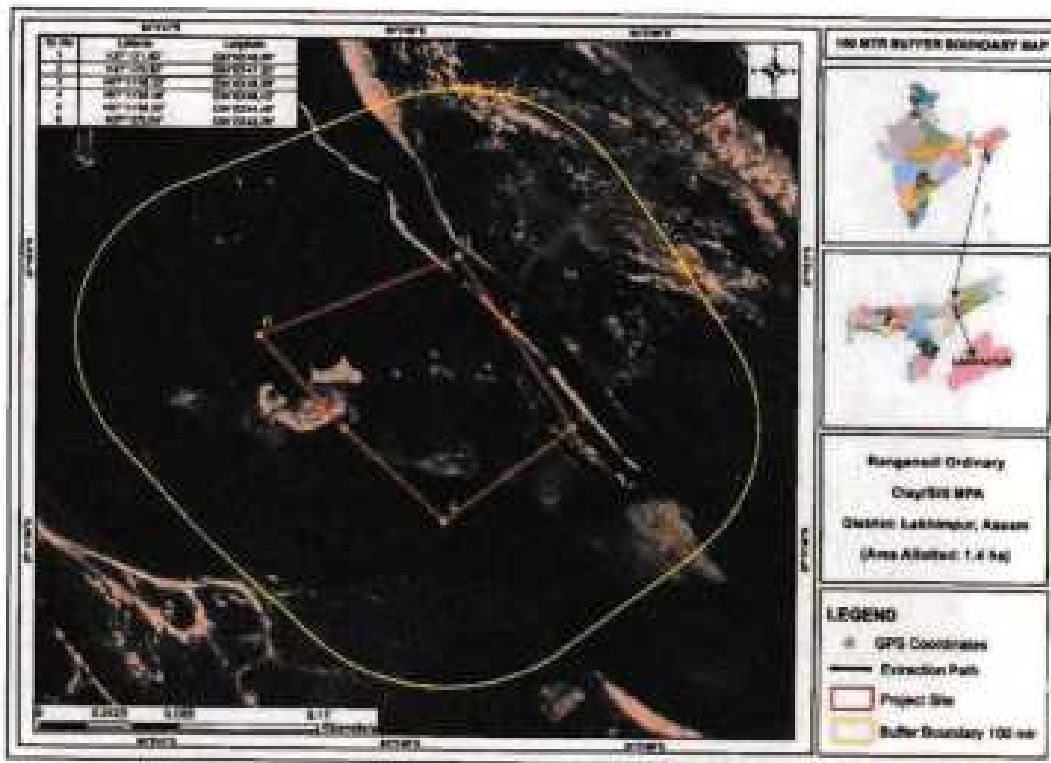


Fig. 13.19 A Ranganadi Ordinary Clay/ Silt MPA, 100m buffer map (Google Image)

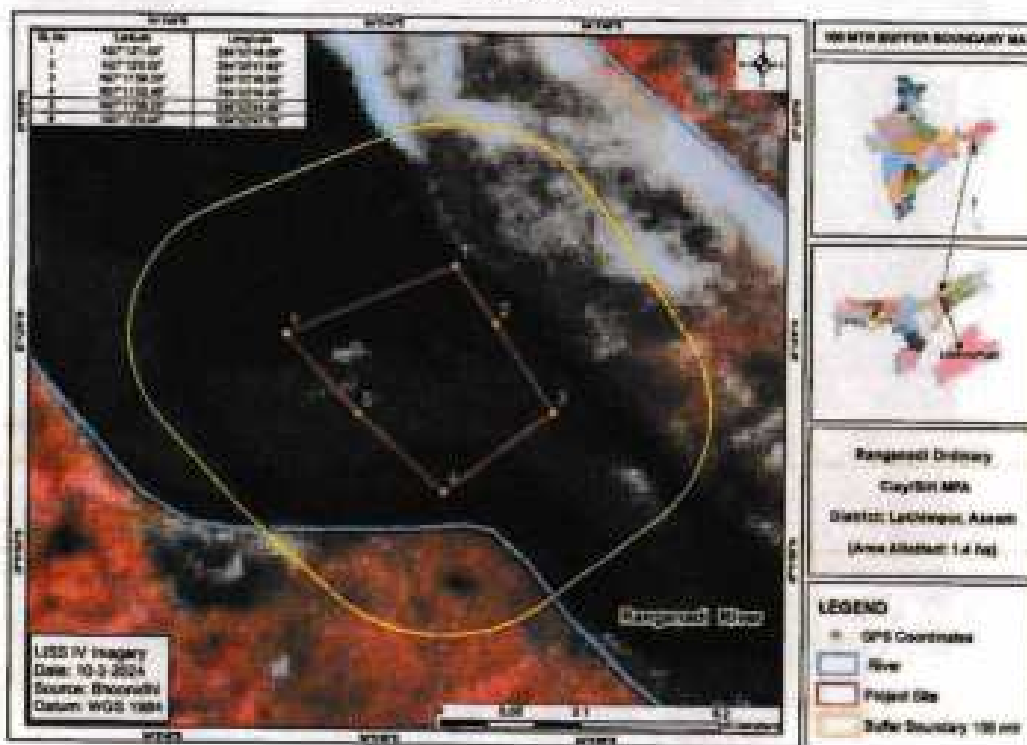


Fig. 13.19 B Ranganadi Ordinary Clay/ Silt MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay


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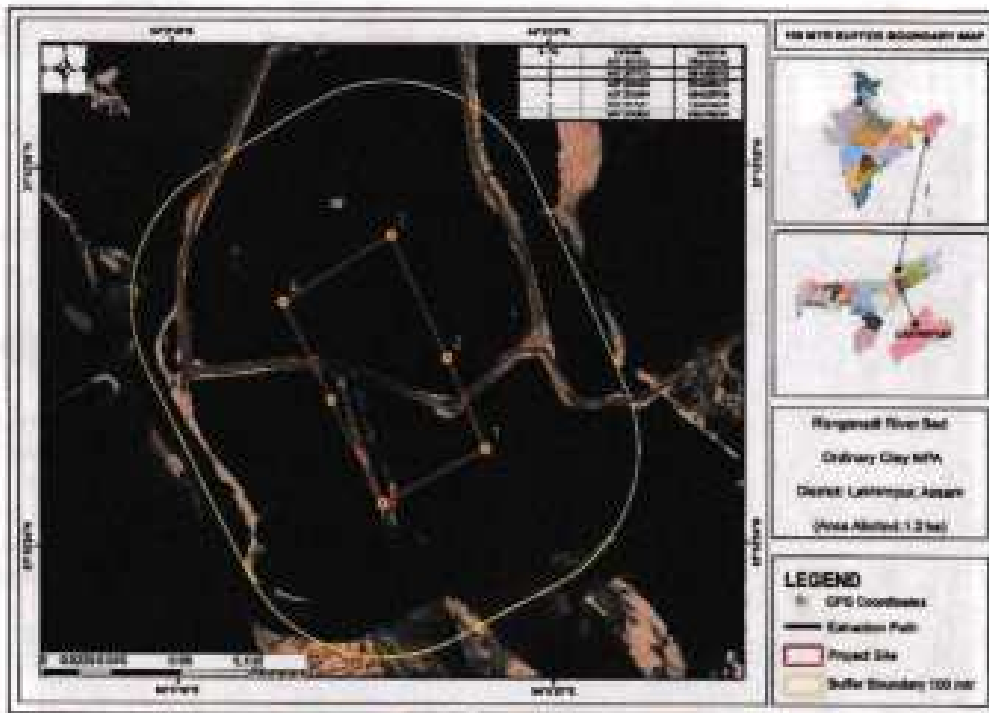


Fig. 13.20 A Ranganadi River Bed Ordinary Clay MPA near Pahumora, 100m buffer map (Google Image)

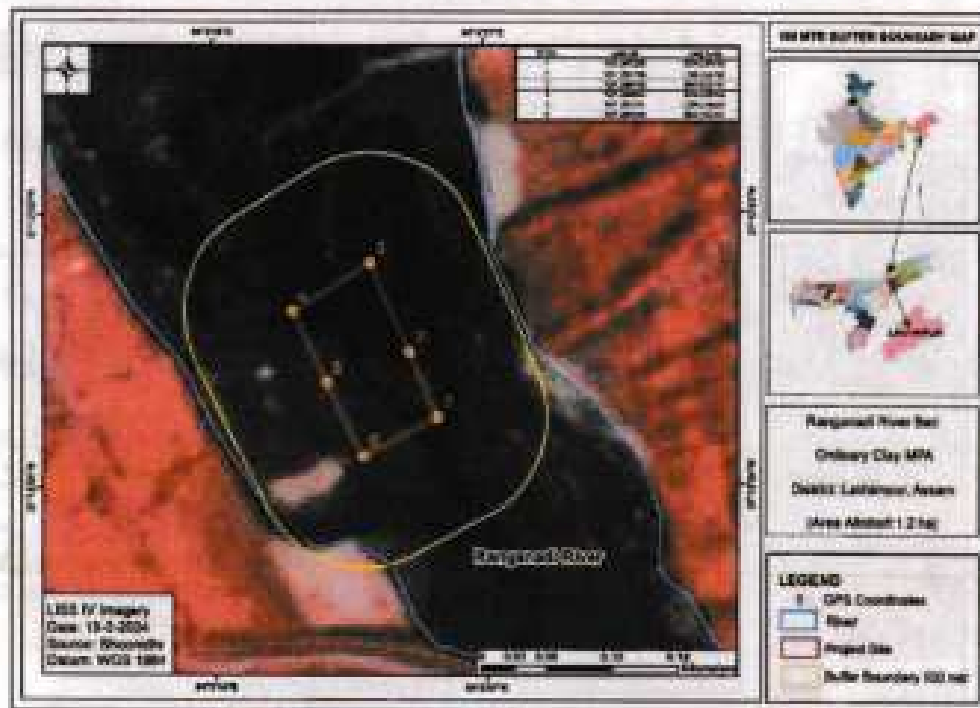


Fig. 13.20 B Ranganadi River Bed Ordinary Clay MPA near Pahumora, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay



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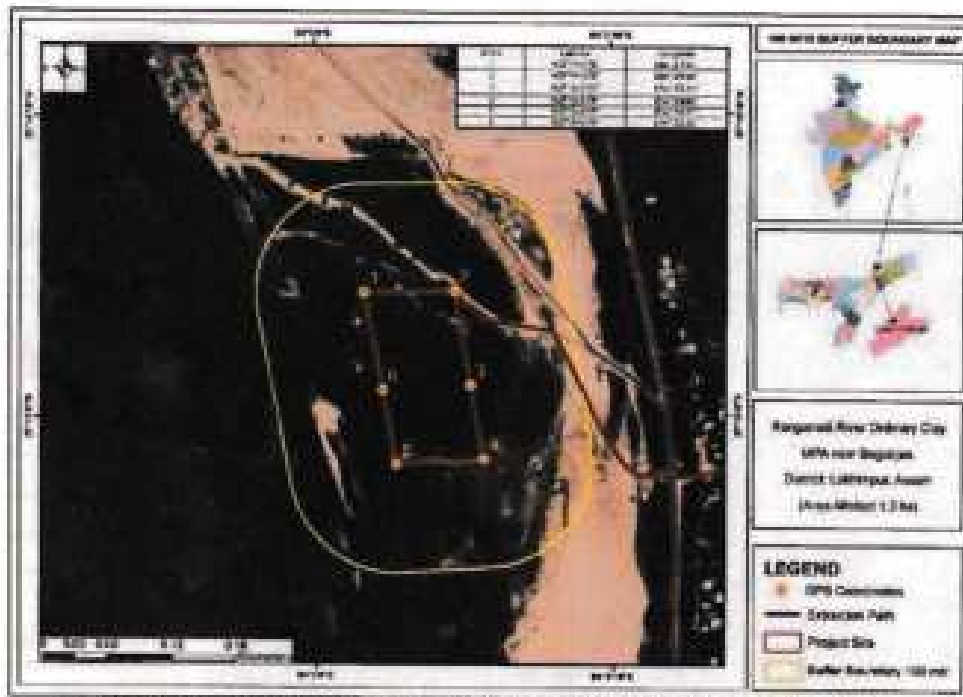


Fig. 13.21 A Ranganadi River Ordinary Clay MPA near Bogolijan, 100m buffer map (Google Image)

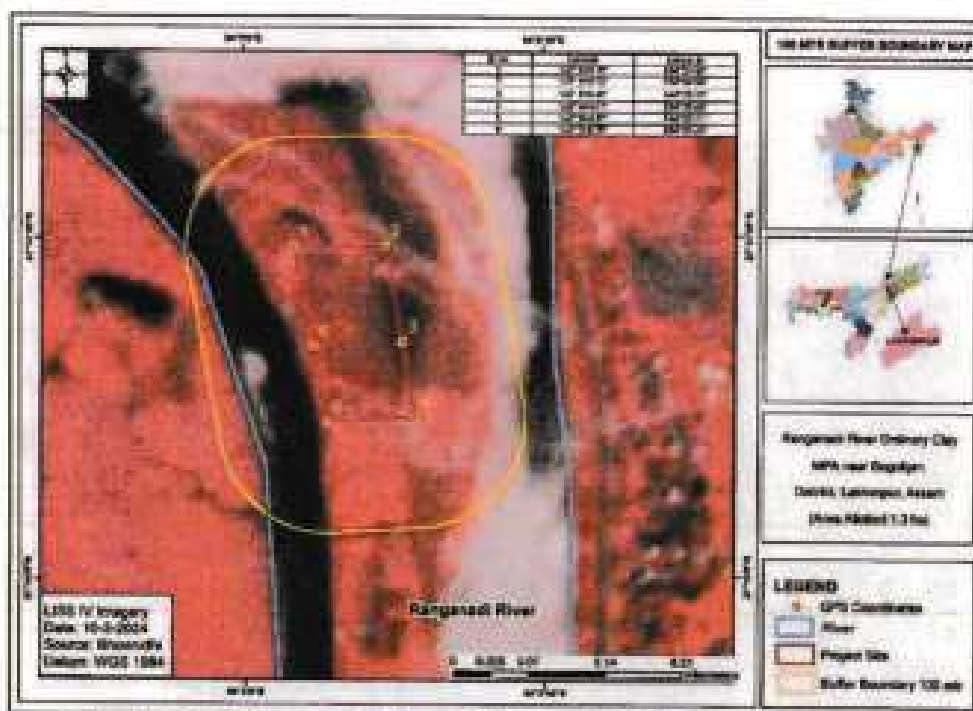


Fig. 13.21 B Ranganadi River Ordinary Clay MPA near Bogolijan, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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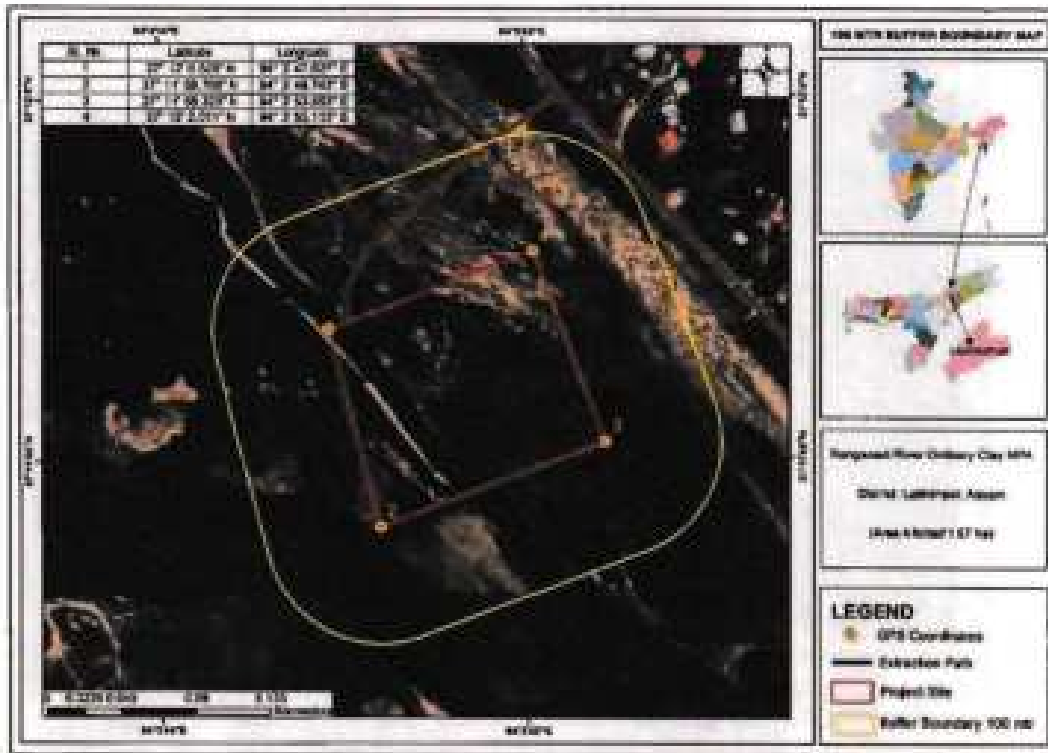


Fig. 13.22 A Ranganadi River Ordinary Clay MPA, 100m buffer map (Google Image)

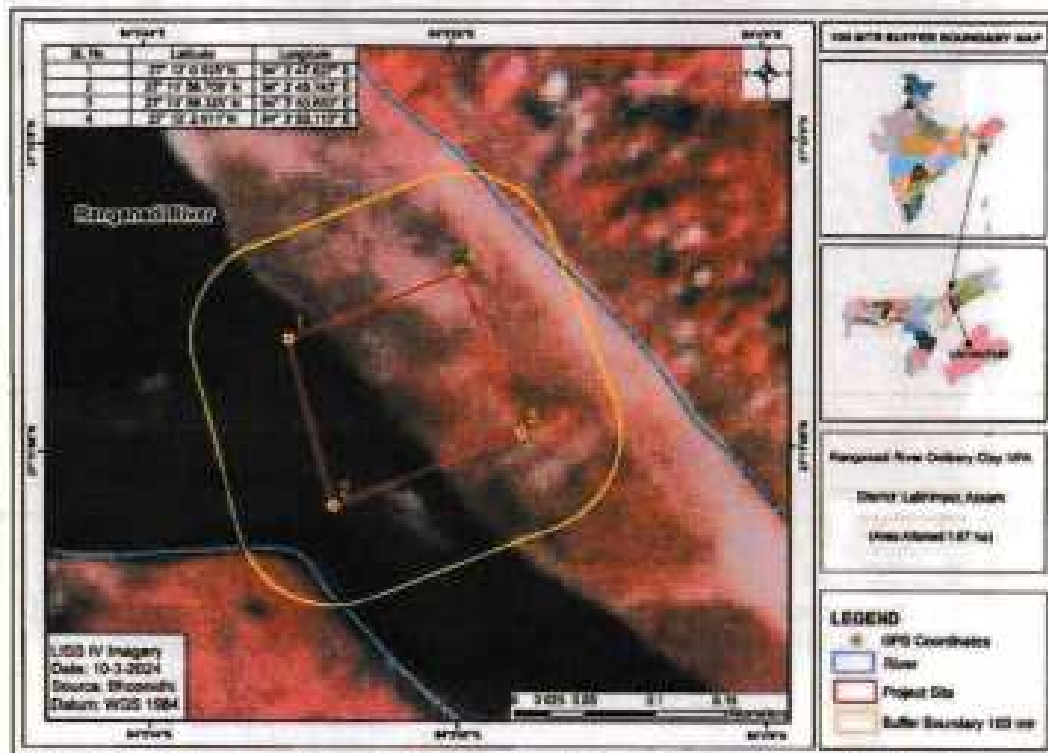


Fig. 13.22 B Ranganadi River Ordinary Clay MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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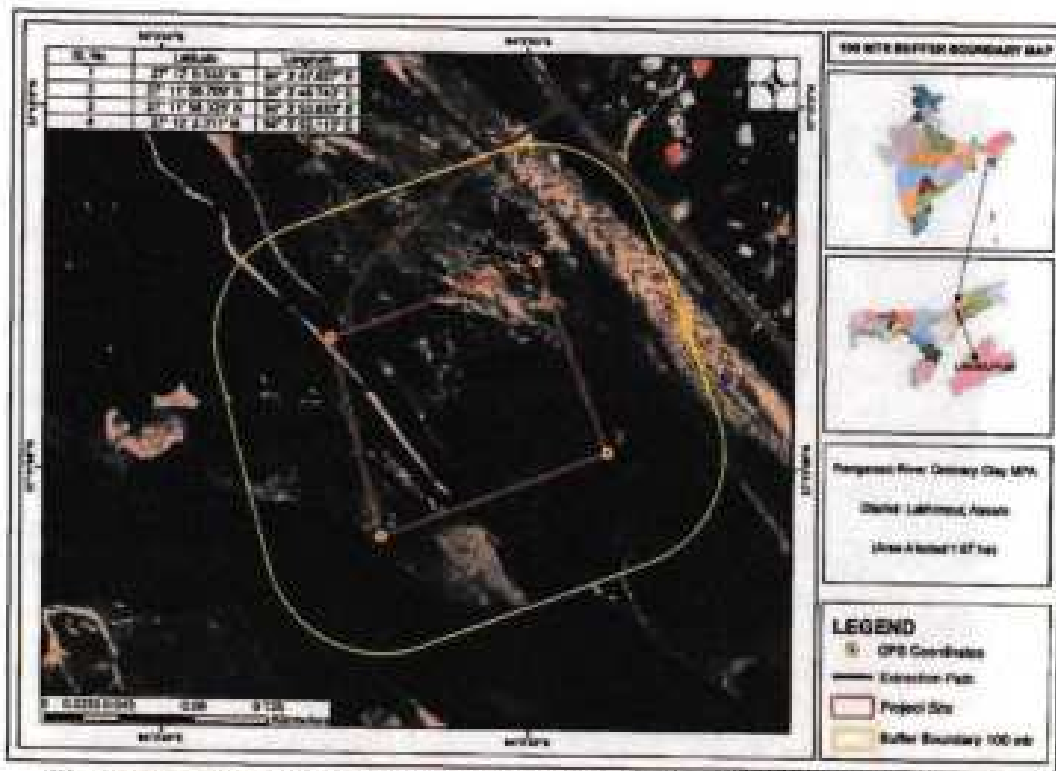


Fig. 13.23 A Ranganadi River Ordinary Clay MPA, 100m buffer map (Google Image)

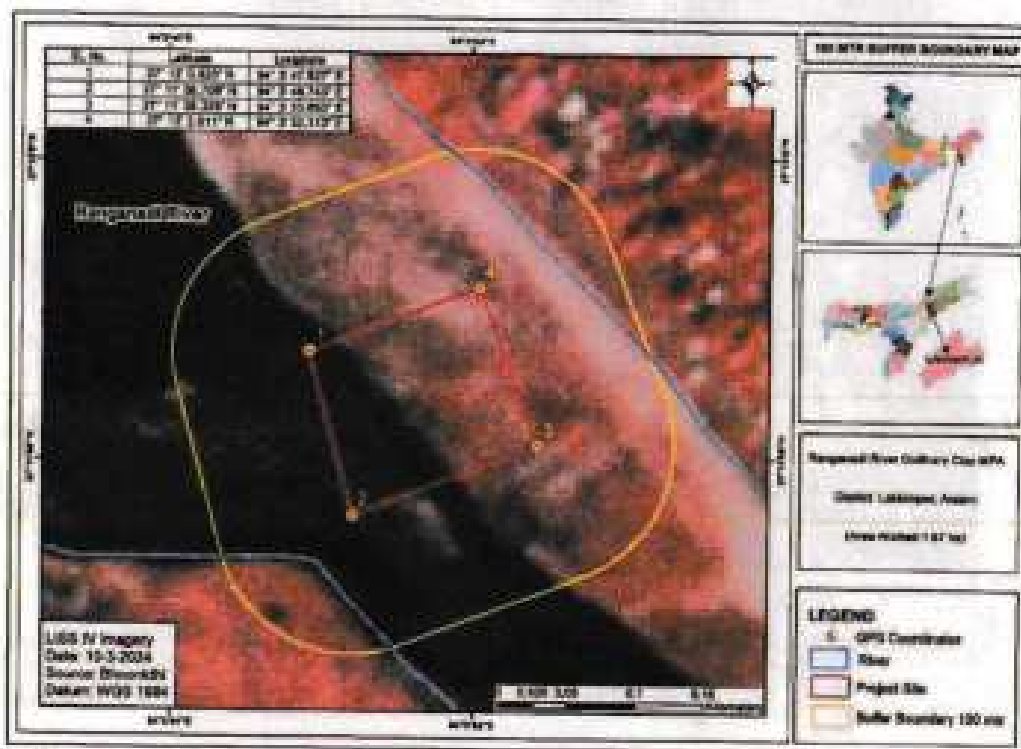


Fig. 13.23 B Ranganadi River Ordinary Clay MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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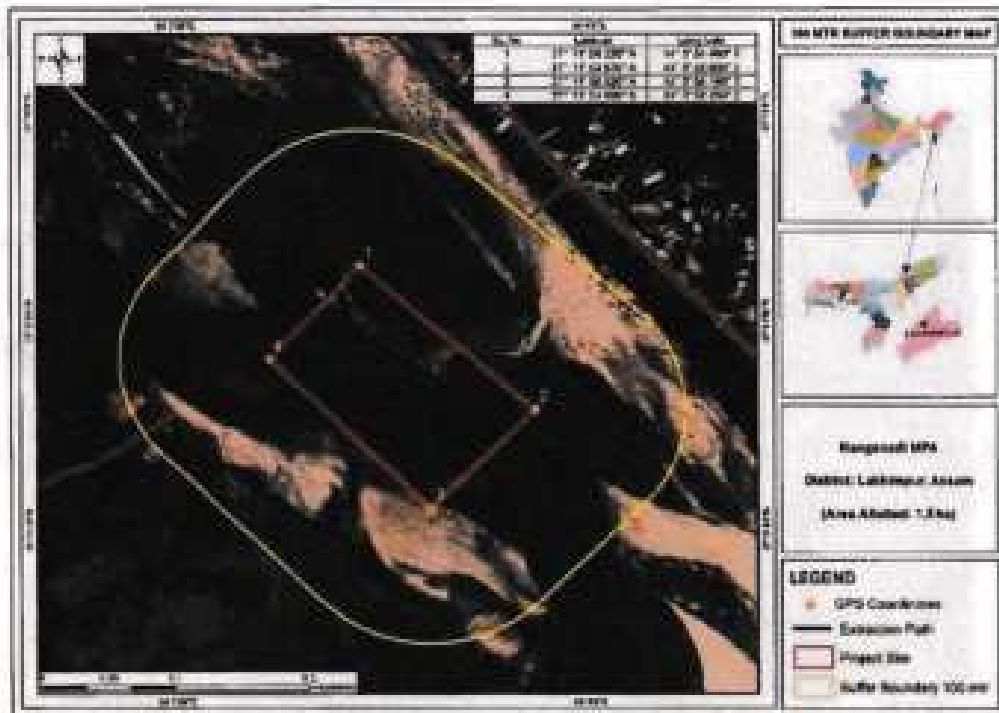


Fig. 13.24 A 1.5 ha. Ranganadi MPA (Proposed), 100m buffer map (Google Image)

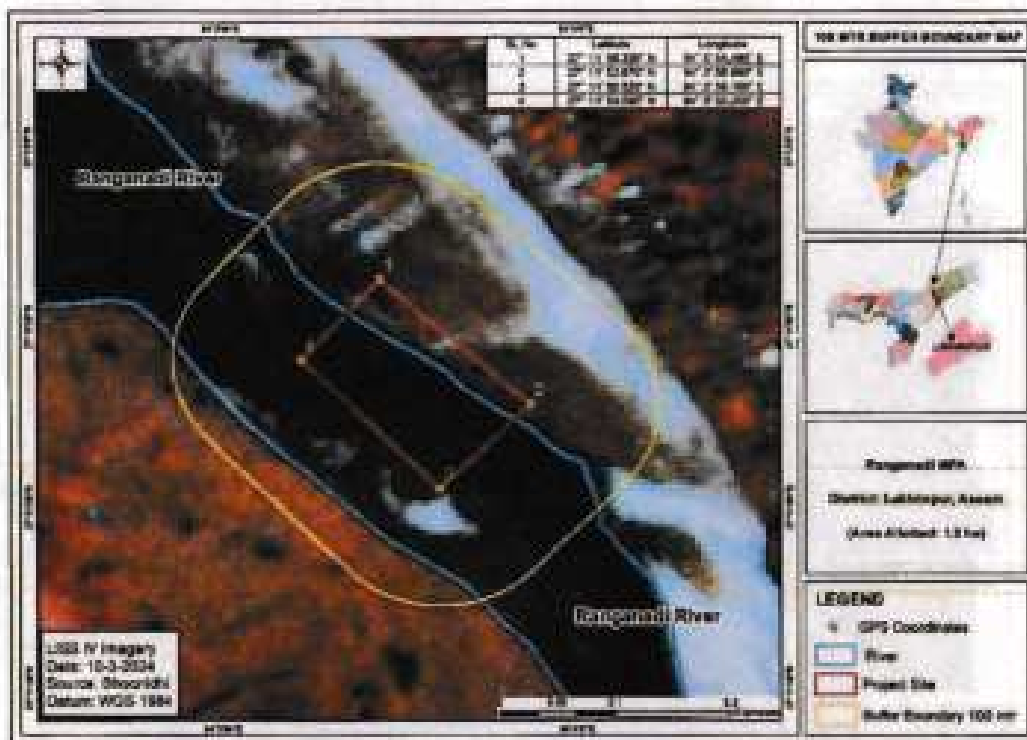


Fig. 13.24 B 1.5 ha. Ranganadi MPA (Proposed), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay



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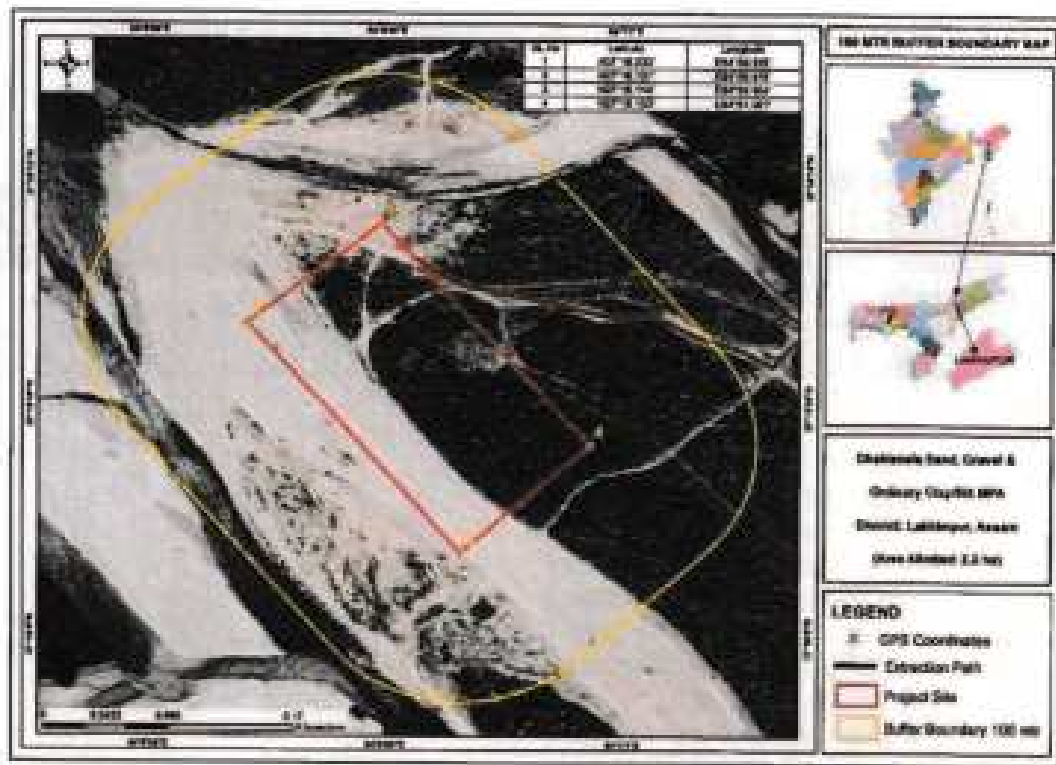


Fig. 13.25 A Dhekianala Sand, Gravel & Ordinary Clay/ Silt MPA, 100m buffer map (Google Image)

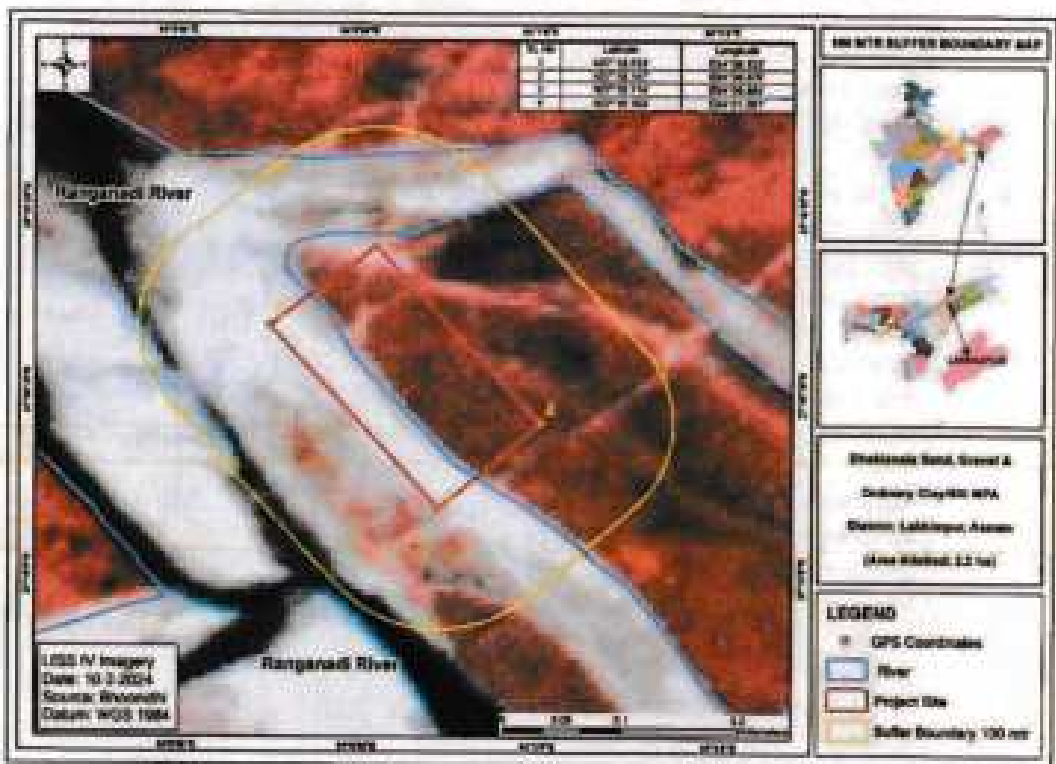


Fig. 13.25 B Dhekianala Sand, Gravel & Ordinary Clay/ Silt MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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13.4.3 Description of Mining Permit/ Contract Areas in Dikrong River:

Table 13.9: Details of Dikrong River

Sr No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Dikron River in the district	1553.17	100	0
2	Area already granted in the Dikrong River	38.61	2.49	2.49
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	6.2	0.39	2.88
6	Area not recommended for future Quarry Permit/ Contract Area grant due non- availability of un-mined block 50 meters with after every block of 1000 meters over which is undertaken or	0	0	0

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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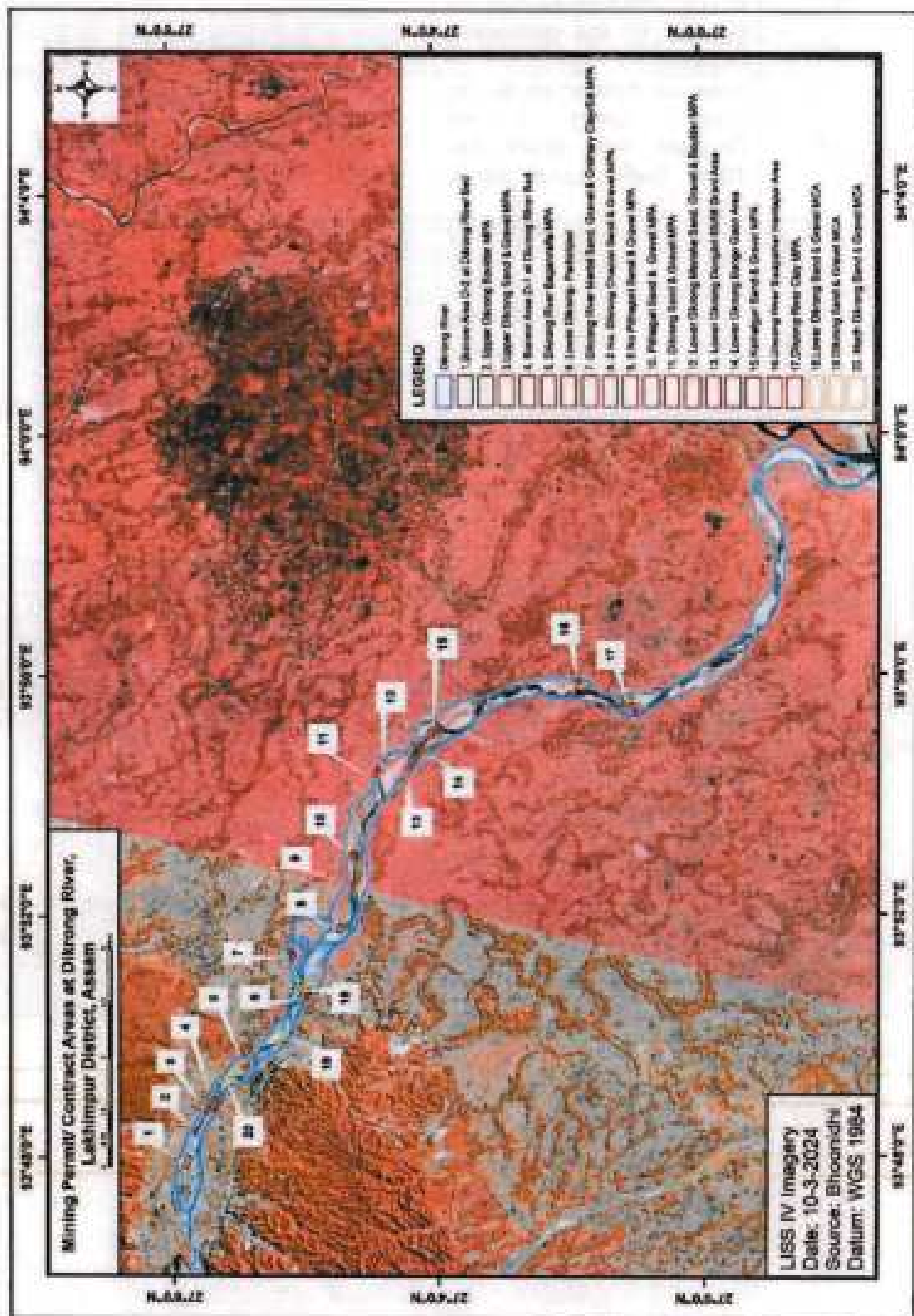
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	at such distance as may be directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco- sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	No	-	-



Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Map 13.3: Map showing Mining Permit/ Contract Areas within Dikrong River



Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Table 13.10: Status of Individual Mining Permit/ Contract Areas of Dikrong River

Sl No.	Name	Name of Mineral	Area in Ha.	Mining Area in Ha.	Period (in Year)	Operational/ Non-operational	Coordinate	
							Latitude	Longitude
1	Upper Dikrong Boulder MPA	Boulder	1.5	1.5	2	Non-operational	N27.12732°	E93.80834°
							N27.128372°	E93.806534°
							N27.127925°	E93.806018°
							N27.12686°	E93.80787°
2	Upper Dikrong Sand & Gravel MPA	Sand & Gravel	2.0	2.0	2	Non-operational	N27°07.502'	E93°48.681'
							N27°07.452'	E93°48.778'
							N27°07.474'	E93°48.828'
							N27°07.521'	E93°48.724'
3	Lower Dikrong-Parbatipur Sand & Gravel MPA	Sand & Gravel	2.2	2.2	7	Non-operational	N27°05'59.20"	E93°50'36.10"
							N27°06'00.70"	E93°50'37.30"
							N27°05'56.80"	E93°50'47.50"
							N27°05'55.30"	E93°50'47.40"
4	Dikrong Sand & Gravel MPA	Sand & Gravel	2.0	2.0	2	Non-operational	N27°4'57.699°	E94°54'17.554°
							N27°4'57.834°	E94°54'17.906°
							N27°4'52.689°	E94°54'26.240°
							N27°4'49.617°	E94°54'23.181°
5	5 No. Pithaguri Sand & Gravel MPA	Sand & Gravel	2.0	2.0	2	Non-operational	N27.087067°	E93.873756°
							N27.087876°	E93.873675°
							N27.088086°	E93.875831°
							N27.087190°	E93.875841°
6	Lower Dikrong Sand & Gravel MCA	Sand & Gravel	6.0	6.0	7	Operational	N27.102619°	E93.845252°
							N27.101475°	E93.844794°
							N27.101314°	E93.849091°
							N27.100000°	E93.848528°
7	North Dikrong Sand & Gravel MCA	Sand & Gravel	4.91	4.91	7	Operational	N27.121803°	E93.821242°
							N27.121842°	E93.820364°
							N27.117078°	E93.821398°
							N27.117294°	E93.822454°
8			1.82	1.82	2		N27.115943	E93.824605

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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	Dikrong River Bagannalla MPA	Sand & Gravel				Non-operational	N27.115590 N27.113889 N27.114247	E93.824089 E93.825035 E93.825995
9	Dikrong Sand & Gravel MCA	Sand & Gravel	10.0	10.0	7	Non-operational	N27°6'26.280" N27°6'31.975" N27°6'21.928" N27°6'16.027"	E93°49'49.199" E93°49'53.828" E93°50'6.389" E93°50'2.234"
10	2.0 Ha. Kathalguri Sand & Gravel Mining Permit Area	Sand & Gravel	2.0	2.0	2	Non-operational	N27.068385 N27.067979 N27.065840 N27.066156	E93.918070 E93.917334 E93.918420 E93.919034
11	Lower Dikrong Meneha Sand, Gravel & Boulder MPA	Sand, Gravel & Boulder	1.47	1.47	2	Non-operational	N27°04'56.64" N27°04'54.43" N27°04'52.30" N27°04'47.71"	E93°54'21.27" E93°54'19.48" E93°54'26.59" E93°54'23.55"
12	Dikrong River Merbil Sand, Gravel & Ordinary Clay/ Silt MPA	Sand, Gravel & Ordinary Clay/ Silt	2.71	2.71	2	Non-operational	N27°6'7.56" N27°6'11.80" N27°6'14.13" N27°6'13.60"	E93°51'19.55" E93°51'13.70" E93°51'26.26" E93°51'26.66"



Minerals: Sand, Gravel, Boulder, Ordinary Clay

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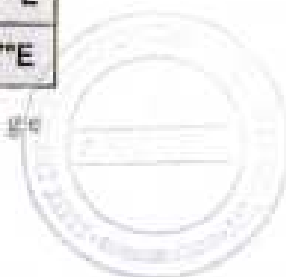
**Table 13.11: Details of Individual Mining Permit/ Contract of Dikrong River
(New Mining area proposed)**

Sr No.	Permit area details	Name of Mineral	Area allotted in Ha.	Coordinate	
				Latitude	Longitude
1	2.33 Ha. Pithaguri Sand & Gravel MPA	Sand & Gravel	2.33	27° 5' 14.200" N	93° 53' 3.156" E
				27° 5' 18.448" N	93° 53' 2.436" E
				27° 5' 17.944" N	93° 52' 56.745" E
				27° 5' 12.688" N	93° 52' 57.645" E
2	2.24 Ha. 2 No. Dikrong Chapori Sand & Gravel MPA	Sand & Gravel	2.24	27° 5' 26.534" N	93° 51' 42.65" E
				27° 5' 29.734" N	93° 51' 43.65" E
				27° 5' 22.934" N	93° 51' 48.35" E
				27° 5' 28.334" N	93° 51' 50.55" E
3	Dikrong River Clay Mining Permit Area	Ordinary Clay/ Silt	4.53	27.01632901	93.92417608
				27.01646399	93.92304011
				27.01748101	93.92416807
				27.01886101	93.92458804
				27.02003602	93.92511101
				27.01962003	93.92614098
				27.01733102	93.92519804
4	Borrow Area "D-1" at Dikrong River Bed	Sand & Gravel	4.91	27°7'21.580" N	93°48'59.320" E
				27°7'18.340" N	93°48'55.840" E
				27°7'23.310" N	93°48'45.260" E
				27°7'27.410" N	93°48'48.450" E
5	Borrow Area "D-2" at Dikrong River Bed	Sand & Gravel	4.64	27°7'46.782" N	93°48'1.648" E
				27°7'43.282" N	93°47'59.188" E
				27°7'47.541" N	93°47'48.587" E
				27°7'52.021" N	93°47'50.457" E
6	Lower Dikrong Dongibil	Ordinary Clay/ Silt	2.30	27° 4' 26.679" N	93°54'24.197" E
				27° 4' 29.131" N	93°54'26.077" E

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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	65/68 Grant Area			27° 4' 25.205" N	93°54'32.486" E
				27° 4' 22.024" N	93°54'29.165" E
7	Lower Dikrong Bango Gaon Area	Ordinary Clay/ Silt	2.40	27° 4' 14.162" N	93°54'38.818" E
				27° 4' 15.501" N	93°54'41.824" E
				27° 4' 10.706" N	93°54'45.694" E
				27° 4' 8.478" N	93°54'43.833" E
8	Dikrong River Sisapathar Hantapur Area	Ordinary Clay/ Silt	2.21	27° 1' 53.004" N	93°55'55.232" E
				27° 1' 53.623" N	93°55'52.064" E
				27° 1' 49.199" N	93°55'50.192" E
				27° 1' 50.293" N	93°55'54.858" E

Dokrong river area in the district is 1553.17 Ha and area already granted in the River is 38.61 Ha. The riverbed is having a total of 12 mine Permit/ Contract Areas. Out of 12, 9 areas are of mineral-Sand & Gravel, 1 area is of Boulder, 1 area is of Sand, Gravel & Boulder and rest 1 are of mineral Sand, Gravel & Ordinary Clay. Out of these 12 Mining Permit/ Contract areas, 2 areas in the operational condition and 10 areas are in non-operational condition. 8 new areas are identified for future mining project for sand, gravel and ordinary clay. There is no applicability of Cluster due to non presence of mining areas within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, Go- zone and No-Go zone has been identified. Total Go zone area is 57.97 Ha (inclusive of 8 proposed areas) and No-Go zone area is 6.2 Ha. Out of all mining areas, no areas falls within 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 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. 6.2 Ha areas fall within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads.

Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below (with extraction path).

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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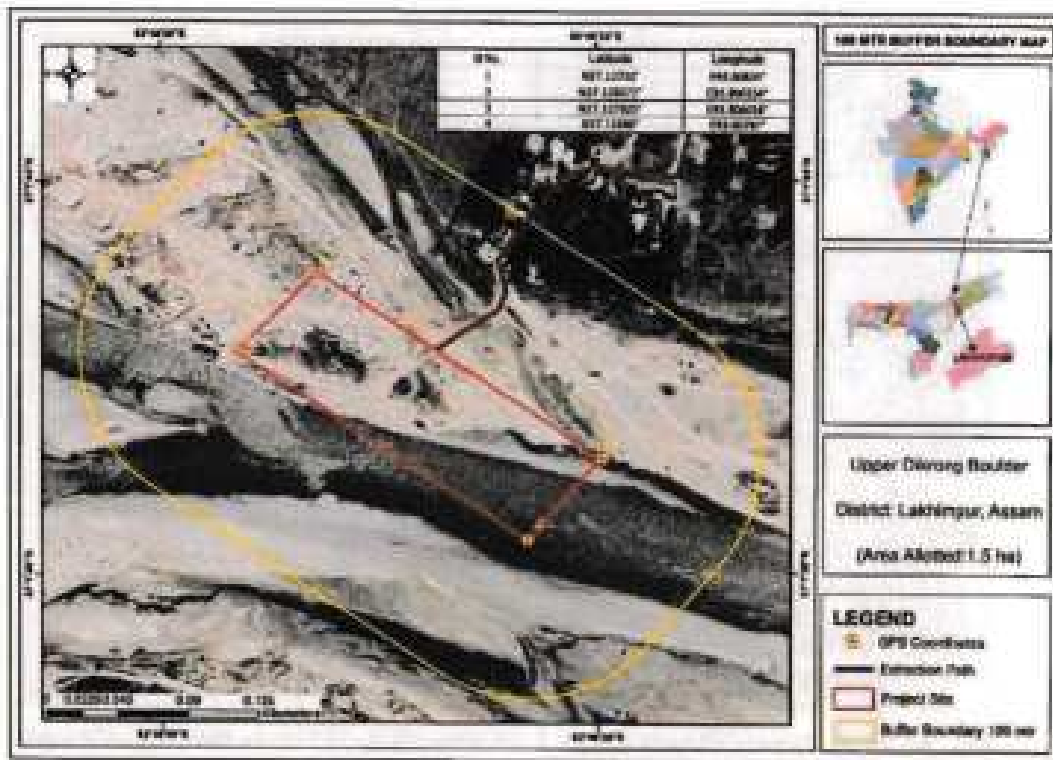


Fig. 13.26 A Upper Dikrong Boulder MPA, 100m buffer map (Google Image)

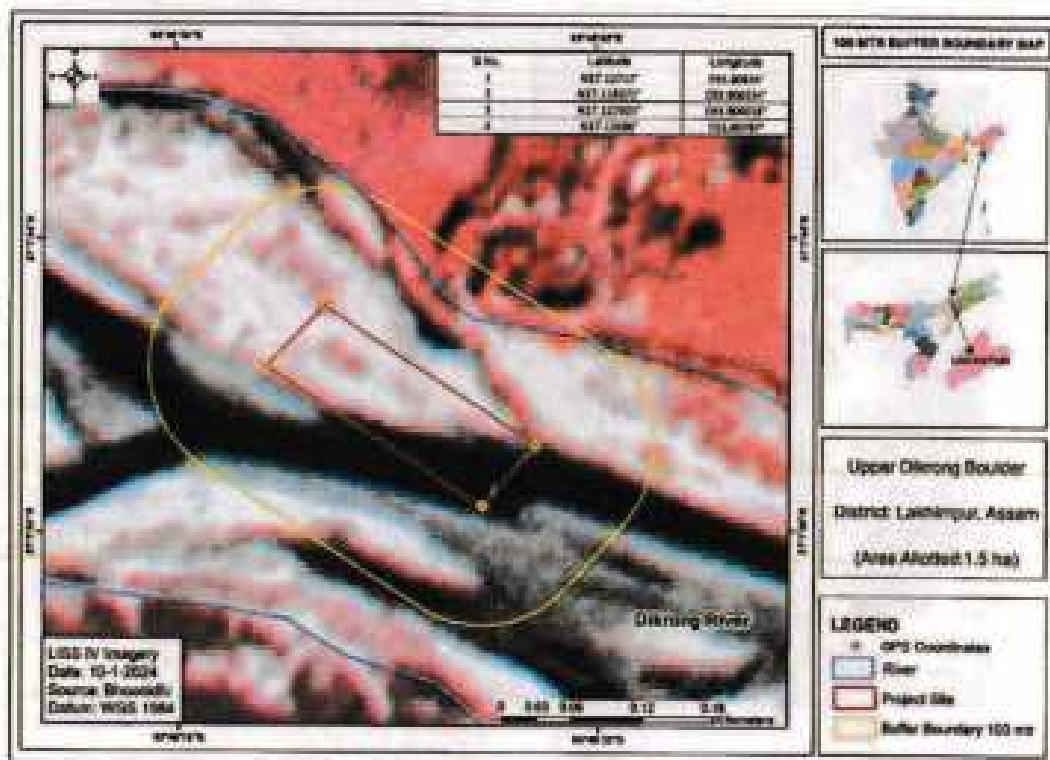


Fig. 13.26 B Upper Dikrong Boulder MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



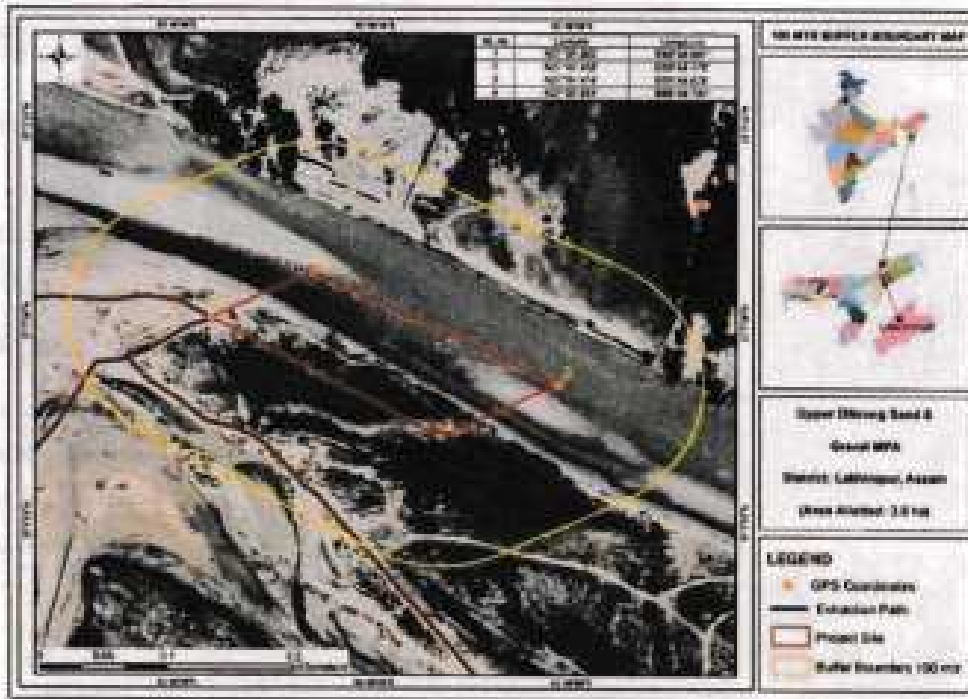


Fig. 13.27 A Upper Dikrong Sand & Gravel MPA, 100m buffer map (Google Image)

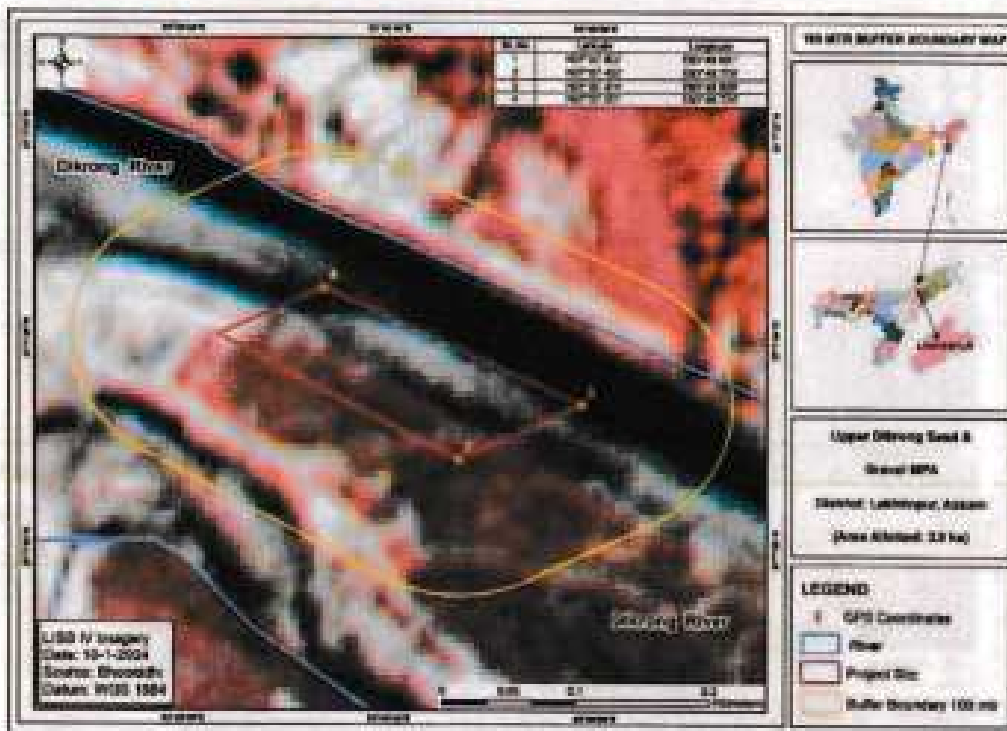


Fig. 13.27 B Upper Dikrong Sand & Gravel MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer
 Lakhimpur Division
 Road Lakhimpur.



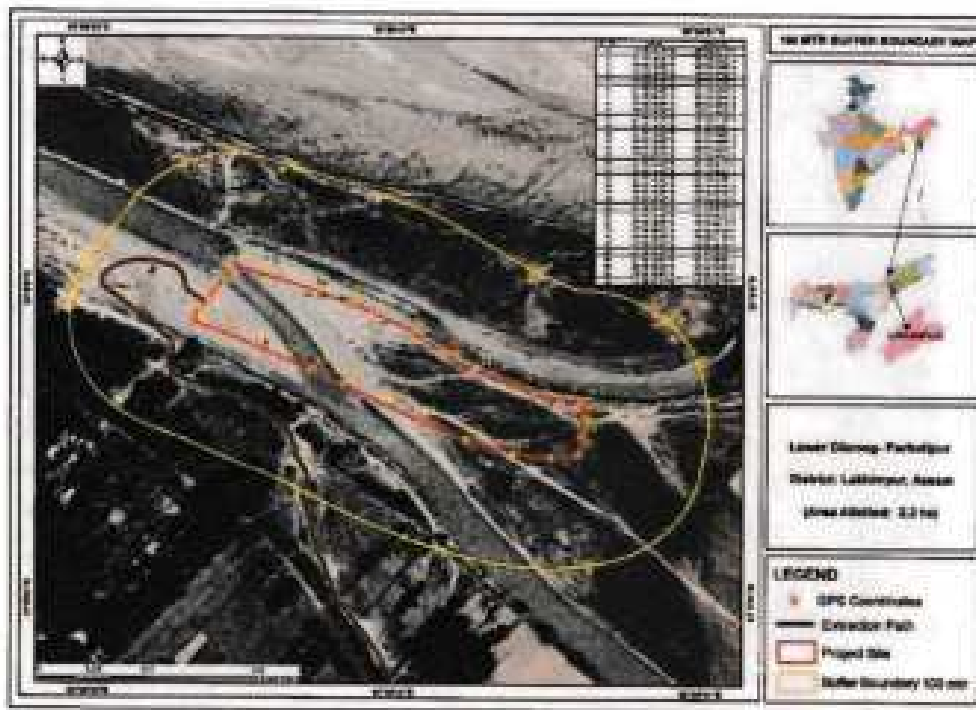


Fig. 13.28 A Lower Dikrong-Parbatipur Sand & Gravel MPA, 100m buffer map (Google Image)

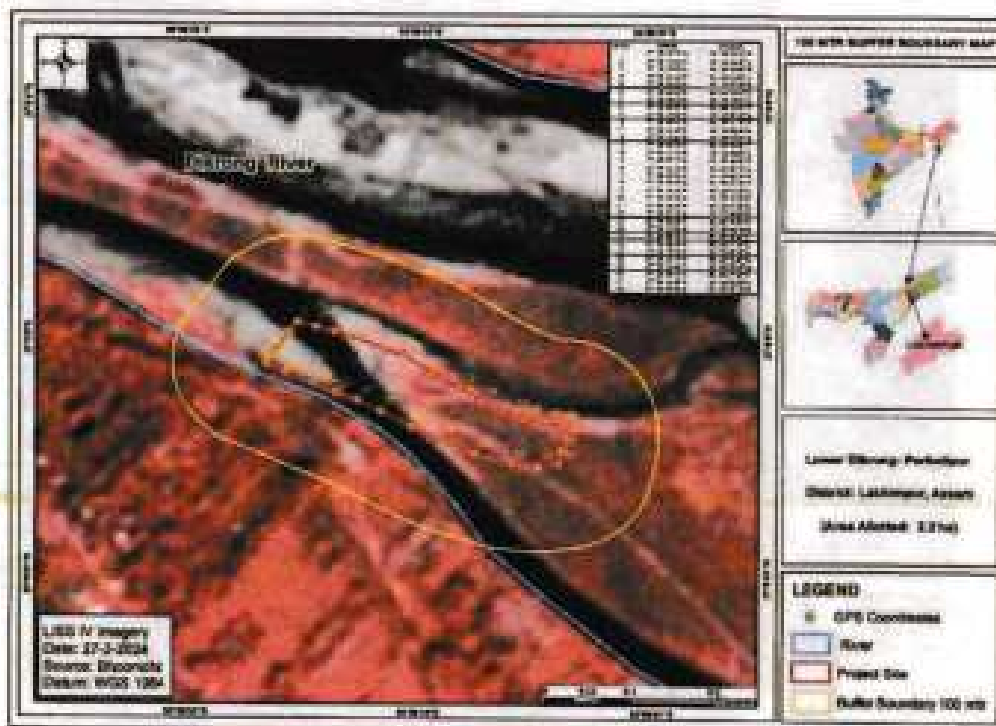


Fig. 13.28 B Lower Dikrong-Parbatipur Sand & Gravel MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



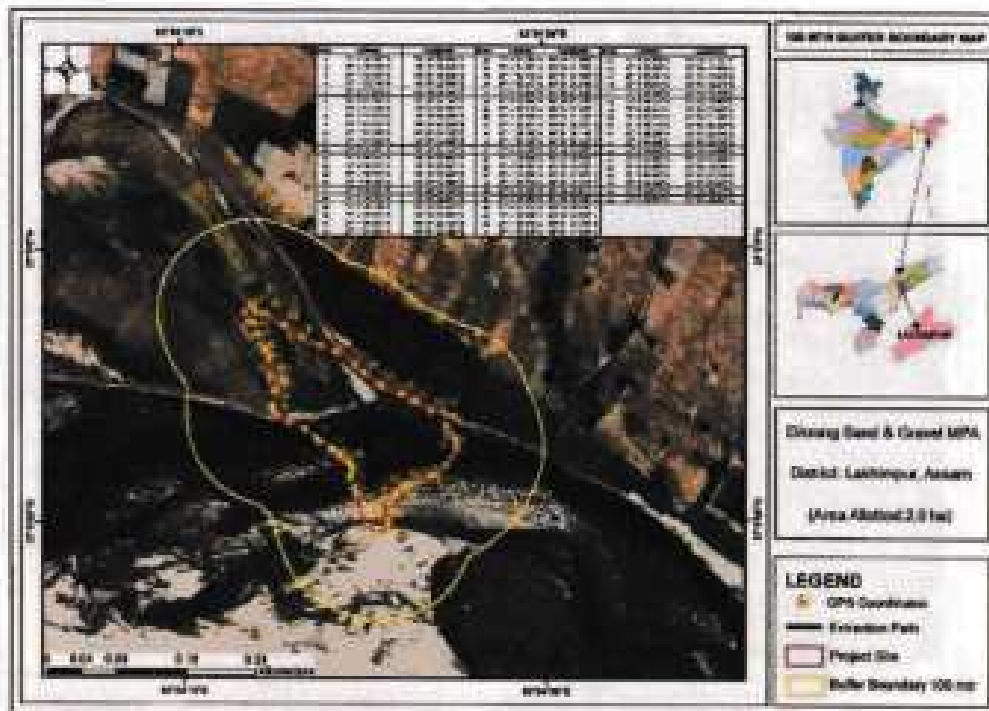


Fig. 13.29 A Dikrong Sand & Gravel MPA, 100m buffer map (Google Image)

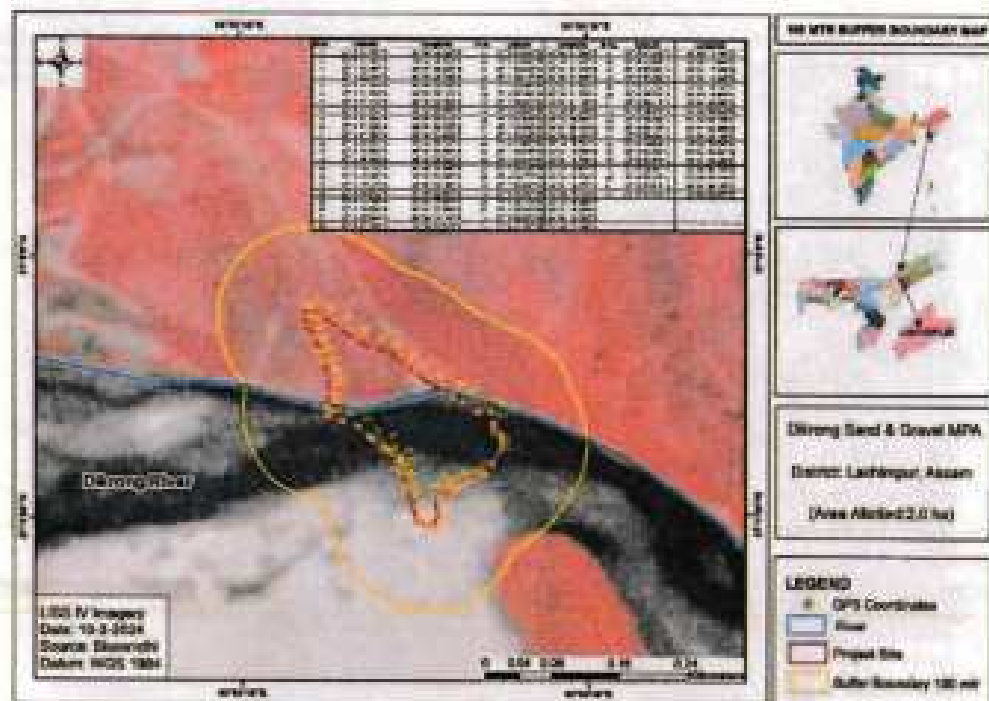


Fig. 13.29 B Dikrong Sand & Gravel MPA, 100m buffer map (Satellite Image)



Minerals: Sand, Gravel, Boulder, Ordinary Clay

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North Lakhimpur.

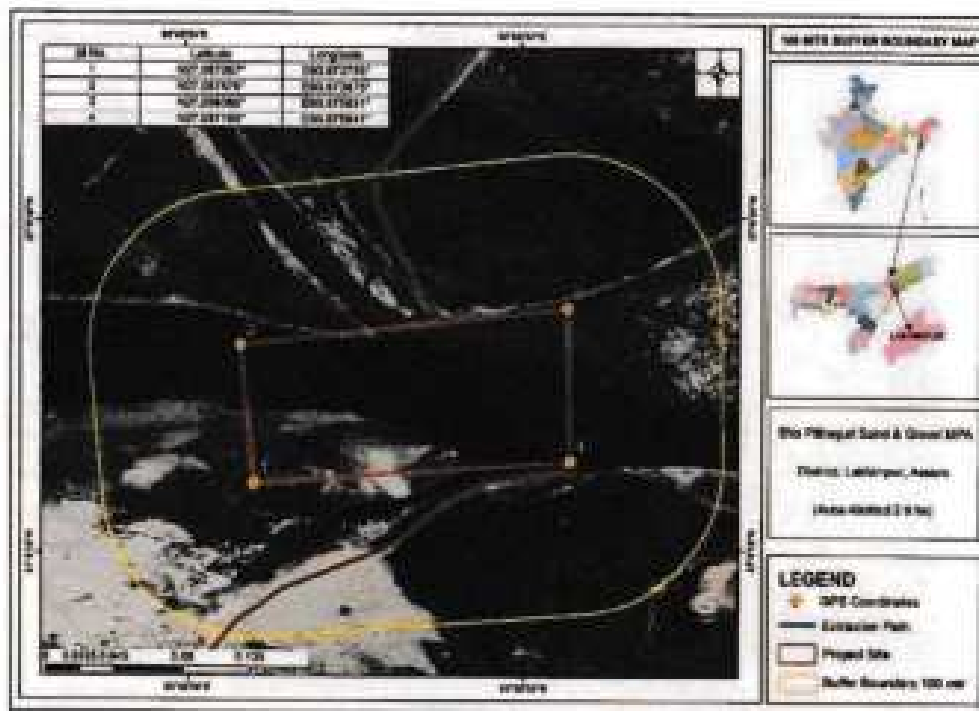


Fig. 13.30 A 5 No Pithaguri Sand & Gravel MPA, 100m buffer map (Google Image)

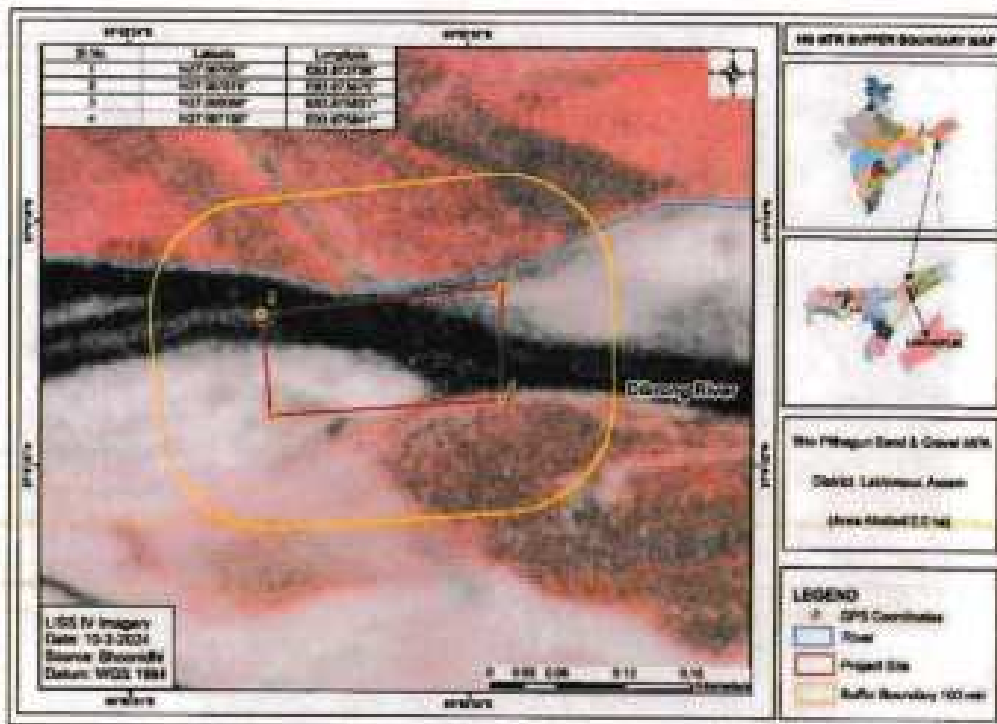


Fig. 13.30 B 5 No Pithaguri Sand & Gravel MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Lakhimpur Division
North Lakhimpur.



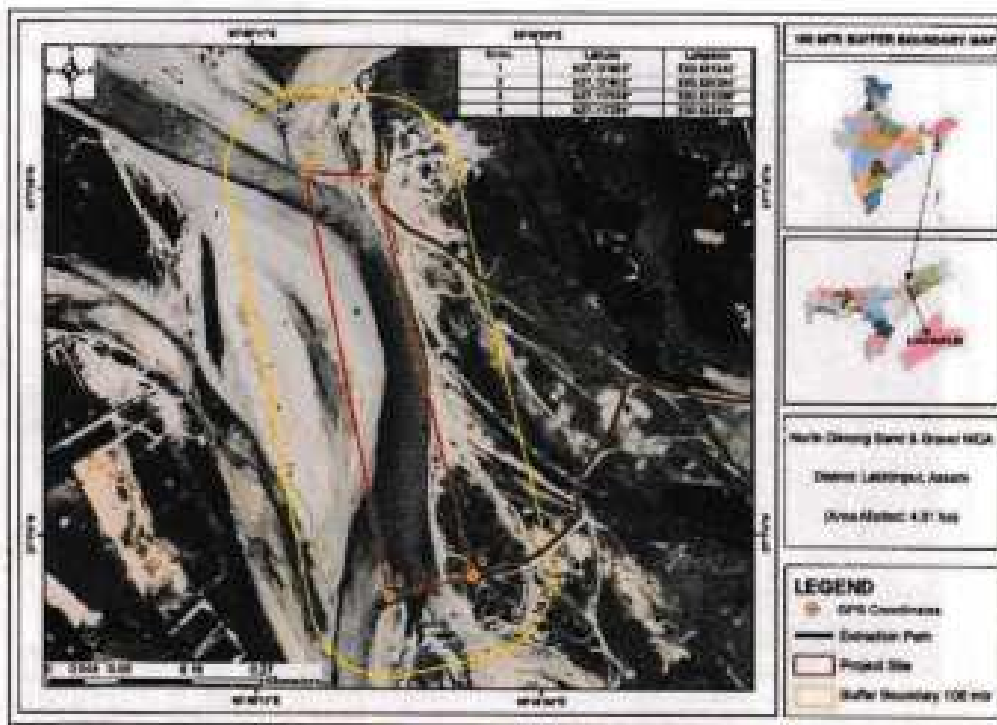


Fig. 13.31 A North Dikrong Sand & Gravel MCA, 100m buffer map (Google Image)

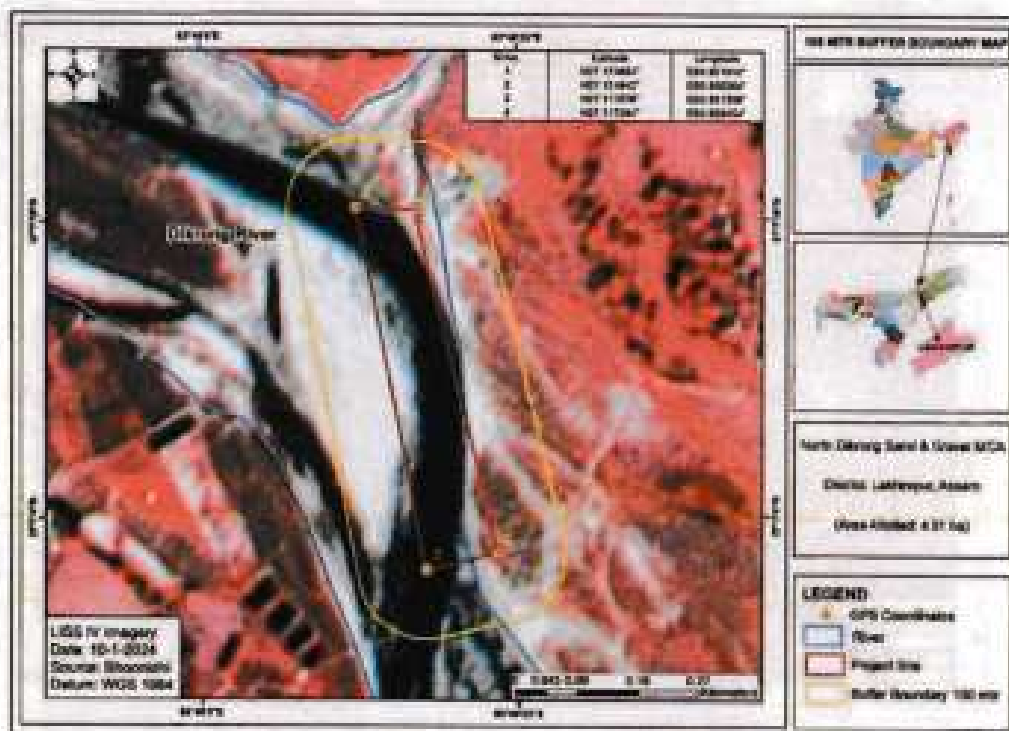


Fig. 13.31 B North Dikrong Sand & Gravel MCA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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North Lakhimpur.

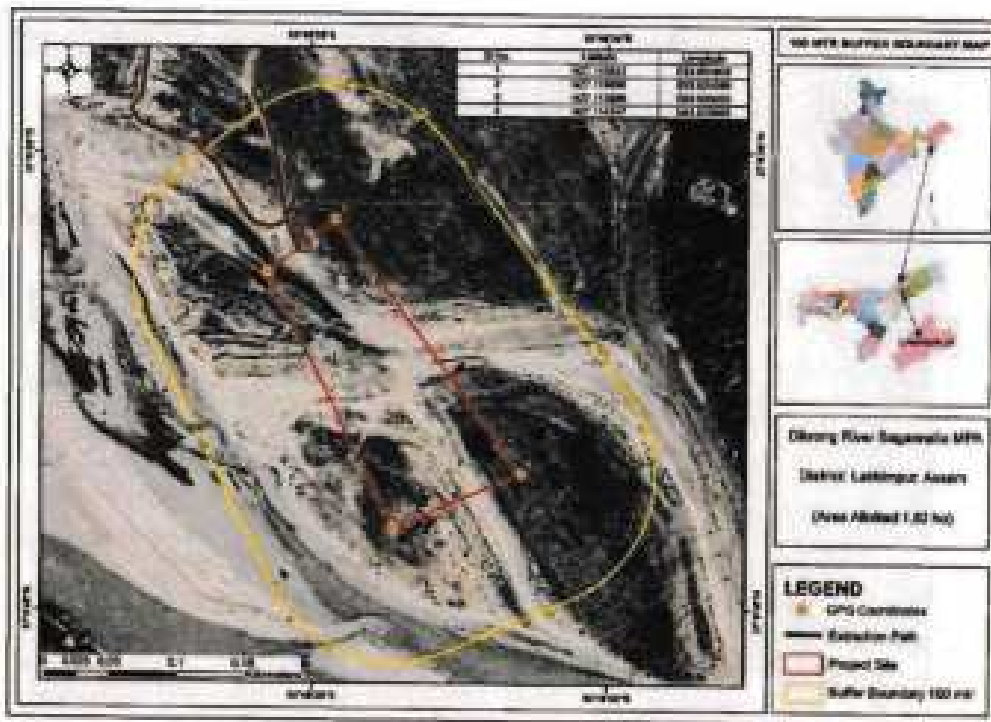


Fig. 13.32 A Dikrong River Bagannalla MPA, 100m buffer map (Google Image)

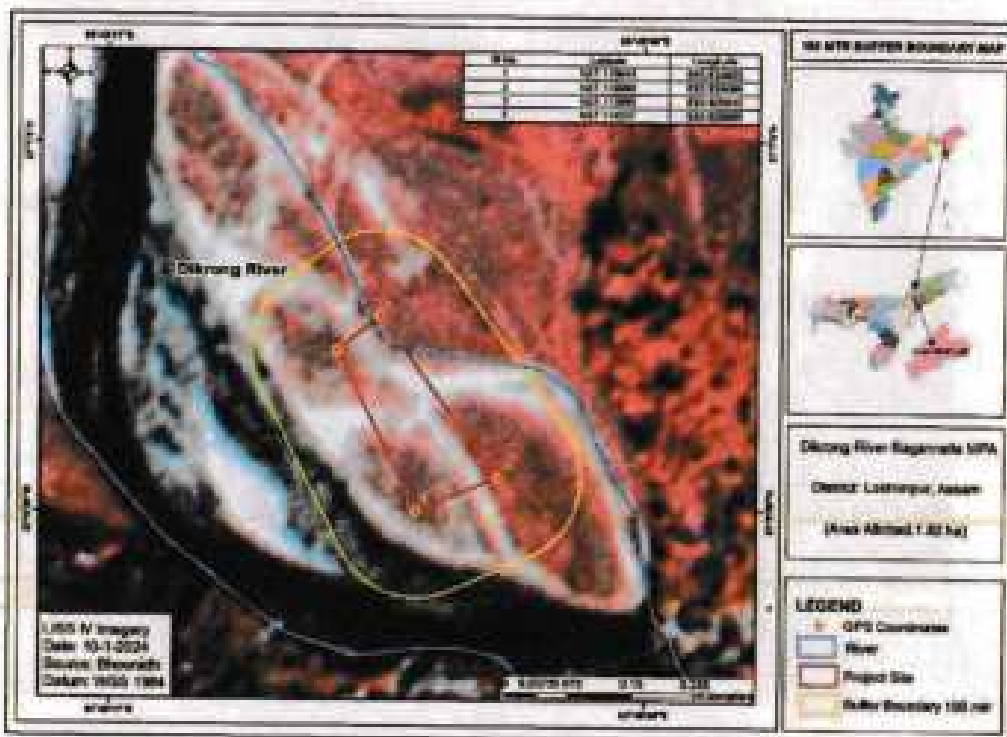


Fig. 13.32 B Dikrong River Bagannalla MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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North Lakhimpur.



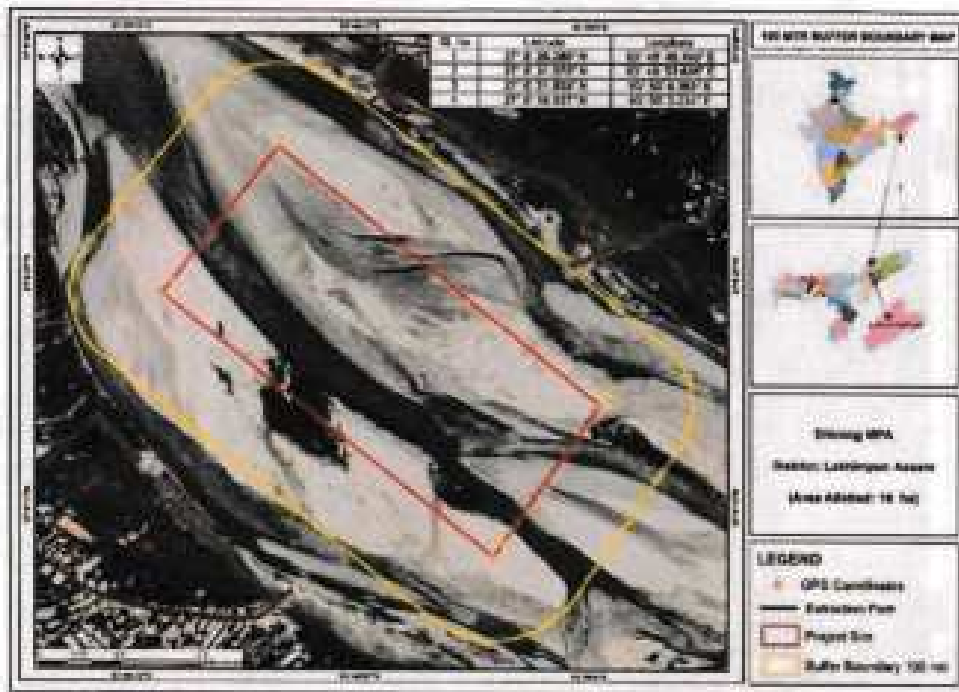


Fig. 13.33 A Dikrong Sand & Gravel MCA, 100m buffer map (Google Image)

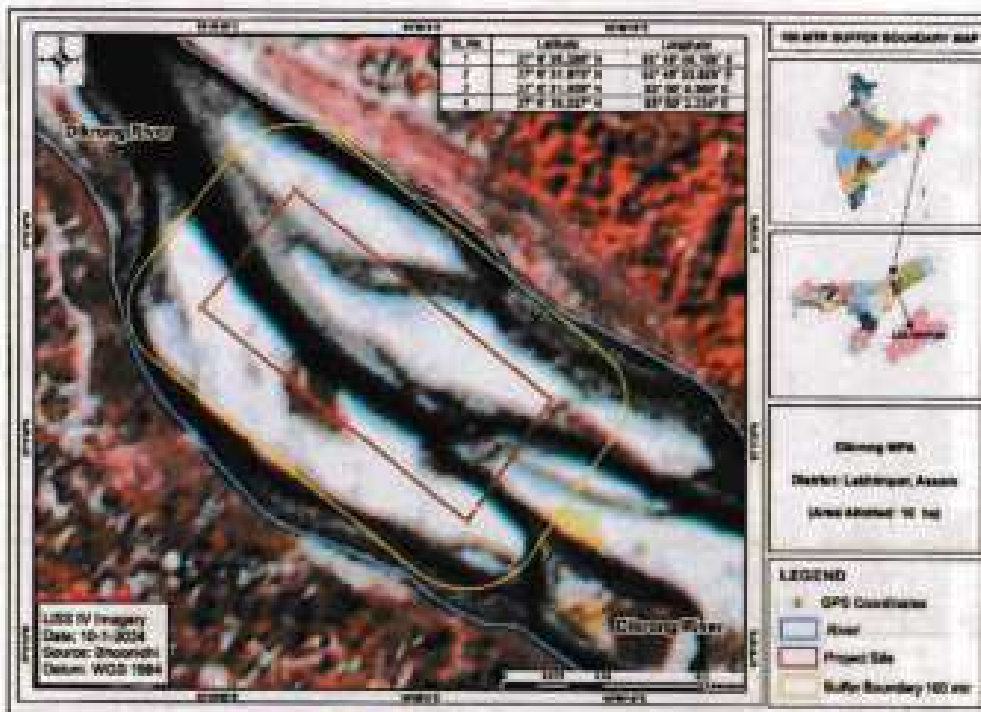


Fig. 13.33 B Dikrong Sand & Gravel MCA, 100m buffer map (Satellite Image)

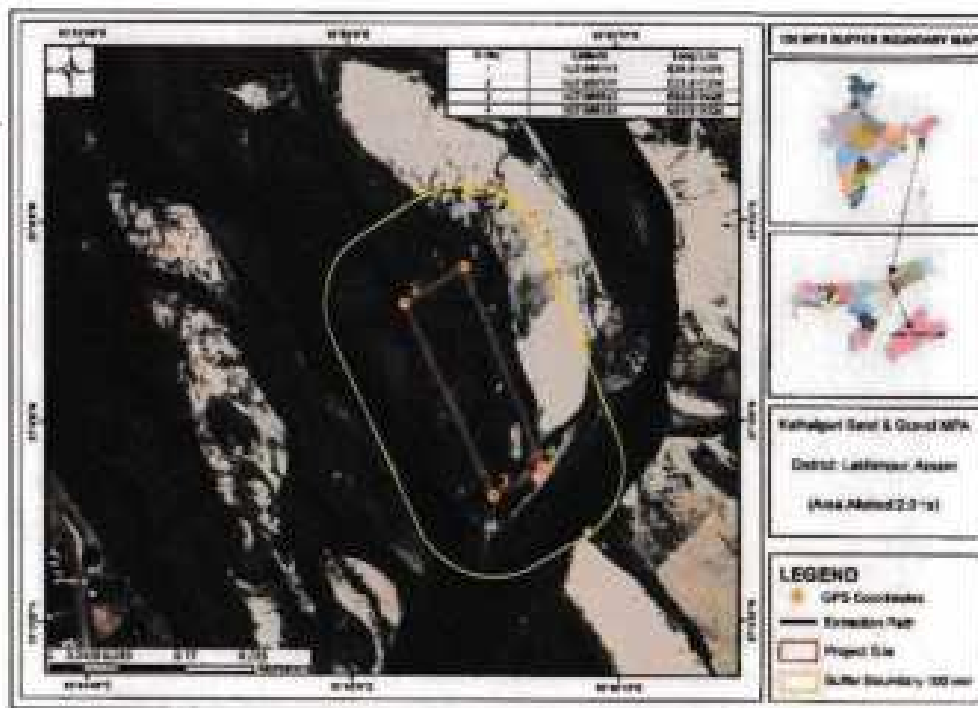


Fig. 13.34 A 2.0 Ha. Kathalguri Sand & Gravel Mining Permit Area, 100m buffer map (Google Image)

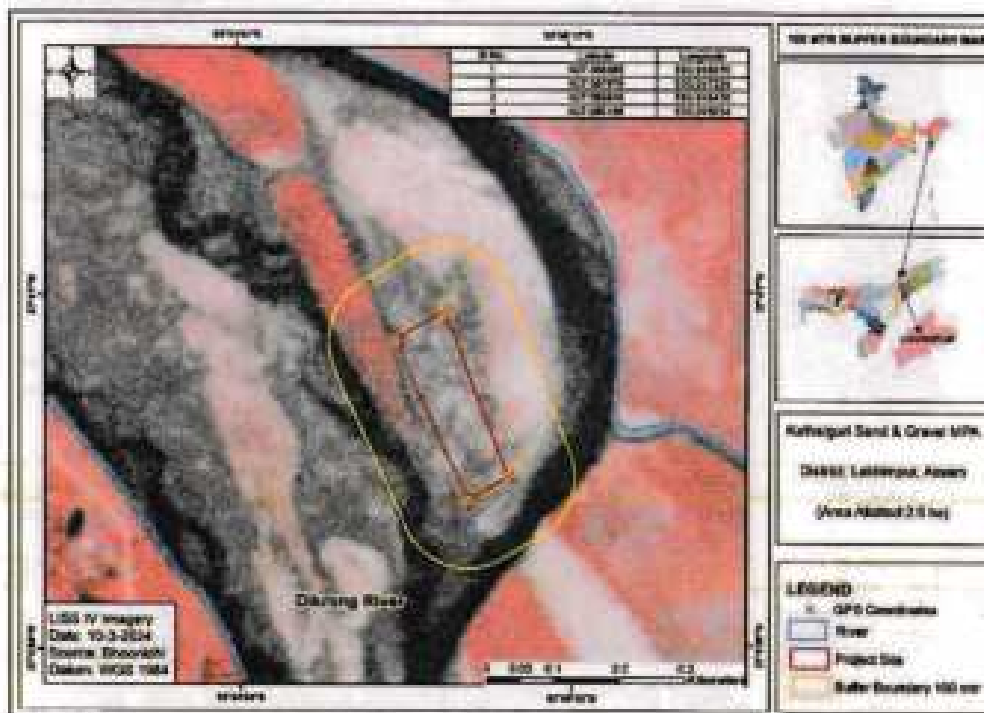


Fig. 13.34 B 2.0 Ha. Kathalguri Sand & Gravel Mining Permit Area, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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North Lakhimpur.

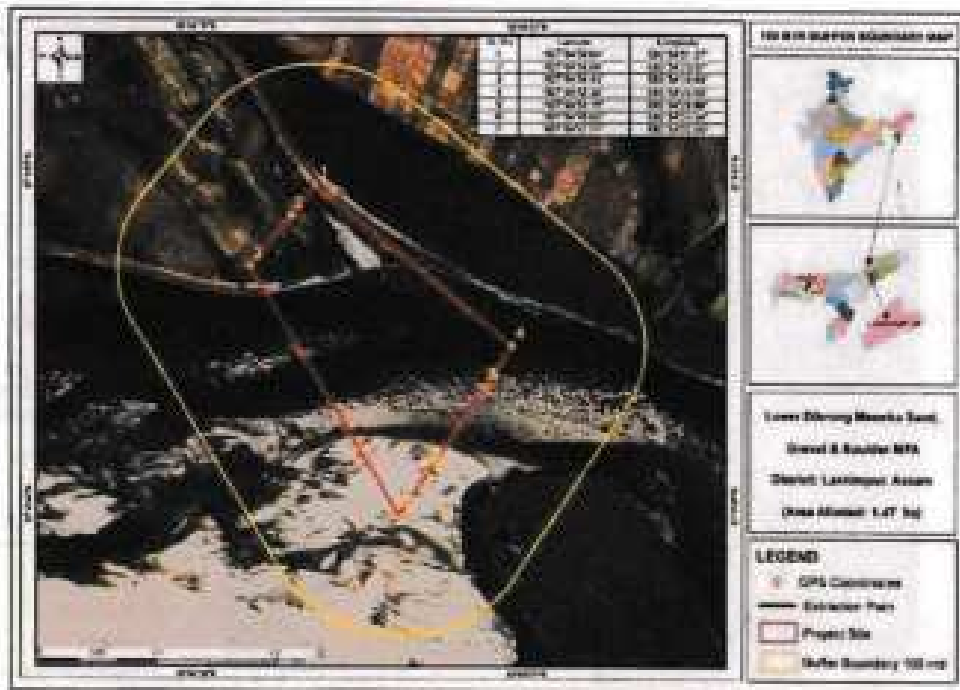


Fig. 13.35 A Lower Dikrong Meneha Sand, Gravel & Boulder MPA, 100m buffer map (Google Image)

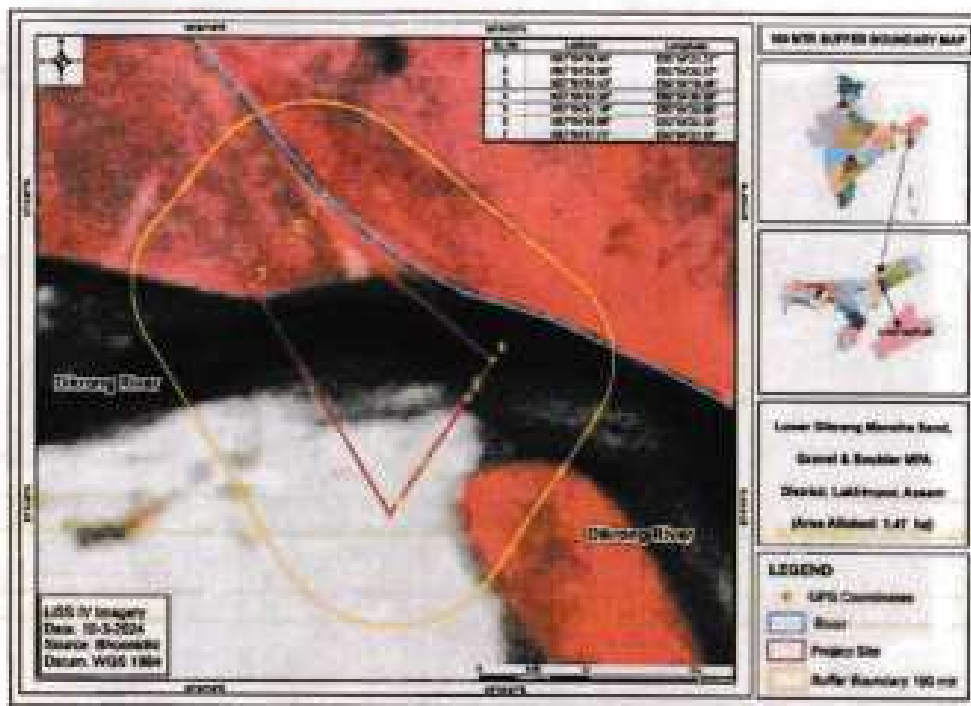


Fig. 13.35 B Lower Dikrong Meneha Sand, Gravel & Boulder MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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North Lakhimpur.



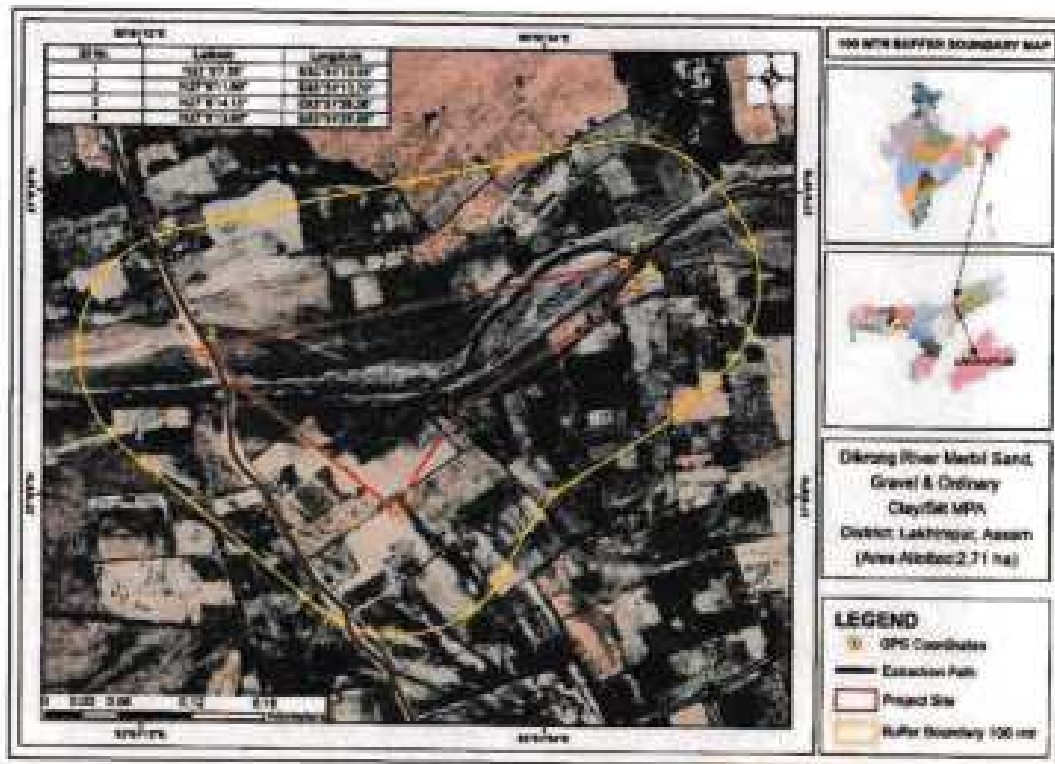


Fig. 13.36 A Dikrong River Merbil Sand, Gravel & Ordinary Clay/ Silt MPA, 100m buffer map (Google Image)

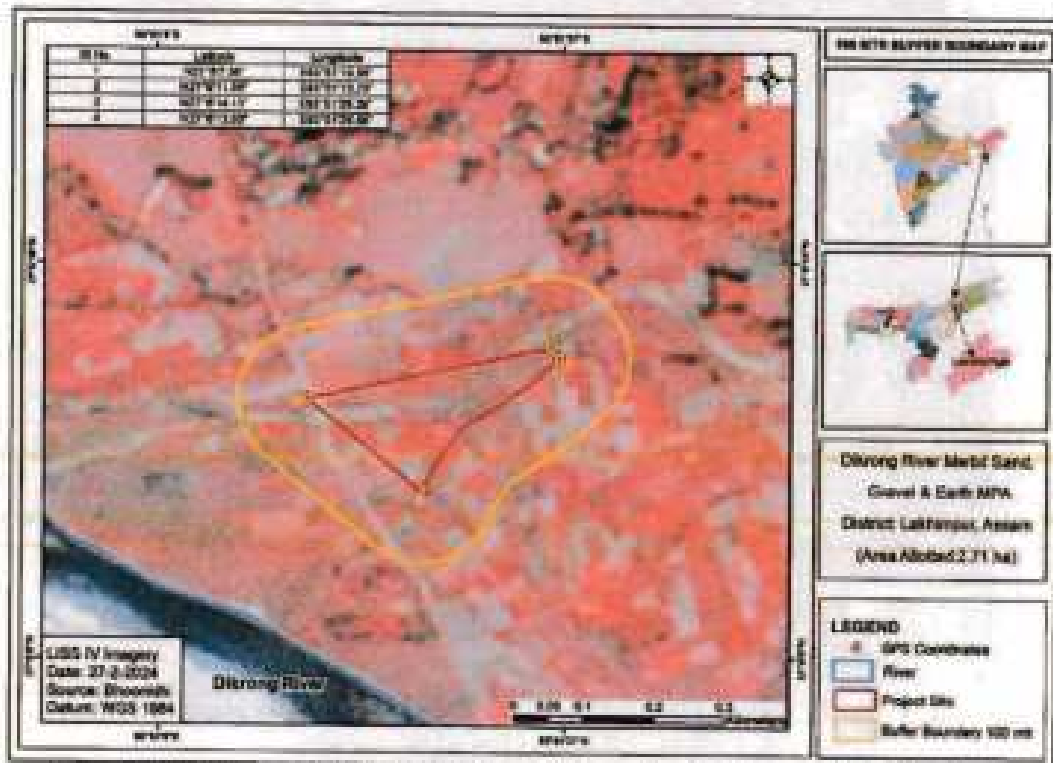


Fig. 13.36 B Dikrong River Merbil Sand, Gravel & Ordinary Clay/ Silt MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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 North Lakhimpur



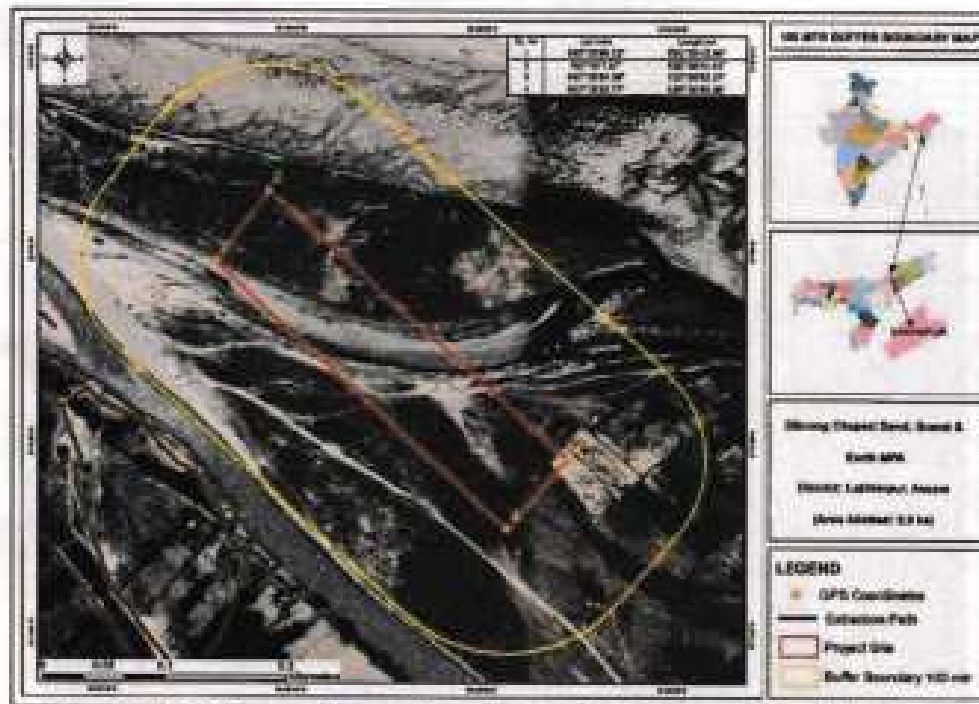


Fig. 13.37 A Dikrong Chapori Sand, Gravel & Ordinary Clay/ Silt MPA, 100m buffer map (Google Image)

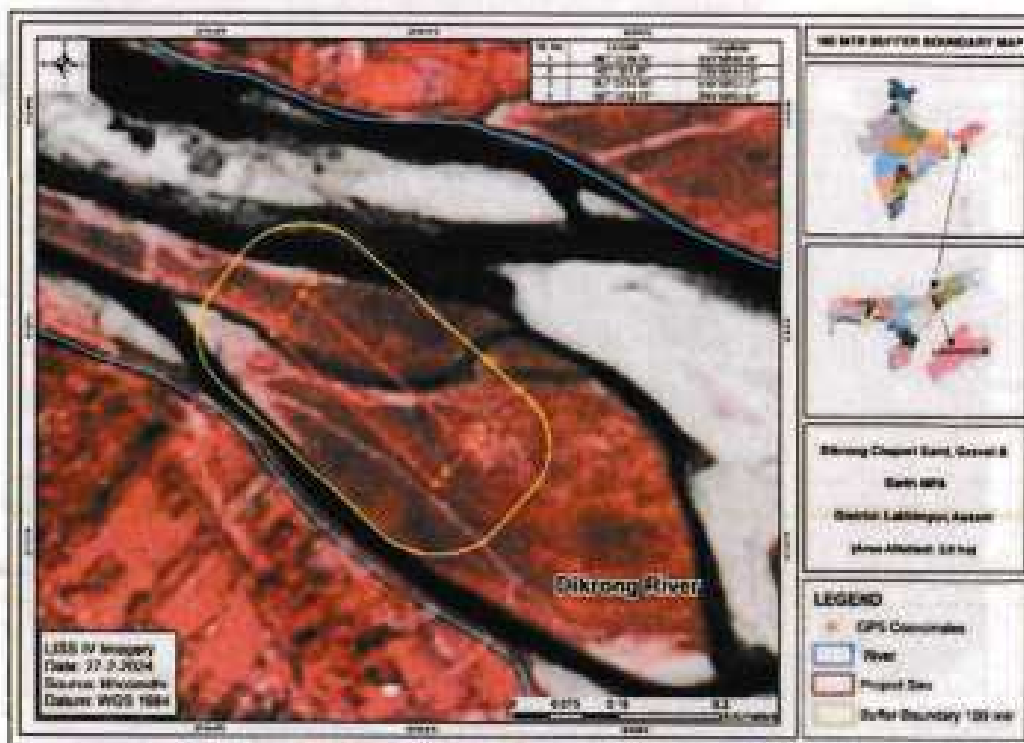


Fig. 13.37 B Dikrong Chapori Sand, Gravel & Ordinary Clay/ Silt MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer
 Lakhimpur Division
 North Lakhimpur.



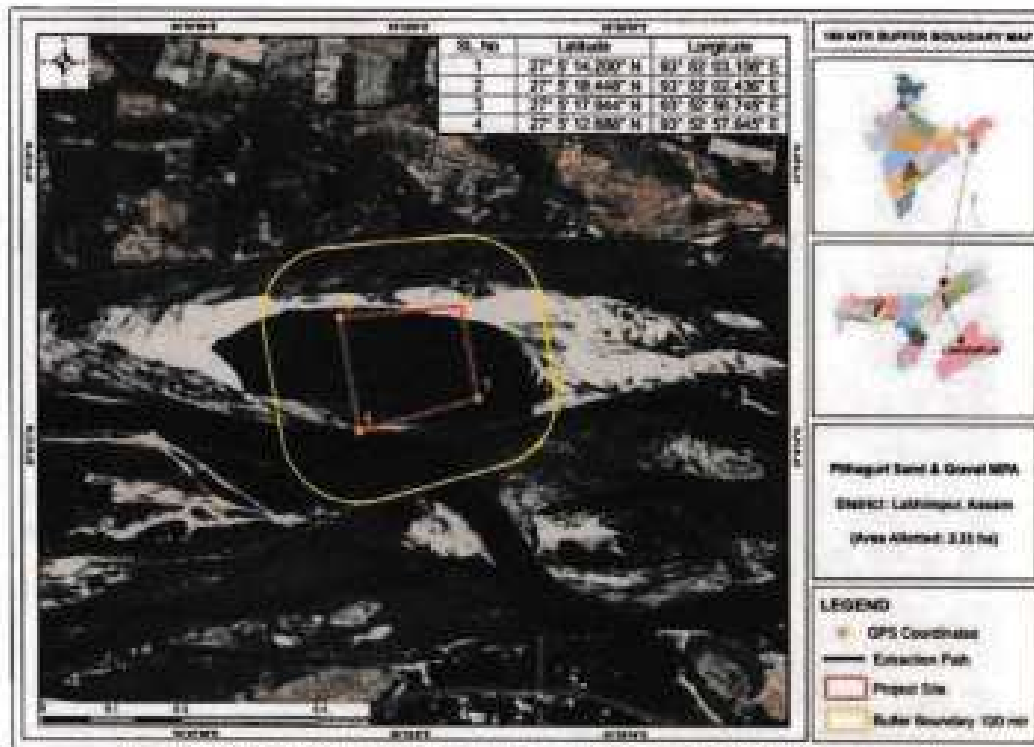


Fig. 13.38 A 2.33 Ha. Pithaguri Sand & Gravel MPA (Proposed), 100m buffer map (Google Image)

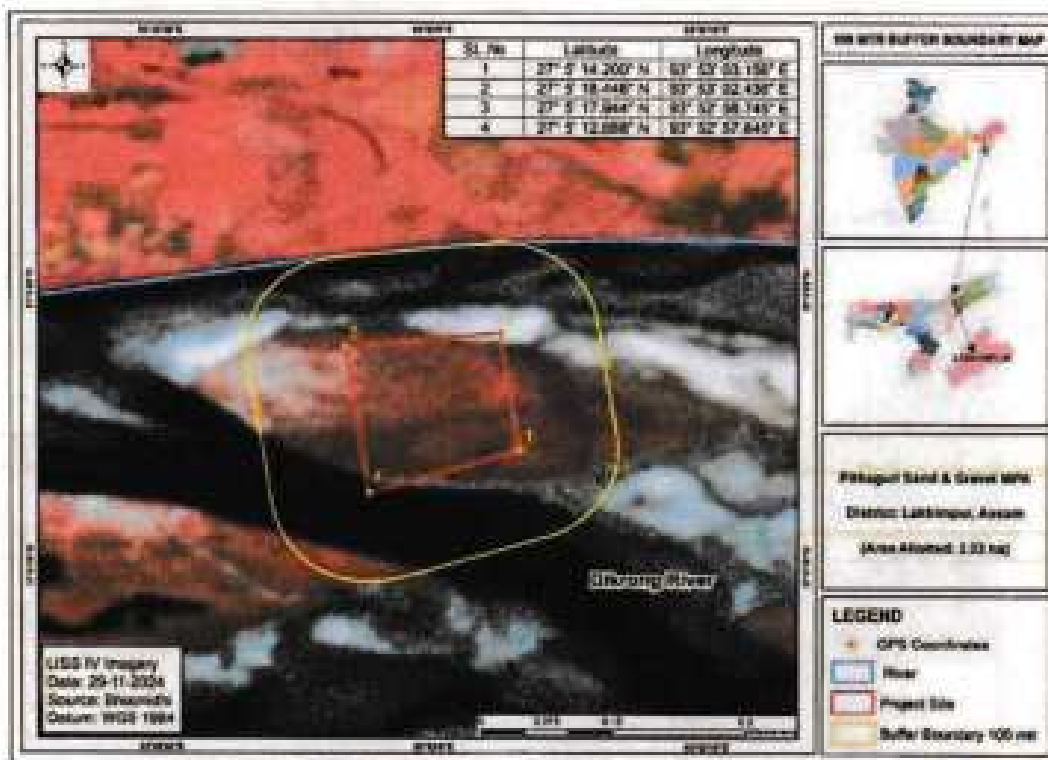


Fig. 13.38 B 2.33 Ha. Pithaguri Sand & Gravel MPA (Proposed), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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North Lakhimpur.



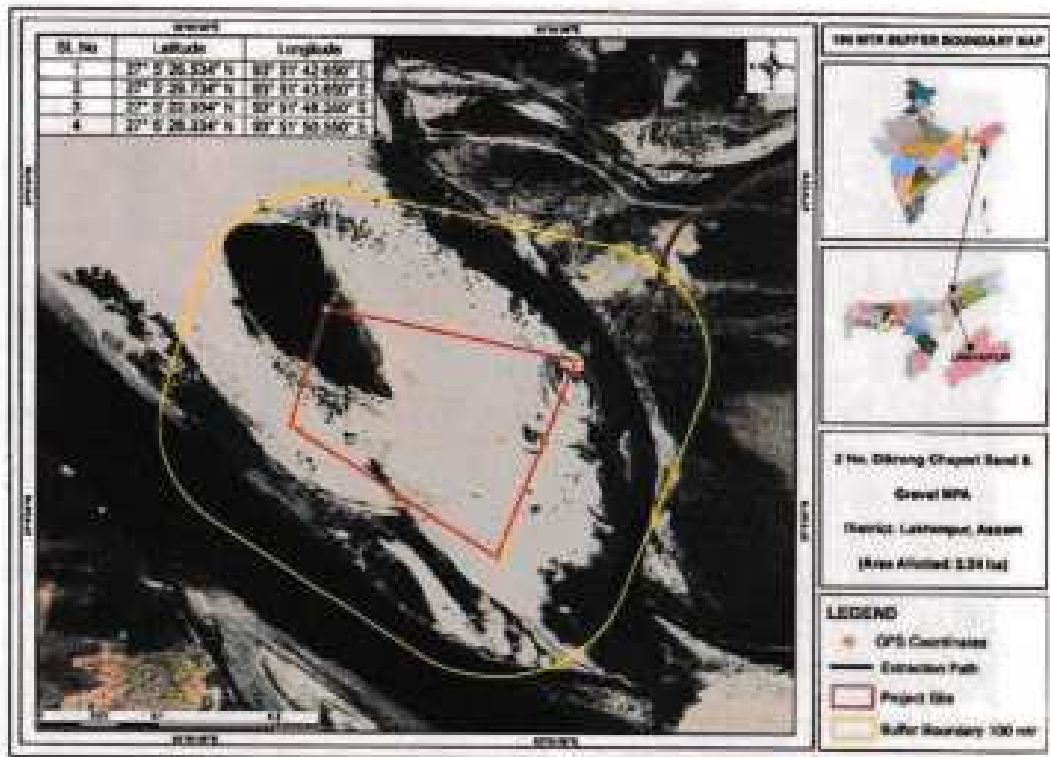


Fig. 13.39 A 2.24 Ha. 2 No. Dikrong Chapori Sand & Gravel MPA (Proposed), 100m buffer map (Google Image)

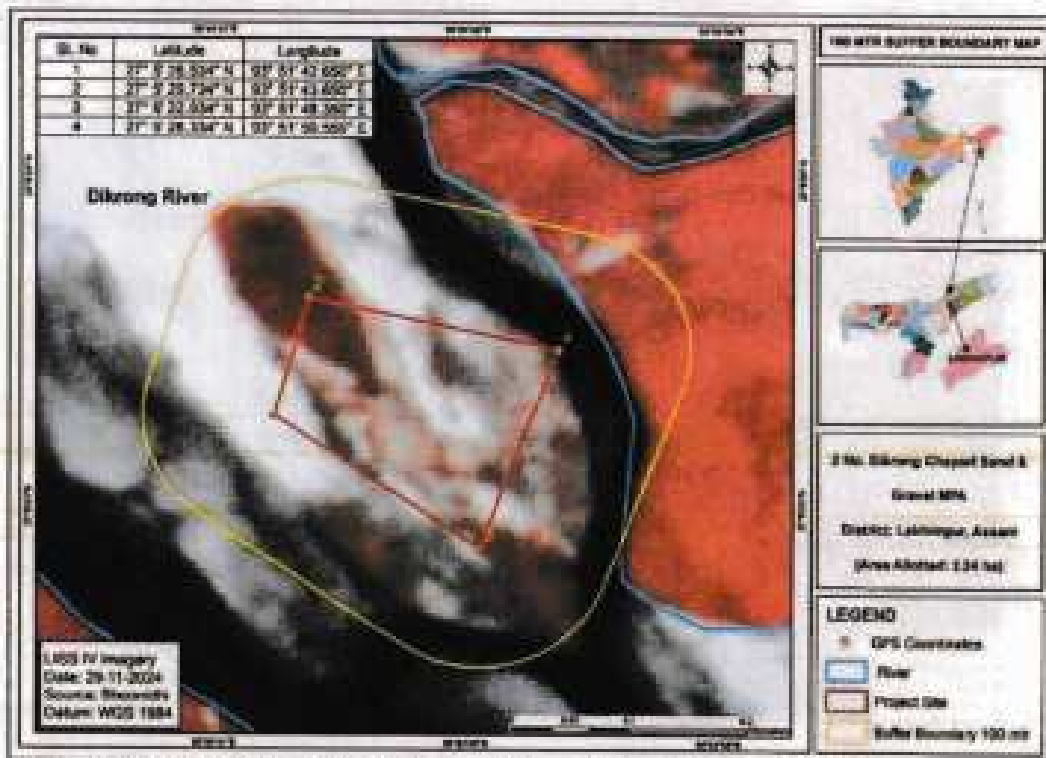


Fig. 13.39 B 2.24 Ha. 2 No. Dikrong Chapori Sand & Gravel MPA (Proposed), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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North Lakhimpur.

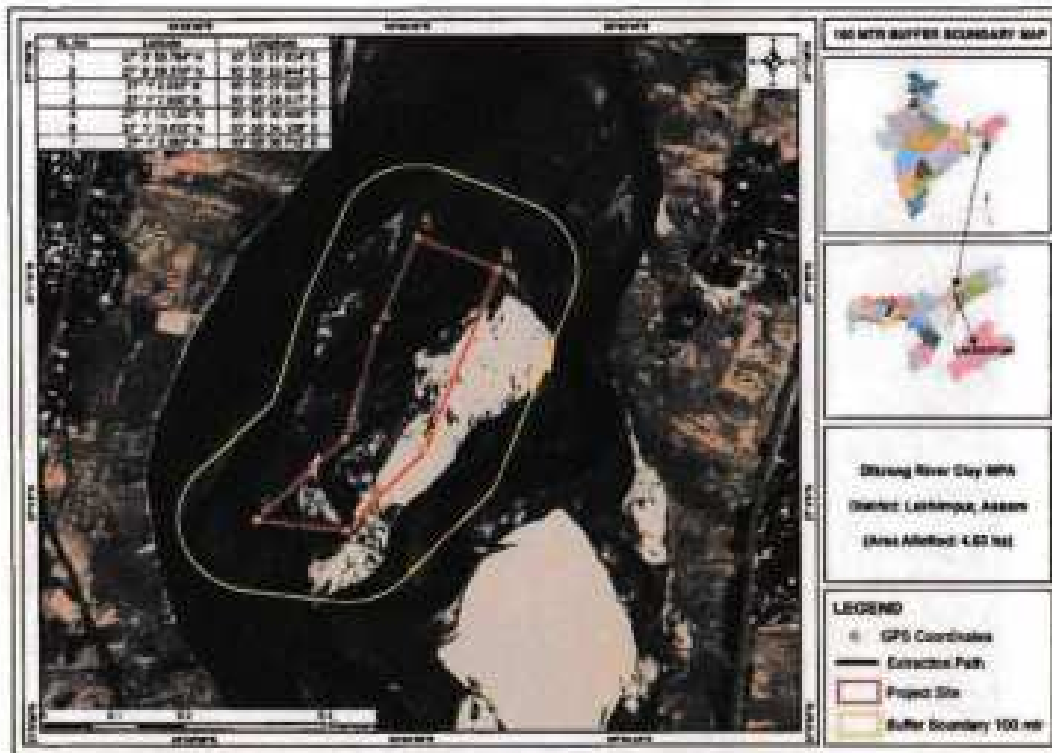


Fig. 13.40 A Dikrong River Clay Mining Permit Area (Proposed), 100m buffer map (Google Image)

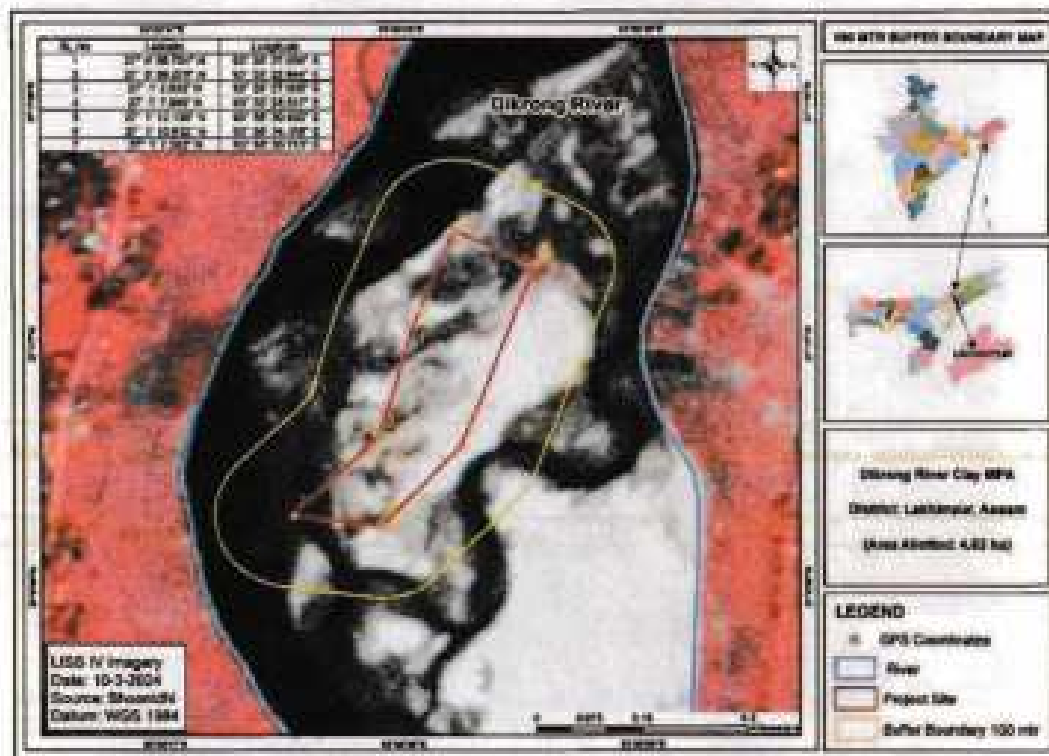


Fig. 13.40 B Dikrong River Clay Mining Permit Area (Proposed), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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North Lakhimpur.



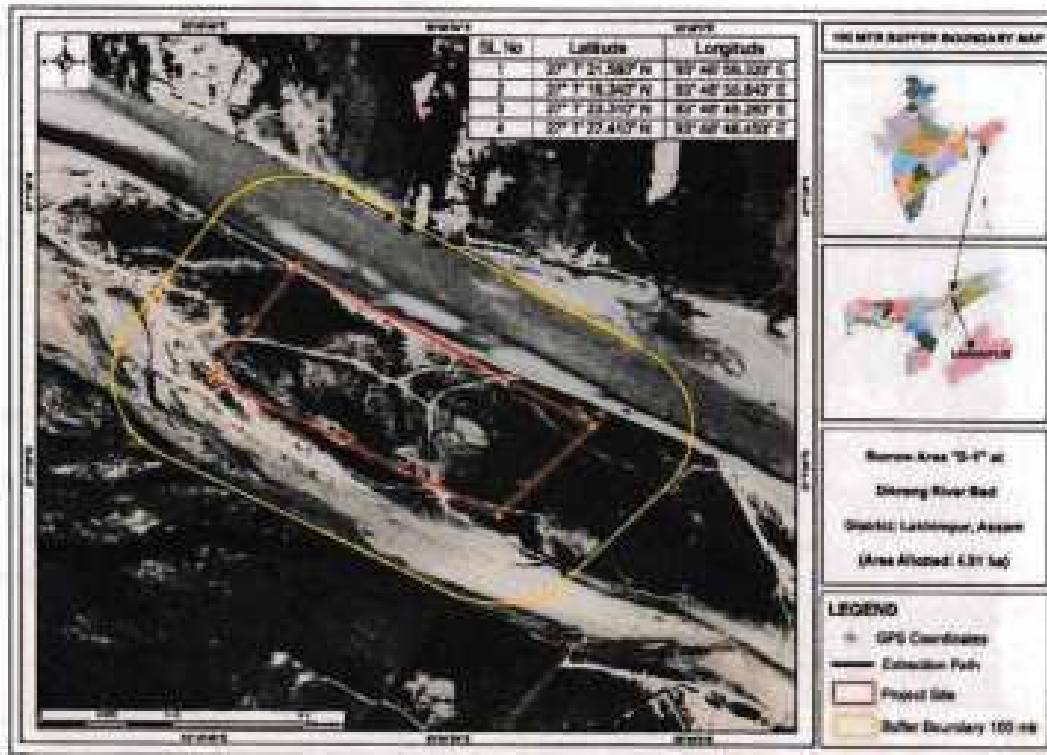


Fig. 13.41 A Borrow Area "D-1" at Dikrong River Bed (Proposed), 100m buffer map (Google Image)

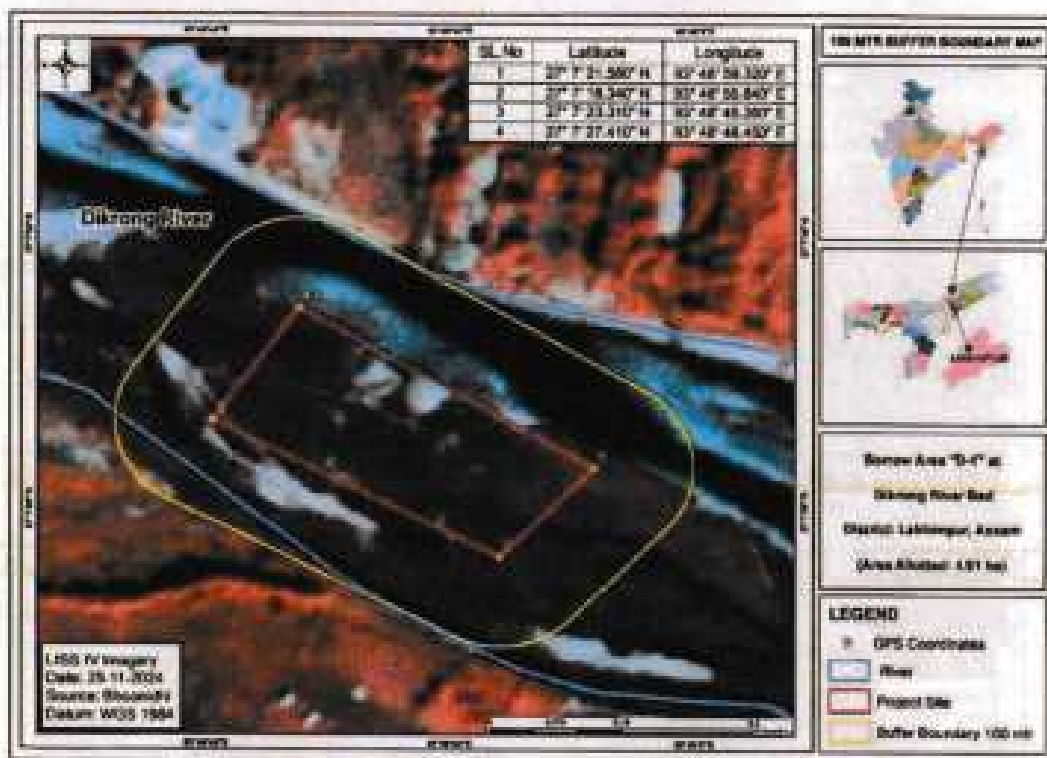


Fig. 13.41 B Borrow Area "D-1" at Dikrong River Bed (Proposed), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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North Lakhimpur.

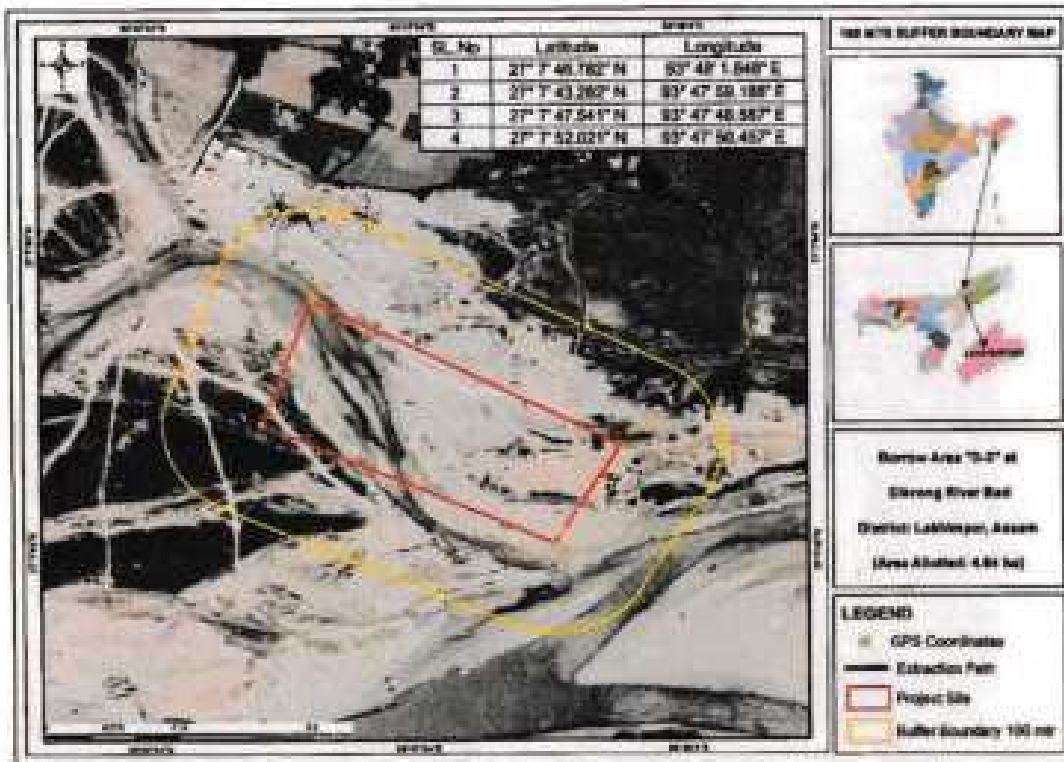


Fig. 13.42 A Borrow Area "D-2" at Dikrong River Bed (Proposed), 100m buffer map (Google Image)

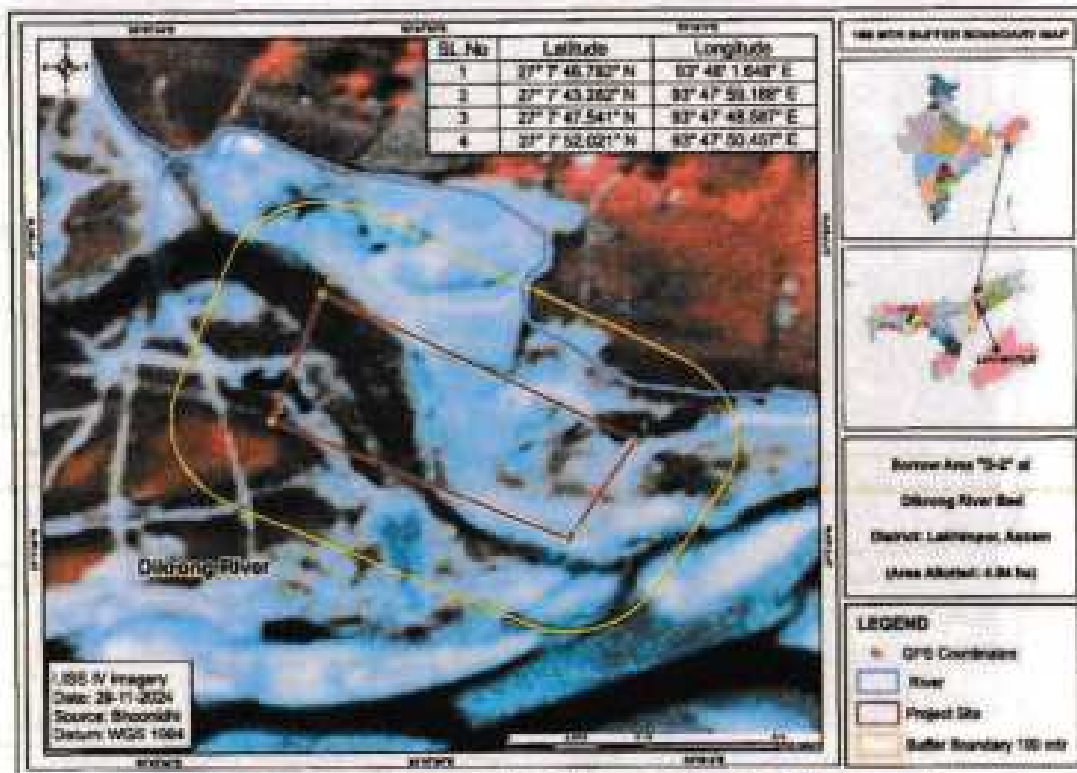


Fig. 13.42 B Borrow Area "D-2" at Dikrong River Bed (Proposed), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Fig. 13.43 A Lower Dikrong Dongibil 65/68 Grant Area (Proposed), 100m buffer map (Google Image)

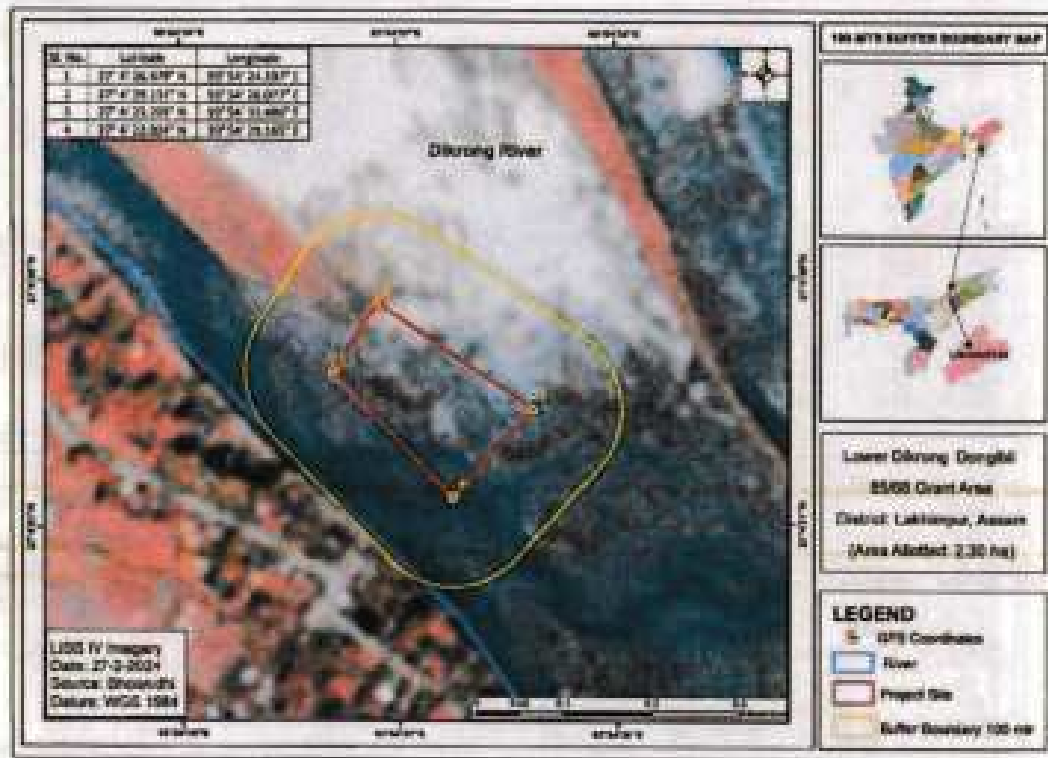


Fig. 13.43 B Lower Dikrong Dongibil 65/68 Grant Area (Proposed), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer
Lakhimpur Division
Naha, Lakhimpur.



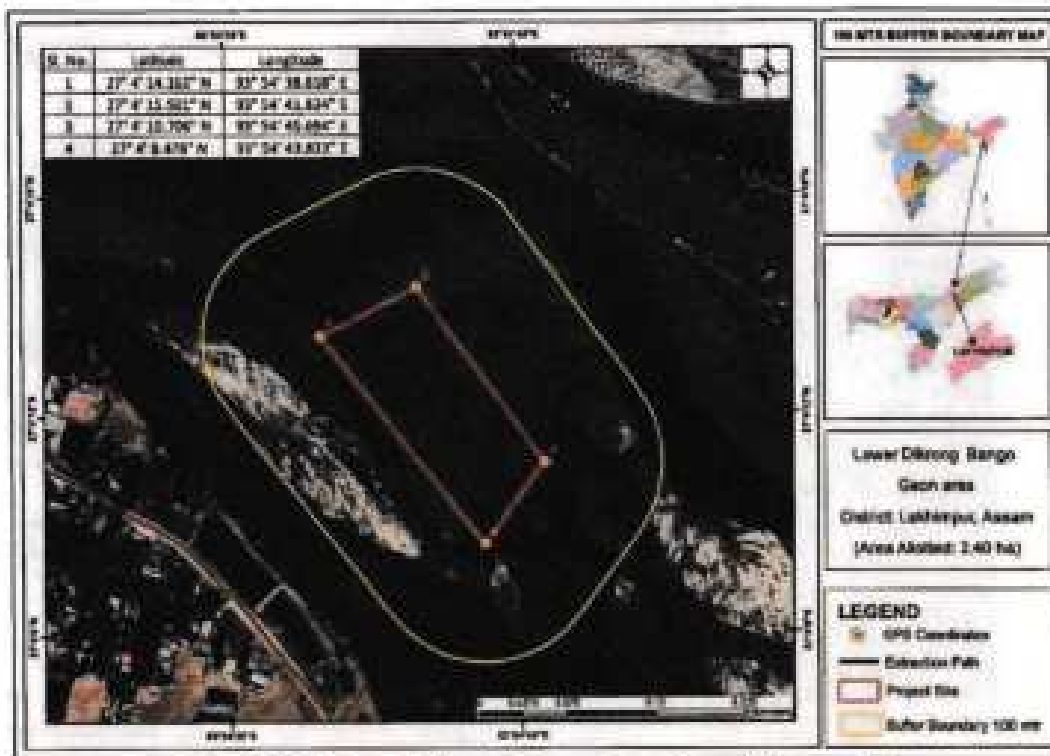


Fig. 13.44 A Lower Dikrong Bango Gaon Area (Proposed), 100m buffer map (Google Image)



Fig. 13.44 B Lower Dikrong Bango Gaon Area (Proposed), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



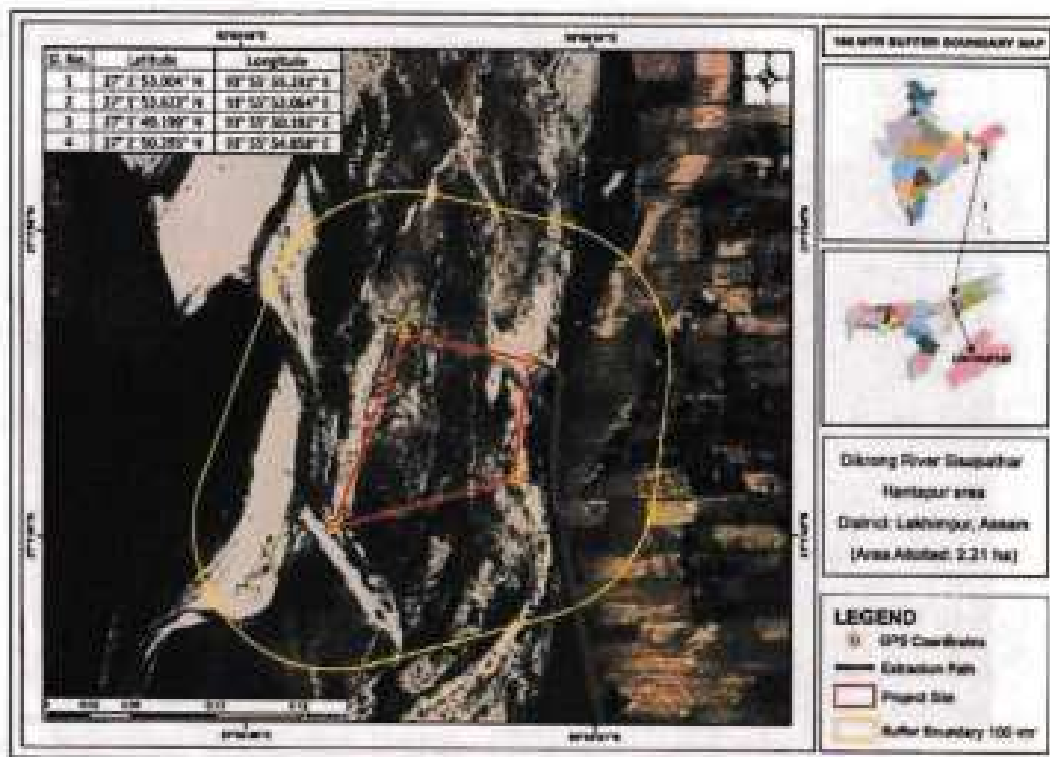


Fig. 13.45 A Dikrong River Sisapathar Hantapur Area (Proposed), 100m buffer map (Google Image)

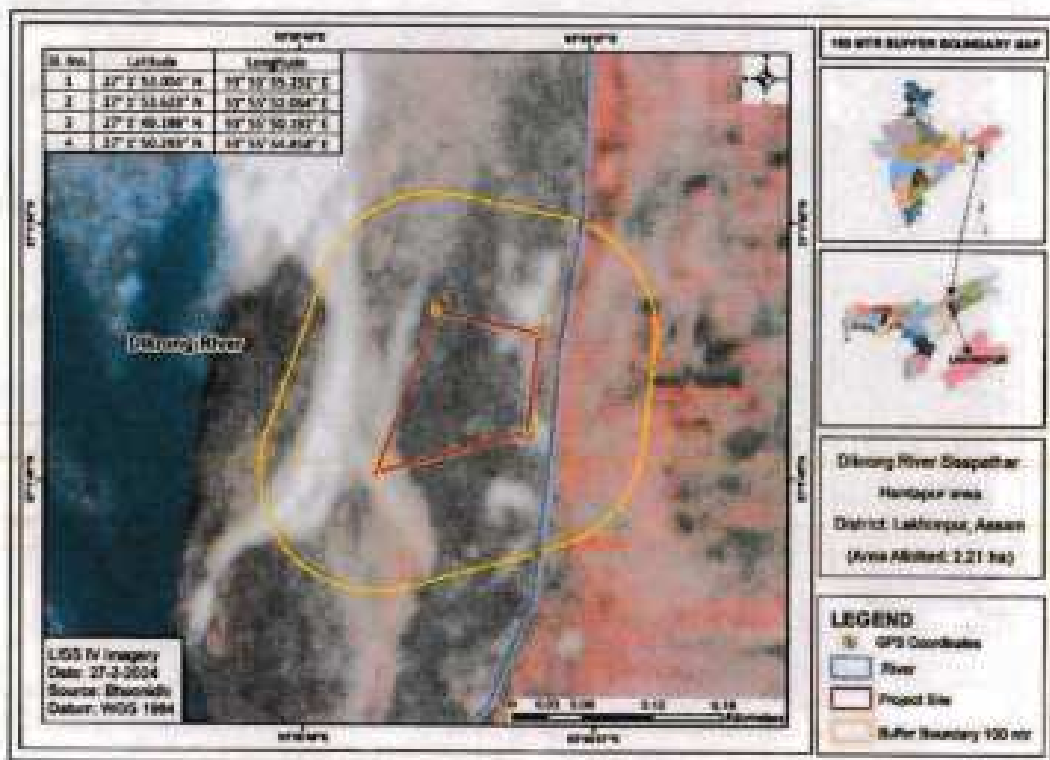


Fig. 13.45 B Dikrong River Sisapathar Hantapur Area (Proposed), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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13.4.4 Description of Mining Permit/ Contract Areas in Kakoi River:

Table 13.12: Details of Kakoi River

Sr No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Kakoi River in the district	183.87	100	0
2	Area already granted in the Kakoi River	8.5	4.62	4.62
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	2.5	1.36	5.98
6	Area not recommended for future Quarry Permit/ Contract Area grant due non- availability of un-mined block 50 meters with after every block of 1000 meters over which is undertaken or	0	0	0

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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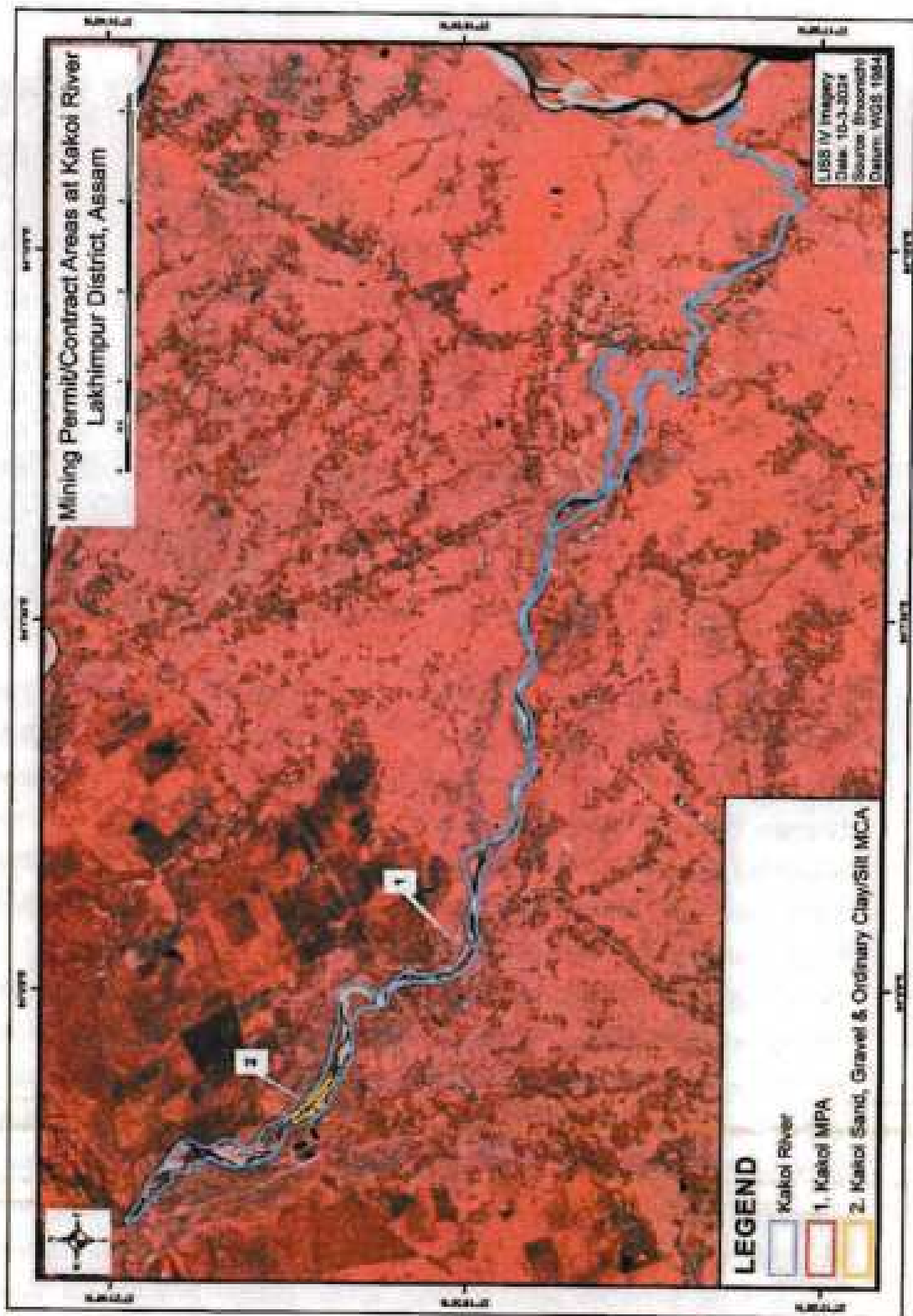
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	at such distance as may be directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco-sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	No	0	0

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Map 13.4: Map showing Mining Permit/ Contract Areas within Kakoi River.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Table 13.13: Details and Status of Individual Mining Permit/ Contract Areas of Kakoi River

Sl No.	Name	Name of Mineral	Area in Ha.	Mining Area in Ha.	Period (in Year)	Operational/ Non-operational	Coordinate	
							Latitude	Longitude
1	Kakoi Sand, Gravel & Ordinary Clay/ Silt MCA	Sand, Gravel & Ordinary Clay/ Silt	6.0	4.5	7	Operational	E93°49'50.565"	N27°6'30.320"
							E93°49'53.027"	N27°6'31.397"
							E93°50'8.251"	N27°6'17.585"
							E93°50'6.963"	N27°6'16.052"
							E93°49'58.426"	N27°6'25.492"
							E93°49'56.736"	N27°6'23.221"
2	Kakoi MPA	Ordinary Clay/ Silt	2.5	2.5	2	Non-operational	N27°6'32.280"	E93°50'2.760"
							N27°6'31.020"	E93°50'1.680"
							N27°6'24.240"	E93°50'9.600"
							N27°6'24.240"	E93°50'10.740"

Kakoi river area in the district is 183.87 Ha and area already granted in the River is 8.5 Ha. The riverbed is having a total of 2 mine Permit/ Contract Areas. Out of 2, 1 area is of mineral-Sand, Gravel & Ordinary Clay/ Silt and rest 1 is of mineral Ordinary Clay/ Silt. Out of these, 1 in operational condition and other is in non-operational condition. No area is identified for future mining project till date. There is no applicability of Cluster due to non presence of mining areas within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, Go- zone and No-Go zone has been identified. Total Go zone area is 6 Ha and No-Go zone area is 2.5 Ha. Out of 8.5 Ha, no area falls within 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 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. 2.5 Ha area falls within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads.

Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below (with extraction path).

Minerals: Sand, Gravel, Boulder, Ordinary Clay



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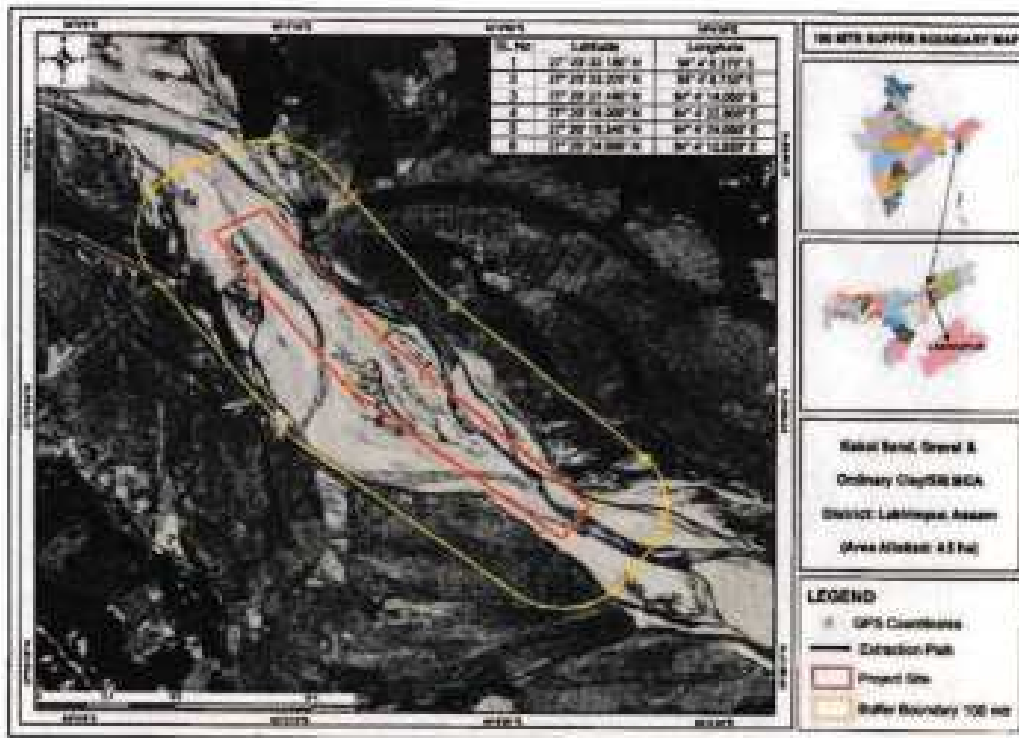


Fig. 13.46 A Kakoi Sand, Gravel & Ordinary Clay/ Silt MCA, 100m buffer map (Google Image)

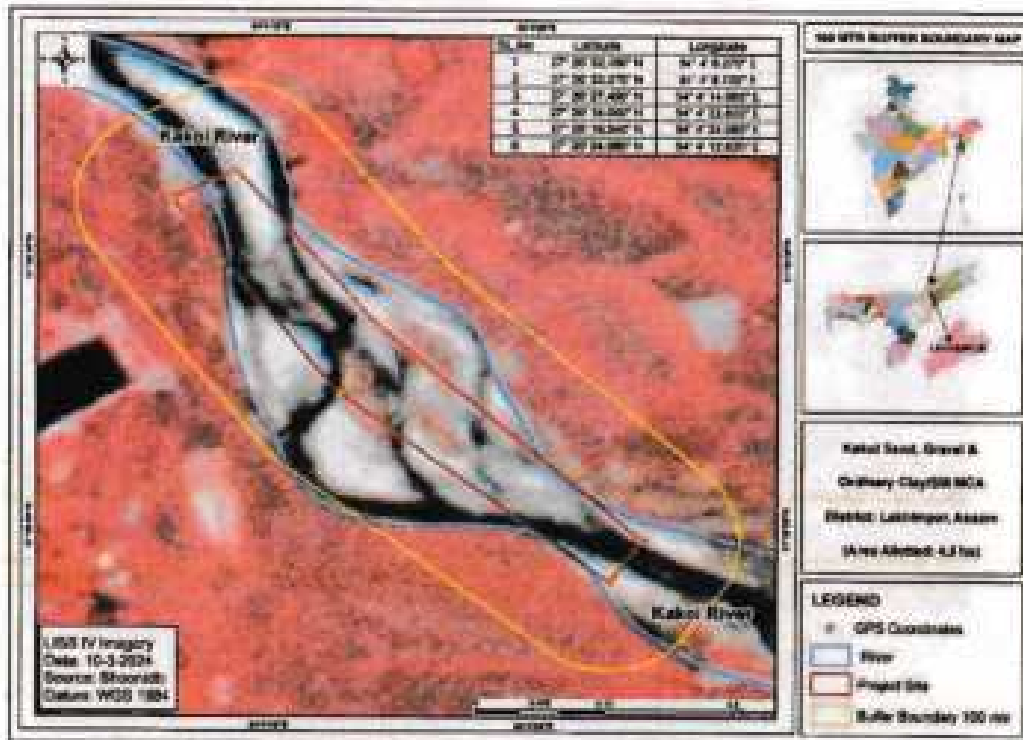


Fig. 13.46 B Kakoi Sand, Gravel & Ordinary Clay/ Silt MCA, 100m buffer map (Satellite Image)



Fig. 13.47 A Kakoi MPA, 100m buffer map (Google Image)

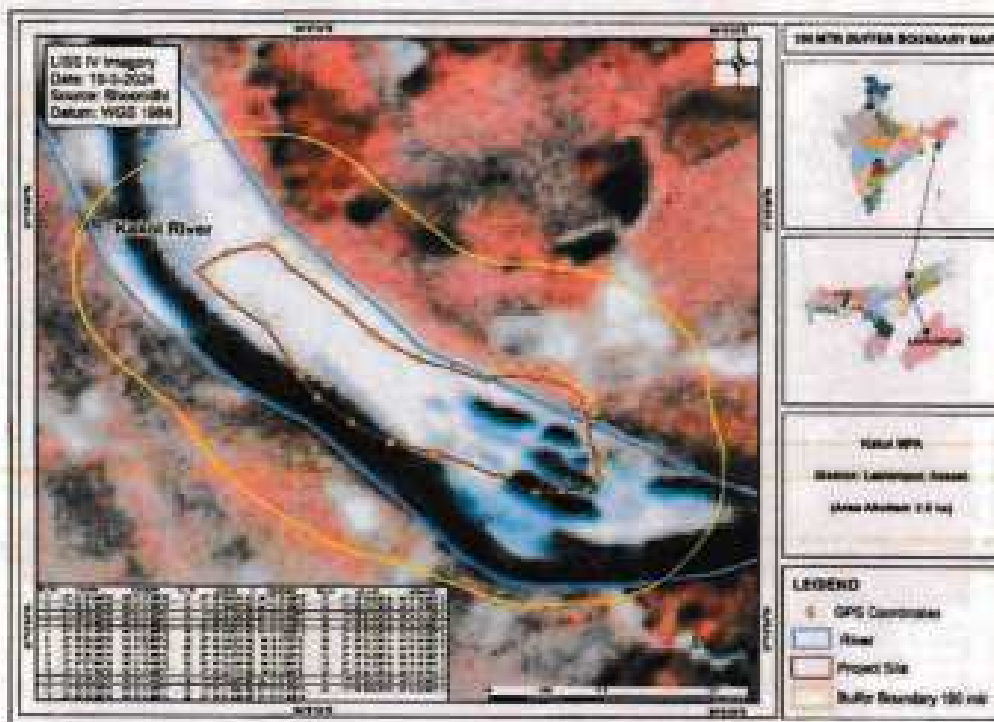


Fig. 13.47 B Kakoi MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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13.4.5 Description of Mining Permit/ Contract Areas in Kananadi River:

Table 13.14: Details of Kananadi River

Sr No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Kananadi River in the district	9.67	100	0
2	Area already granted in the Kananadi River	1.68	17.37	17.37
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	1.68	17.37	34.74
6	Area not recommended for future Quarry Permit/ Contract Area grant due non- availability of un-mined block 50 meters with after every block of 1000 meters over which is undertaken or at such distance as may be	0	0	0

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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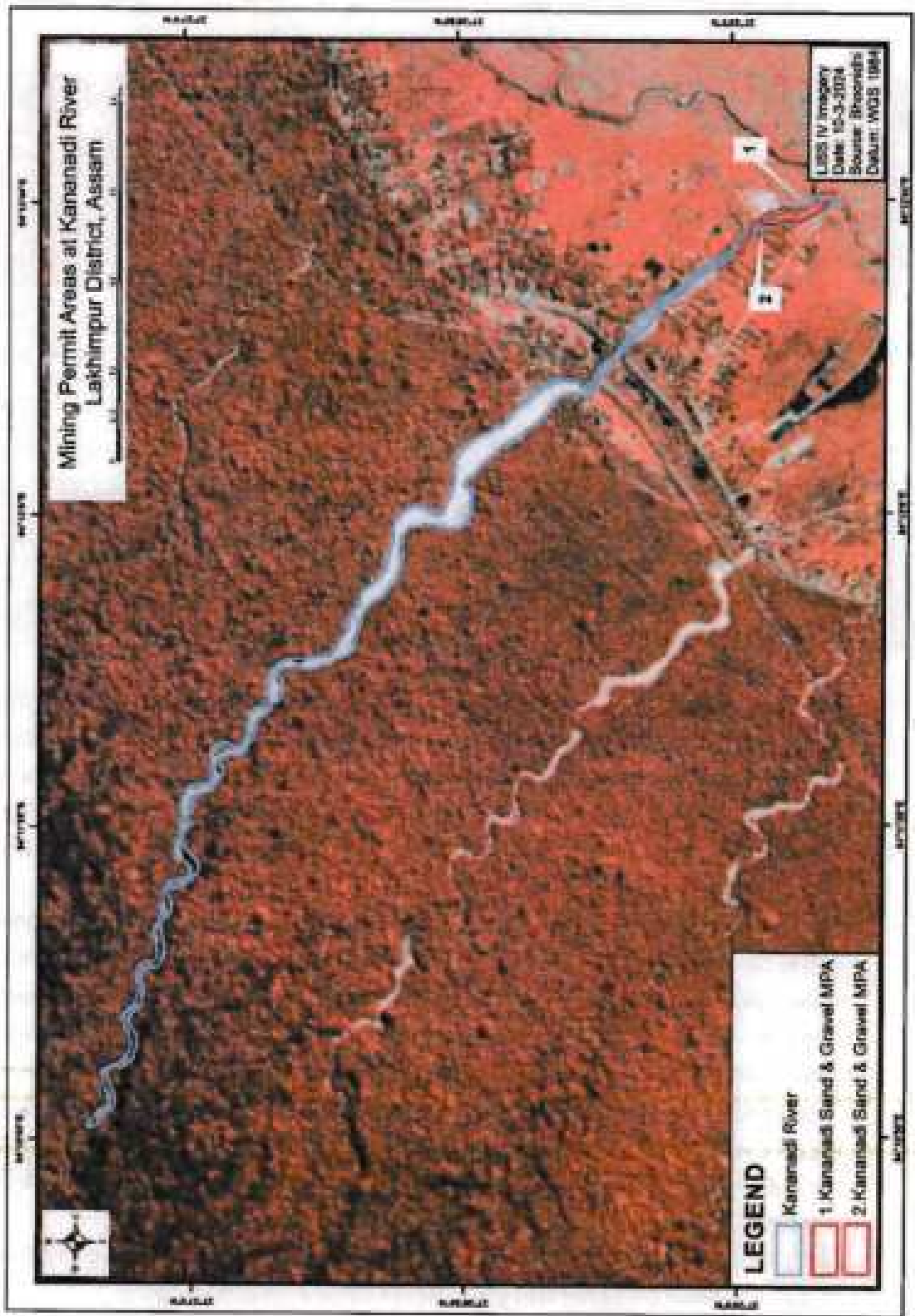
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	directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco- sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	No	0	0

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Map 13.5: Map showing Mining Permit/ Contract Areas within Kananadi River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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North Lakhimpur.



Table 13.15: Details and Status of Individual Mining Permit/ Contract Areas of Kananadi River

Sl No.	Name and address of the lessee	Name of Mineral	Area in Ha.	Mining Area in Ha.	Period (in Year)	Operational/ Non-operational	Coordinate	
							Latitude	Longitude
1	Kananadi Sand & Gravel MPA	Sand & Gravel	1.0	0.64	2	Non-operational	N27°11'46.920"	E94°26'16.680"
							N27°11'47.160"	E94°26'16.560"
							N27°11'48.600"	E94°26'25.080"
							N27°11'48.120"	E94°26'25.260"
2	Kananadi Sand & Gravel MPA	Sand & Gravel	0.68	0.53	2	Non-operational	N27°25'59.69"	E94°12'37.76"
							N27°25'59.40"	E94°12'37.42"
							N27°25'48.36"	E94°12'45.03"
							N27°25'49.16"	E94°12'44.00"

Kananadi river area in the district is 9.67 Ha and area already granted in the River is 1.68 Ha. The riverbed is having a total of 2 mine Permit/ Contract Areas. Out of 2, both the areas are of mineral- Sand & Gravel. Out of these 2 Mining Permit/ Contract, both the areas in non-operational condition. There is no applicability of Cluster due to non presence of mining areas within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, Go- zone and No-Go zone has been identified. Total Go zone area is 0.0 Ha and No-Go zone area is 1.68 Ha. Out of 1.68 Ha, no area falls within 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 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. 1.68 Ha falls within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads.

Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below (with extraction path).

Minerals: Sand, Gravel, Boulder, Ordinary Clay



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North Lakhimpur.

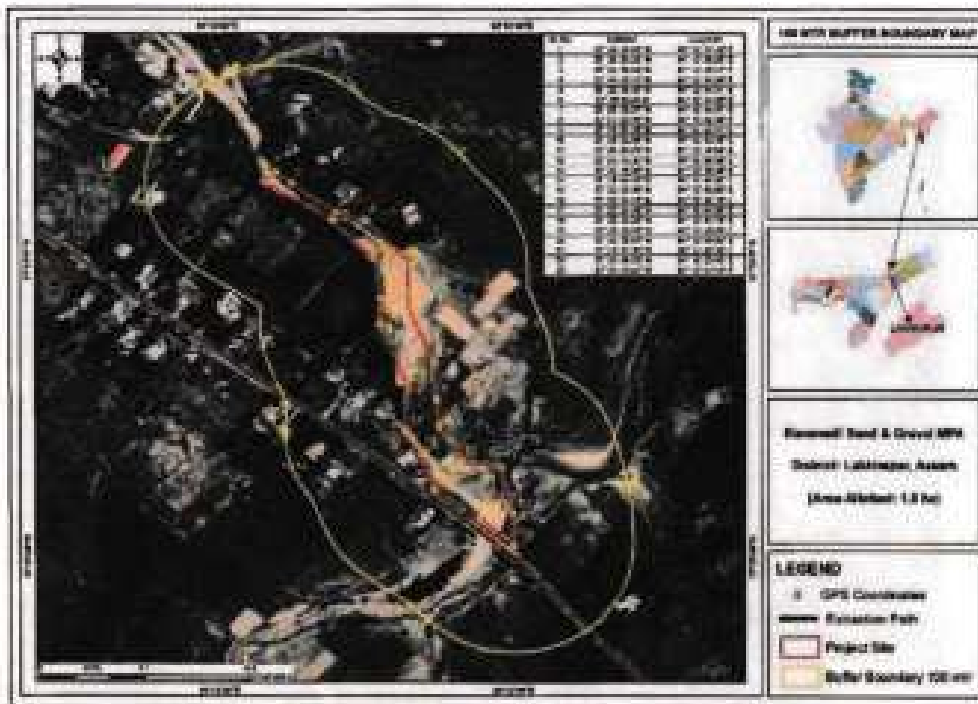


Fig. 13.48 A Kananadi Sand & Gravel MPA, 100m buffer map (Google Image)

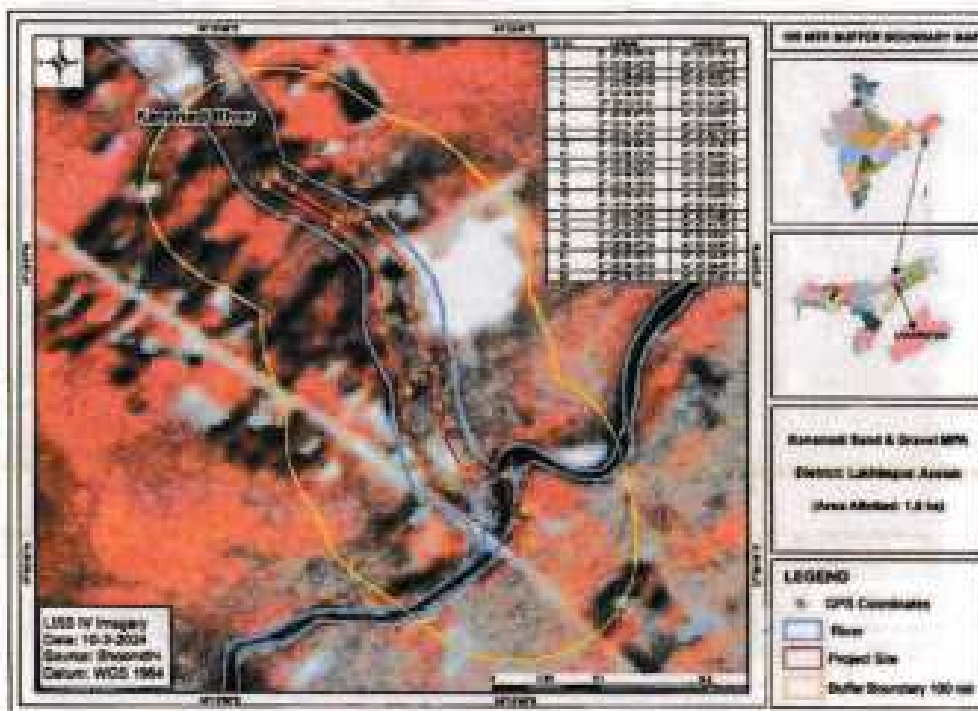


Fig. 13.48 B Kananadi Sand & Gravel MPA, 100m buffer map (Satellite Image)



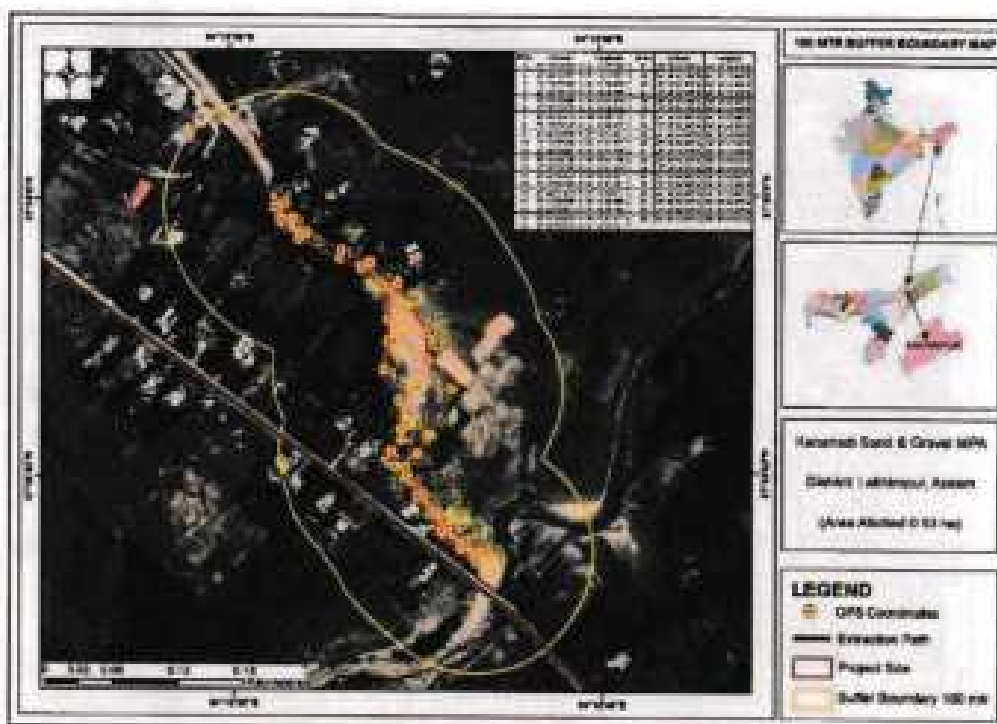


Fig. 13.49 A Kananadi Sand & Gravel MPA, 100m buffer map (Google Image)

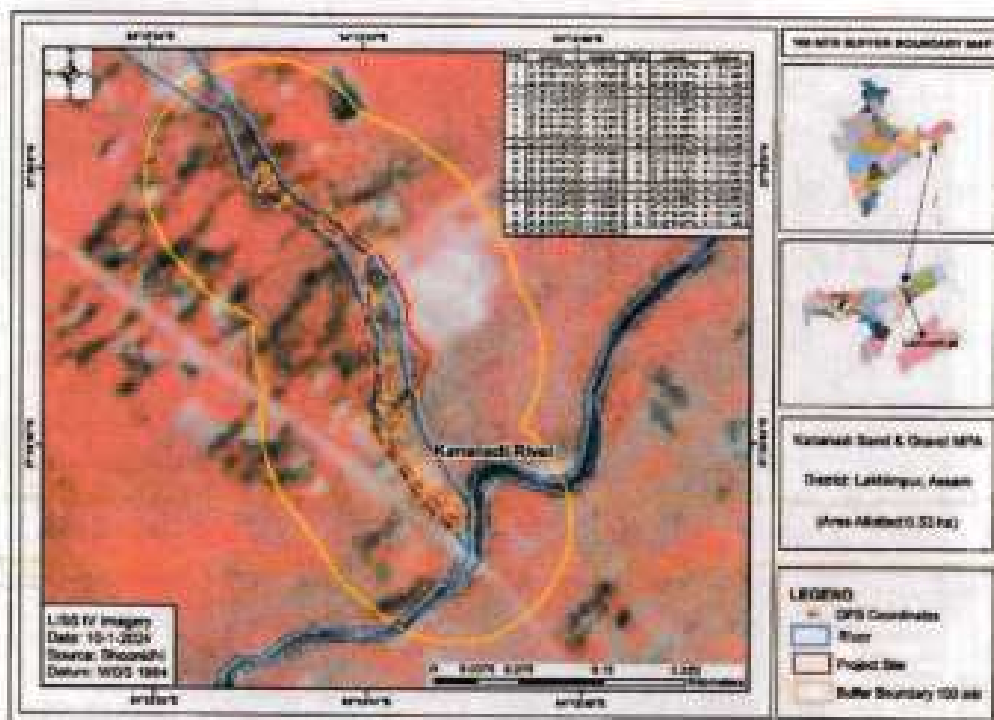


Fig. 13.49 B Kananadi Sand & Gravel MPA, 100m buffer map (Satellite Image)

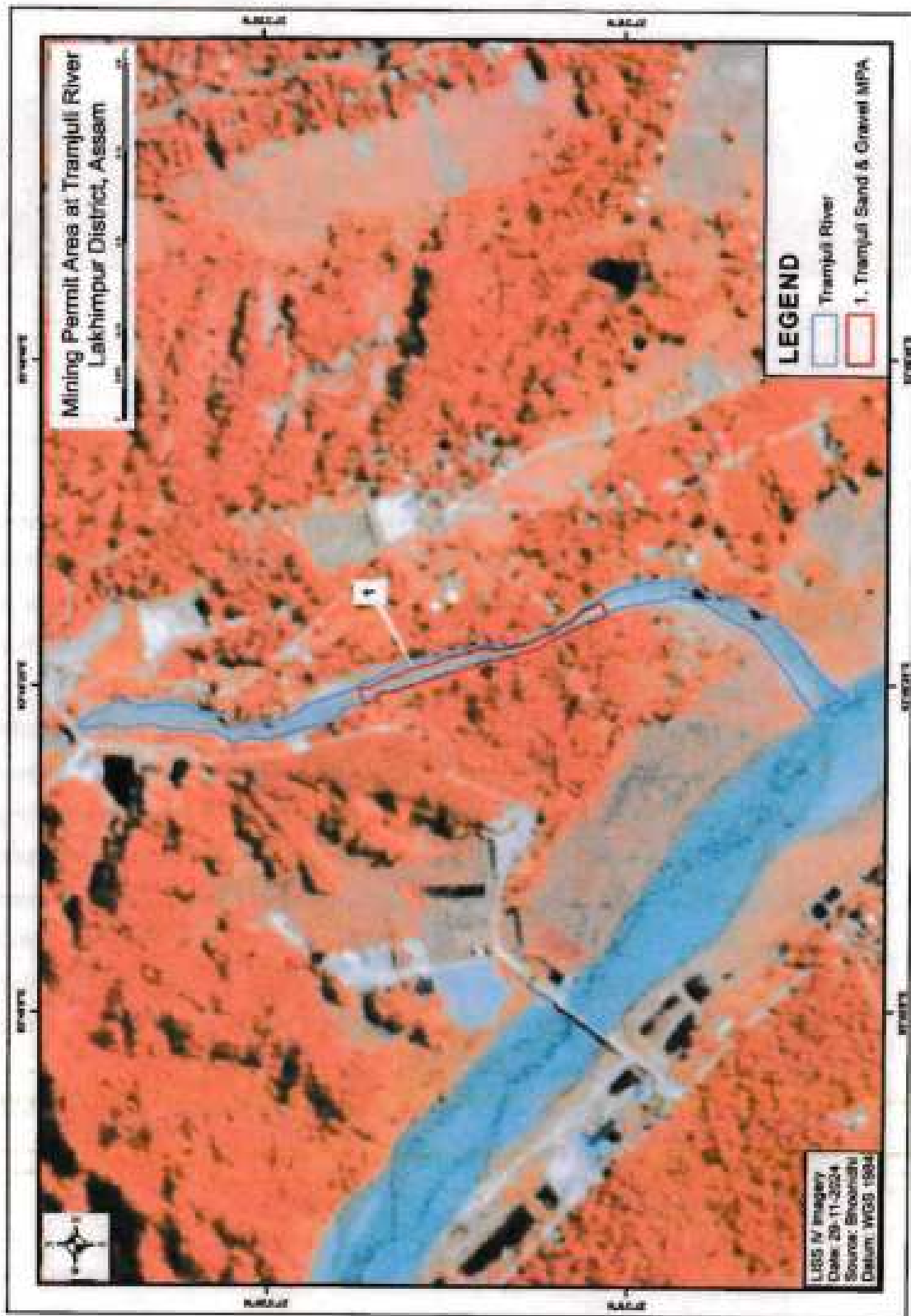


13.4.6 Description of Mining Permit/ Contract Areas in Tramjuli River:

Table 13.16: Details of Tramjuli River

Sr No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Tramjuli River in the district	4.36	100	0
2	Area already granted in the Tramjuli River	1.2	27.52	27.52
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	1.2	27.52	55.04
6	Area not recommended for future Quarry Permit/ Contract Area grant due non- availability of un-mined block 50 meters with after every block of 1000 meters over which is undertaken or	0	0	0

	at such distance as may be directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco- sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	0	0	0



Map 13.6: Map showing Mining Permit/ Contract Areas within Tramjuli River



Table 13.17: Details and Status of Individual Mining Permit/ Contract Areas of Tramjuli River

Sl No.	Name	Name of Mineral	Area in Ha.	Mining Area in Ha.	Period (in Year)	Operational/ Non-operational	Coordinate	
							Latitude	Longitude
1	Tramjuli Sand & Gravel MPA	Sand & Gravel	1.2	0.98	2	Non-operational	N27°3'14.841"	E93°46'19.681"
							N27°3'14.567"	E93°46'18.705"
							N27° 3' 1.124"	E93°46'24.157"
							N27° 3' 1.370"	E93°46'24.921"

Tramjuli river area in the district is 4.36 Ha and area already granted in the River is 1.2 Ha. The riverbed is having a total of 1 mine Permit/ Contract Area. The area is of mineral-Sand & Gravel. The area is in non-operational condition. There is no applicability of Cluster due to non presence of mining areas within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, Go- zone and No-Go zone has been identified. Total Go zone area is 0.0 Ha and No-Go zone area is 1.2 Ha. Out of 1.2 Ha, no area falls within 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 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. 1.2 Ha area falls within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads.

Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Lakhimpur Division
North Lakhimpur.



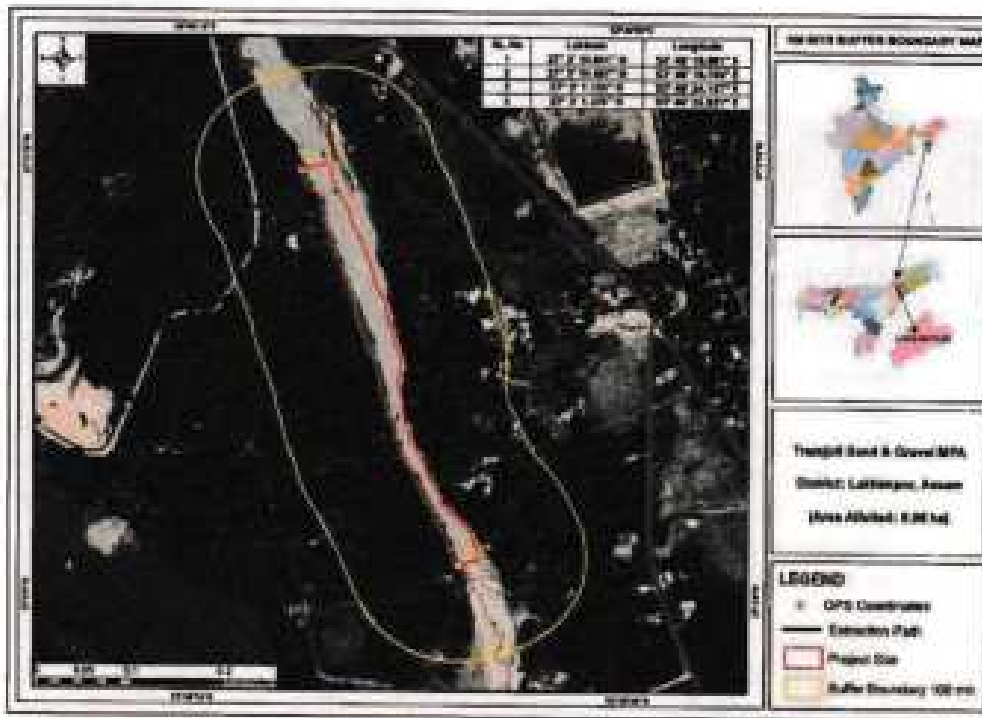


Fig. 13.50 A Tramjuli Sand & Gravel MPA, 100m buffer map (Google Image)

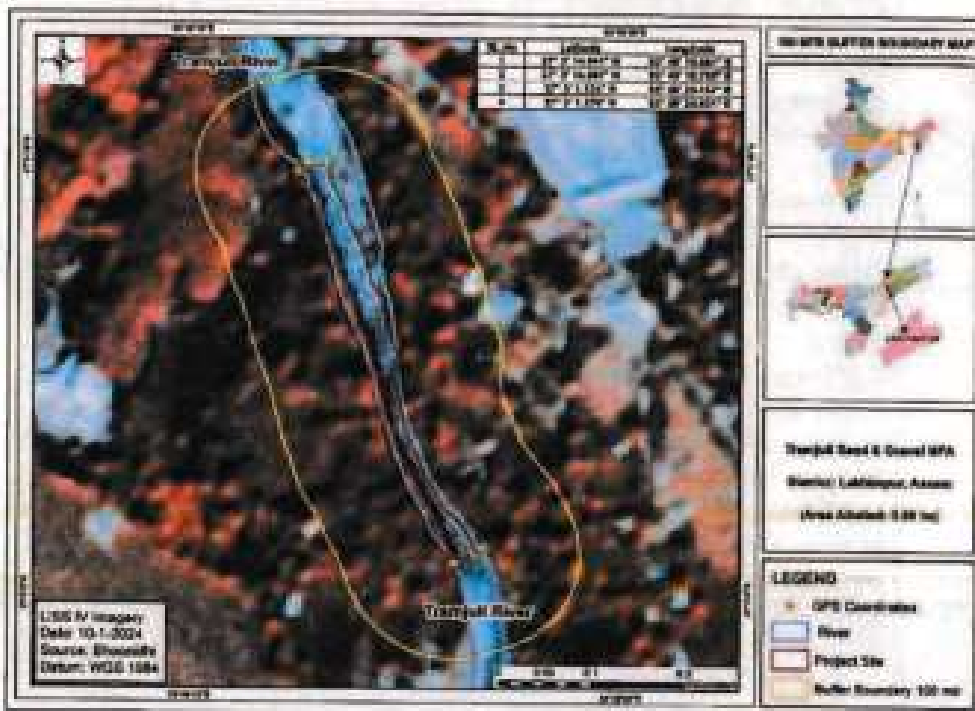


Fig. 13.50 B Tramjuli Sand & Gravel MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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North Lakhimpur.



13.4.7 Description of Mining Permit/ Contract Areas in Bogoli River:

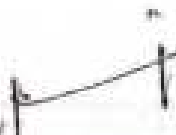
Table 13.18: Details of Bogoli River

Sr No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Bogoli River in the district	58.05	100	0
2	Area already granted in the Bogoli River	4.3	7.4	7.4
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	1.3	2.24	9.64
6	Area not recommended for future Quarry Permit/ Contract Area grant due non- availability of un-mined block 50 meters with after every block of 1000 meters over which is undertaken or at such distance as may be	0	0	0



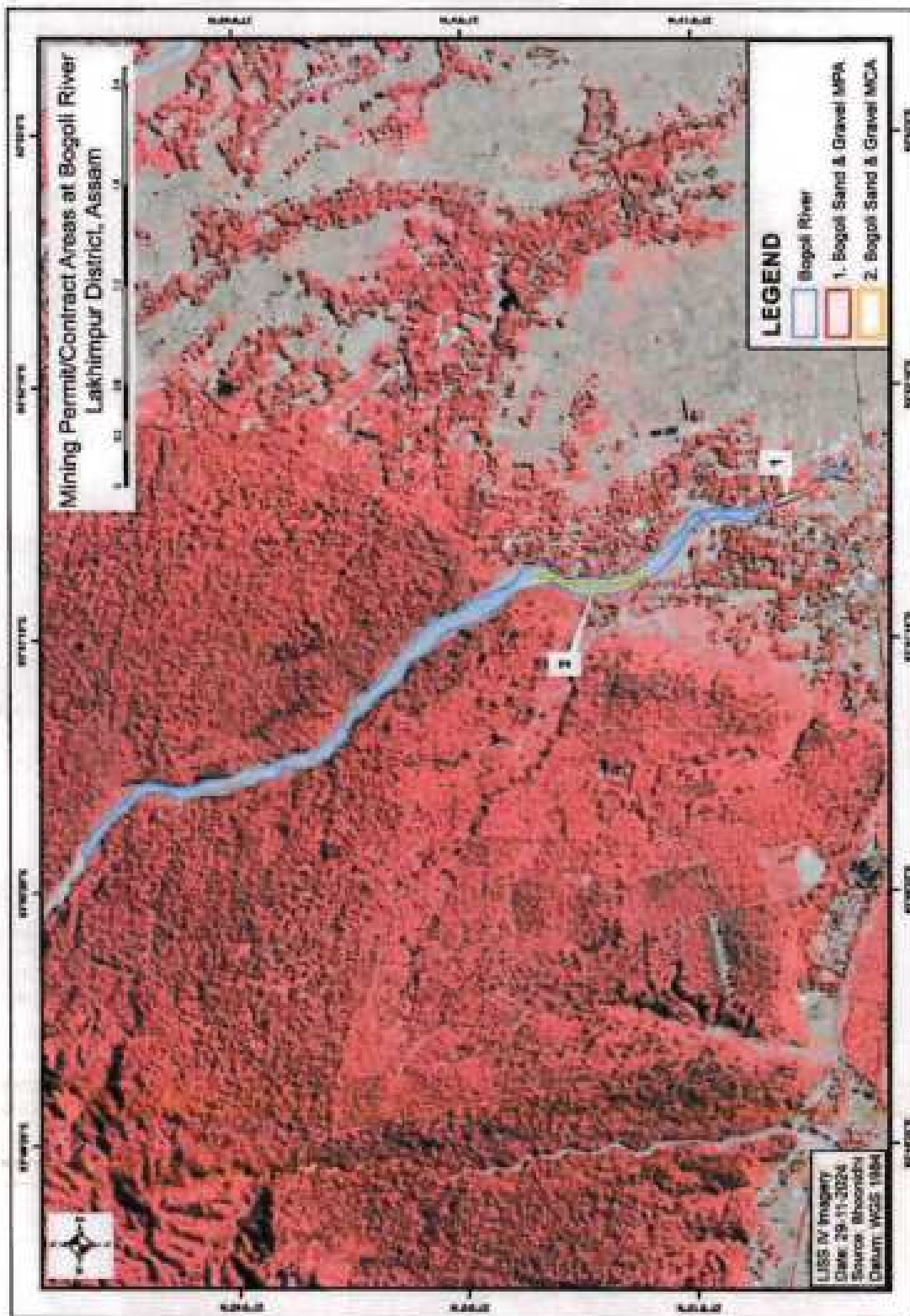
	directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco- sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	No	0	0

Minerals: Sand, Gravel, Boulder, Ordinary Clay


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Map 13.7: Map showing Mining Permit/ Contract Areas within Bogoli River

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Table 13.19: Details and Status of Individual Mining Permit/ Contract Areas of Bogoli River

Sl No.	Name	Name of Mineral	Area in Ha.	Mining Area in Ha.	Period (in Year)	Operational/ Non-operational	Coordinate	
							Latitude	Longitude
1	Bogoli Sand & Gravel MCA	Sand & Gravel	3.0	3.0	7	Operational	N27°08'45.935°	E93°51'27.608°
							N27°08'45.766°	E93°51'29.498°
							N27°08'24.749°	E93°51'27.828°
							N27°08'25.152°	E93°51'29.488°
2	Bogoli Sand & Gravel MPA	Sand & Gravel	1.3	1.3	2	Non-operational	N27°07'59.2°	E93°51'43.2°
							N27°07'59.1°	E93°51'44.8°
							N27°07'50.7°	E93°51'49.3°
							N27°07'56.3°	E93°51'44.1°

Bogoli river area in the district is 58.05 Ha and area already granted in the river is 4.3 Ha. The riverbed is having a total of 2 mine Permit/ Contract Areas. Out of 2, both the areas are of mineral-Sand & Gravel. Out of these 2 Mining Permit/ Contract areas, 1 area is in the operational condition and another area is in non-operational condition. There is no applicability of Cluster due to non presence of mining areas within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, Go- zone and No-Go zone has been identified. Total Go zone area is 3.0 Ha and No-Go zone area is 1.3 Ha. Out of 4.3 Ha, no area falls within 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 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. 1.3 Ha areas fall within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads.

Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below (with extraction path).

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



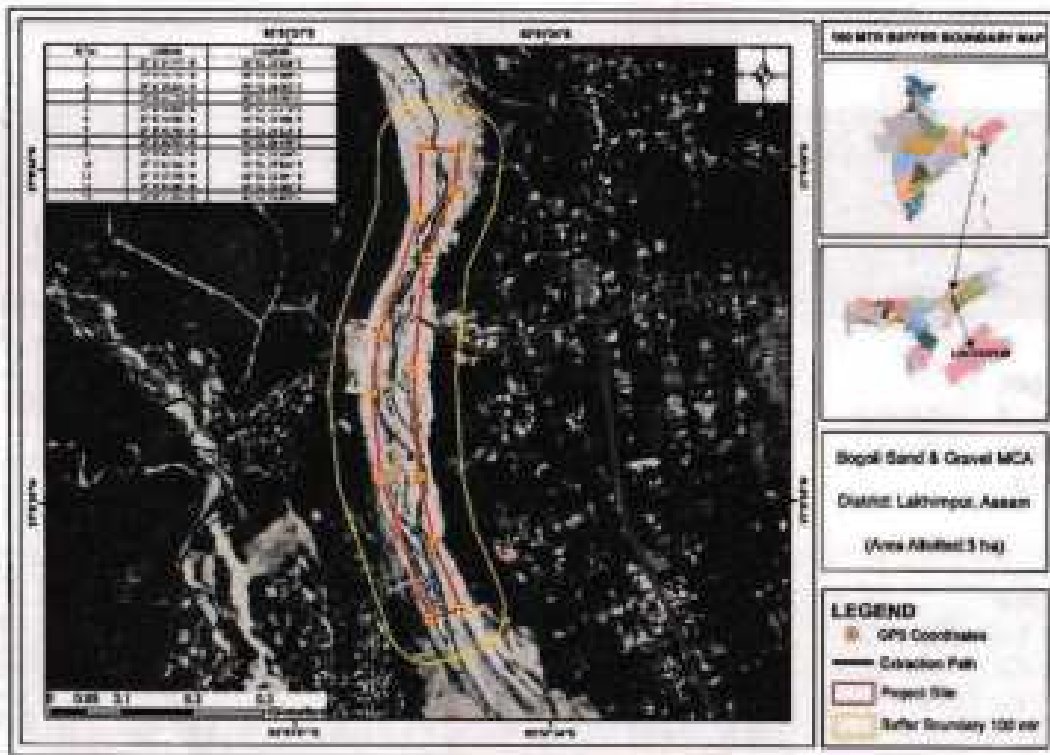


Fig. 13.51 A Bogoli Sand & Gravel MCA, 100m buffer map (Google Image)

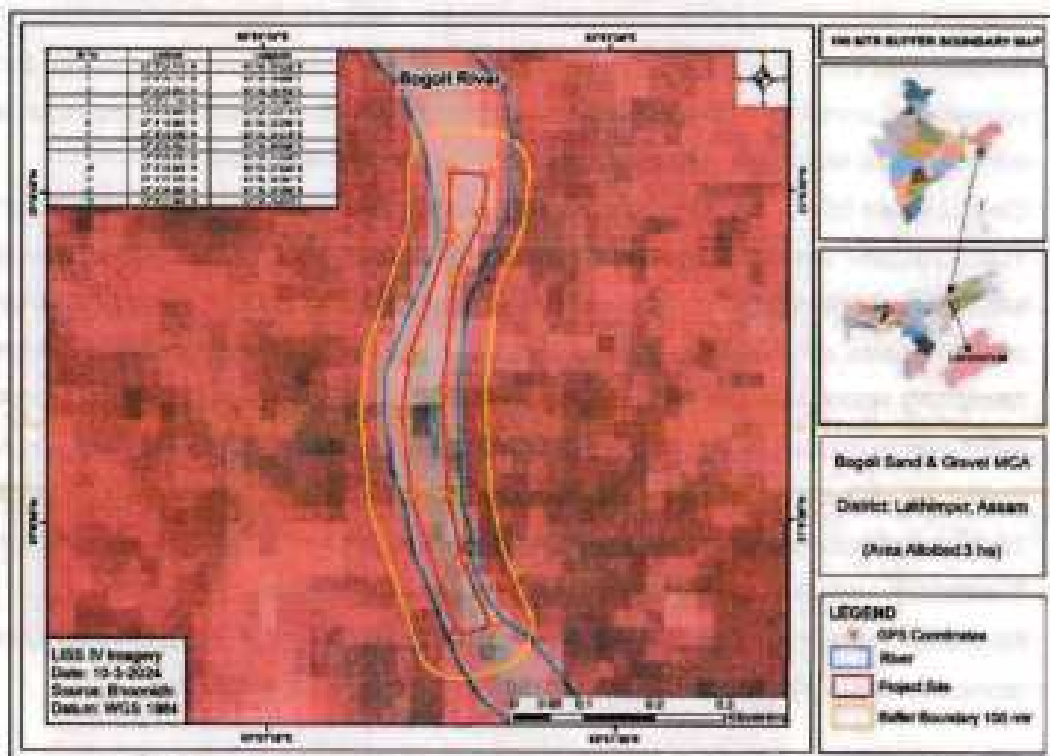


Fig. 13.51 B Bogoli Sand & Gravel MCA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Lakhimpur Division
North Lakhimpur.



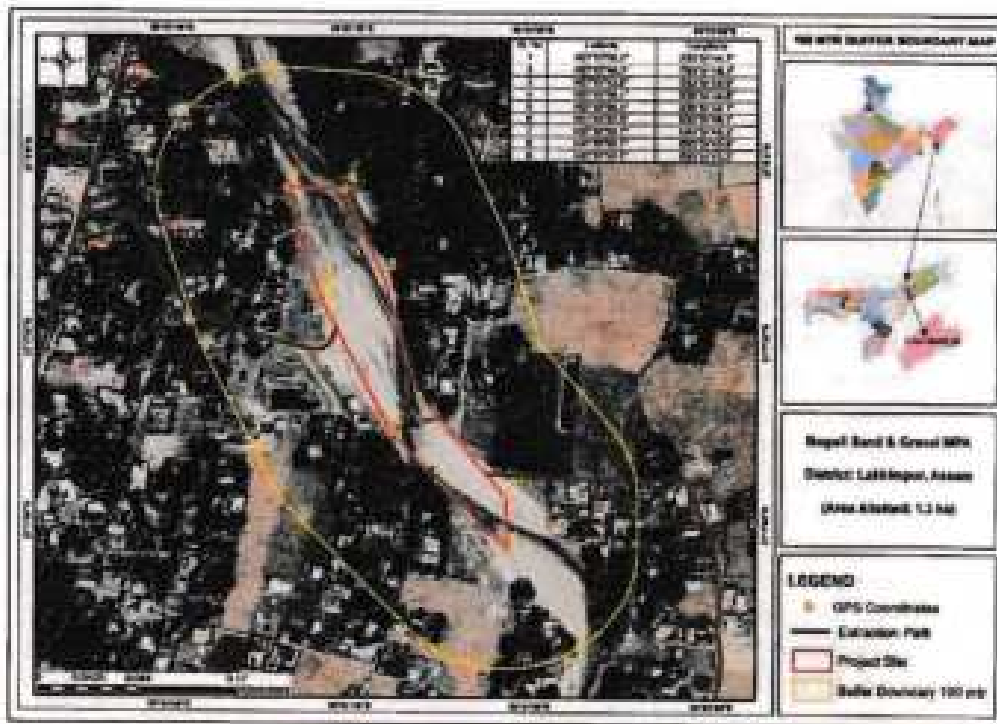


Fig. 13.52 A Bogoli Sand & Gravel MPA, 100m buffer map (Google Image)

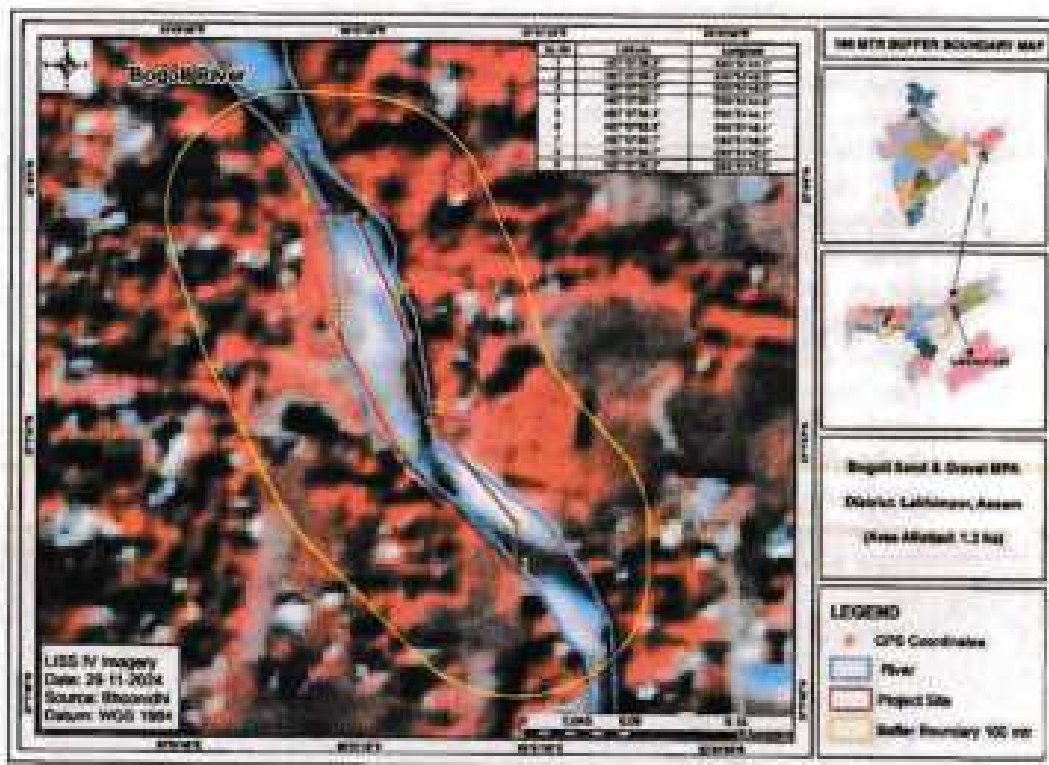


Fig. 13.52 B Bogoli Sand & Gravel MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Lakhimpur Division
North Lakhimpur.




13.4.8 Description of Mining Permit/ Contract Areas in Singra River:

Table 13.20: Details of Singra River

Sr No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Singra River in the district	272.00	100	0
2	Area already granted in the Singra River	9.8	3.60	3.60
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	3.80	1.39	4.99
6	Area not recommended for future Quarry Permit/ Contract Area grant due non- availability of un-mined block 50 meters with after every block of 1000 meters over which is undertaken or at such distance as may be	0	0	0

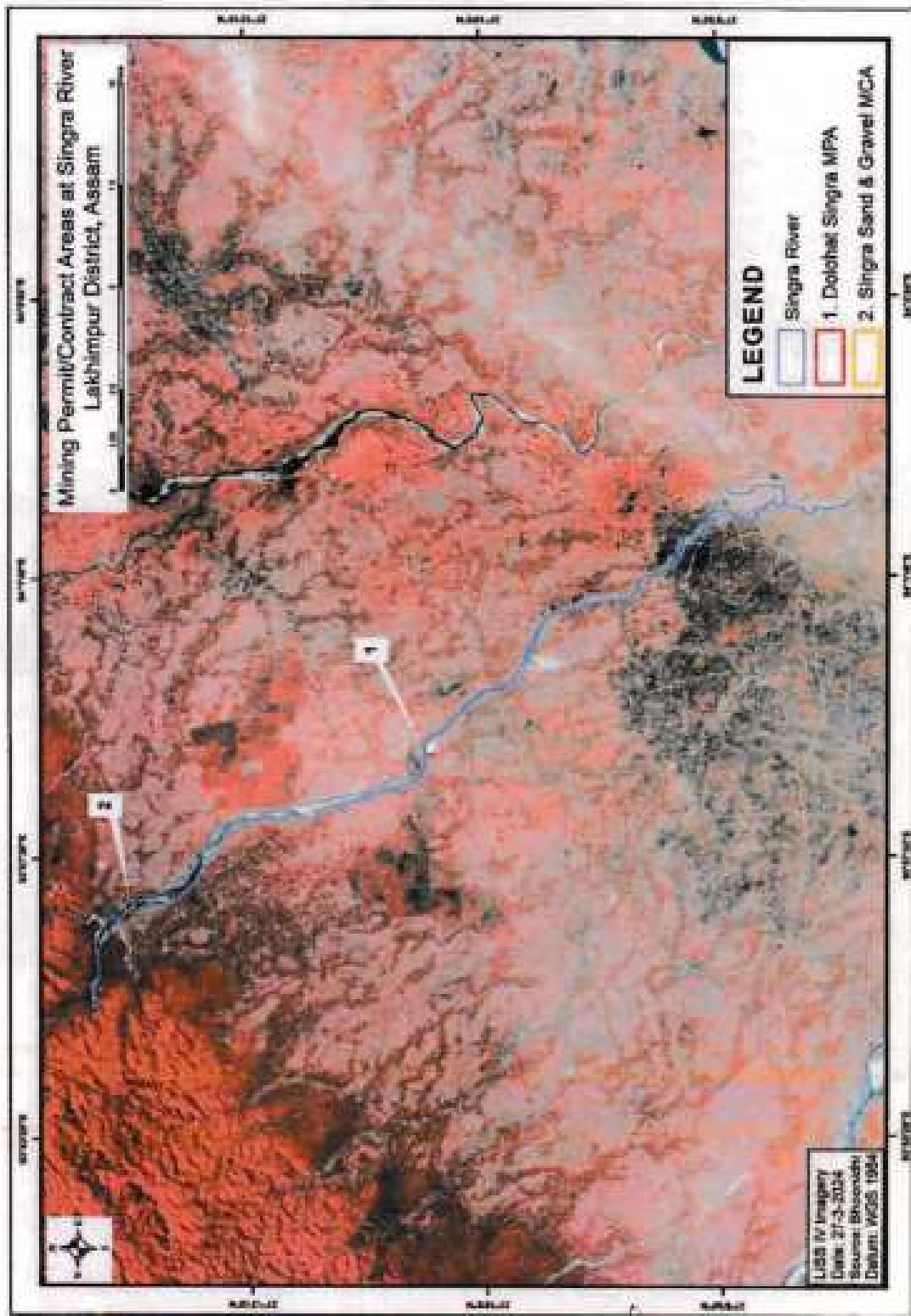
	directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco- sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	No	0	0

Minerals: Sand, Gravel, Boulder, Ordinary Clay


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Map 13.8: Map showing Mining Permit/ Contract Areas within Singra River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Lakhimpur Division
North Lakhimpur

Table 13.21: Details and Status of Individual Mining Permit/ Contract Areas of Singra River

Sl No.	Name	Name of Mineral	Area in Ha.	Mining Area in Ha.	Period (in Year)	Operational/ Non-operational	Coordinate	
							Latitude	Longitude
1	Singra Sand & Gravel MCA	Sand & Gravel	6.0	6.0	7	Non-operational	N27°14'53.015"	E93°56'47.410"
							N27°14'46.118"	E93°56'52.719"
							N27°14'43.903"	E93°56'47.594"
							N27°14'50.763"	E93°56'43.020"
2	Dolohat Singra MPA	Ordinary Clay/ Silt	3.8	3.8	2	Non-operational	N27°10.816'	E93°59.089'
							N27°10.787'	E93°59.128'
							N27°10.739'	E93°59.028'
							N27°10.706'	E93°59.069'

Singra river area in the district is 272.0 Ha and area already granted in the River is 9.8 Ha. The riverbed is having a total of 2 mine Permit/ Contract Areas. Out of 2, 1 area is of mineral-Sand & Gravel and rest 1 is of mineral Ordinary Clay/ Silt. Out of these 2 Mining Permit/ Contract, both the areas are in non-operational condition. There is no applicability of Cluster due to non presence of mining areas within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, Go- zone and No-Go zone has been identified. Total Go zone area is 6.0 Ha and No-Go zone area is 3.8 Ha. No area falls within 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 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. 3.8 Ha area falls within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads.

Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below (with extraction path).

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer 161 | Pa
Lakhimpur Division
North Lakhimpur.



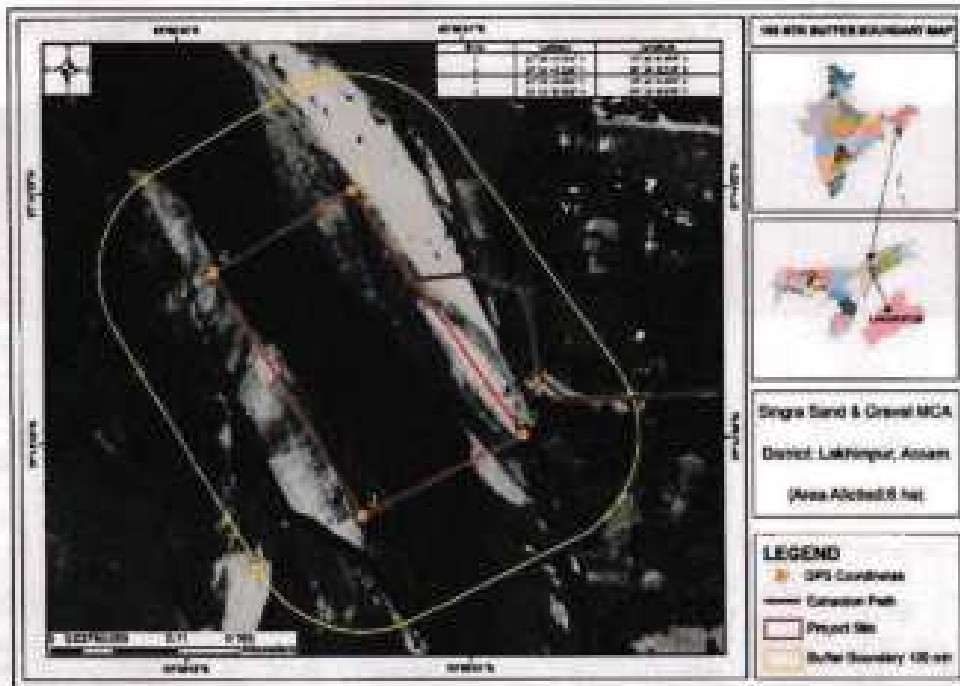


Fig. 13.53 A Singra Sand & Gravel MCA, 100m buffer map (Google Image)

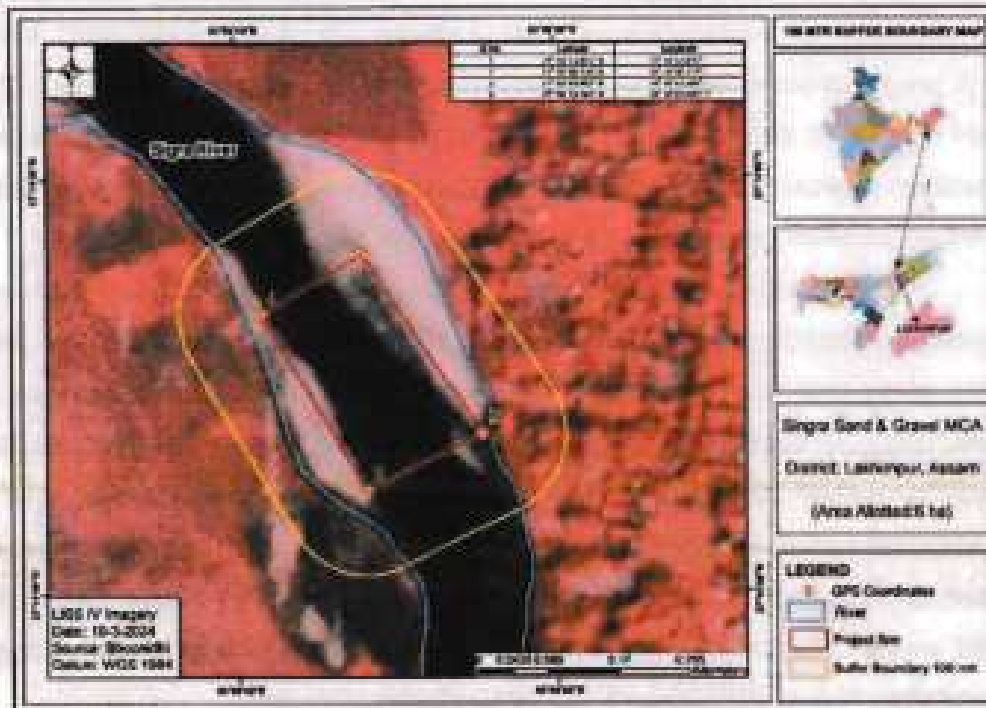


Fig. 13.53 B Singra Sand & Gravel MCA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Lakhimpur Division
Naruli Lakhimpur



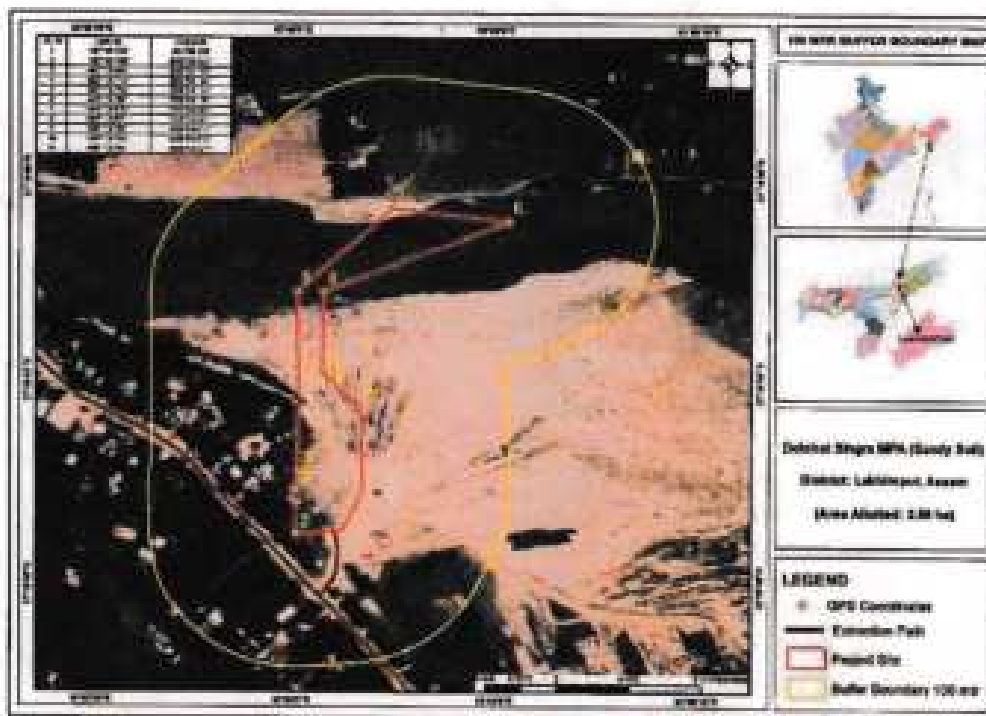


Fig. 13.54 A Dolohat Singra MPA, 100m buffer map (Google Image)

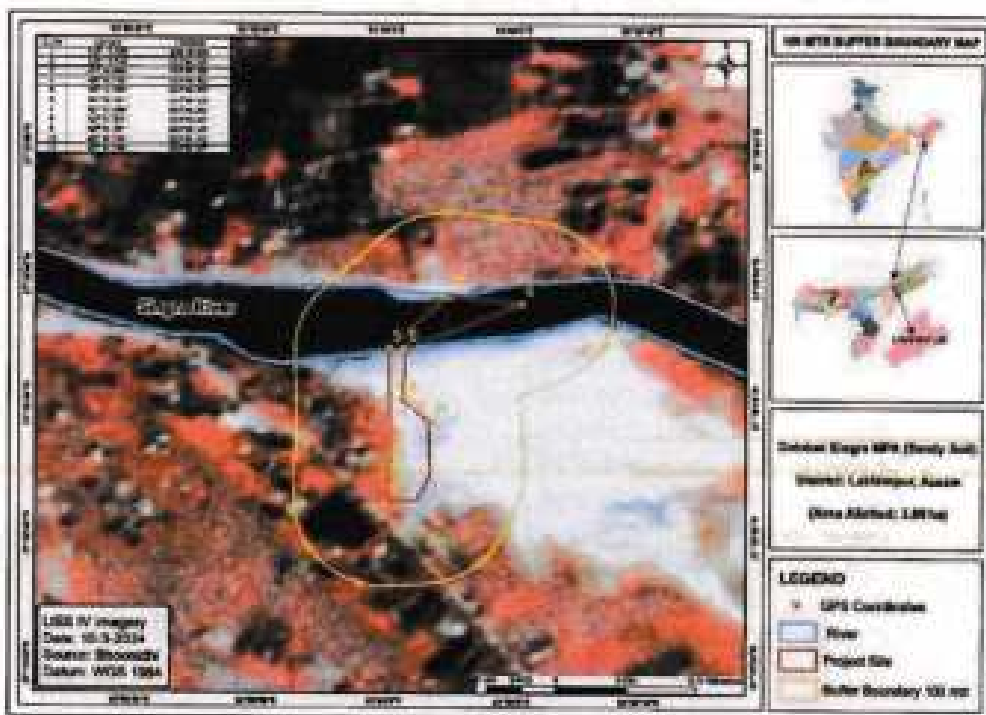


Fig. 13.54 B Dolohat Singra MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer 163 |
Lakhimpur Division
North Lakhimpur.



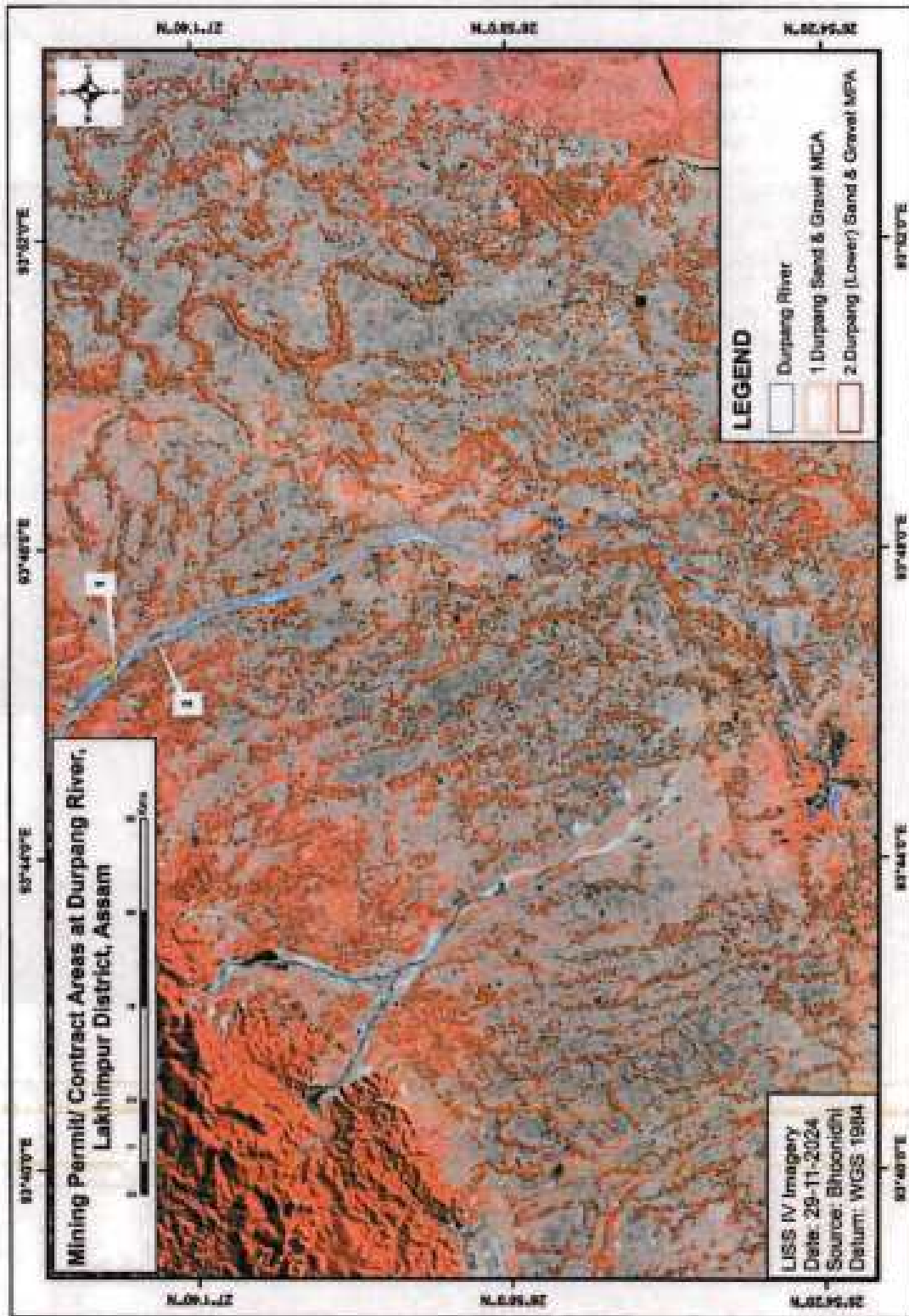
13.4.9 Description of Mining Permit/ Contract Areas in Durpang River:

Table 13.22: Details of Durpang River

Sr No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Durpang River in the district	24.25	100	0
2	Area already granted in the Durpang River	7.11	7.87	7.87
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	0	0	0
6	Area not recommended for future Quarry Permit/ Contract Area grant due non- availability of un-mined block 50 meters with after every block of 1000 meters over which is undertaken or at such distance as may be	0	0	0

	directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco- sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	No	0	0





Map 13.9 Map showing Mining Permit/ Contract Areas within Durlpang River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

Table 13.23: Details and Status of Individual Mining Permit/ Contract Areas of Durpang River

Sl No.	Name	Name of Mineral	Area in Ha.	Mining Area in Ha.	Period (in Year)	Operational/ Non-operational	Coordinate	
							Latitude	Longitude
1	Durpang (Lower) Sand & Gravel MPA	Sand & Gravel	1.91	1.91	2	Non-operational	N27.036856	E93.781193
							N27.036645	E93.780405
							N27.034392	E93.781502
							N27.034559	E93.782083
2	Durpang Sand & Gravel MCA	Sand & Gravel	5.2	5.2	7	Non-operational	N27°2'43.94"	E93°46'22.03"
							N27°2'42.42"	E93°46'16.66"
							N27°2'34.36"	E93°46'28.54"
							N27°2'36.21"	E93°46'33.48"

Durpang river area in the district is 24.25 Ha and area already granted in the river is 7.11 Ha. The riverbed is having a total of 2 mine Permit/ Contract Areas. These areas are of mineral-Sand & Gravel. Both the mining areas are in non-operational condition. No new area is identified for future mining project. There is no applicability of Cluster due to non presence of mining areas within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, Go- zone and No-Go zone has been identified. Total Go zone area is 7.11 Ha and No-Go zone area is 0.0 Ha. No area falls *within 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 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 area falls within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads.*

Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below (with extraction path):



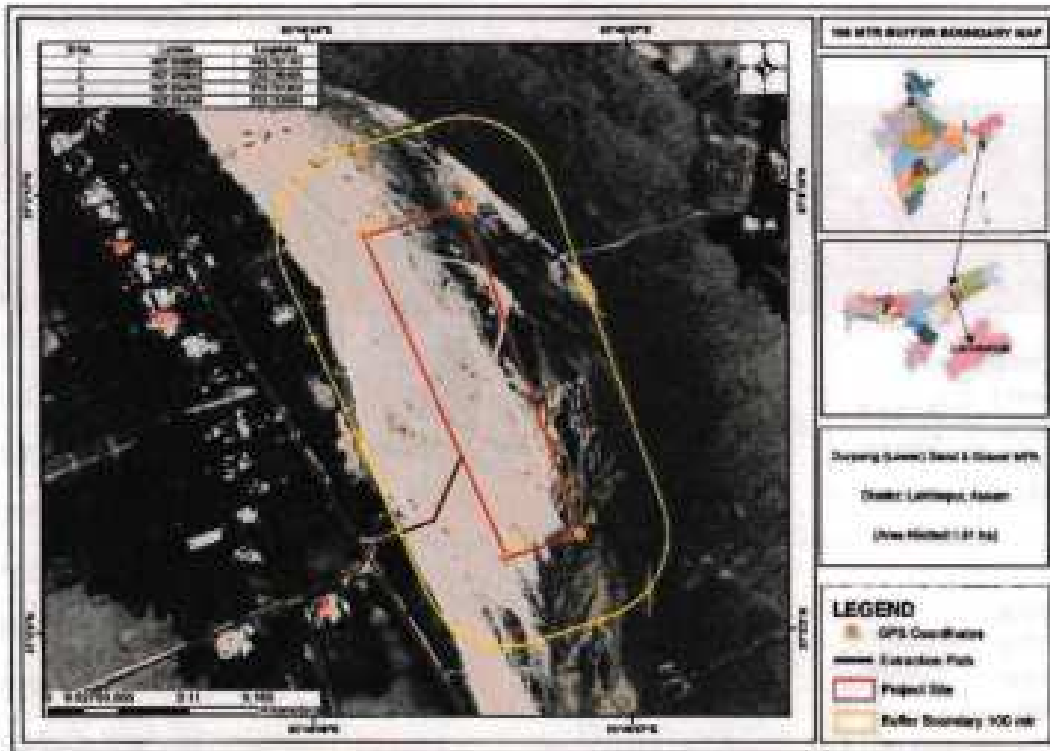


Fig. 13.55 A Durpang (Lower) Sand & Gravel MPA, 100m buffer map (Google Image)

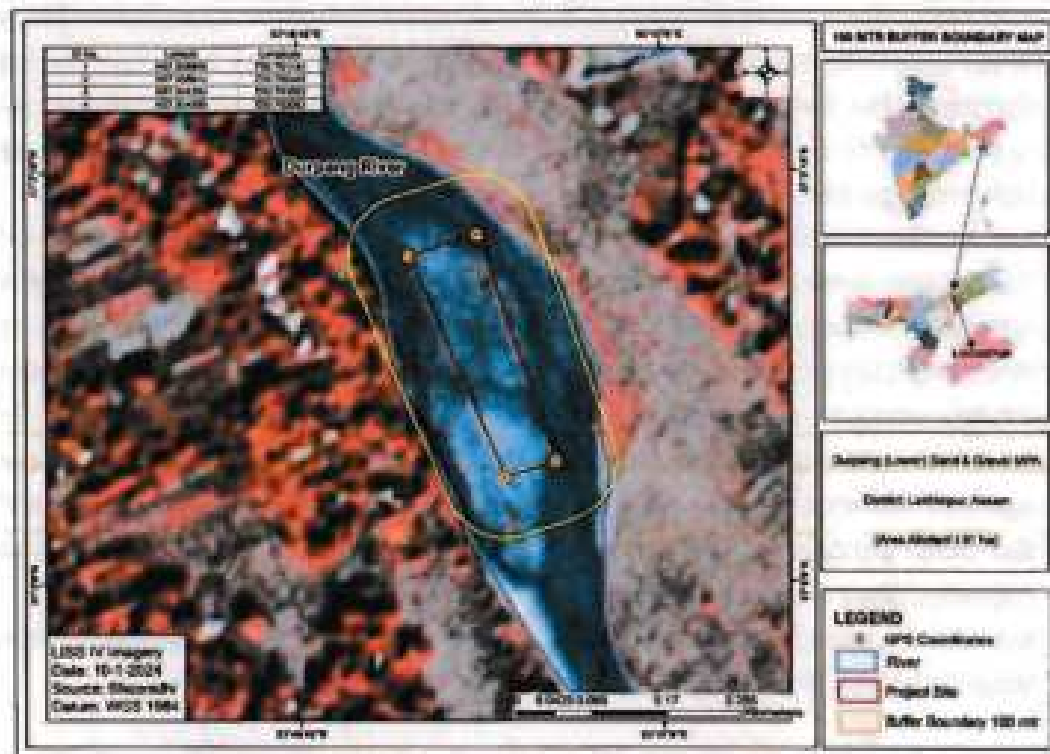


Fig. 13.55 B Durpang (Lower) Sand & Gravel MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer
Lakhimpur Division
Baroi, Lakhimpur.

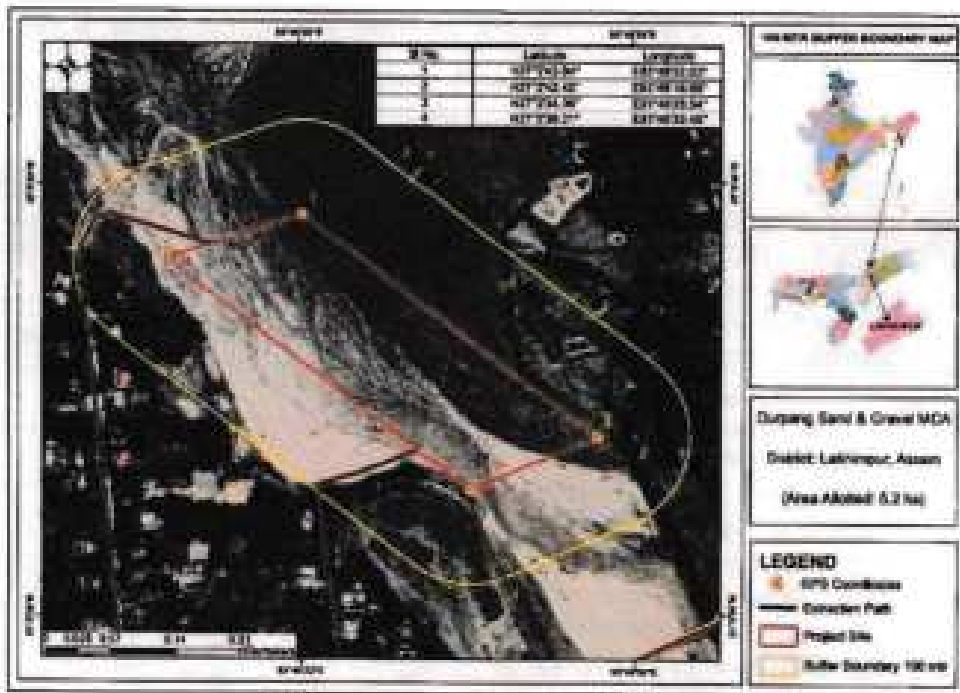


Fig. 13.56 A Durgang Sand & Gravel MCA, 100m buffer map (Google Image)

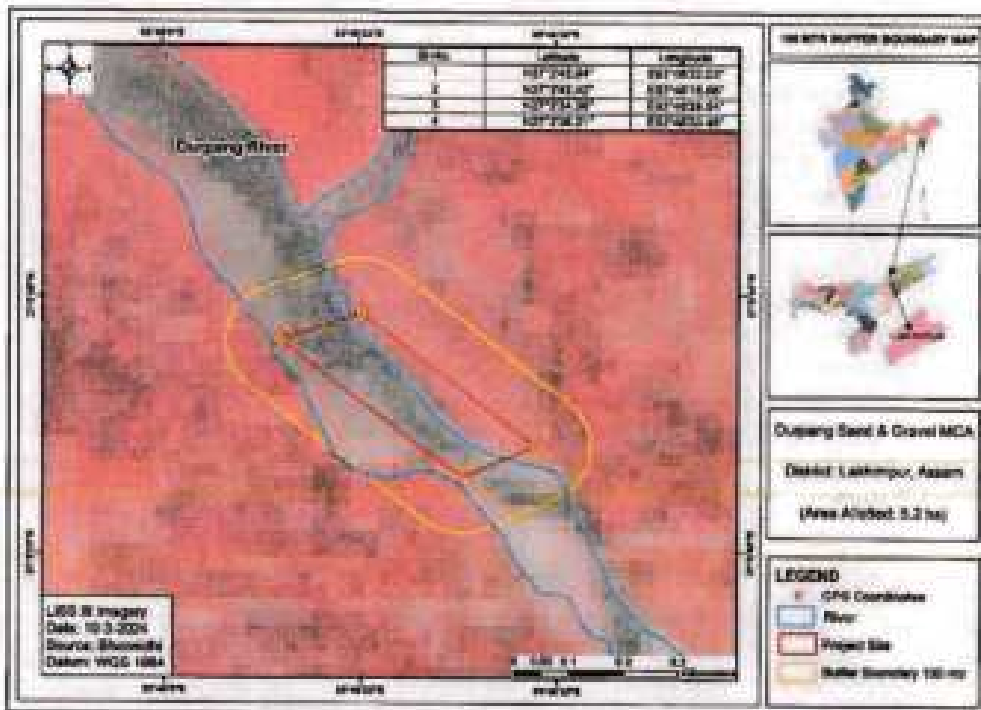


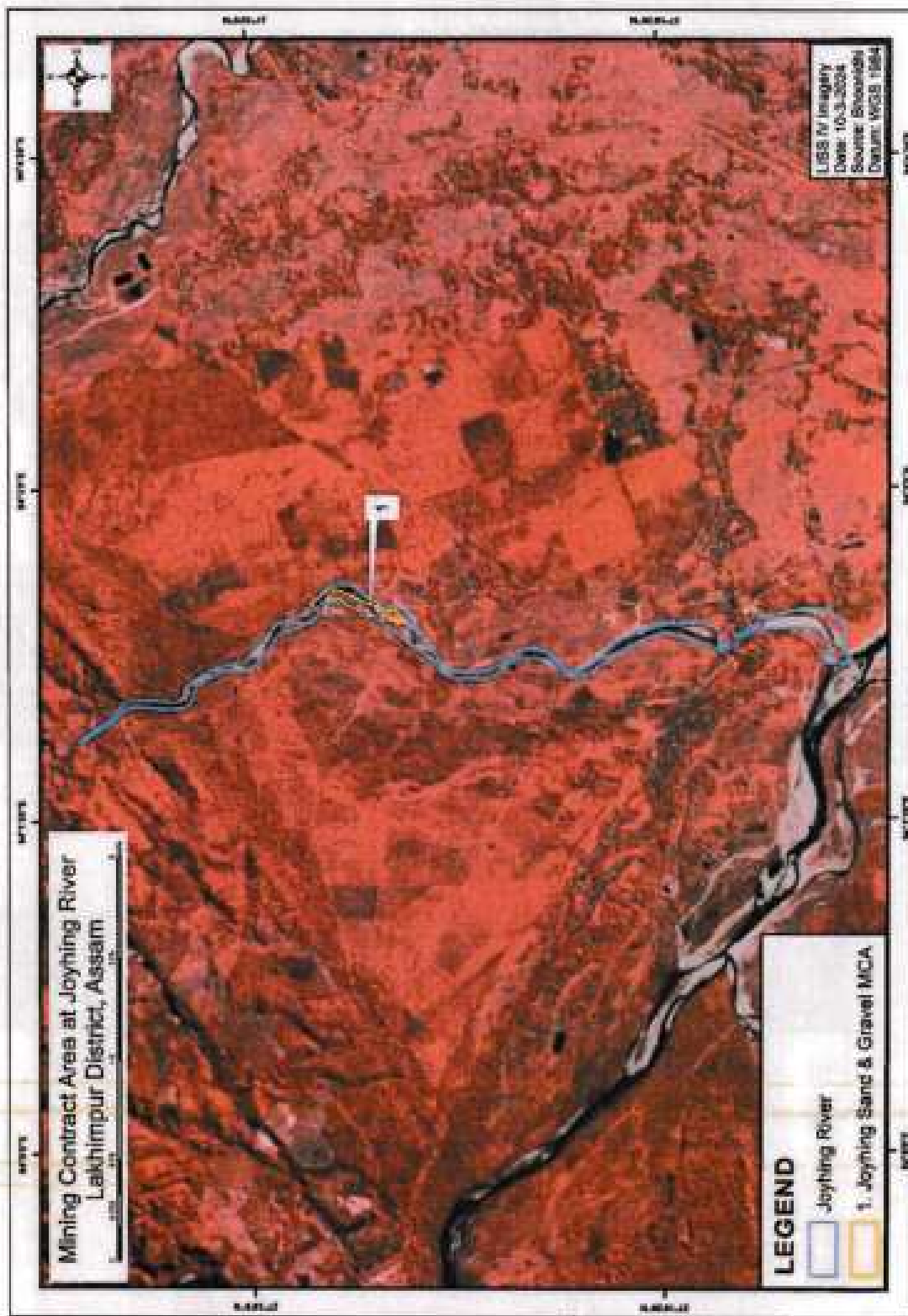
Fig. 13.56 B Durgang Sand & Gravel MCA, 100m buffer map (Satellite Image)

13.4.10 Description of Mining Permit/ Contract Areas in Joyhing River:

Table 13.24: Details of Joyhing River

Sr No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Joyhing River in the district	46.90	100	0
2	Area already granted in the Joyhing River	4.9	10.44	10.44
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	0	0	0
6	Area not recommended for future Quarry Permit/ Contract Area grant due non- availability of un-mined block 50 meters with after every block of 1000 meters over which is undertaken or	0	0	0

	at such distance as may be directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco-sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	No	0	0



Map 13.10: Map showing Mining Permit/ Contract Areas within Joyhing River

Minerals: Sand, Gravel, Boulder, Ordinary Clay
District Forest Officer
Lakhimpur Division
North Lakhimpur.

Table 13.25: Details and Status of Individual Mining Permit/ Contract Areas of Joyhing River

Sl No.	Name	Name of Mineral	Area in Ha.	Mining Area in Ha.	Period (in Year)	Operational/ Non-operational	Coordinate	
							Latitude	Longitude
1	Joyhing Sand & Gravel MCA	Sand & Gravel	4.9	4.46	7	Operational	N27°19'45.00"	E94°2'28.80"
							N27°19'43.81"	E94°2'27.10"
							N27°19'27.10"	E94°2'26.80"
							N27°19'40.37"	E94°2'32.47"

Joyhing river area in the district is 46.90 Ha and area already granted in the River is 4.9 Ha. The riverbed has only one mine Permit/ Contract Area. The mining area is for mineral-Sand & Gravel. The area is in operational condition No new area is identified for future mining project. There is no applicability of Cluster due to non presence of mining areas within 500-meter radius having homogeneous mineral. On the basis of distance criteria, Go- zone and No-Go zone has been identified. Total Go zone area is 4.9 Ha and No-Go zone area is 0.0 Ha. No area falls within 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 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. The present mining area do not fall within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads.

Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below (with extraction path):

Minerals: Sand, Gravel, Boulder, Ordinary

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Lakhimpur Division
North Lakhimpur.



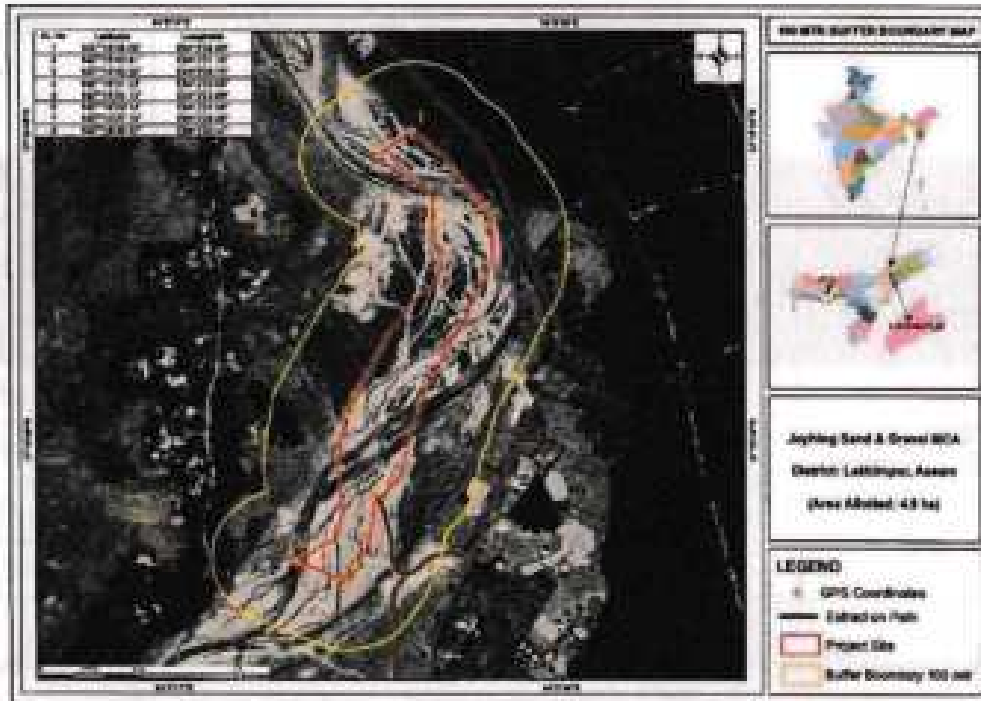


Fig. 13.57 A Joyhing Sand & Gravel MCA, 100m buffer map (Google Image)

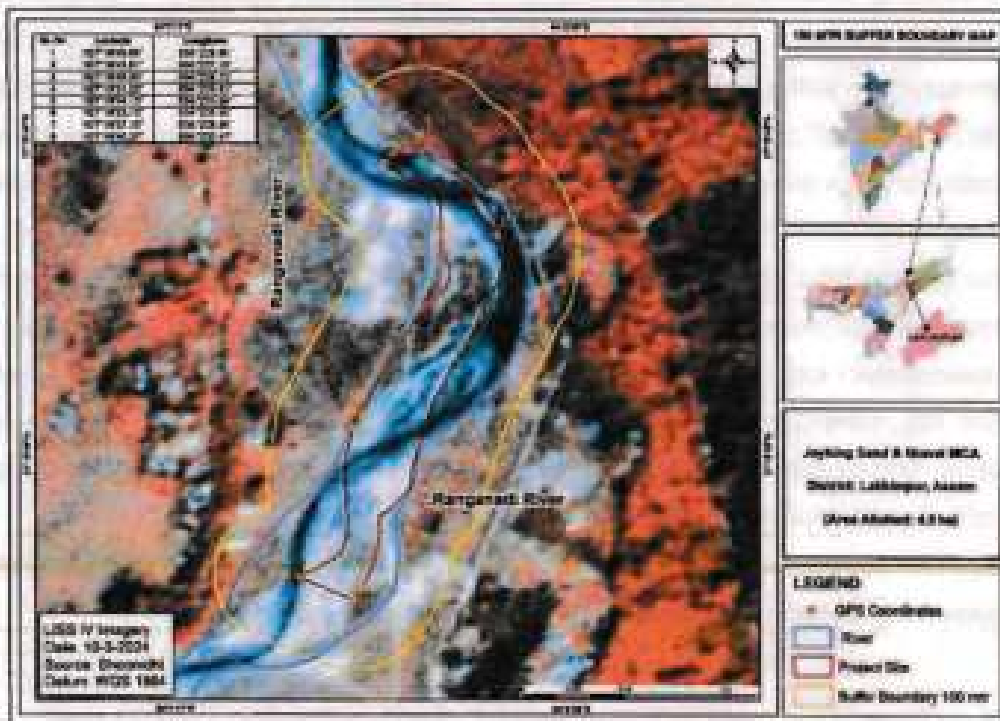


Fig. 13.57 B Joyhing Sand & Gravel MCA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Mineral Forest Officer
Lakhimpur District
North Lakhimpur

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13.4.11 Description of Mining Permit/ Contract Areas in Dirgha River:

Table 13.26: Details of Dirgha River

Sr No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Dirgha River in the district	153.77	100	0
2	Area already granted in the Dirgha River	5.0	3.25	3.25
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	0	0	0
6	Area not recommended for future Quarry Permit/ Contract Area grant due non- availability of un-mined block 50 meters with after every block of 1000 meters over which is undertaken or at such distance as may be	0	0	0

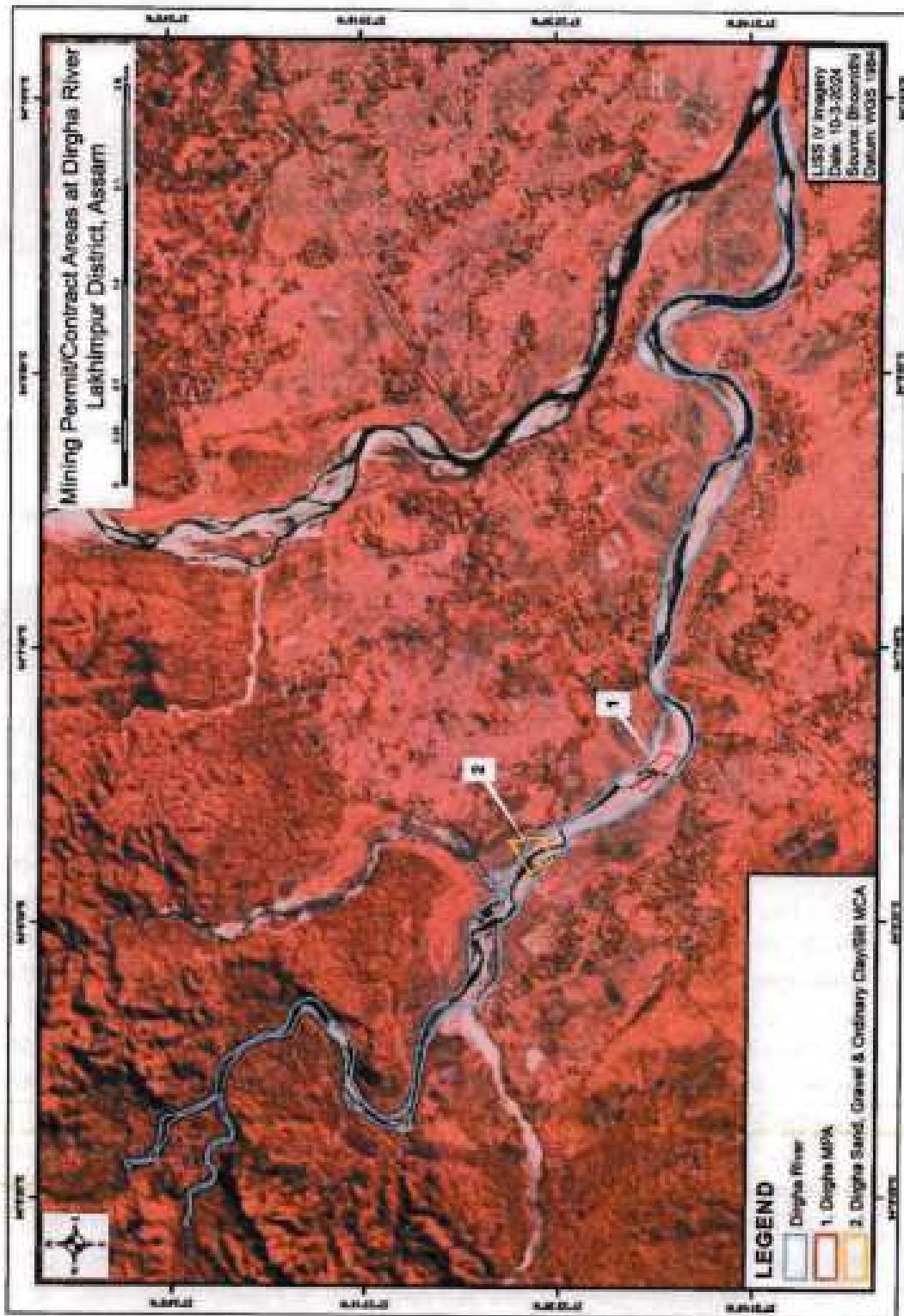
Minerals: Sand, Gravel, Boulder, Ordinary Clay

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 North Lakhimpur.

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	directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco- sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	No	0	0
14	High Voltage Power Line	5.0	3.25	6.5



Map 13.11 Map showing Mining Permit/ Contract Areas within Dirgha River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Table 13.27: Details and Status of Individual Mining Permit/ Contract Areas of Dirgha River

Sl No.	Name	Name of Mineral	Area in Ha.	Mining Area in Ha.	Period (in Year)	Operational/ Non-operational	Coordinate	
							Latitude	Longitude
1	Dirgha Sand, Gravel & Ordinary Clay/ Silt MCA	Gravel & Ordinary Clay/ Silt	5.0	4.84	7	Non-operational	N27°22'41.160"	E94°6'50.580"
							N27°22'33.660"	E94°6'51.660"
							N27°22'31.200"	E94°6'45.600"
							N27°22'36.360"	E94°6'42.480"

Table 13.28: Details of Individual Mining Permit/ Contract of Dirgha River (New Mining area proposed)

Sr No.	Permit area details	Name of Mineral	Area allotted in Ha.	Coordinate	
				Latitude	Longitude
1	3.0 Ha Dirgha MPA	Sand, Gravel & Ordinary Clay/ Silt	3.0	27°22'2.172" N	94°7'12.141" E
				27°22'5.606" N	94°7'13.328" E
				27°22'9.561" N	94°7'3.209" E
				27°22'12.176" N	94°7'5.287" E

Dirgha river area in the district is 153.77 Ha and area already granted in the River is 5.0 Ha. The riverbed has a total of only one mine Permit/ Contract Area. This area is of mineral- Sand, Gravel & Ordinary Clay/ Silt. The mining area is in non-operational condition. 1 new area is identified for future mining project for Sand, Gravel & Ordinary Clay/ Silt. There is no applicability of Cluster due to non presence of mining areas within 500-meter radius having homogeneous mineral. On the basis of distance criteria, Go- zone and No-Go zone has been identified. Total Go zone area is 3.0 Ha (inclusive of 1 proposed area) and No-Go zone area is 5.0 Ha. No area falls within 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 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 area falls within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads. No Go Zone is considered due to the presence of High Voltage power line within the mining area.

Map showing the identification of Go-zone and No-Go zone for each individual lease has been prepared and given below (with extraction path):

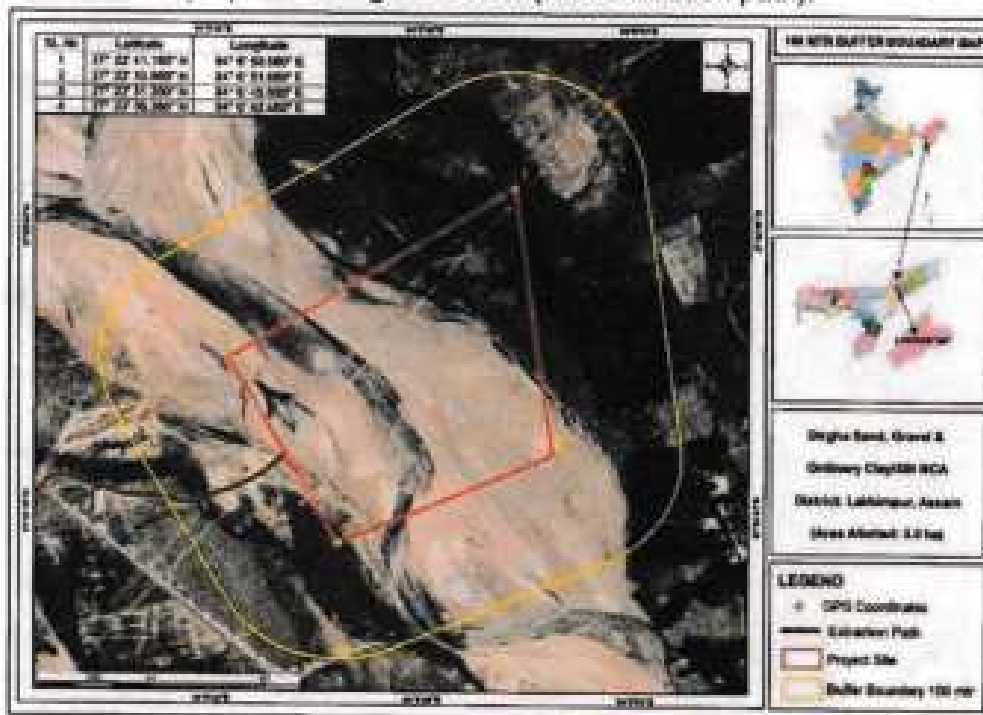


Fig. 13.58 A Dirgha Sand, Gravel & Ordinary Clay/ Silt MCA, 100m buffer map (Google Image)

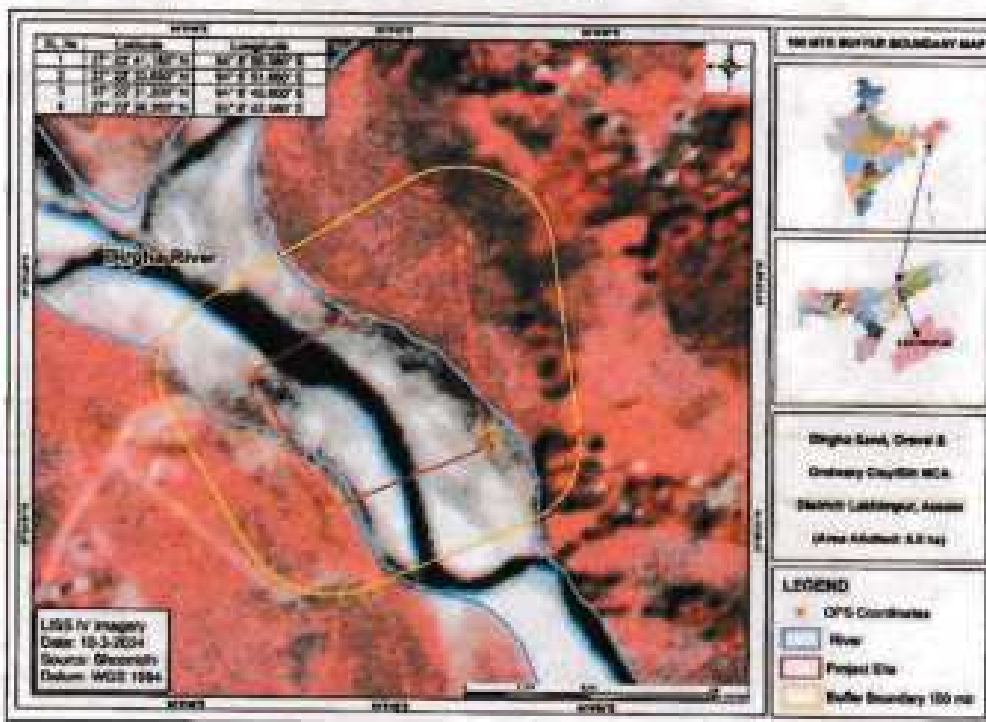


Fig. 13.58 B Dirgha Sand, Gravel & Ordinary Clay/ Silt MCA, 100m buffer map (Satellite Image)

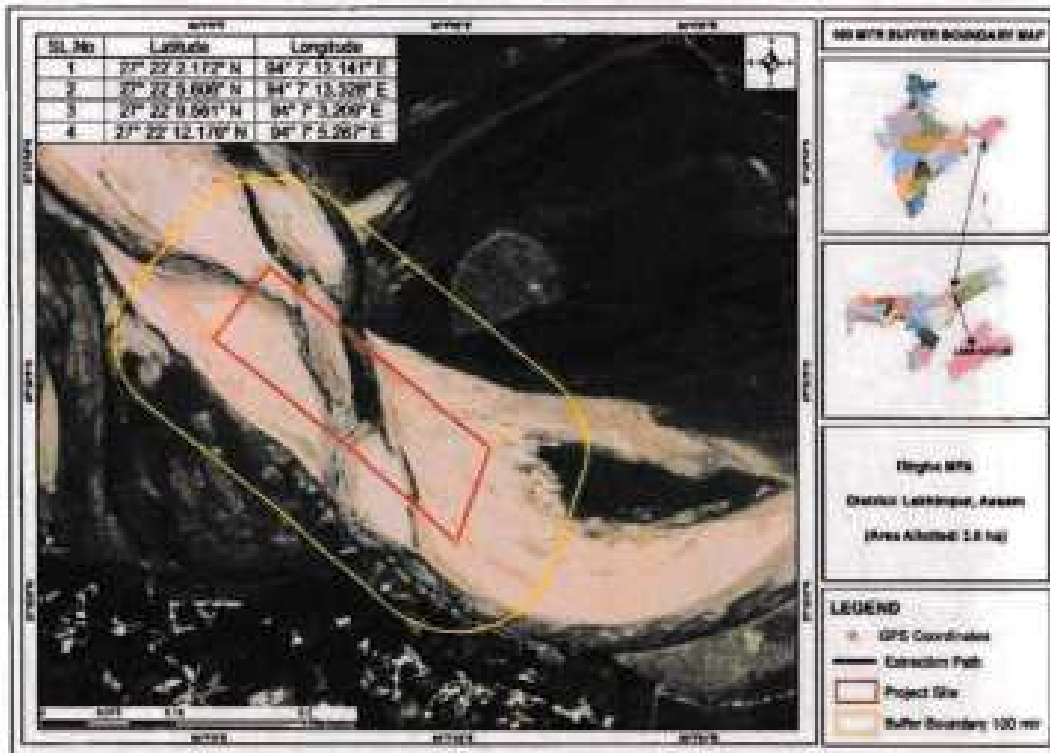


Fig. 13.59 A 3.0 Ha Dirgha MPA, 100m buffer map (Proposed) (Google Image)



Fig. 13.59 B 3.0 Ha Dirgha MPA, 100m buffer map (Proposed) (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur

13.4.12 Description of Mining Permit/ Contract Areas in Baghinijan River:

Table 13.29: Details of Baghinijan River

Sr No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Baghinijan River in the district	14.81	100	0
2	Area already granted in the Baghinijan River	0.9	6.07	6.07
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	0.9	6.07	12.14
6	Area not recommended for future Quarry Permit/ Contract Area grant due non- availability of un-mined block 50 meters with after every block of 1000 meters over which is undertaken or at such distance as may be	0	0	0

Minerals: Sand, Gravel, Boulder, Ordinary Clay

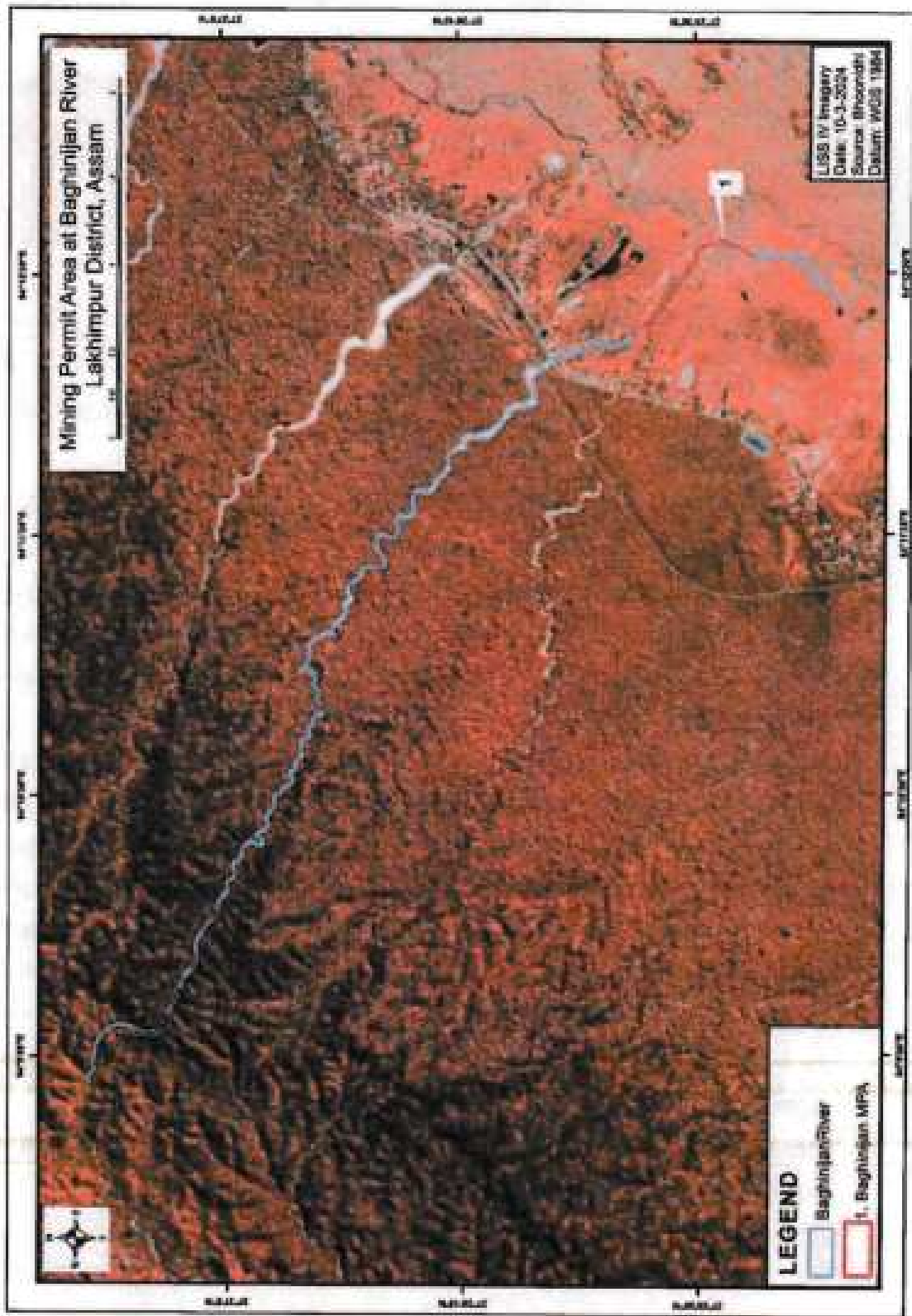
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Lakhimpur Division
North Lakhimpur

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	directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco- sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	0	0	0





Map 13.12: Map showing Mining Permit/ Contract Areas within Baghiniyan River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

Table 13.30: Details and Status of Individual Mining Permit/ Contract Areas of Baghinijan River

Sl No.	Name	Name of Mineral	Area in Ha.	Mining Area in Ha.	Period (in Year)	Operational/ Non-operational	Coordinate	
							Latitude	Longitude
1	Baghinijan Mining Permit Area (Outside R.F.)	Sand & Gravel	0.90	0.8	2	Non-operational	N27°25'41.280"	E94°12'6.840"
							N27°25'42.318"	E94°12'7.214"
							N27°25'19.426"	E94°12'23.499"
							N27°25'19.361"	E94°12'23.695"

Baghinijan river area in the district is 14.81 Ha and area already granted in the River is 0.90 Ha. The riverbed has only one mine Permit/ Contract Areas. The area is of mineral-Sand & Gravel. The area is in non-operational condition. No new area is identified for future mining project. There is no applicability of Cluster due to non presence of mining areas within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, Go- zone and No-Go zone has been identified. Total Go zone area is 0.0 Ha and No-Go zone area is 0.9 Ha. No area falls within 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 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. The area falls within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads.

Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below (with extraction path).

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Lakhimpur Division
North Lakhimpur.

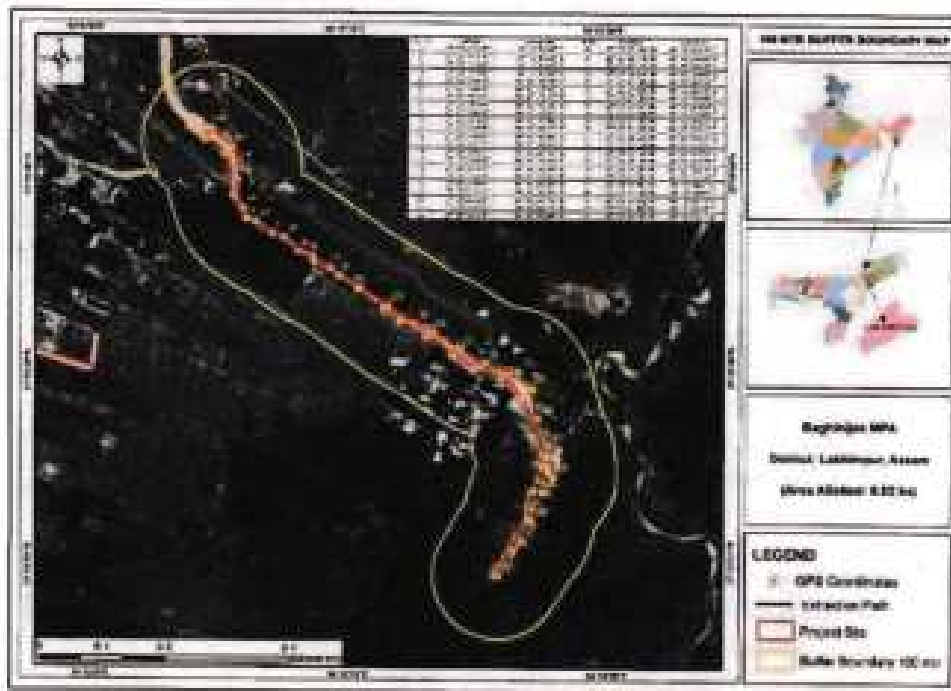


Fig. 13.60 A Baghinijan Mining Permit Area (Outside R.F.), 100m buffer map (Google Image)

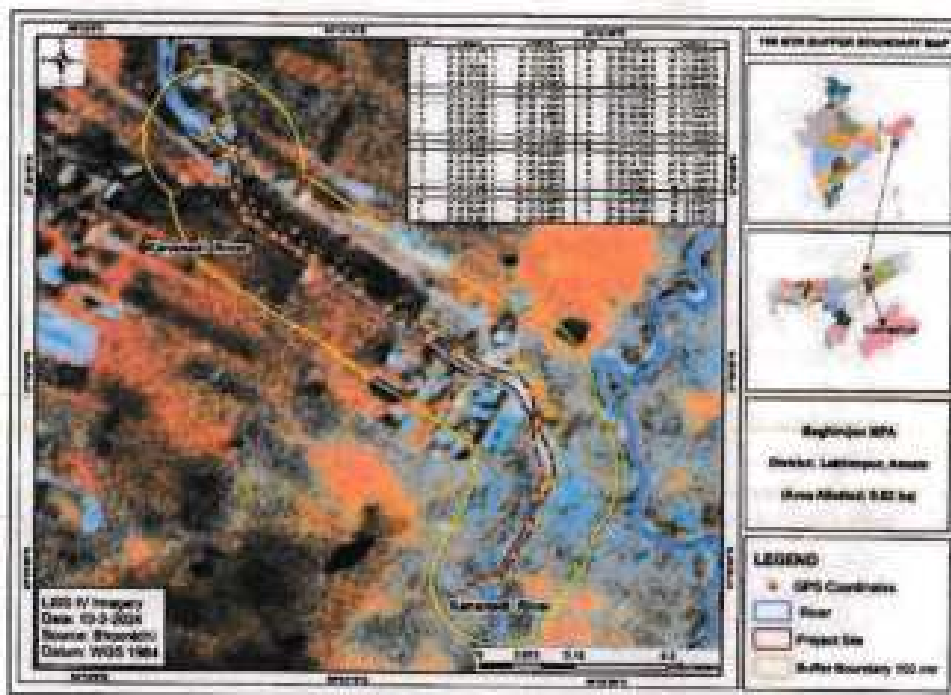


Fig. 13.60 B Baghinijan Mining Permit Area (Outside R.F.), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.




13.4.13 Description of Mining Permit/ Contract Areas in Boginadi River:

Table 13.31: Details of Boginadi River

Sr No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Boginadi River in the district	390.03	100	0
2	Area already granted in the Boginadi River	8.8	2.26	2.26
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	0	0	0
6	Area not recommended for future Quarry Permit/ Contract Area grant due non- availability of un-mined block 50 meters with after every block of 1000 meters over which is undertaken or at such distance as may be	0	0	0

	directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco- sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	No	0	0

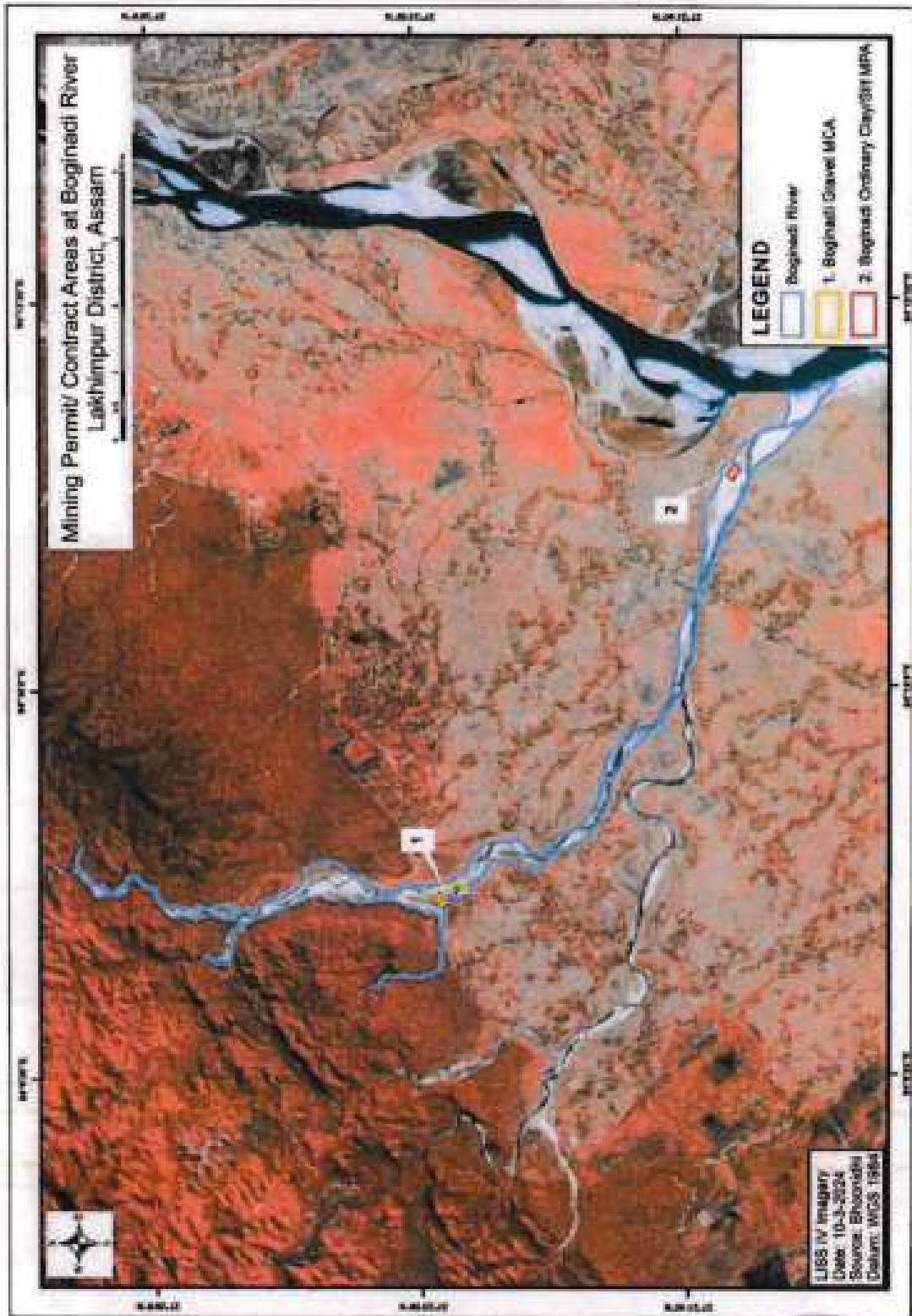
Minerals: Sand, Gravel, Boulder, Ordinary Clay



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Lakhimpur Division
North Lakhimpur.

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Map 13.13: Map showing Mining Permit/ Contract Areas within Boginadi River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Original Forest Officer
Lakhimpur District
North Lakhimpur



Table 13.32: Details and Status of Individual Mining Permit/ Contract Areas of Boginadi River

Sl No.	Name	Name of Mineral	Area in Ha.	Mining Area in Ha.	Period (in Year)	Operational/ Non-operational	Coordinate	
							Latitude	Longitude
1	Boginadi Gravel MCA	Gravel	8.8	8.8	7	Operational	N27°23'41.81"	E94°08'10.66"
							N27°23'38.7"	E94°08'2.50"
							N27°23'26.50"	E94°08'9.40"
							N27°23'29.10"	E94°08'15.42"

Table 13.33: Details of Individual Mining Permit/ Contract of Boginadi River (New Mining area proposed)

Sr No.	Permit area details	Name of Mineral	Area allotted in Ha.	Coordinate	
				Latitude	Longitude
1	Boginadi Ordinary Clay/ Silt MPA	Ordinary Clay/ Silt	2.58	27°21'18.060"N	94°11'54.720"E
				27°21'14.820"N	94°11'51.780"E
				27°21'11.100"N	94°11'57.680"E
				27°21'14.100"N	94°12'0.840"E

Boginadi river area in the district is 390.03 Ha and area already granted in the River is 8.8 Ha. The riverbed has only one Permit/ Contract Area. The area is of mineral- Gravel. The area is in operational condition. A new area is identified for future mining project. There is no applicability of Cluster due to non presence of mining areas within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, Go- zone and No-Go zone has been identified. Total Go zone area is 11.38 Ha (inclusive of proposed area) and No-Go zone area is 0.0 Ha. No area falls within 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 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 area falls within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads.

Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below (with extraction path):

Minerals: Sand, Gravel, Boulder, Ordinary Clay



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Lakhimpur Division
North Lakhimpur.



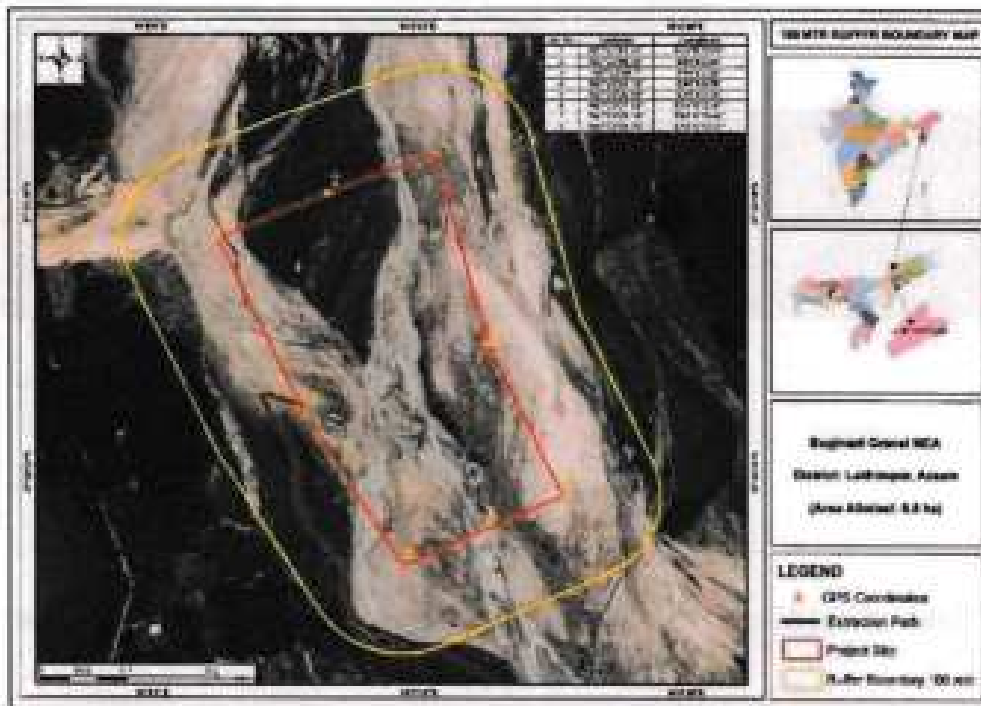


Fig. 13.61 A Boginadi Gravel MCA, 100m buffer map (Google Image)

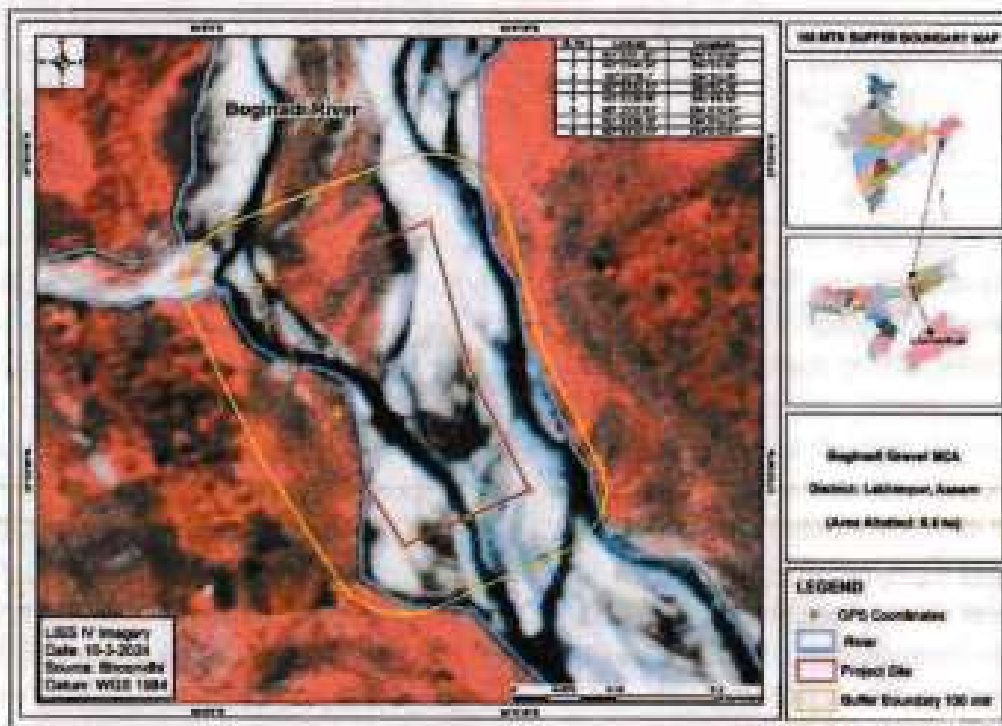


Fig. 13.61 B Boginadi Gravel MCA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Lakhimpur Division
North Lakhimpur.



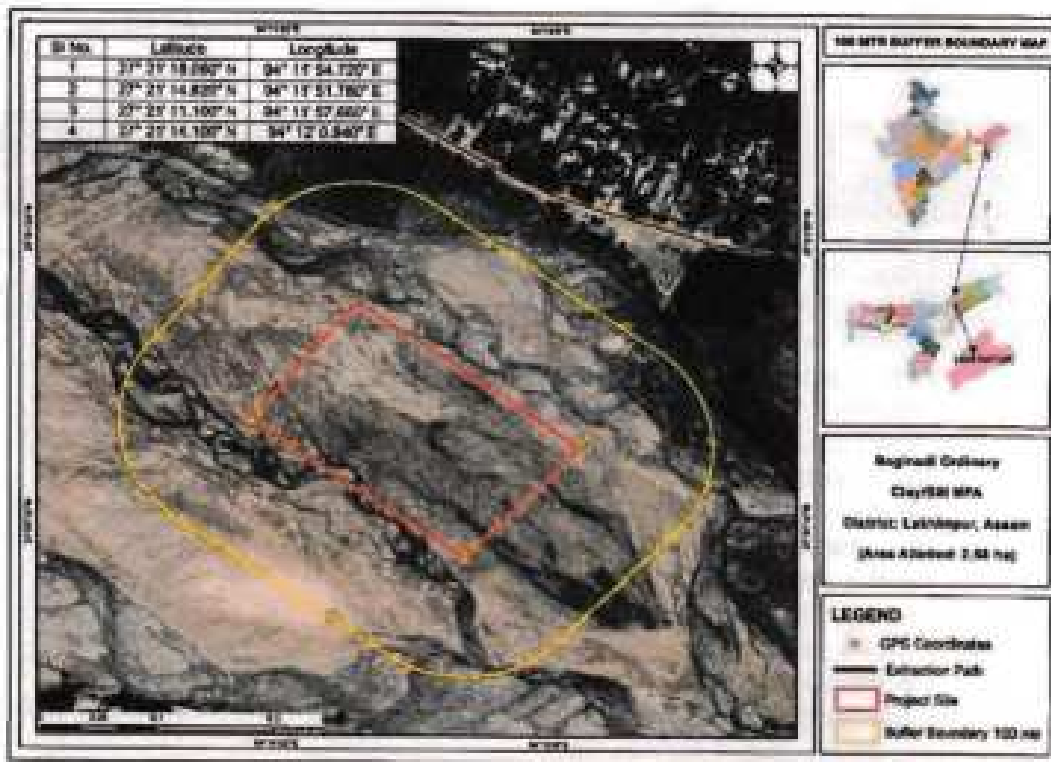


Fig. 13.62 A Boginadi Ordinary Clay/ Silt MPA (Proposed), 100m buffer map (Google Image)

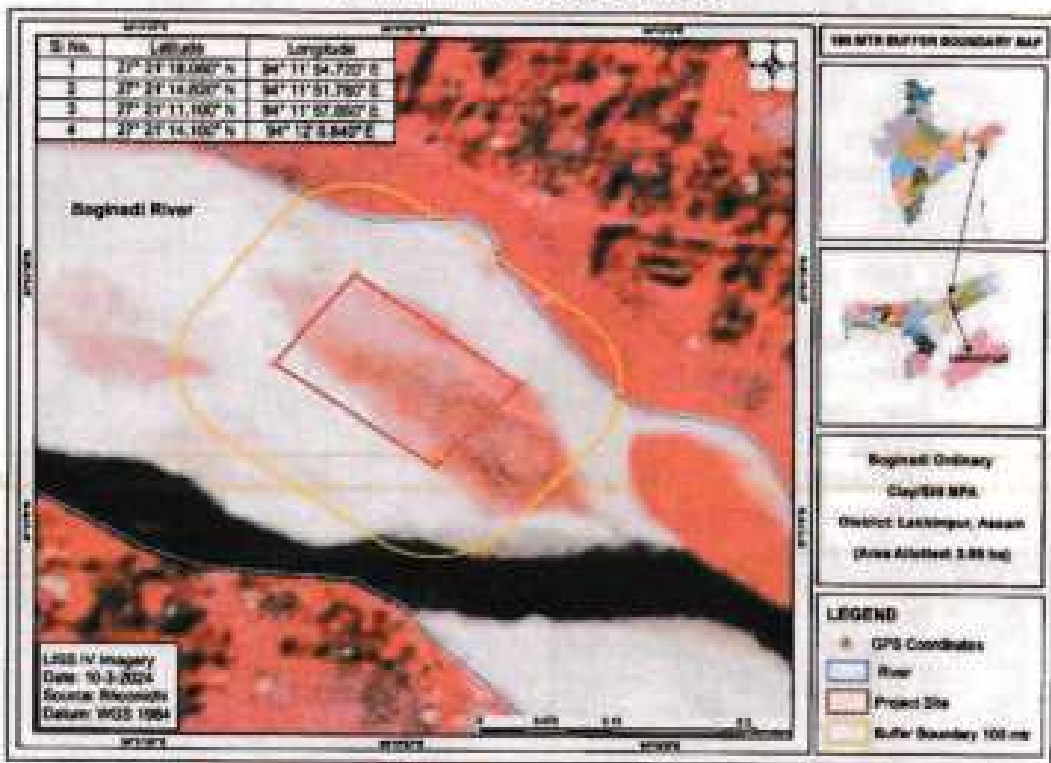


Fig. 13.62 A Boginadi Ordinary Clay/ Silt MPA (Proposed), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.




13.4.14 Description of Mining Permit/ Contract Areas in Ghagor River:

Table 13.34: Details of Ghagor River

Sl. No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Ghagor River in the district	40.24	100	0
2	Area already granted in the Ghagor River	0.57	1.41	1.41
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	0.57	1.41	2.82
6	Area not recommended for future Quarry Permit/ Contract Area grant due non- availability of un-mined block 50 meters with after every block of 1000 meters over which is undertaken or at such distance as may be	0	0	0

	directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco- sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	No	0	0

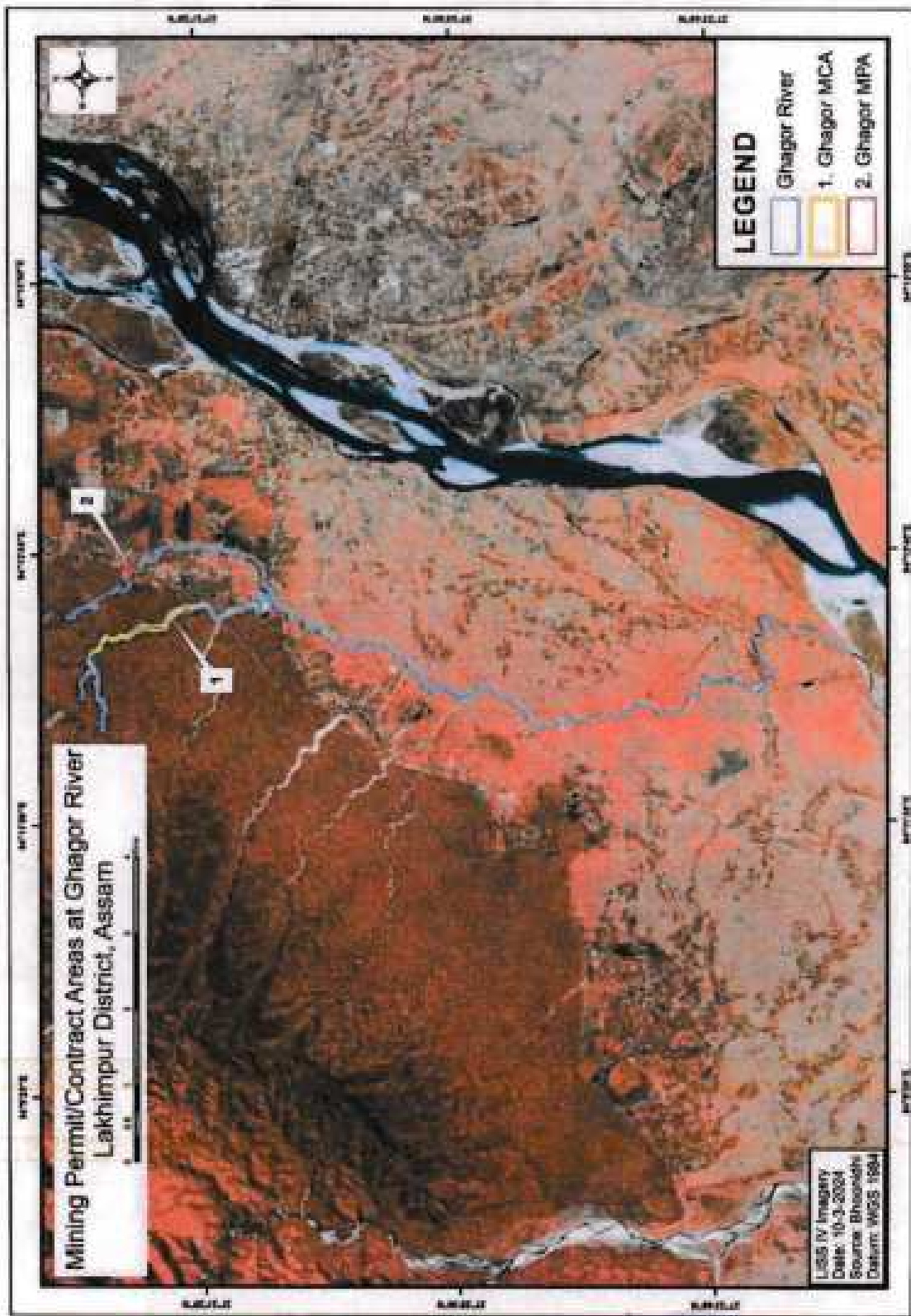
Minerals: Sand, Gravel, Boulder, Ordinary Clay



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Map 13.14 Map showing Mining Permit/ Contract Areas within Ghaghar River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Table 13.35: Details and Status of Individual Mining Permit/ Contract Areas of Ghagor River

Sl. No.	Name	Name of Mineral	Area in Ha.	Mining Area in Ha.	Period (in Year)	Operational/ Non-operational	Coordinate	
							Latitude	Longitude
1	Ghagar Sand & Gravel MPA	Sand & Gravel	0.57	0.48	2	Non-operational	N27°27'51.72"	E94°13'32.52"
							N27°27'48.81"	E94°13'31.82"
							N27°27'50.01"	E94°13'38.51"
							N27°27'40.40"	E94°13'31.44"

Table 13.36: Details of Individual Mining Permit/ Contract of Ghagor River (New Mining area proposed)

Sl. No.	Permit area details	Name of Mineral	Area allotted in Ha.	Coordinate	
				Latitude	Longitude
1	Ghagor Mining Contract Area (RF Area)	Sand, Gravel & Boulder	9.0	94.220892	27.456726
				94.220453	27.458292
				94.219876	27.459209
				94.218283	27.460178
				94.218067	27.461354
				94.218440	27.462197
				94.218240	27.462825
				94.217083	27.464199
				94.217140	27.465209
				94.216887	27.465390
				94.216638	27.466140
				94.217023	27.466826
				94.216899	27.467092
				94.215875	27.467637
				94.215148	27.467977
				94.215051	27.468462
				94.214677	27.468705
				94.214242	27.468637
				94.214686	27.468329
				94.215068	27.467471
94.215367	27.467305				
94.215783	27.467329				
94.216403	27.467021				
94.216494	27.4664232				
94.216131	27.465953				

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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				94.216584	27.465180
				94.216598	27.463981
				94.217418	27.463020
				94.217623	27.462324
				94.217462	27.460595
				94.21802	27.459496
				94.218804	27.459207
				94.220073	27.457653
				94.220095	27.456535

Ghagor river area in the district is 40.24 Ha and area already granted in the River is 0.57 Ha. The riverbed has a total of only one mine Permit/ Contract Area. The area is of mineral-Sand & Gravel. The only one available mining area is in non-operational condition. 1 new area is identified for future mining project for Sand, Gravel & Boulder, located within Reserved Forest. There is no applicability of Cluster due to non presence of mining areas within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, Go- zone and No-Go zone has been identified. Total Go zone area is 9.0 Ha (inclusive of 1 proposed area) and No-Go zone area is 0.57 Ha. No area falls within 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 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. 0.57 Ha area falls within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads.

Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below (with extraction path).

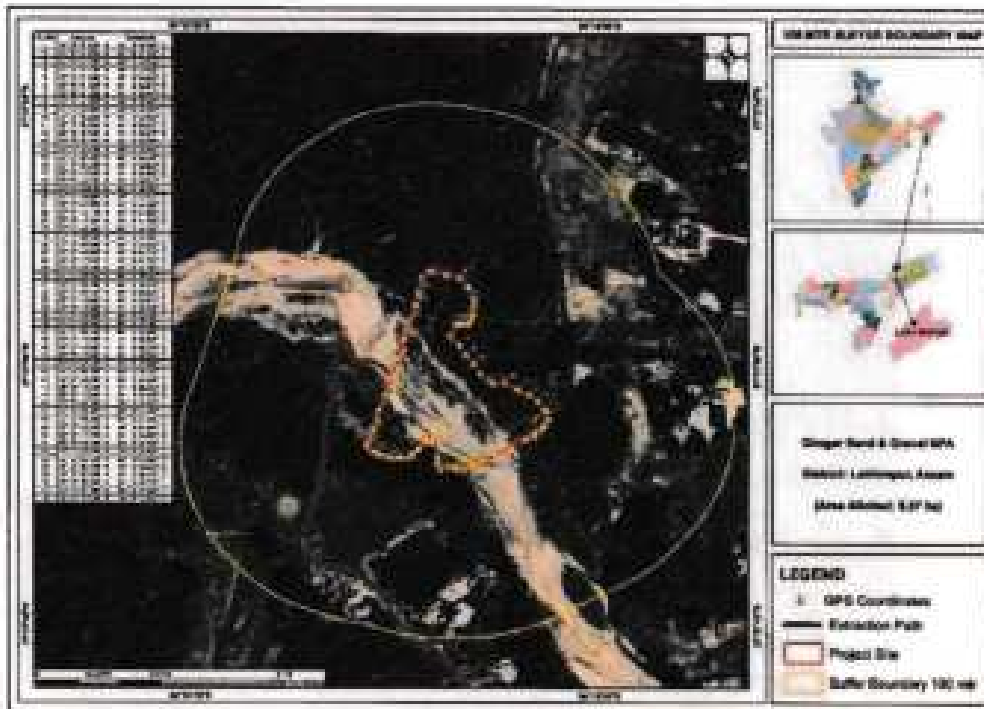


Fig. 13.63 A Ghagor Sand & Gravel MPA, 100m buffer map (Google Image)

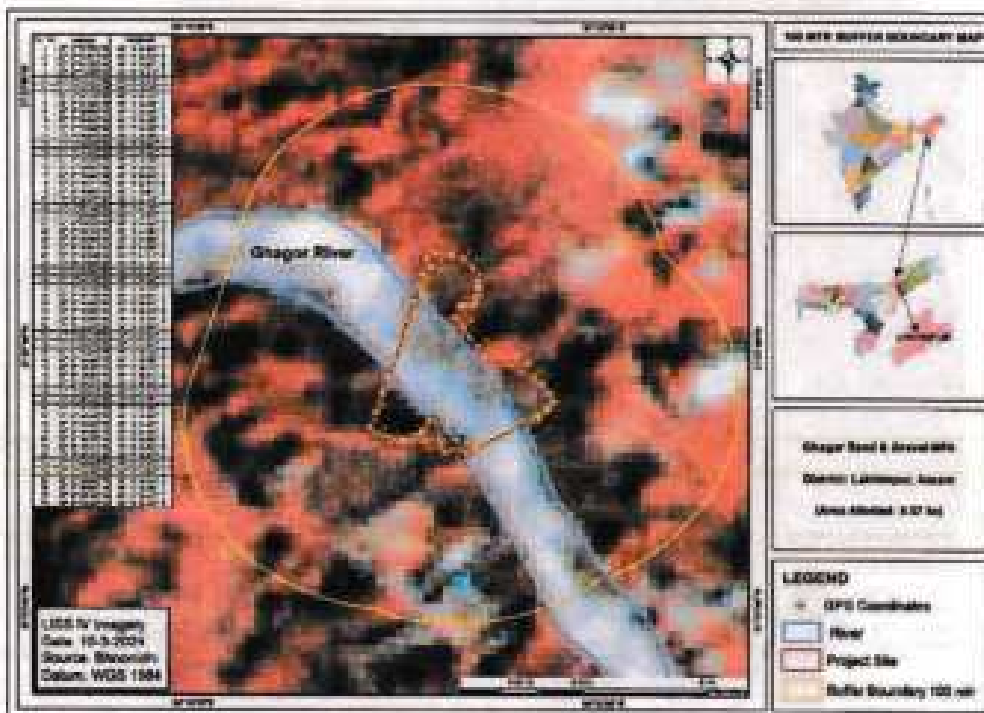


Fig. 13.63 B Ghagor Sand & Gravel MPA, 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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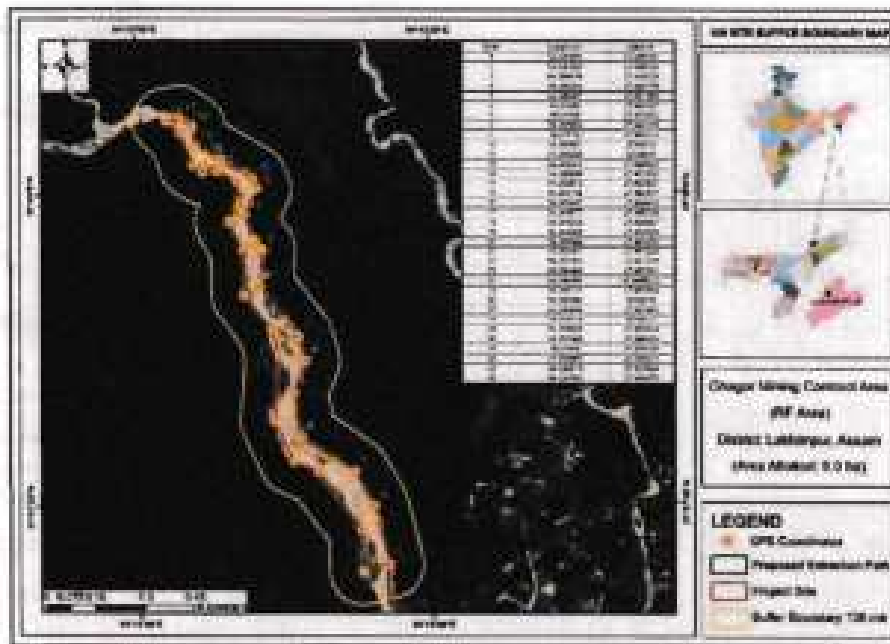


Fig. 13.64 A Ghagor Mining Contract Area (RF Area) (Proposed),
100m buffer map (Google Image)

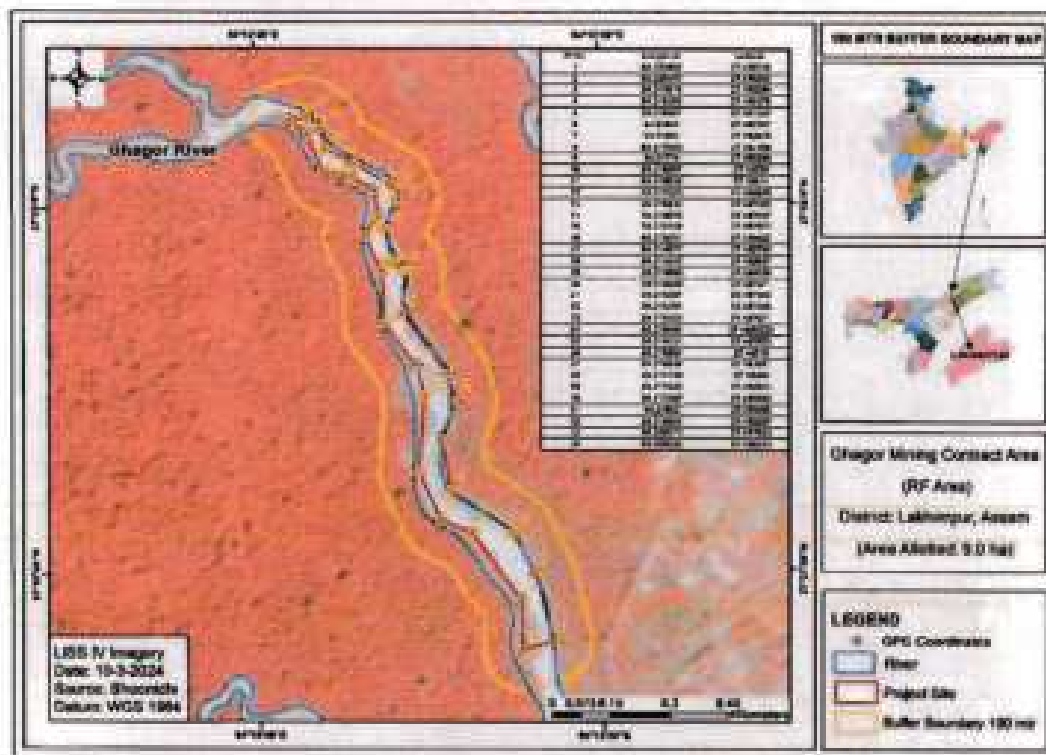


Fig. 13.64 B Ghagor Mining Contract Area (RF Area) (Proposed),
100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay


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13.4.15 Description of Mining Permit/ Contract Areas in Kimin River:

Table 13.37: Details of Kimin River

Sr No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Kimin River in the district	102.59	100	0
2	Area already granted in the Kimin River	0	0	0
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	0	0	0
6	Area not recommended for future Quarry Permit/ Contract Area grant due non- availability of un-mined block 50 meters with after every block of 1000 meters over which is undertaken or	0	0	0

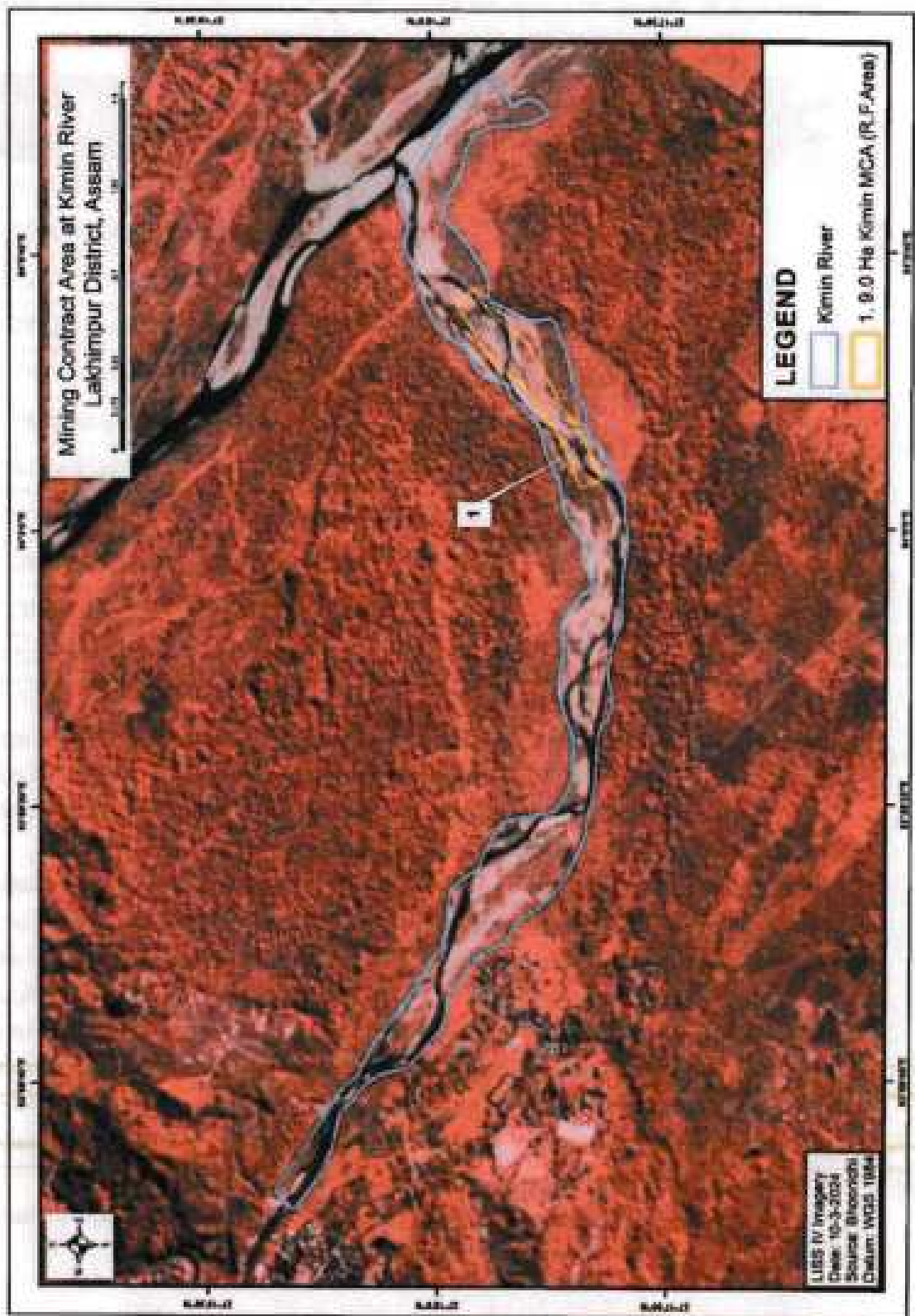
Minerals: Sand, Gravel, Boulder, Ordinary Clay


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	at such distance as may be directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco- sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	No	0	0



Map 13.15: Map showing Mining Permit/ Contract Areas within Kimin River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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**Table 13.38: Details of Individual Mining Permit/ Contract Areas of Kimin River
(New Mining area proposed)**

Sr No.	Permit area details	Name of Mineral	Area allotted in Ha.	Coordinate	
				Latitude	Longitude
1	9.0 Ha Kimin Mining Contract Area (R.F. Area)	Sand, Gravel & Boulder	9.0	N27.294602°	E94.003933°
				N27.295334°	E94.005064°
				N27.296536°	E94.007527°
				N27.297894°	E94.008771°
				N27.298453°	E94.009701°
				N27.299077°	E94.009097°
				N27.297833°	E94.006814°
				N27.296471°	E94.005619°
				N27.295223°	E94.003399°
				N27.294584°	E94.001659°
N27.293863°	E94.002042°				

Kimin river area in the district is 102.59 Ha and no area is granted for mining in the River bed. 1 new area is identified for future mining project for Sand, Gravel & Boulder. There is no applicability of Cluster due to non presence of mining areas within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, Go- zone and No-Go zone has been identified. Total Go zone area is 9.0 Ha and No-Go zone area is 0.0 Ha. Out of 9.0 Ha, no area falls within 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 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 area falls within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads.

Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below (with extraction path):

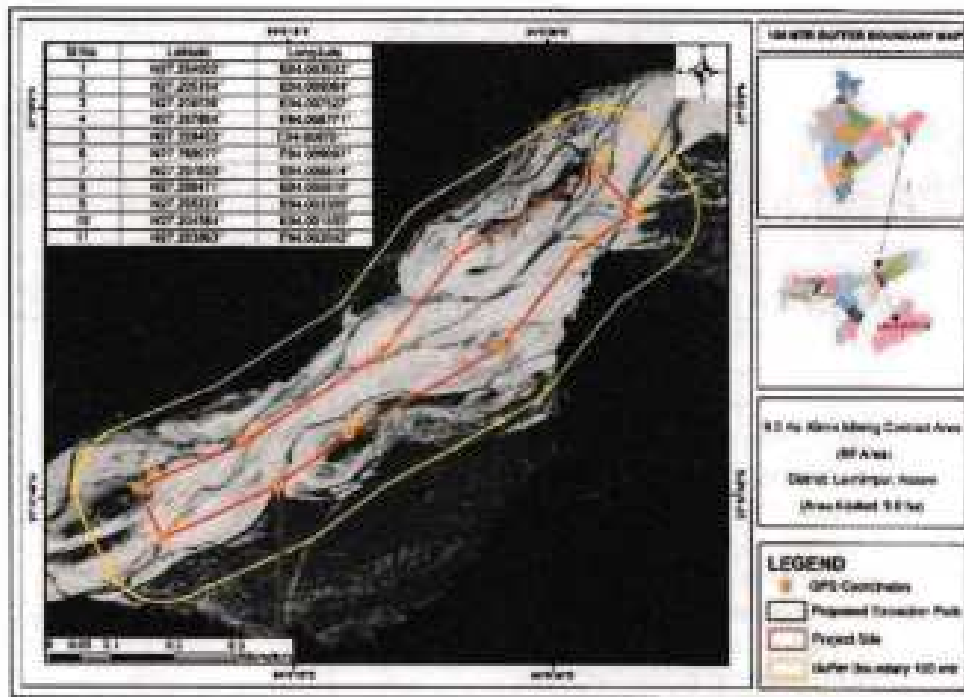


Fig. 13.65 A 9.0 Ha Kimin Mining Contract Area (R.F. Area) (Proposed), 100m buffer map (Google Image)

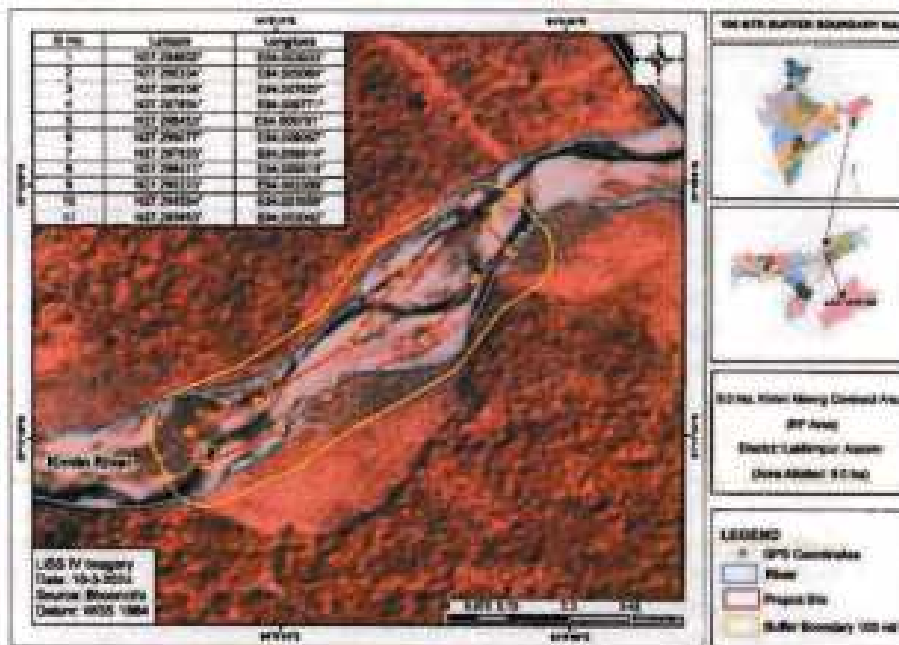


Fig. 13.65 B 9.0 Ha Kimin Mining Contract Area (R.F. Area) (Proposed), 100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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13.4.15 Description of Mining Permit/ Contract Areas in Gabharu River:

Table 13.39: Details of Gabharu River

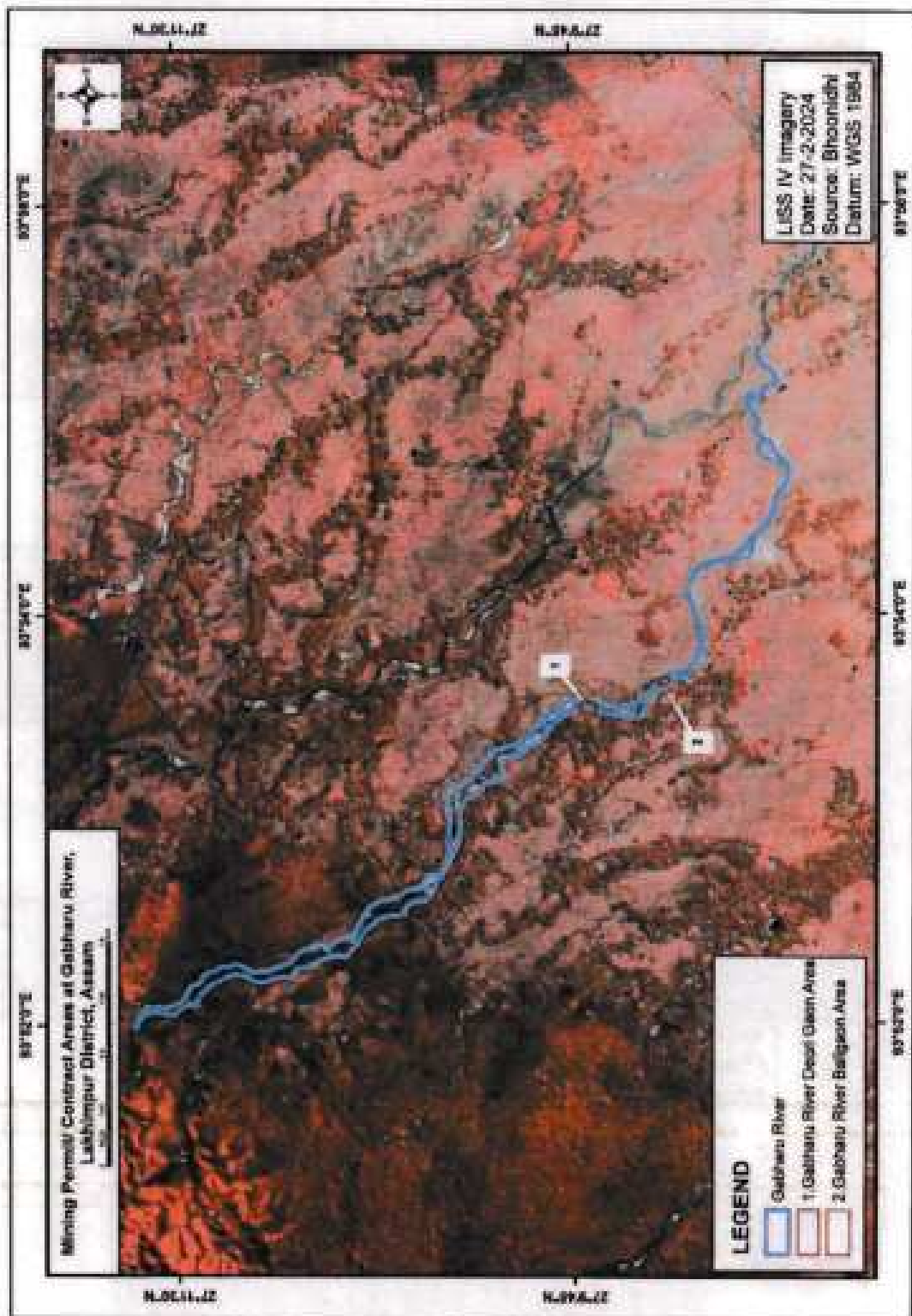
Sr No.	Description	Area in Ha.	Percentage of Total area (In %)	Cumulative %
1	Gabharu River in the district	62.01	100	0
2	Area already granted in the Kimin River	0	0	0
3	No. of Permit/ Contract Area not recommended for future Quarry/ Permit/ Contract Area grant due extracted up to a distance of 1 Kilometer (1 km) from major bridges and highways on both side, 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	0	0	0
4	Area not recommended for future Quarry Permit/ Contract Area grant due to 100 m Buffer from any railway line or bridge	0	0	0
5	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m Buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads	0	0	0
6	Area not recommended for future Quarry Permit/ Contract Area grant due non- availability of un-mined block 50 meters with after every block of 1000 meters over which is undertaken or at such distance as may be	0	0	0

	directed by the competent authority			
7	Area not recommended for future Quarry Permit/ Contract Area grant due 100m Buffer Local Minor check Dam	0	0	0
8	Area not recommended for future Quarry Permit/ Contract Area grant due 500m buffer from the irrigation structure/ Reservoir & submergence are	0	0	0
9	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Canal/Tank/Lake	0	0	0
10	Area not recommended for future Quarry Permit/ Contract Area grant due 100m buffer from the Ropeway or Ropeway trestle or station	0	0	0
11	Area not recommended for future Quarry Permit/ Contract Area grant due to 100m buffer from the Heritage site, Protected monuments	0	0	0
12	Area not recommended for future Quarry Permit/ Contract Area grant due to Eco- sensitive Zone	0	0	0
13	Applicability of Cluster (Permit/ Contract Area within 500 meters radius)	No	0	0

Minerals: Sand, Gravel, Boulder, Ordinary Clay


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Map 13.16: Map showing Mining Permit/ Contract Areas within Gabharu River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Table 13.40: Details of Individual Mining Permit/ Contract Areas of Gabharu River (New Mining area proposed)

Sr No.	Permit area details	Name of Mineral	Area allotted in Ha.	Coordinate	
				Latitude	Longitude
1	Gabharu River Baligaon Area	Ordinary Clay/ Silt	1.20	27°9'21.925° N	93°53'38.417°E
				27°9'22.253° N	93°53'39.799°E
				27°9'20.449°N	93°53'41.459°E
				27°9'19.329°N	93°53'39.893°E
2	Gabharu River Deori Gaon Area	Ordinary Clay/ Silt	1.20	27°9'39.203°N	93°53'29.981°E
				27°9'38.660°N	93°53'33.470°E
				27°9'43.043°N	93°53'30.926°E
				27°9'42.531°N	93°53'34.540°E

Gabharu river area in the district is 102.59 Ha and no area is granted for mining in the River bed. 2 new areas are identified for future mining project for Ordinary Clay/ Silt. There is no applicability of Cluster due to non presence of mining areas within 500-meter radius having homogeneous mineral.

On the basis of distance criteria, Go- zone and No-Go zone has been identified. Total Go zone area is 2.4 Ha and No-Go zone area is 0.0 Ha. Out of 2.4 Ha, no area falls within 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 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 area falls within 100 m buffer from the outer periphery of the defined limits of any village, habitation, National Highway, State highway and other roads.

Map showing the identification of Go- zone and No-Go zone for each individual lease has been prepared and given below (with extraction path):

Minerals: Sand, Gravel, Boulder, Ordinary Clay


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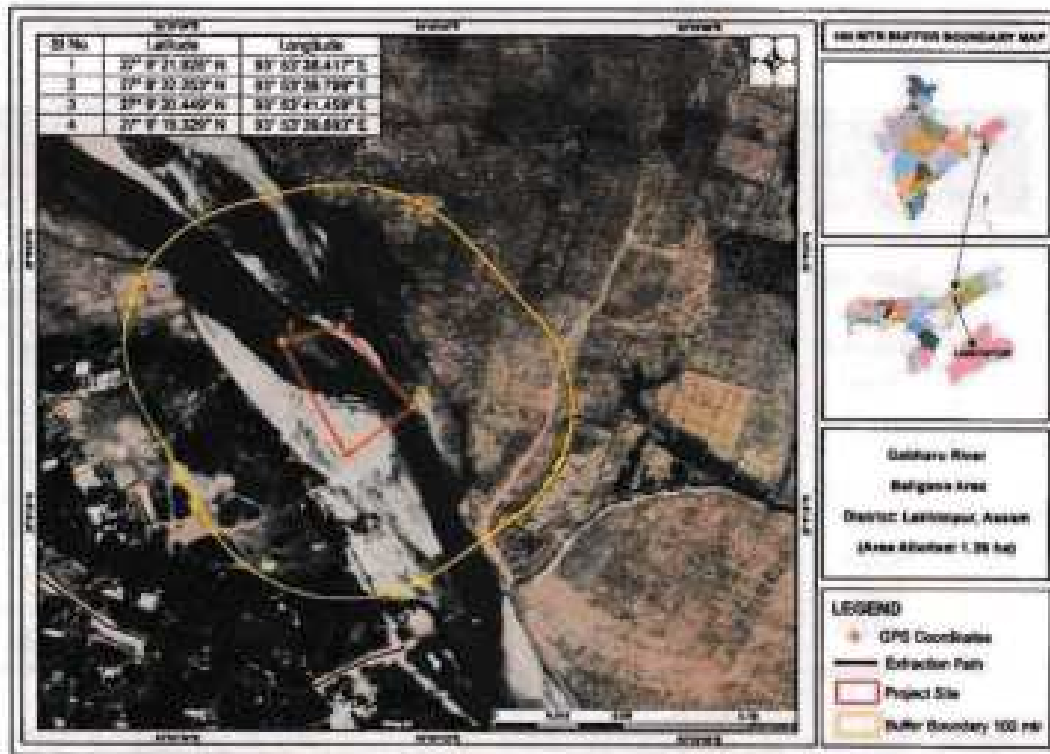


Fig. 13.66 A Gabharu River Balgaon Area (Proposed),
100m buffer map (Google Image)

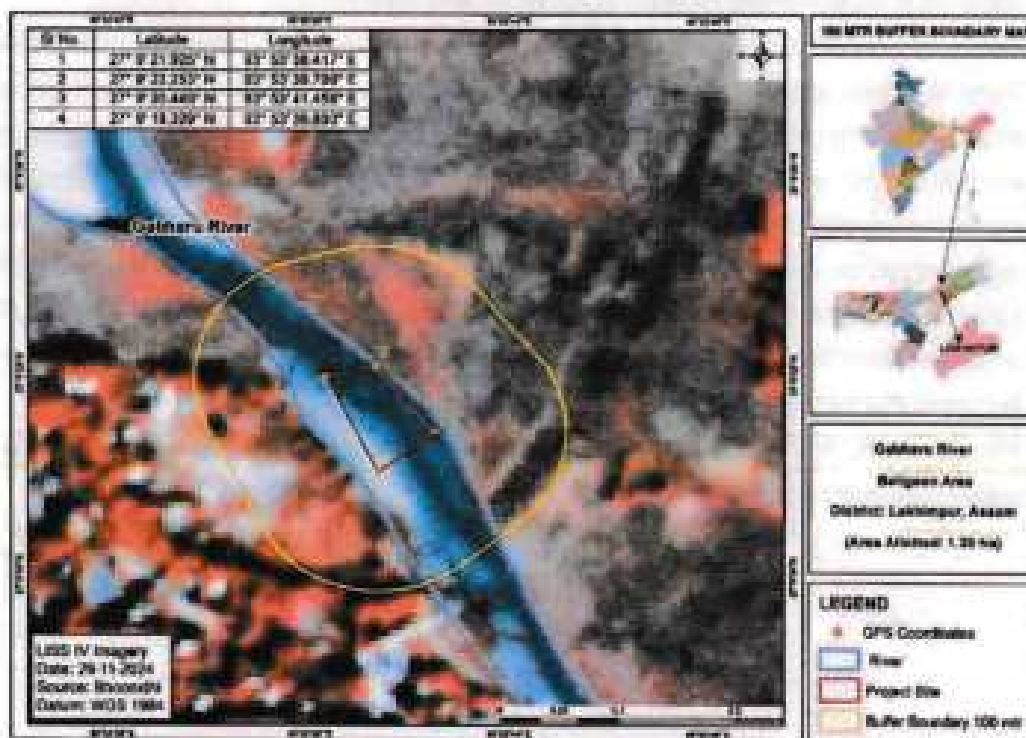


Fig. 13.66 B Gabharu River Balgaon Area (Proposed),
100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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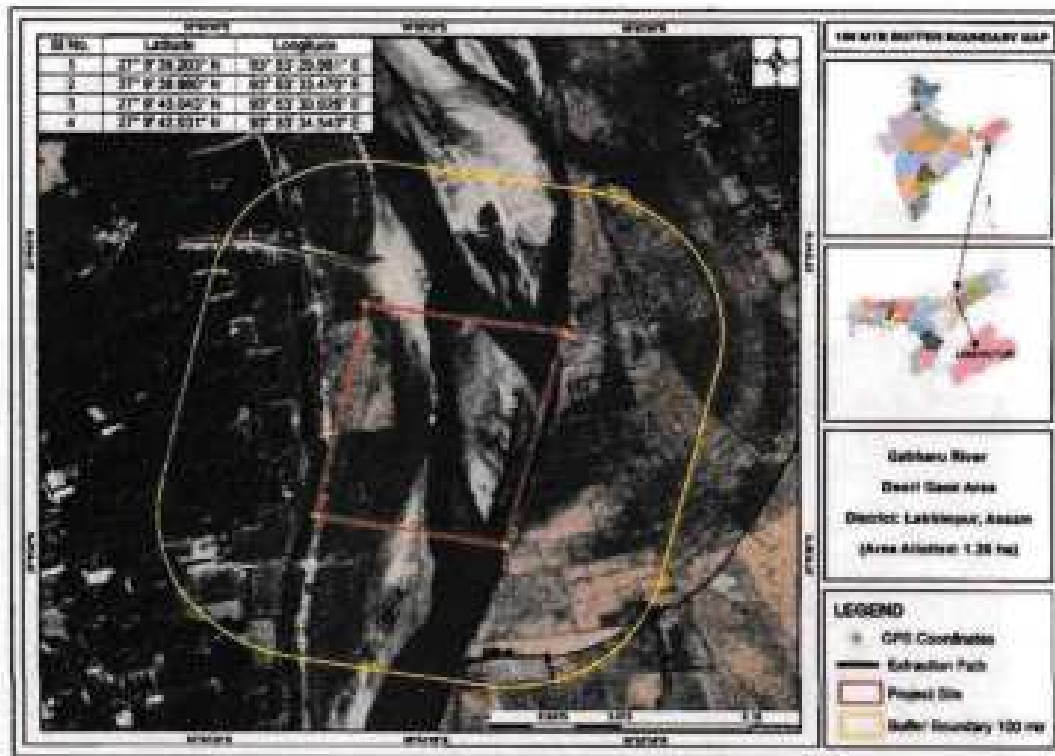


Fig. 13.67 A Gabharu River Deori Gaon Area (Proposed),
100m buffer map (Google Image)

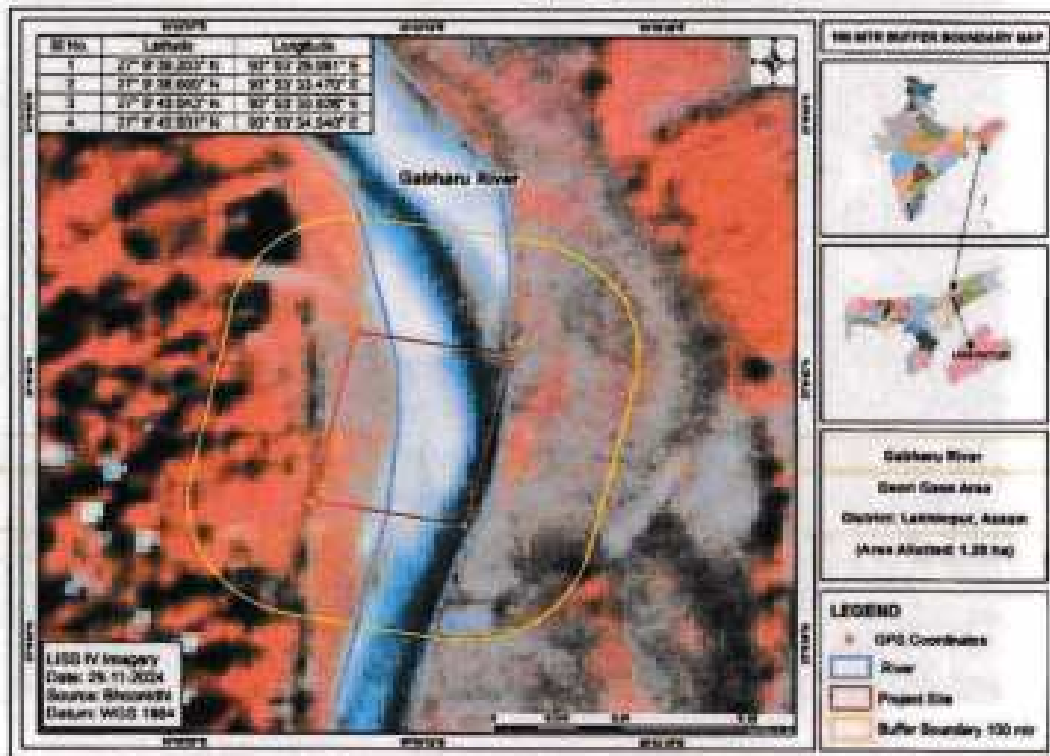


Fig. 13.67 B Gabharu River Deori Gaon Area (Proposed),
100m buffer map (Satellite Image)

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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CLUSTER AT RANGANADI RIVER BED

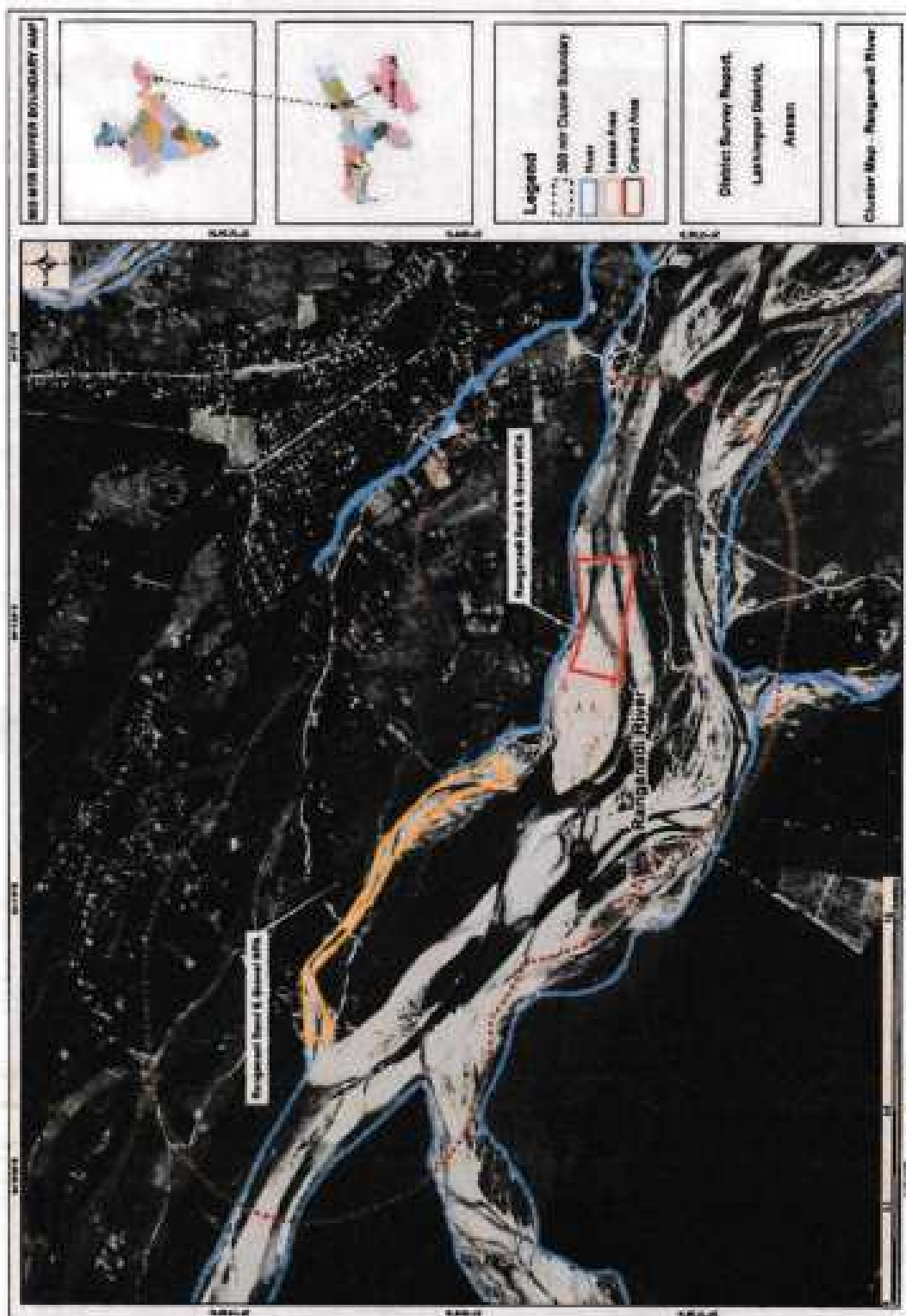


Fig. 13.68 Formation of Cluster at Ranganadi River bed (Google Image) in between Ranganadi Sand & Gravel MPA and Ranganadi Sand & Gravel MCA

13.4.17 Inference from DSR

On the basis of distance and cluster criteria, the details of leases fall in Go- zone and No-Go zone for each individual lease has been given below:

Table 13.41: Inference from DSR

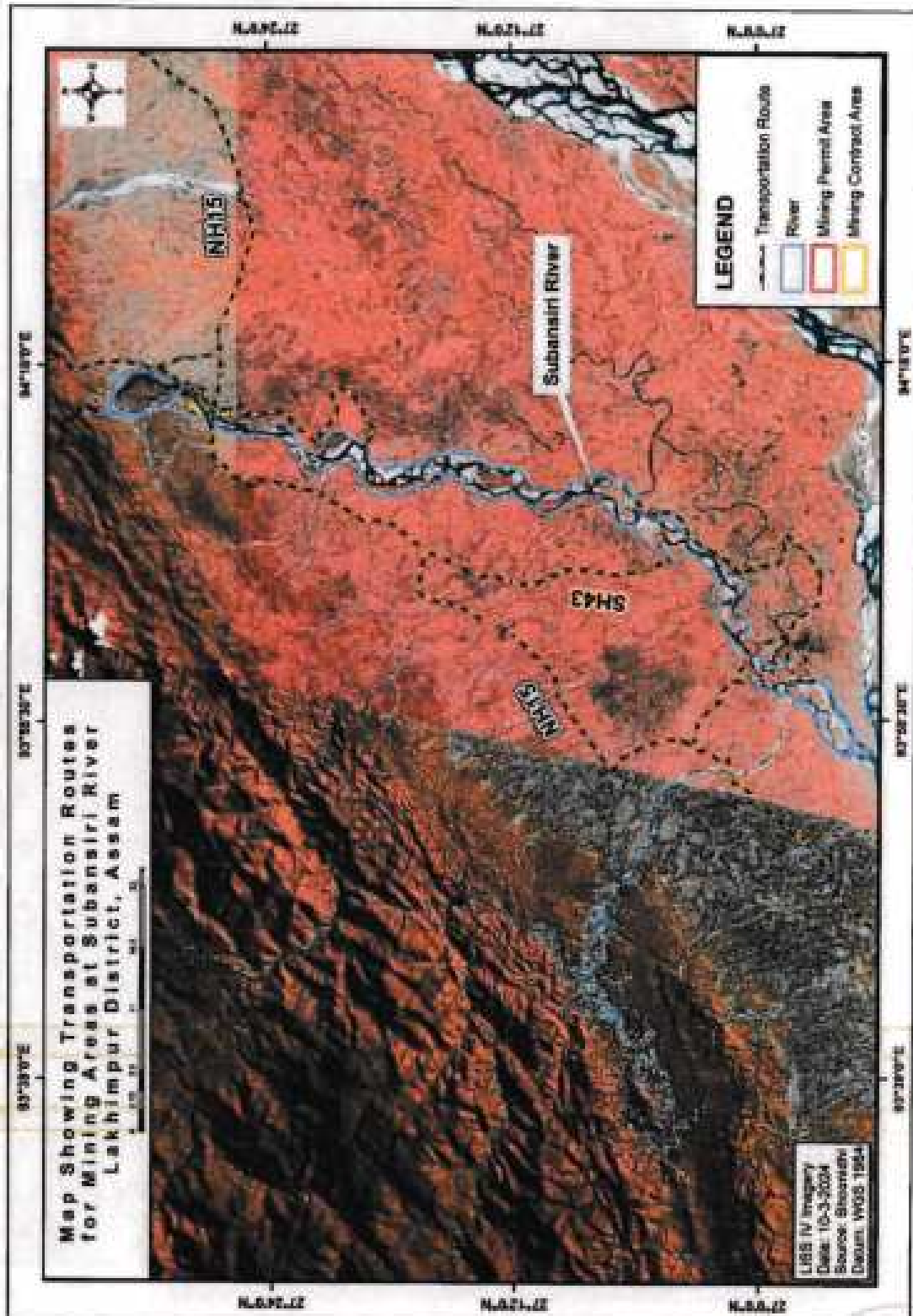
Sl No.	Reference	Name of the Mining Area	River	Lease Area (in Ha.)	Go Zone (in Ha.)	No Go Zone (in Ha.)	Remarks
1	Table No. 13.4, Sl. No. 7	No.2 Chenimora Kongkur Gaon Ordinary Clay MPA (Plot-L)	Near Subansiri	2.64	0	2.64	Not recommended due to presence of habitation within 100 m.
2	Table No. 13.10, Sl. No. 2	Upper Dikrong Sand & Gravel MPA	Dikrong	2.0	0	2.0	Not recommended due to presence of habitation within 100 m.
3	Table No. 13.10, Sl. No. 3	Lower Dikrong-Parbatipur Sand & Gravel MPA	Dikrong	2.2	0	2.2	Not recommended due to presence of habitation within 100 m.
4	Table No. 13.10, Sl. No. 4	Dikrong Sand & Gravel MPA	Dikrong	2.0	0	2.0	Completely overlapped with 'Lower Dikrong Meneha Sand, Gravel & Boulder MPA'.
5	Table No. 13.7, Sl. No. 2	Ranganadi Sand & Gravel MPA	Ranganadi	4.84	0	4.84	Not recommended due to presence Cluster
6	Table No. 13.7, Sl. No. 1	Ranganadi Sand & Gravel MPA	Ranganadi	1.0	0	1.0	Not recommended due to presence of habitation within 100 m.
7	Table No. 13.7, Sl. No. 4	Ranganadi Ordinary Clay/ Silt MPA	Ranganadi	8.73	0	8.73	Area located outside the river bank, shall cause bank erosion.
8	Table No. 13.7, Sl. No. 5	Ranganadi Ordinary Clay/ Silt MPA	Ranganadi	4.5	0	4.5	Area overlapped with proposed

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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							'1.5 Ha Ranganadi MPA'.
9	Table No. 13.7, Sl. No. 6	Ranganadi Ordinary Clay/ Silt MPA	Ranganadi	1.4	0	1.4	Area overlapped with 'Ranganadi River Ordinary Clay MPA'.
10	Table No. 13.17, Sl. No. 1	Tranjuli Sand & Gravel MPA	Tranjuli	1.2	0	1.2	Not recommended due to presence of habitation within 100 m.
11	Table No. 13.15, Sl. No. 1	Kananadi Sand & Gravel MPA	Kananadi	1.0	0	1.0	Not recommended due to presence of habitation within 100 m.
12	Table No. 13.15, Sl. No. 2	Kananadi Sand & Gravel MPA	Kananadi	0.68	0	0.68	Not recommended due to presence of habitation within 100 m.
13	Table No. 13.19, Sl. No. 2	Bogoli Sand & Gravel MPA	Bogoli	1.3	0	1.3	Not recommended due to presence of habitation within 100 m.
14	Table No. 13.21, Sl. No. 2	Dolohat Singra MPA	Singra	3.8	0	3.8	Not recommended due to presence of habitation within 100 m.
15	Table No. 13.30, Sl. No. 1	Baghiniyan Mining Permit Area (Outside R.F.)	Baghiniyan	0.90	0	0.90	Not recommended due to presence of habitation within 100 m.
16	Table No. 13.35, Sl. No. 1	Ghagar Sand & Gravel MPA	Ghagar	0.6	0	0.6	Not recommended due to presence of habitation within 100 m.
17	Table No. 13.27, Sl. No. 1	Dirgha Sand, Gravel & Ordinary Clay/ Silt MCA	Dirgha	5.0	0	5.0	Not recommended due to presence of High Voltage Power Line

13.4.18 Transportation Route Maps:

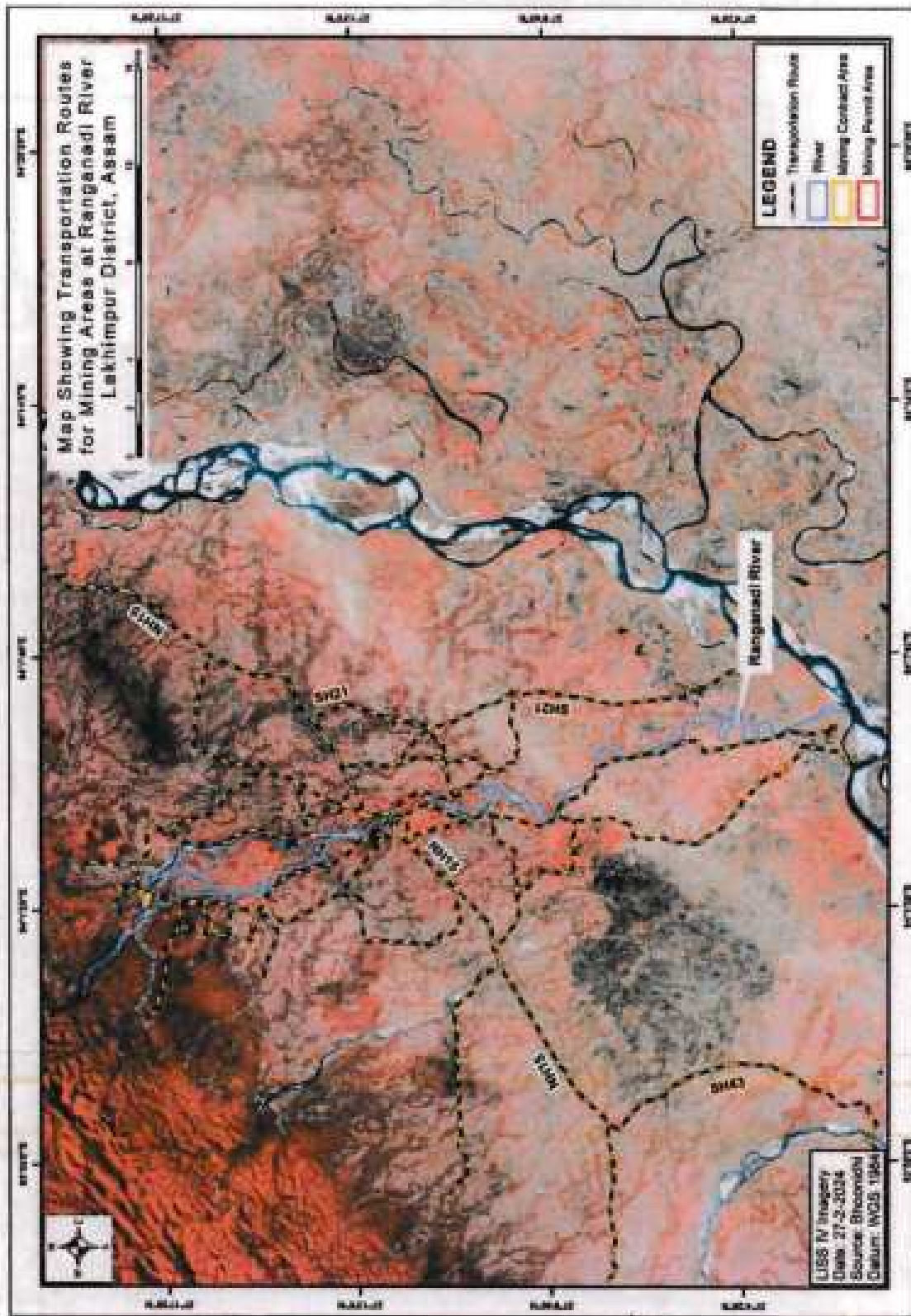


Map 13.17: Transportation Route Map for Mining Areas at Subansiri River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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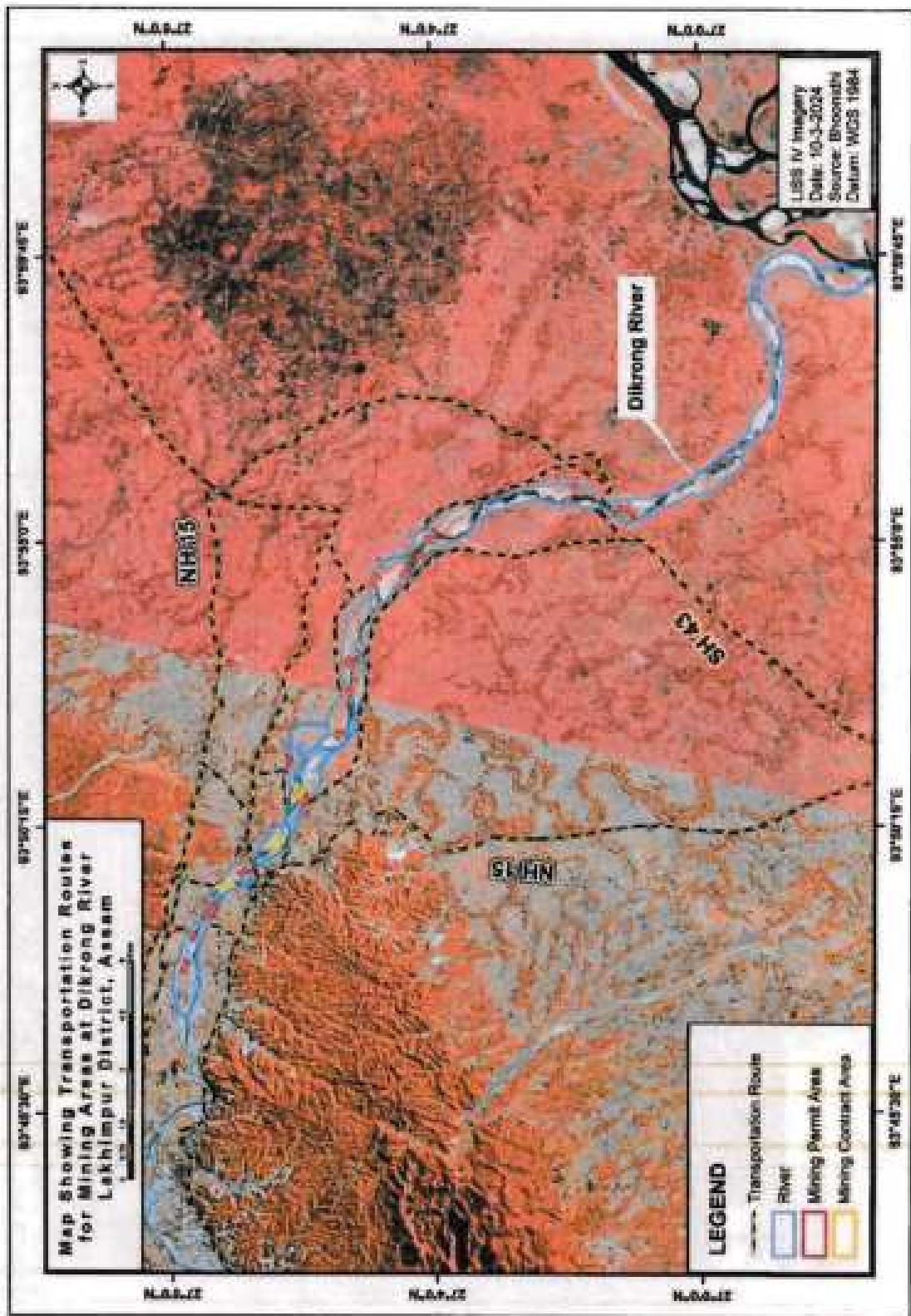


Map 13.18: Transportation Route Map for Mining Areas at Ranganadi River

Minerals: Sand, Gravel, Boulder, Ordinary

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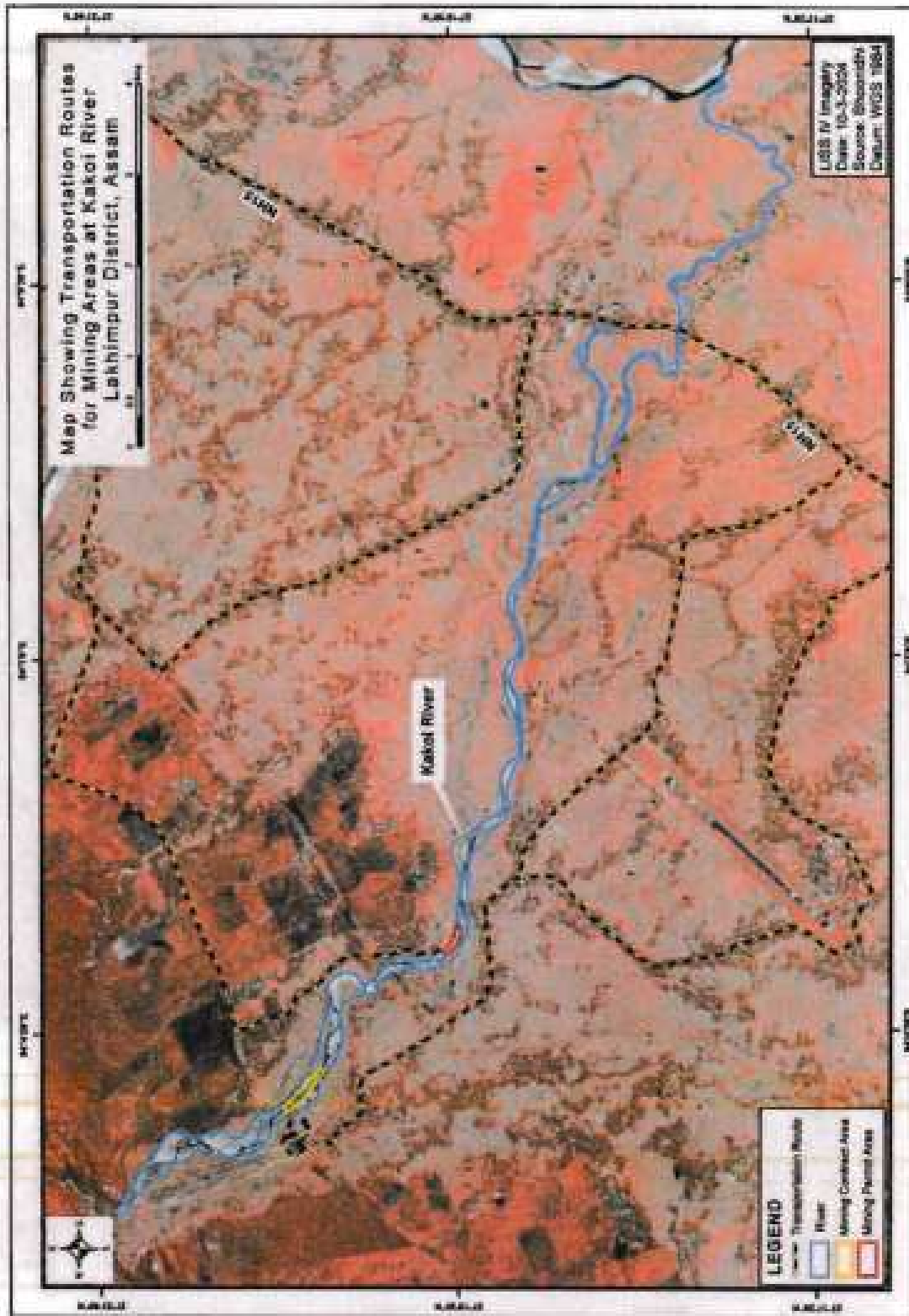


Map 13.19: Transportation Route Map for Mining Areas at Dikrong River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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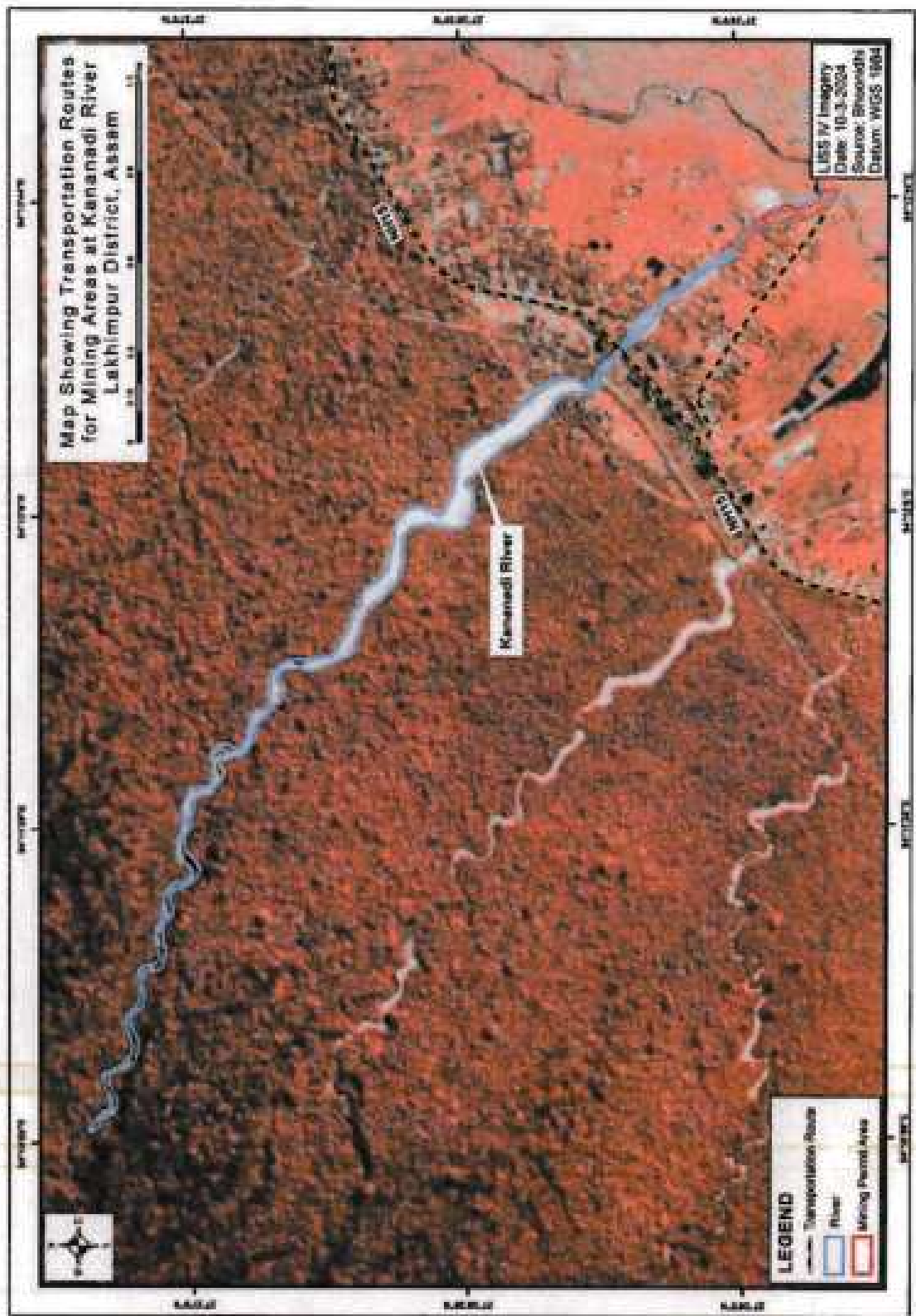




Map 13.20: Transportation Route Map for Mining Areas at Kakoi River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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North Lakhimpur.

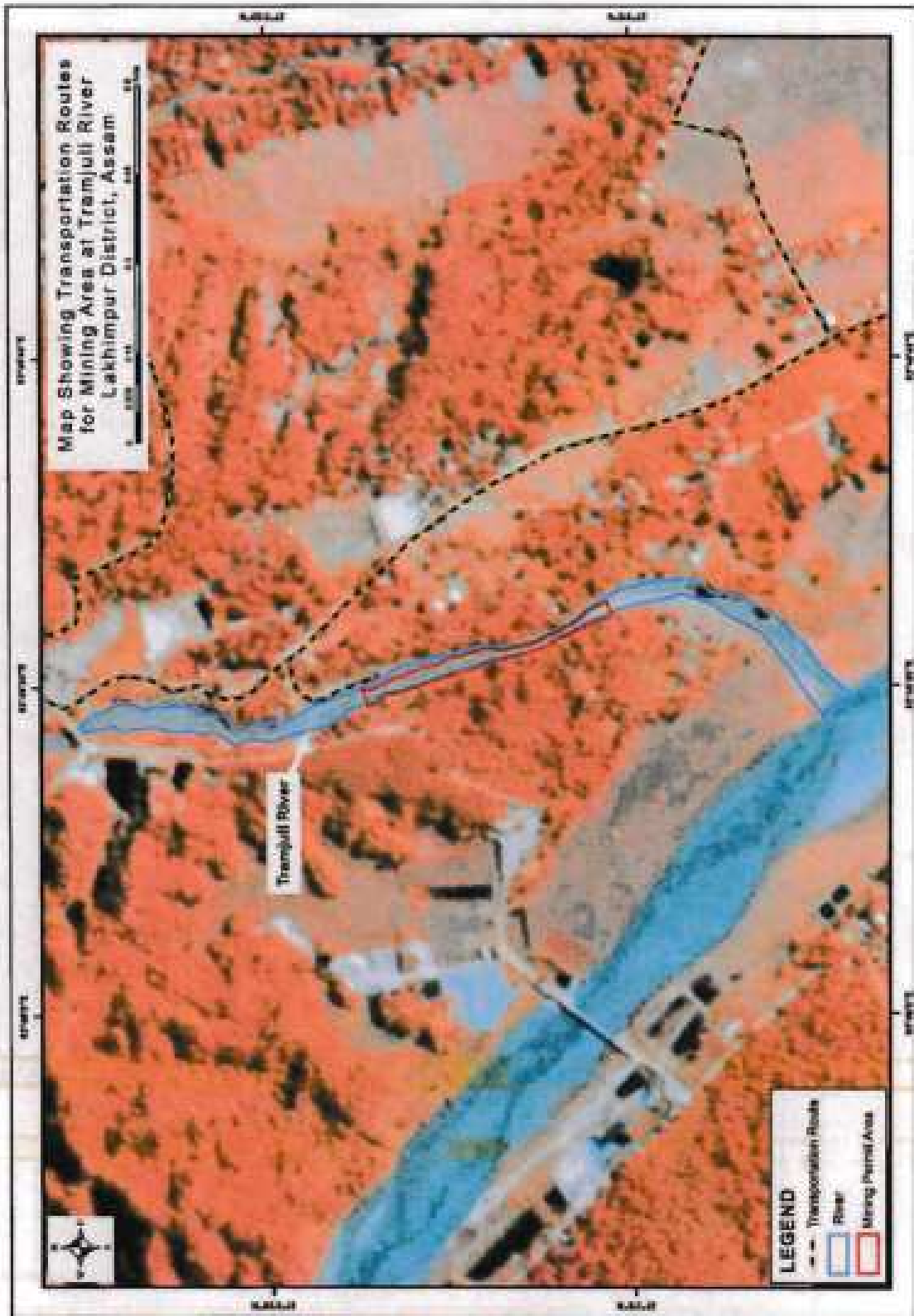


Map 13.21: Transportation Route Map for Mining Areas at Kananadi River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

[Signature]
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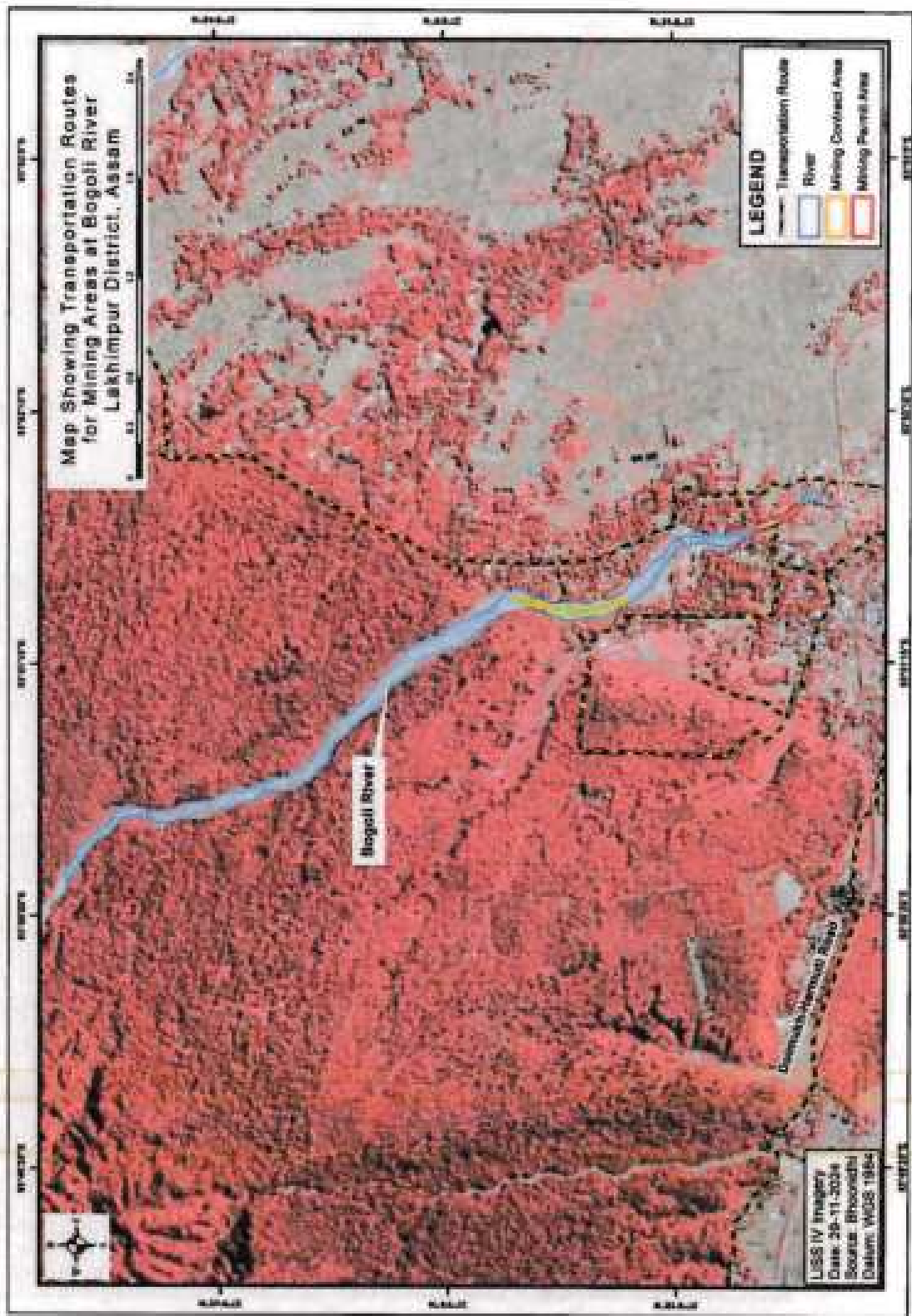


Map 13.22: Transportation Route Map for Mining Areas at Tramjuli River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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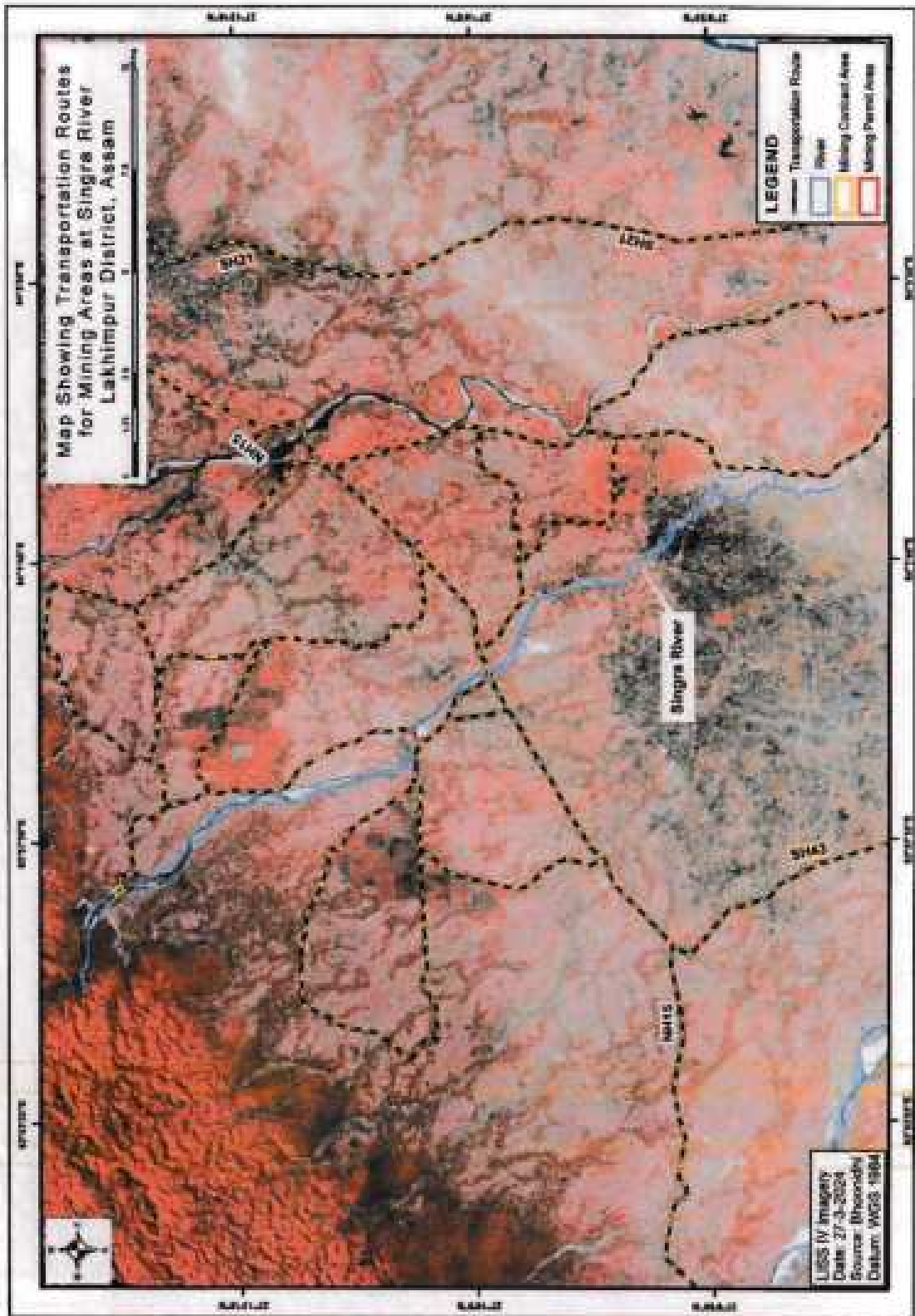




Minerals: Sand, Gravel, Boulder, Ordinary Clay

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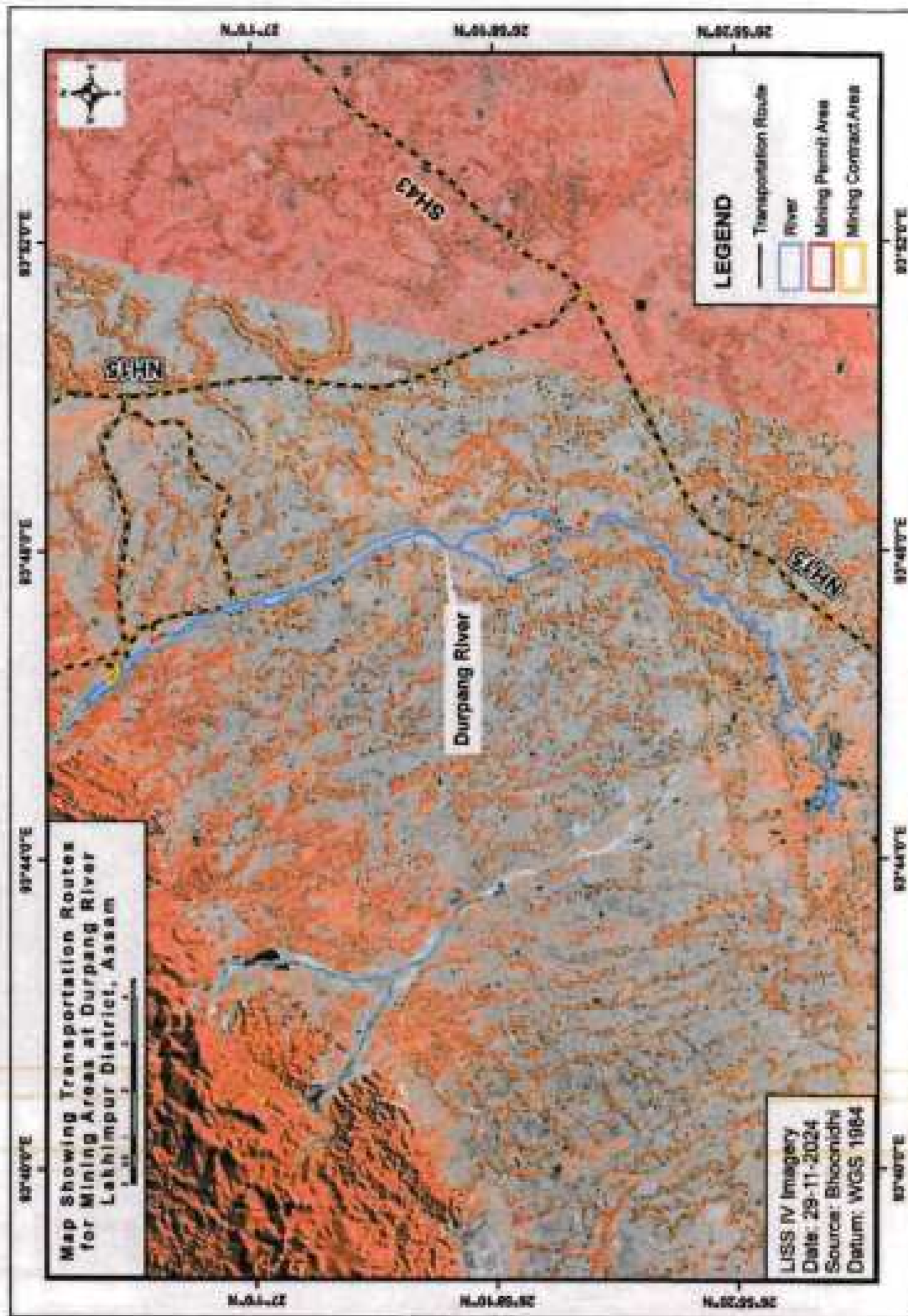




Map 13.24: Transportation Route Map for Mining Areas at Singra River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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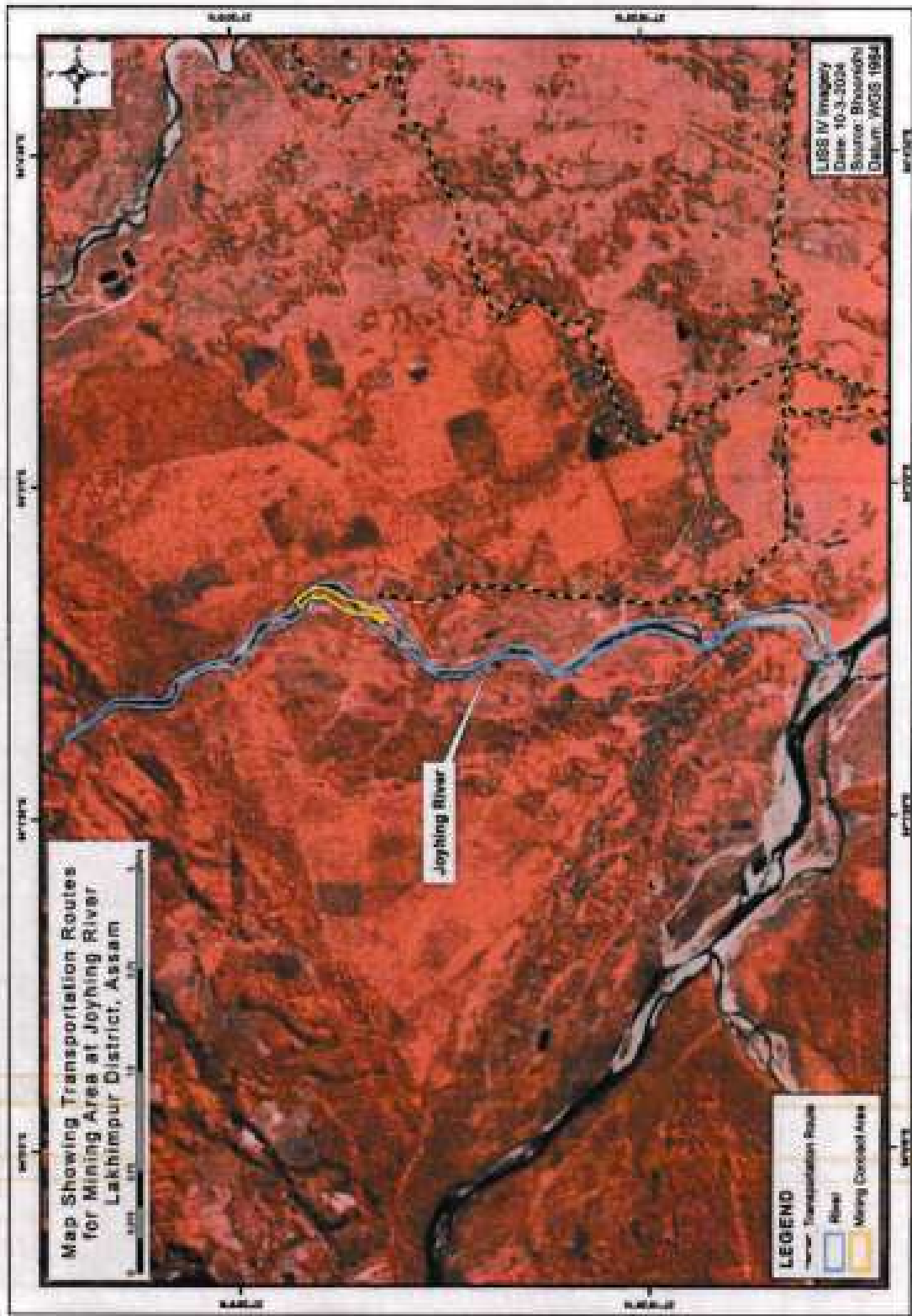


Map 13.25: Transportation Route Map for Mining Areas at Durpang River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Map 13.26: Transportation Route Map for Mining Areas at Joyhing River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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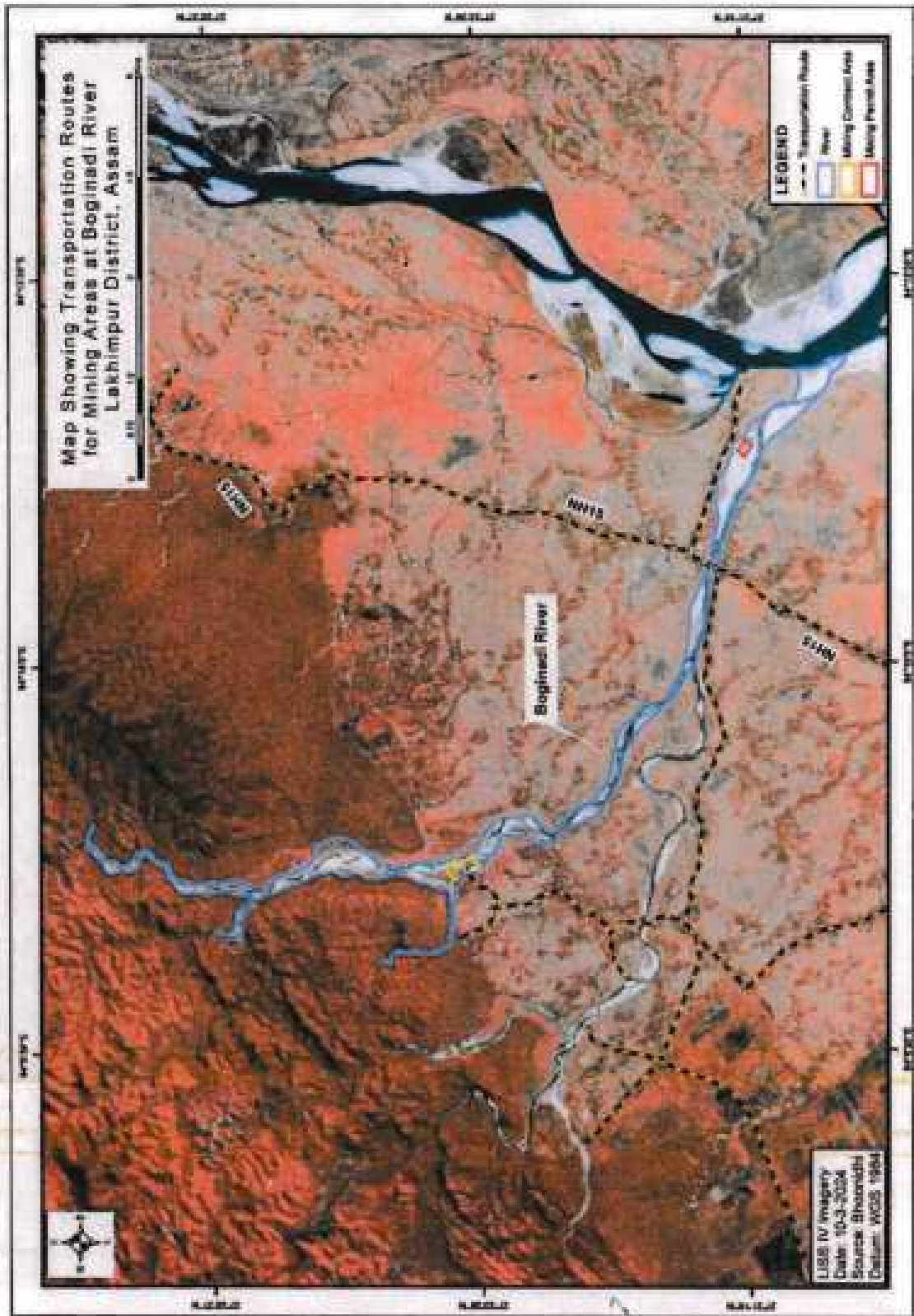


Map 13.27: Transportation Route Map for Mining Areas at Dirgha River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

Divisional Forest Officer
 Lakhimpur Division
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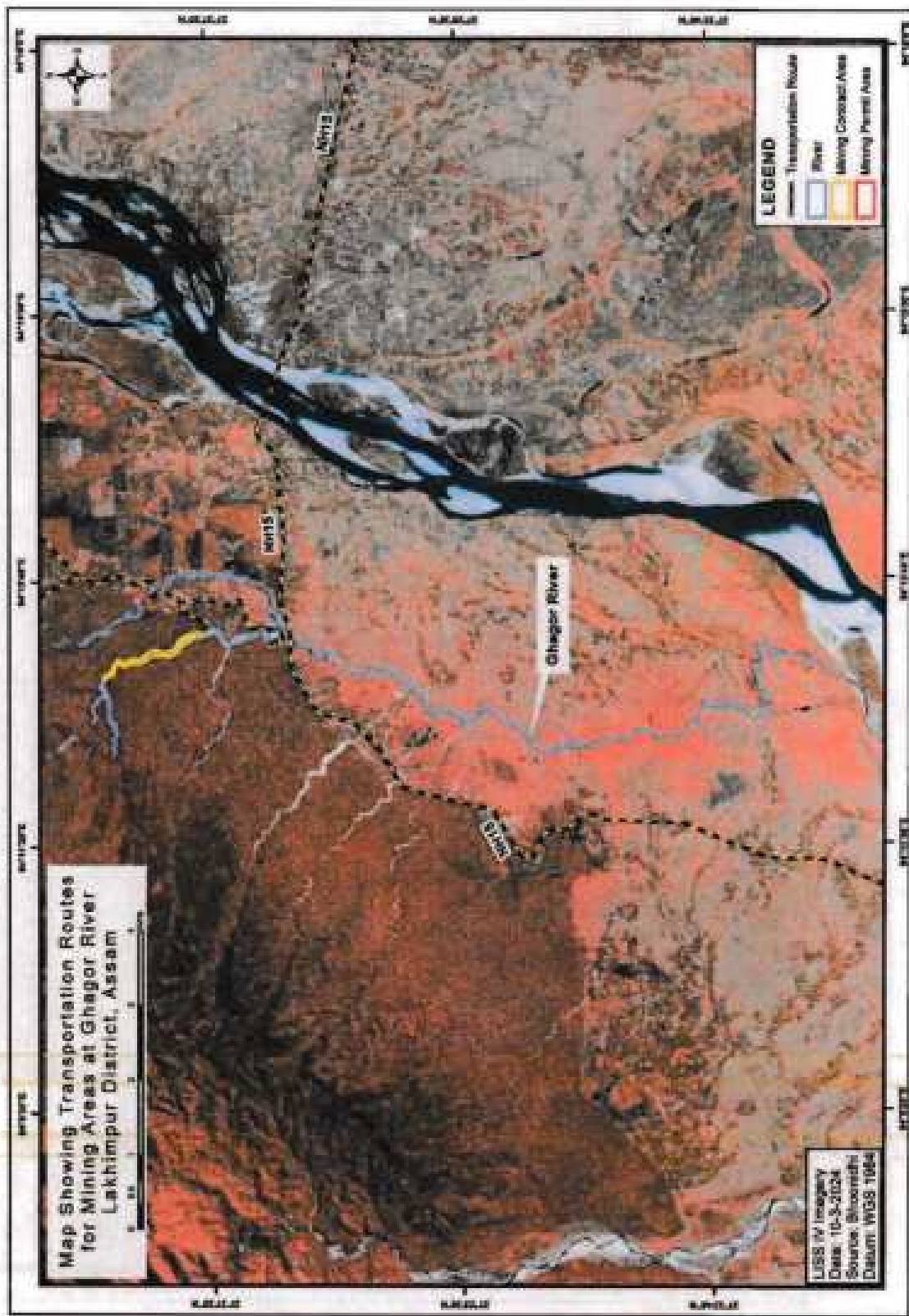




Map 13.28: Transportation Route Map for Mining Areas at Boginadi River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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North Lakhimpur.

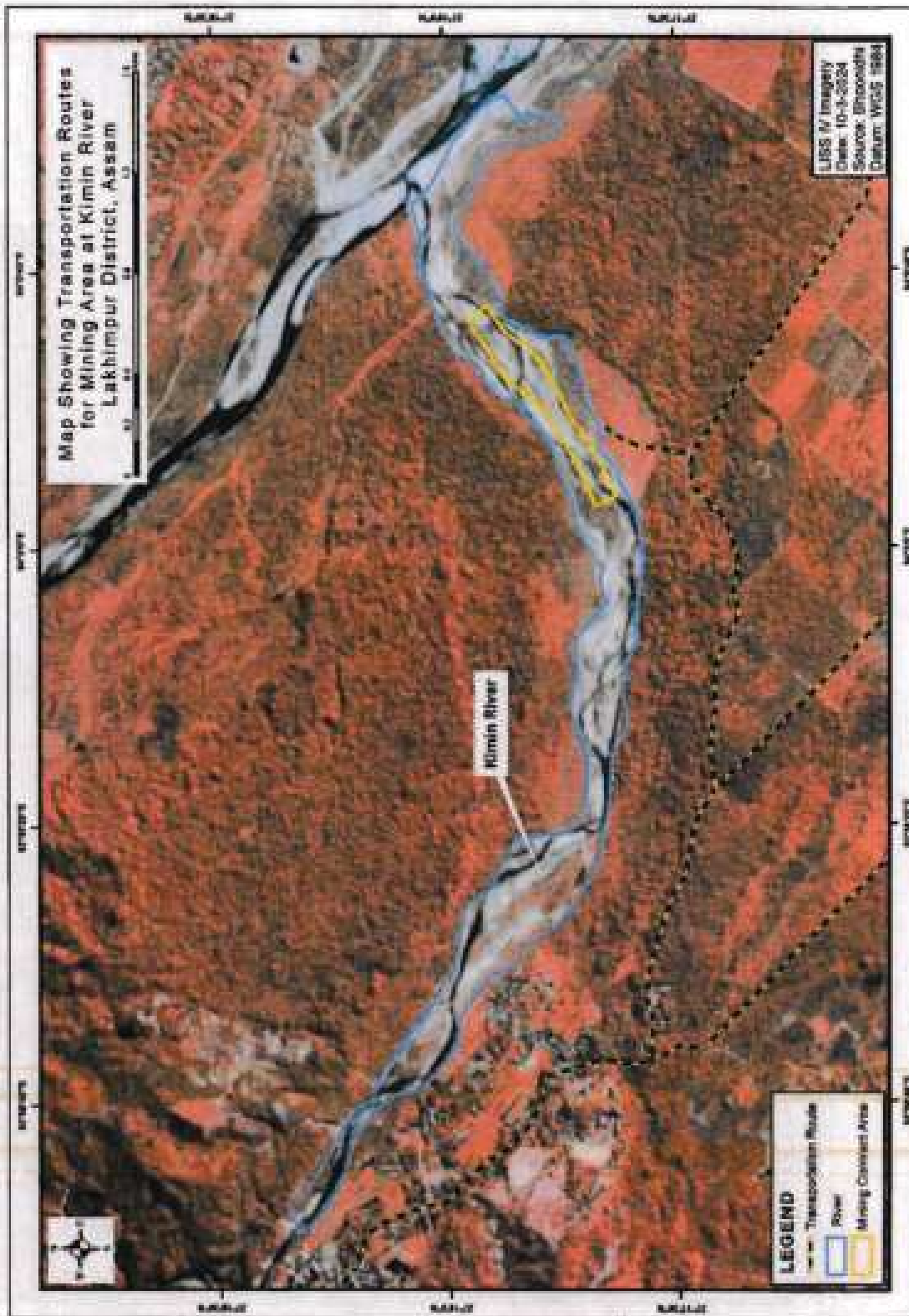


Map 13.29: Transportation Route Map for Mining Areas at Ghagor River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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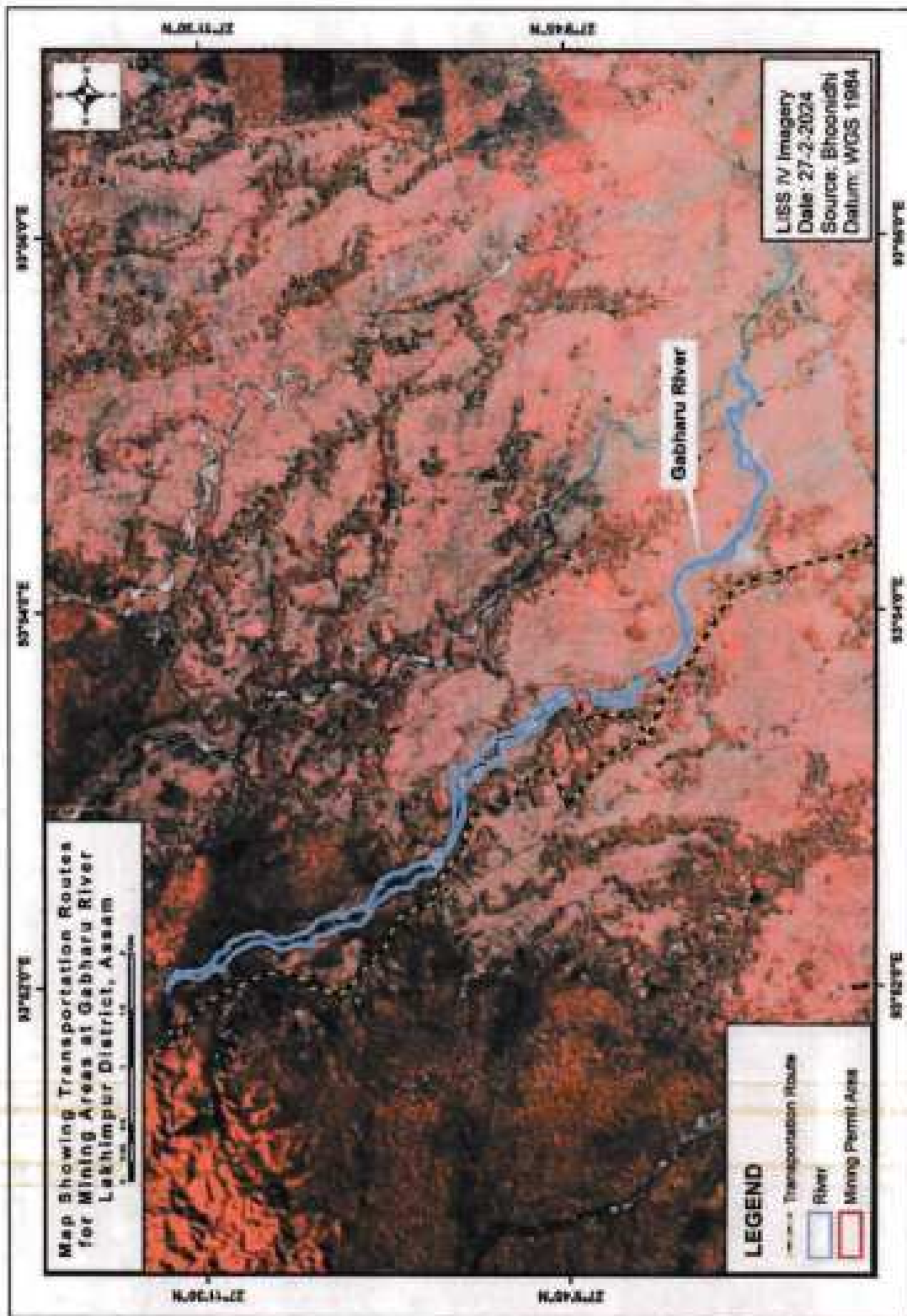




Map 13.30: Transportation Route Map for Mining Areas at Kimin River

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Table 13.42: Mineral Reserve of Mining Permit/ Contract Area within Lakhimpur District.

Sl. No.	Reference SL No.	Name of Mining Area	River	Mineable Area (In Ha.)	Area (In Sq.M)	Depth (m)	Volume (Area * Depth * Specific Gravity) (In CuM)	Permissible Quantity i.e. 60% (In CuM)	Current Status
1	Table 13.4, Sl. No. 1 (Page No. 74)	Lower Subansiri Sand & Gravel MCA	Subansiri	24.0	240000	1	624000	374400	Operational
2	Table 13.4, Sl. No. 2 (Page No. 74)	Bhimpara Sand & Gravel MPA	Subansiri	2.5	25000	1	65000	39000	Non-operational
3	Table 13.4, Sl. No. 3 (Page No. 74)	Gomari Nala Sand, Gravel & Boulder MPA	Subansiri	2.97	29700	1	77220	46332	Operational
4	Table 13.4, Sl. No. 4 (Page No. 74)	Bhimpara Sand, Gravel & Ordinary Clay/ Silt MCA	Subansiri	7.5	75000	1	195000	117000	Operational
5	Table 13.4, Sl. No. 5 (Page No. 74)	No.2 Chenimora Kongkur Gaon Ordinary Clay MPA (Plot-K)	Subansiri	39.43	394300	1	1025180	615108	Non-operational
6	Table 13.4, Sl. No. 6 (Page No. 75)	Subansiri River Ordinary Clay MPA	Subansiri	21.58	215800	1	561080	336648	Non-operational
7	Table 13.4, Sl. No. 7 (Page No. 75)	No.2 Chenimora Kongkur Gaon	Subansiri	2.64	26400	1	68640	41184	Non-operational

		Ordinary Clay MPA (Plot-L)								(Included in No Go Zone)
6	Table 13.4, Sl. No. 8 (Page No. 75)	Dhumabari Gaon Ordinary Clay MPA (Plot-E)	Subansiri	5.03	50300	1	130780	78468	Non-operational	
9	Table 13.4, Sl. No. 9 (Page No. 75)	Dhumabari Gaon Ordinary Clay MPA (Plot-F, G, H&I)	Subansiri	3.68	36800	1	95680	57408	Non-operational	
10	Table 13.5, Sl. No. 1 (Page No. 76)	Lower Subansiri 1.5 Ha Sand & Gravel MPA	Subansiri	1.5	15000	1	39000	23400	New Mining Area Proposed	
11	Table 13.5, Sl. No. 2 (Page No. 76)	Borrow Area-R	Subansiri	4.95	49500	1	126700	77220	New Mining Area Proposed	
12	Table 13.5, Sl. No. 3 (Page No. 76)	Subansiri River MPA	Subansiri	4.02	40200	1	104520	62712	New Mining Area Proposed	
13	Table 13.5, Sl. No. 4 (Page No. 76)	Borrow Area "Q" At Subansiri River Bed	Subansiri	3.55	35600	1	92560	55536	New Mining Area Proposed	
14	Table 13.7, Sl. No. 1 (Page No. 94)	Ranganadi Sand & Gravel MPA	Ranganadi	1.0	10000	1	26000	15800	Non-operational (Included in No Go Zone)	
15	Table 13.7, Sl. No. 2 (Page No. 94)	Ranganadi Sand & Gravel MPA	Ranganadi	4.84	48400	1	125840	75504	Operational (Included in No Go Zone)	
16	Table 13.7, Sl. No. 3 (Page No. 94)	Ranganadi Sand & Gravel MCA	Ranganadi	4.95	49500	1	128700	77220	Operational	


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17	Table 13.7, Sl. No. 4 (Page No. 94)	Ranganadi Ordinary Clay/ Silt MPA	Ranganadi	6.73	87300	1	226980	136188	Non- operational (included in No Go Zone)
18	Table 13.7, Sl. No. 5 (Page No. 94)	Ranganadi Ordinary Clay/ Silt MPA	Ranganadi	4.5	45000	1	117000	70200	Non- operational (included in No Go Zone)
19	Table 13.7, Sl. No. 6 (Page No. 94)	Ranganadi Ordinary Clay/ Silt MPA	Ranganadi	1.4	14000	1	36400	21840	Non- operational (included in No Go Zone)
20	Table 13.7, Sl. No. 7 (Page No. 94)	Ranganadi River Bed Ordinary Clay MPA near Pahumora	Ranganadi	1.2	12000	1	31200	18720	Operational
21	Table 13.7, Sl. No. 8 (Page No. 94)	Ranganadi River Ordinary Clay MPA near Bogolijan	Ranganadi	1.3	13000	1	33600	20280	Operational
22	Table 13.7, Sl. No. 9 (Page No. 95)	Ranganadi River Ordinary Clay MPA	Ranganadi	1.67	16700	1	43420	26052	Operational
23	Table 13.7, Sl. No. 10 (Page No. 95)	Dhekianala Sand, Gravel & Ordinary Clay/ Silt MPA	Ranganadi	1.86	18600	1	48360	29016	Non- operational
24	Table 13.8, Sl. No. 1 (Page No. 94)	1.5 ha. Ranganadi MPA	Ranganadi	1.5	15000	1	39000	23400	New Mining Area Proposed
25	Table 13.10, Sl. No. 1	Upper Dikrong Boulder MPA	Dikrong	1.5	15000	1	39000	23400	Non- operational

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26	(Page No. 111) Table 13.10, Sl. No. 2 (Page No. 111)	Upper Dikrong Sand & Gravel MPA	Dikrong	2.0	20000	1	52000	31200	Non- operational (included in No Go Zone)
27	Table 13.10, Sl. No. 3 (Page No. 111)	Lower Dikrong- Parbatipur Sand & Gravel MPA	Dikrong	2.2	22000	1	57200	34320	Non- operational (included in No Go Zone)
28	Table 13.10, Sl. No. 4 (Page No. 111)	Dikrong Sand & Gravel MPA	Dikrong	2.0	20000	1	52000	31200	Non- operational (included in No Go Zone)
29	Table 13.10, Sl. No. 5 (Page No. 111)	5 No. Pithaguri Sand & Gravel MPA	Dikrong	2.0	20000	1	52000	31200	Operational
30	Table 13.10, Sl. No. 6 (Page No. 111)	Lower Dikrong Sand & Gravel MCA	Dikrong	5.0	60000	1	155000	93500	Operational
31	Table 13.10, Sl. No. 7 (Page No. 111)	North Dikrong Sand & Gravel MCA	Dikrong	4.91	49100	1	127680	76596	Operational
32	Table 13.10, Sl. No. 8 (Page No. 111)	Dikrong River Bagannalla MPA	Dikrong	1.82	18200	1	47320	28392	Operational

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33	Table 13.10, Sl. No. 9 (Page No. 112)	Dikrong Sand & Gravel MCA	Dikrong	10.0	100000	1	260000	156000	Non- operational
34	Table 13.10, Sl. No. 10 (Page No. 112)	2.0 Ha. Kathalguri Sand & Gravel Mining Permit Area	Dikrong	2.0	20000	1	52000	31200	Non- operational
35	Table 13.10, Sl. No. 11 (Page No. 112)	Lower Dikrong Meneha Sand, Gravel & Boulder MPA	Dikrong	1.47	14700	1	38220	22932	Non- operational
36	Table 13.10, Sl. No. 12 (Page No. 112)	Dikrong River Merbil Sand, Gravel & Ordinary Clay/ Silt MPA	Dikrong	2.71	27100	1	70460	42276	Non- operational
37	Table 13.11, Sl. No. 1 (Page No. 113)	2.33 Ha. Pithaguri Sand & Gravel MPA	Dikrong	2.33	23300	1	60580	36348	New Mining Area Proposed
38	Table 13.11, Sl. No. 2 (Page No. 113)	2.24 Ha. 2 No. Dikrong Chapori Sand & Gravel MPA	Dikrong	2.24	22400	1	58240	34944	New Mining Area Proposed
39	Table 13.11, Sl. No. 3 (Page No. 113)	Dikrong River Clay Mining Permit Area	Dikrong	4.53	45300	1	117780	70668	New Mining Area Proposed
40	Table 13.11, Sl. No. 4	Borrow Area 'D-1' at Dikrong River Bed	Dikrong	4.91	49100	1	127660	76596	New Mining Area Proposed

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48	Table 13.15, Sl. No. 2 (Page No. 144)	Kananadi Sand & Gravel MPA	Kananadi	0.53	5300	1	13780	8268	Non- operational (included in No Go Zone)
49	Table 13.17, Sl. No. 1 (Page No. 150)	Tramjuli Sand & Gravel MPA	Tramjuli	0.98	9800	1	25480	15288	Non- operational (included in No Go Zone)
50	Table 13.19, Sl. No. 1 (Page No. 155)	Bogoli Sand & Gravel MCA	Bogoli	3.0	30000	1	78000	46800	Operational
51	Table 13.19, Sl. No. 2 (Page No. 1535)	Bogoli Sand & Gravel MPA	Bogoli	1.3	13000	1	33800	20280	Non- operational (included in No Go Zone)
52	Table 13.21, Sl. No. 1 (Page No. 161)	Singra Sand & Gravel MCA	Singra	6.0	60000	1	156000	93600	Non- operational
53	Table 13.21, Sl. No. 2 (Page No. 161)	Dolohat Singra MPA	Singra	3.8	38000	1	98800	59280	Non- operational (included in No Go Zone)
54	Table 13.23, Sl. No. 1 (Page No. 167)	Durpang (Lower) Sand & Gravel MPA	Durpang	1.91	19100	1	49680	29796	Operational
55	Table 13.23, Sl. No. 2	Durpang Sand & Gravel MCA	Durpang	5.2	52000	1	135200	81120	Non- operational

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	(Page No. 167)												
56	Table 13.25, Sl. No. 1 (Page No. 173)	Joyhing Sand & Gravel MCA	Joyhing	4.46	44600	1	115960	69576	Operational				
57	Table 13.27, Sl. No. 1 (Page No. 178)	Dirgha Sand, Gravel & Ordinary Clay/ Silt MCA	Dirgha	4.84	48400	1	125840	75504	Non- operational				
58	Table 13.28, Sl. No. 1 (Page No. 178)	3.0 Ha Dirgha MPA	Dirgha	3.0	30000	1	78000	46800	New Mining Area Proposed				
59	Table 13.30, Sl. No. 1 (Page No. 184)	Baghinijan Mining Permit Area (Outside R.F.)	Baghinijan	0.6	6000	1	20800	12480	Non- operational (Included in No Go Zone)				
60	Table 13.32, Sl. No. 1 (Page No. 189)	Boginadi Gravel MCA	Boginadi	6.8	88000	1	226800	137280	Operational				
61	Table 13.33, Sl. No. 1 (Page No. 189)	Boginadi Ordinary Clay/ Silt MPA	Boginadi	2.58	25800	1	67080	40248	New Mining Area Proposed				
62	Table 13.35, Sl. No. 1 (Page No. 194)	Ghagar Sand & Gravel MPA	Ghagar	0.48	4800	1	12480	7488	Non- operational (Included in No Go Zone)				


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63	Table 13.36, Sl. No. 1 (Page No. 194)	Ghagor Mining Contract Area (RF Area)	Ghagor	9.0	90000	1	234000	140400	New Mining Area (within RF)
64	Table 13.38, Sl. No. 1 (Page No. 202)	9.0 Ha Kimin Mining Contract Area (R.F. Area)	Kimin	9.0	90000	1	234000	140400	New Mining Area (within RF)
65	Table 13.40, Sl. No. 1 (Page No. 207)	Gabharu River Baligaon Area	Gabharu	1.20	12000	1	31200	16720	New Mining Area Proposed
66	Table 13.40, Sl. No. 2 (Page No. 207)	Gabharu River Deori Gaon Area	Gabharu	1.20	12000	1	31200	16720	New Mining Area Proposed


Note: 1. Average Specific Gravity is taken as 2.6.

2. The estimations of geological reserves in the rivers of Lakhimpur district have been done keeping in mind the morphology of the rivers. The rivers characteristically meander and hence adequate corridor has been left for the same. The mitigation measures such as avoiding mining in certain areas like permanent sand bars and erosion prone areas have been put into effect. Appropriate measures have been implemented to ensure that the mining activities pose no threat to the aquatic and faunal diversity. No stream diversions have been suggested which could fragment the existing ecosystem. Also, the animal corridors have been avoided in the context of mining in the rivers of Lakhimpur.

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Table 13.43: Mineral Reserve Estimation in Go Zone Areas within Lakhimpur District.

Sl. No.	Reference SL. No.	Name of Mining Area	River	Mineable Area (In Ha.)	Area (in Sq.M)	Depth (m)	Volume (Area * Depth * Specific Gravity) (in CuM)	Permissible Quantity i.e. 60% (In CuM)	Current Status
1	Table 13.4, Sl. No. 1 (Page No. 74)	Lower Subansiri Sand & Gravel MCA	Subansiri	24.0	240000	1	624000	374400	Operational
2	Table 13.4, Sl. No. 2 (Page No. 74)	Bhimpara Sand & Gravel MPA	Subansiri	2.5	25000	1	65000	39000	Non-operational
3	Table 13.4, Sl. No. 3 (Page No. 74)	Gomari Nala Sand, Gravel & Boulder MPA	Subansiri	2.97	29700	1	77220	46332	Operational
4	Table 13.4, Sl. No. 4 (Page No. 74)	Bhimpara Sand, Gravel & Ordinary Clay/ Silt MCA	Subansiri	7.5	75000	1	195000	117000	Operational
5	Table 13.4, Sl.	No.2 Chenimora Kongkur Gaon	Subansiri	39.43	394300	1	1025180	615108	Non-operational


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	No. 5 (Page No. 74)	Ordinary Clay MPA (Plot-K)										
6	Table 13.4, Sl. No. 6 (Page No. 75)	Subansiri River Ordinary Clay MPA	Subansiri	21.58	215800	1	561080	336648			Non- operational	
7	Table 13.4, Sl. No. 8 (Page No. 75)	Dhunabari Gaon Ordinary Clay MPA (Plot-E)	Subansiri	5.03	50300	1	130780	78468			Non- operational	
8	Table 13.4, Sl. No. 9 (Page No. 75)	Dhunabari Gaon Ordinary Clay MPA (Plot- F,G,H&I)	Subansiri	3.68	36800	1	95680	57408			Non- operational	
9	Table 13.5, Sl. No. 1 (Page No. 76)	Lower Subansiri 1.5 Ha. Sand & Gravel MPA	Subansiri	1.5	15000	1	39000	23400			New Mining Area Proposed	
10	Table 13.5, Sl. No. 2 (Page No. 76)	Borrow Area-R	Subansiri	4.95	49500	1	128700	77220			New Mining Area Proposed	
11	Table 13.5, Sl. No. 3	Subansiri River MPA	Subansiri	4.02	40200	1	104520	62712			New Mining Area Proposed	

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12	(Page No. 76) Table 13.5, Sl. No. 4 (Page No. 76)	Borrow Area "Q" At Subansiri River Bed	Subansiri	3.56	35600	1	92560	55536	New Mining Area Proposed
13	Table 13.7, Sl. No. 3 (Page No. 94)	Ranganadi Sand & Gravel MCA	Ranganadi	4.95	49500	1	128700	77220	Operational
14	Table 13.7, Sl. No. 7 (Page No. 94)	Ranganadi River Bed Ordinary Clay MPA near Pahumora	Ranganadi	1.2	12000	1	31200	18720	Operational
15	Table 13.7, Sl. No. 8 (Page No. 94)	Ranganadi River Ordinary Clay MPA near Bogolijan	Ranganadi	1.3	13000	1	33800	20280	Operational
16	Table 13.7, Sl. No. 9 (Page No. 95)	Ranganadi River Ordinary Clay MPA	Ranganadi	1.67	16700	1	43420	26052	Operational
17	Table 13.7, Sl. No. 10 (Page No. 95)	Dhekianala Sand, Gravel & Ordinary Clay/ Silt MPA	Ranganadi	1.86	18600	1	48360	29016	Non- operational

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18	Table 13.8, Sl. No. 1 (Page No. 94)	1.5 ha. Ranganadi MPA	Ranganadi	1.5	15000	1	39000	23400	New Mining Area Proposed
19	Table 13.10, Sl. No. 1 (Page No. 111)	Upper Dikrong Boulder MPA	Dikrong	1.5	15000	1	39000	23400	Non- operational
20	Table 13.10, Sl. No. 5 (Page No. 111)	5 No. Pithaguri Sand & Gravel MPA	Dikrong	2.0	20000	1	52000	31200	Operational
21	Table 13.10, Sl. No. 6 (Page No. 111)	Lower Dikrong Sand & Gravel MCA	Dikrong	6.0	60000	1	156000	93600	Operational
22	Table 13.10, Sl. No. 7 (Page No. 111)	North Dikrong Sand & Gravel MCA	Dikrong	4.91	49100	1	127660	76596	Operational
23	Table 13.10, Sl. No. 8 (Page No. 111)	Dikrong River Bagannalla MPA	Dikrong	1.82	18200	1	47320	28392	Operational

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24	Table 13.10, Sl. No. 9 (Page No. 112)	Dikrong Sand & Gravel MCA	Dikrong	10.0	100000	1	260000	156000	Non- operational
25	Table 13.10, Sl. No. 10 (Page No. 112)	2.0 Ha. Kathalguri Sand & Gravel Mining Permit Area	Dikrong	2.0	20000	1	52000	31200	Non- operational
26	Table 13.10, Sl. No. 11 (Page No. 112)	Lower Dikrong Meniha Sand, Gravel & Boulder MPA	Dikrong	1.47	14700	1	36220	22932	Non- operational
27	Table 13.10, Sl. No. 12 (Page No. 112)	Dikrong River Merbil Sand, Gravel & Ordinary Clay/ Silt MPA	Dikrong	2.71	27100	1	70460	42276	Non- operational
28	Table 13.11, Sl. No. 1 (Page No. 113)	2.33 Ha. Pithaguri Sand & Gravel MPA	Dikrong	2.33	23300	1	60580	36348	New Mining Area Proposed
29	Table 13.11, Sl. No. 2 (Page No. 113)	2.24 Ha. 2 No. Dikrong Chapori Sand & Gravel MPA	Dikrong	2.24	22400	1	58240	34944	New Mining Area Proposed

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30	Table 13.11, Sl. No. 3 (Page No. 113)	Dikrong River Clay Mining Permit Area	Dikrong	4.53	45300	1	117780	70668	New Mining Area Proposed
31	Table 13.11, Sl. No. 4 (Page No. 113)	Borrow Area "D-1" at Dikrong River Bed	Dikrong	4.91	49100	1	127660	76596	New Mining Area Proposed
32	Table 13.11, Sl. No. 5 (Page No. 113)	Borrow Area "D-2" at Dikrong River Bed	Dikrong	4.64	46400	1	120640	72384	New Mining Area Proposed
33	Table 13.11, Sl. No. 6 (Page No. 113)	Lower Dikrong Dongbil 65/68 Grant Area	Dikrong	2.30	23000	1	59800	35880	New Mining Area Proposed
34	Table 13.11, Sl. No. 7 (Page No. 114)	Lower Dikrong Bango Gaon Area	Dikrong	2.40	24000	1	62400	37440	New Mining Area Proposed
35	Table 13.11, Sl. No. 8 (Page No. 114)	Dikrong River Sisapathar Hantapur Area	Dikrong	2.21	22100	1	57460	34476	New Mining Area Proposed

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District Survey Report

District: Lakhimpur, State: Assam

36	Table 13.13, Sl. No. 1 (Page No. 138)	Kakoi Sand, Gravel & Ordinary Clay/ Silt MCA	Kakoi	4.5	45000	1	117000	70200	Non- operational
37	Table 13.13, Sl. No. 2 (Page No. 138)	Kakoi MPA	Kakoi	2.5	25000	1	65000	39000	Non- operational
38	Table 13.19, Sl. No. 1 (Page No. 155)	Bogoli Sand & Gravel MCA	Bogoli	3.0	30000	1	78000	48800	Operational
39	Table 13.21, Sl. No. 1 (Page No. 161)	Singra Sand & Gravel MCA	Singra	6.0	60000	1	156000	93800	Non- operational
40	Table 13.23, Sl. No. 1 (Page No. 167)	Durpang (Lower) Sand & Gravel MPA	Durpang	1.91	19100	1	49660	29796	Operational
41	Table 13.23, Sl. No. 2 (Page No. 167)	Durpang Sand & Gravel MCA	Durpang	5.2	52000	1	135200	81120	Non- operational
42	Table 13.25, Sl.	Joyhing Sand & Gravel MCA	Joyhing	4.46	44600	1	115960	69576	Operational


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Minerals: Sand, Gravel, Boulder, Ordinary Clay

43	No. 1 (Page No. 173) Table 13.28, Sl. No. 1 (Page No. 178)	3.0 Ha Dingha MPA	Dingha	3.0	30000	1	78000	46800	New Mining Area Proposed
44	Table 13.32, Sl. No. 1 (Page No. 189)	Boginadi Gravel MCA	Boginadi	8.8	88000	1	228800	137280	Operational
45	Table 13.33, Sl. No. 1 (Page No. 189)	Boginadi Ordinary Clay/ Silt MPA	Boginadi	2.58	25800	1	67080	40248	New Mining Area Proposed
46	Table 13.36, Sl. No. 1 (Page No. 194)	Ghagor Mining Contract Area (RF Area)	Ghagor	9.0	90000	1	234000	140400	New Mining Area (within RF)
47	Table 13.38, Sl. No. 1 (Page No. 202)	9.0 Ha Kimin Mining Contract Area (R.F. Area)	Kimin	9.0	90000	1	234000	140400	New Mining Area (within RF)
48	Table 13.40, Sl. No. 1	Gabharu River Balligaon Area	Gabharu	1.20	12000	1	31200	18720	New Mining Area Proposed

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District Survey Report

District: Lakhimpur, State: Assam

49	(Page No. (207) Table 13.40, Sl. No. 2 (Page No. (207)	Gabharu River Deori Gaon Area	Gabharu	1.20	12000	1	31200	18720	New Mining Area Proposed
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Minerals: Sand, Gravel, Boulder, Ordinary Clay

Table 13.44: Quantity Validation with operational Mining Leases.

Sl. No.	Name of Mining Area	Area (in Ha.)	Calculated Quantity (in CuM)	Percentage of minor mineral recommended for mining (60%) as per NGT Guideline	Allotted quantity (in cum)	Remarks
1	Lower Subansiri Sand & Gravel MCA	24.0	624000	374400	300000	Operational
2	Gomari Nala Sand & Gravel MPA	2.97	77220	46332	43940	Operational
3	Bhimpara Sand, Gravel & Ordinary Clay/Silt MCA	7.5	195000	117000	416095	Operational
4	Ranganadi Sand & Gravel MPA	4.84	125840	75504	60000	Operational (Falls in No Go Zone)
5	Ranganadi Sand & Gravel MCA	4.95	128700	77220	50000	Operational
6	Ranganadi River Bed Ordinary Clay MPA near Pahumora	1.2	31200	18720	22000	Operational
7	Ranganadi River Ordinary Clay MPA	1.67	43420	26052	14380	Operational
8	Lower Dikrong Sand &	6.0	156000	93600	190000	Operational

	Gravel MCA					
9	North Dikrong Sand & Gravel MCA	4.91	127660	76596	150000	Operational
10	Bogoli Sand & Gravel MCA	3	78000	46800	92500	Operational
11	Joyhing Sand & Gravel MCA	4.46	115960	69576	75000	Operational
12	Dhunabari Gaon Ordinary Clay MPA (Plot- F,G,H&I)	3.89	95680	57408	34000	Operational
13	Kakoi Sand, Gravel & Ordinary Clay/ Silt MCA	4.5	117000	70200	10250	Operational
14	Boginadi Gravel MCA	8.8	228800	137280	52500	Operational

Minerals: Sand, Gravel, Boulder, Ordinary Clay



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CHAPTER 14: REPLENISHMENT

14.1 INTRODUCTION:

To counteract the negative effects of excessive sand, gravel, boulder, and ordinary clay extraction, replenishment studies are necessary for river bed sand, gravel, boulder, and ordinary clay. The physical features of the stream, including channel geometry, bed elevation, substratum composition and stability, in-stream bed roughness, flow velocity, discharge capacity, sediment transport capacity, turbidity, temperature, etc., are directly impacted by mining inside or next to the riverbed. Changes or adjustments to the aforementioned characteristics might affect the riverine regime's biological balance and disrupt the flow routes and channel structure. Additionally, this might have a negative effect on riparian ecosystems and stream biodiversity.

If replenishment equals excavation over a certain stretch, it is thought that the disturbance of riparian habitat is minimal. Therefore, a study of material replenishment throughout the specified period is essential to limit the negative effects of mining minor minerals (sand, gravel, boulder/stone, silt/ordinary clay) in a specific river stretch.

14.2 GENERIC STRUCTURE OF REPLENISHMENT STUDY:

Four surveys are initially needed for the replenishment study. In order to record the amount of mining lease prior to the monsoon, the first survey must be conducted in April. When the mines close for the monsoon season, the second survey is conducted. The amount of material dug prior to the monsoon season's arrival will be provided by this survey. To determine the amount of material deposited or refilled in the mining lease, the third survey must be conducted following the monsoon. To determine the amount of material dug throughout the fiscal year, the fourth survey is conducted at the end of March. For the years that follow, just three surveys will be usually required. The state government uses the findings of annual surveys to determine the river's rate of replenishment. Future auctions may be scheduled based on the pace of replenishment.

Because of variations in the flow, the replenishment period may differ depending on the channel's characteristics and the season of deposition. These seasons and periods may differ depending on the region's geography and precipitation patterns, and they must be established by local authorities, ideally with assistance from the Indian Meteorological Department and Central Water Commission. As a result, the excavation will be restricted to the expected replenishment after taking other regulatory restrictions into account.

14.3 METHODOLOGY FOR REPLENISHMENT STUDY:

A theoretical empirical formula serves as the basis for the replenishment estimation, which is computed using analytical models for bed load transport estimation. Rainfall may be estimated using the IMD's iso-pluvial maps. Several conventional empirical formulae that are pertinent to the geographical and channel characteristics are used to calculate the catchment yield. For instance, the runoff coefficient's Strange's Monsoon runoff curves. The Dickens, Jarvis, and Rational formulas may be used to determine the study area's peak flood discharge at 25, 50, and 100 years of return. It is possible to estimate bed load transfer using the Ackers and White Equation or a comparable method. To estimate the volume of replenished material, a simulation model is utilized with basic data collected from the field during the pre-study and post-study periods (ideally before and after the monsoon). A laboratory accredited by NABL must evaluate the bulk density and particle size distribution of the deposited material. The calculation of replenishment in weight will be computed after taking into account the stability and safety of the slopes and riverine regime, taking into account the bulk density and volume. The following are some typical techniques for gathering field data for replenishment studies.

14.3.1 PHYSICAL SURVEY OF THE FIELD BY THE CONVENTIONAL METHOD:

i. The topography, contours, and offsets of the lease area are defined by a traditional survey technician employing DGPS and other survey techniques. The main characteristics of the river's stretch, as well as any adjacent significant civil and other

Minerals: Sand, Gravel, Boulder, Ordinary Clay


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features, should be clearly highlighted in the survey. The mining-eligible geographical region will be provided by such information. The baseline data for evaluating the situation before and after the study period will be provided by the contour and elevation benchmarks.

ii. The Reduced Level (RL) must be verified from a nearby standard RL, and physical benchmarks must be set at suitable intervals (ideally 1 in 30 m). A steel plate (Bench Plate) should be etched with these RL, and they must be fastened and positioned in areas that are available both before and after the study time and are free from damage. Throughout the mining phase, the bench plates will be accessible for use as a reference for all mining operations. As common reference points to regulate the topographic survey and mining operations, reference pillars can also be employed in place of bench plates with readable and apparent demarcation on the ground.

iii To ensure accuracy in the evaluation, baseline elevation status data for a 10 m × 10 m grid is preferred. Although it is intended that two successive cross-sections in both the longitudinal and lateral directions should not be more than 10 meters apart, the regulating body may set these intervals based only on site-specific and geographic circumstances and only after presenting a scientific justification for the variance.

iv. To estimate the area of erosion and deposition, the elevation changes at each node in the pre and post scenarios should be represented graphically using the proper scale. These visual representations ought to show the flow bed elevation and the active channel regime, together with other crucial elements that must be taken into account while estimating the mining area. After taking into account the stability and safety of active channel banks as well as other significant factors, the area of deposition and erosion will be computed for each cross-section. The elevation level must be measured in relation to the closest bench-plates that have been set up for that purpose.

V. Each grid's corner points should have distinguishable MSL and RL levels, and non-mining safety obstacles should be marked as restricted in accordance with the relevant State's Mineral Concession Rules and the guidelines outlined in this Sustainable Sand Mining Management Guide.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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vi. There must be a distinct difference between the grids under the mineable and non-mineable areas. Data mining software is used to stimulate this baseline data (pre and post) in order to determine the replenishment area, associated volume, and anticipated weight.

vii. The database should be set up in a tabular format that clearly shows the section line names, the beginning point's latitude and longitude, the chain-age, and the corresponding levels of each point that was 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 distance between two cross-sections and the average net area of these two successive cross-sections will be multiplied to determine the volume.

ix The ideal sample density for determining the bulk density and estimating the deposition rate is one sample every 900 square meters (30 m x 30 m). It is important to make sure that the sample used to measure bulk density comes from the deposition zone rather than erosion. However, sample density may be modified based on site conditions, river morphology, and geographic circumstances. The report must properly identify the reason for the divergence and provide scientific evidence to justify it.

14.3.2 USE OF UAV/DRONE AND OTHER IMAGE DATA PROCESSING TECHNIQUES:

With the development in image data processing tools and its accuracy acceptability, Drone/UAV fitted with the advance camera are used for survey purposes. Such technology has promising potential in the survey of minor minerals (sand, gravel, boulder/ stone, silt/ ordinary clay) mining zones due to its fast and reliable output deliveries. The survey is conducted using a set of instruments and compatible software to utilized the properly referenced data for depicting the topography of the

Minerals: Sand, Gravel, Boulder, Ordinary Clay


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study area. Instrument calibration and software compatibility and its validation with the ground data are an essential requirement for using this technique.

(Source: Enforcement & Monitoring Guidelines for Sand Mining, MoEF&CC, Jan 2020)

14.4 METHODOLOGY USED FOR REPLENISHMENT STUDY FOR THE REGION:

The following methodology used for replenishment study of the region which is as follows:

Study of Google Images on time scale for year 2017 to 2024 (Pre and Post

Monsoon),

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

Procuring satellite imageries (LISS IV) (pre and post monsoon) 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.

Figure 14.1 Methodology used for replenishment study of the region

14.5 MINE LEASES MAPPING

Study of Google Images on time scale for year 2017 to 2024 (Pre and Post Monsoon), there after Site visit for physical verification and Geo-tagging of the mine site was done. After that, procuring the LISS-IV satellite data, based on this satellite data all

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the Sand, Gravel, Boulder/Stone, Silt/ Ordinary Clay and Ordinary Earth mine leases in Lakhimpur district have been mapped are shown in Map 14.1 & 14.2.

The mine leases "Operational" are shown in 'Brown' color, mine lease "Non-operational" are shown in 'Orange' color and the mine lease "Proposed" are shown in 'Purple' color'.

14.6 Replenishment of Sand, Gravel, Boulder and Ordinary Clay/ Silt

The term "replenishment of sand, gravel, boulder, and ordinary clay/silt" refers to the natural phenomena of sand, gravel, and boulders being re-distributed within a river or stream due to natural processes, such as monsoon or precipitation, brought on by erosion from the river's upland to its downstream portions. Minor mineral deposits were mapped along the Subansiri, Ranganadi, Dikrong, Kakoi, Kananadi, Tramjuli, Bogoli, Singra, Durpang, Joyhing, Dirgha, Baghinijan, Ghagar, Baginadi, and Kimin River segments. These deposits were found to be confined inside geomorphic landforms.

River erosion is the process by which sediment from the source rock is broken down by physical and chemical weathering, producing small mineral deposits. Since the Indian Summer Monsoon is seen as synonymous with the climatic hazards, this trigger is particularly dependent on the monsoon on the Indian subcontinent.

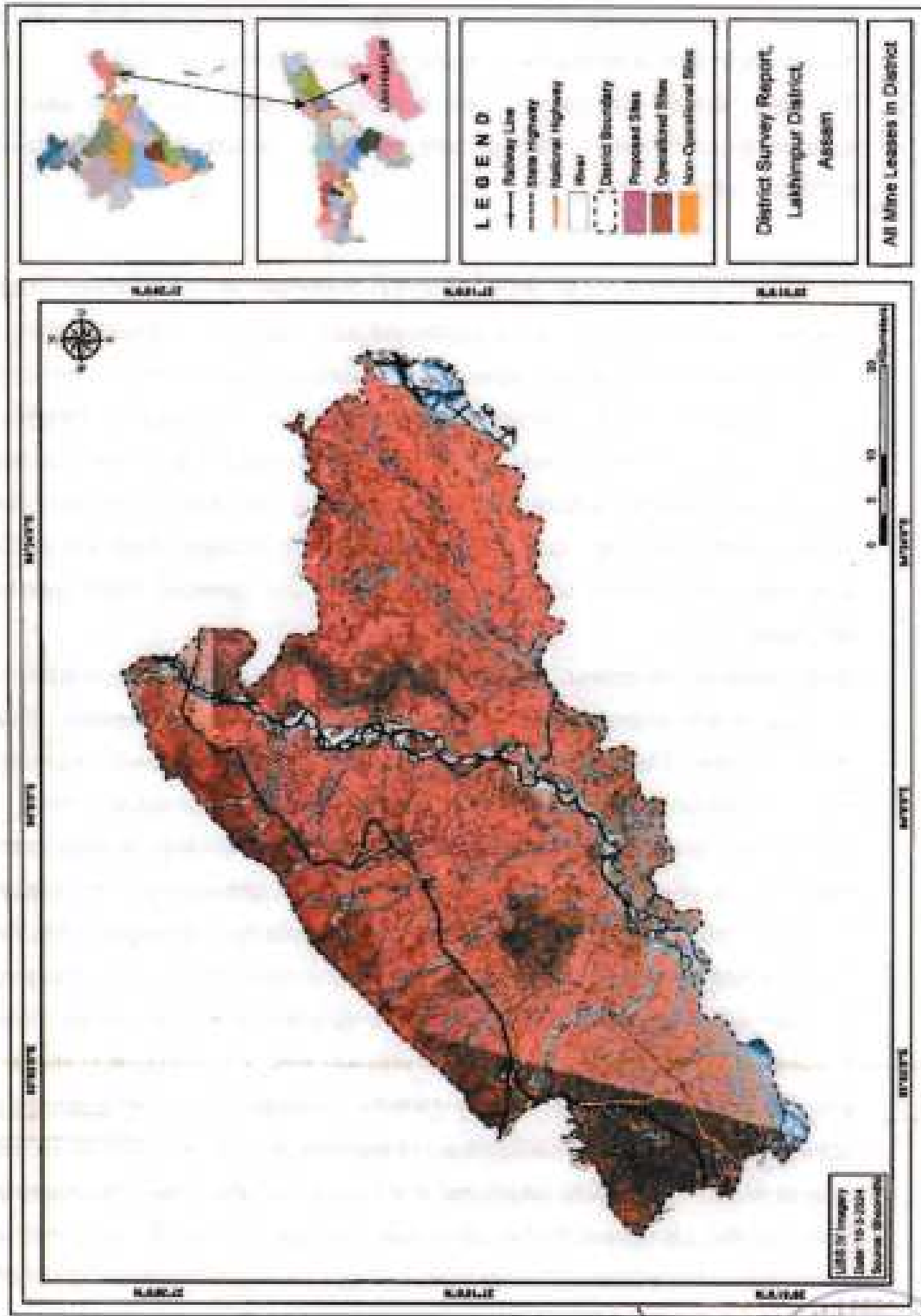
One of the end-members that causes mass movement in minor minerals and their redistribution along the river length is the monsoonal intensity and its fluctuations. Currently, mining activities would function as replenishment. Changes in the strength of the monsoon, upland geological formations, the river's gradient, and the extent of the river section would all contribute to the replenishment as proposed. Since the fluvial dynamics in the uplands, middle, and lower reaches of the river fluctuate, even within the same or distinct geological domains, the reach of the river segment is also significant for the natural replenishment of sand and silt. The Map 14.1 & 14.2 shows map of mineral wise leases distributed in the various rivers of the Lakhimpur district. Rivers of the Lakhimpur district are shown in Map 14.1 & 14.2 and their yearly replenishment have been observed using google timescale imageries (2017-2024).

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Map 14.1: All mining areas within the Lakhimpur District (LISS IV FCC).

Such mineral deposits were also confirmed during field work carried by Ecorescue Enviro Consulting Services Pvt. Ltd. (our knowledge partner) and its staff members in November 2024. Then the contour maps of 1 m interval for all the leases obtained from processing of satellite imageries supported SRTM data (May 2024 (Pre-monsoon) & November 2024 (Post-monsoon) were analyzed. The average rate of replenishment river wise calculated and shown in following Table 14.1.

Table 14.1 Average rate of Replenishment River wise

Sl no.	Name of river	Number of leases present in the river	Values in Contour Map May 2024 (in meters)			Values in Contour November 2024 (in meters)			Average Rate of replenishment (in meters)
			Min	Max	Difference	Min	Max	Difference	
1	Subansiri	13	87.5	88.5	1	88	89	1	1
2	Ranganadi	11	96	97.5	1.5	97	98.5	1.5	1.5
3	Dikrong	20	96	97.5	1.5	97	98.5	1.5	1.5
4	Kakoi	2	108.5	110	1.5	109	110.5	1.5	1.5
5	Kananadi	2	97.5	98.5	1	98	100	2	1.5
6	Tramjuli	1	129	130	1	130	131	1	1
7	Bogoli	2	108.5	109.5	1	108	110	2	1.5
8	Singra	2	106	108	2	107.5	108.5	1	1.5
9	Durpang	2	106	107.5	1.5	107	108.5	1.5	1.5
10	Joyhing	1	121	122	1	127	128	1	1
11	Dirgha	2	111	112	1	112	113	1	1
12	Baghinjan	1	99	100	1	102	103	1	1
13	Boginadi	2	111	112	1	112	114	2	1.5
14	Ghagor	2	111.5	112.5	1	112.5	113.5	1	1
15	Kimin	1	121	122	1	124	125	1	1
16	Gabharu	2	104.5	105.5	1	106	107	1	1

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Based on the Table 14.1 it can be inferred that the average rate of replenishment varies from 1.0 m to 1.5 m in various rivers of Lakhimpur district. Though there is deposition up to 1.5 m in various river stretches, but as per guidelines only 1 m is allowed for mining. So, we have considered 1 m as mineral reserves.

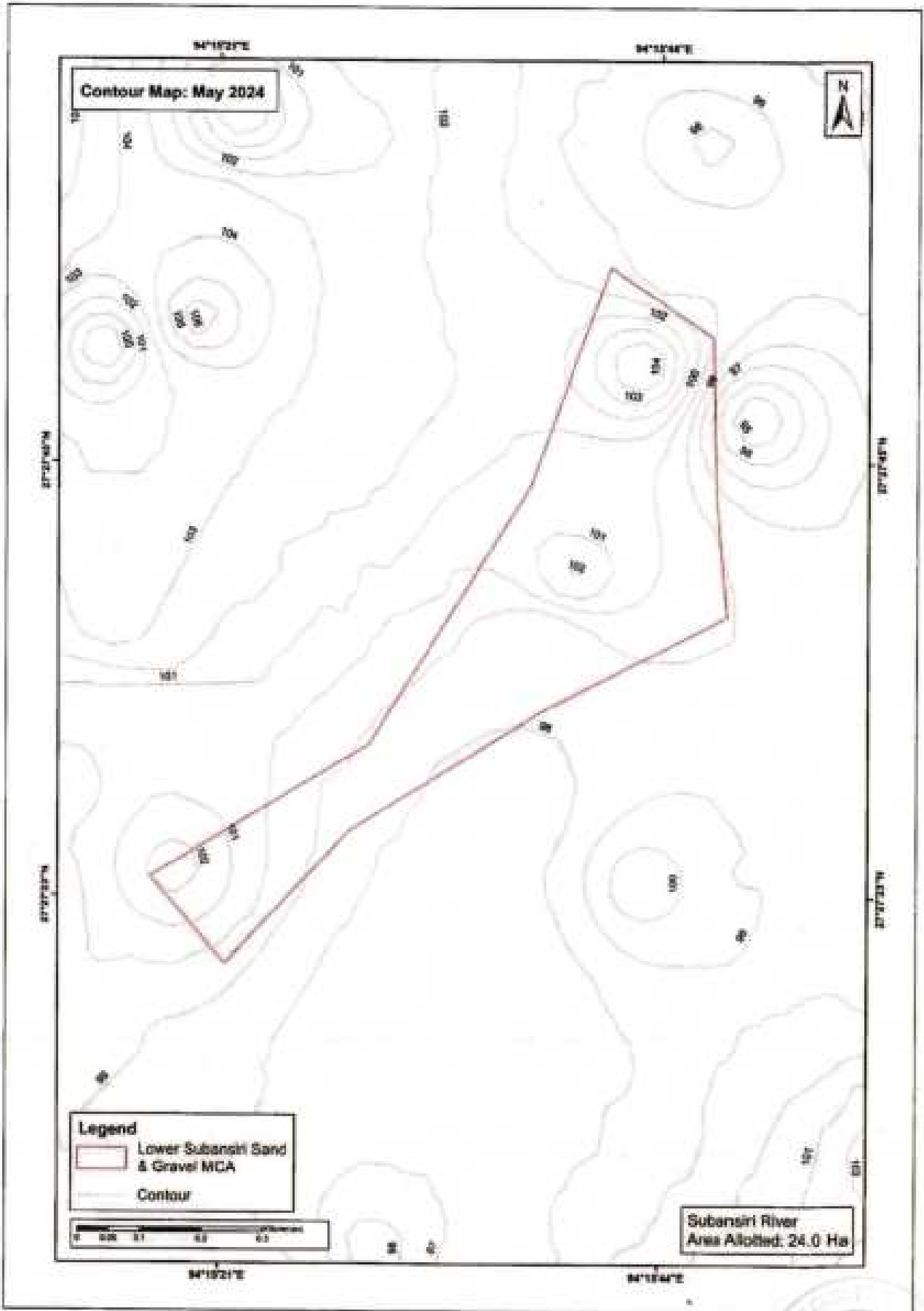
14.7 KEY POINTS FOR SUSTAINABLE REPLENISHMENT IN LAKHIMPUR DISTRICT

The district has sizable Minor Mineral (sand, gravel, boulder/ stone, silt/ ordinary clay) reserves in Subansiri, Ranganadi, Dikrong, Kakoi, Kananadi, Tramjuli, Bogoli, Singra, Dulpang, Joyhing, Dirgha, Baghinjan, Ghagar, Baginadi and Kimin River. Based on the field investigation and satellite images of landform migration, erosion and re- distribution of minor mineral deposits confirms the timely, annual replenishment of minor minerals (sand, gravel, boulder/ stone, silt/ ordinary clay) facilitated by geological setup, gradient of river bed, rainfall pattern and intensity. The Table 14.1 shows average rate of replenishment river wise

The average rate of replenishment varies from 1.0 m to 1.5 m in various rivers of Lakhimpur. Though there is deposition up to 1.5 m in various river stretches, but as per guidelines only 1 m is allowed for mining. So, we have considered 1 m as mineral reserves.

In order to ensure sustainable and systematic minor minerals mining with monitored protection of the environment, the MoEF & CC Sustainable Sand Mining Management Guidelines – 2016, MoEF & CC Enforcement & Monitoring Guidelines for Sand Mining – January 2020, Assam Minor Mineral Concession Rules, 2013 (Compliance of sand mining guidelines) and related Honorable NGT order will be followed.

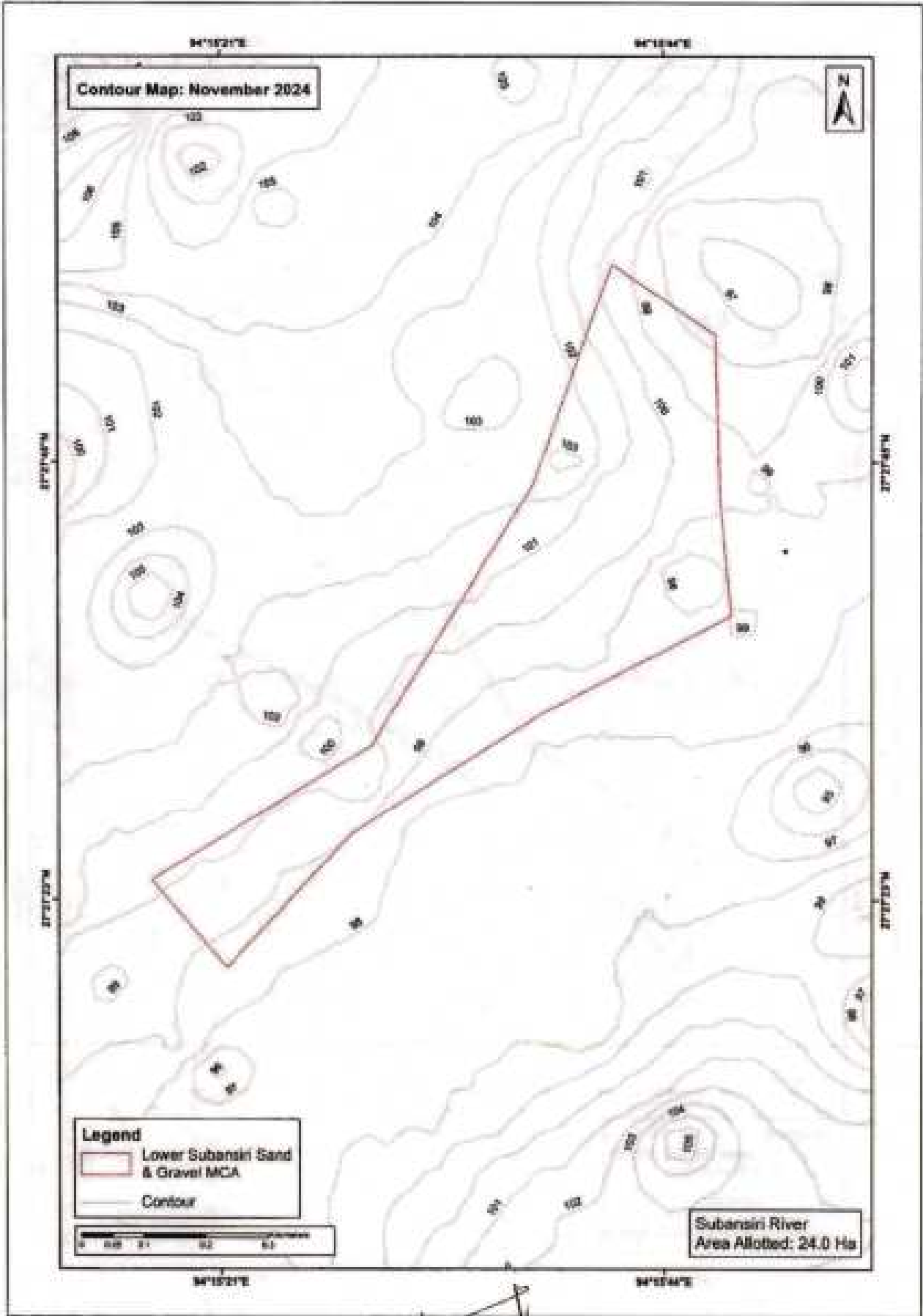
Disclaimer: The present study is based on the available satellite images, remote sensing data set, past and present field investigation. The area of the existing leases (operational and non-operational) was provided by the office of the Divisional Forest Officer, Lakhimpur Division and Geology & Mining Department, Government of Assam based on which the estimation and analysis was done. The results have no bearing on economic viability of the lease or proposed area.



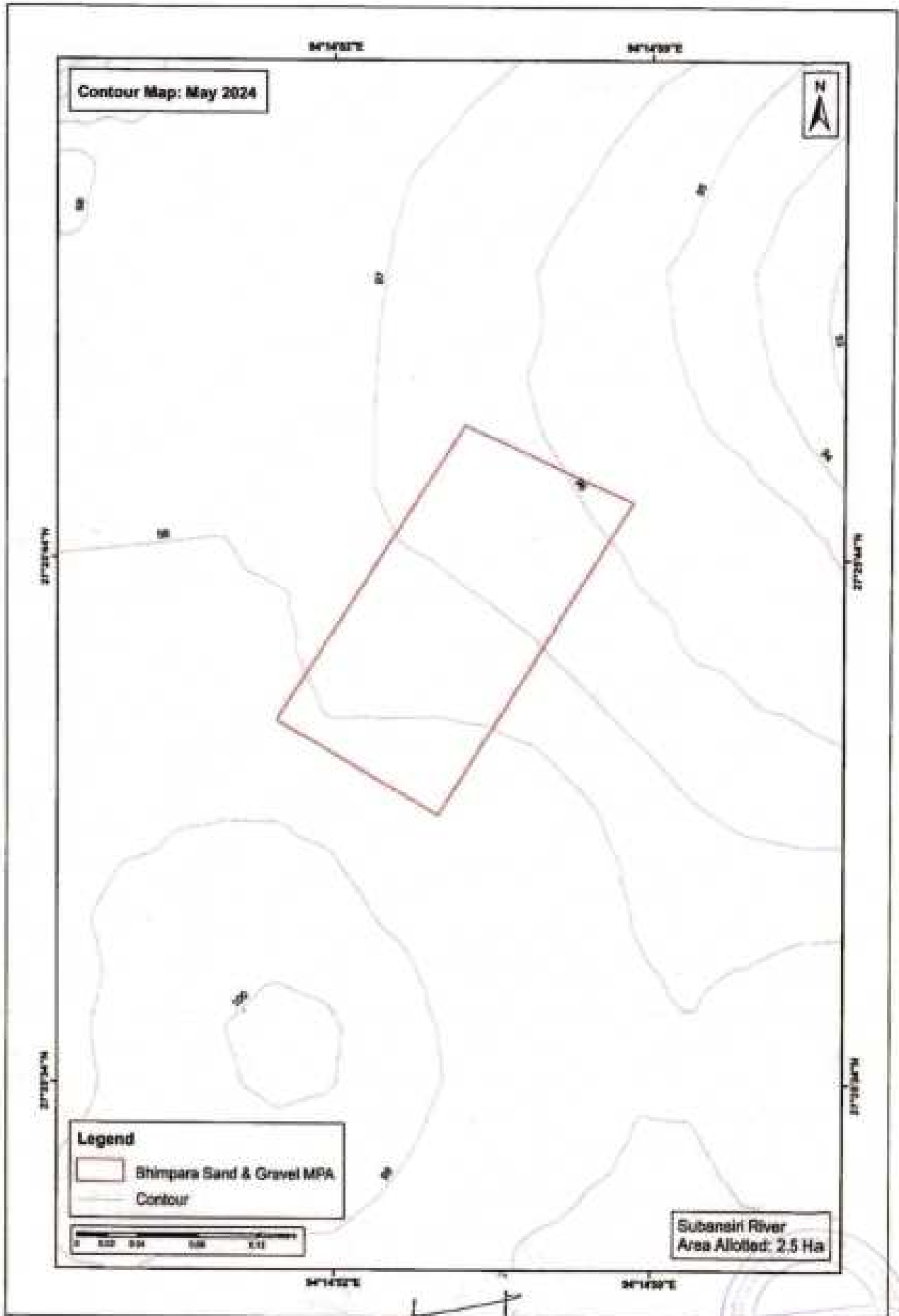
- 65E -

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: May 2024



Legend

-  Bhimpore Sand & Gravel MPA
-  Contour

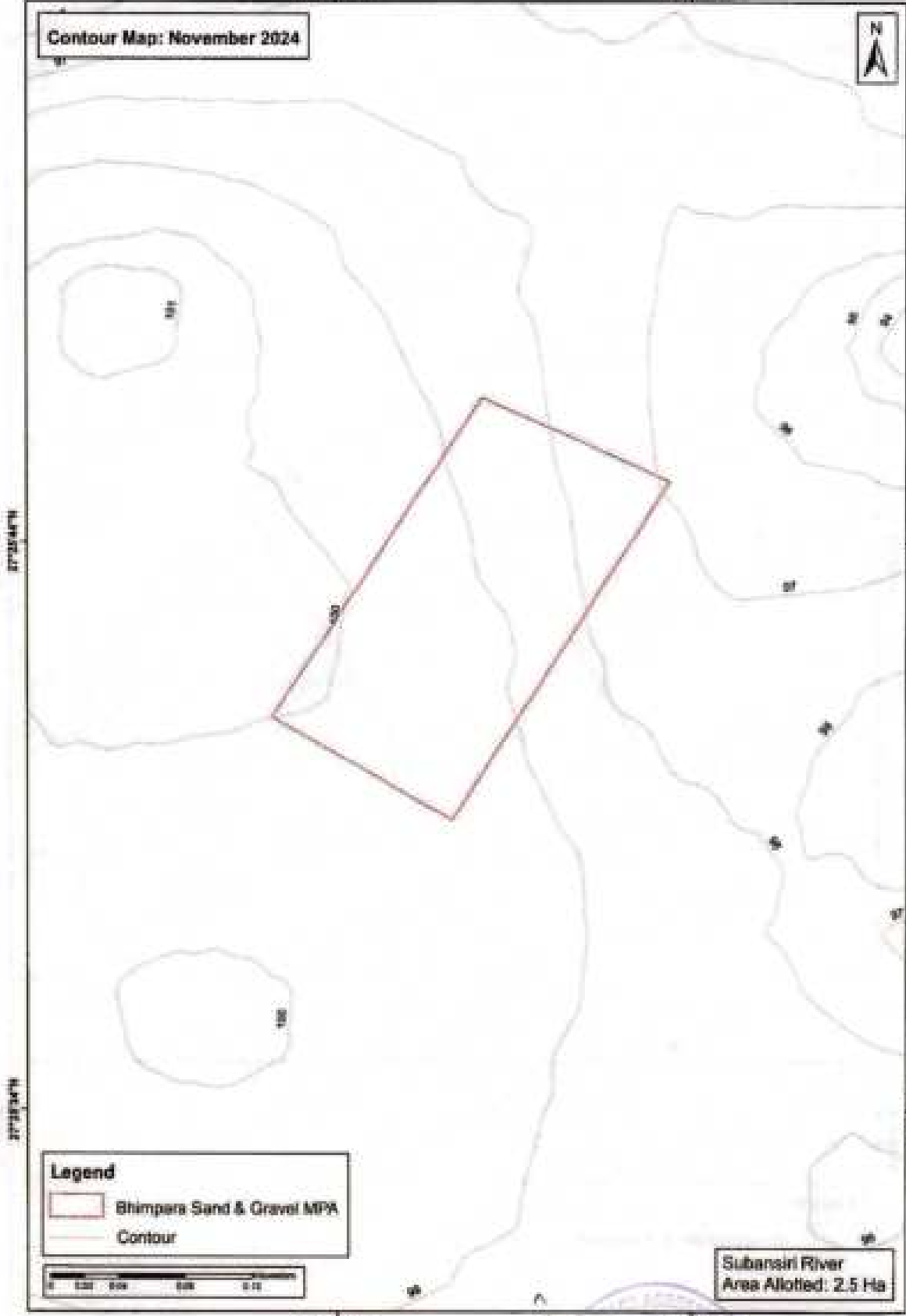


Subansiri River
Area Allotted: 2.5 Ha

Divisional Forest Officer
Lakhimpur Division
Lakhimpur,



Contour Map: November 2024



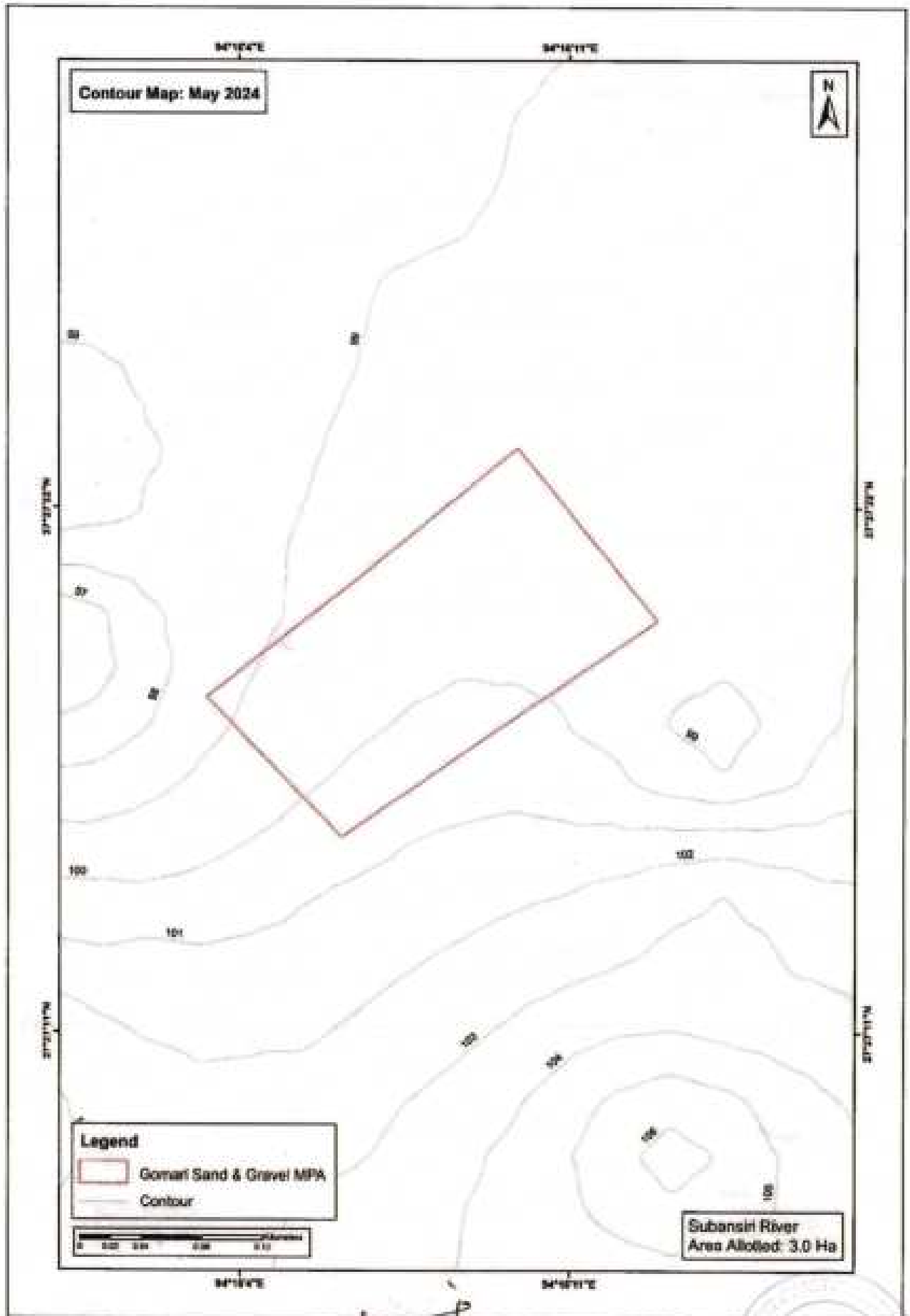
Legend
Bhipara Sand & Gravel MPA
Contour



Subansiri River
Area Allotted: 2.5 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



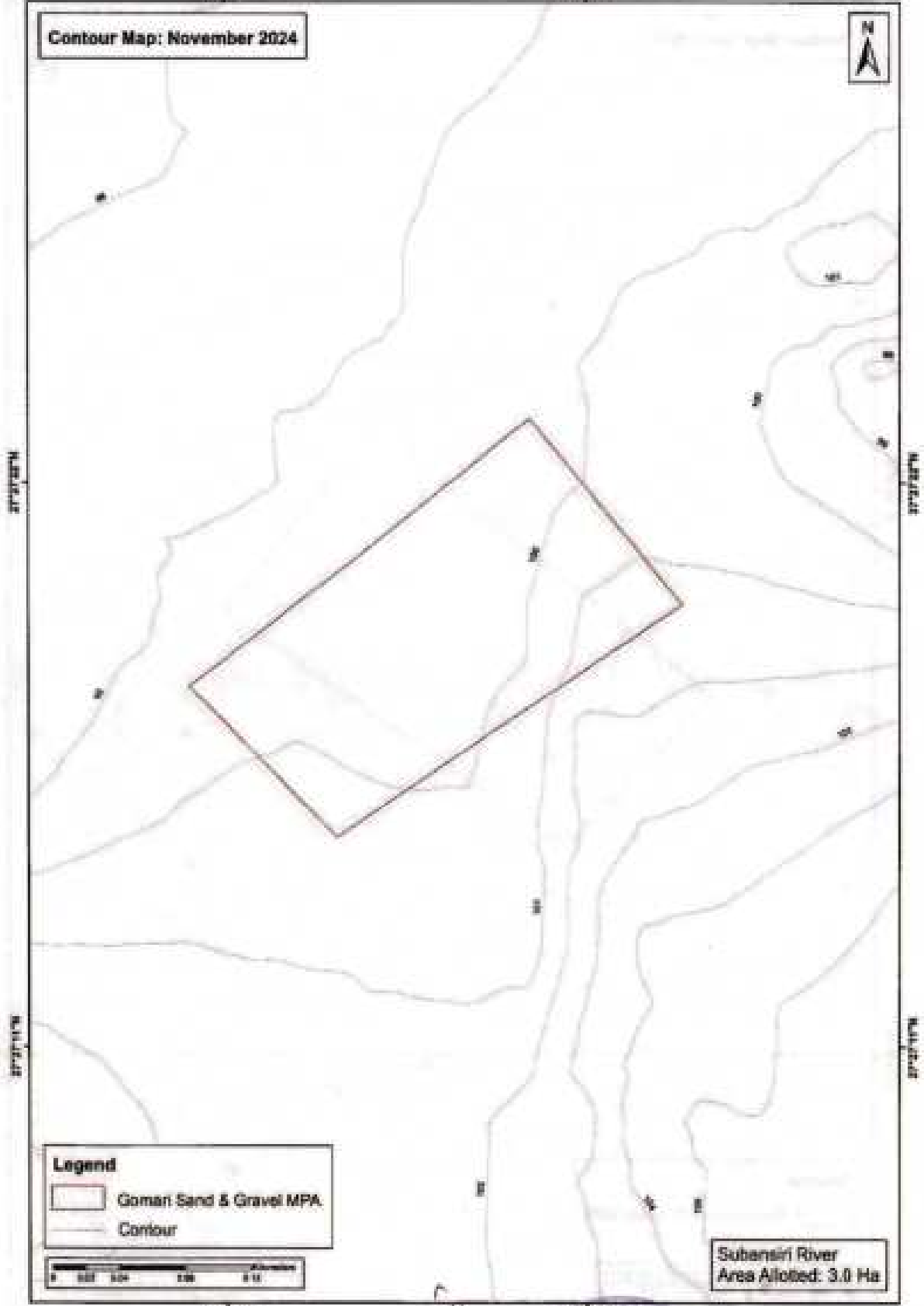


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Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024



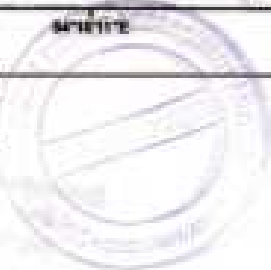
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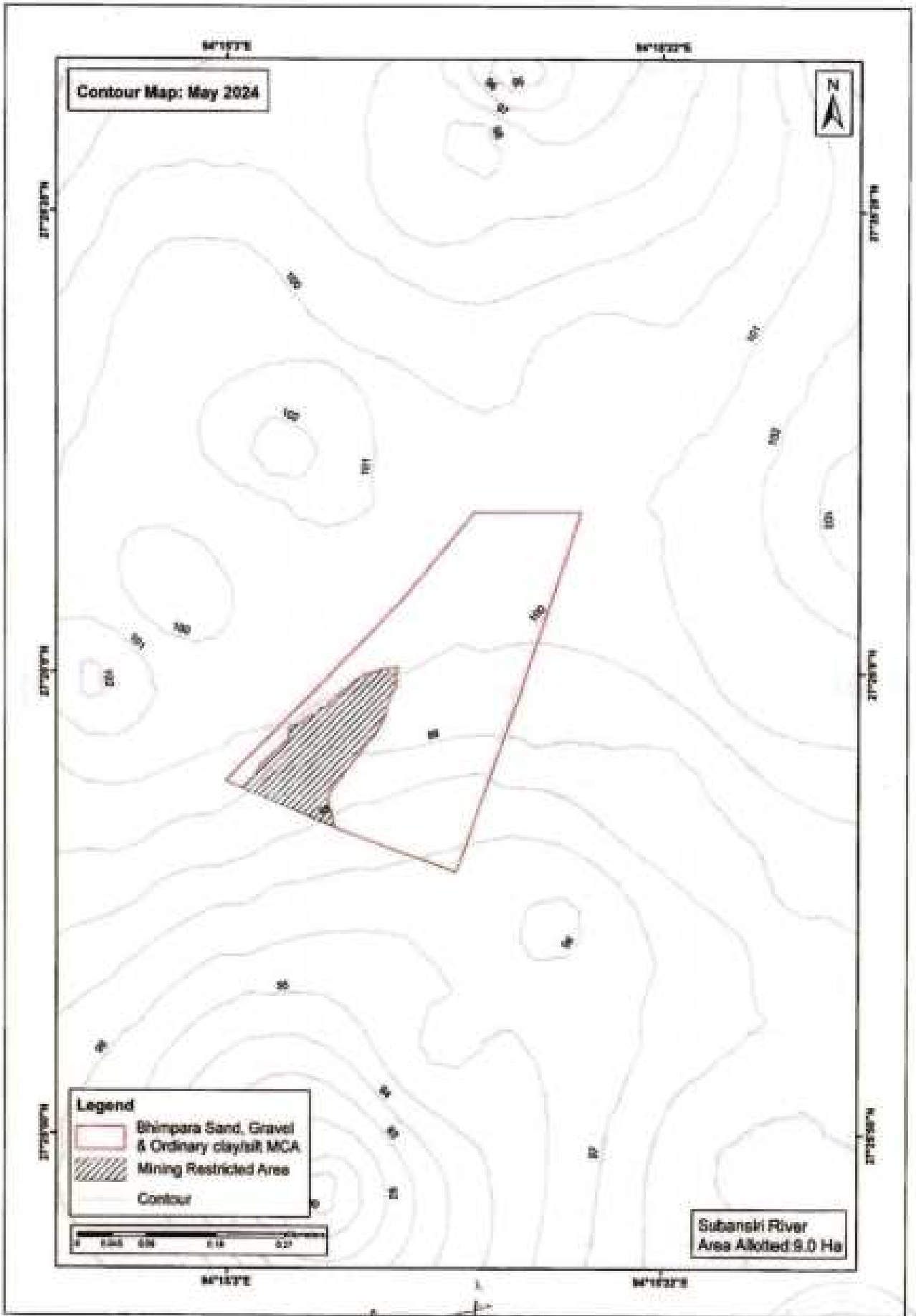
-  Goman Sand & Gravel MPA
-  Contour



Subansiri River
Area Allotted: 3.0 Ha

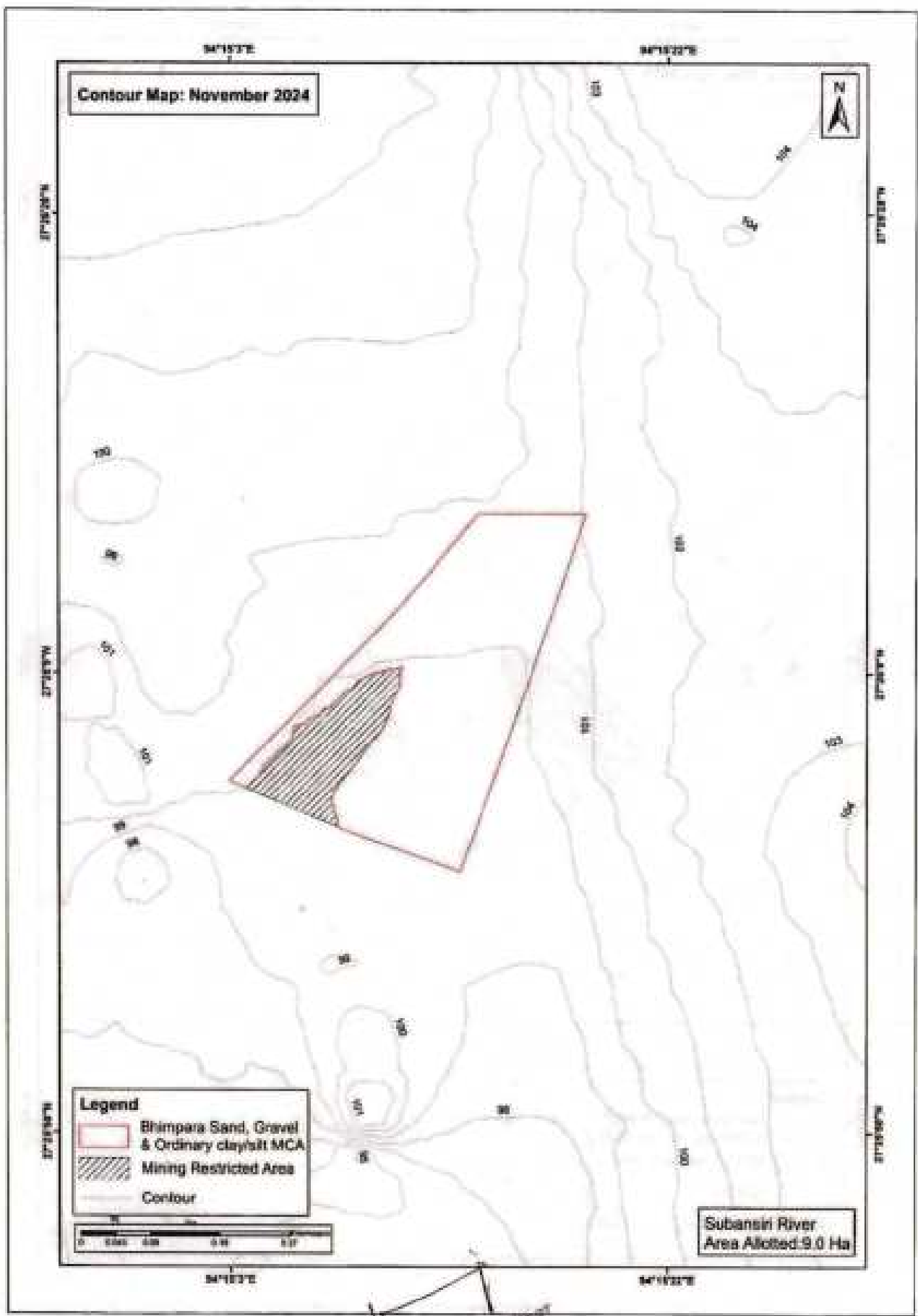
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

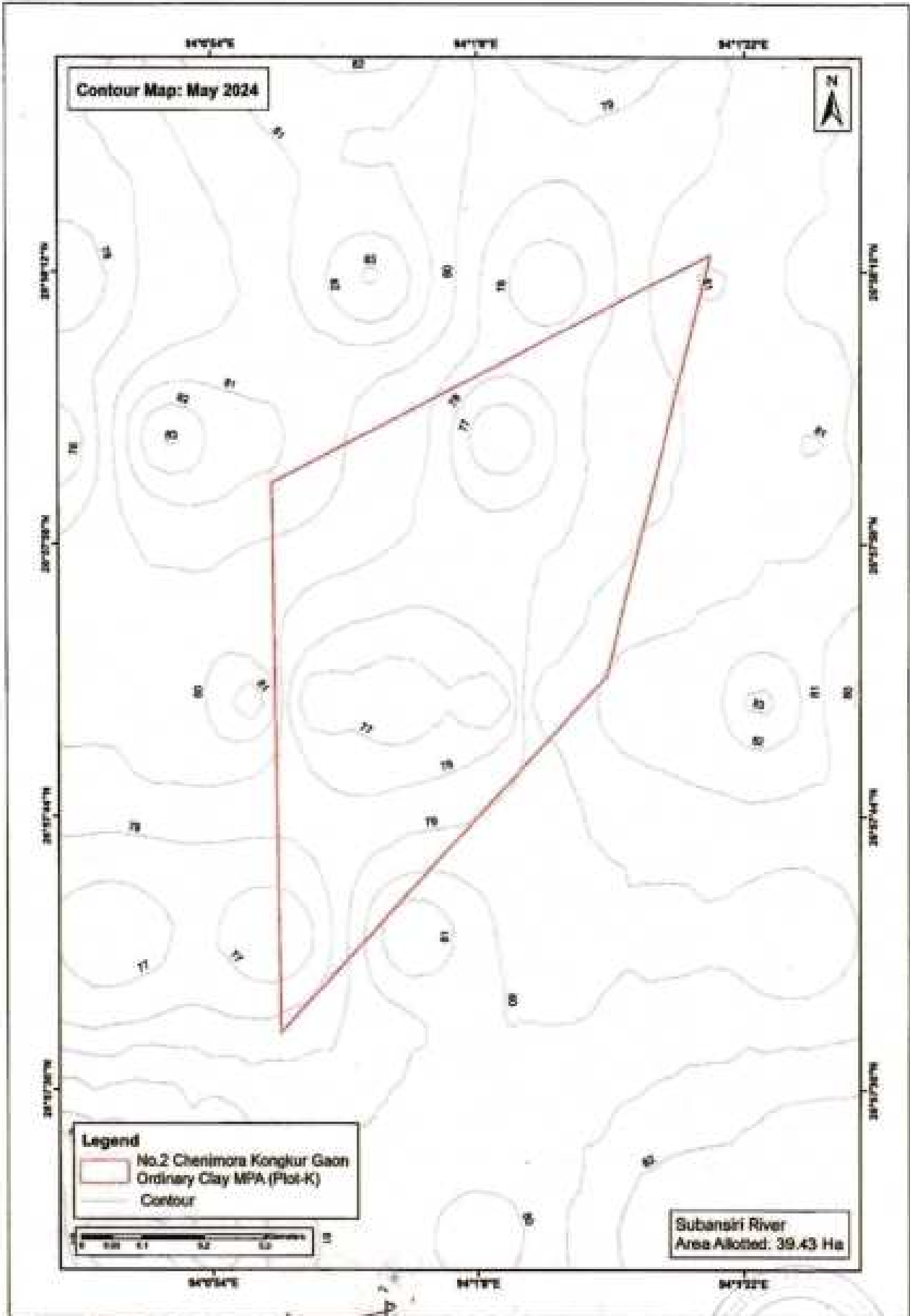




Divisional Forest Officer
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North Lakhimpur.



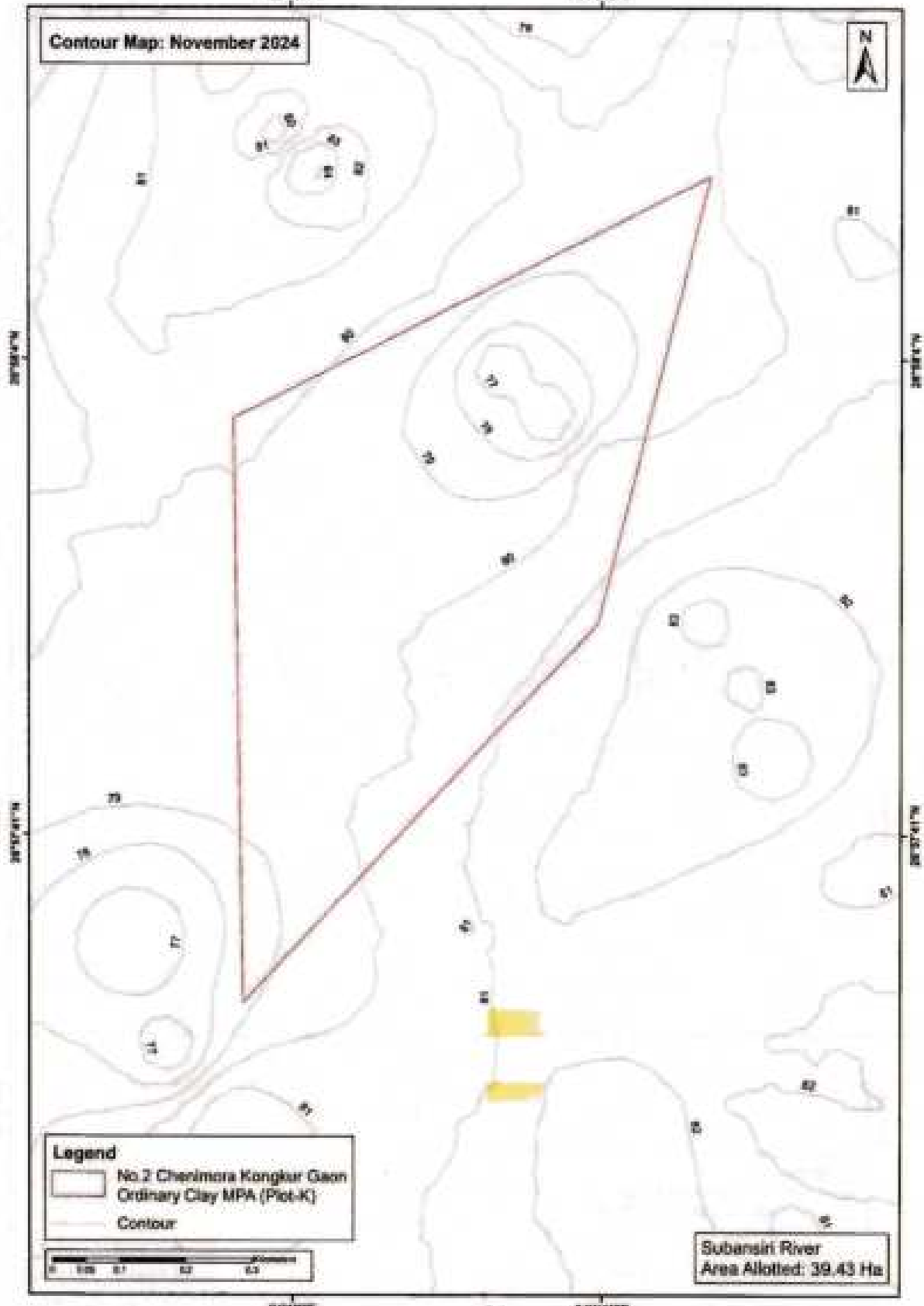






Divisional Forest Officer
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North Lakhimpur.

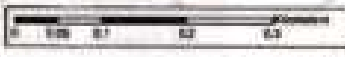


Contour Map: November 2024



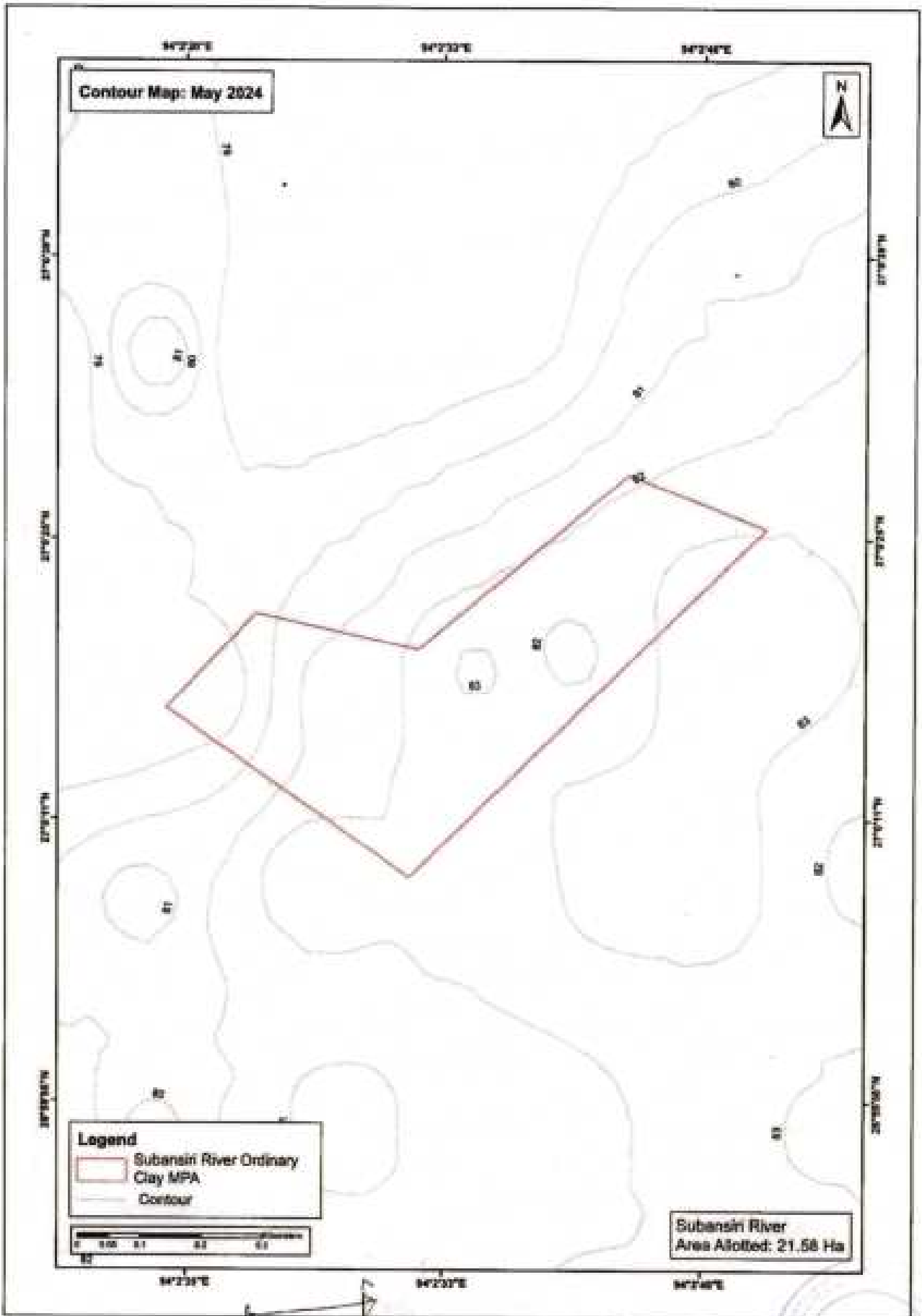
Legend

-  No.2 Cherimora Kongkur Gaon Ordinary Clay MPA (Plot-K)
-  Contour

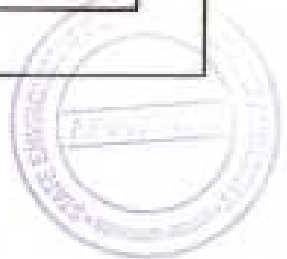


Subansiri River
Area Allotted: 39.43 Ha

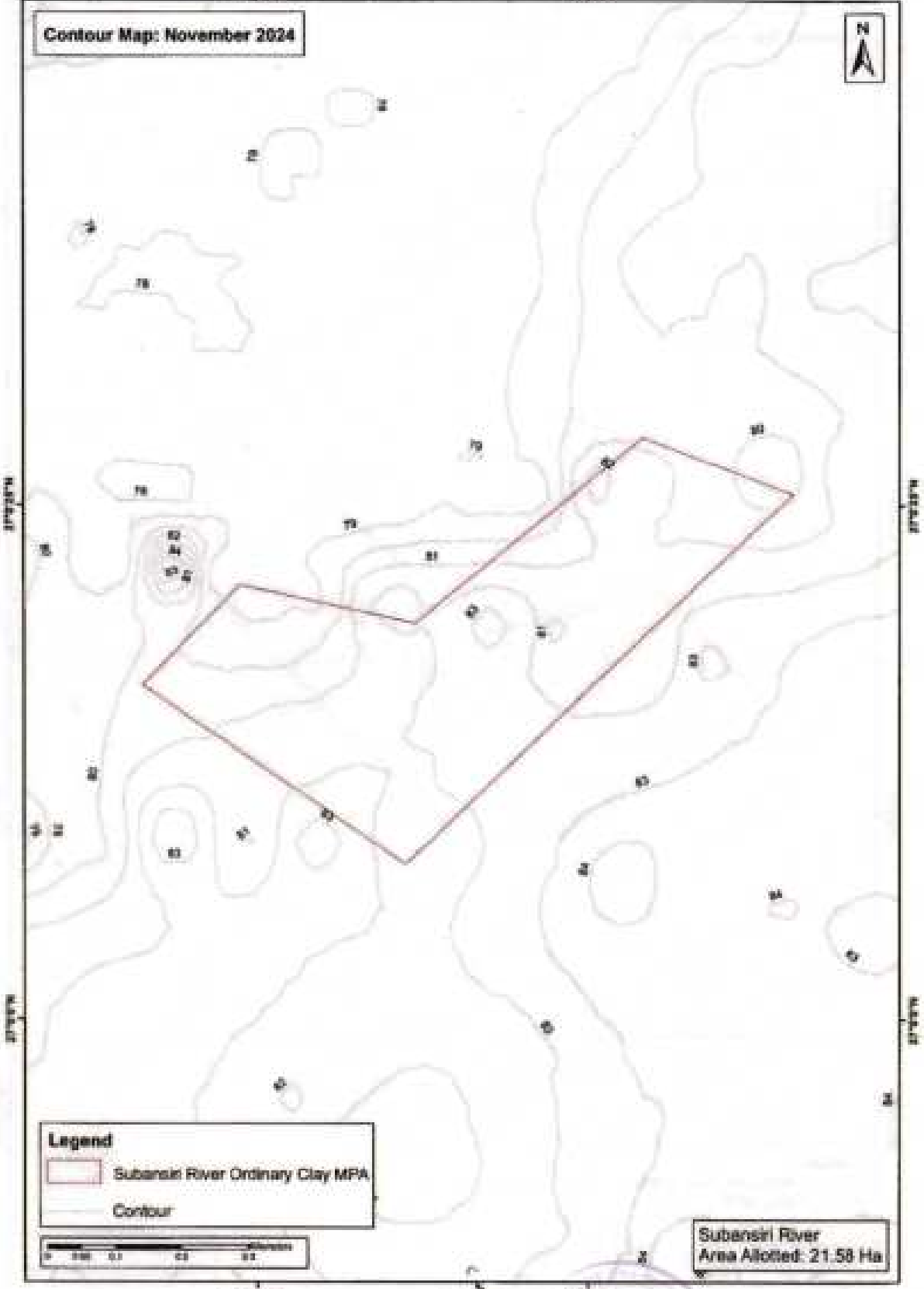
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



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Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024

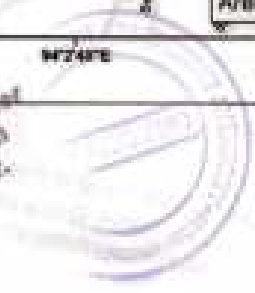


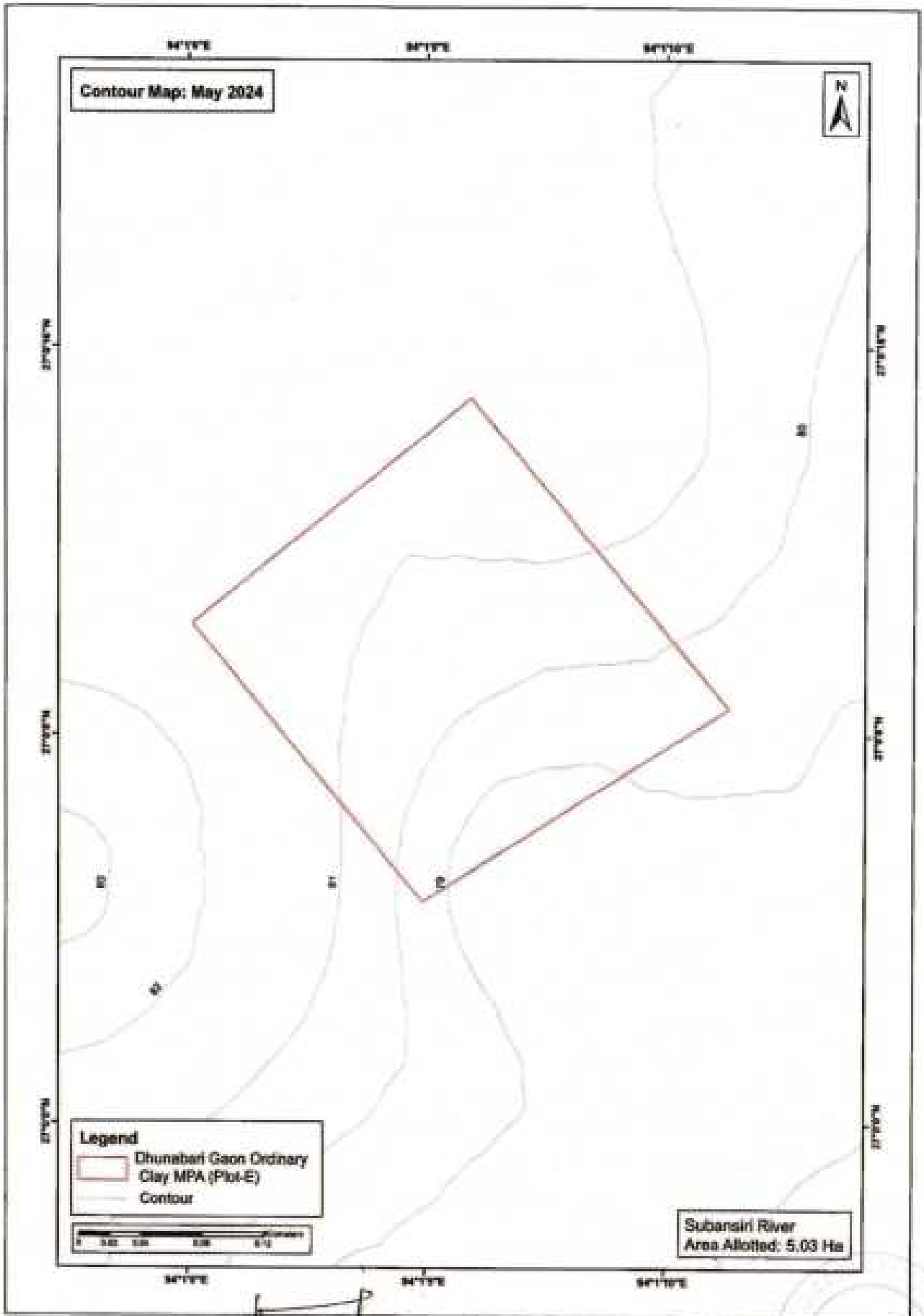
Legend
Subansiri River Ordinary Clay MPA
Contour



Subansiri River
Area Allotted: 21.58 Ha

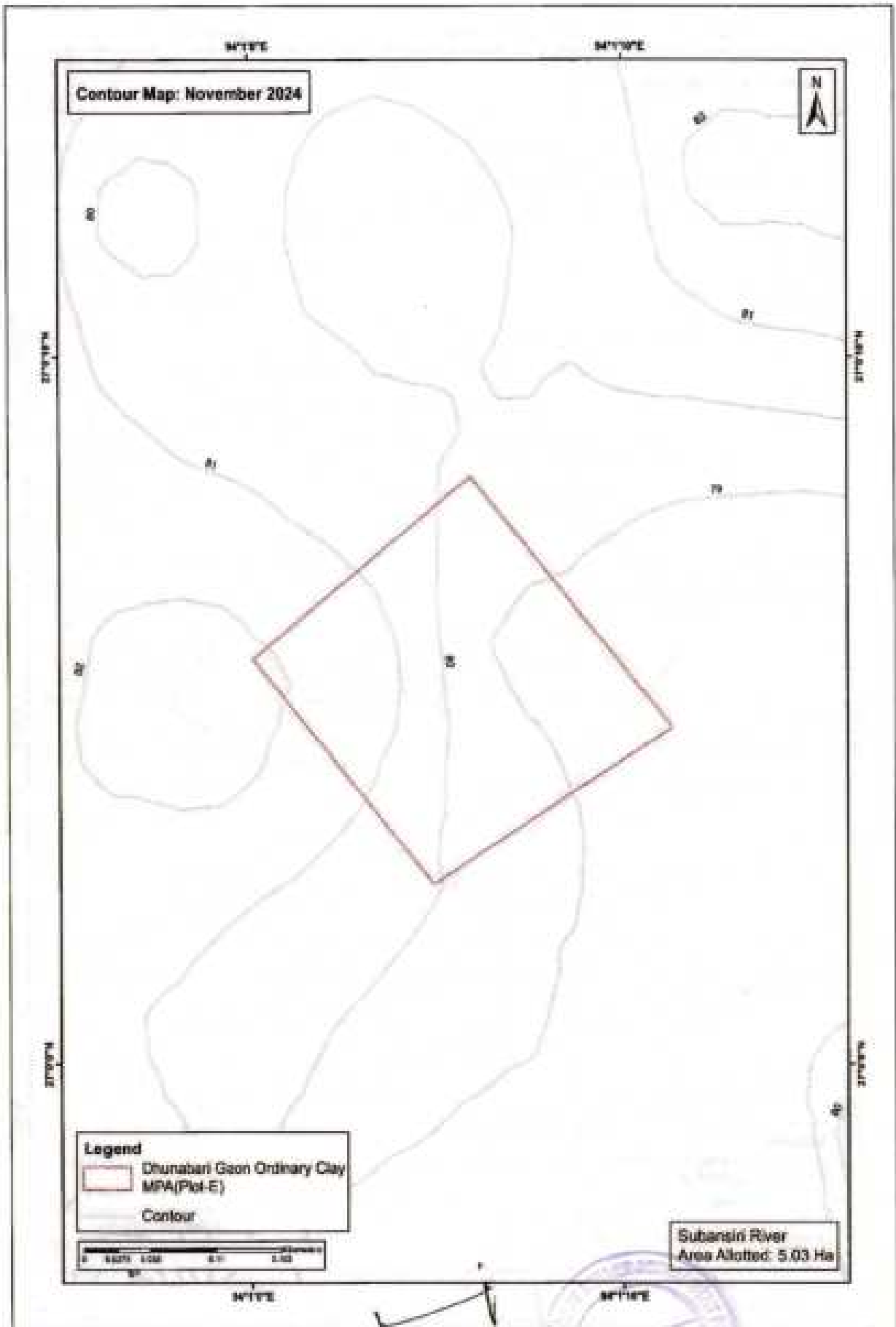
Divisional Forest Officer
Lachimpur Division
North Lakhimpur.





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North Lakhimpur.





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Lakhimpur Division
North Lakhimpur.



Contour Map: May 2024



1000

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Legend

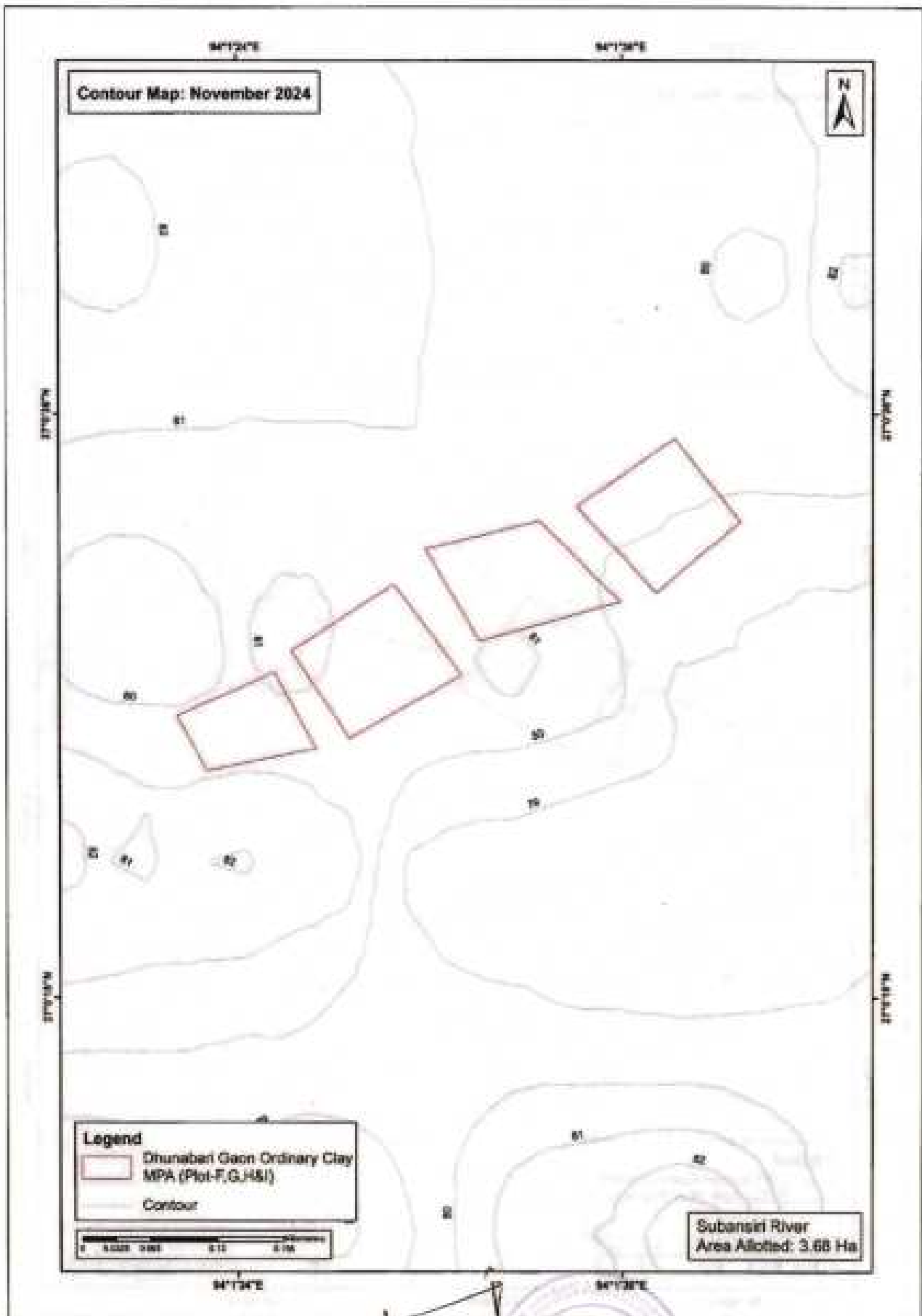
-  Dhunabari Gaon Ordinary Clay MPA (Plot-F,G,H&I)
-  Contour



Subansiri River
Area Allotted: 3.68 Ha

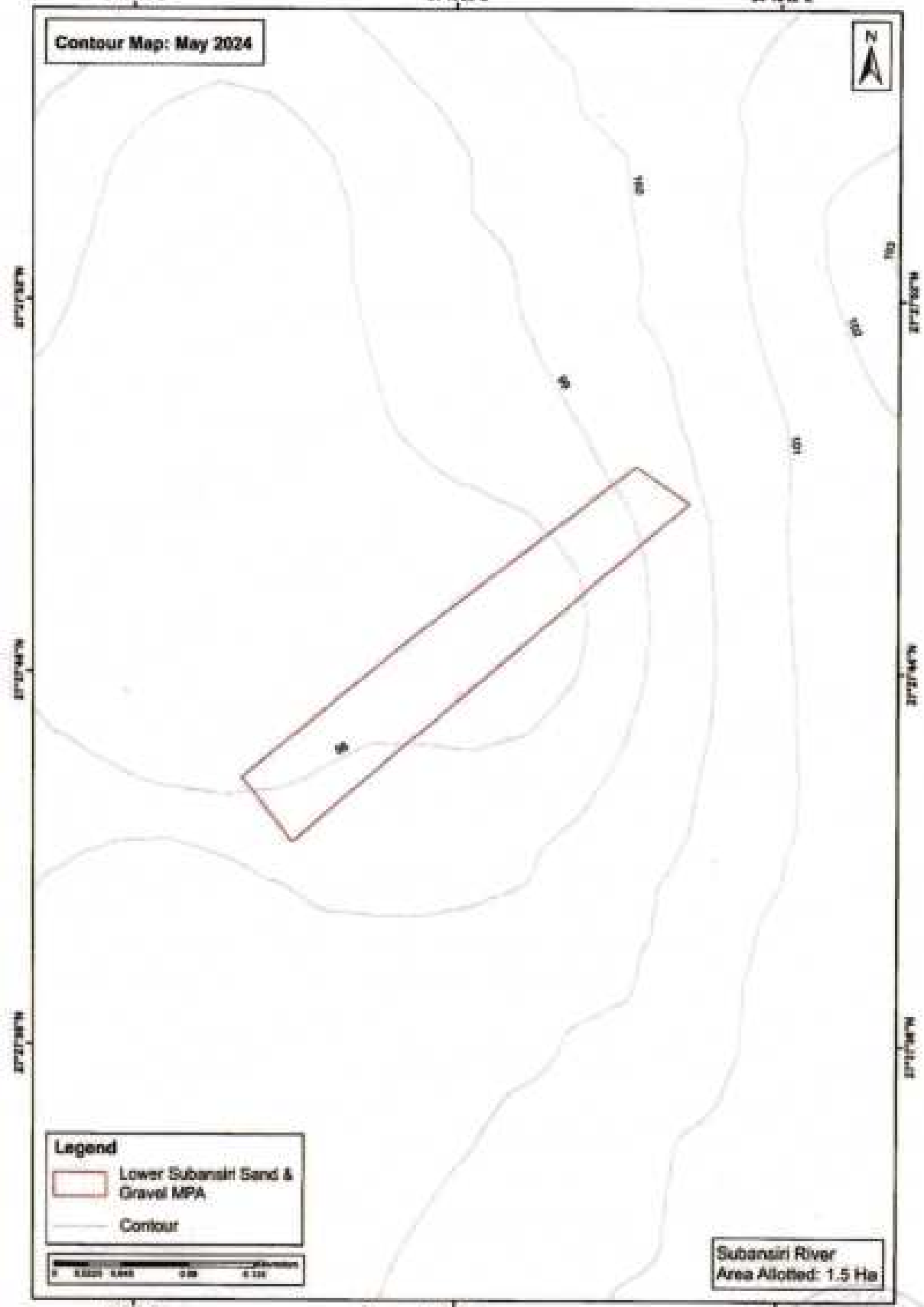
Civilian Forest Officer
Lakhimpur Division
North Lakhimpur.





Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

Contour Map: May 2024



Legend
Lower Subansiri Sand & Gravel MPA
Contour

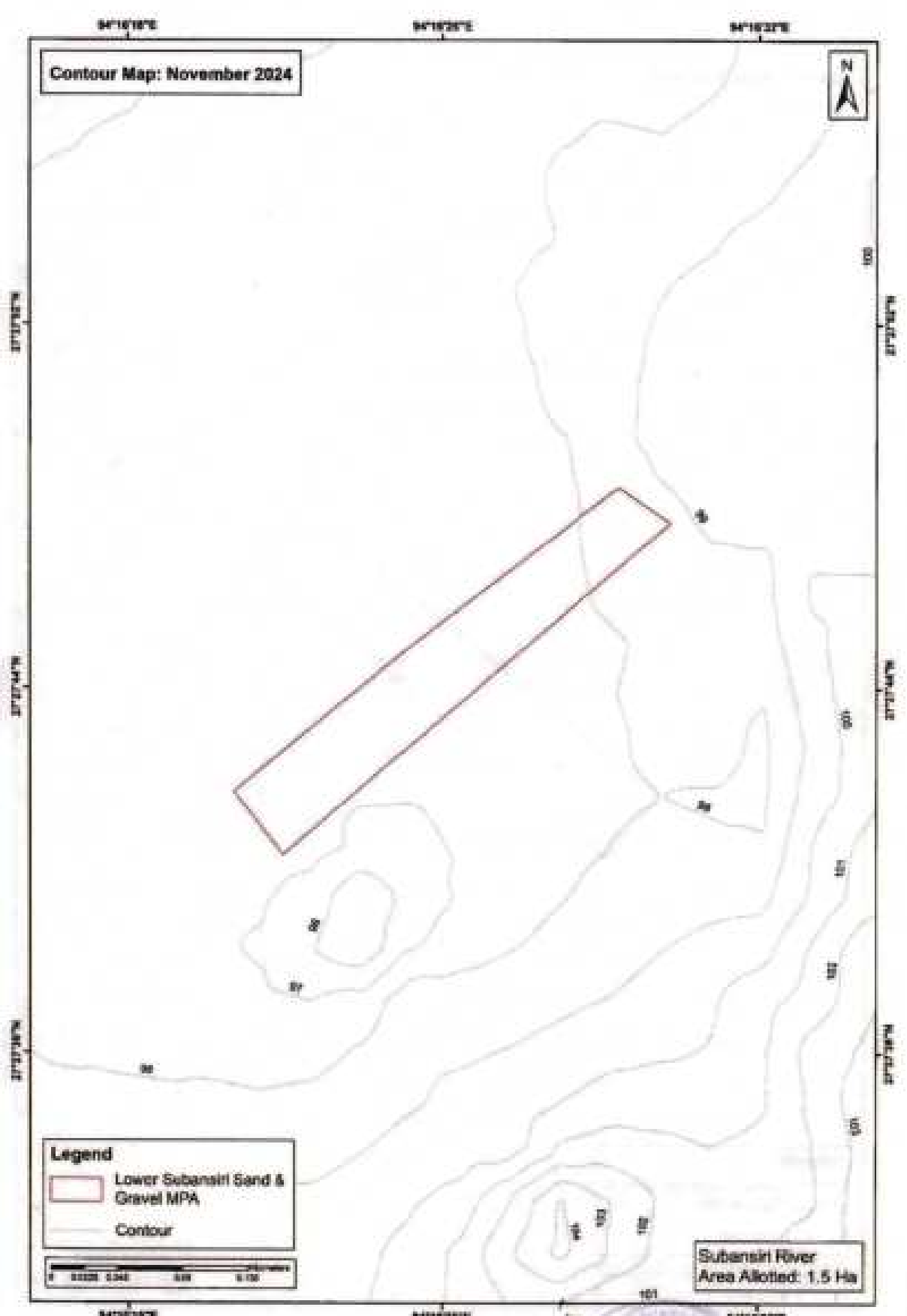


Subansiri River
Area Allotted: 1.5 Ha

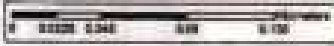
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024



Legend
Lower Subansiri Sand & Gravel MPA
Contour



Subansiri River
Area Allotted: 1.5 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: May 2024



5000m

5000m

5000m

5000m

Legend

-  Borrow Area-R
-  Contour



Subansiri River
Area Allotted: 4.95 Ha

5000m

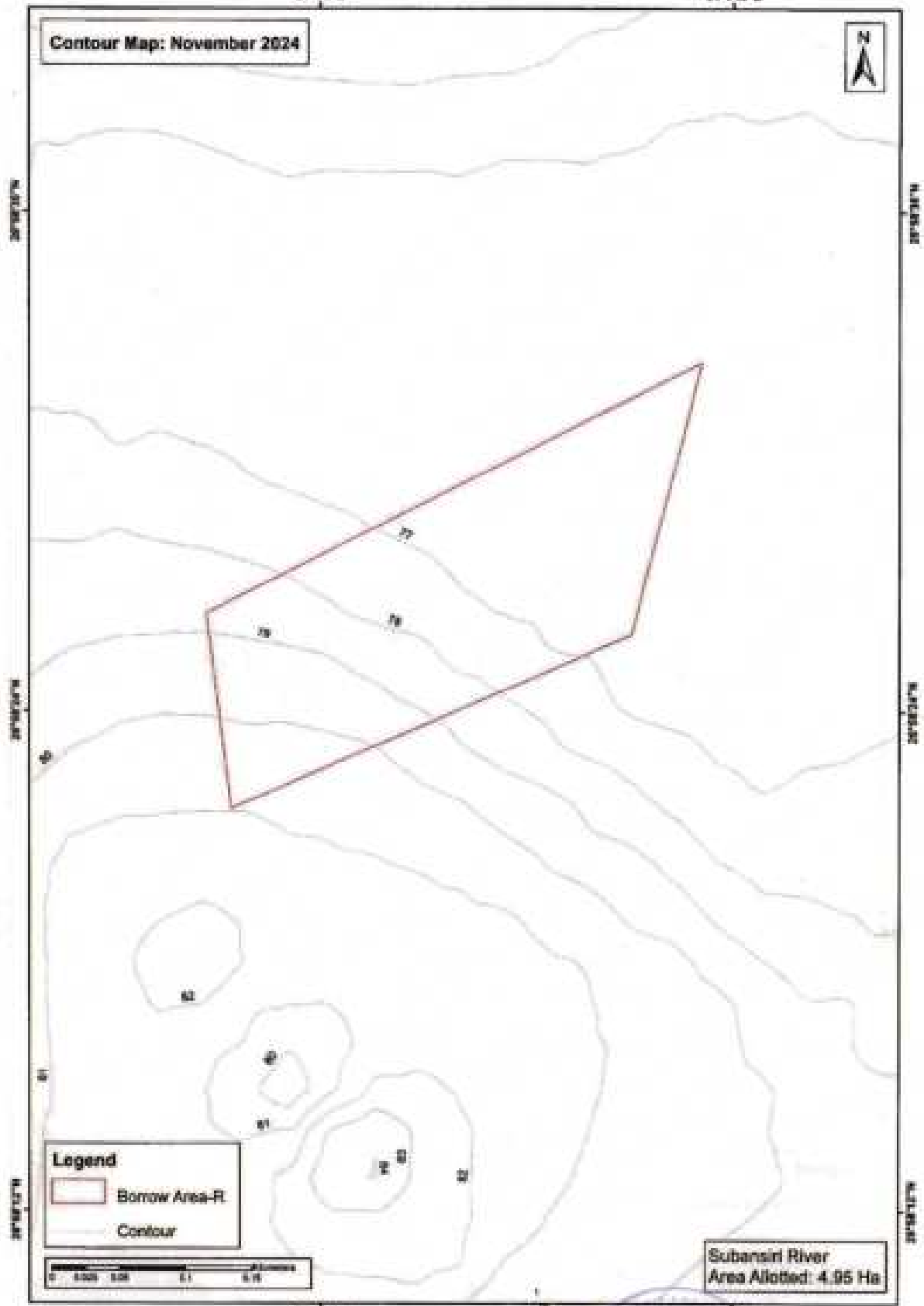
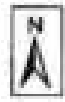
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2024

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024



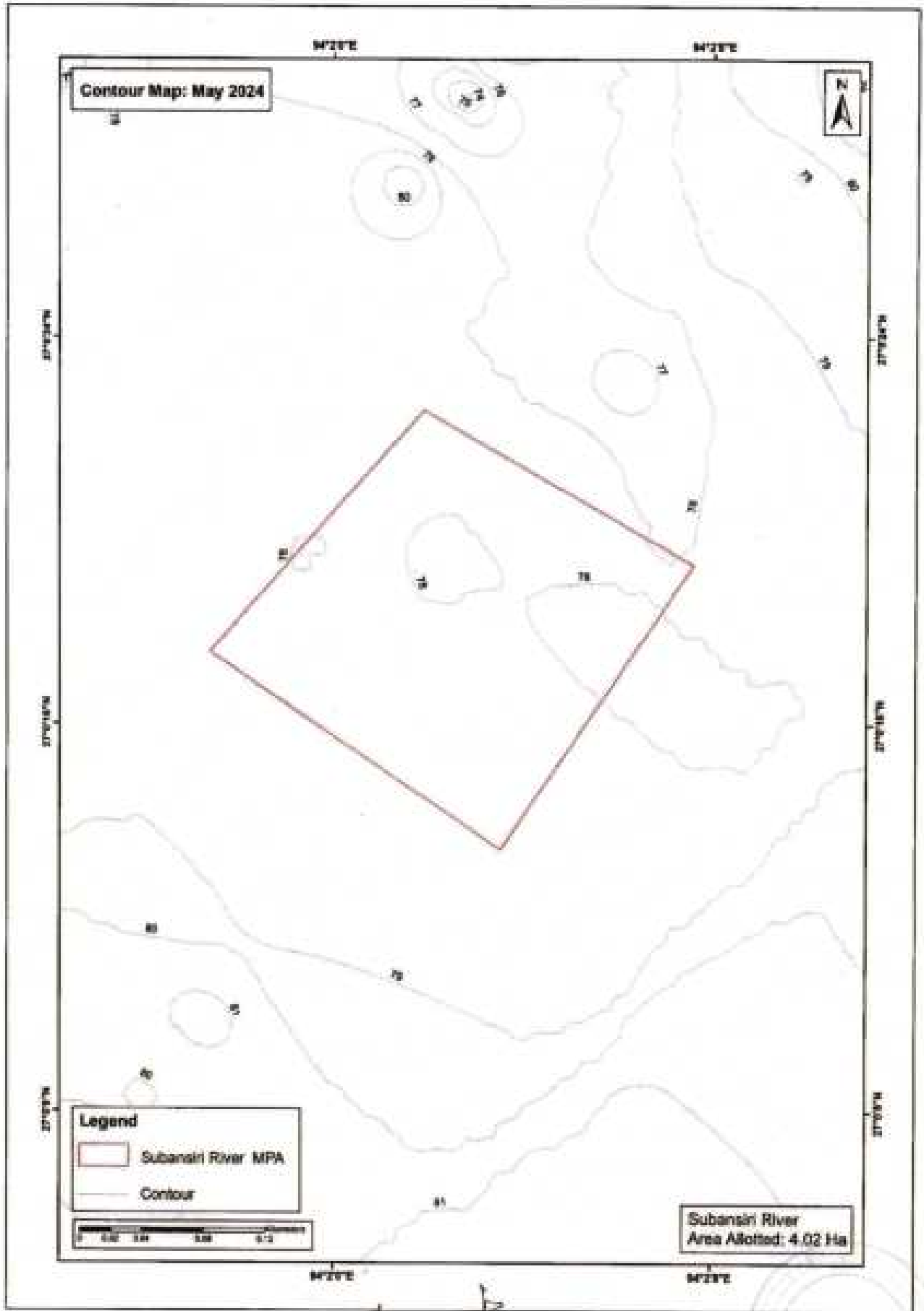
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Borrow Area-R
Contour



Subansiri River
Area Allotted: 4.95 Ha

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Lakhimpur Division
North Lakhimpur.

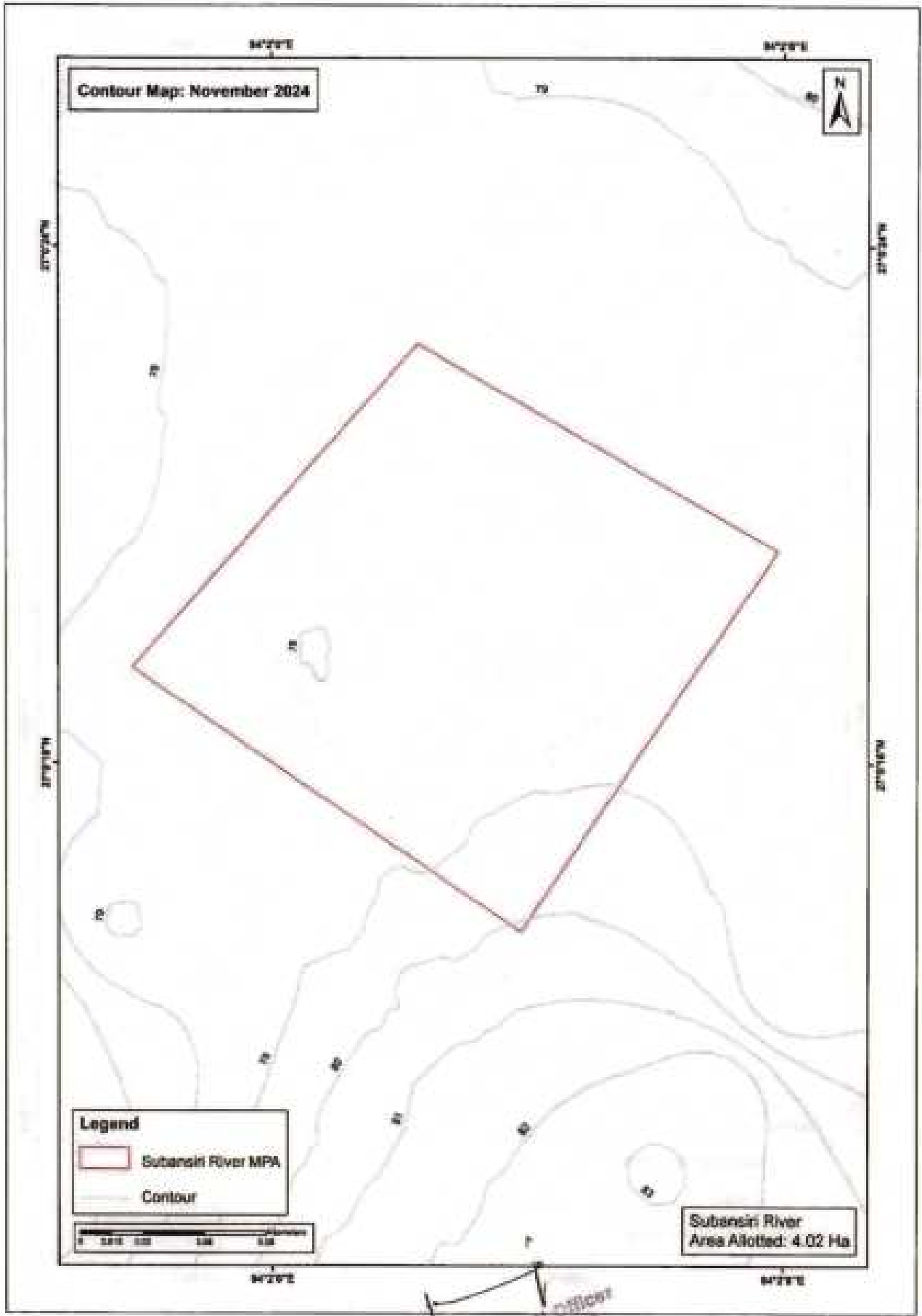




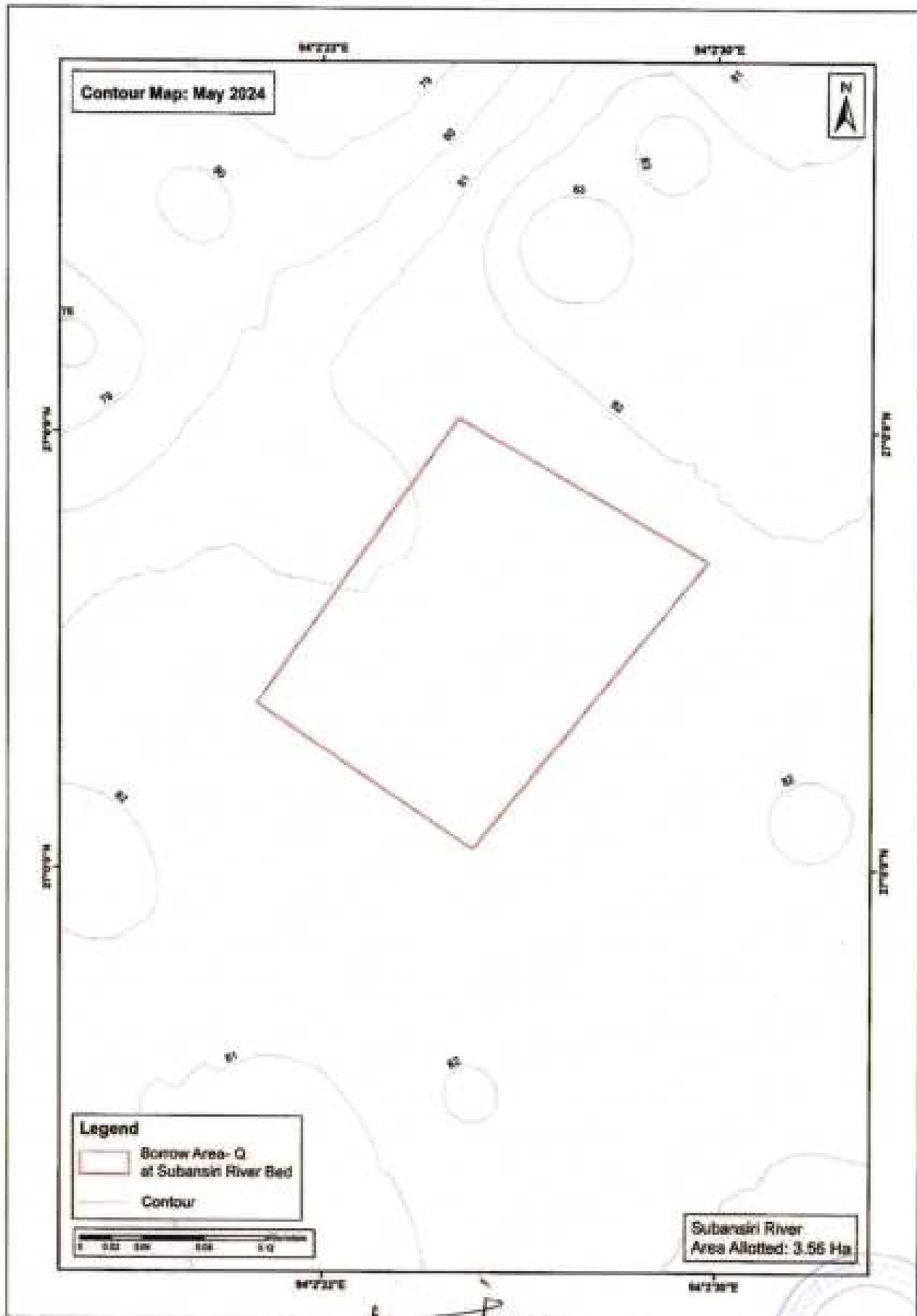
-37-

Divisional Forest Officer
Lakhimpur Division
Buxa Sanctuary



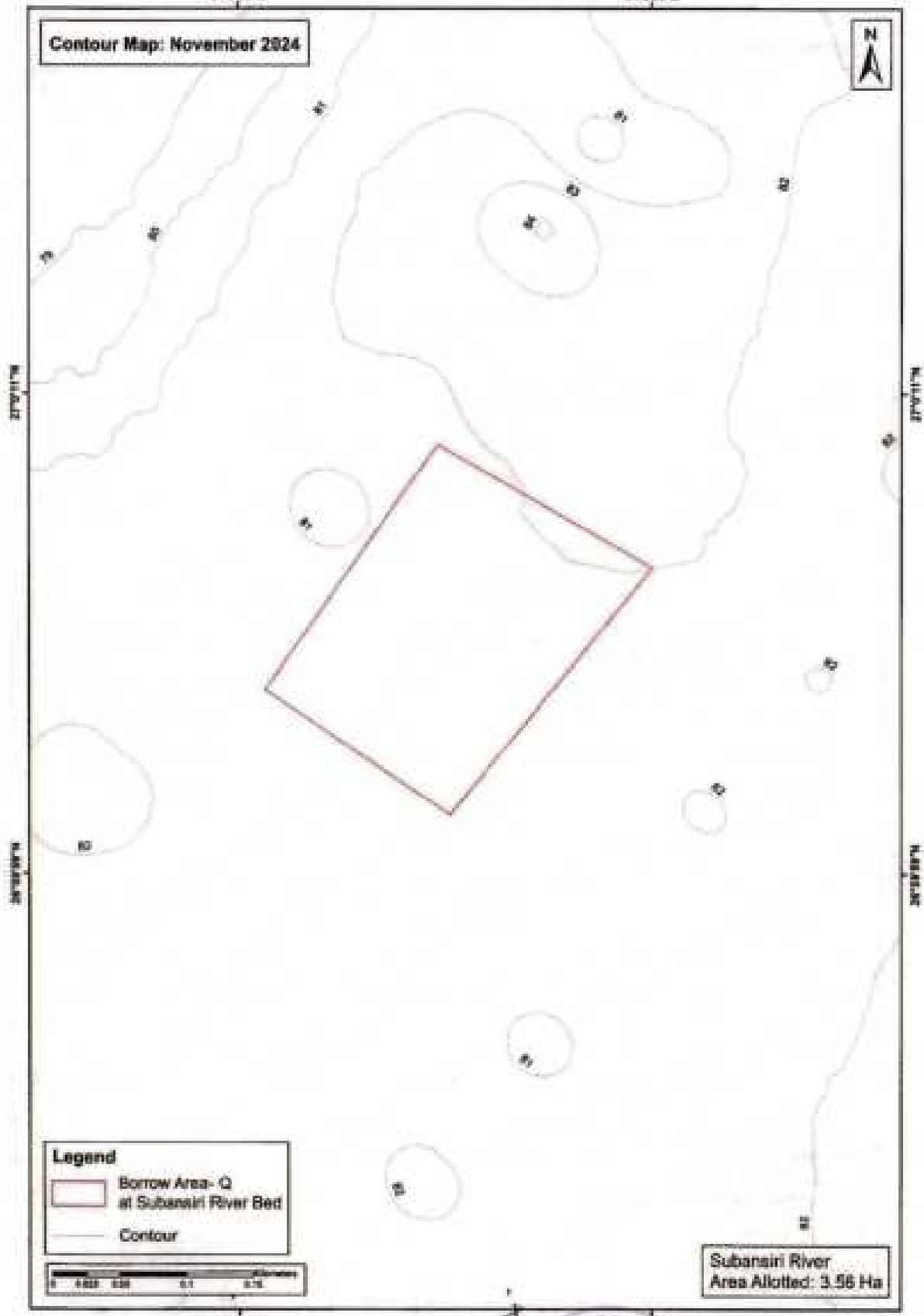


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Lakhimpur Division
North Lakhimpur.



Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

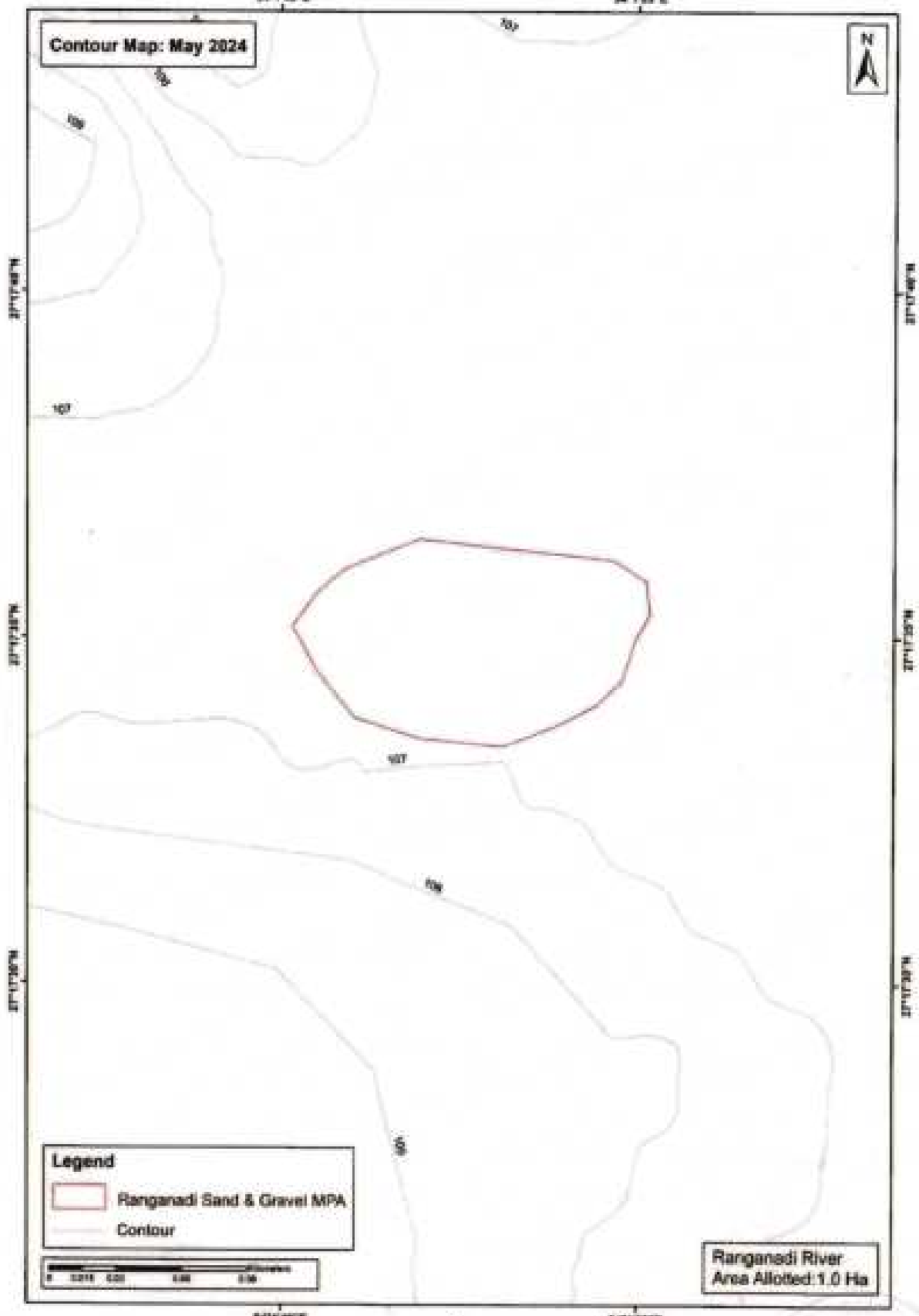
Contour Map: November 2024



Subansiri River
Area Allotted: 3.56 Ha

Divisional Forest Officer
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North Lakhimpur.

Contour Map: May 2024

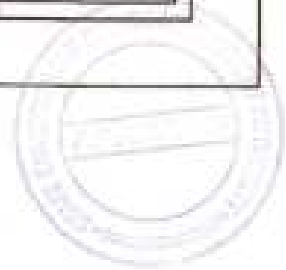


Legend
Ranganadi Sand & Gravel MPA
Contour

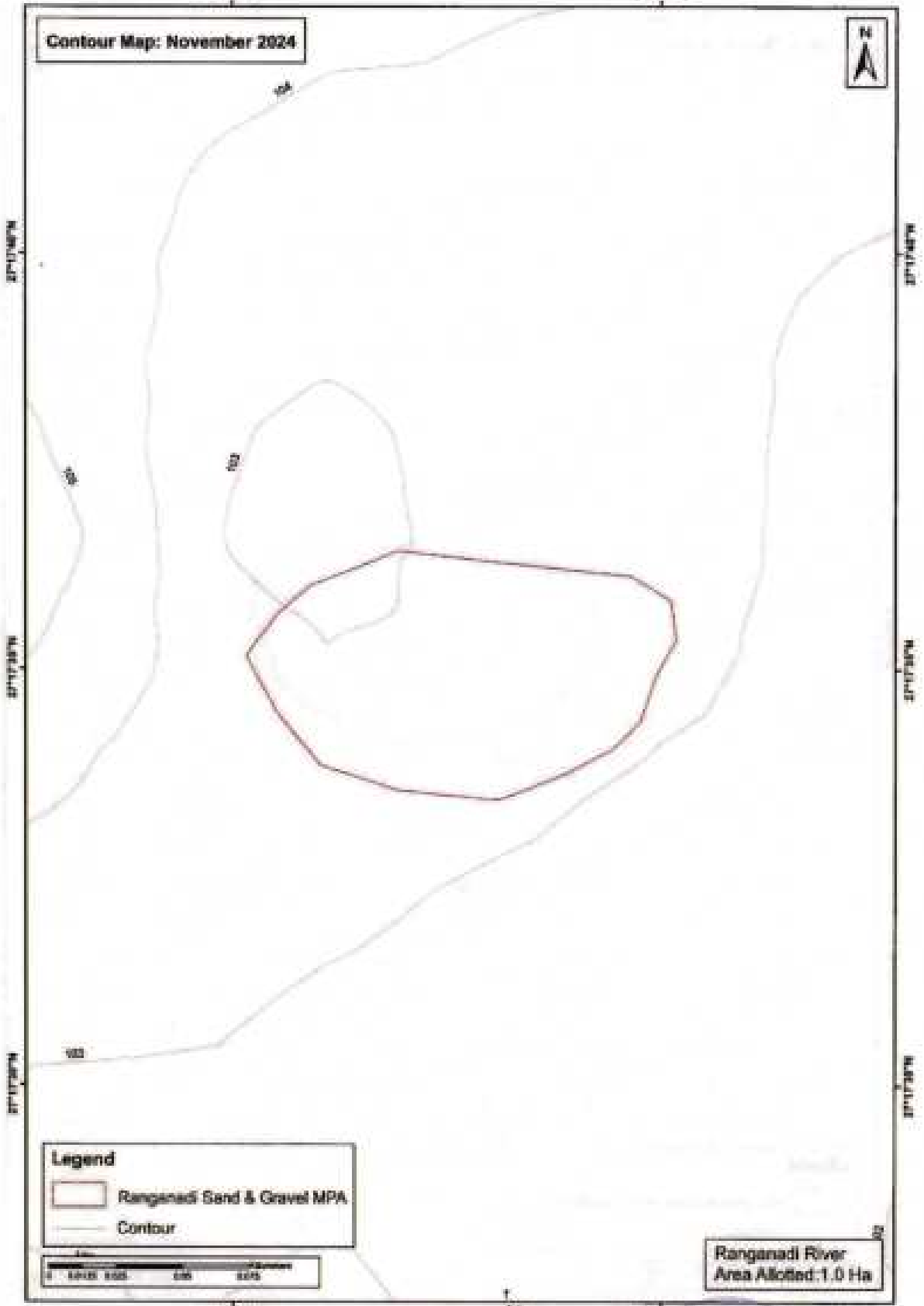


Ranganadi River
Area Allotted: 1.0 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024

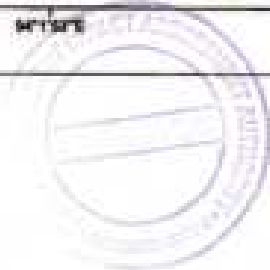


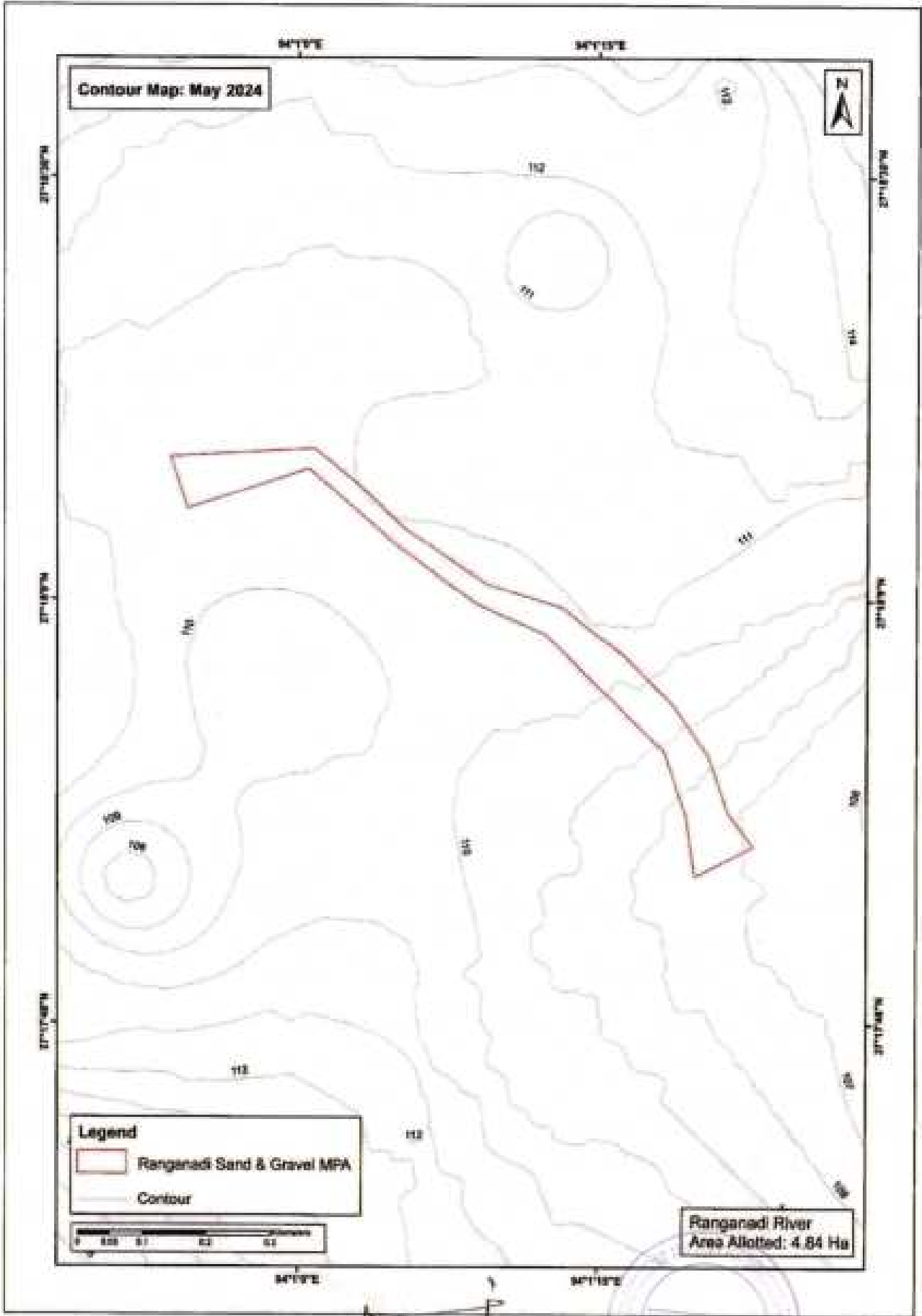
Legend
Ranganadi Sand & Gravel MPA
Contour



Ranganadi River
Area Allotted: 1.0 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Contour Map: May 2024

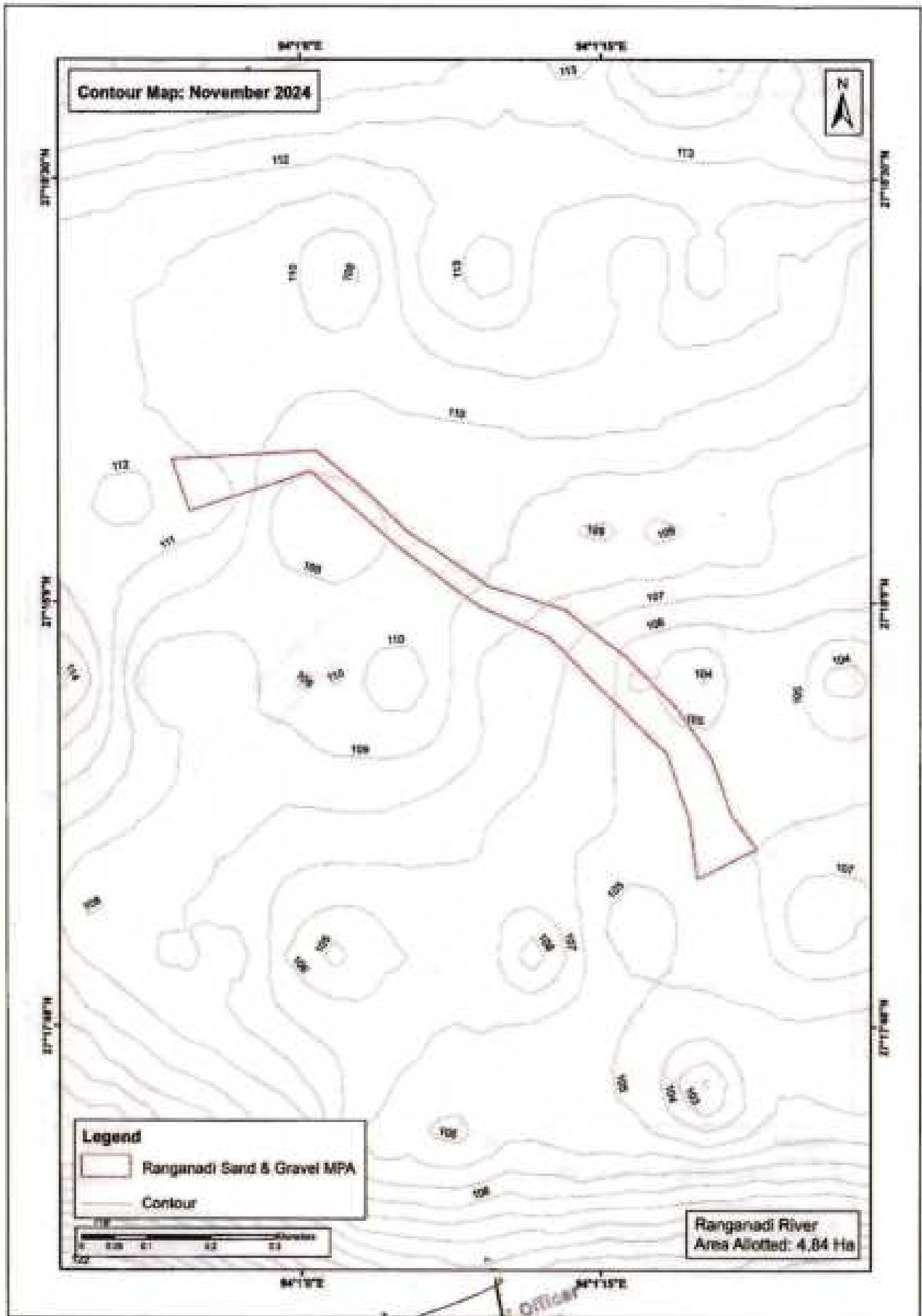
Legend
Ranganadi Sand & Gravel MPA
Contour



Ranganadi River
Area Allotted: 4.84 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Contour Map: November 2024



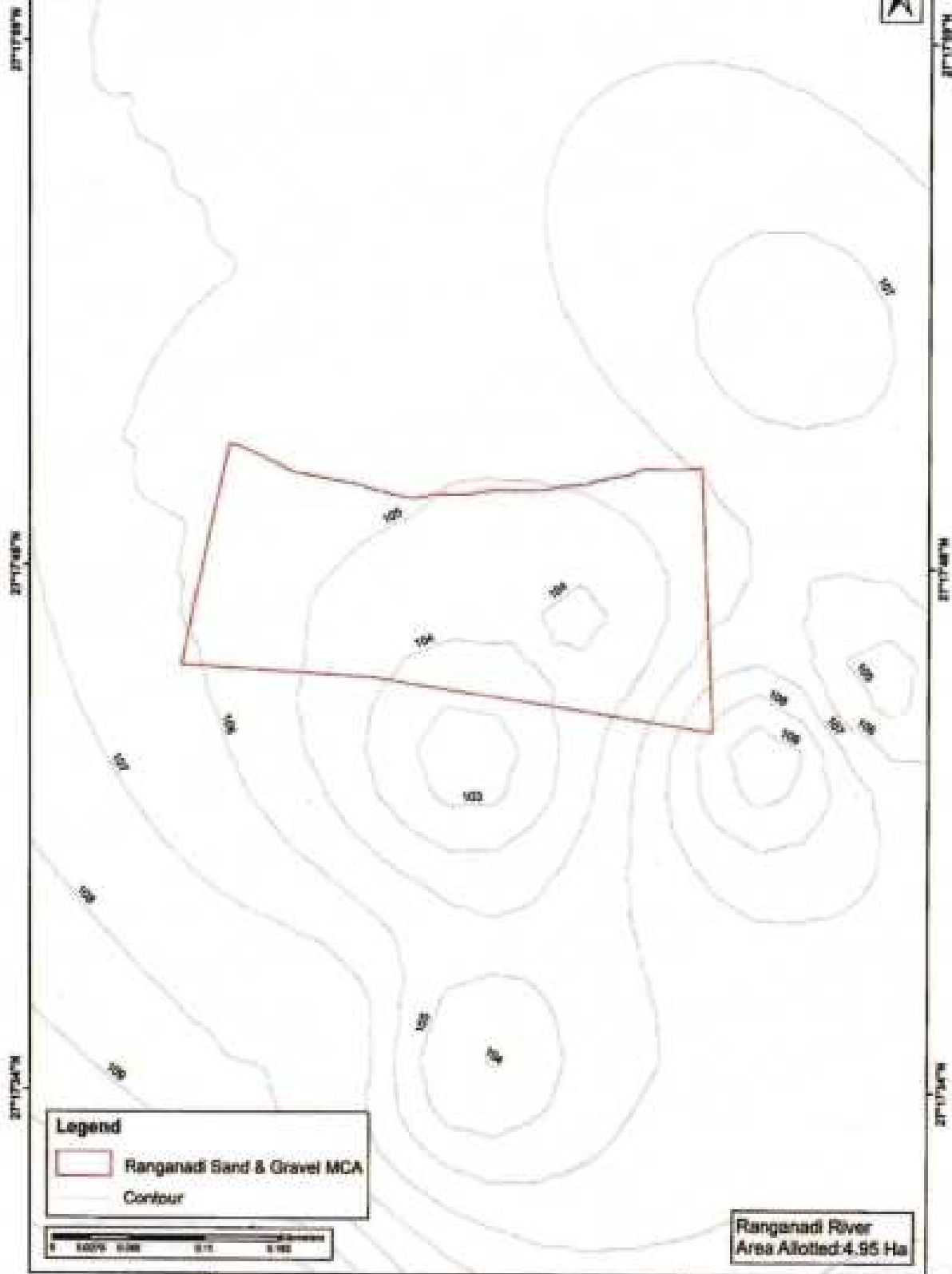
Legend
 [Pink shaded area] Ranganadi Sand & Gravel MPA
 [Line] Contour



Ranganadi River
 Area Allotted: 4.04 Ha

Divisional Forest Officer
 Lakhimpur Division
 North Lakhimpur.

Contour Map: May 2024



Legend

-  Ranganadi Sand & Gravel MCA
-  Contour

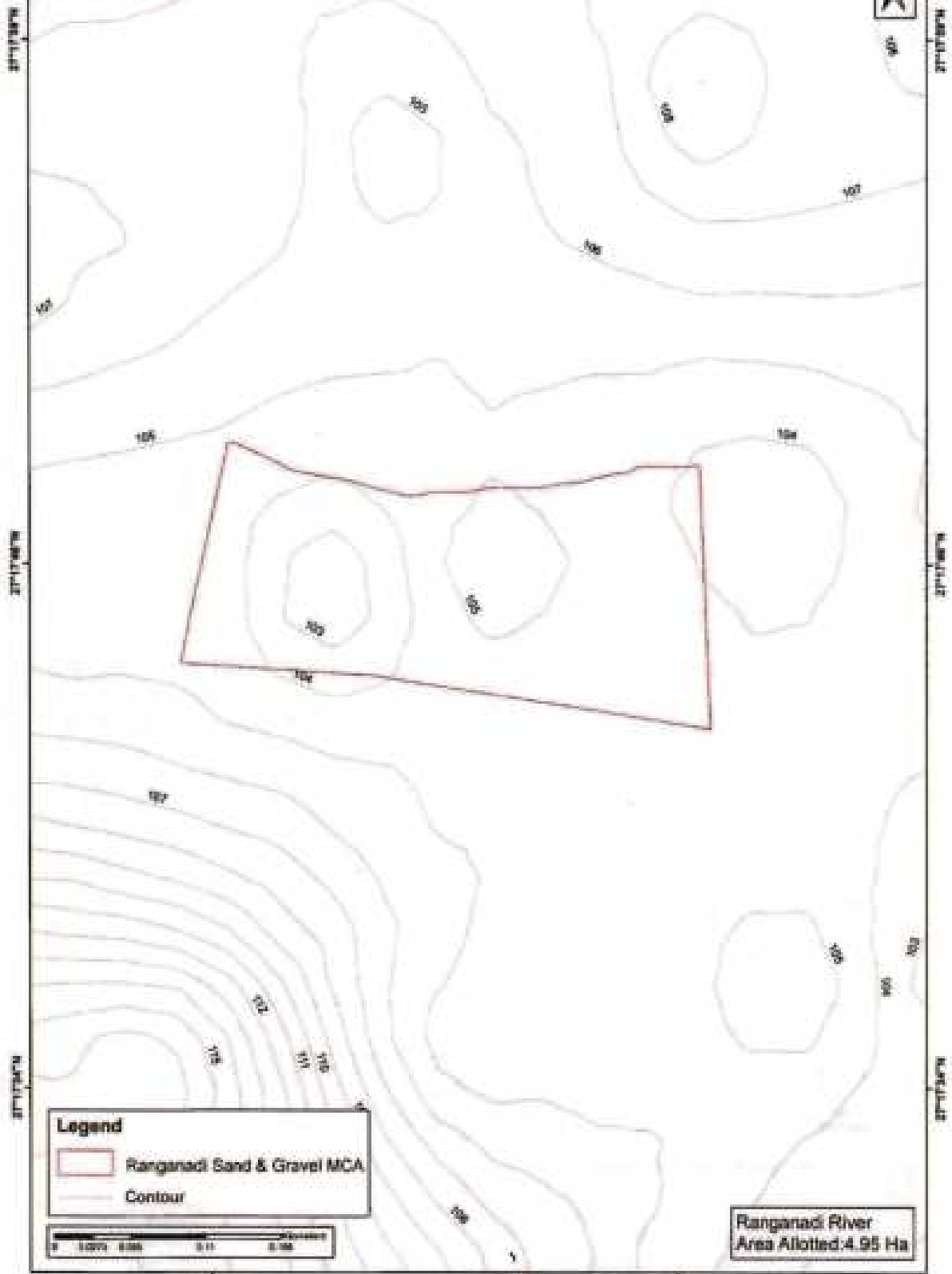


Ranganadi River
Area Allotted 4.95 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024



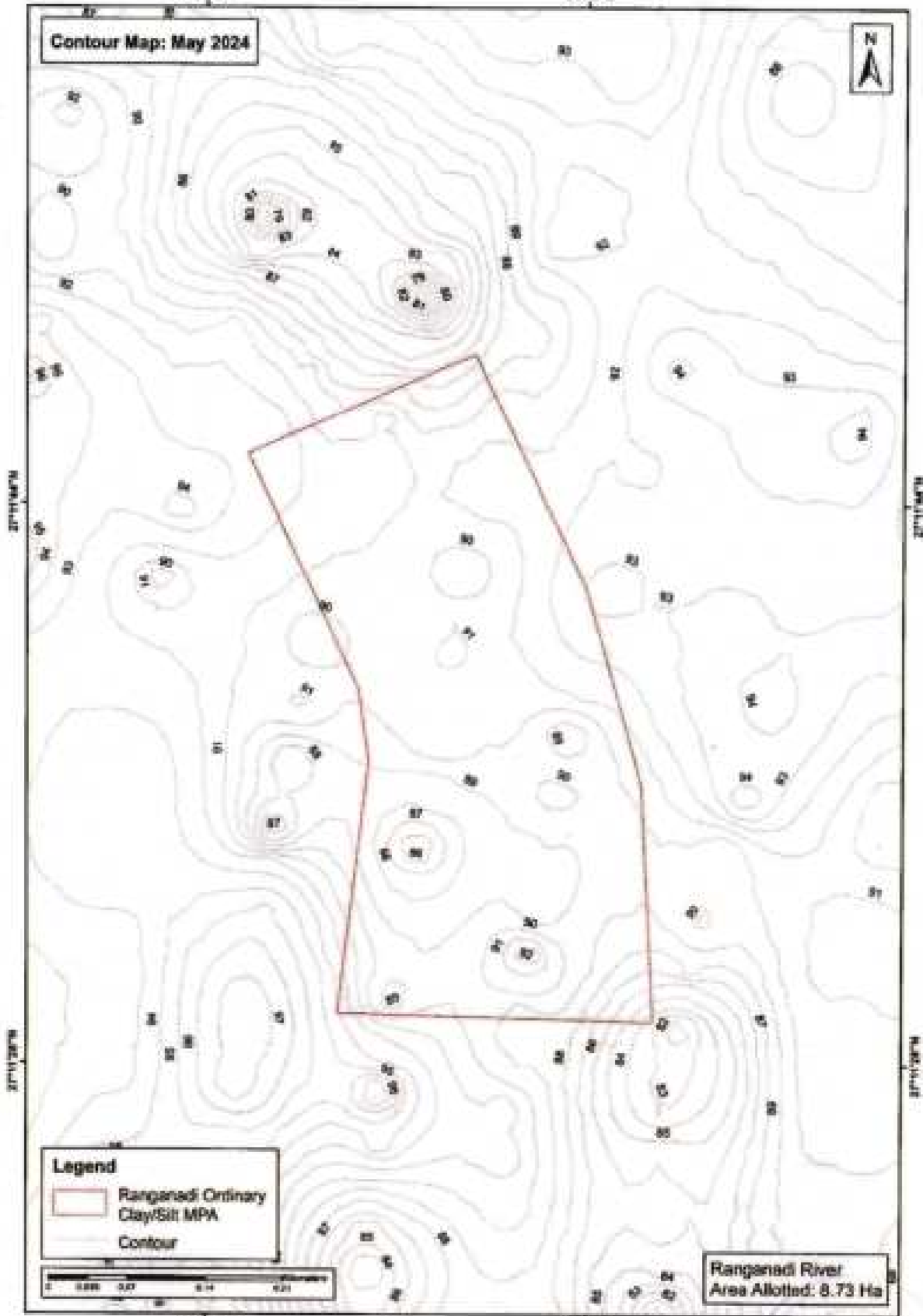
Legend
Ranganadi Sand & Gravel MCA
Contour



Ranganadi River
Area Allotted: 4.95 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

Contour Map: May 2024

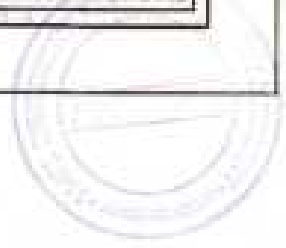


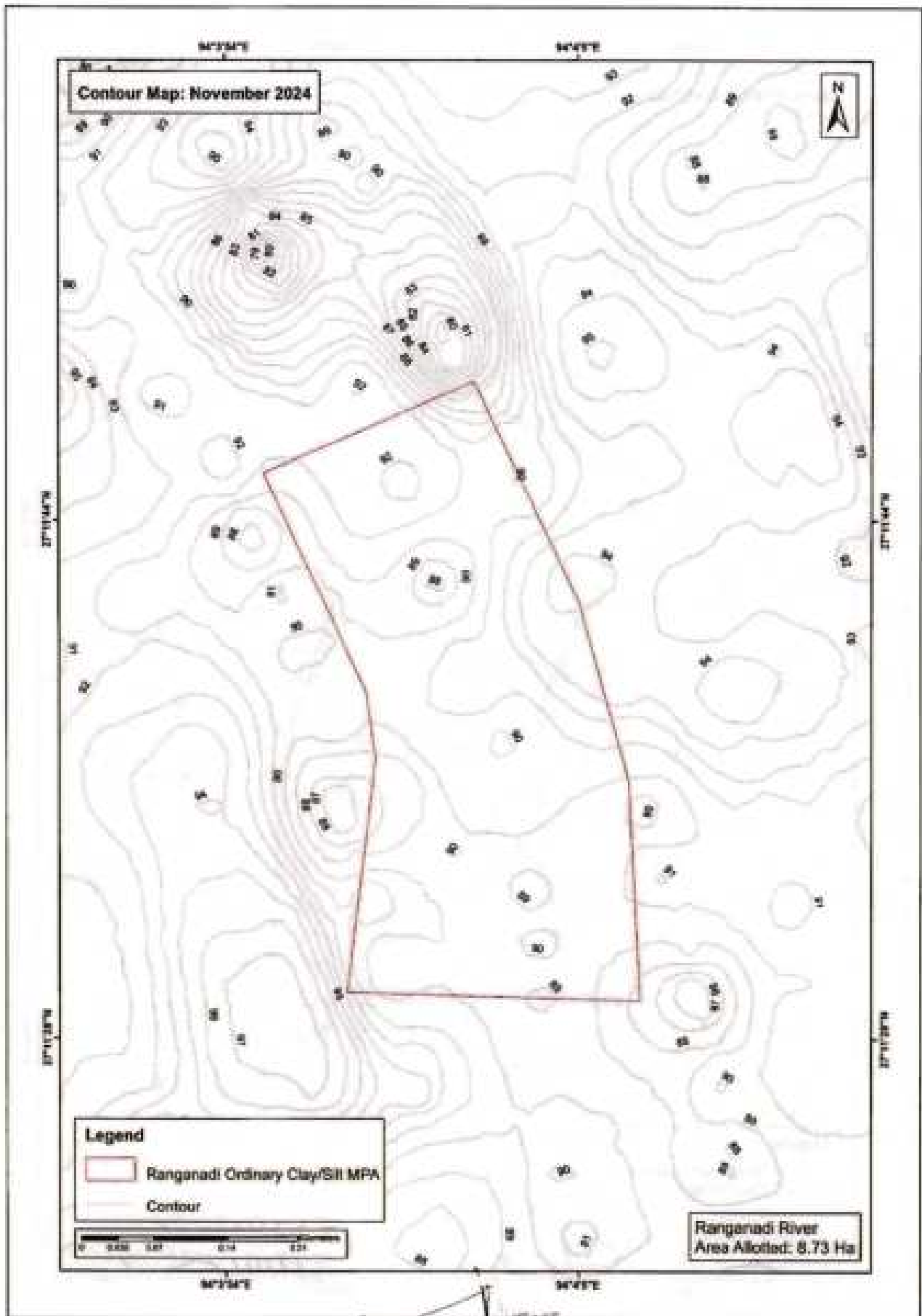
Ranganadi River
Area Allotted: 8.73 Ha

Legend
Ranganadi Ordinary
Clay/Silt MPA
Contour



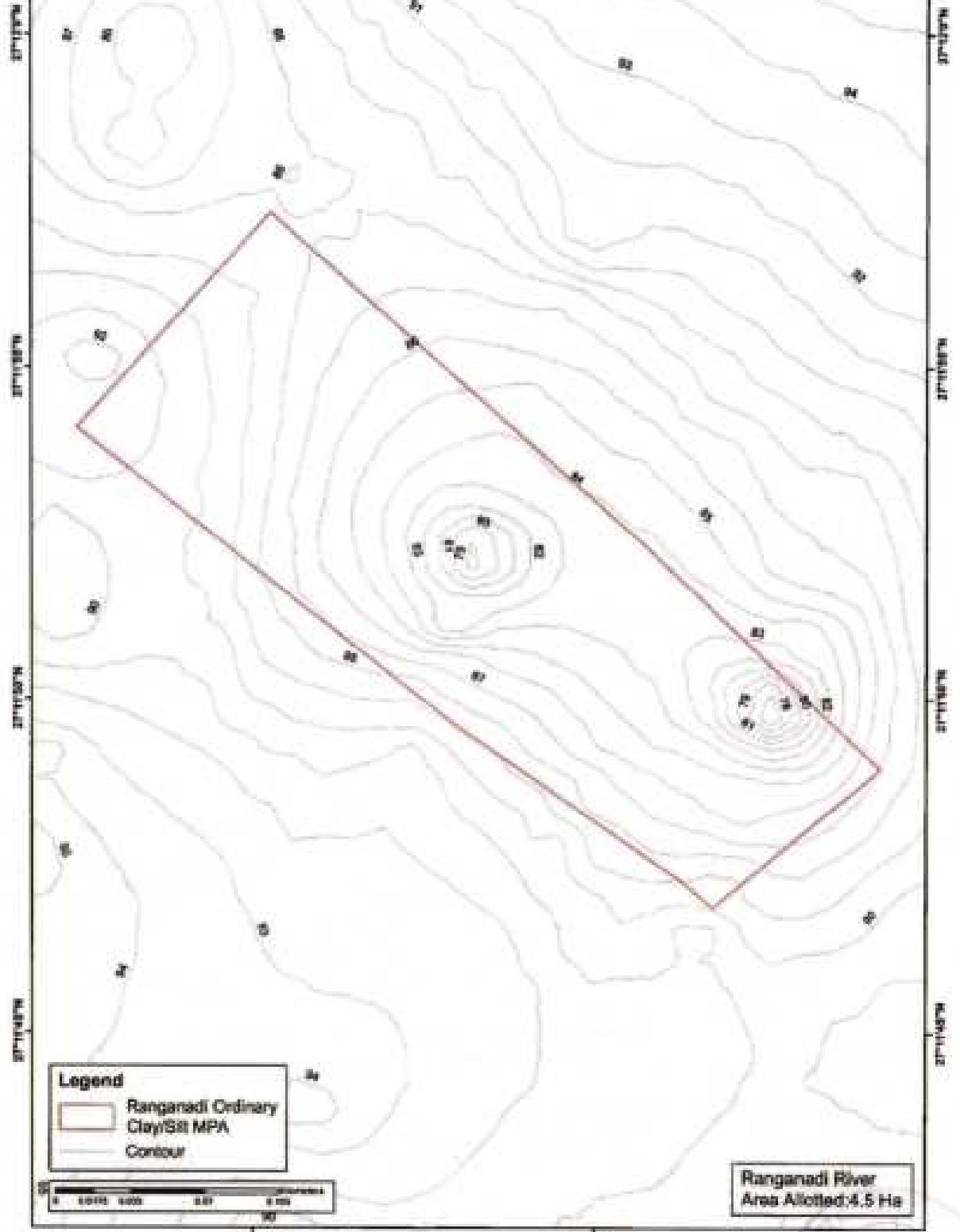
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

Contour Map: May 2024



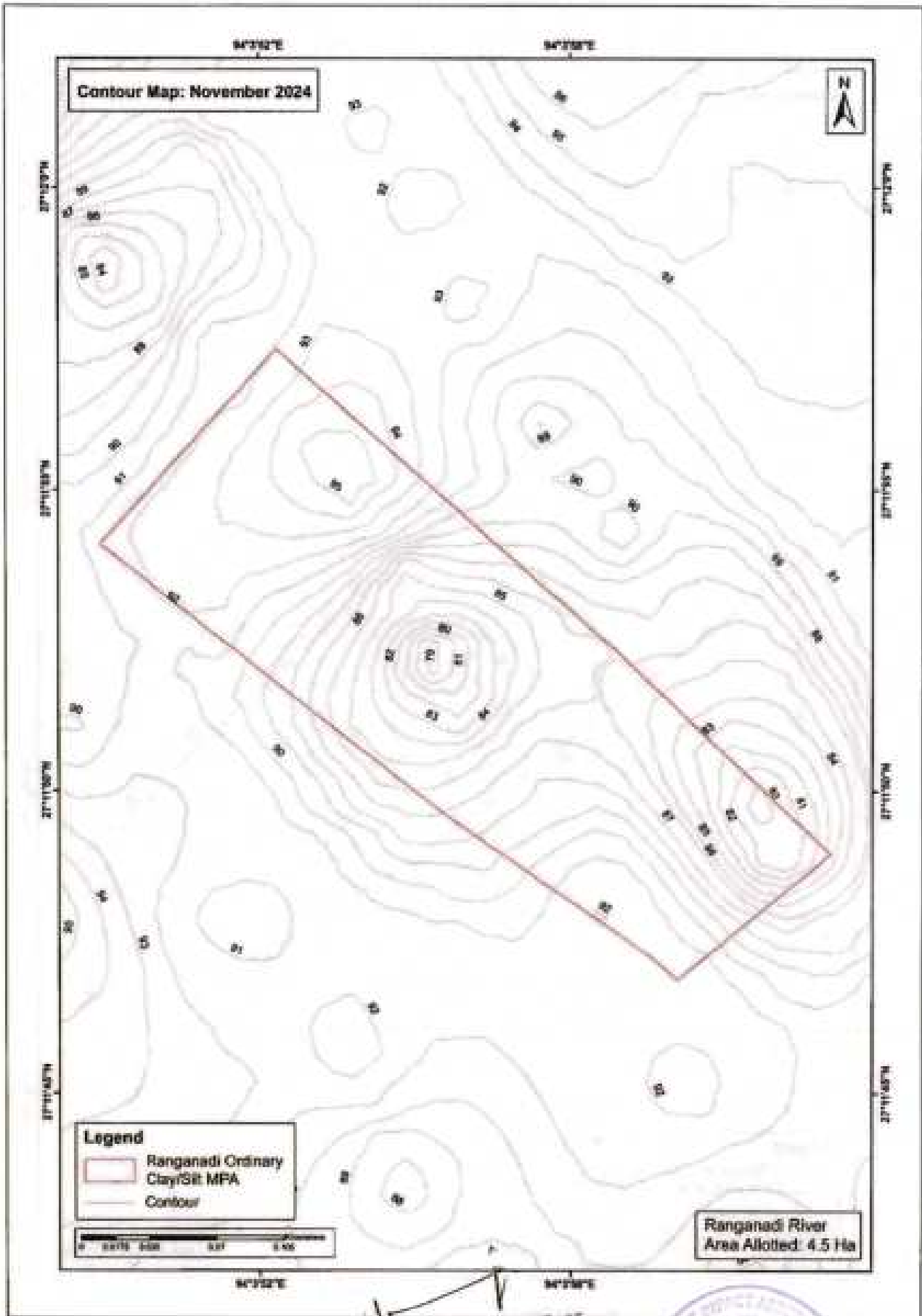
Legend
Ranganadi Ordinary Clay/Silt MPA
Contour



Ranganadi River Area Allotted: 4.5 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur

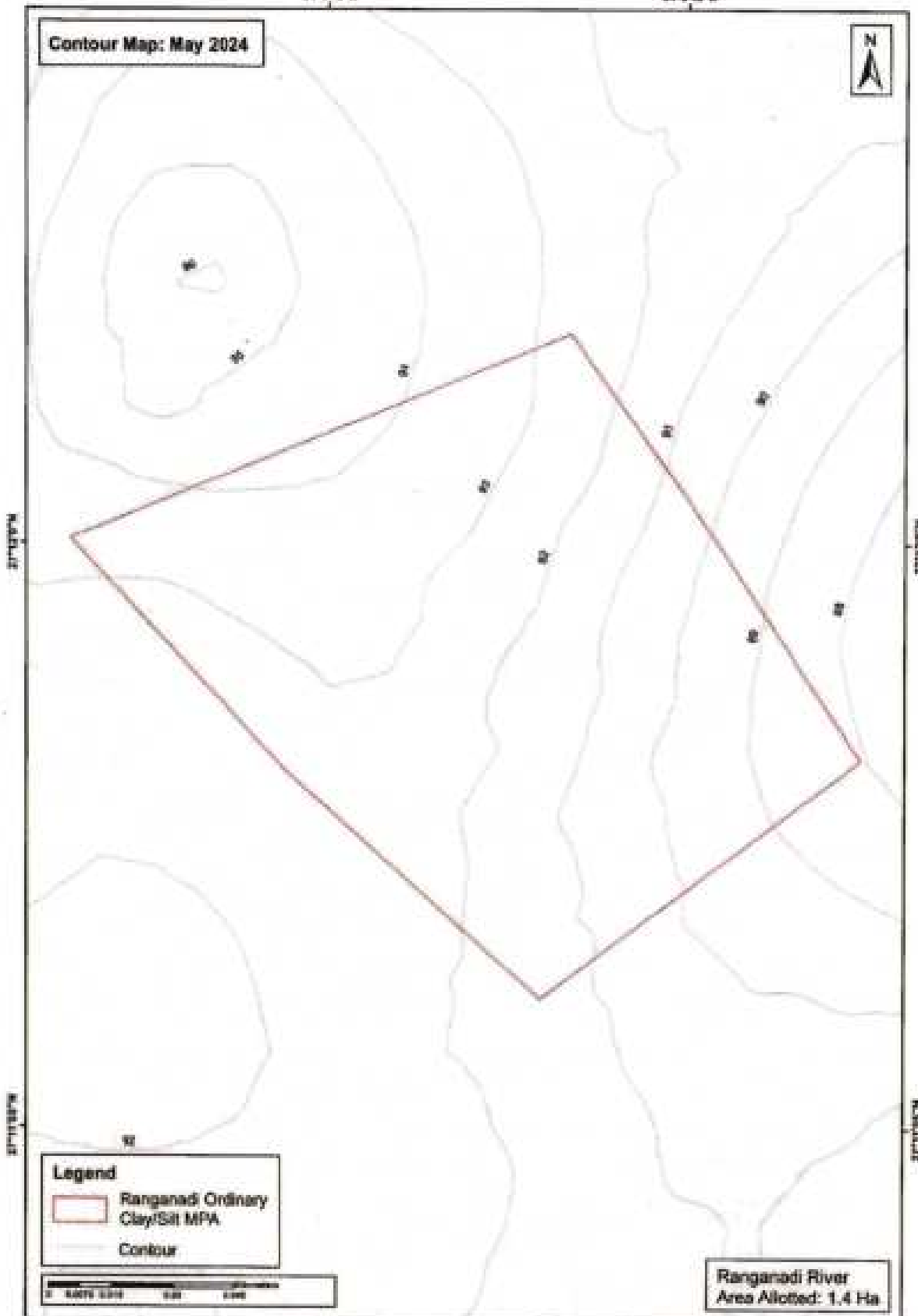




Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: May 2024



Legend
Ranganadi Ordinary Clay/Silt MPA
Contour

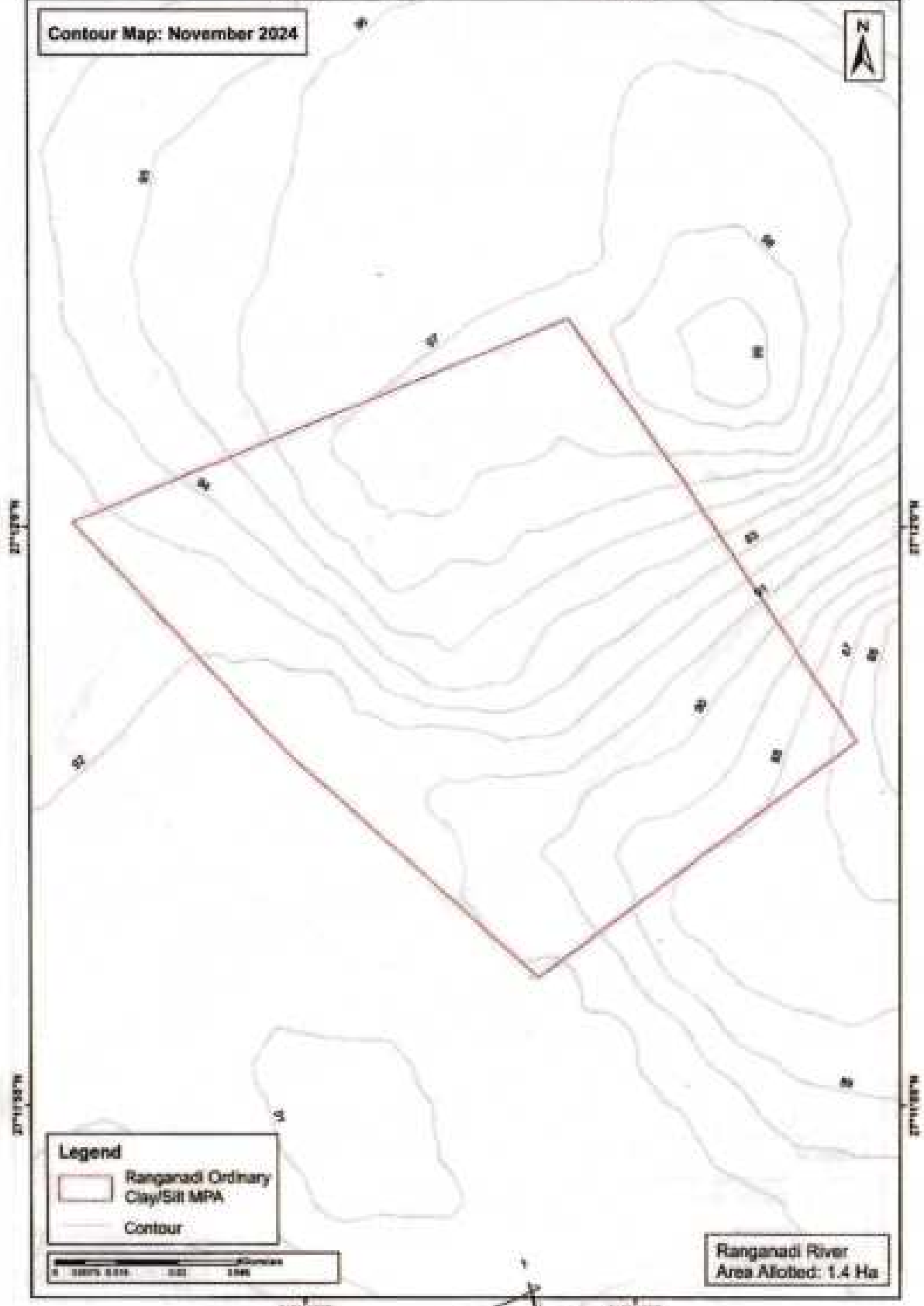


Ranganadi River Area Allotted: 1.4 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024



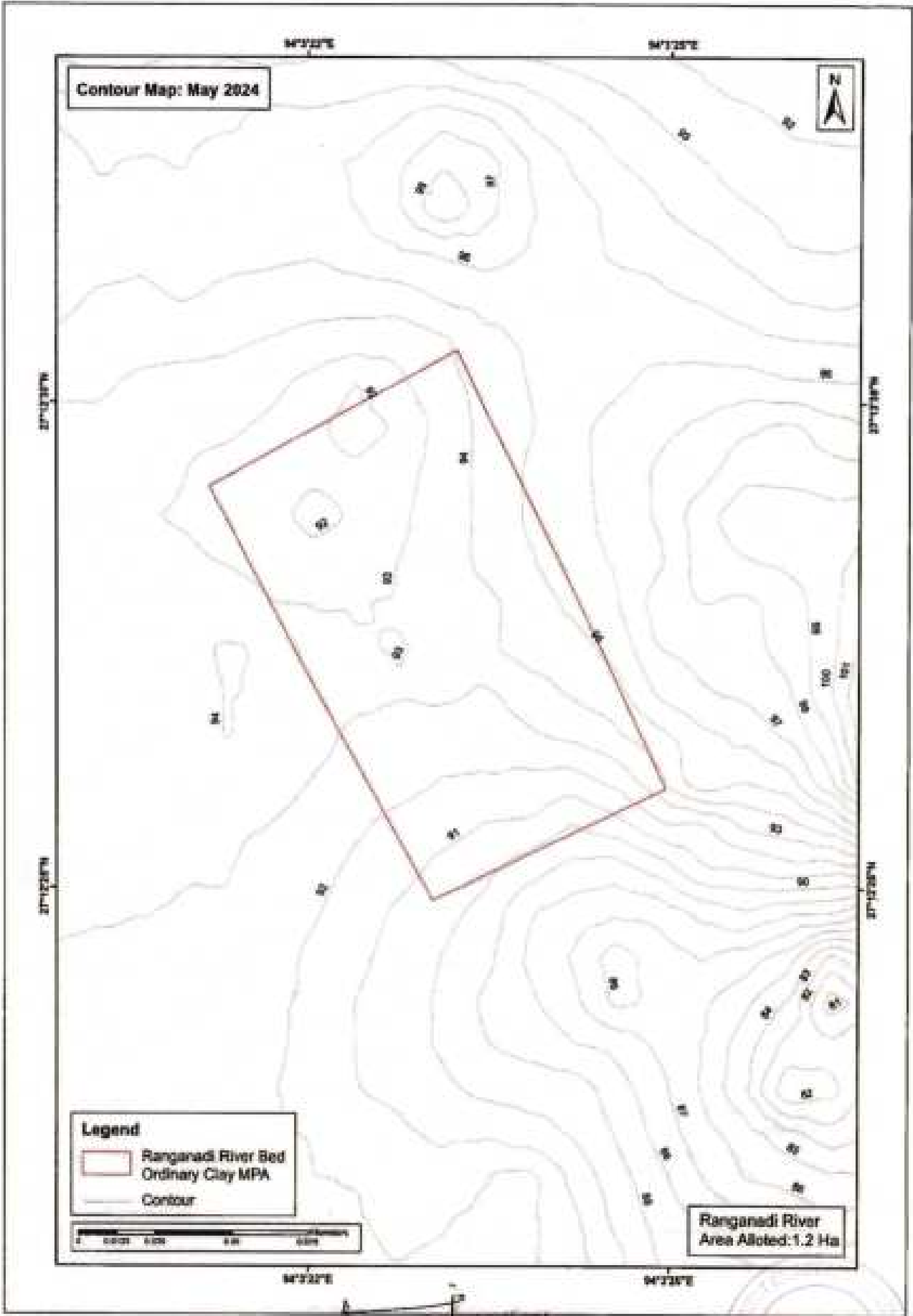
Legend

-  Ranganadi Ordinary Clay/Silt MPA
-  Contour



Ranganadi River
Area Alloted: 1.4 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: May 2024



Legend

- Ranganadi River Bed Ordinary Clay MPA
- Contour

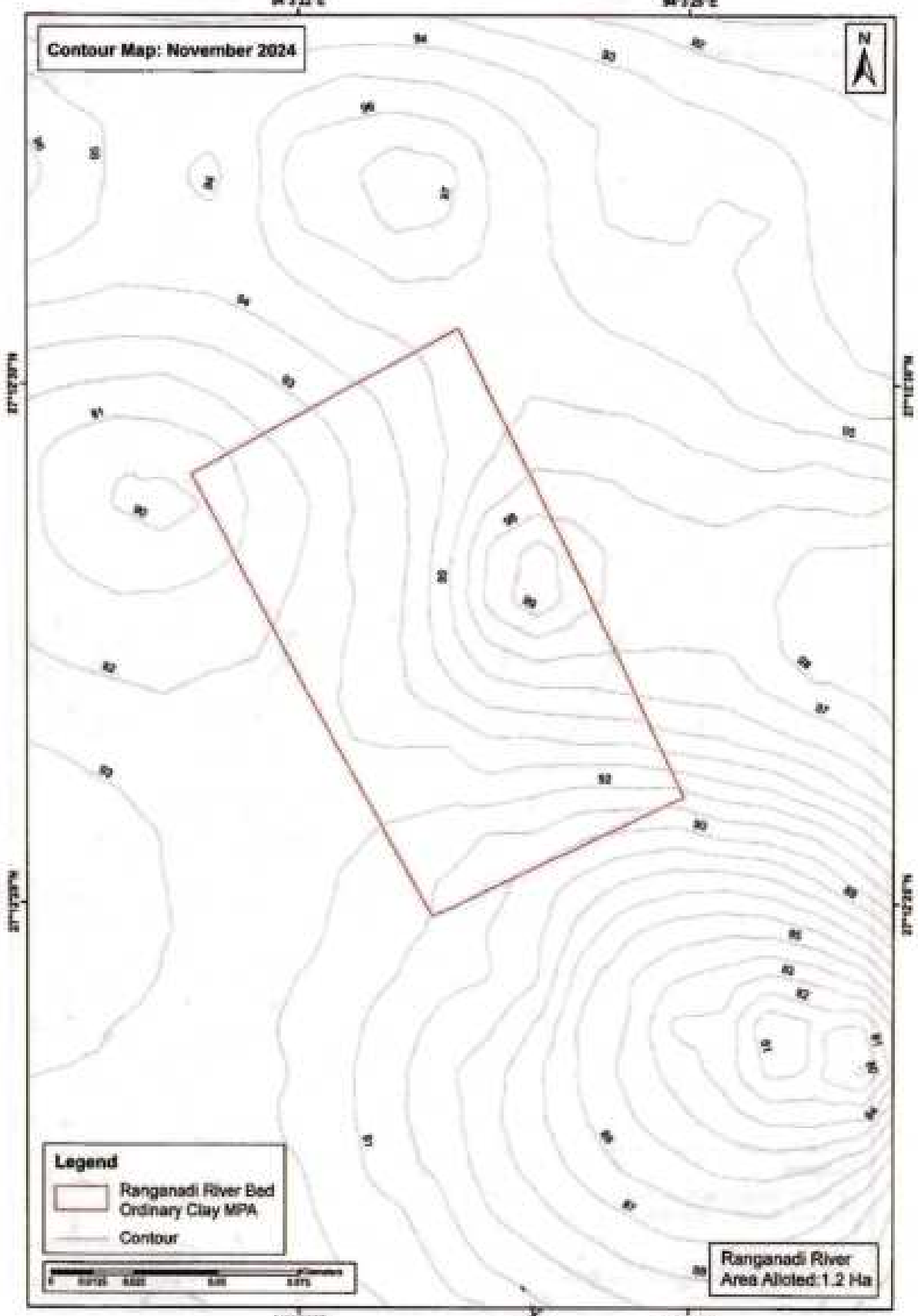


Ranganadi River Area Alloted: 1.2 Ha



Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024



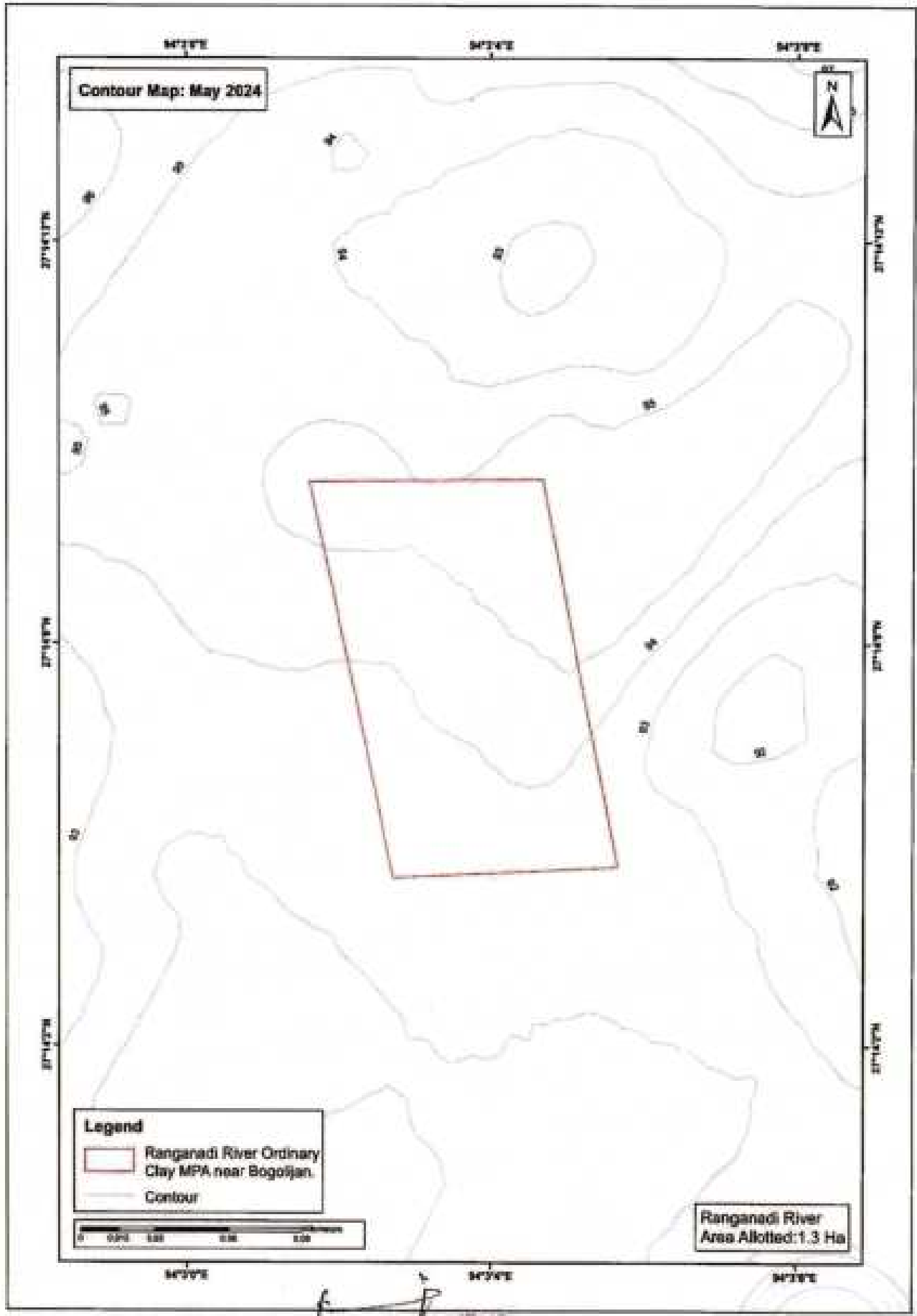
Legend

-  Ranganadi River Bed Ordinary Clay MPA
-  Contour



Ranganadi River
Area Alloted: 1.2 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



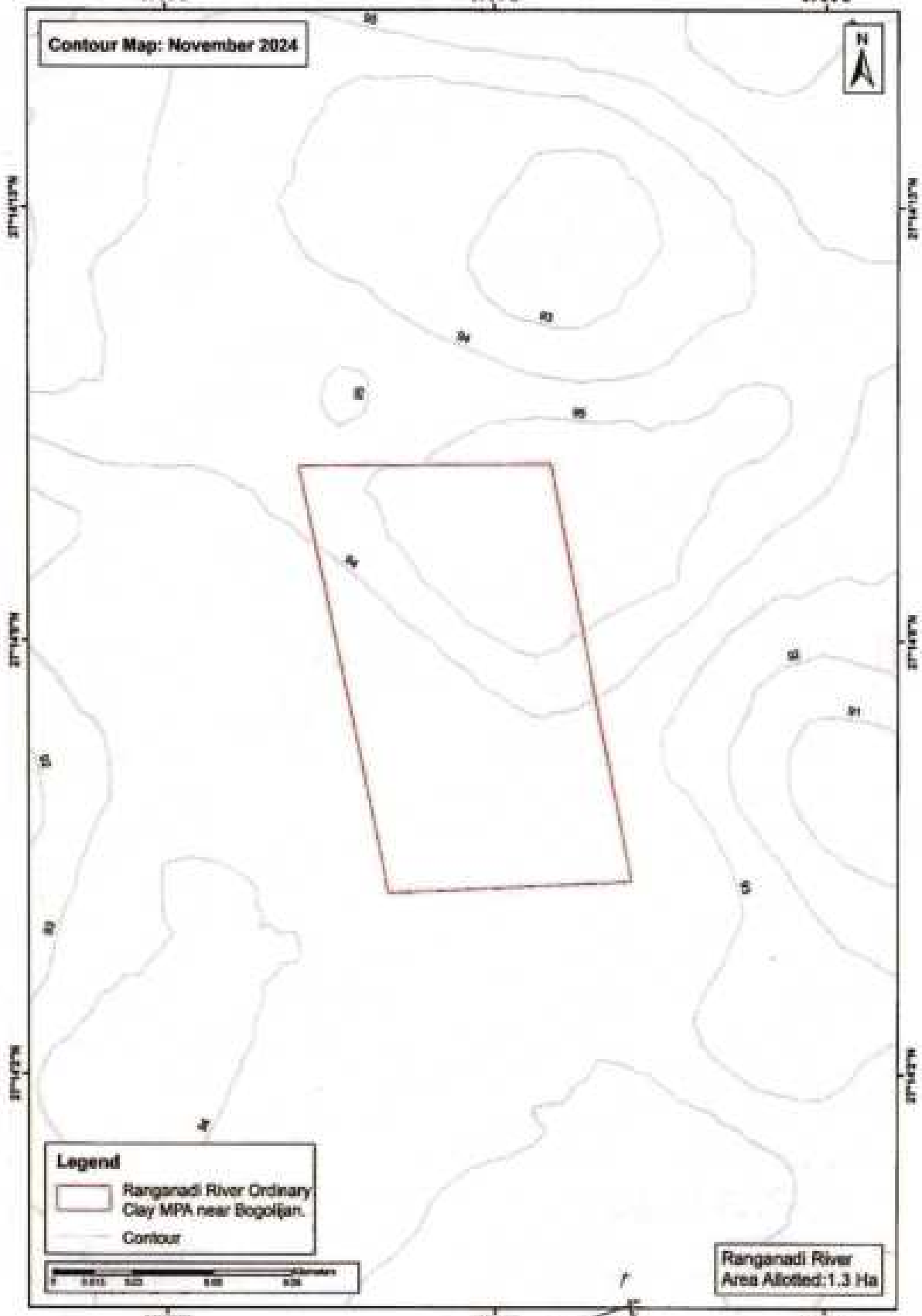
Legend
Ranganadi River Ordinary Clay MPA near Bogoljan.
Contour

Ranganadi River Area Allotted: 1.3 Ha



Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024



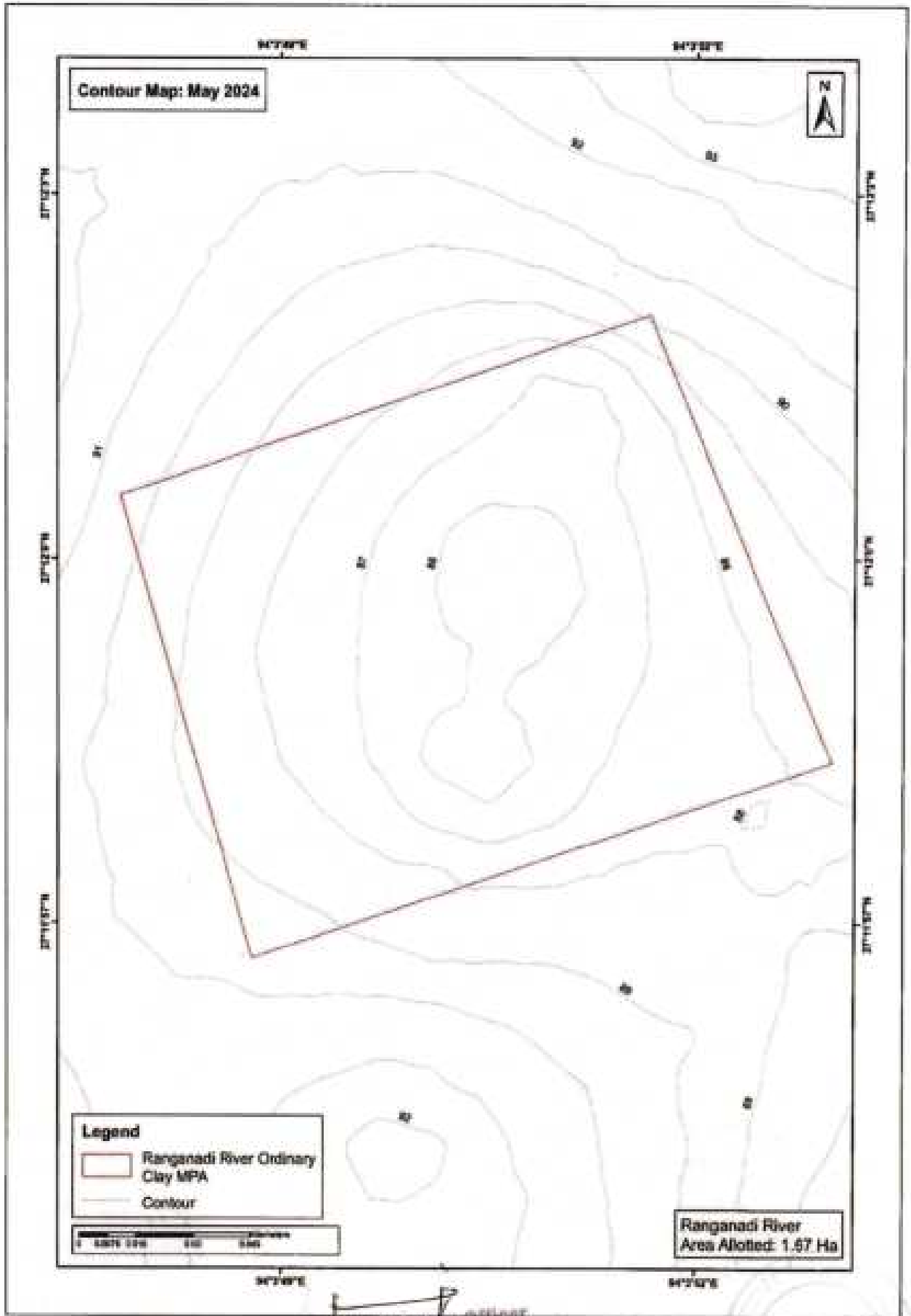
Legend

-  Ranganadi River Ordinary Clay MPA near Bogoljan.
-  Contour



Ranganadi River
Area Allotted: 1.3 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: May 2024



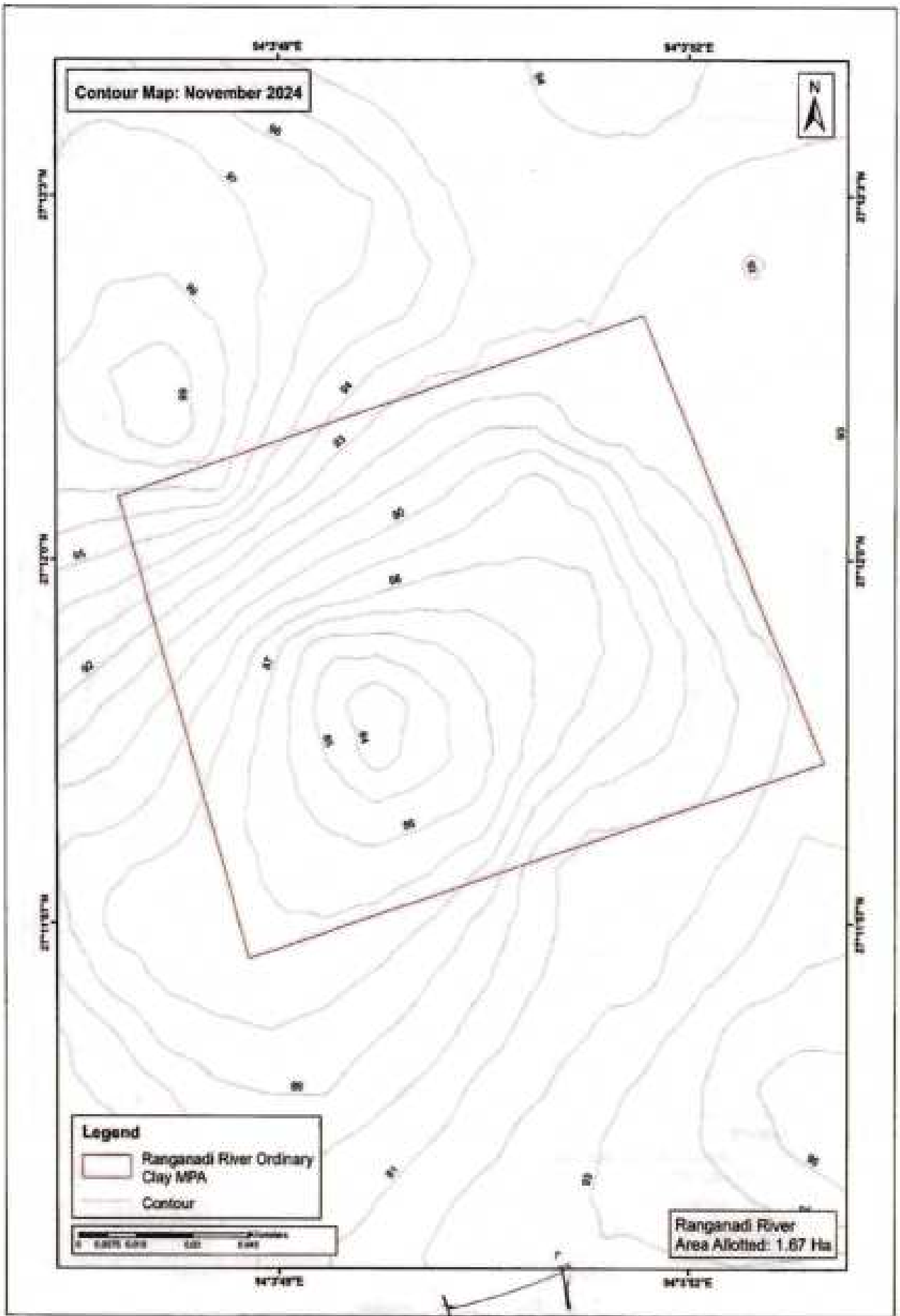
Legend
Ranganadi River Ordinary Clay MPA
Contour



Ranganadi River Area Allotted: 1.57 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.







Contour Map: November 2024



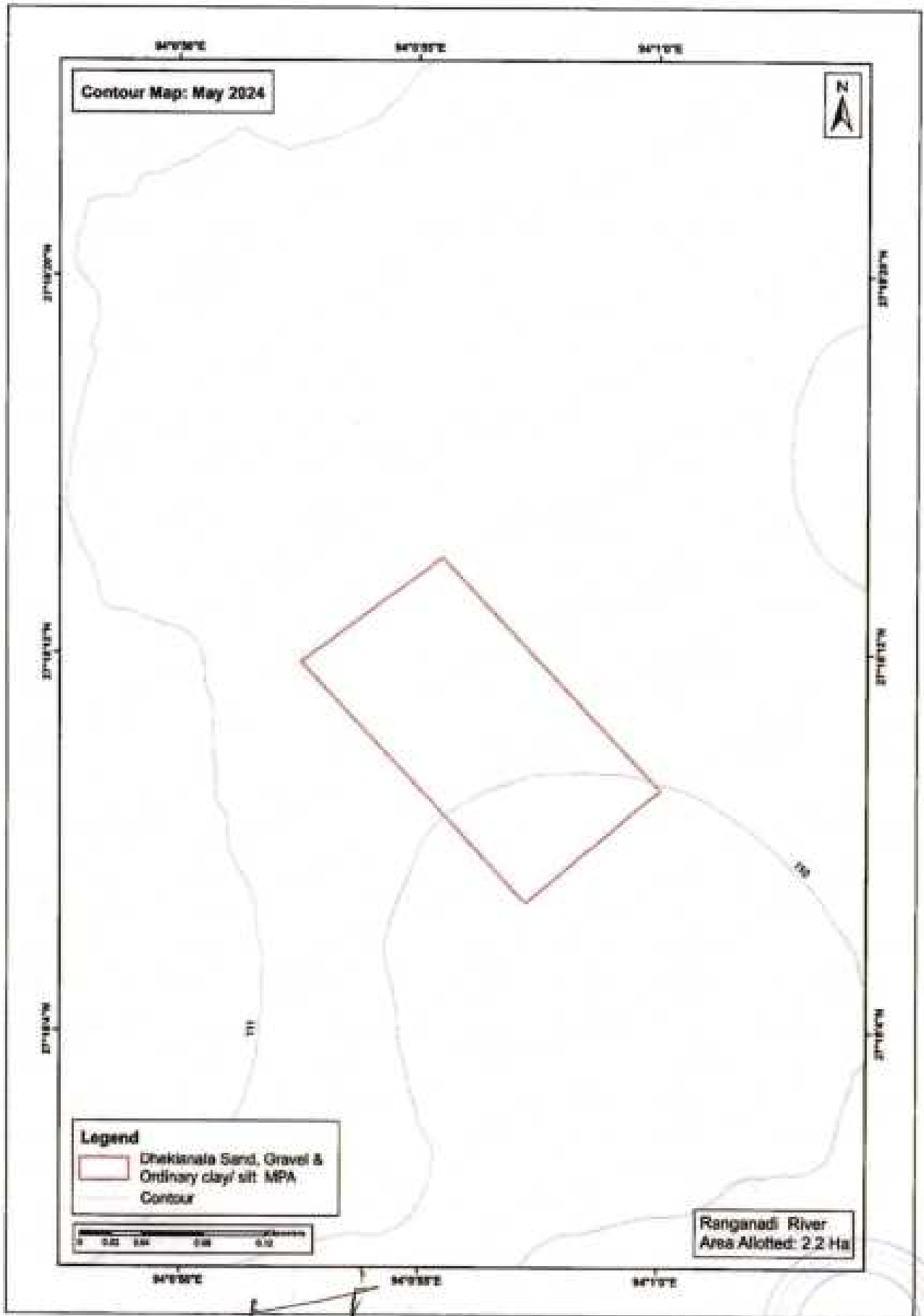
Legend

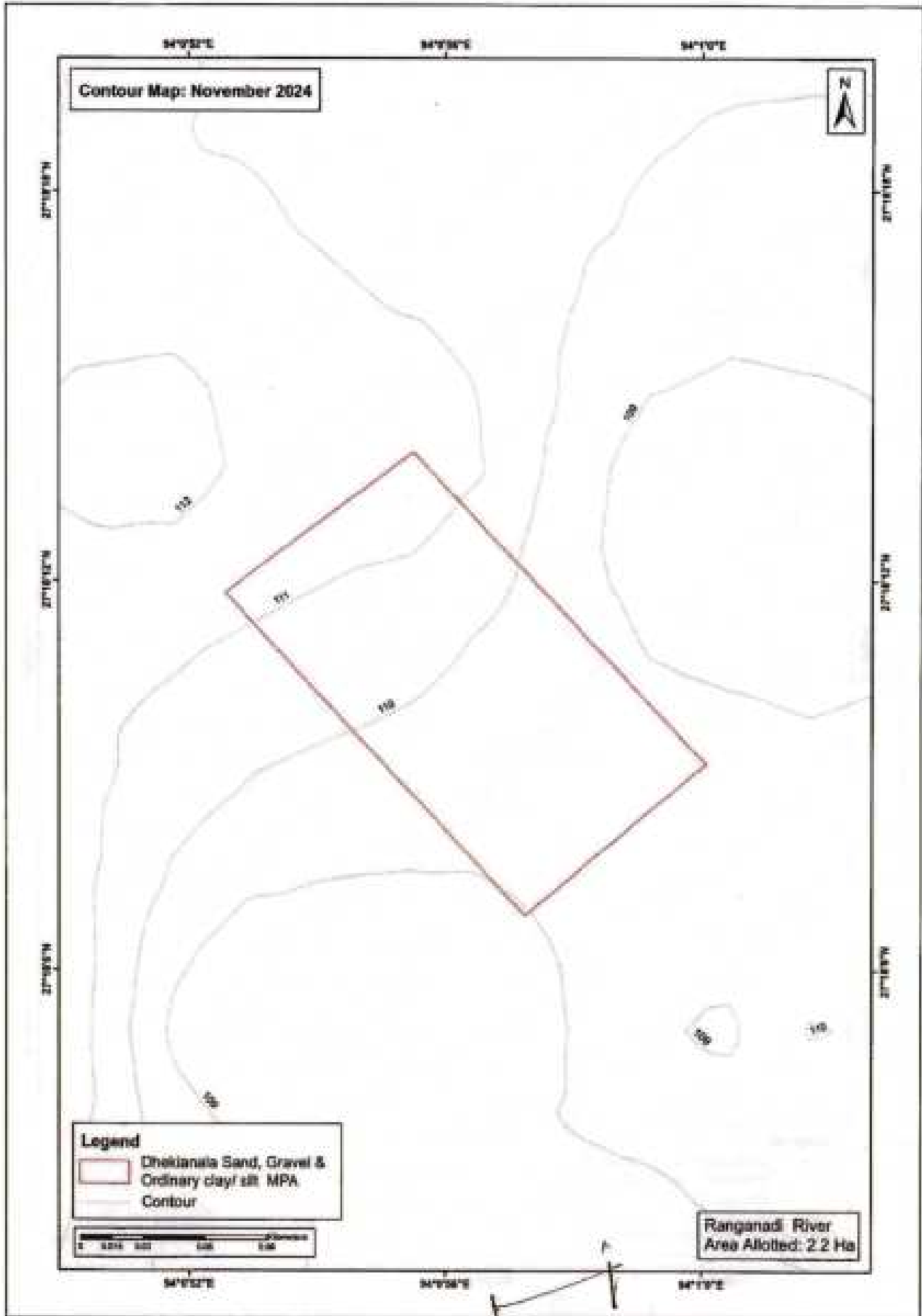
-  Ranganadi River Ordinary Clay MPA
-  Contour



Ranganadi River
Area Allotted: 1.67 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Contour Map: November 2024

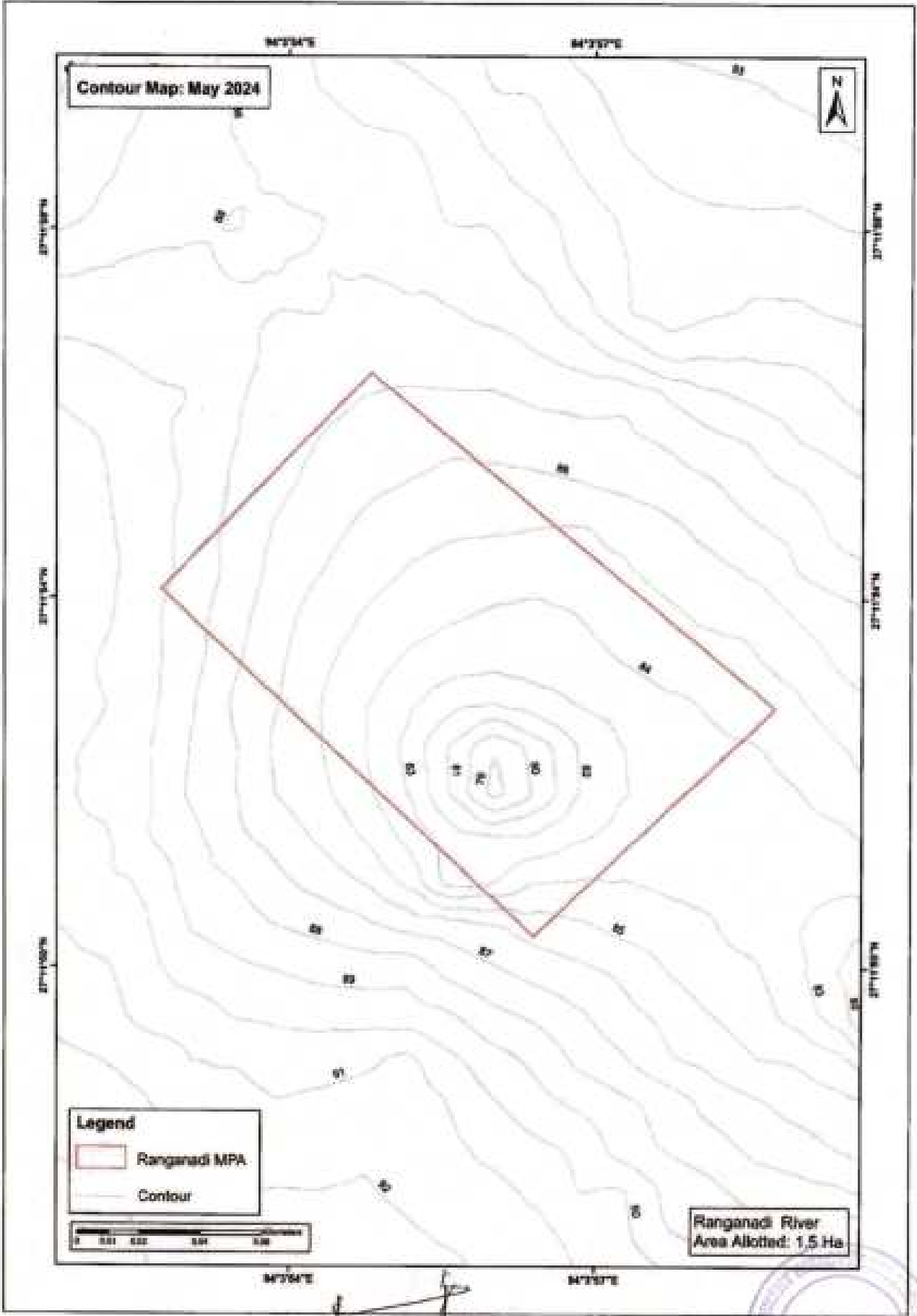


Legend
Dhokanala Sand, Gravel & Ordinary clay/ silt MPA
Contour



Ranganadi River
Area Allotted: 2.2 Ha

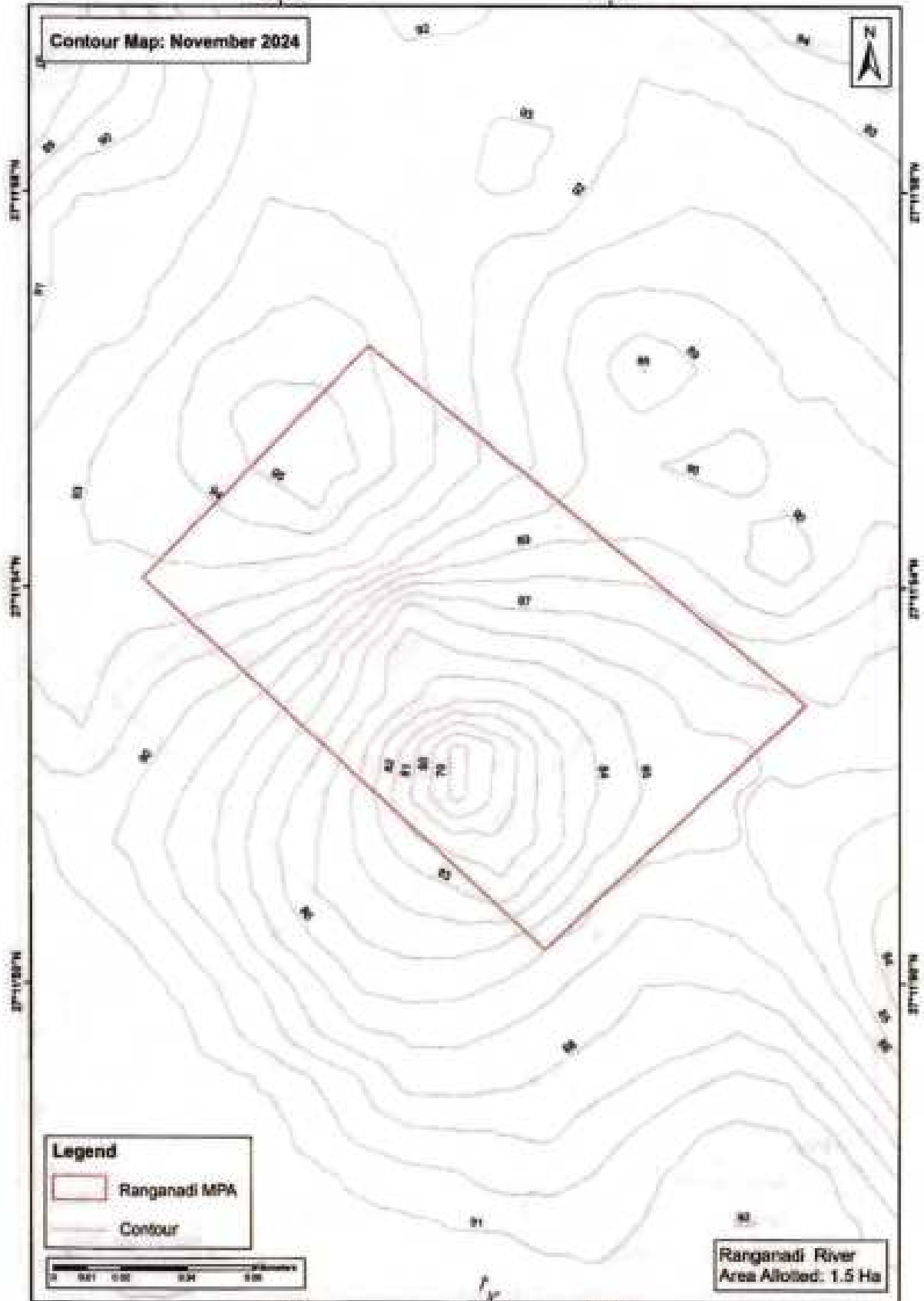
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

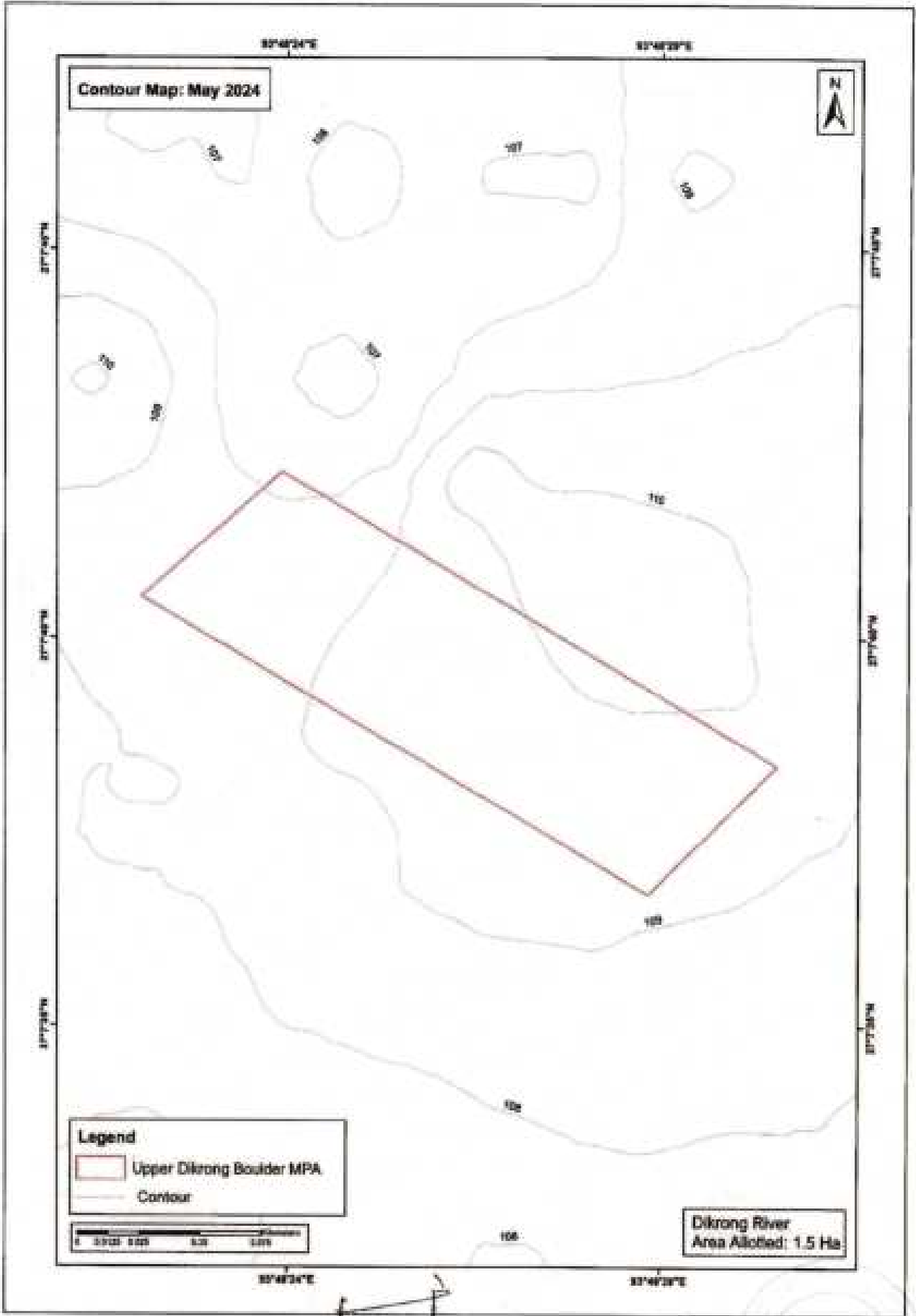


Contour Map: November 2024



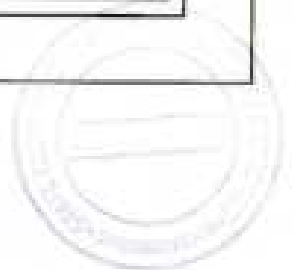
Ranganadi River
Area Allotted: 1.5 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



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Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

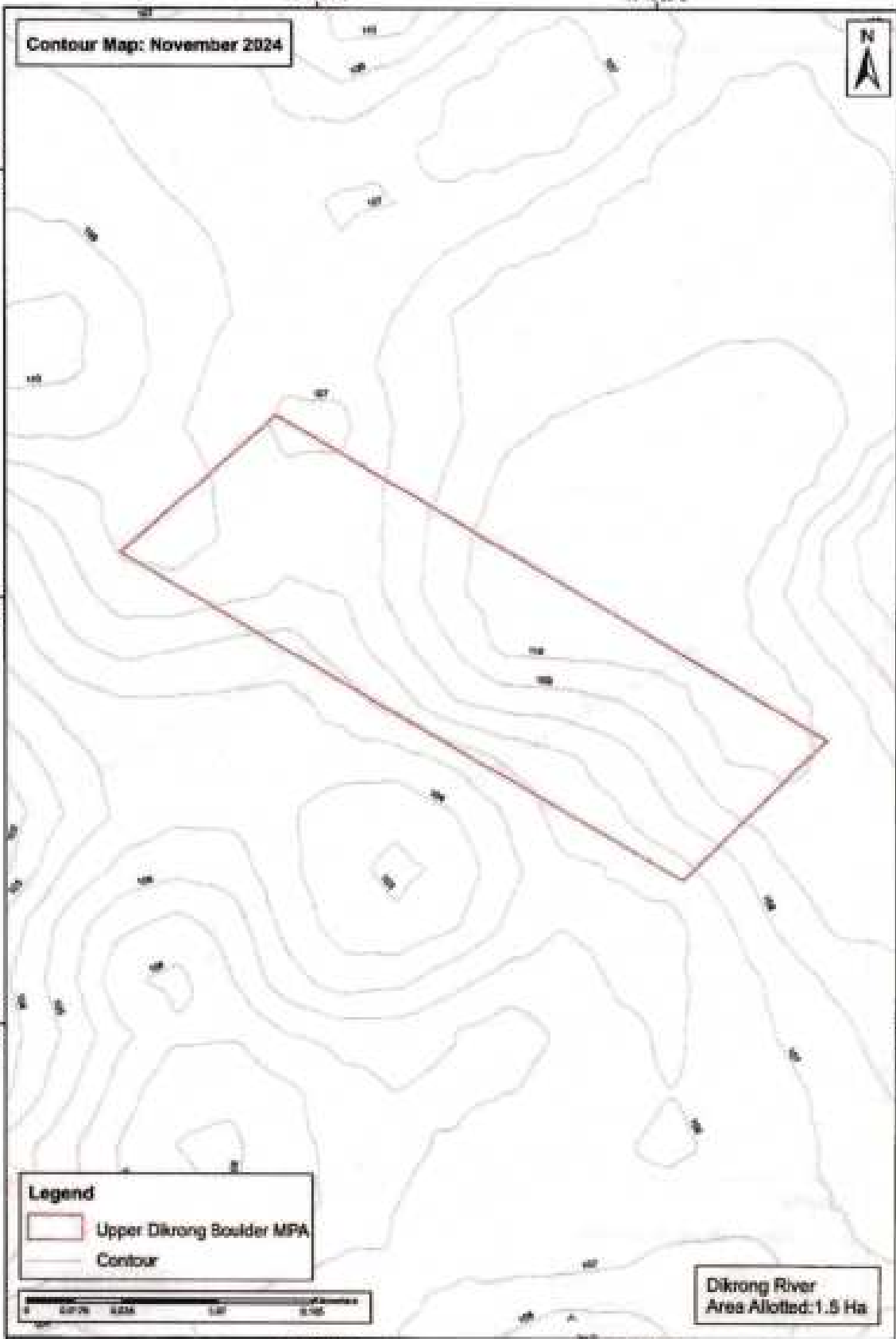


Contour Map: November 2024

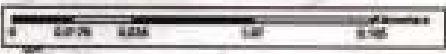


27°45'N
27°45'N
27°45'N
27°45'N

91°45'E
91°45'E
91°45'E
91°45'E



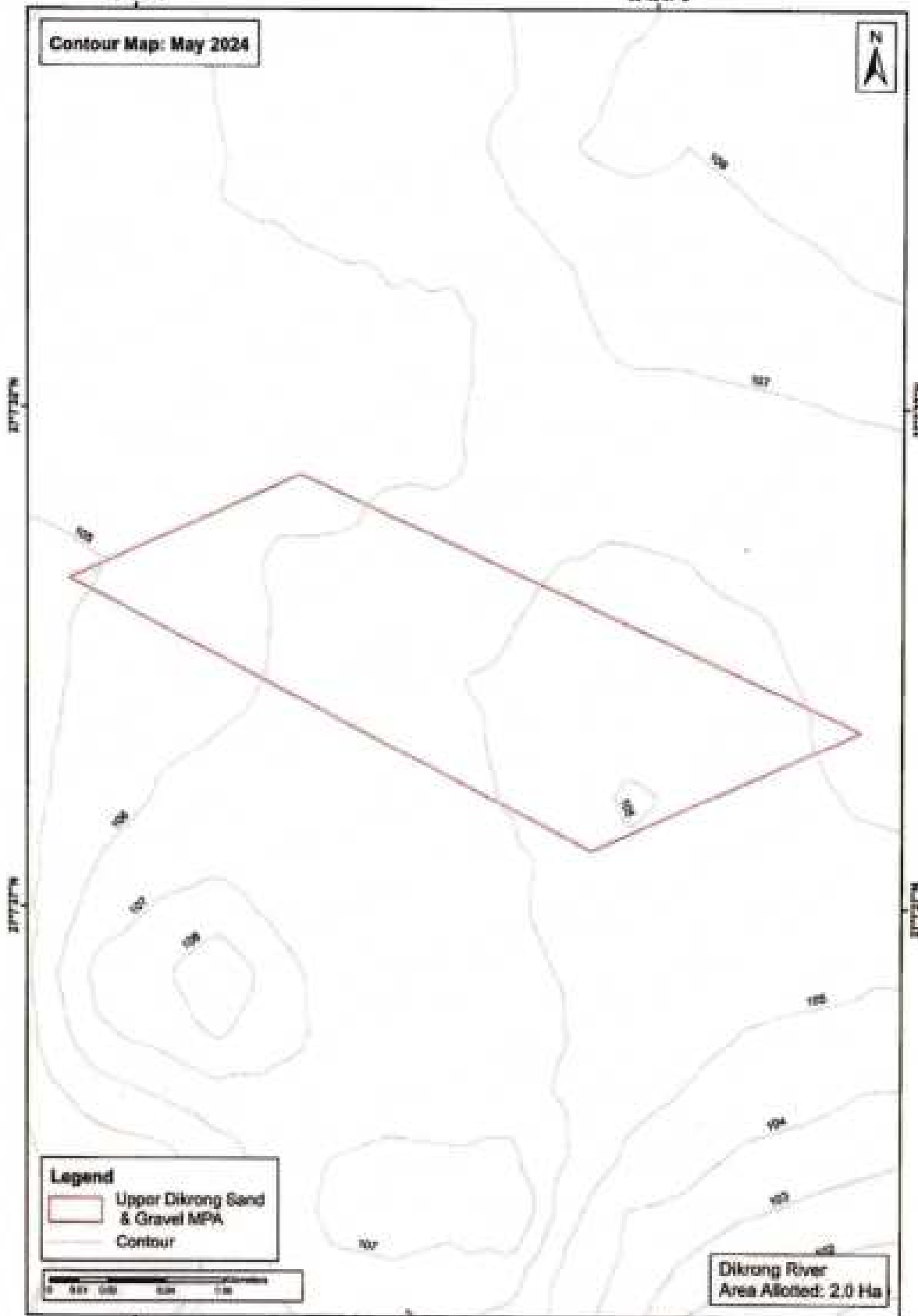
Legend
Upper Dikrong Boulder MPA
Contour




Dikrong River
Area Allotted: 1.8 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

Contour Map: May 2024




Legend

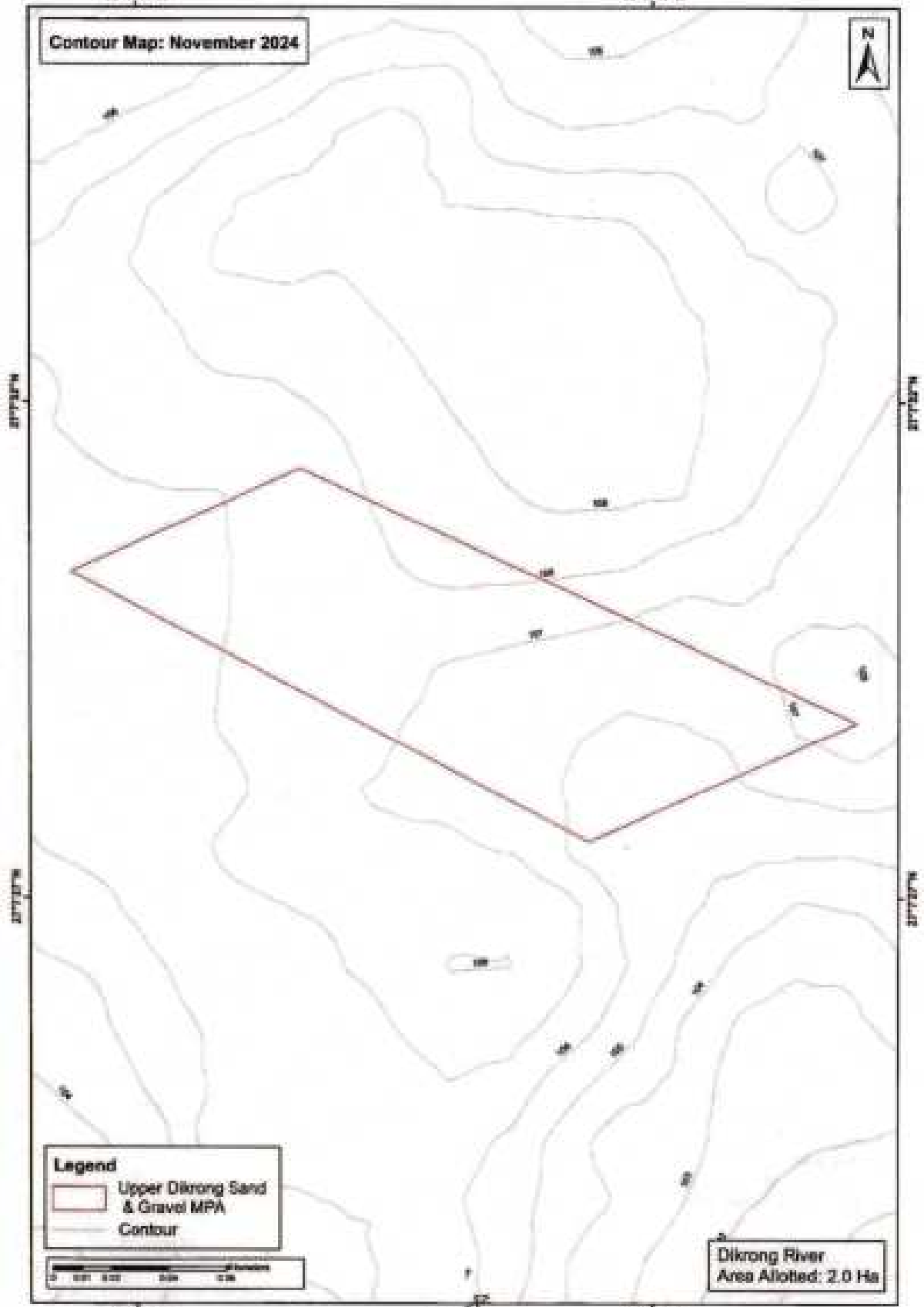
-  Upper Dikrong Sand & Gravel MPA
-  Contour



Dikrong River
Area Allotted: 2.0 Ha

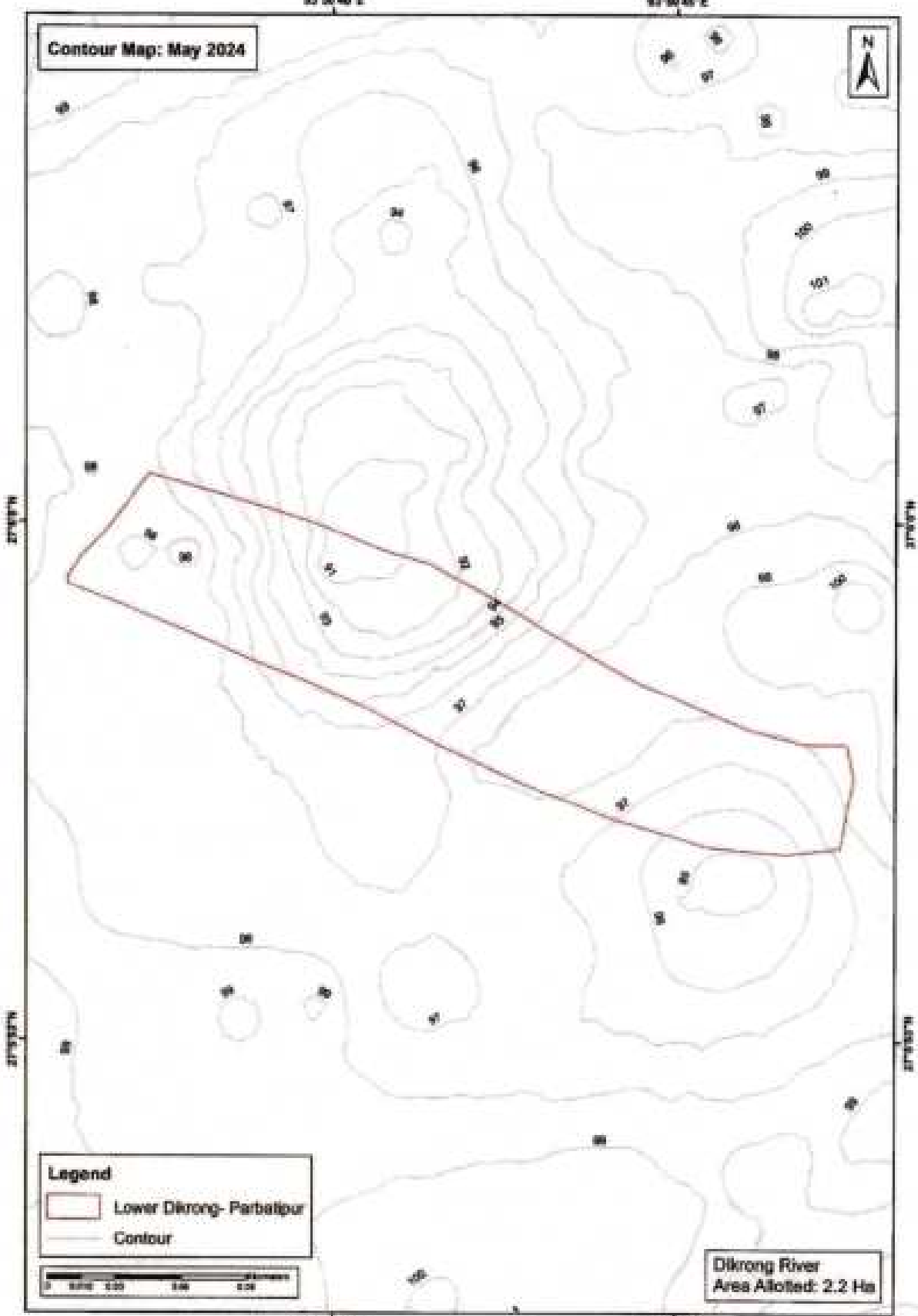

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur

Contour Map: November 2024



Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

Contour Map: May 2024

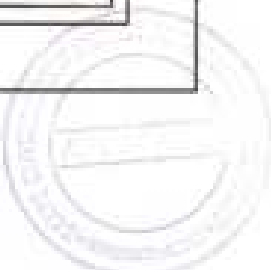


Legend
Lower Dikrong-Parbatpur
Contour

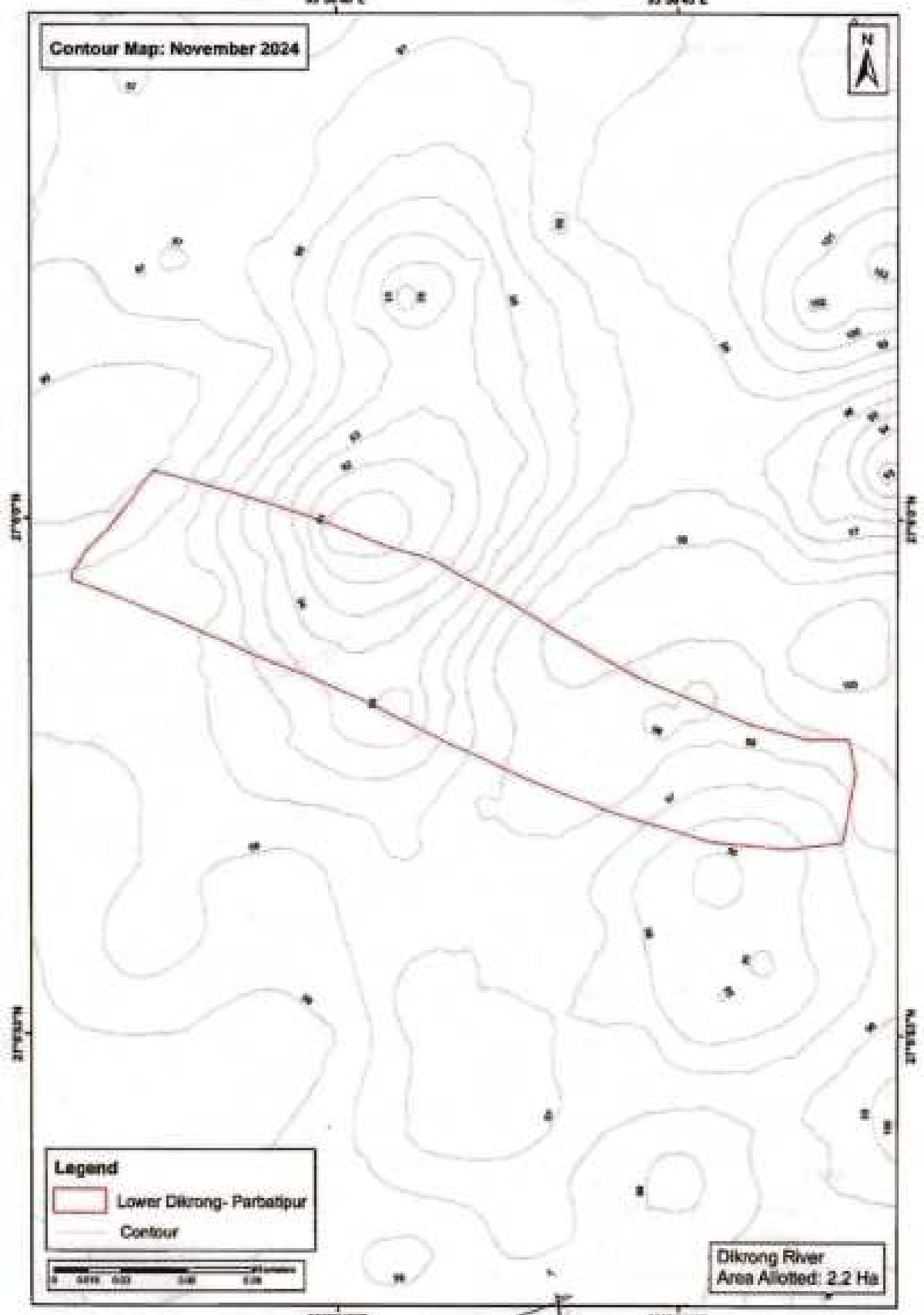


Dikrong River
Area Allotted: 2.2 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

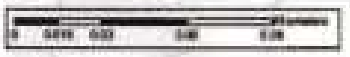


Contour Map: November 2024



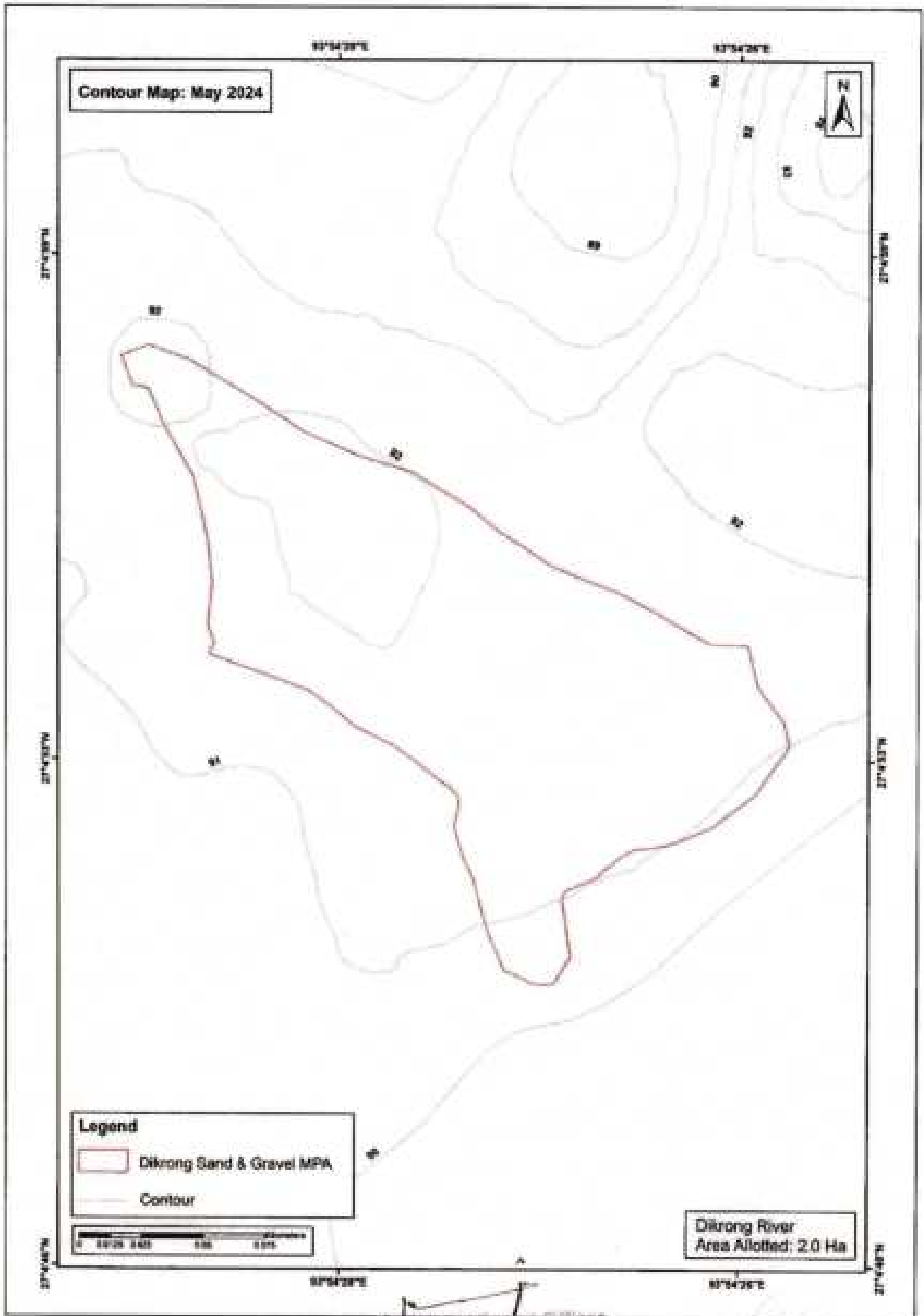
Legend

-  Lower Dikrong-Parbatipur
-  Contour

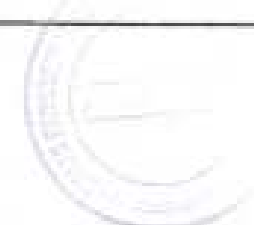


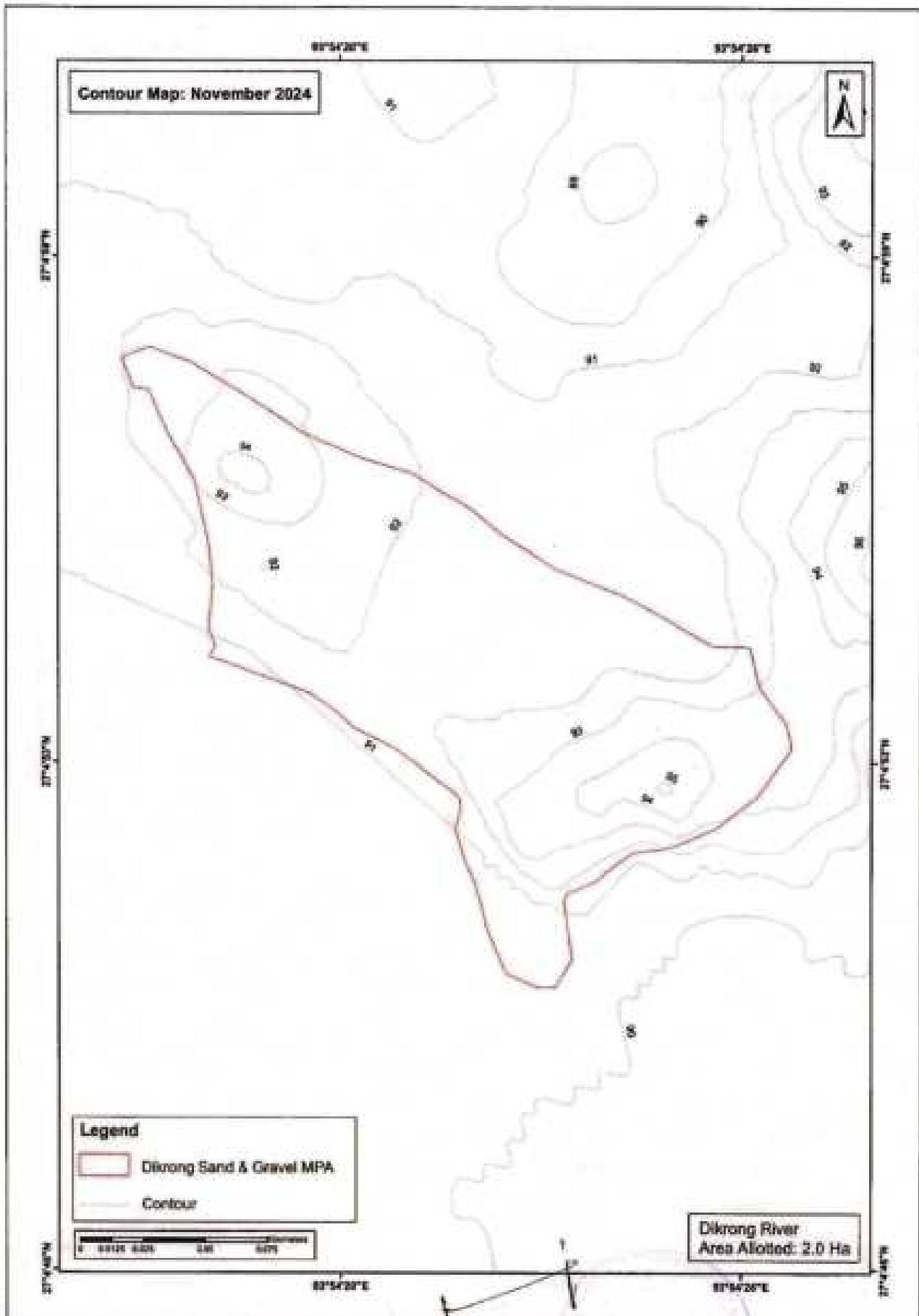
Dikrong River
Area Allotted: 2.2 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



District: 31 Punes District
Lakhimpur Division
North Lakhimpur





Contour Map: November 2024



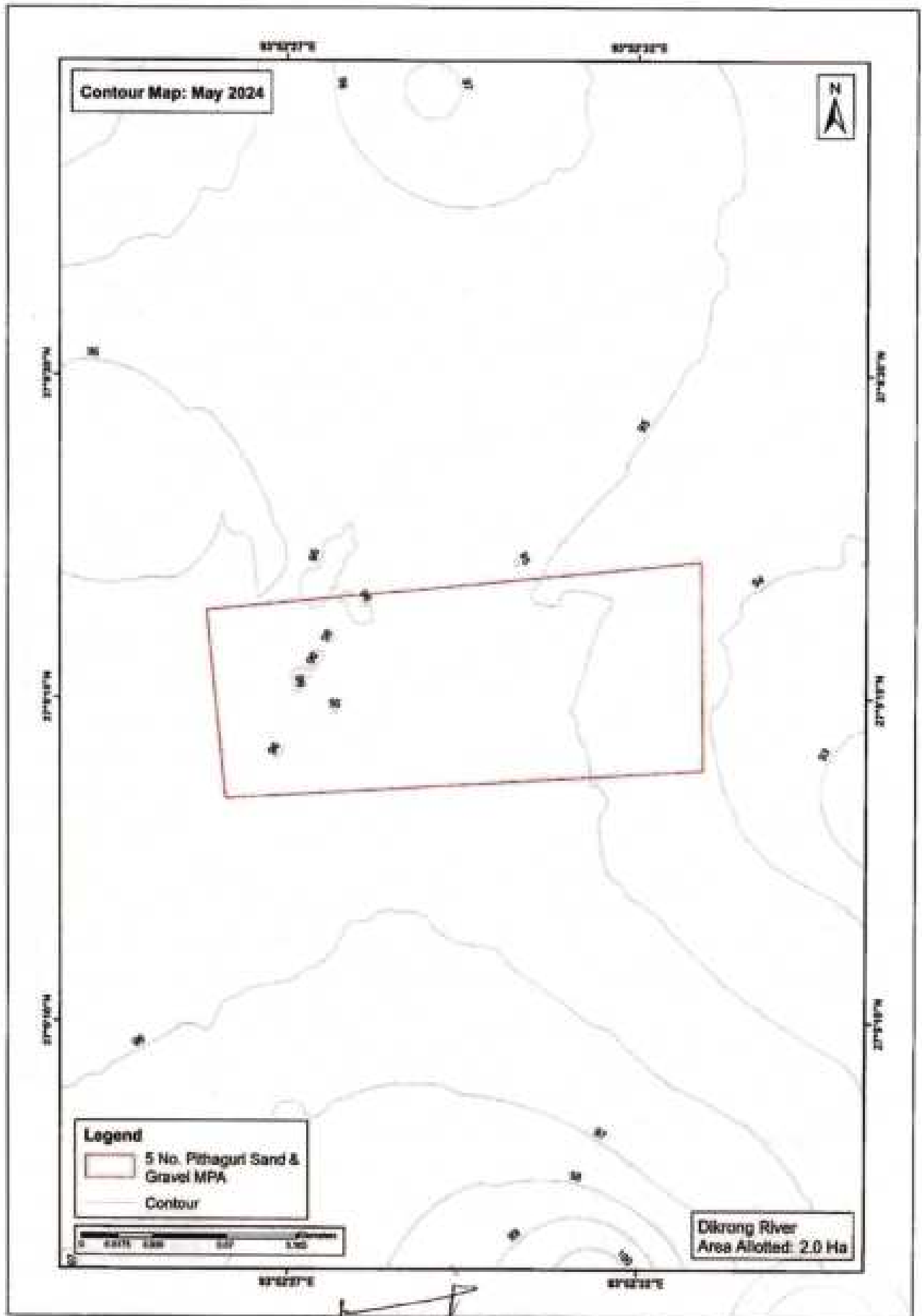
Legend

- Dikrong Sand & Gravel MPA
- Contour



Dikrong River
Area Allotted: 2.0 Ha

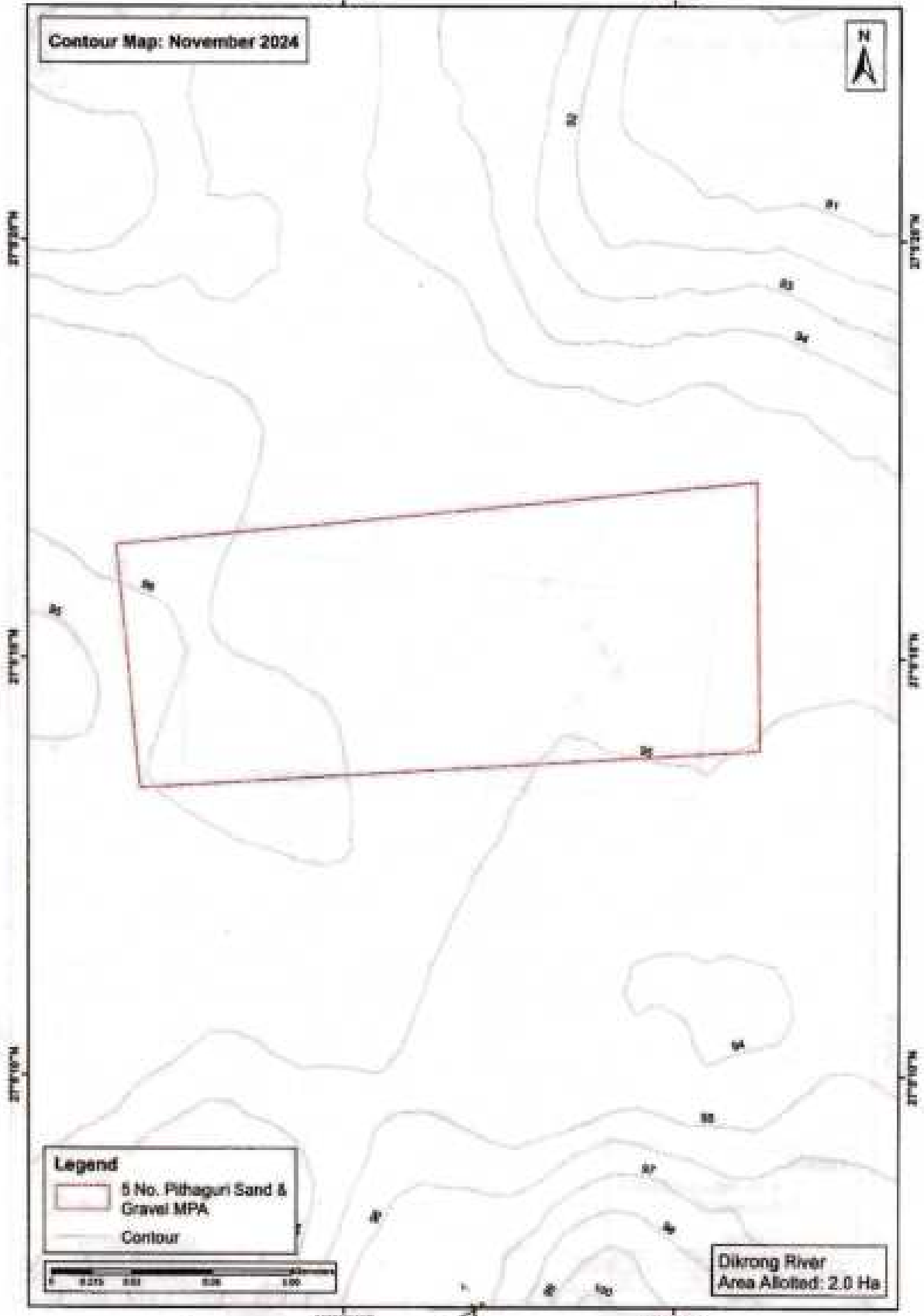
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

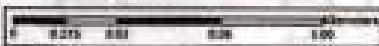


Contour Map: November 2024



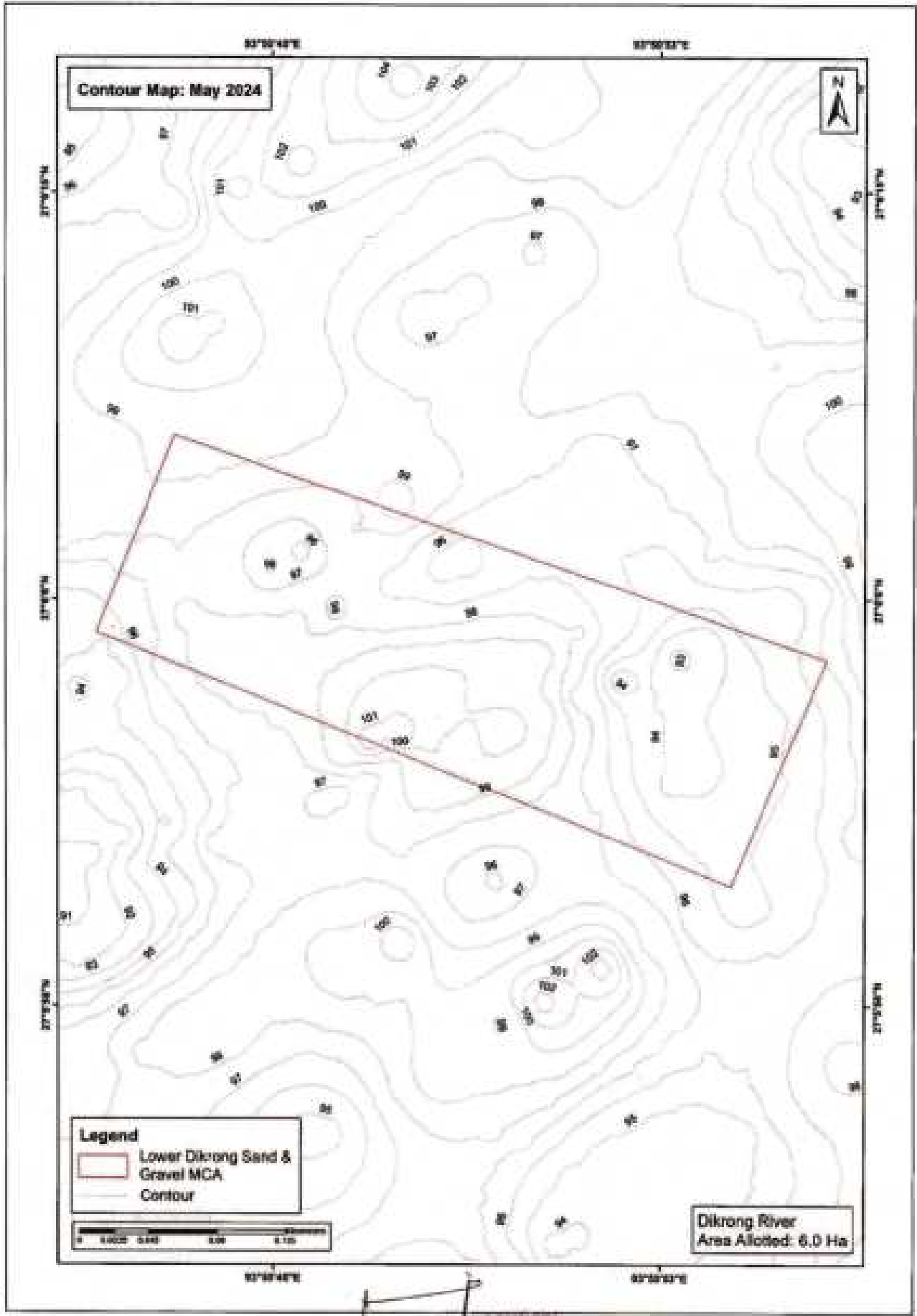
Legend

-  5 No. Pithaguri Sand & Gravel MPA
-  Contour



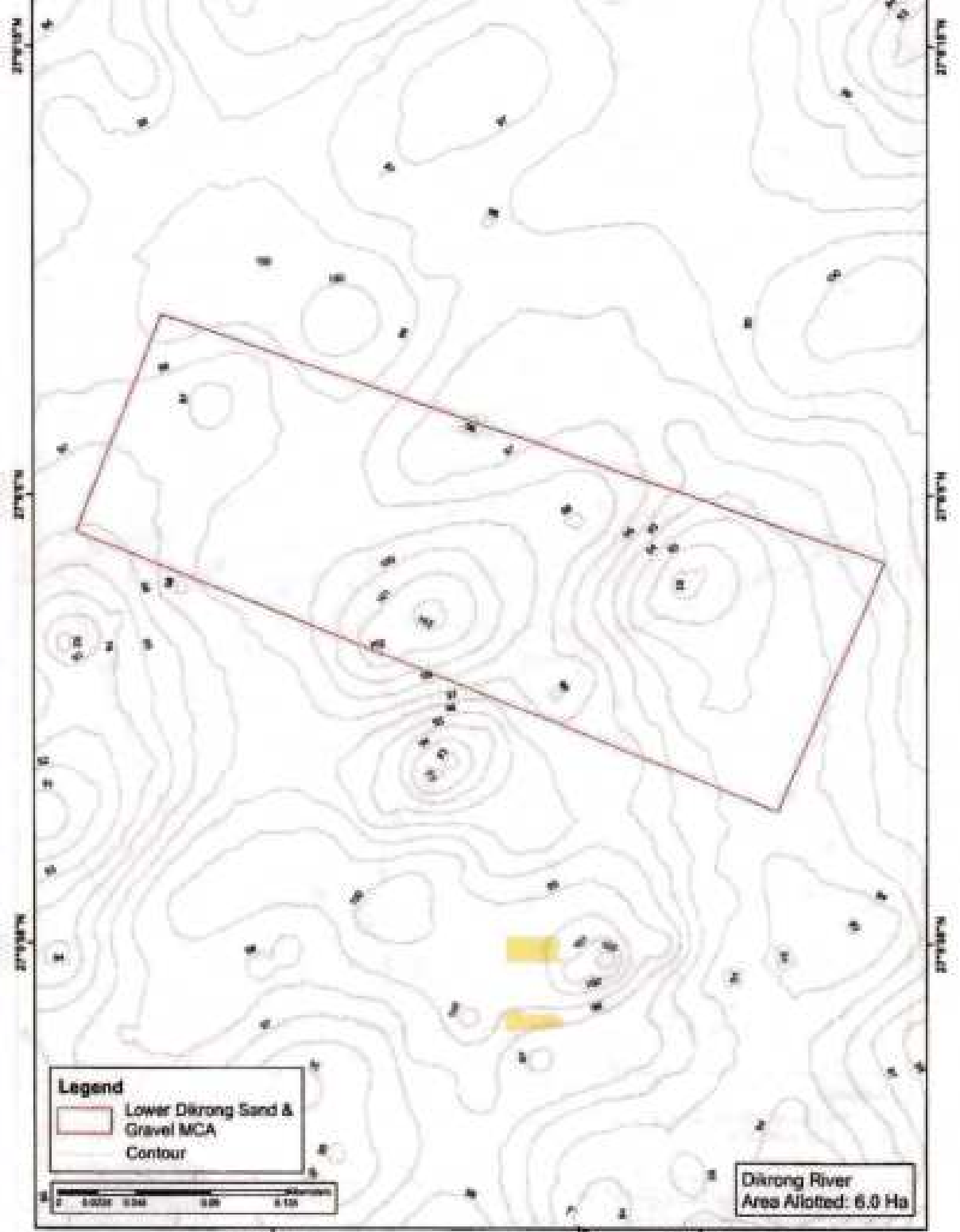
Dikrong River
Area Allotted: 2.0 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Divisional Forest Officer
 Lakhimpur Division
 North Lakhimpur.

Contour Map: November 2024



Legend
Lower Dikrong Sand & Gravel MCA
Contour



Dikrong River
Area Allotted: 6.0 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: May 2024



511470

511470


511470

511470

511470

511470

Legend

-  North Dikrong Sand & Gravel MCA
-  Contour



Dikrong River
Area Allotted: 4.91 Ha

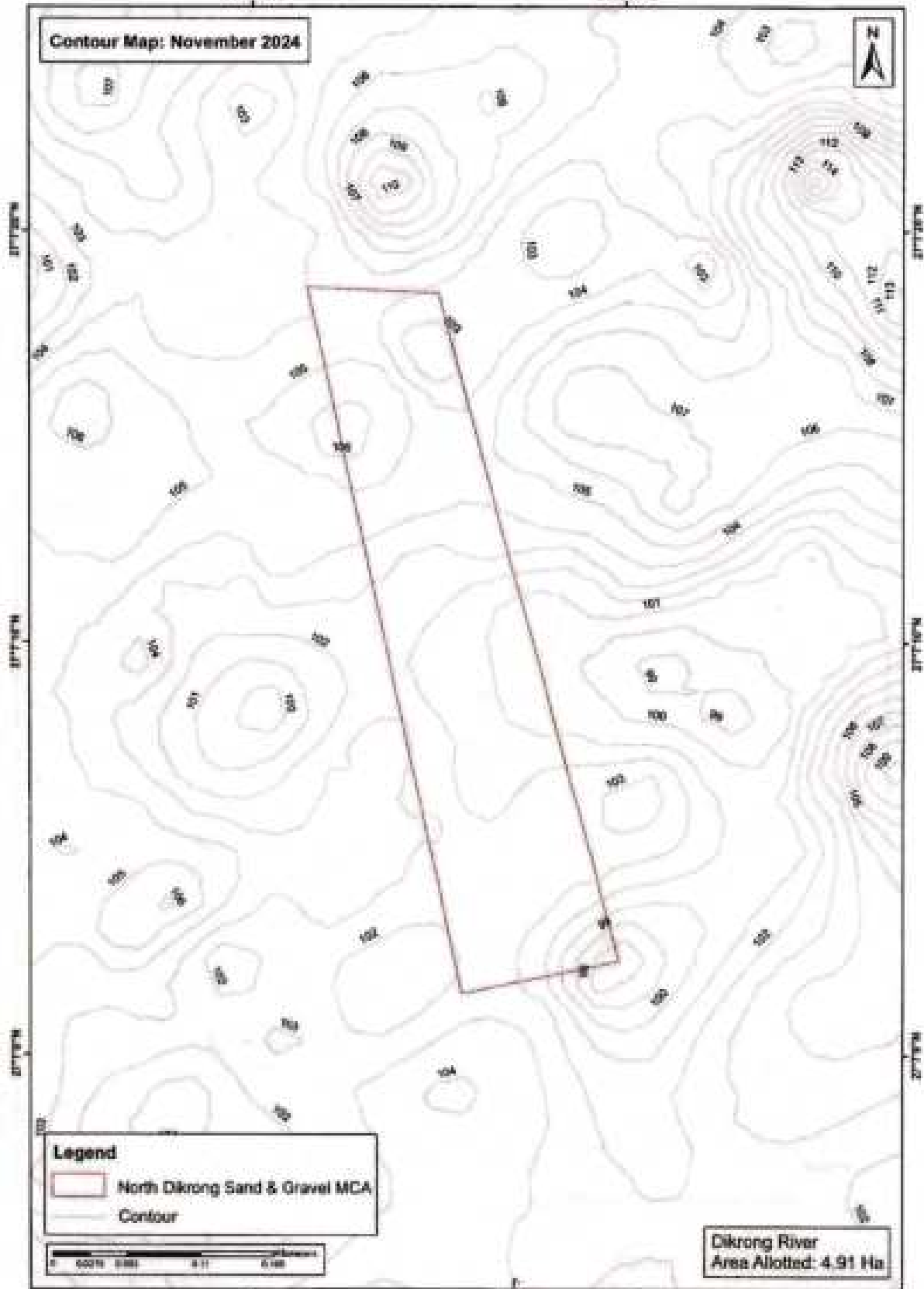
511470

511470

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024



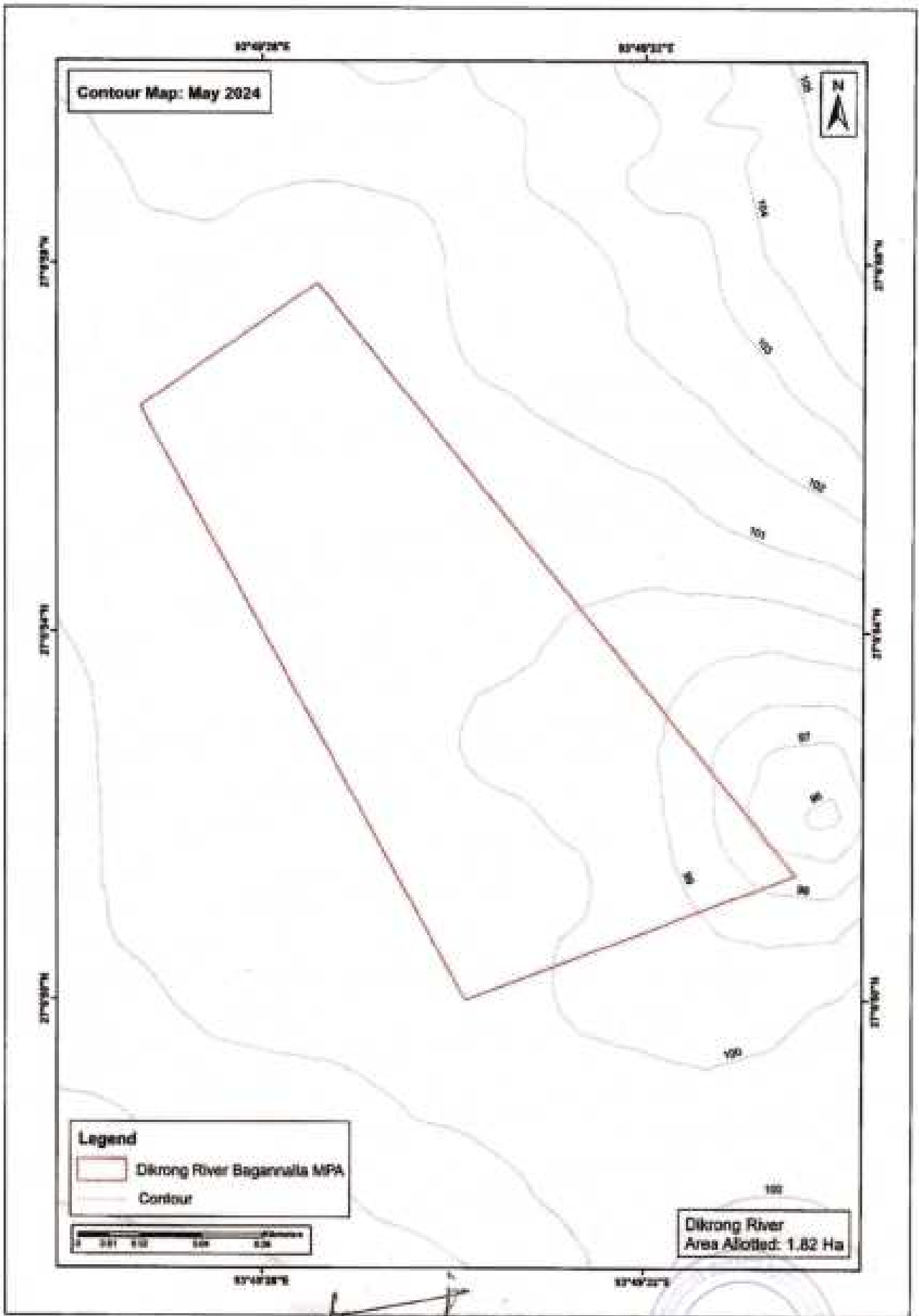
Legend
North Dikrong Sand & Gravel MCA
Contour



Dikrong River
Area Allotted: 4.91 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur





Contour Map: May 2024

Legend
 [Red Box] Dikrong River Begannulla MPA
 [Line] Contour

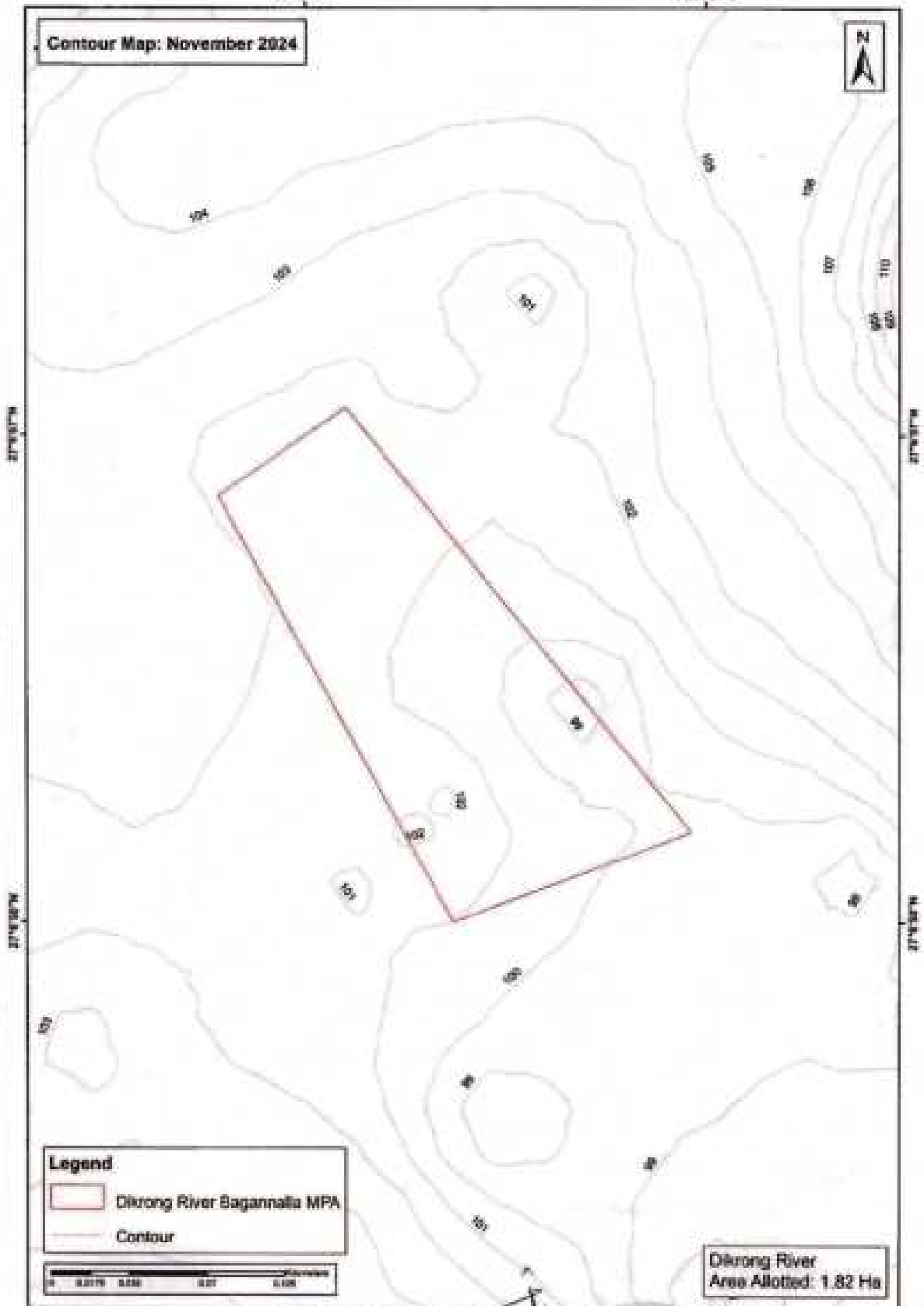


Dikrong River
 Area Allotted: 1.82 Ha

Divisional Forest Officer
 Lakhimpur Division
 North Lakhimpur.



Contour Map: November 2024



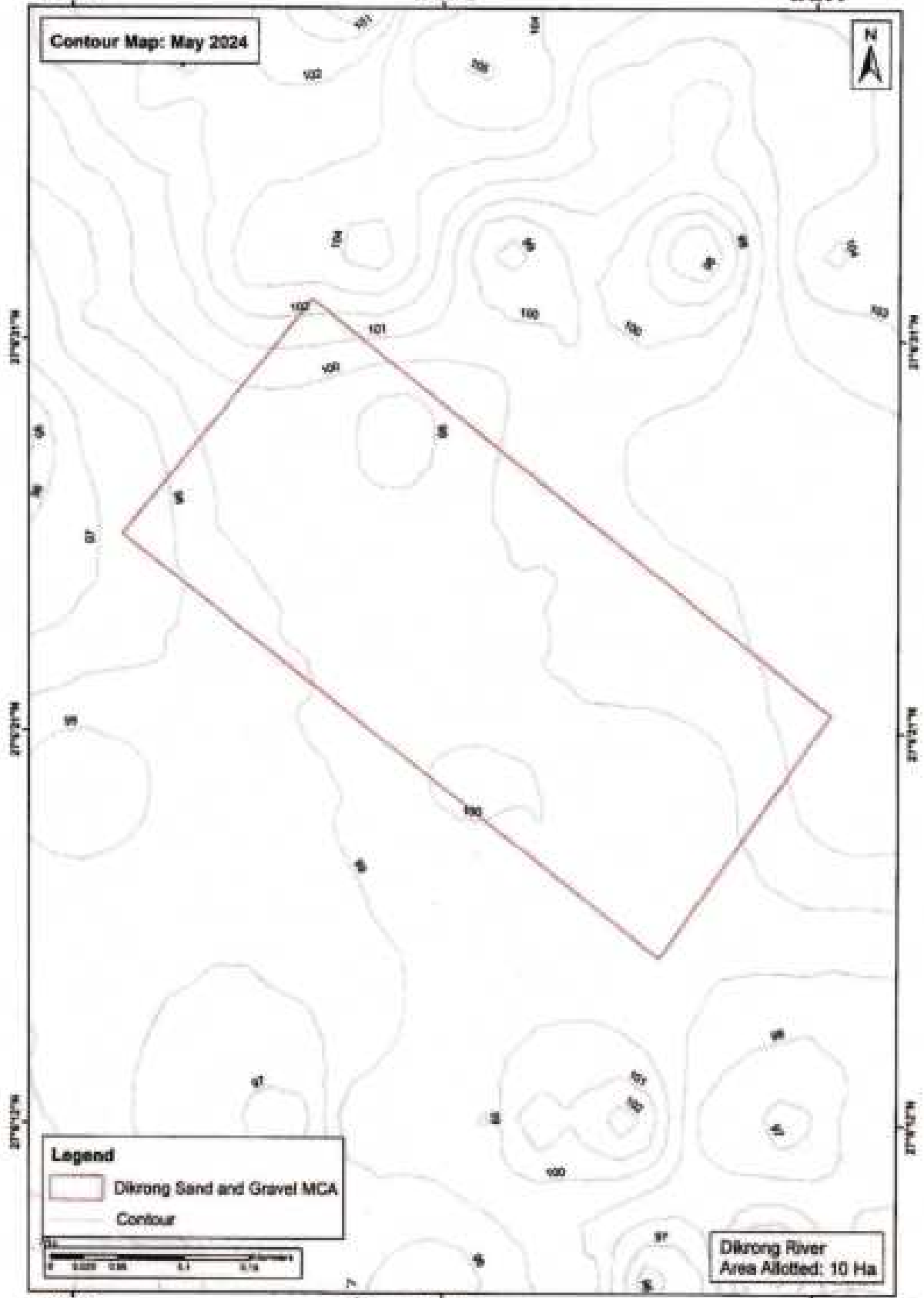
Legend
Dikrong River Bagannalla MPA
Contour

Dikrong River
Area Allotted: 1.82 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: May 2024

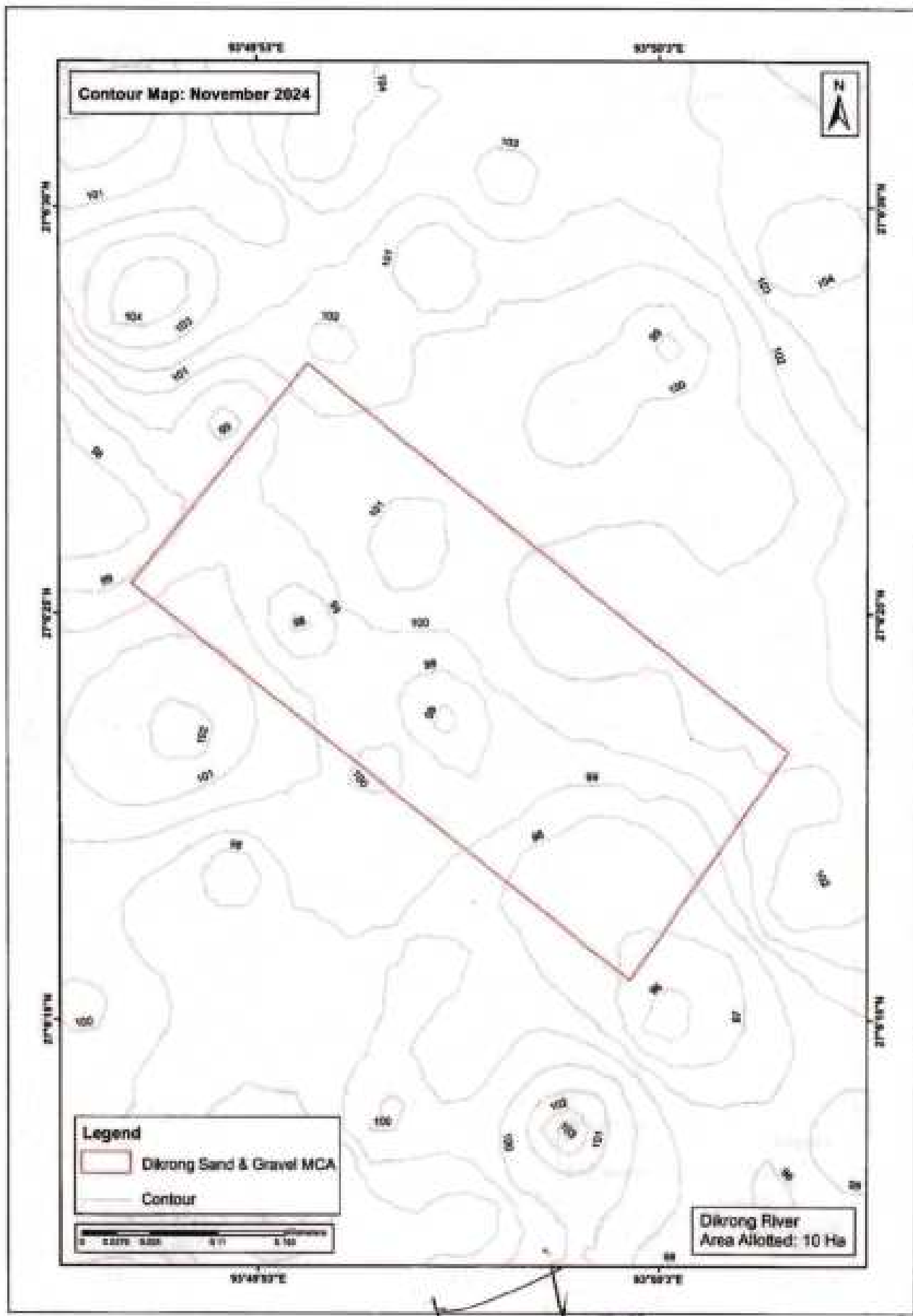


Legend
Dikrong Sand and Gravel MCA
Contour

Dikrong River
Area Allotted: 10 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Contour Map: November 2024

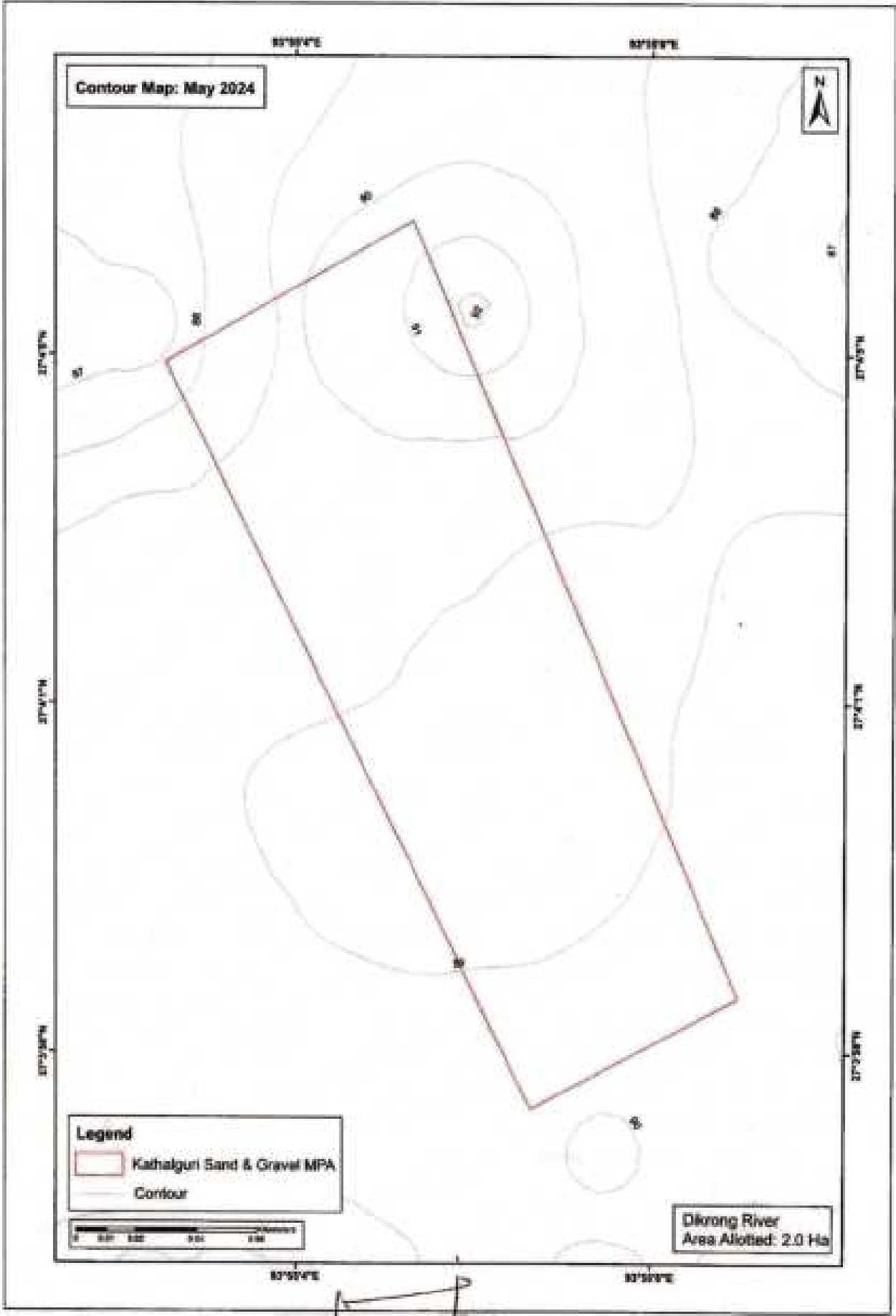


Legend
Dikrong Sand & Gravel MCA
Contour



Dikrong River
Area Allotted: 10 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: May 2024



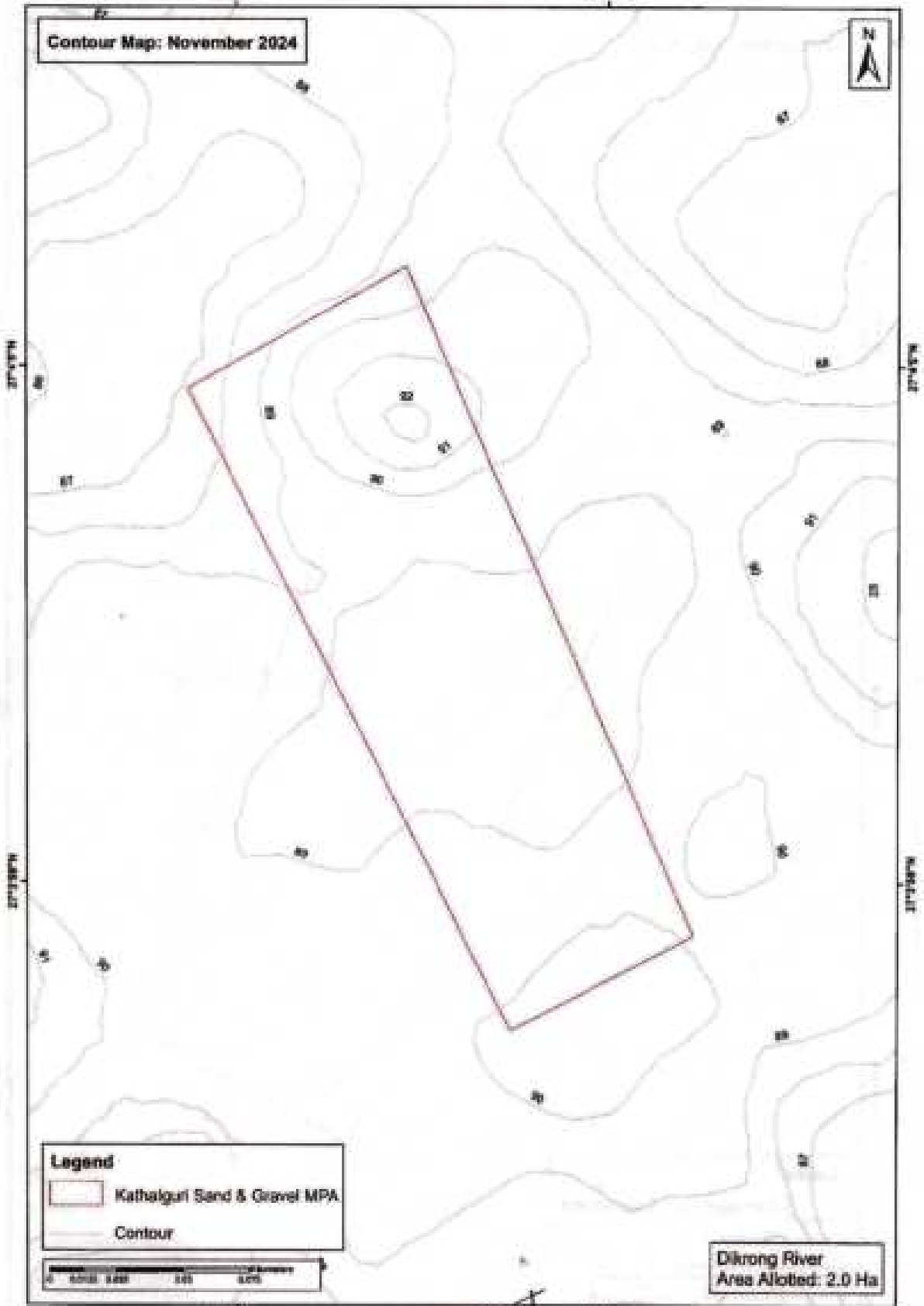
Legend
Kathalguni Sand & Gravel MPA
Contour



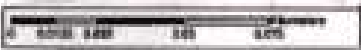
Dikrong River
Area Allotted: 2.0 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

Contour Map: November 2024



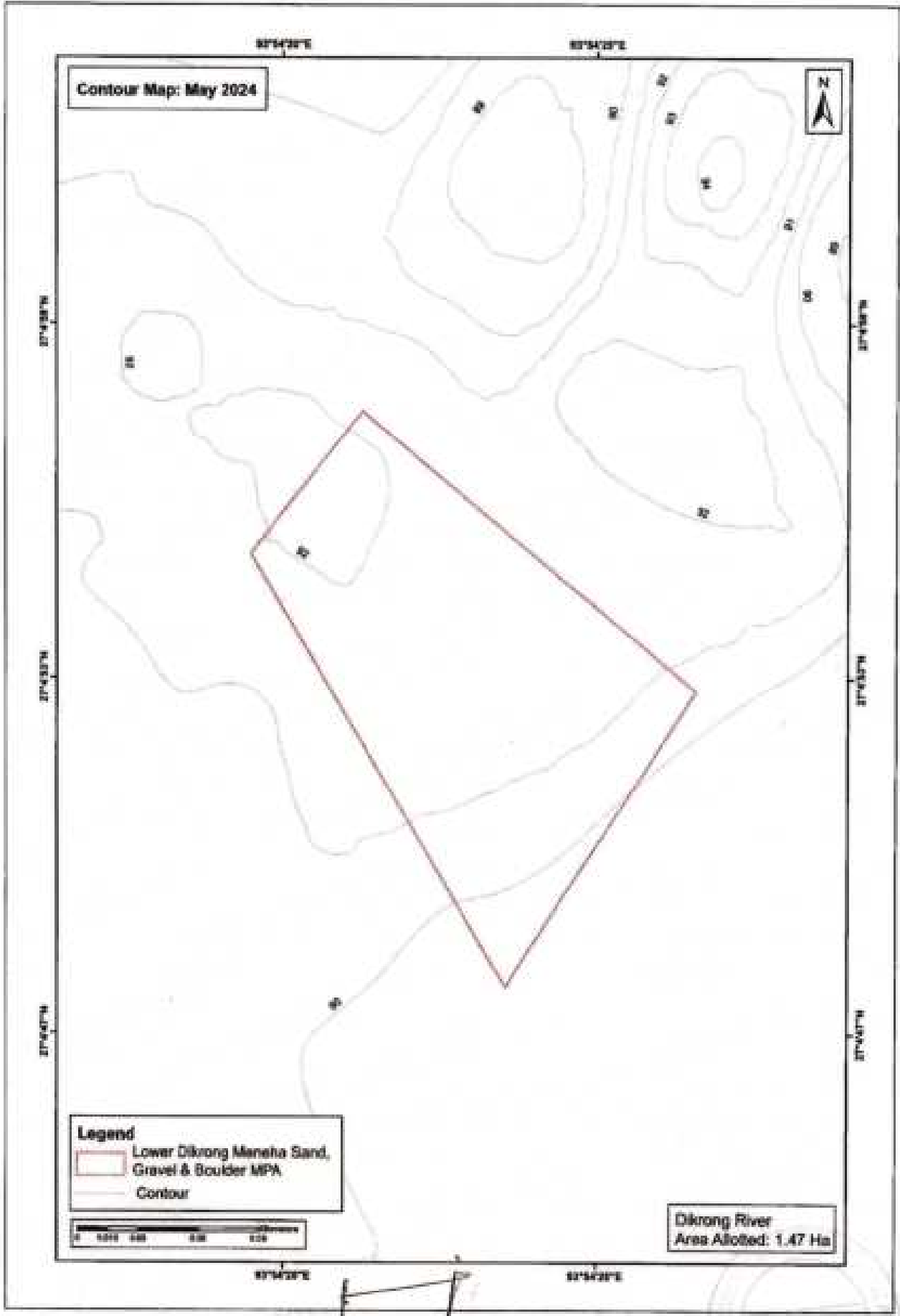
Legend
Kathalguri Sand & Gravel MPA
Contour



Dikrong River
Area Allotted: 2.0 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Contour Map: May 2024

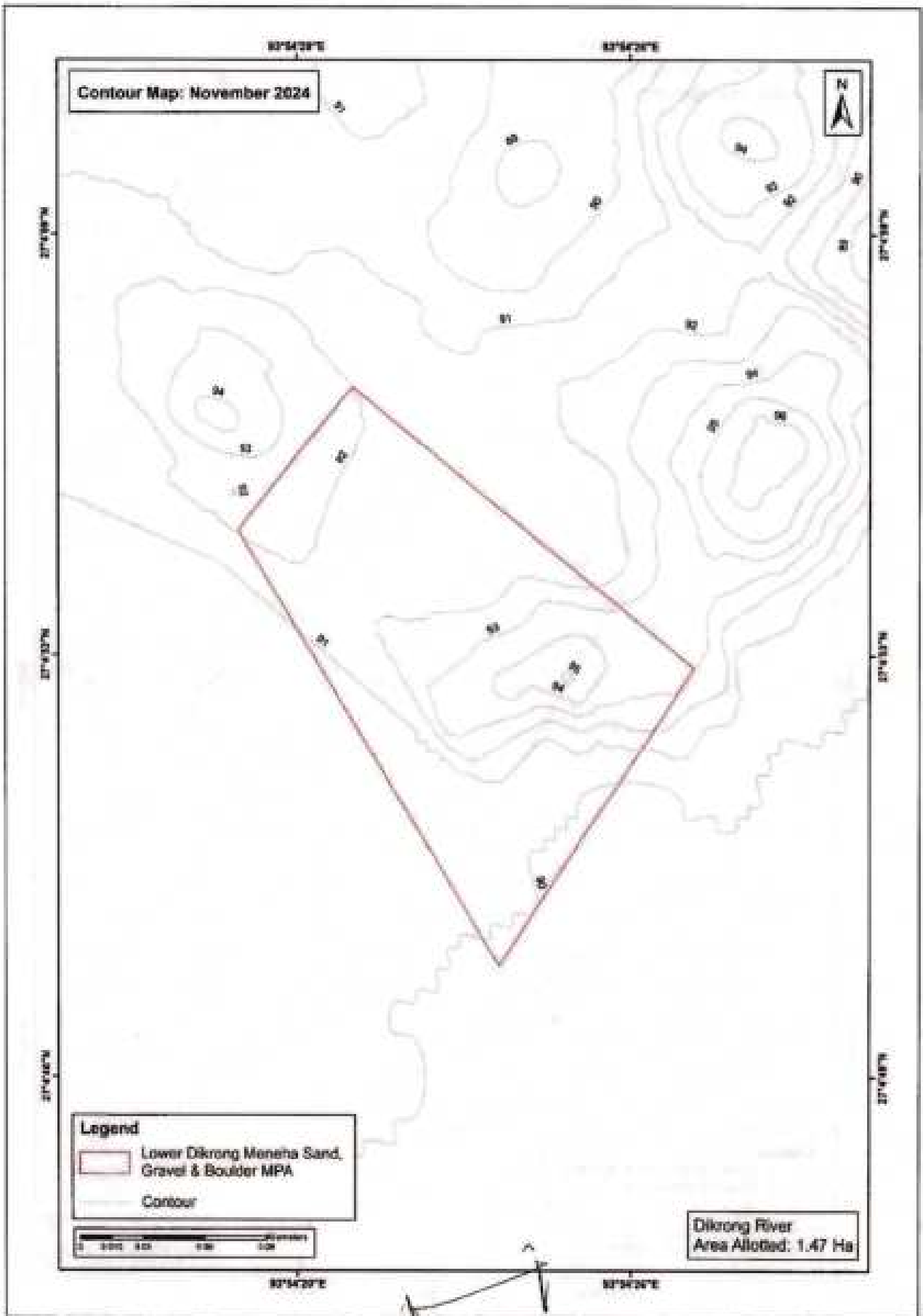
Legend
Lower Dikrong Maneha Sand,
Gravel & Boulder MPA
Contour



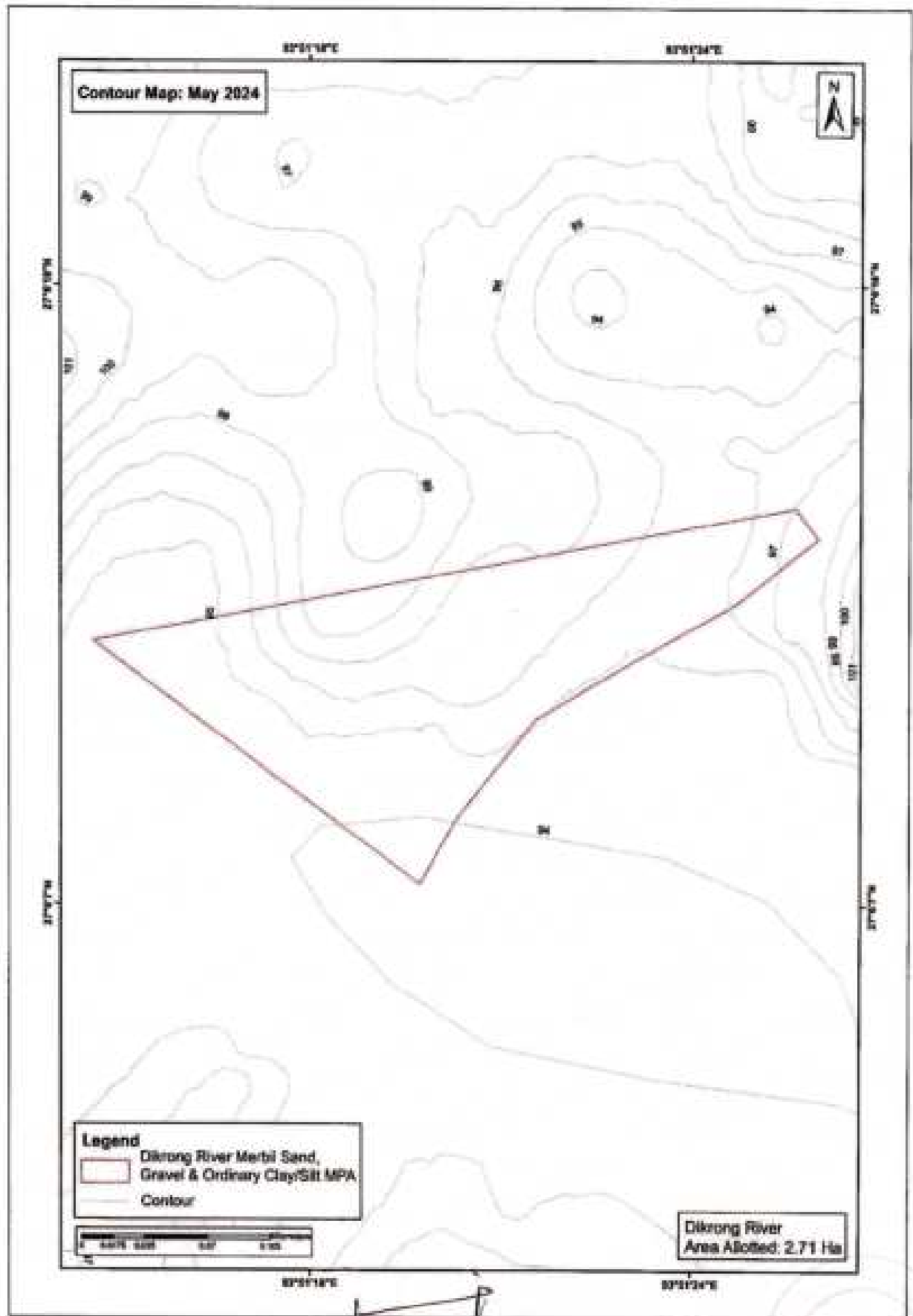
Dikrong River
Area Allotted: 1.47 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

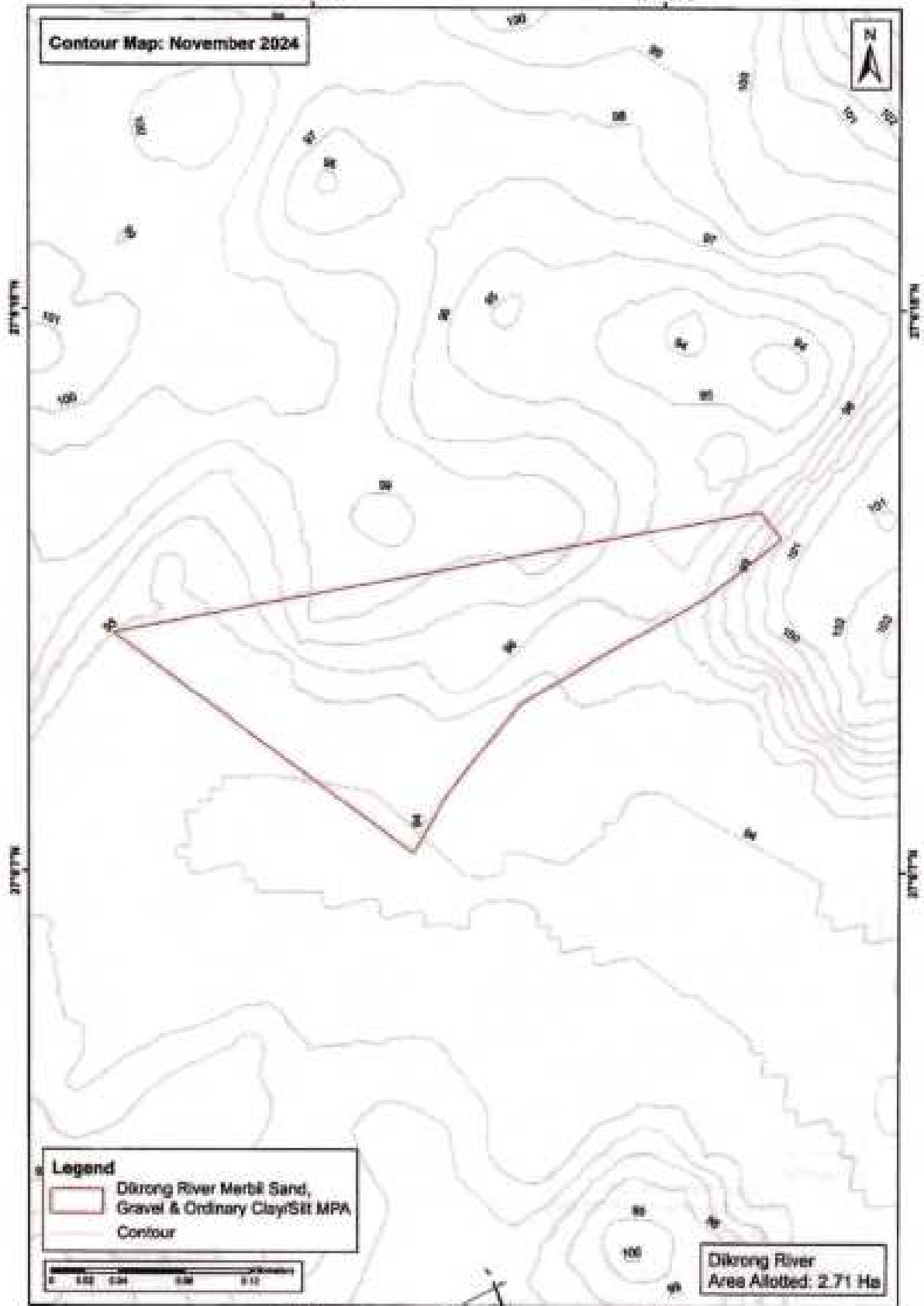


- 501 -

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024

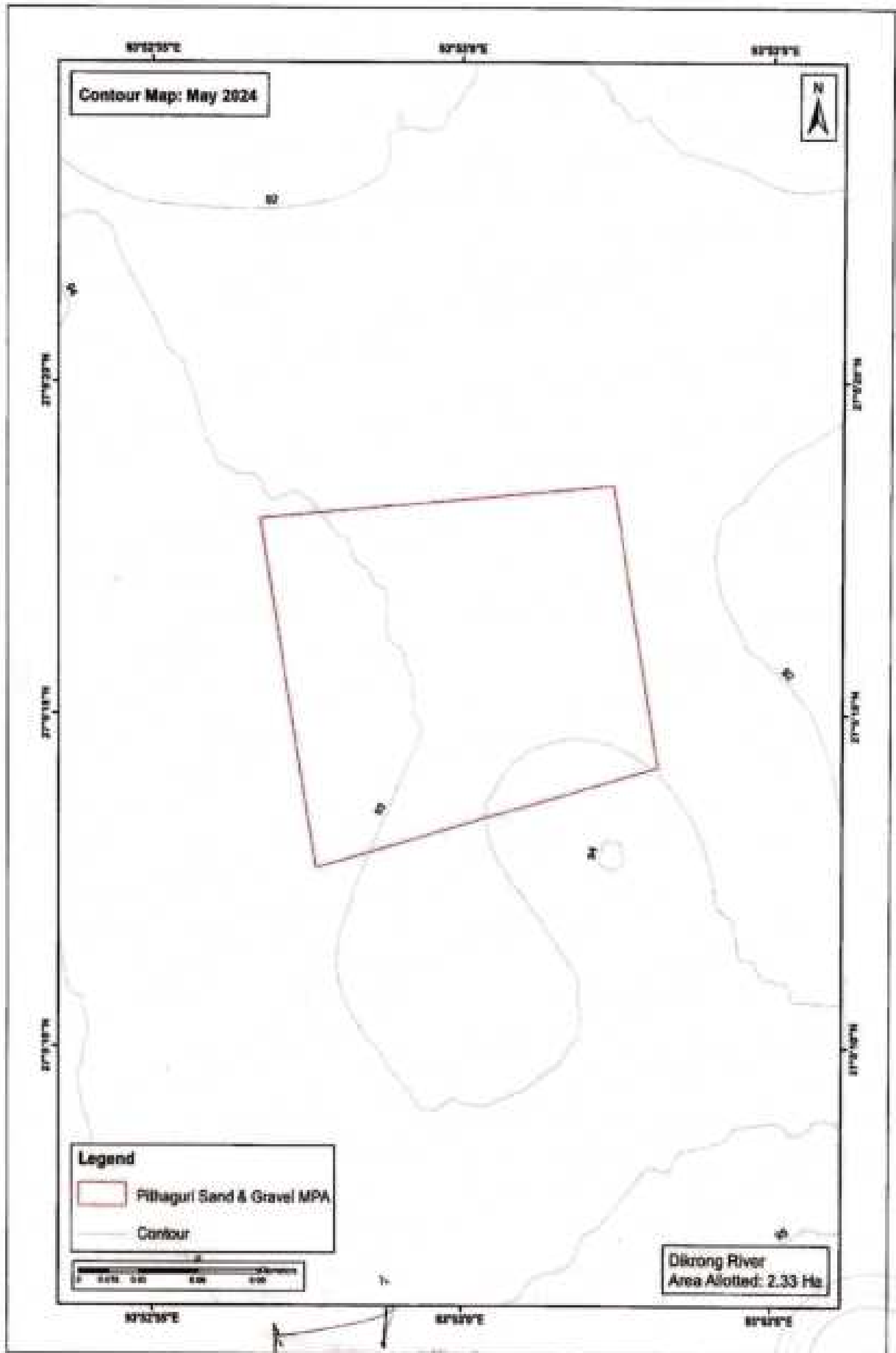


Legend
Dikrong River Merbl Sand,
Gravel & Ordinary Clay/Silt MPA
Contour



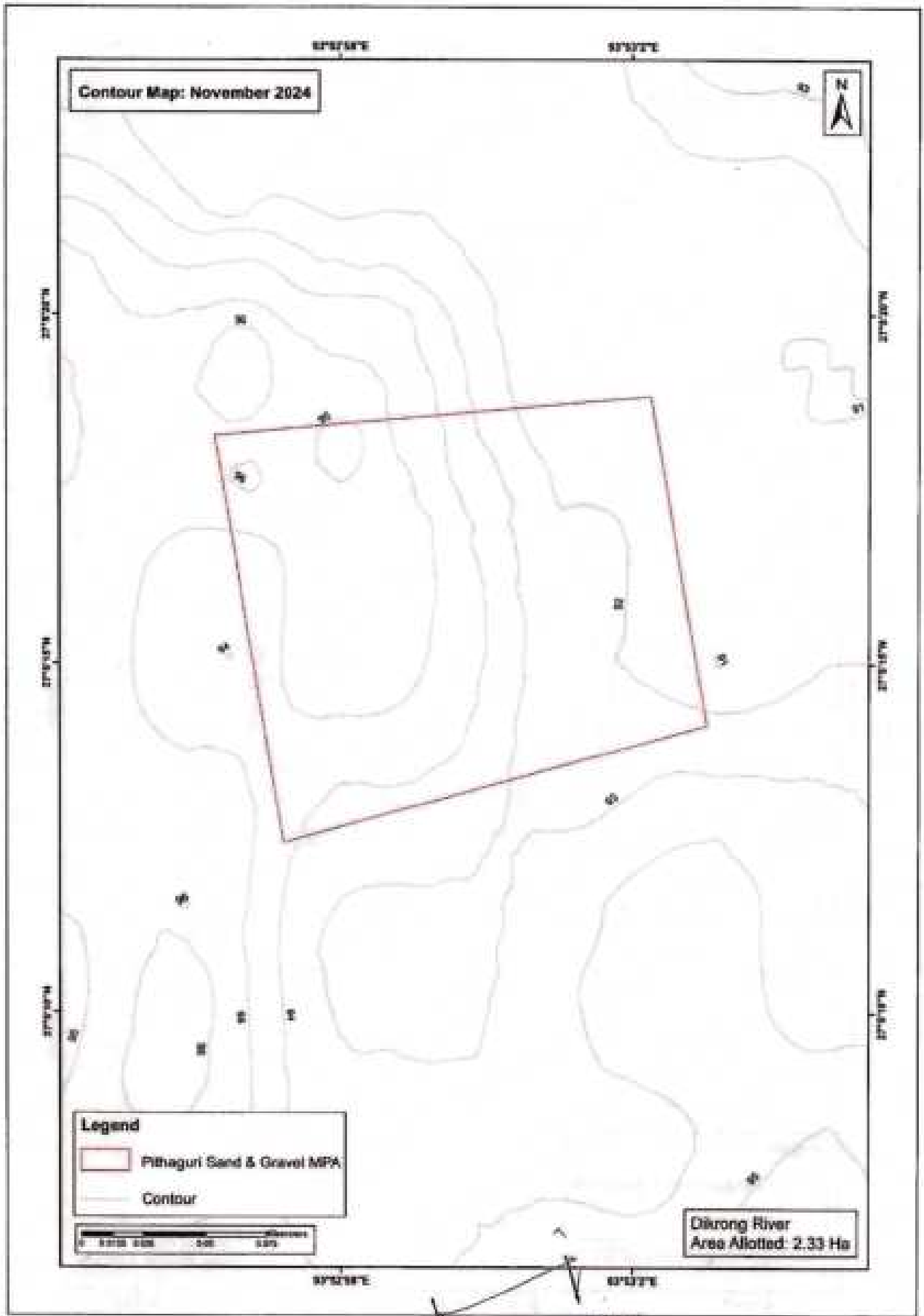
Dikrong River
Area Alloted: 2.71 Ha

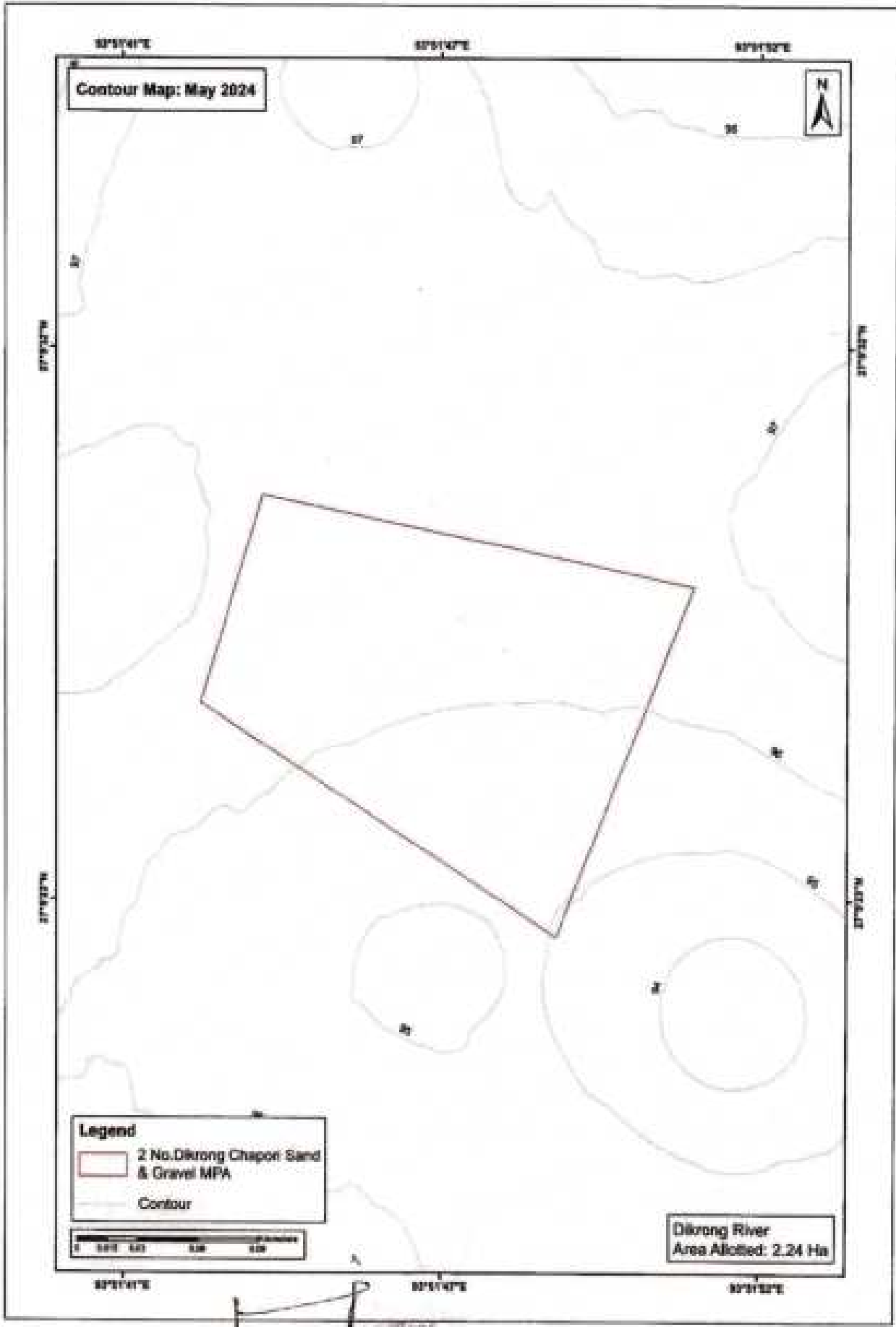
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.







Contour Map: May 2024



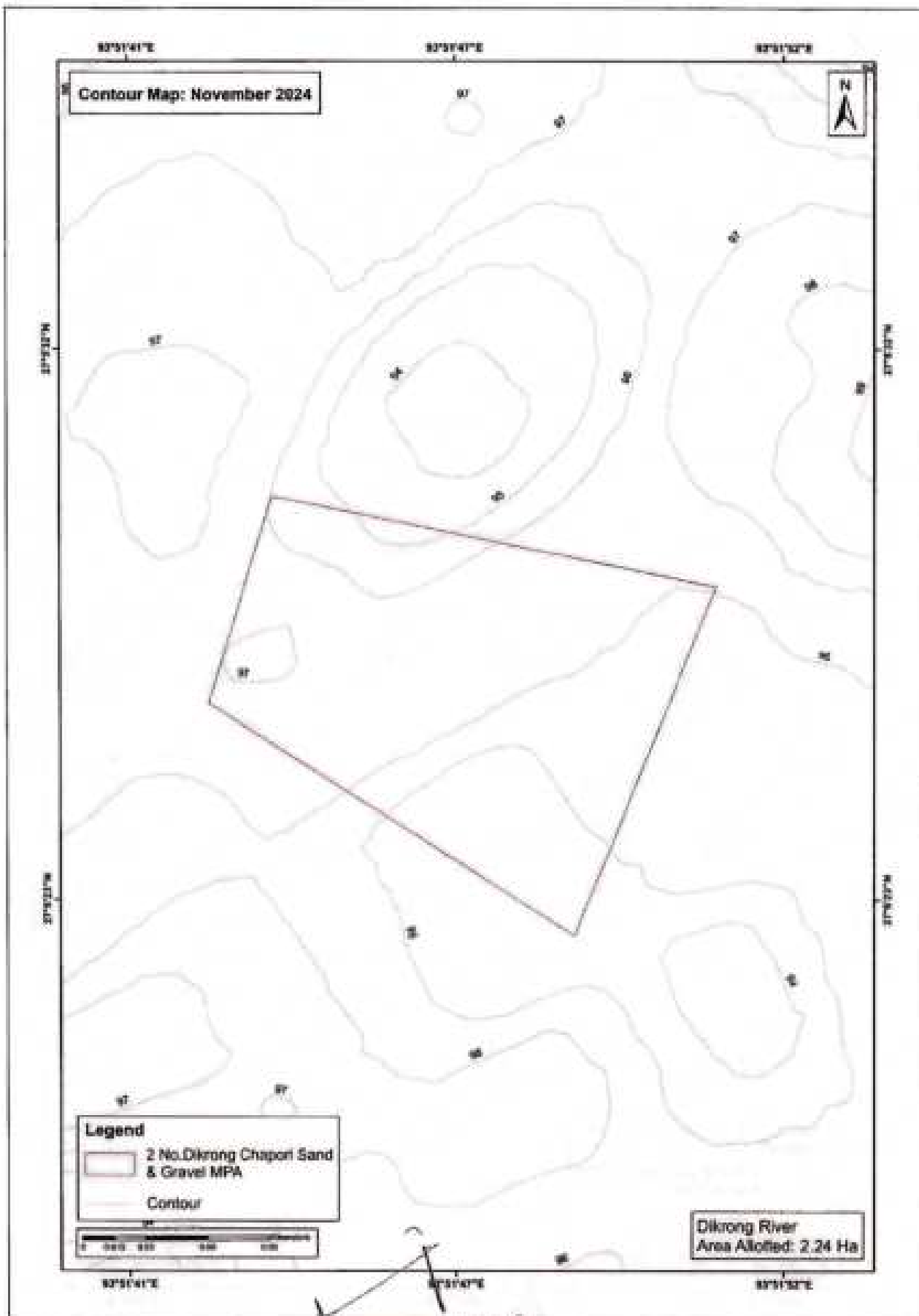
Legend

- 2 No. Dikrong Chapori Sand & Gravel MPA
- Contour

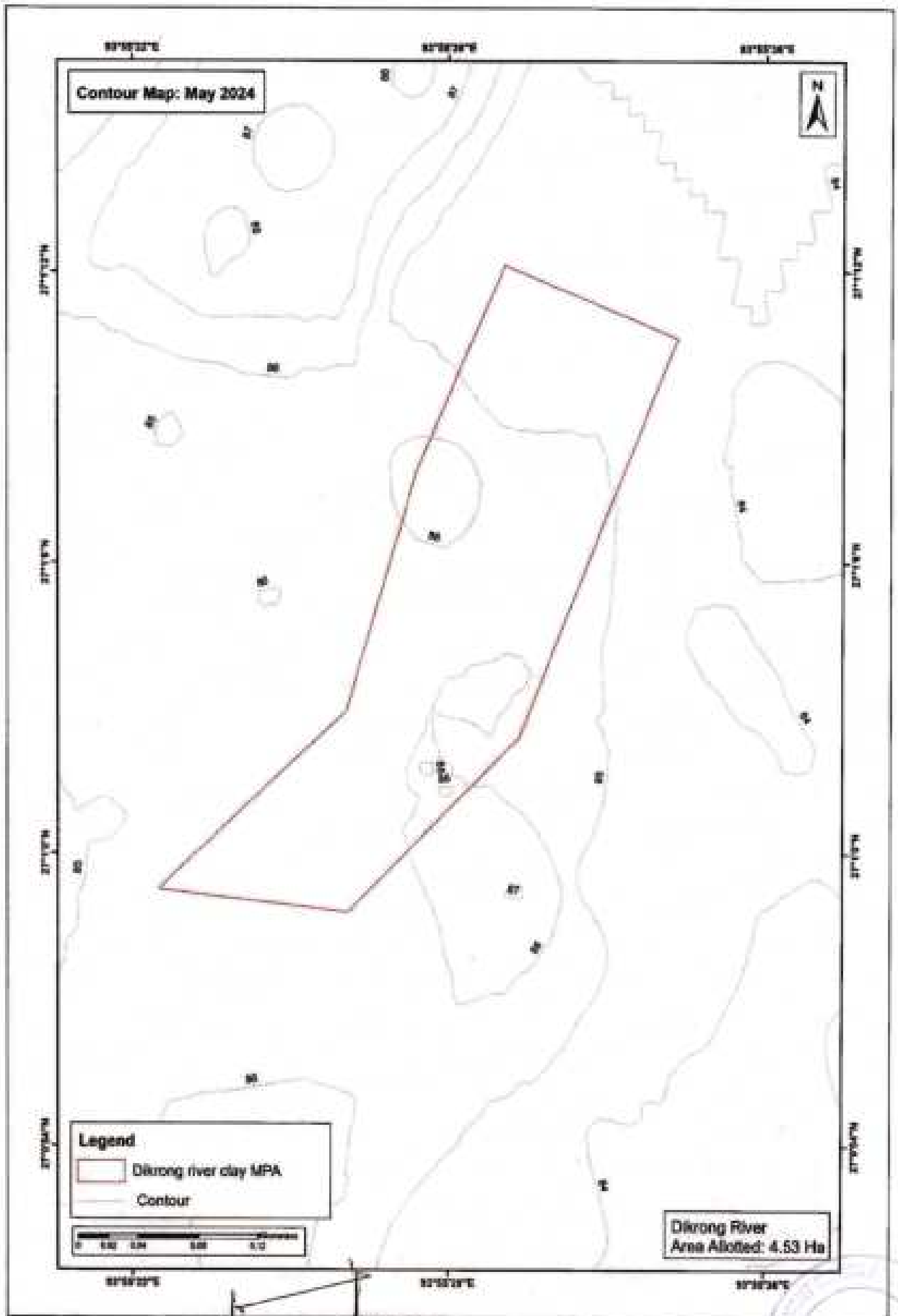


Dikrong River
Area Allotted: 2.24 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: May 2024

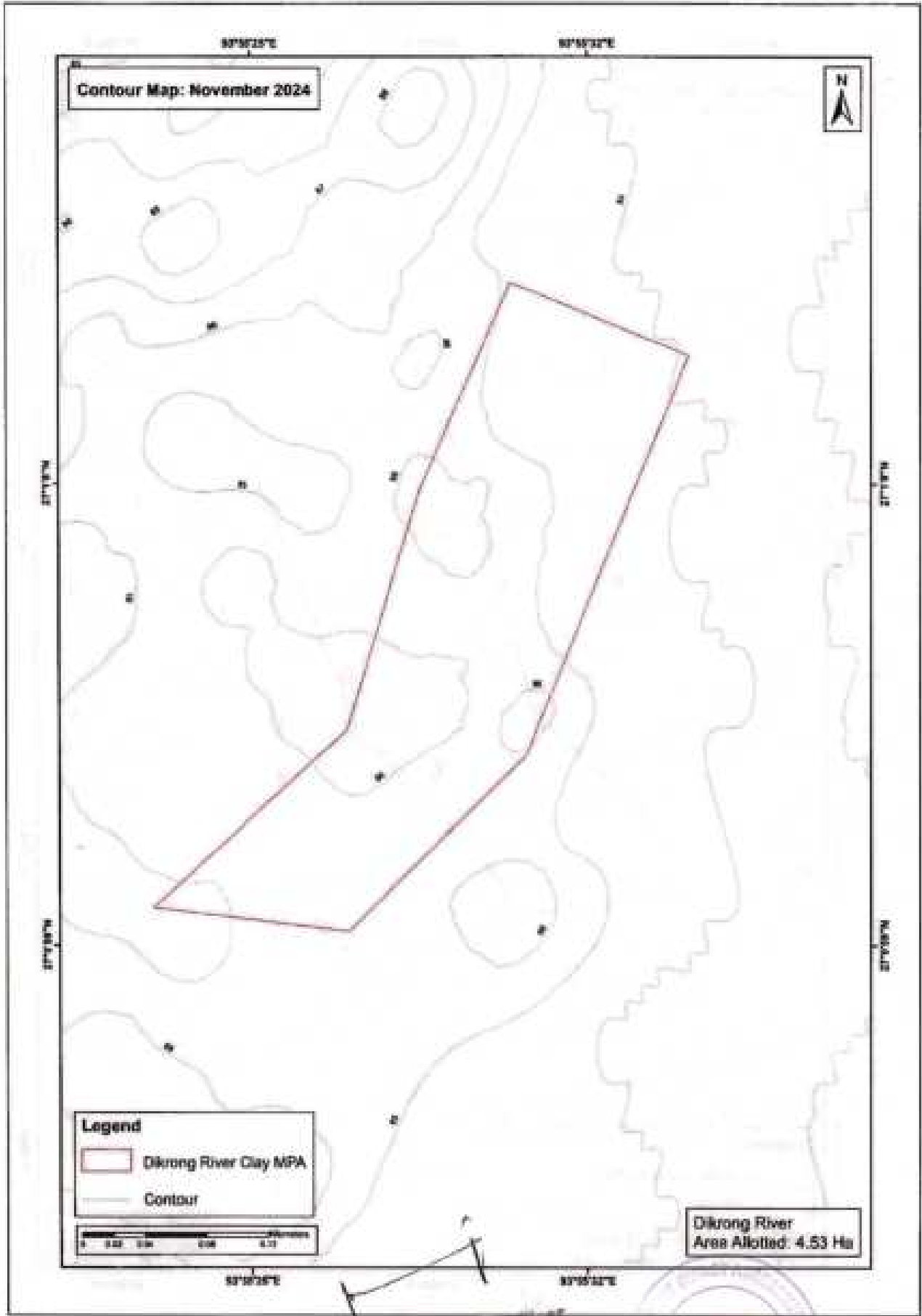
Legend
 Dikrong river clay MPA
 Contour



Dikrong River
 Area Alloted: 4.53 Ha

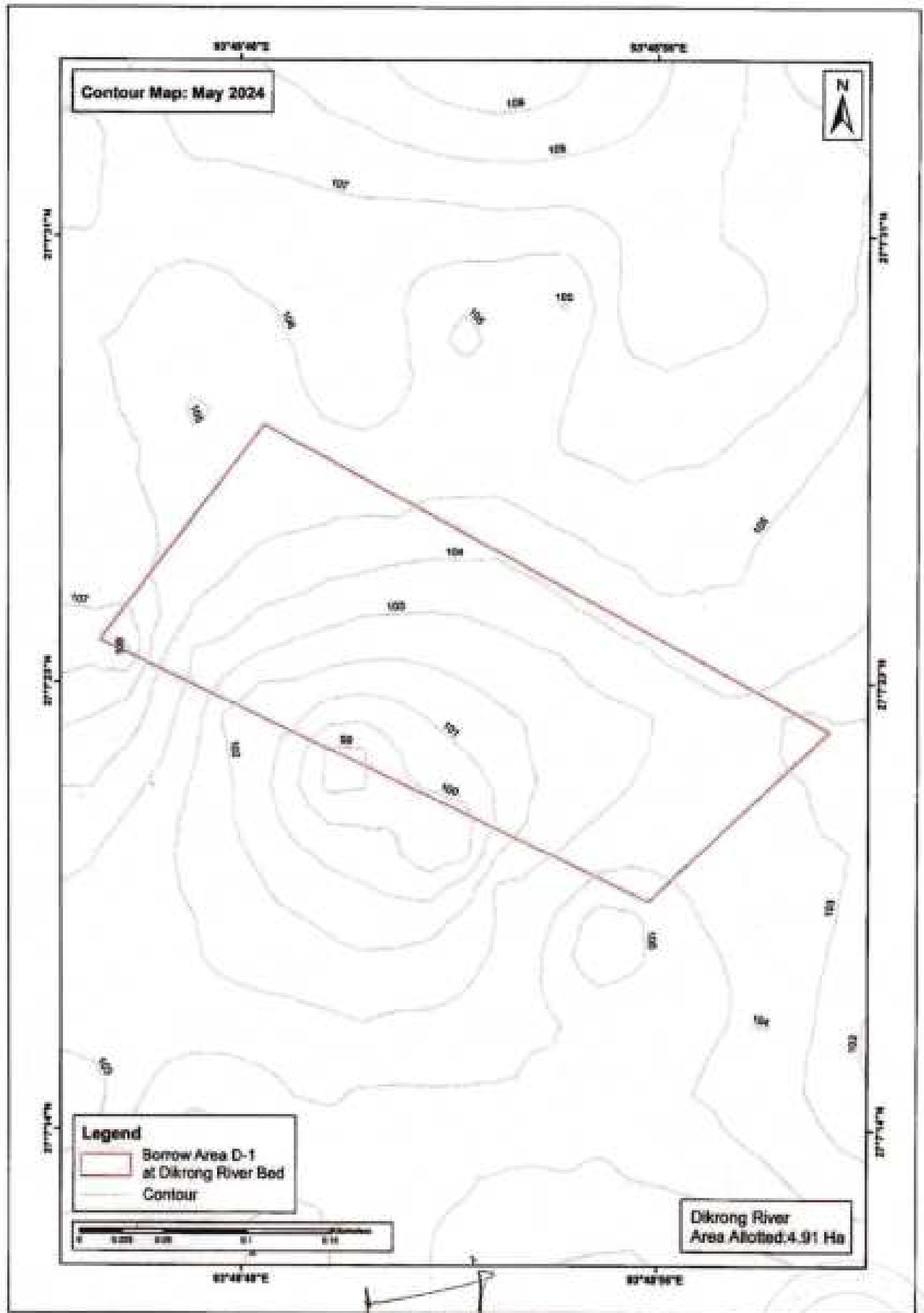
Divisional Forest Officer,
 Lakhimpur Division
 North Lakhimpur.





Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

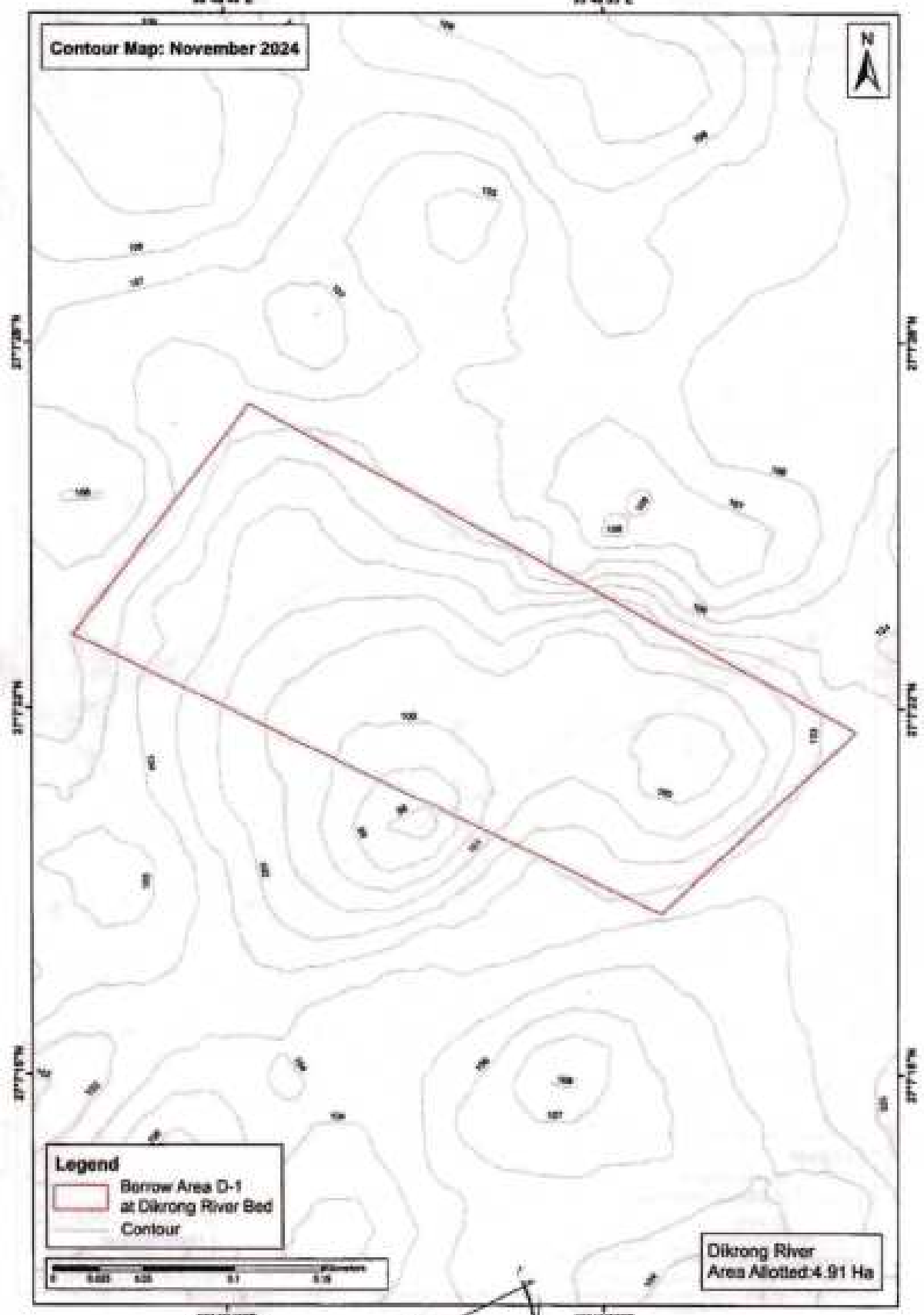




Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024

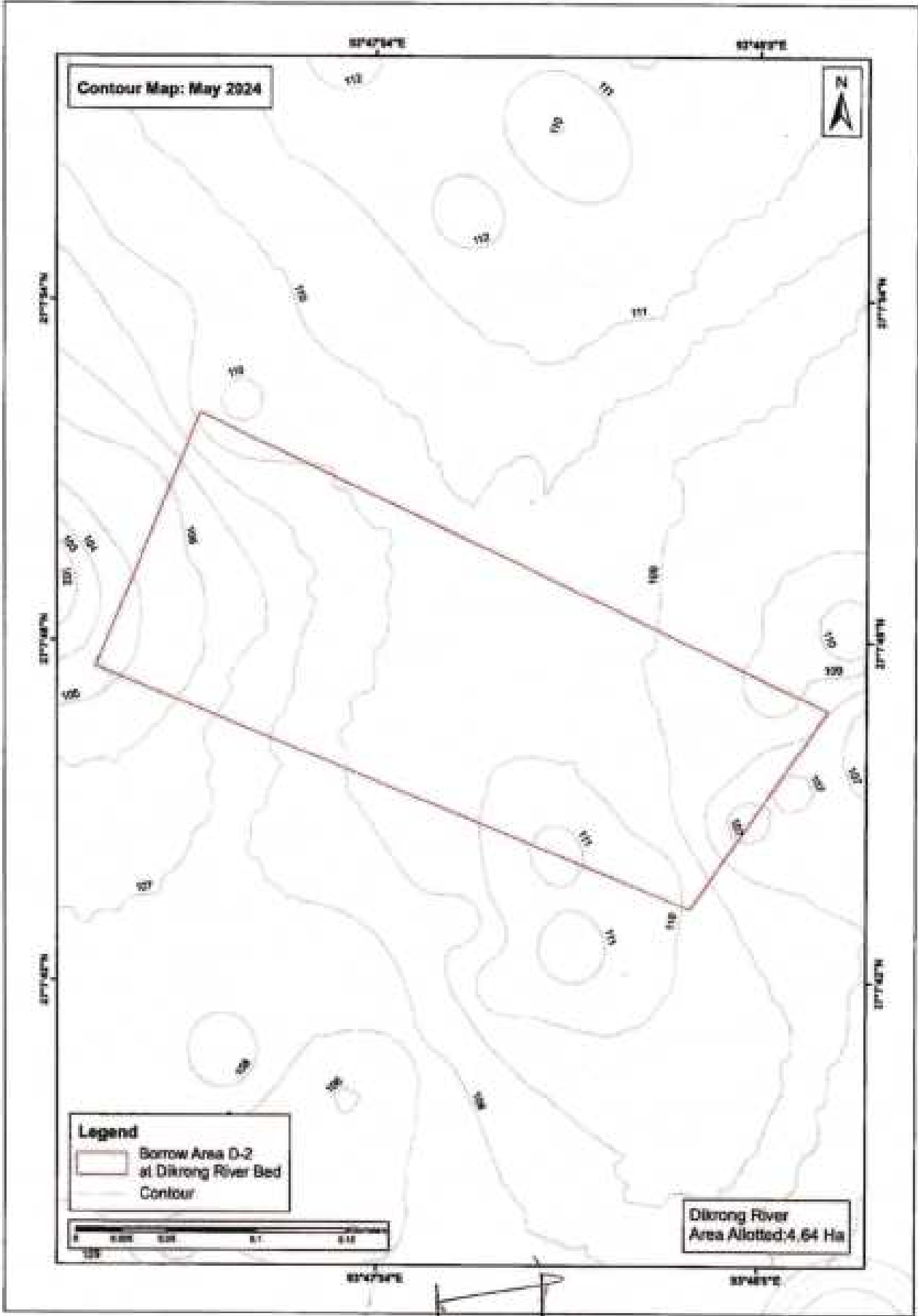


Legend
Borrow Area D-1
at Dikrong River Bed
Contour



Dikrong River
Area Allotted: 4.91 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

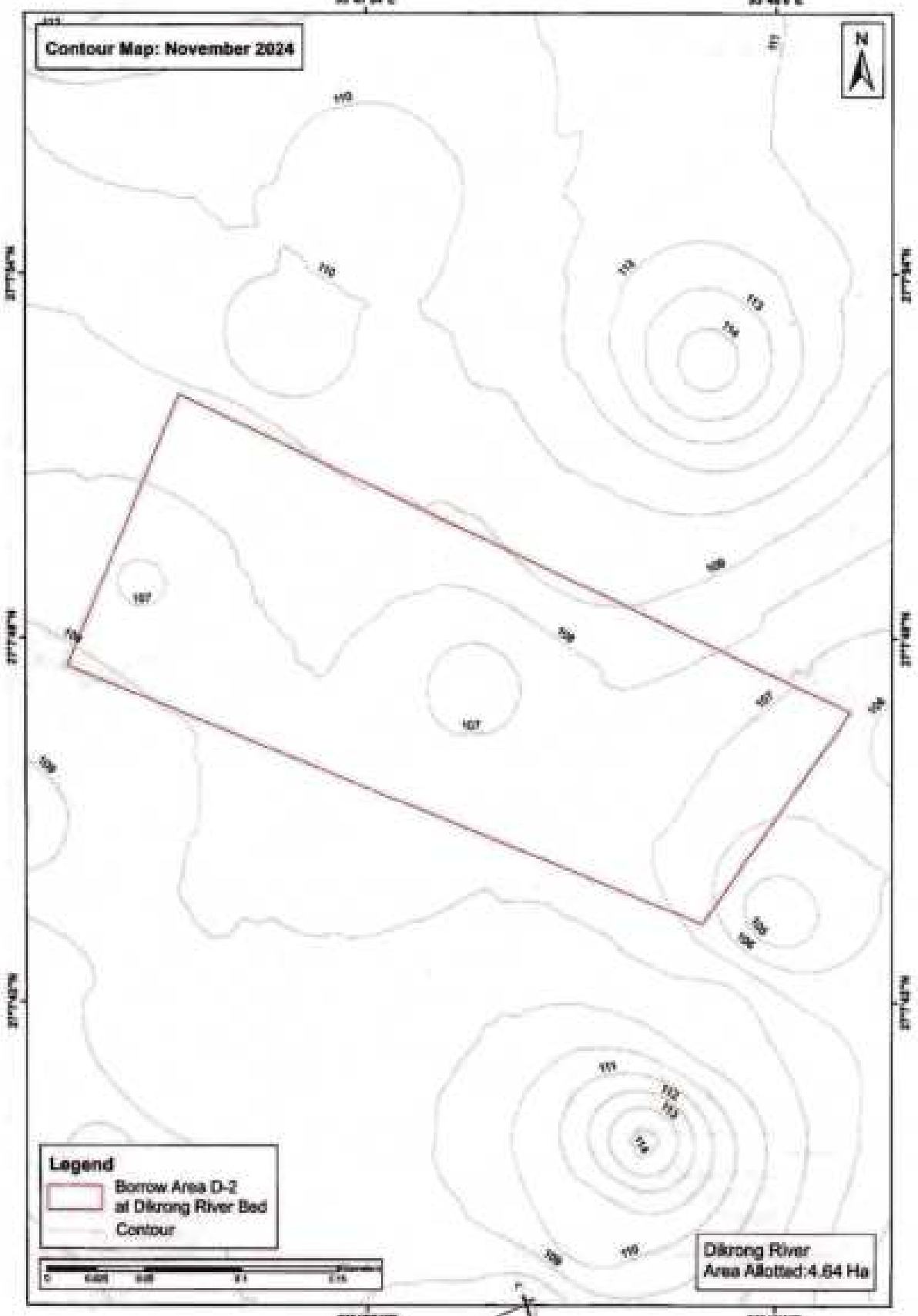


- 001 -

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024

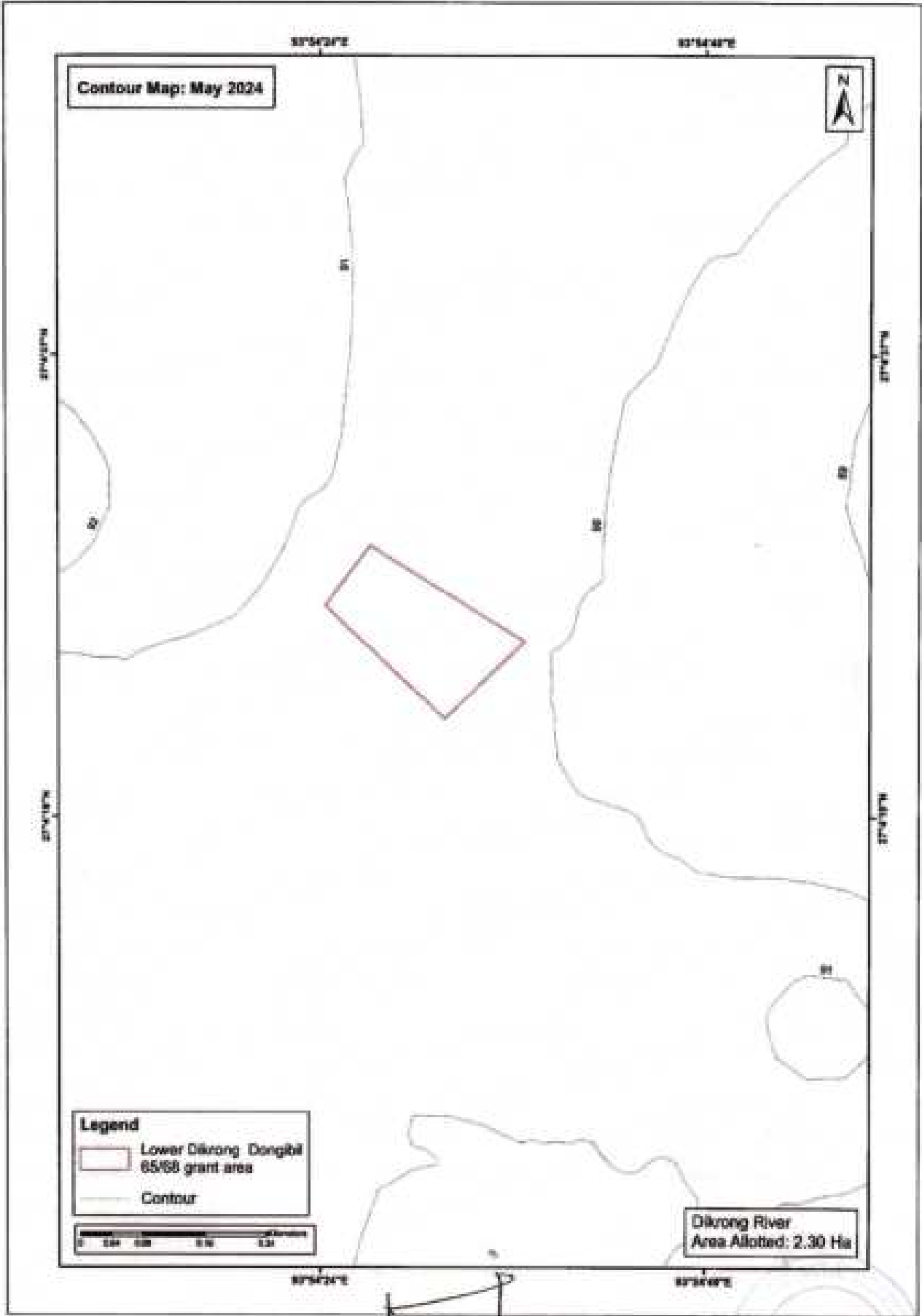


Legend
Borrow Area D-2
at Dikrong River Bed
Contour



Dikrong River
Area Allotted: 4.64 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: May 2024



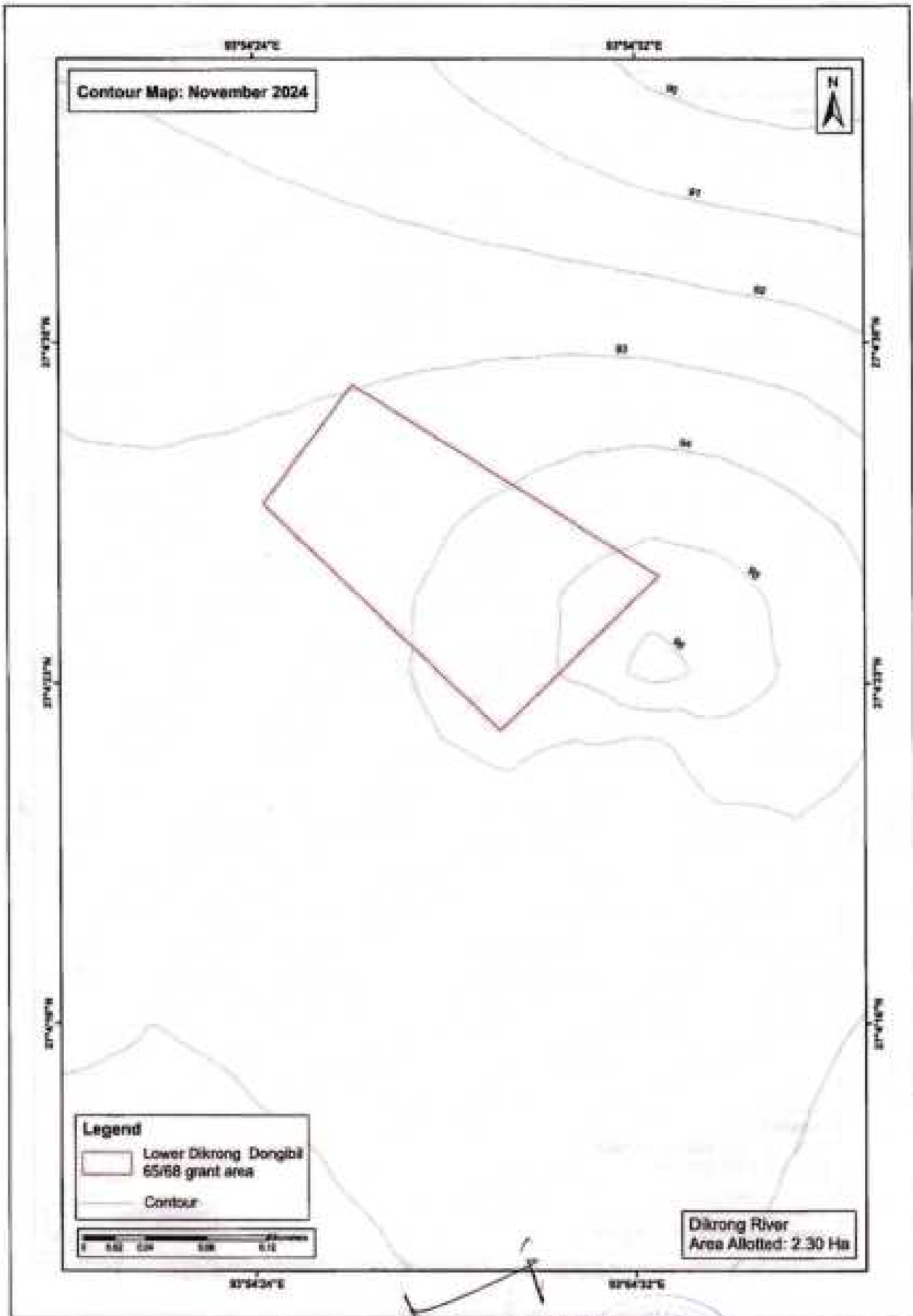
Legend
Lower Dikrong Dongbil
65/68 grant area
Contour



Dikrong River
Area Allotted: 2.30 Ha

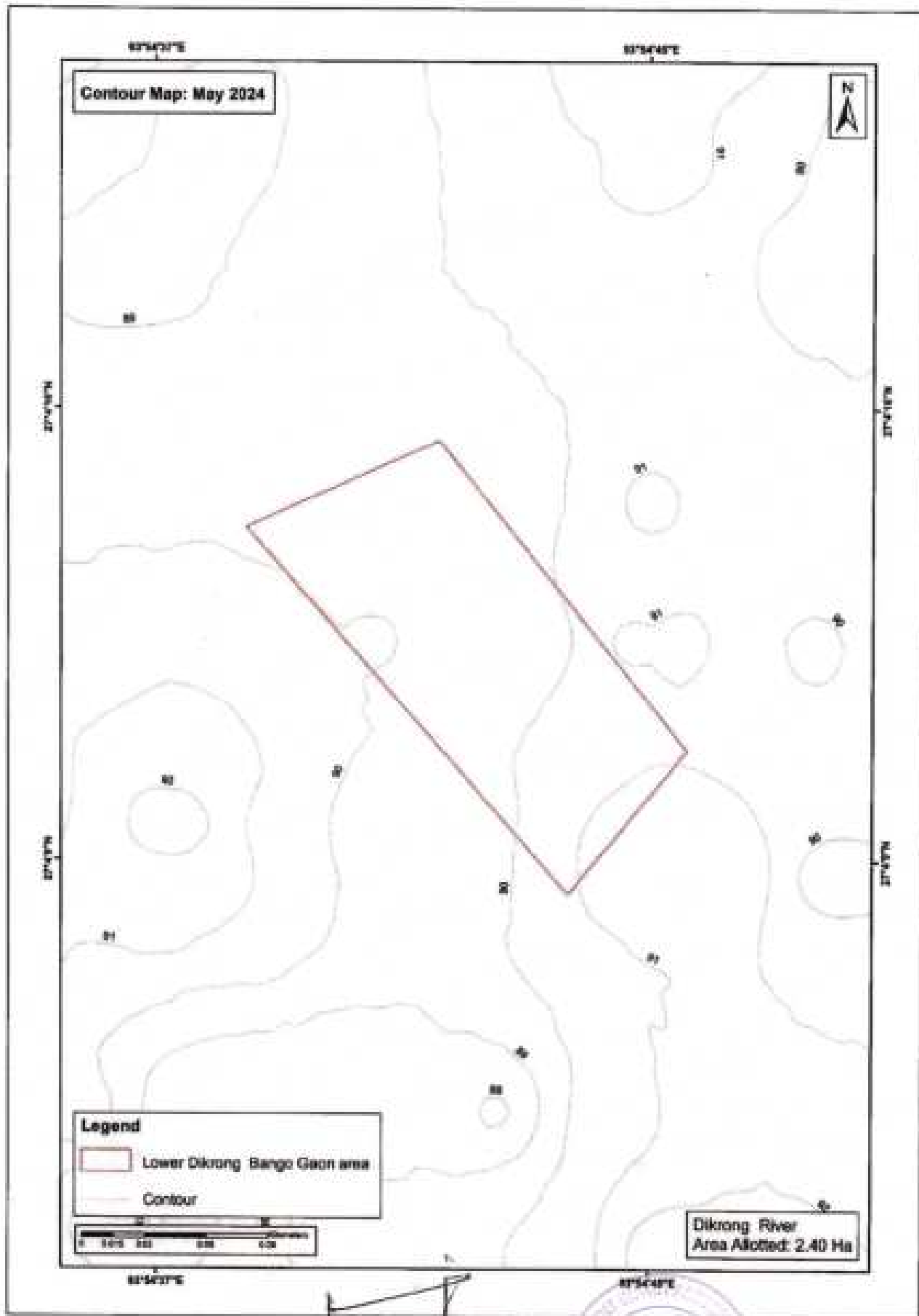
Divisional Forest Officer
Lokhimpur Division
North Lakhimpur.





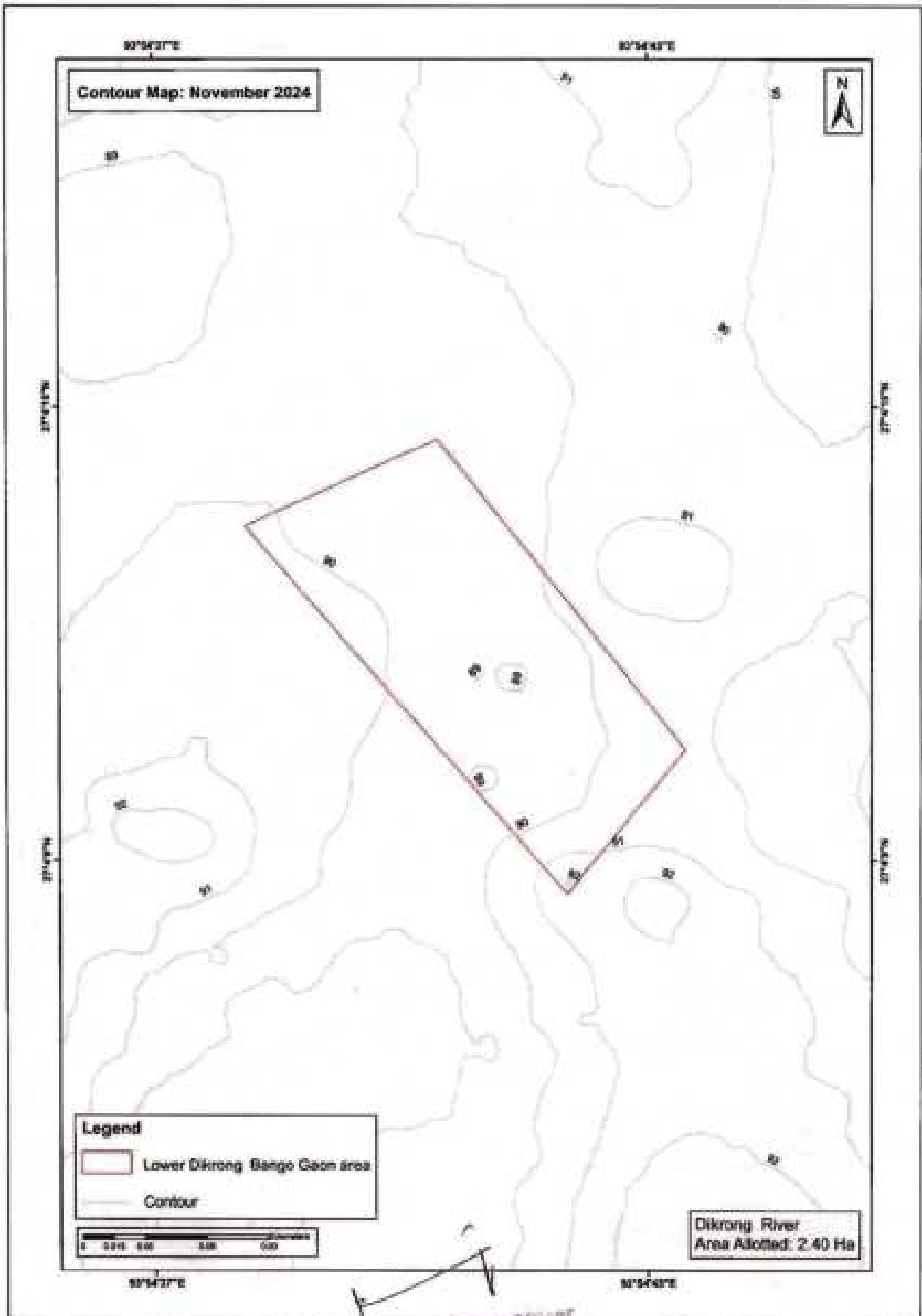
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur

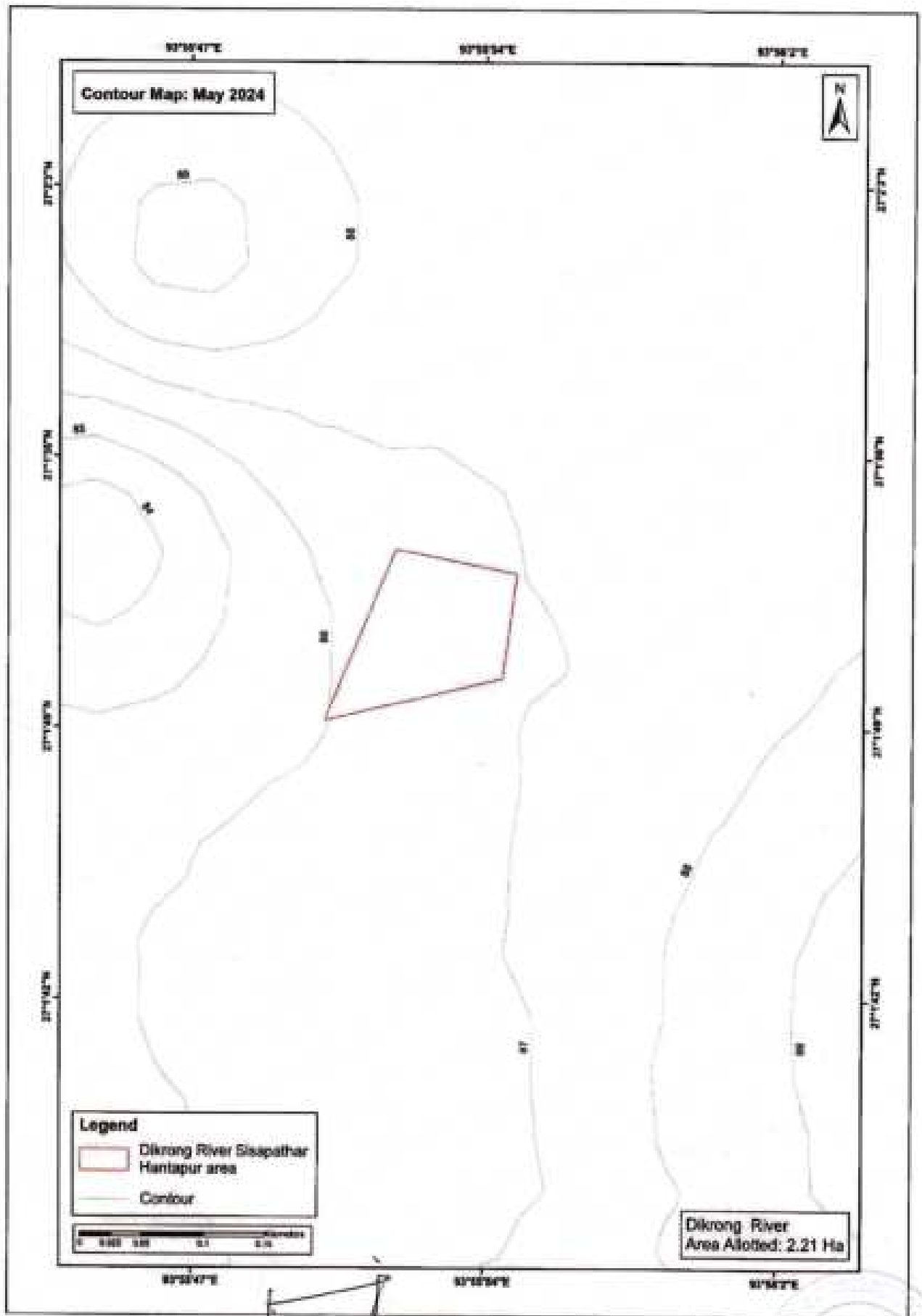




Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.







Contour Map: May 2024



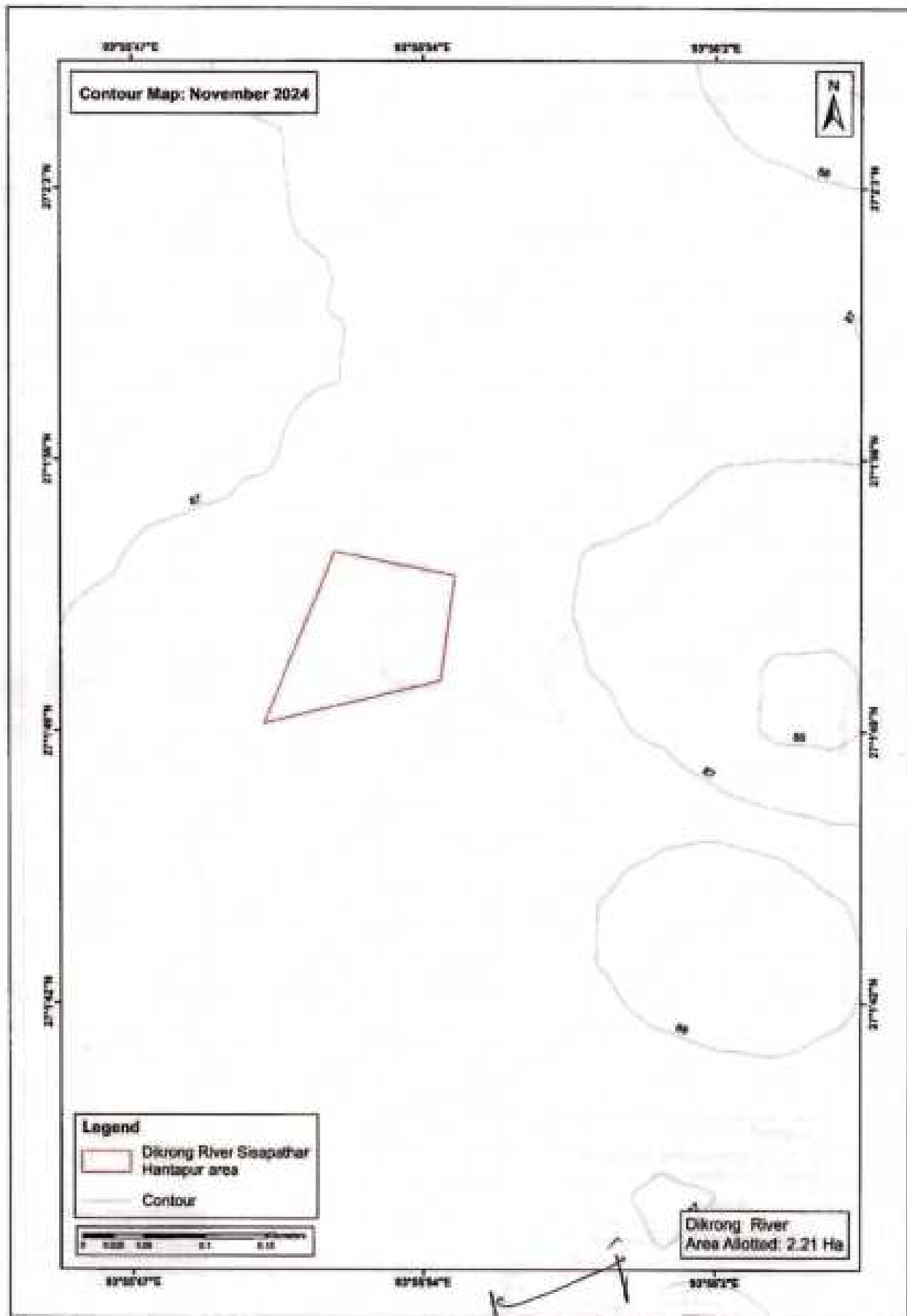
Legend
Dikrong River Sloopathar Hantapur area
Contour



Dikrong River Area Allotted: 2.21 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Contour Map: November 2024

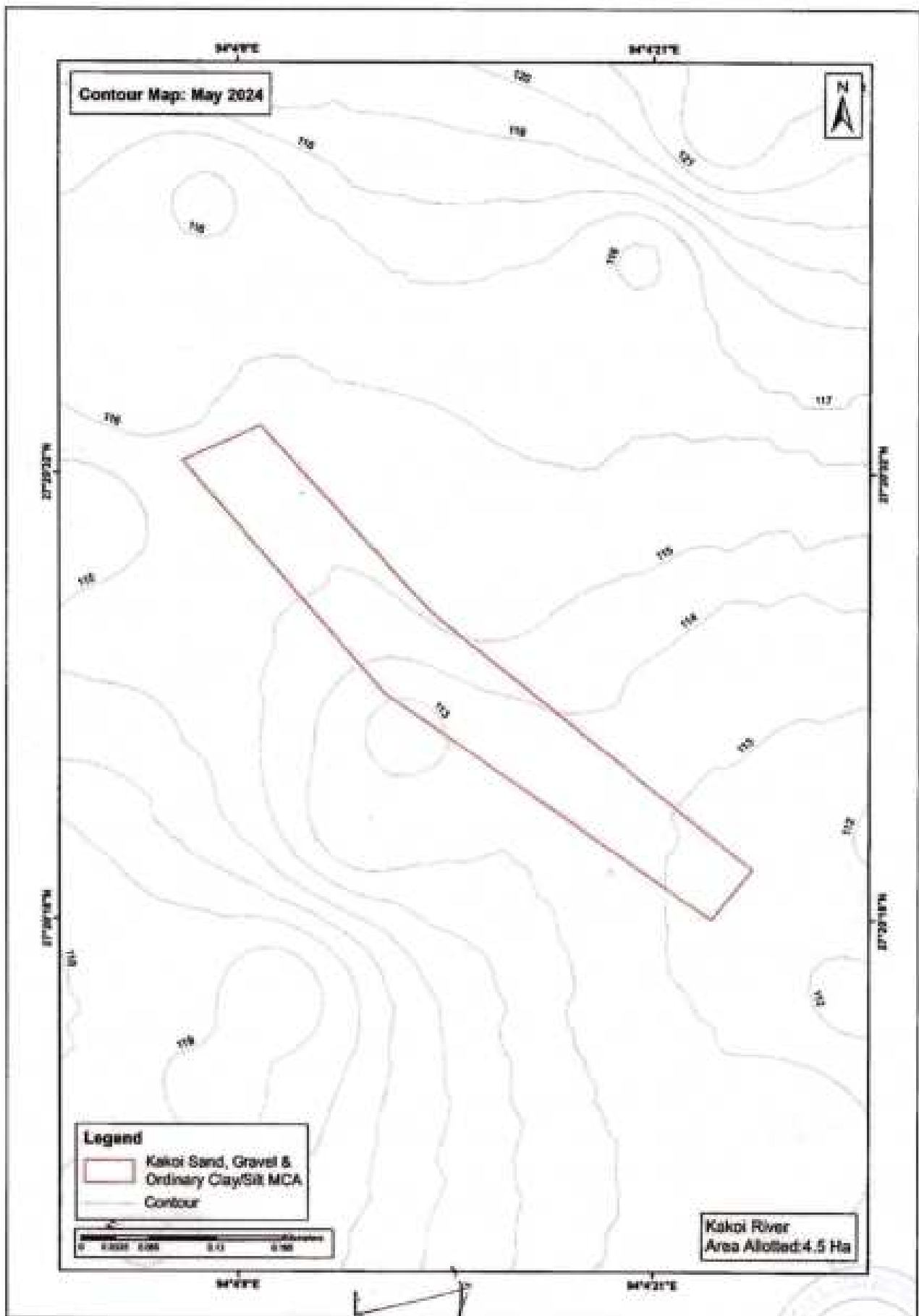
Legend
 [Red Outline] Dikrong River Soapather Hantapur area
 [Line] Contour



Dikrong River Area Allotted: 2.21 Ha

Divisional Forest Officer
 Lakhimpur Division
 North Lakhimpur.



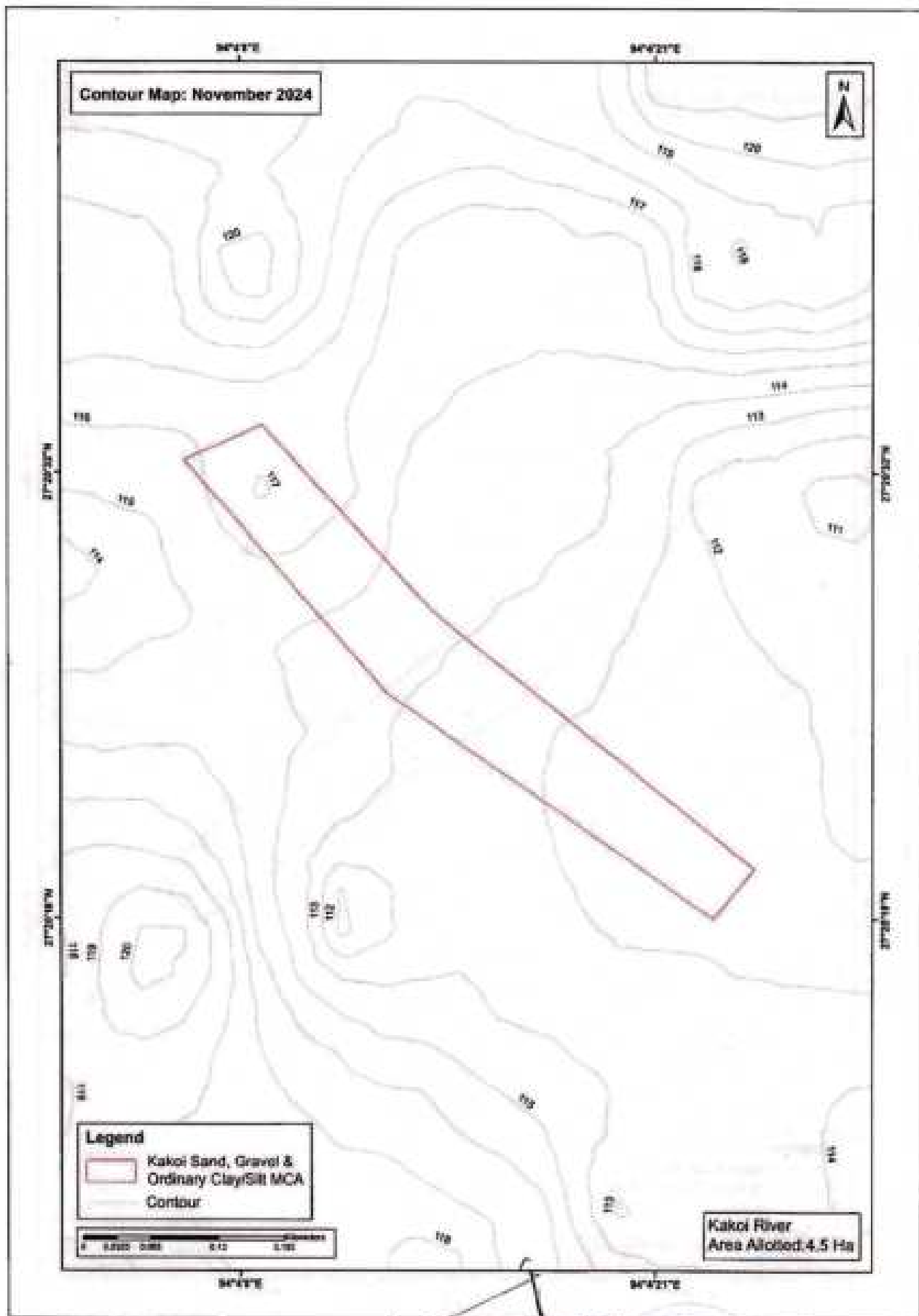


Legend
Kakoi Sand, Gravel &
Ordinary Clay/Silt MCA
Contour

Kakoi River
Area Allotted: 4.5 Ha

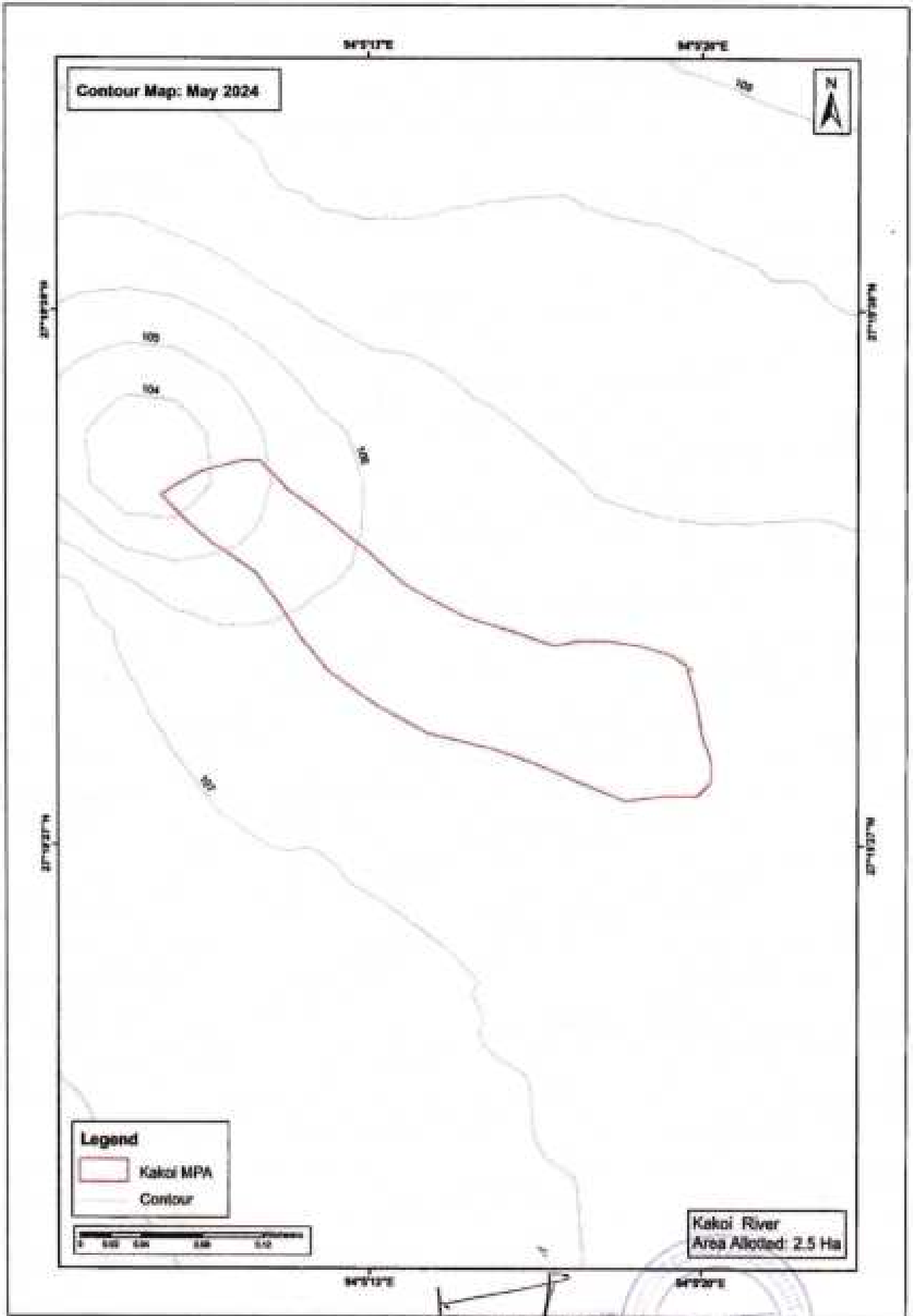
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

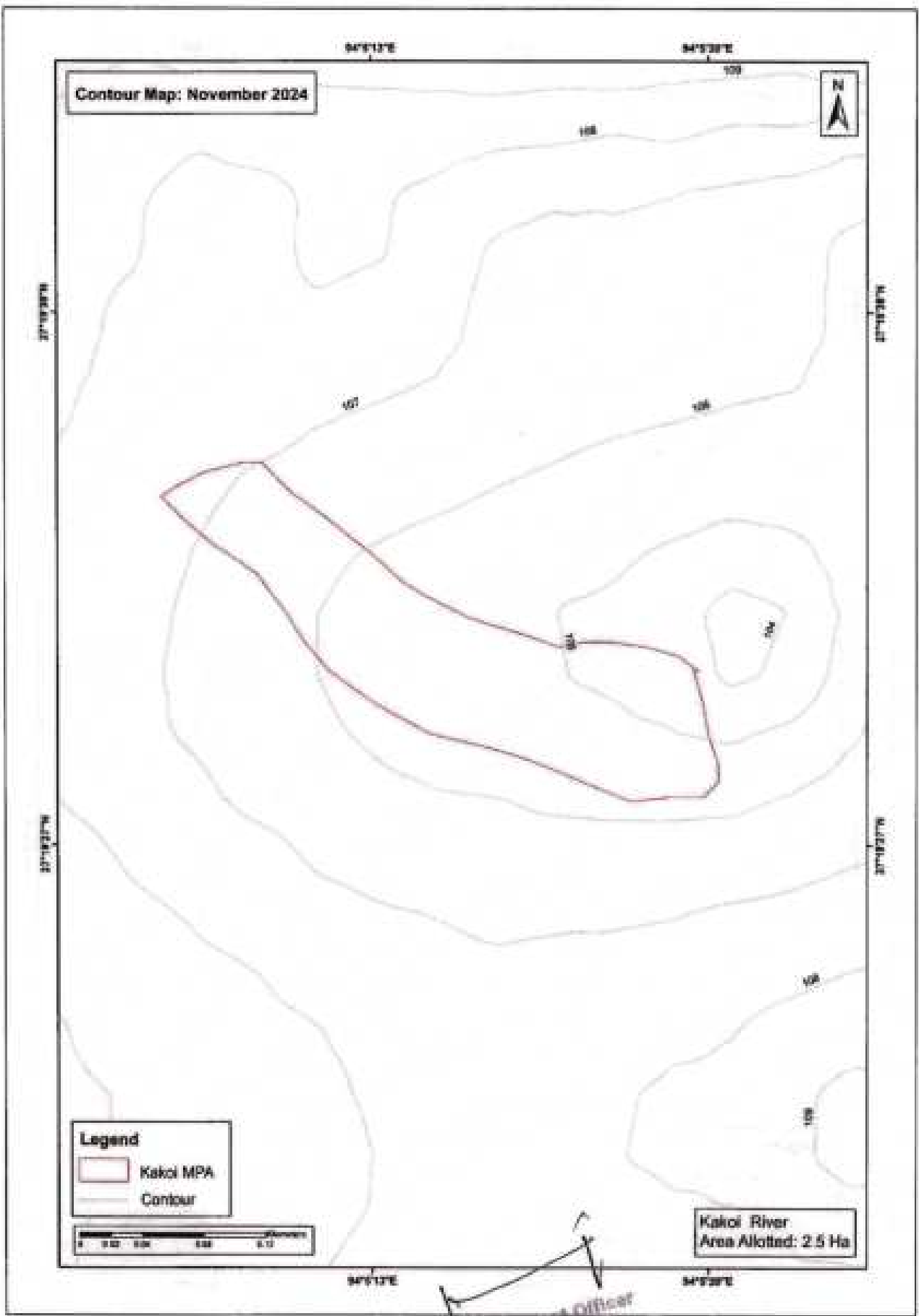




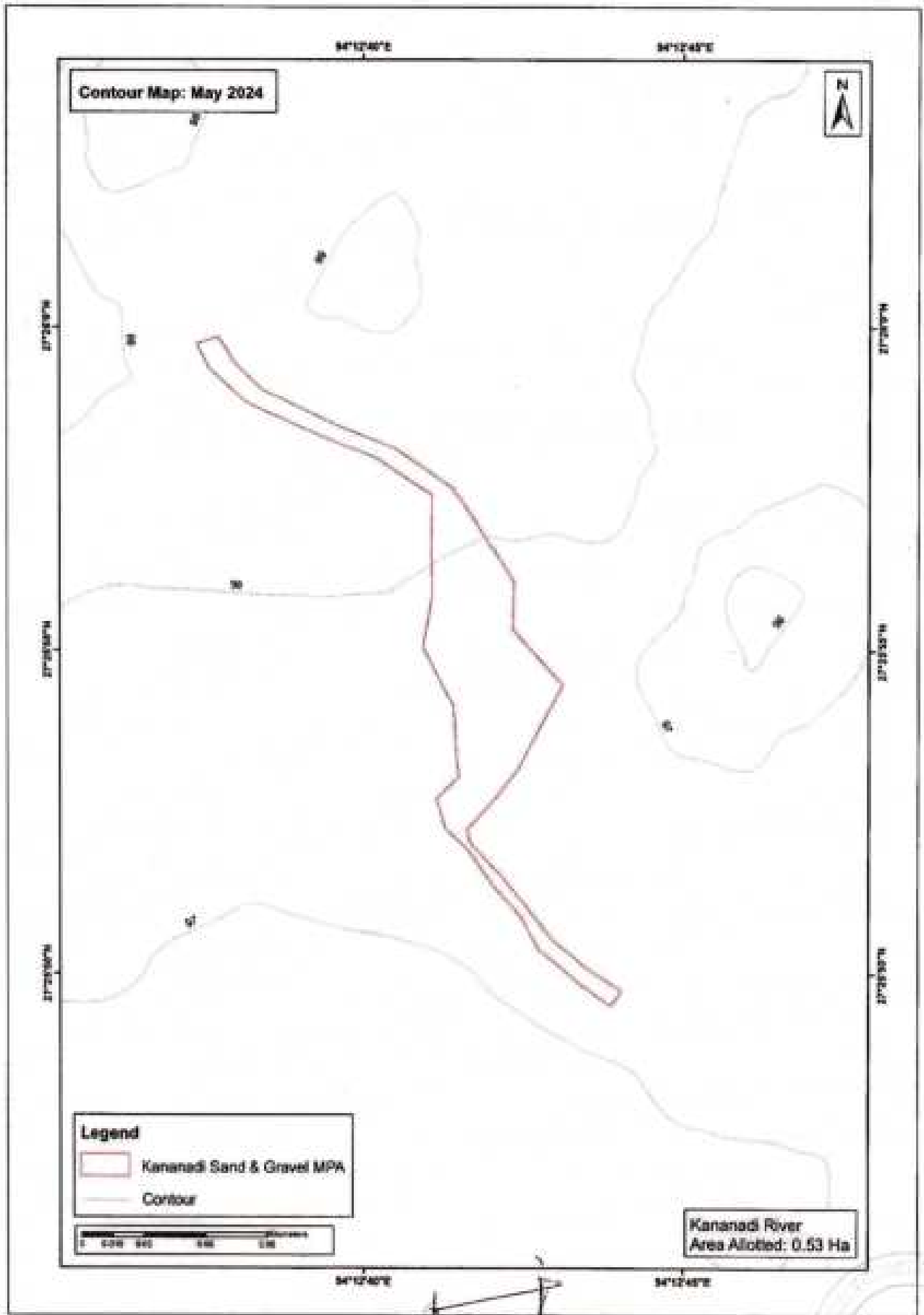
Kakoi River
Area Allotted: 2.5 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: May 2024



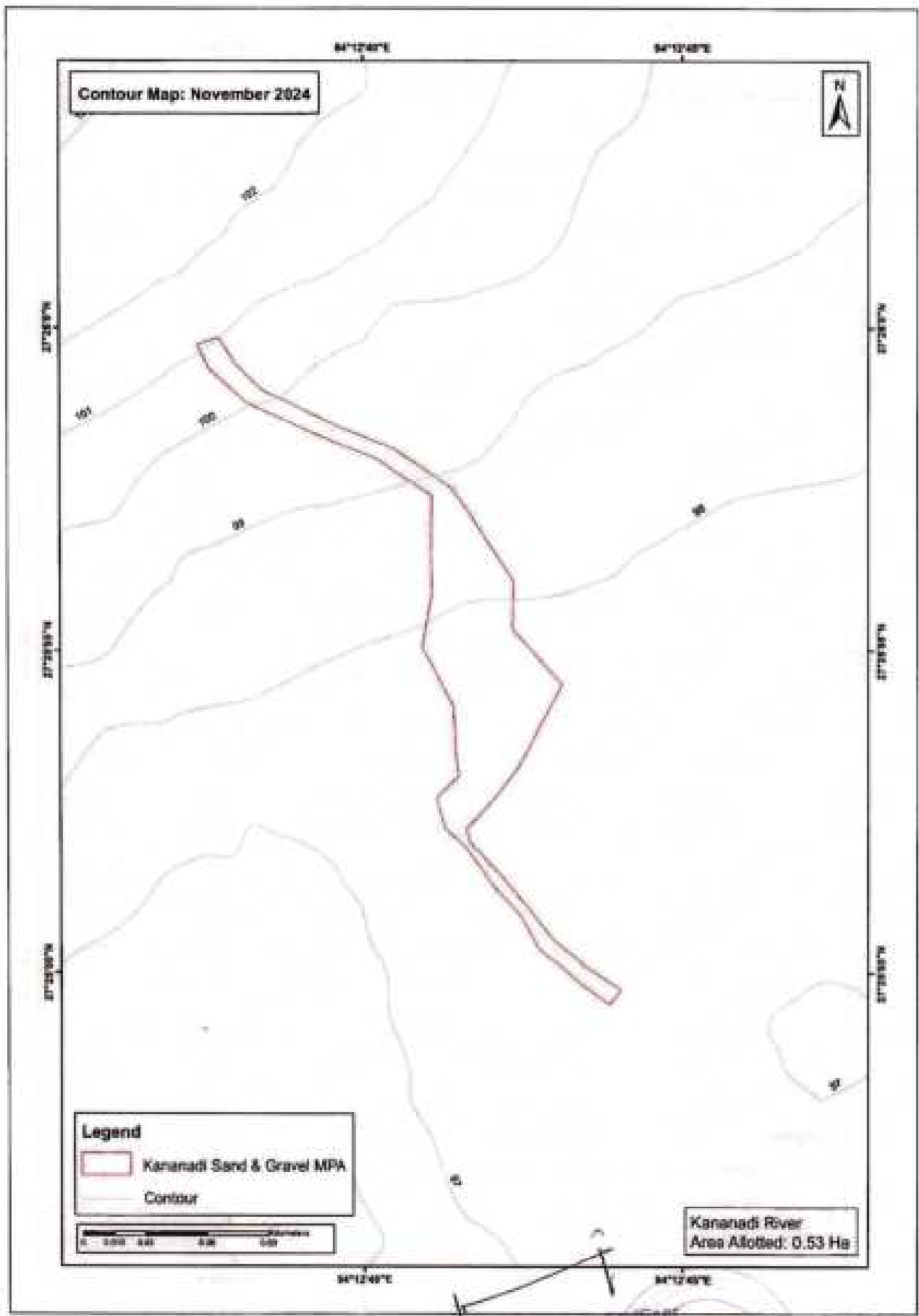
Legend
Kananadi Sand & Gravel MPA
Contour



Kananadi River
Area Allotted: 0.53 Ha

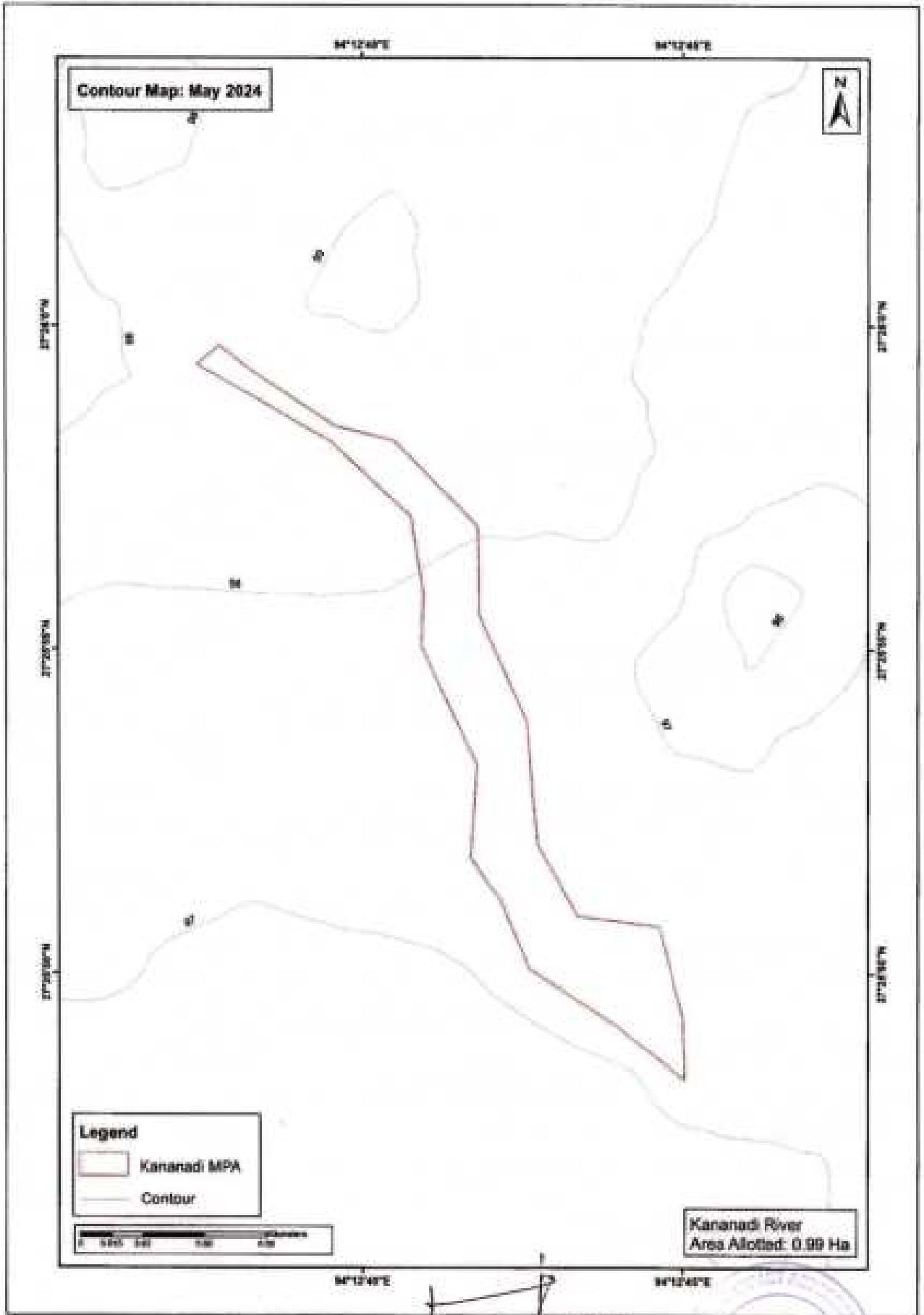
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



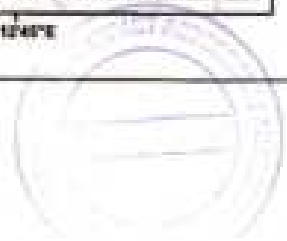


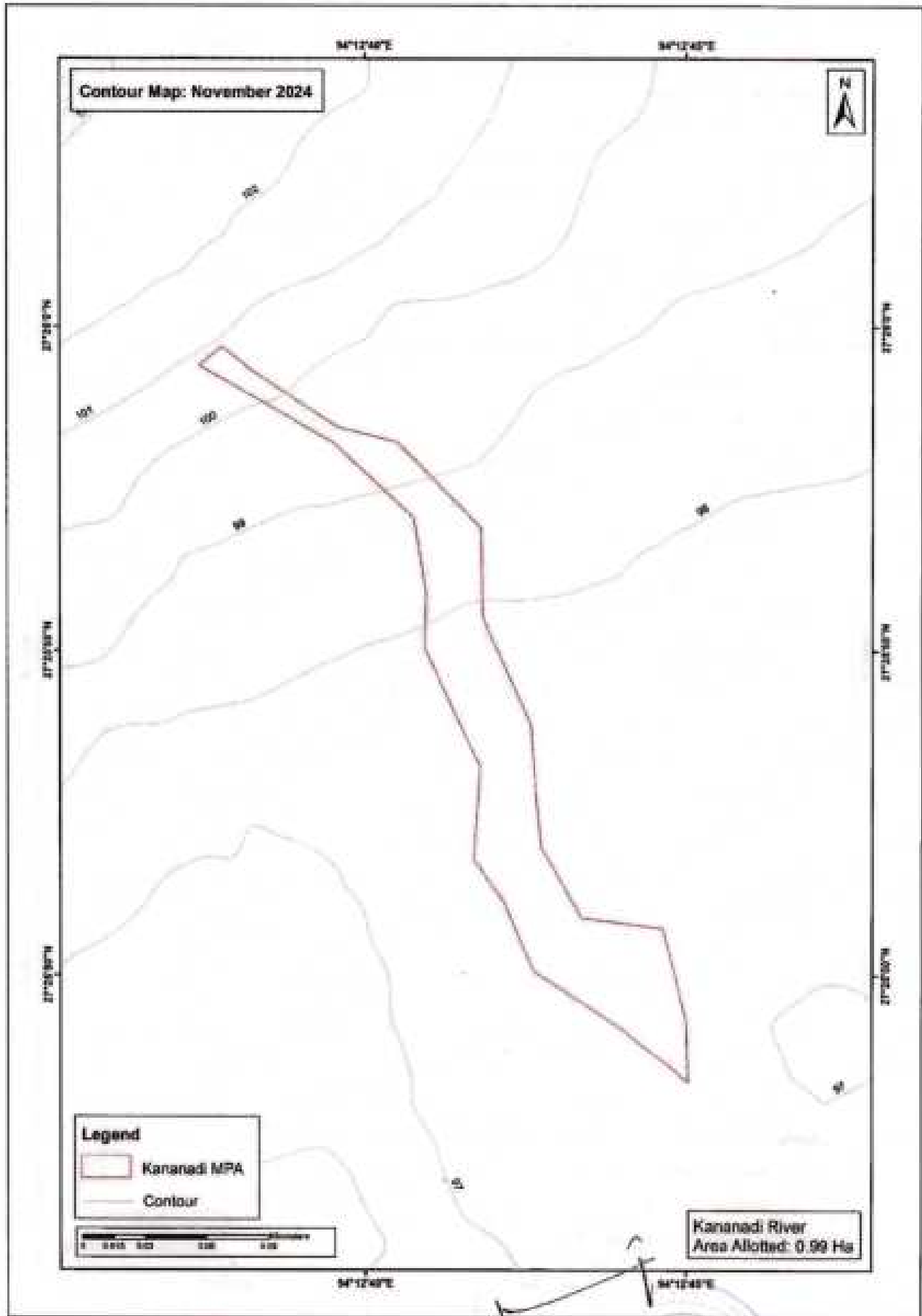
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



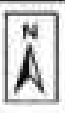


Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Contour Map: November 2024

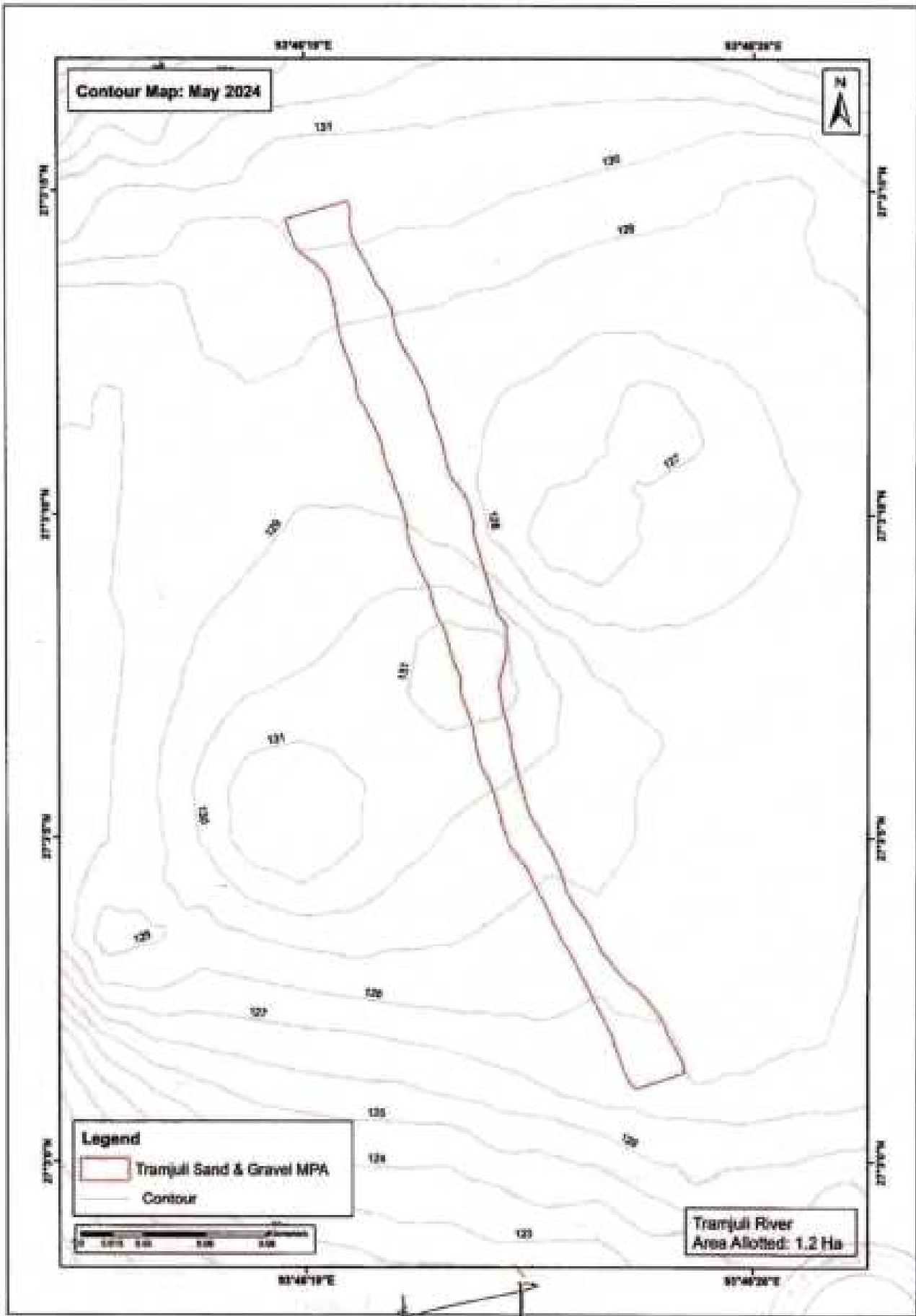


Legend
Kananadi MPA
Contour



Kananadi River
Area Allotted: 0.99 Ha

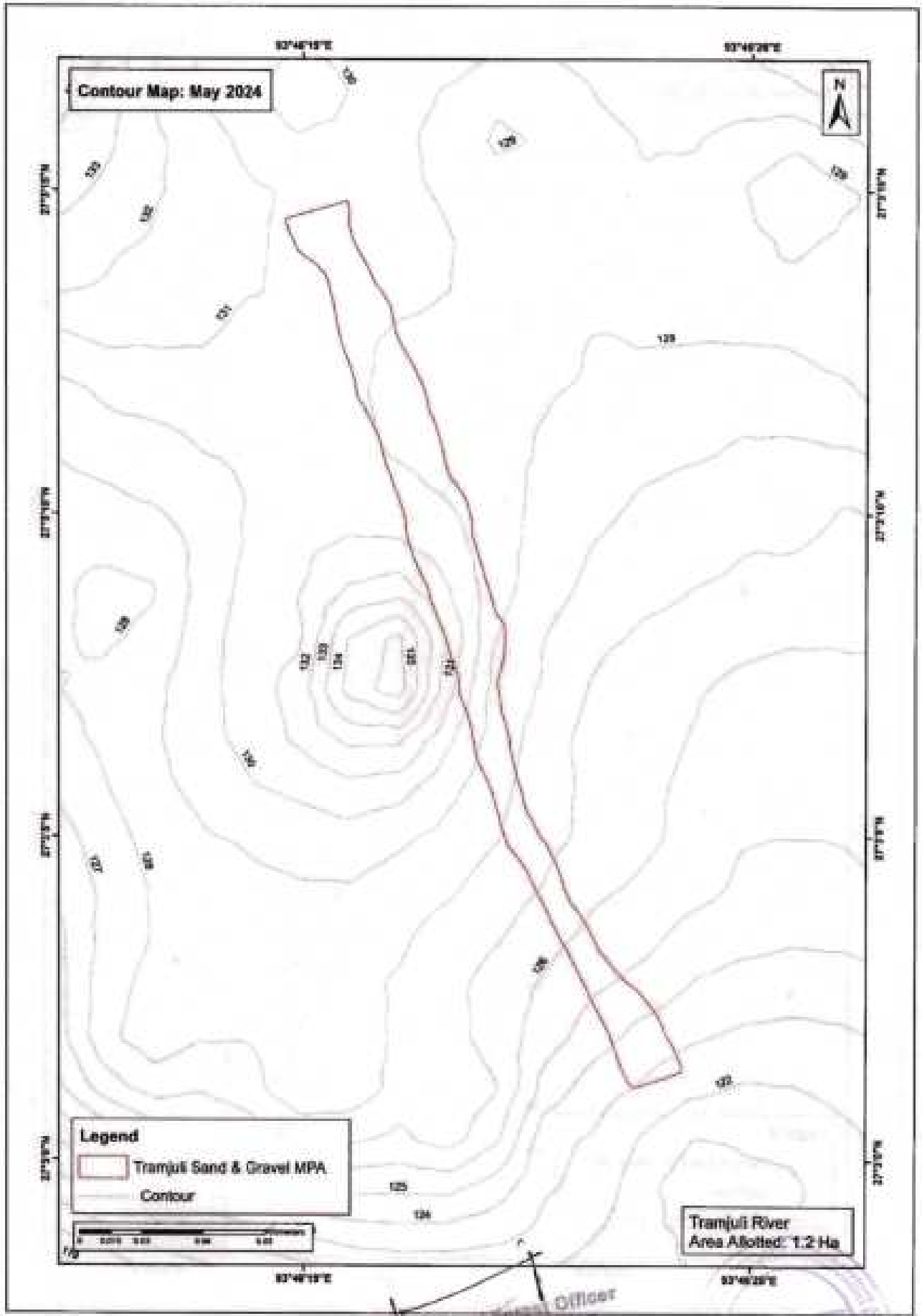
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur



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Divisional Forest Officer,
Lakhimpur Division
North Lakhimpur.





Contour Map: May 2024



Legend

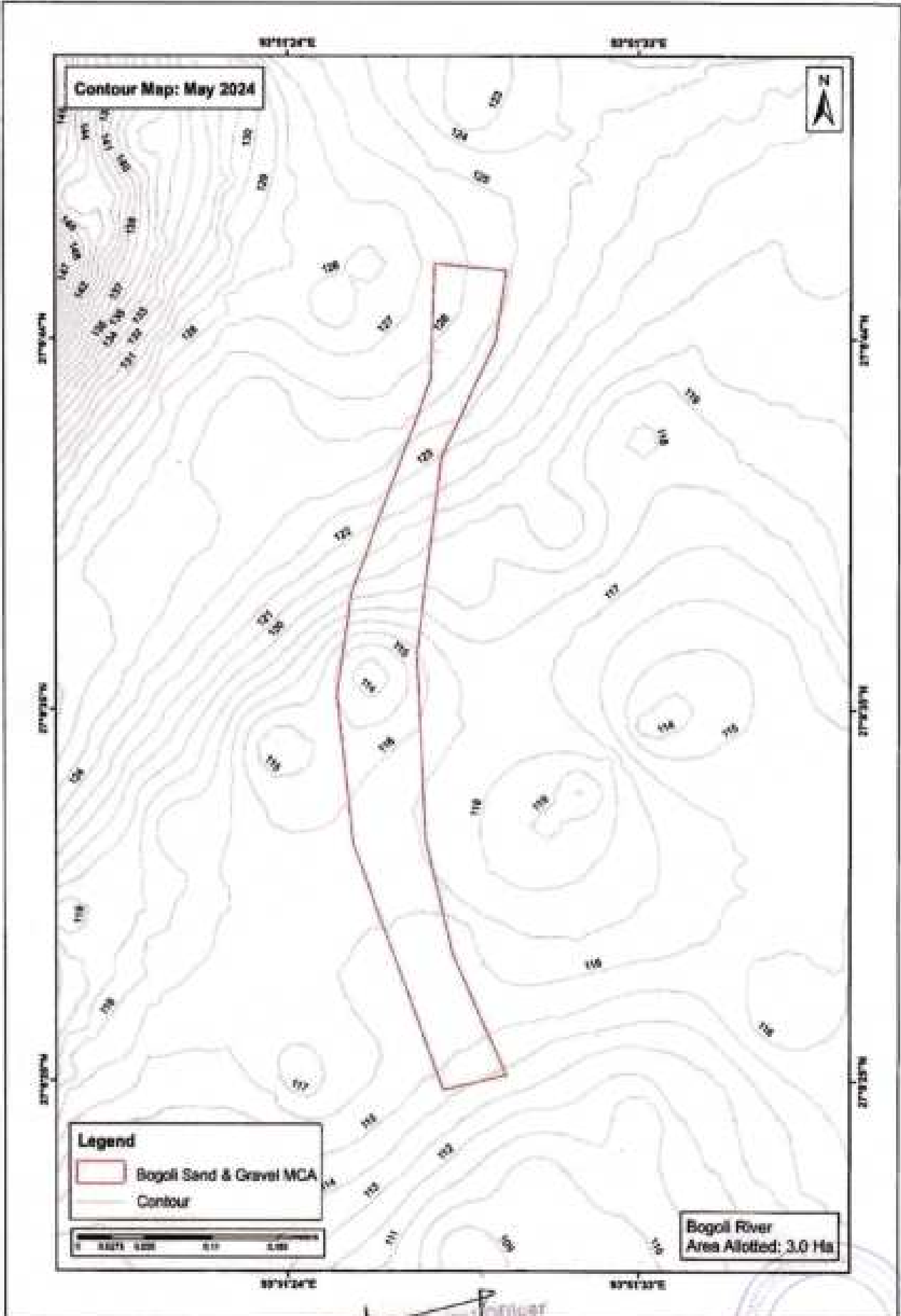
- Tranjuli Sand & Gravel MPA
- Contour



Tranjuli River
Area Allotted: 1.2 Ha

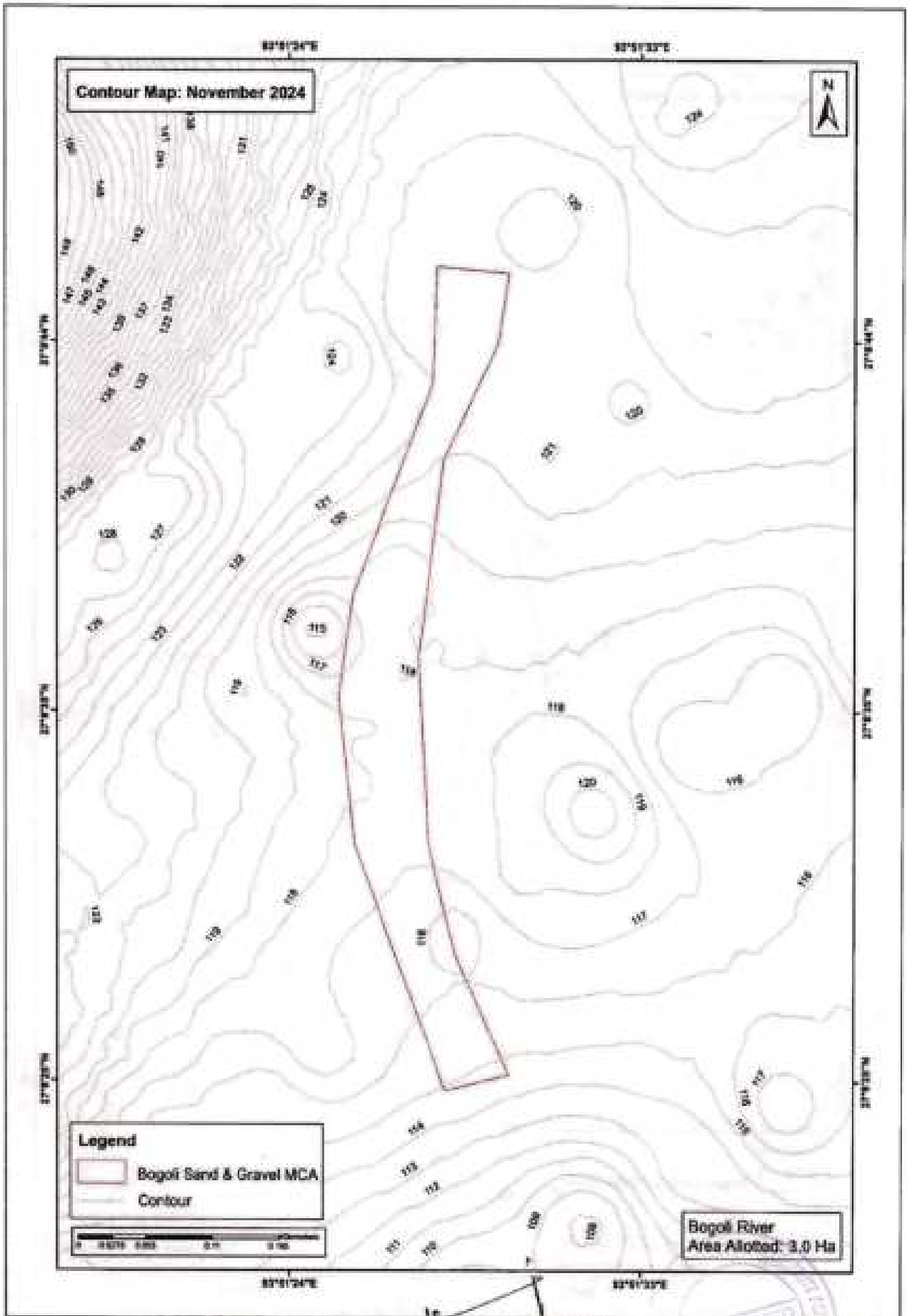
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Dr. J. K. Singh
 Lecturer
 North Lakshimpur.





Contour Map: November 2024

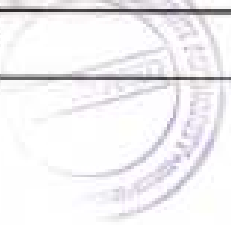


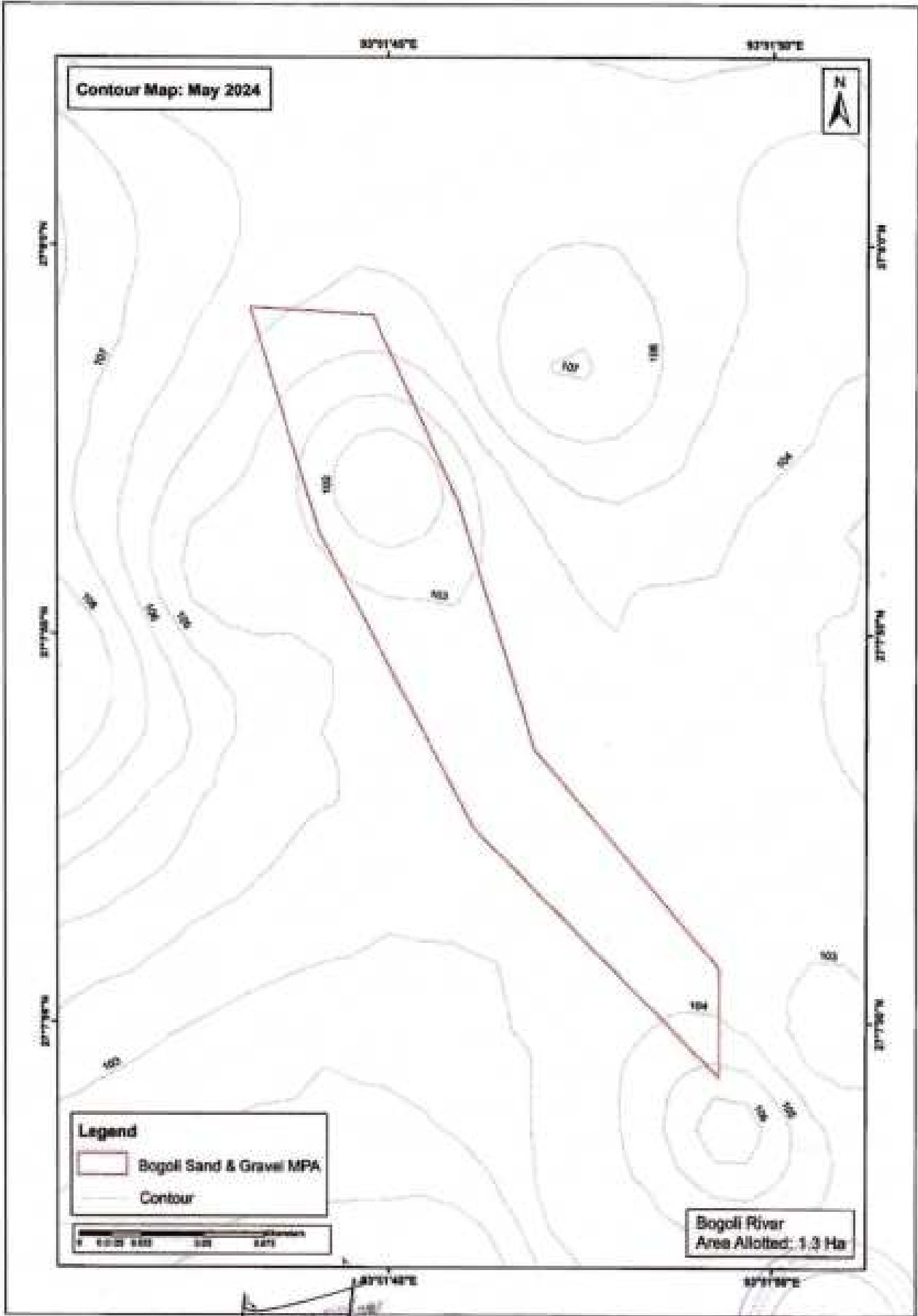
Legend
 Bogoli Sand & Gravel MCA
 — Contour



Bogoli River
 Area Allotted: 3.0 Ha

Divisional Forest Officer
 Lakhimpur Division
 North Lakhimpur.

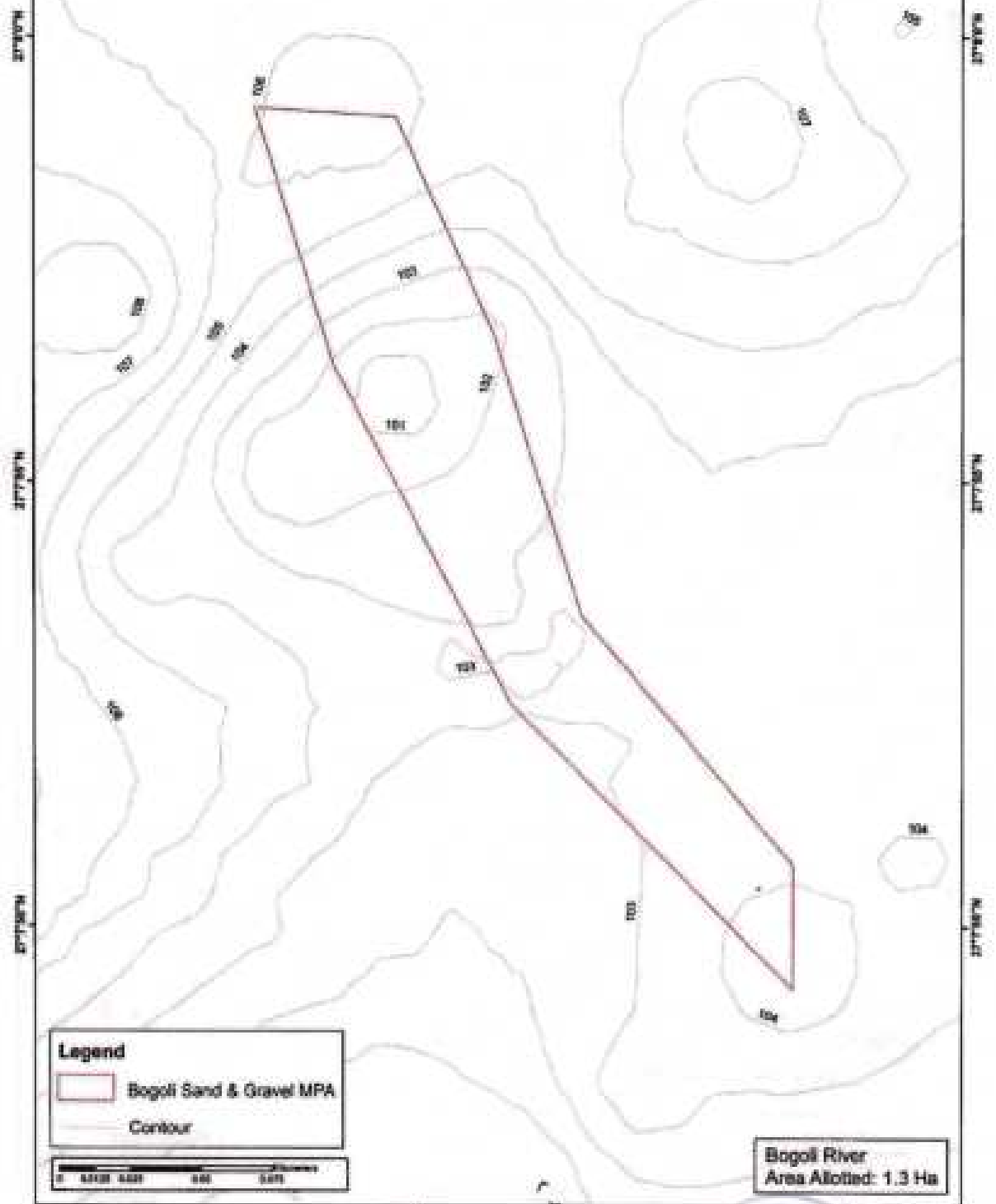






Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024



Legend

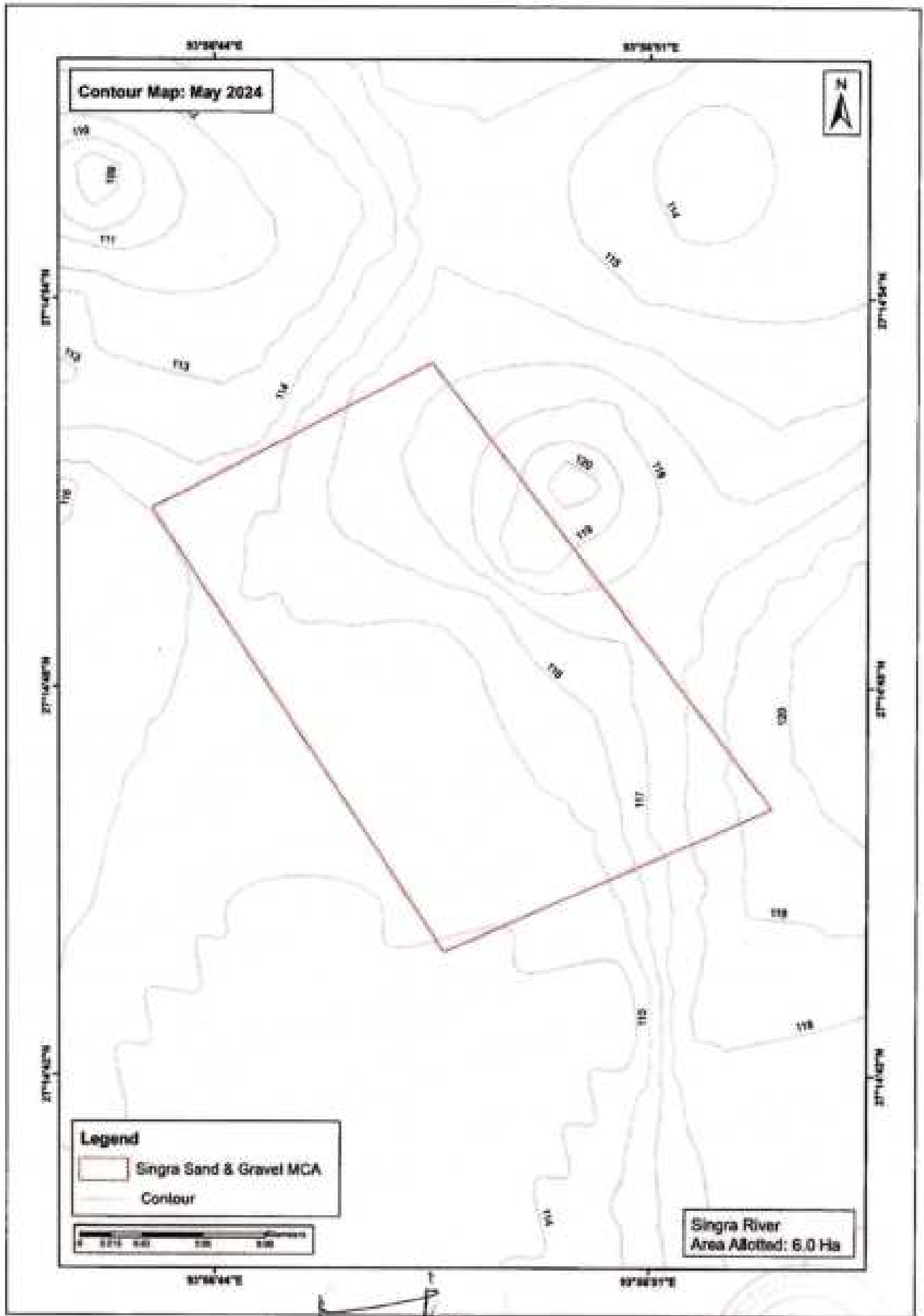
-  Bogoli Sand & Gravel MPA
-  Contour



Bogoli River
Area Allotted: 1.3 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur

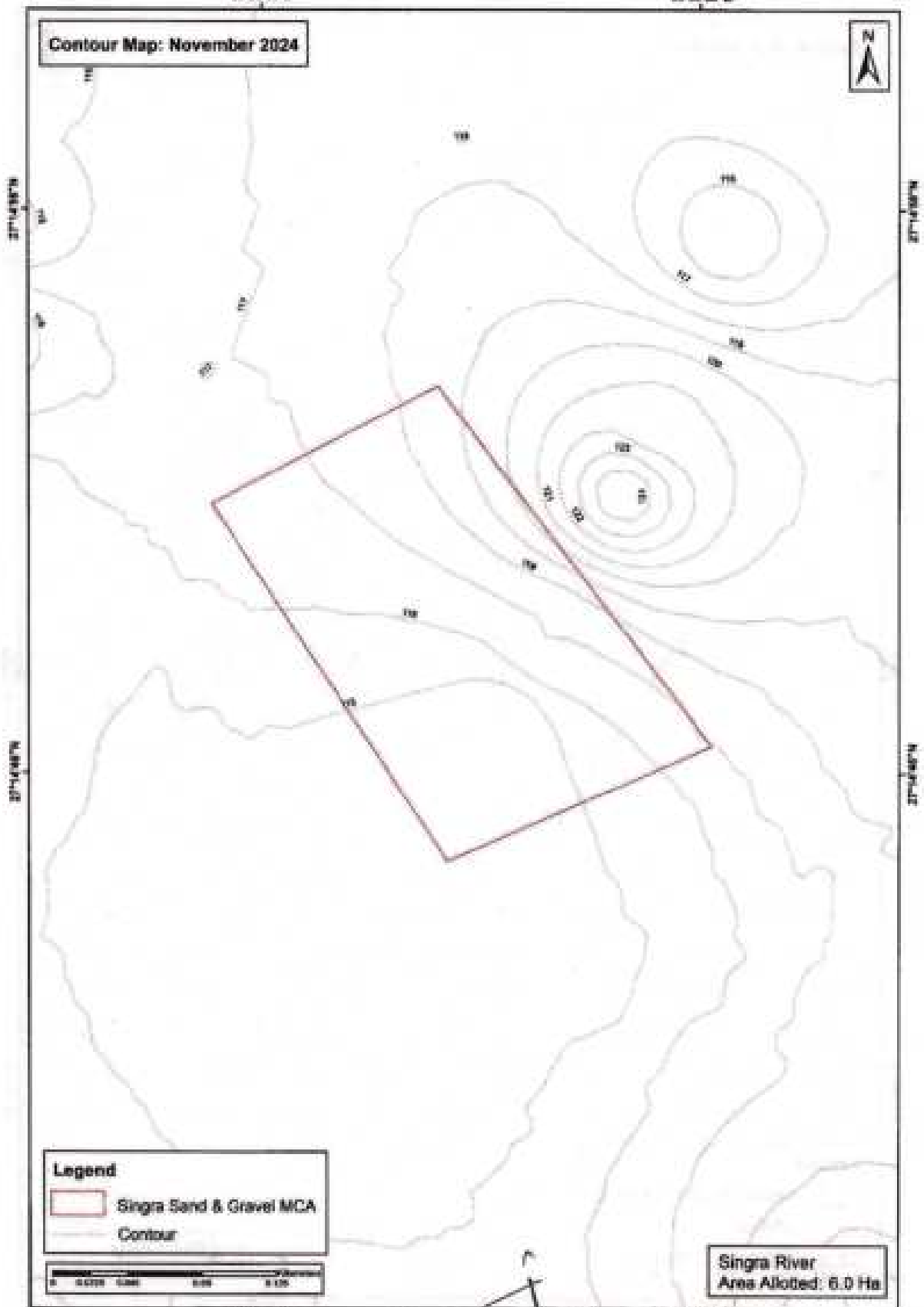




Divisional Forest Officer
Lakhimpur Division
North Lakhimpur,



Contour Map: November 2024

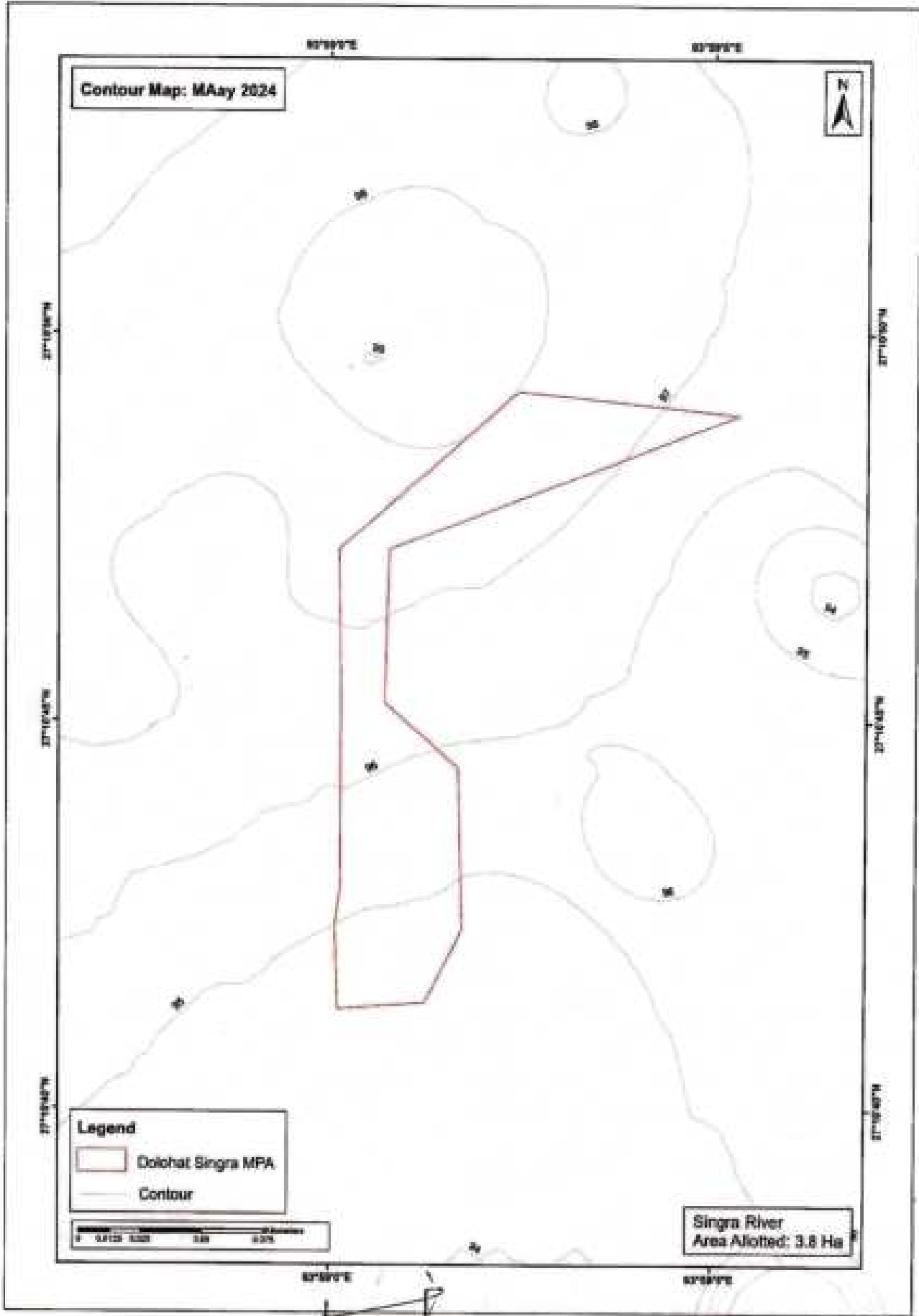


Legend
Singra Sand & Gravel MCA
Contour



Singra River
Area Alloted: 6.0 Ha

Divisional Forest Officer
Lachimpur Division
North Lachimpur.



Divisions Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024



North

North

North

North

North

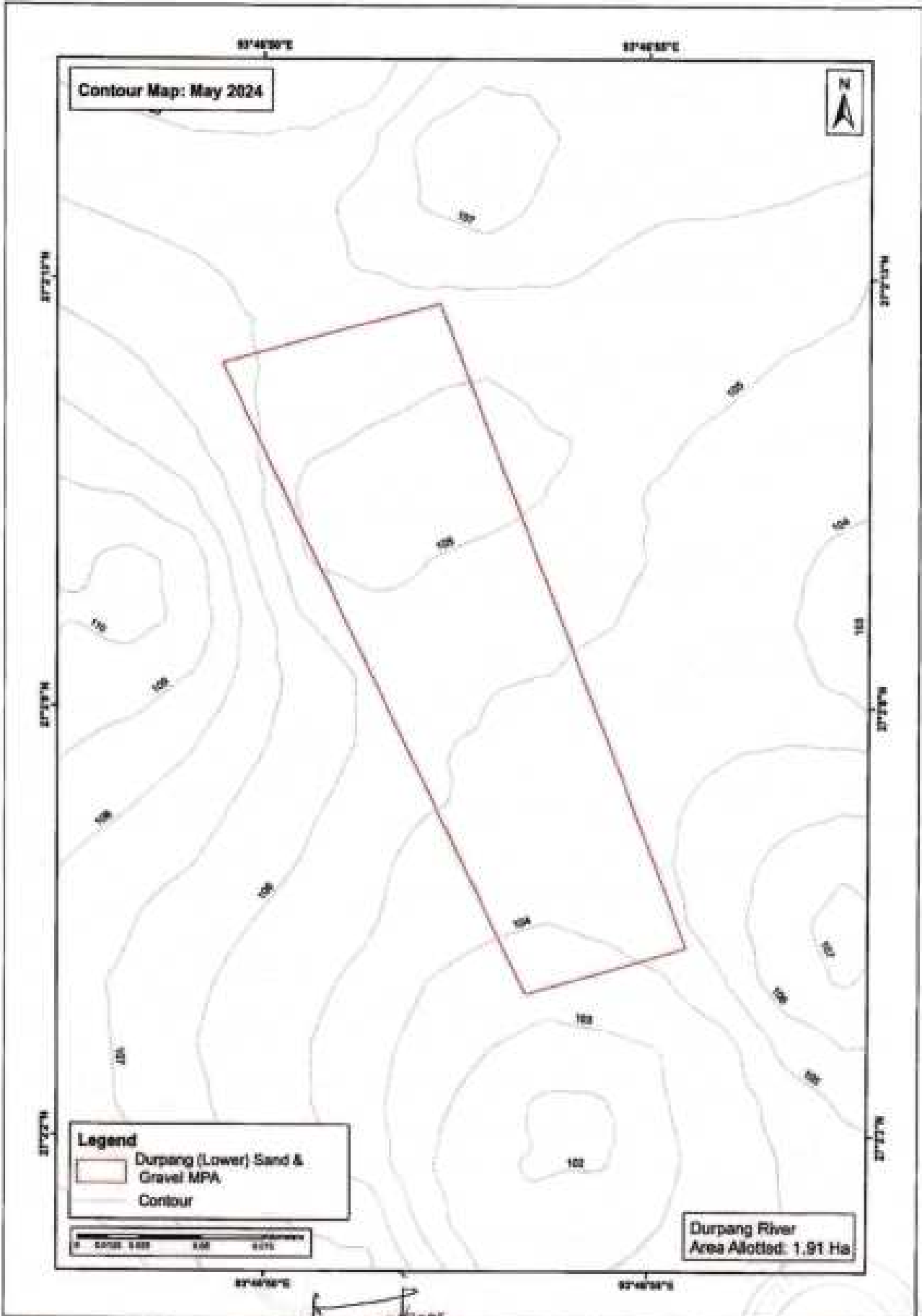
North

Legend
[Red outline] Dolhat Singra MPA
[Grey line] Contour



Singra River
Area Allotted: 3.8 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur



Contour Map: May 2024



Legend
 Durgang (Lower) Sand & Gravel MPA
 — Contour

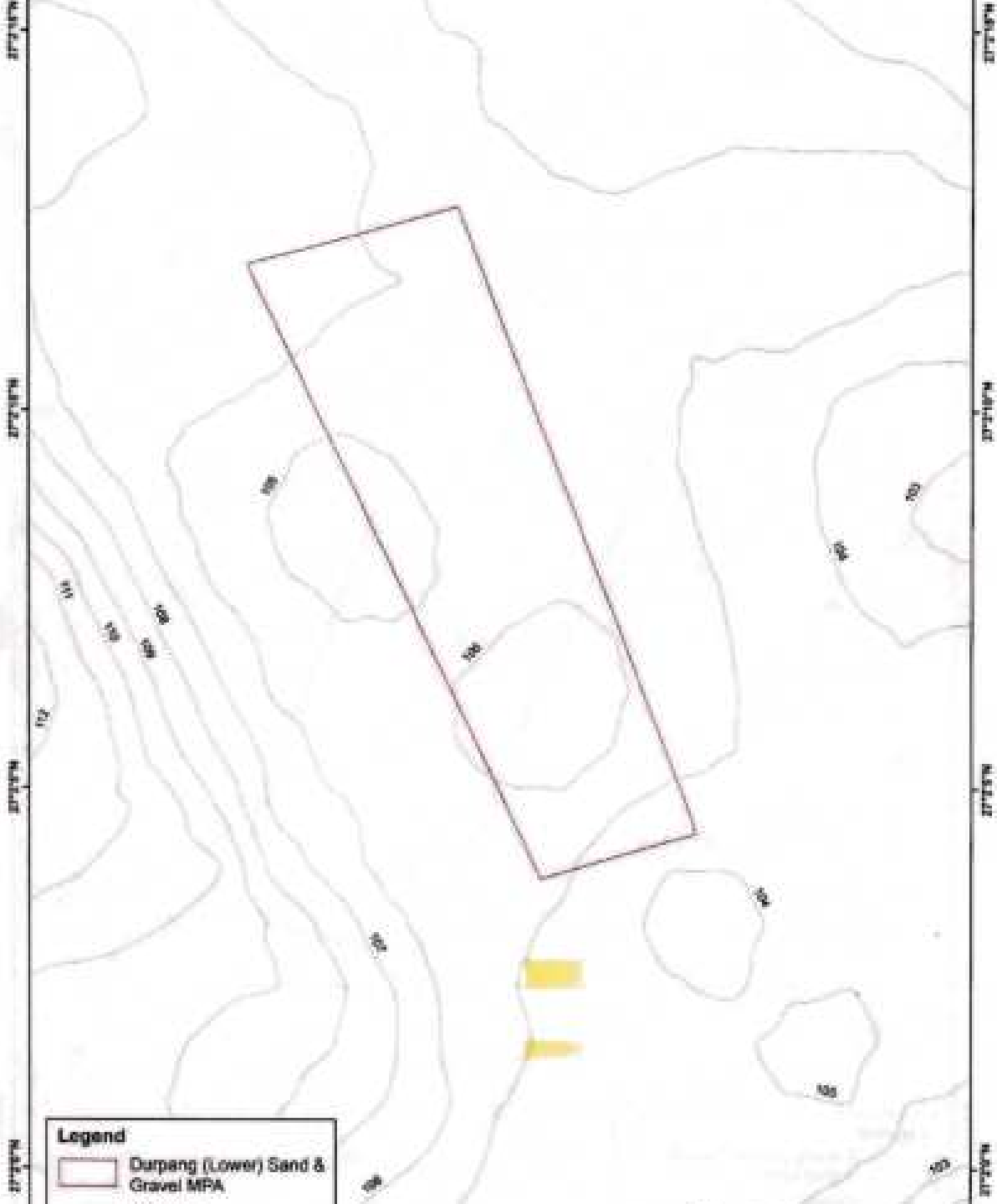


Durgang River
 Area Allotted: 1.91 Ha

Divisional Forest Officer
 Lakhimpur Division
 North Lakhimpur.



Contour Map: November 2024

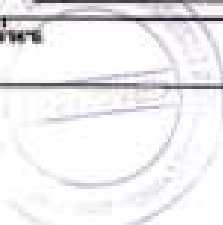


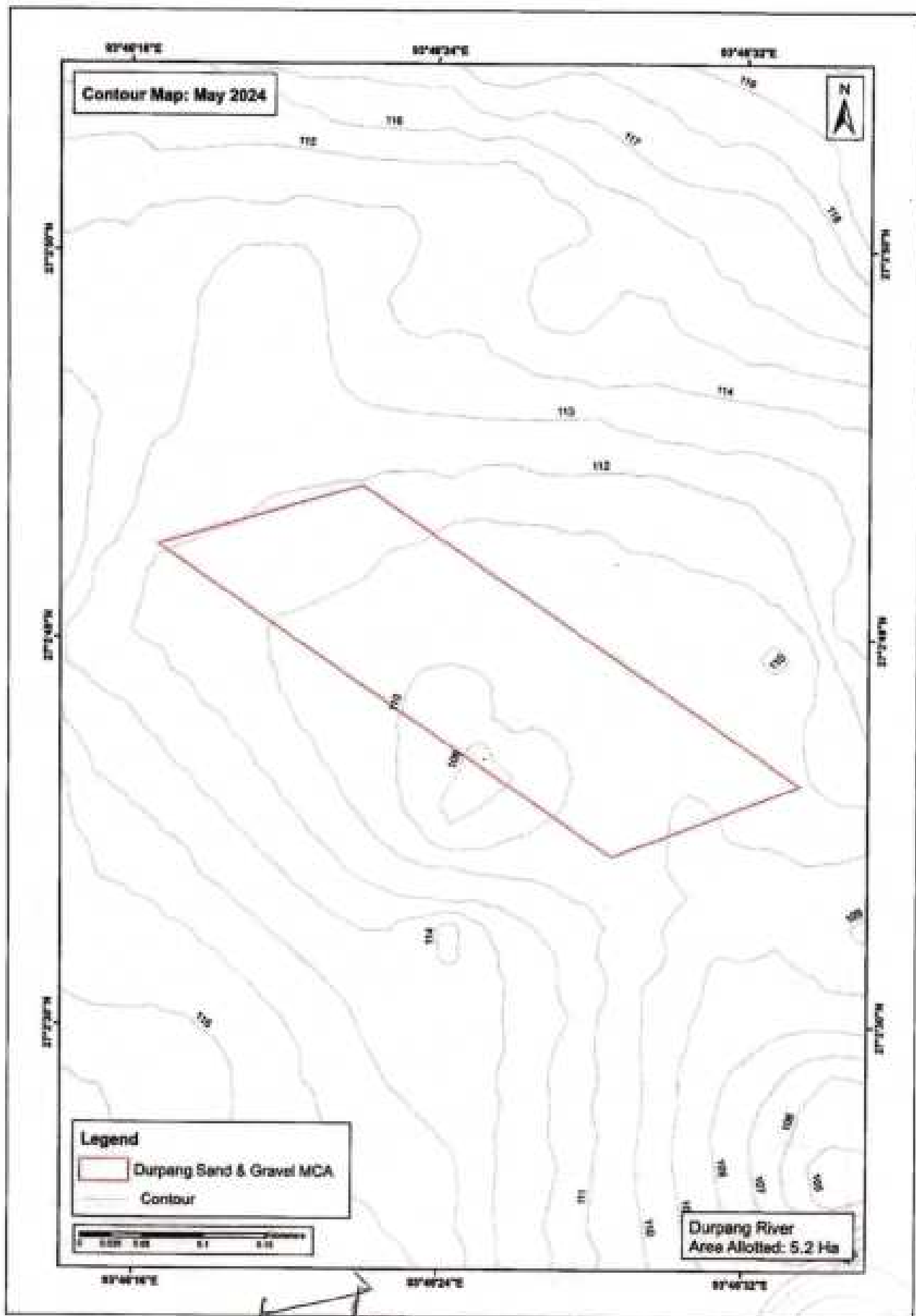
Legend
Durpang (Lower) Sand & Gravel MPA
Contour



Durpang River
Area Allotted: 1.91 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur





Contour Map: May 2024



Legend
Durpang Sand & Gravel MCA
Contour

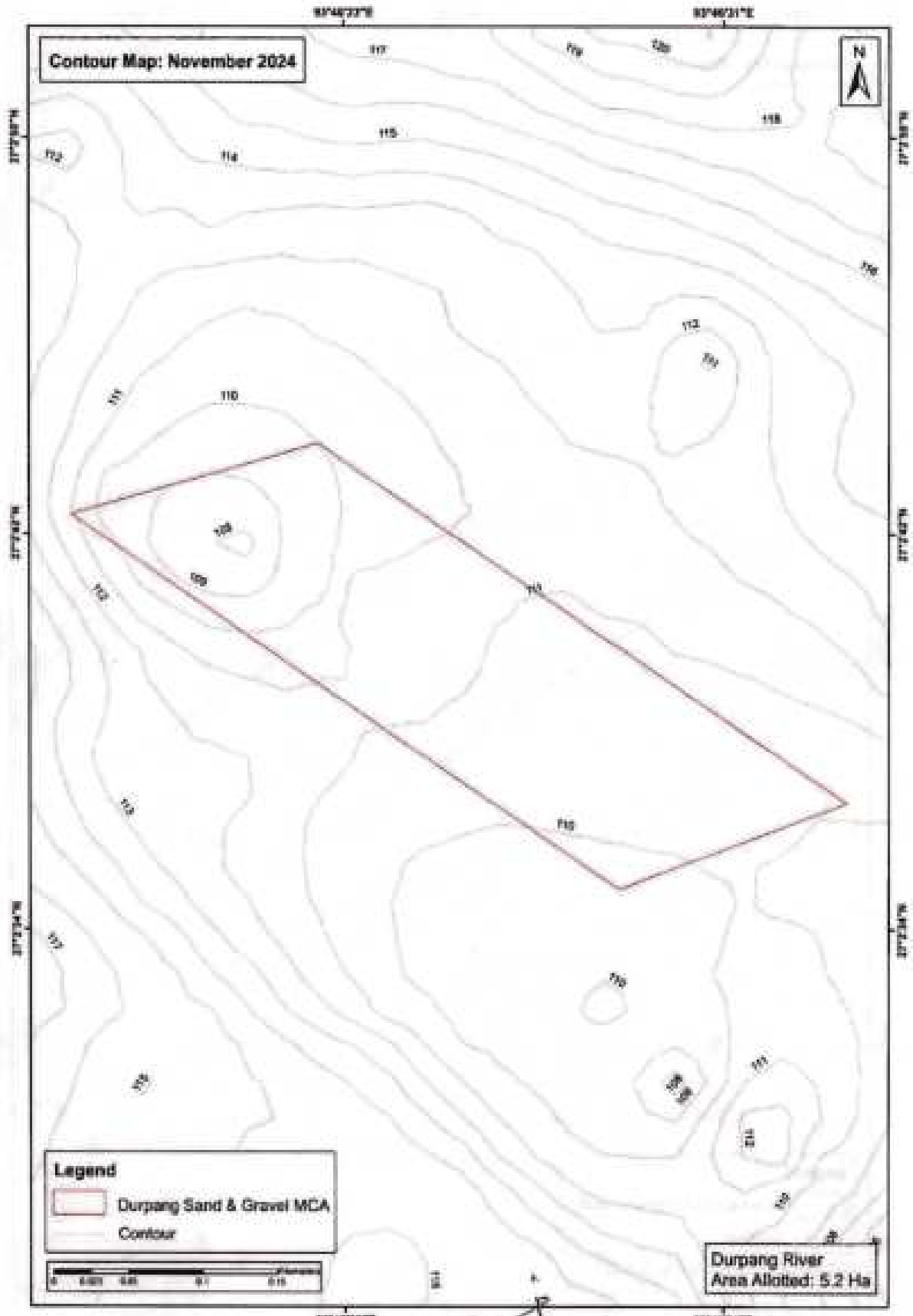


Durpang River
Area Allotted: 5.2 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024



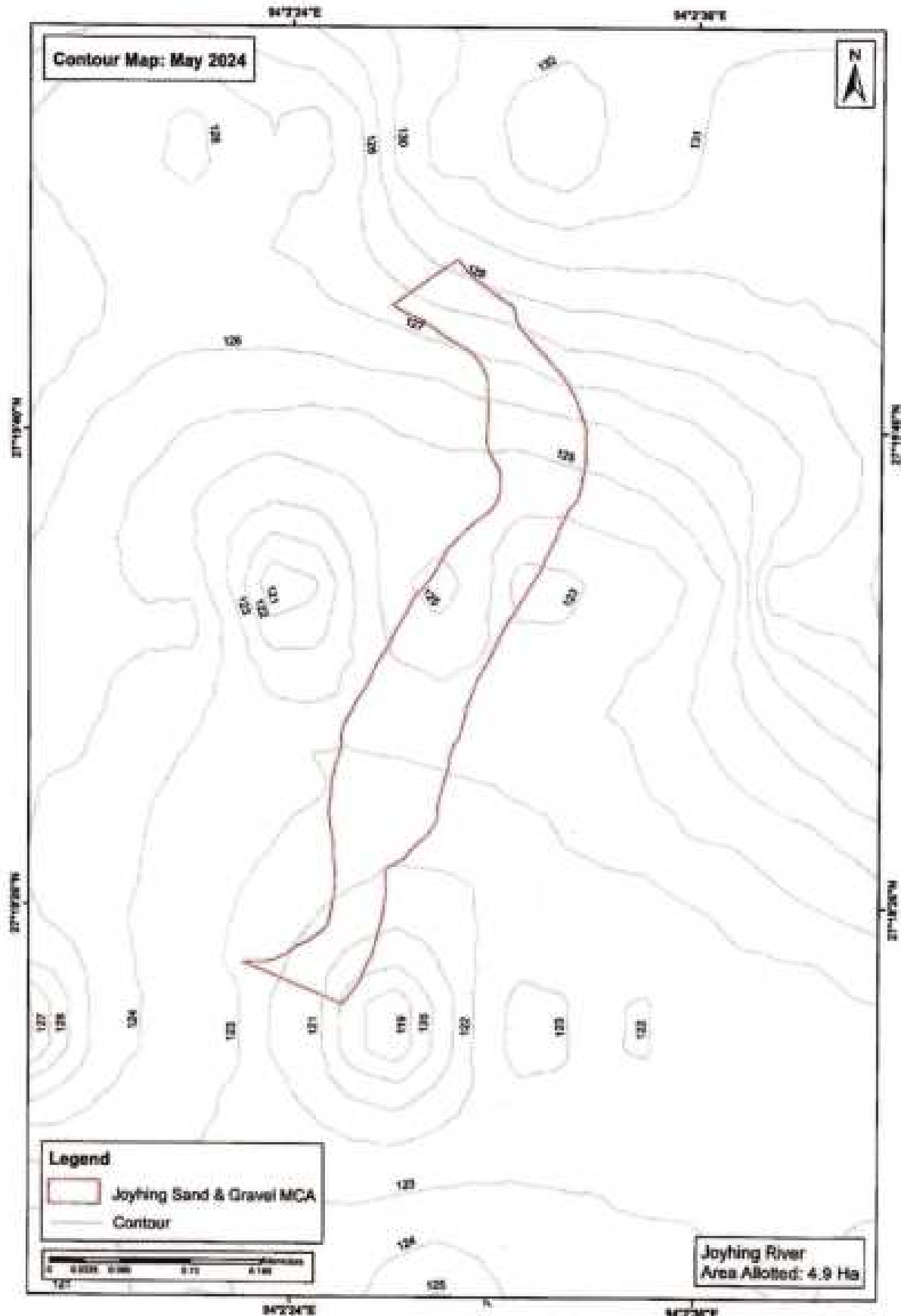
Legend
Durpang Sand & Gravel MCA
Contour



Durpang River
Area Allotted: 5.2 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur

Contour Map: May 2024



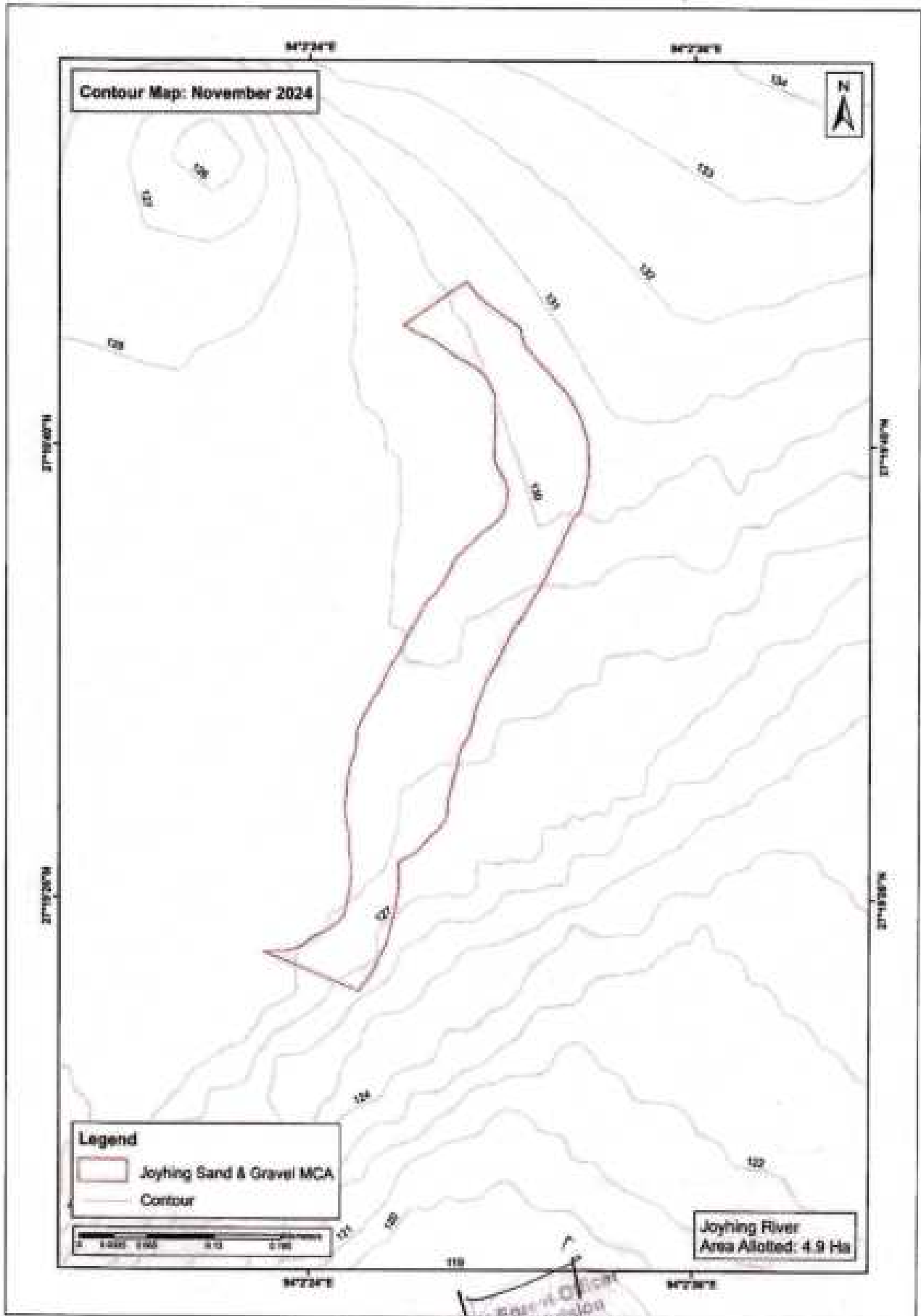
Legend
Joyhing Sand & Gravel MCA
Contour



Joyhing River
Area Allotted: 4.9 Ha

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Contour Map: November 2024

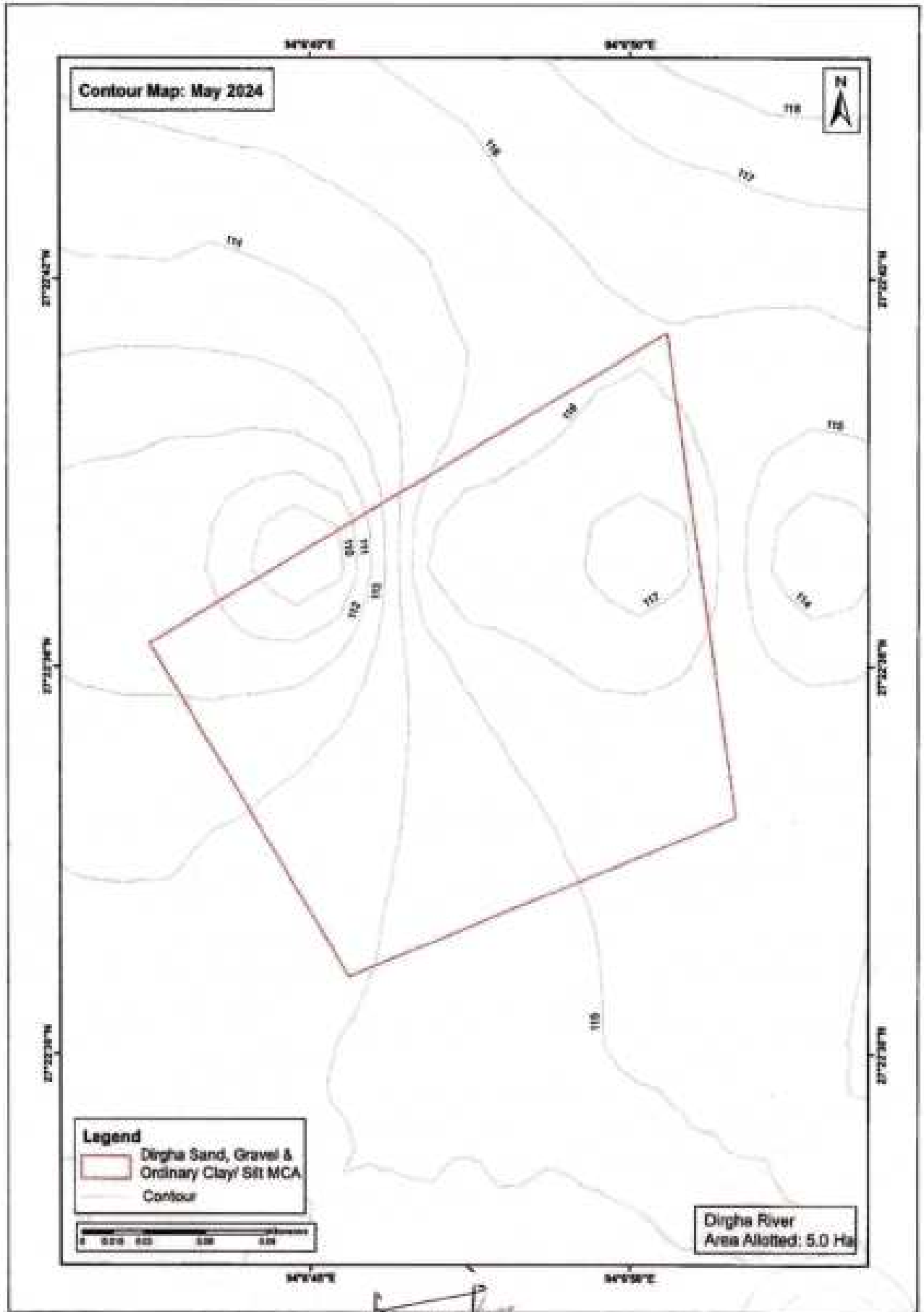


Legend
Joyhing Sand & Gravel MCA
Contour

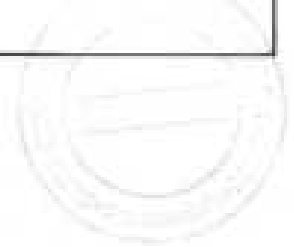


Joyhing River
Area Allotted: 4.9 Ha

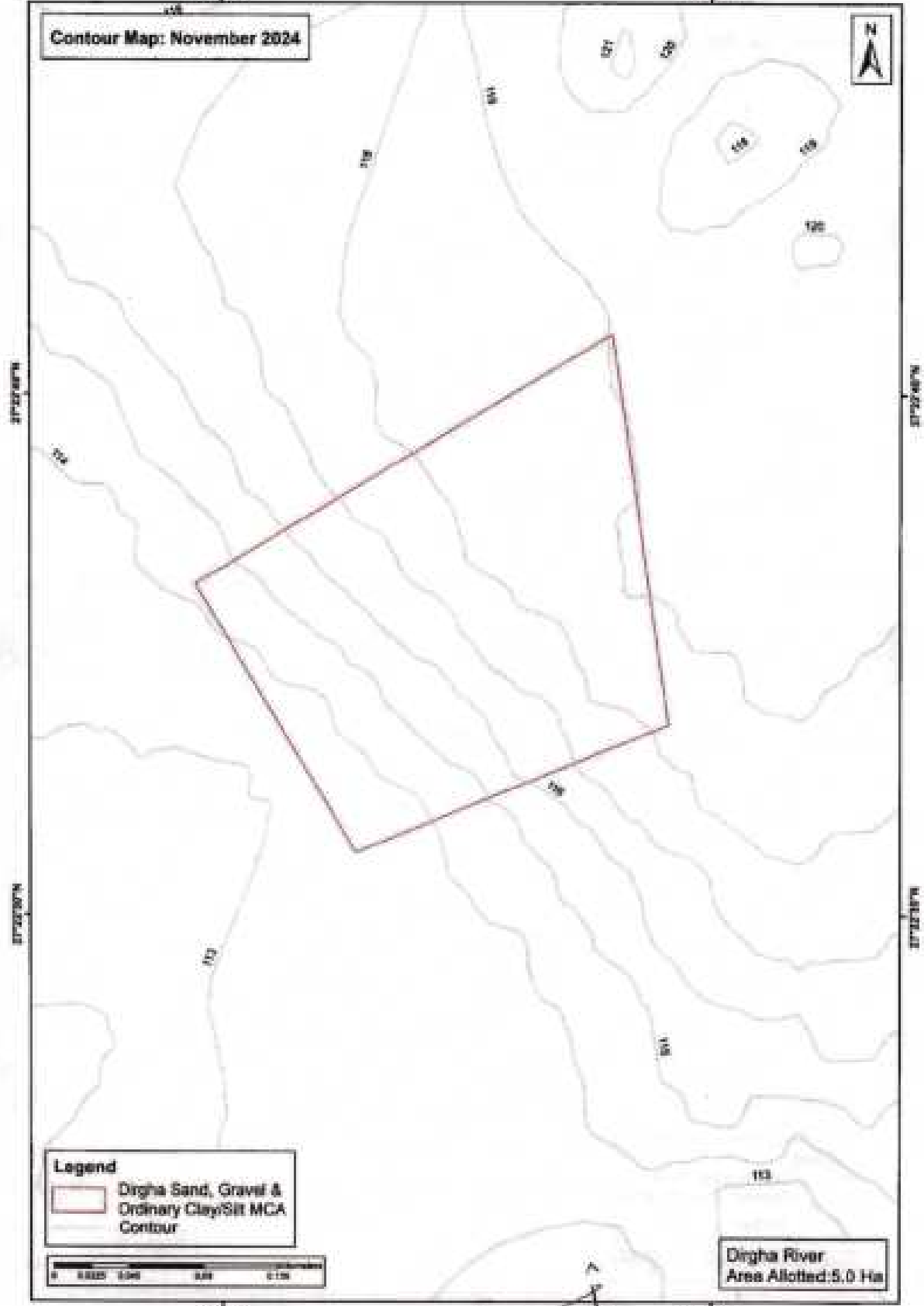
Division Forest Officer
Lakhimpur Division
North Lakhimpur.



Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



Contour Map: November 2024



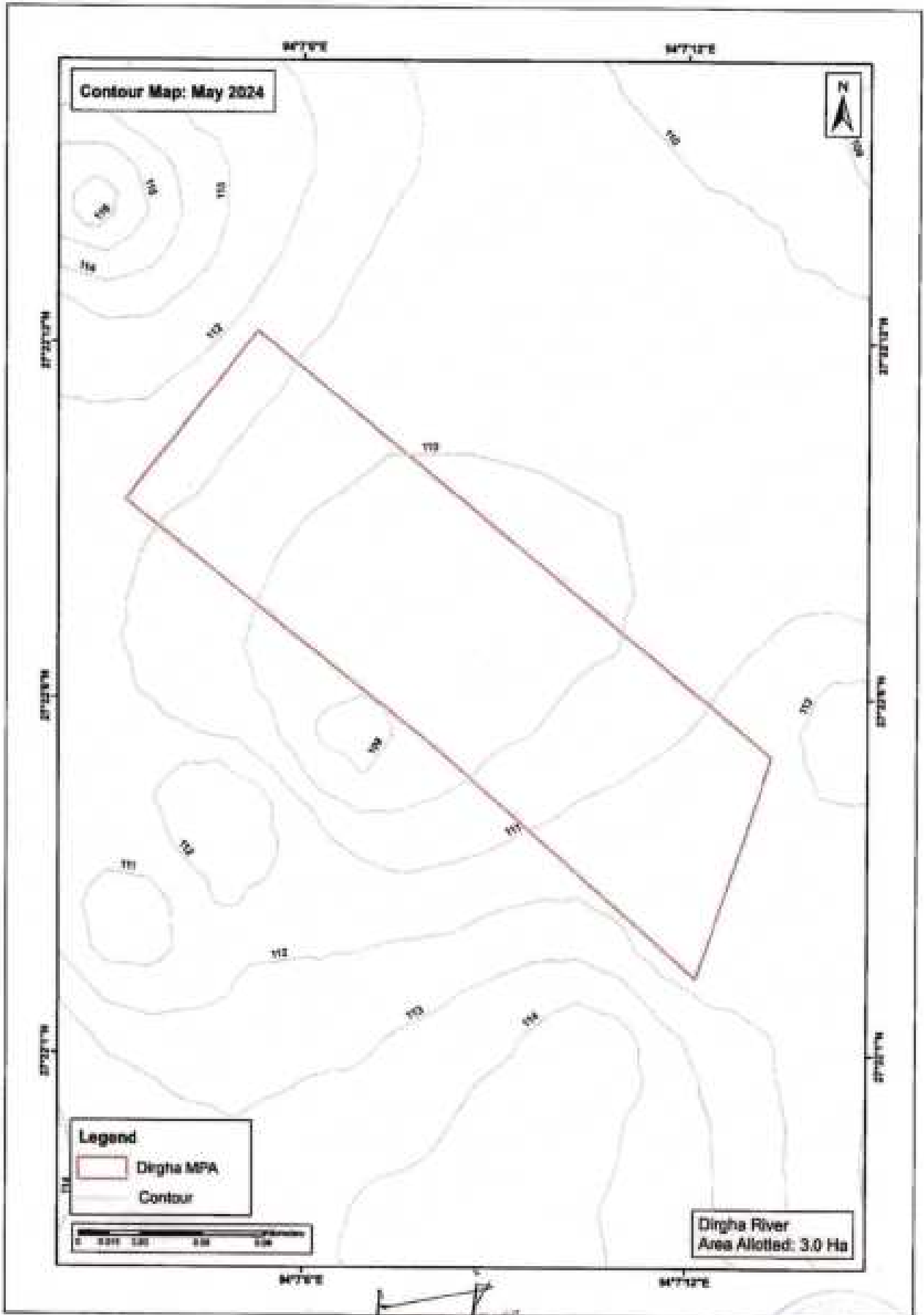
Legend
[Red Outline] Dingha Sand, Gravel & Ordinary Clay/Silt MCA
[Grey Line] Contour



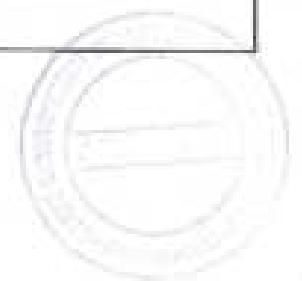
Dingha River
Area Allotted: 5.0 Ha

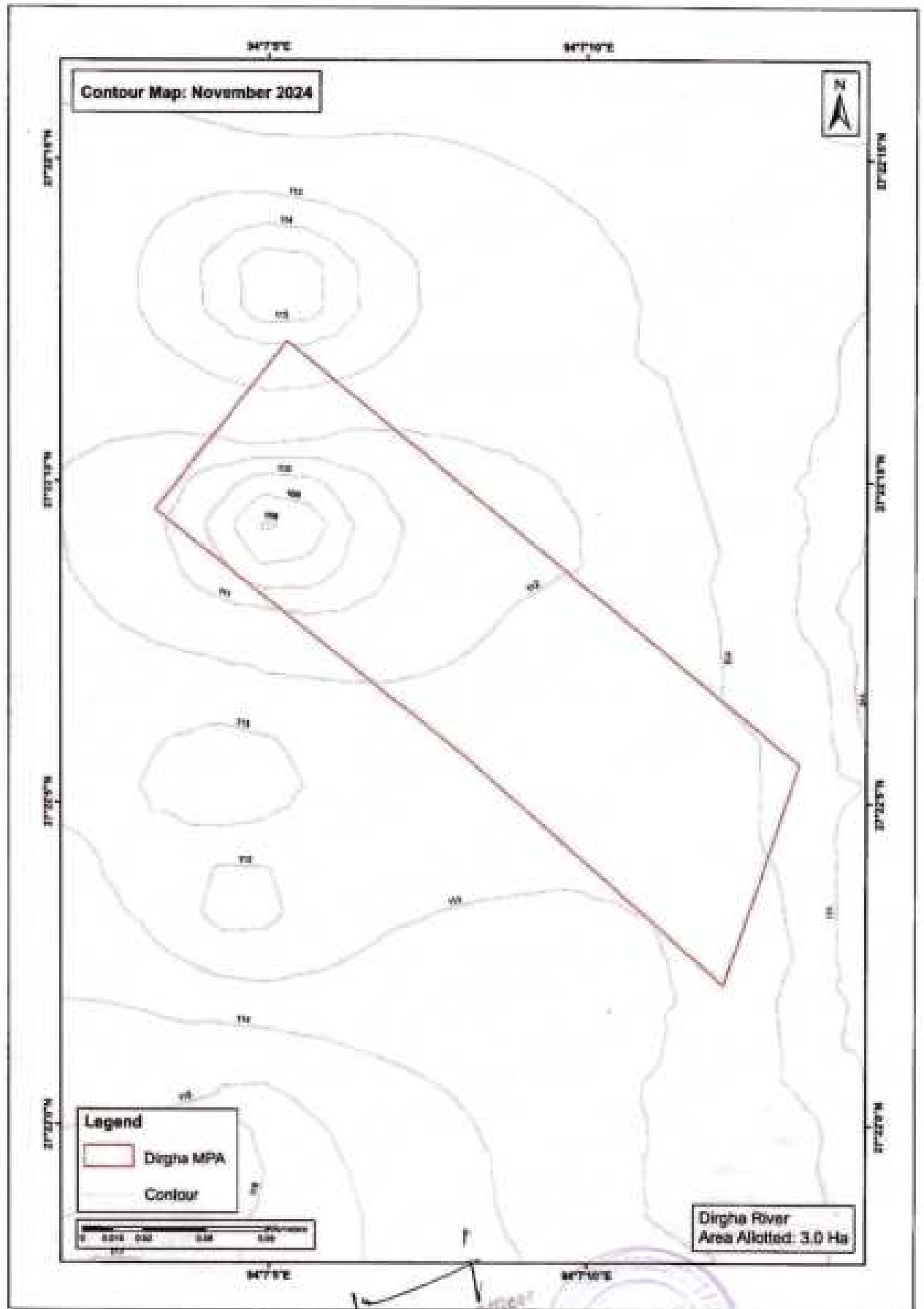
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



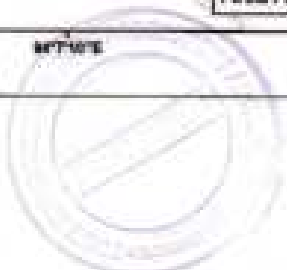


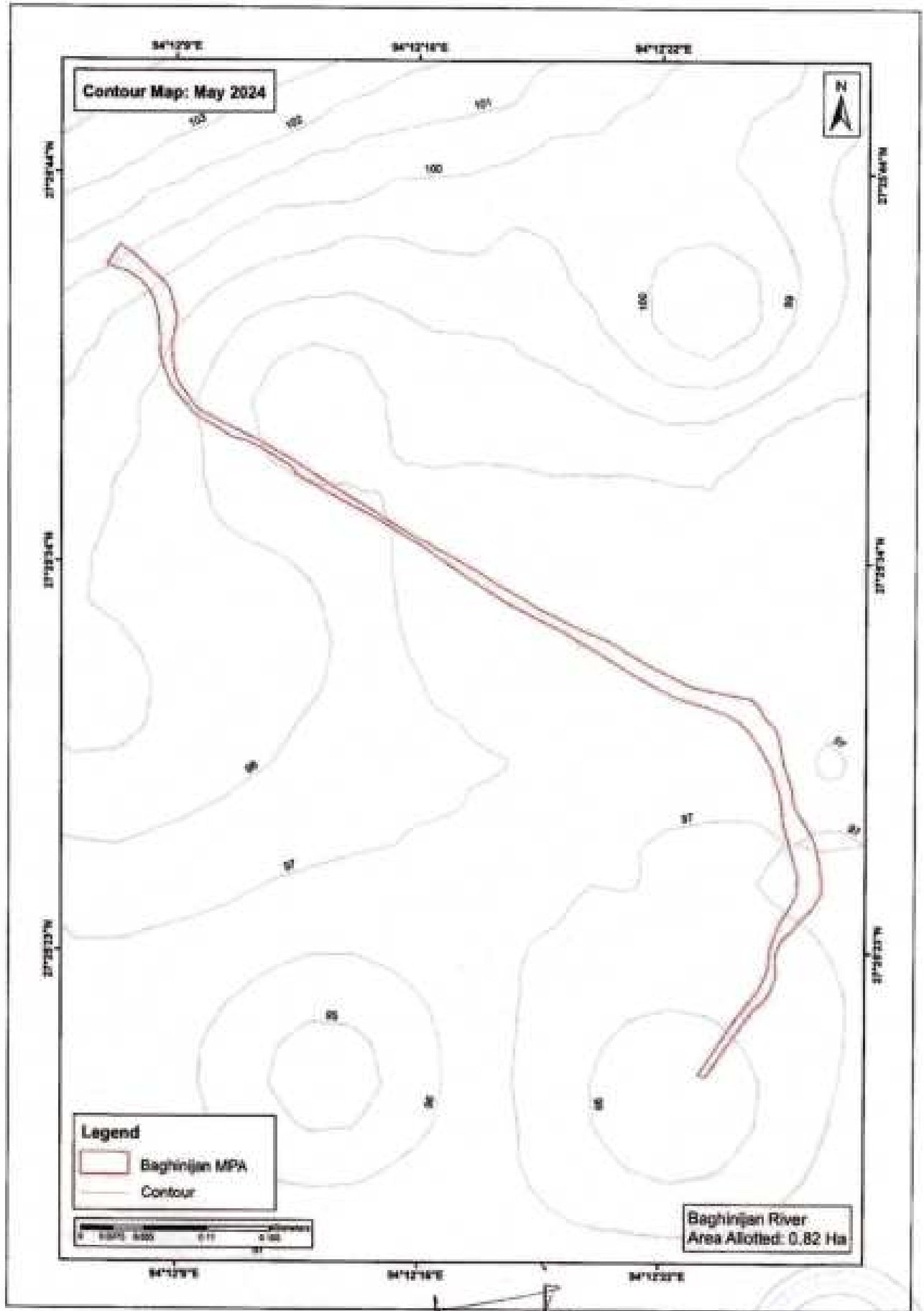
Division II Forest Officer
Lakhimpur Division
North Lakhimpur.





Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

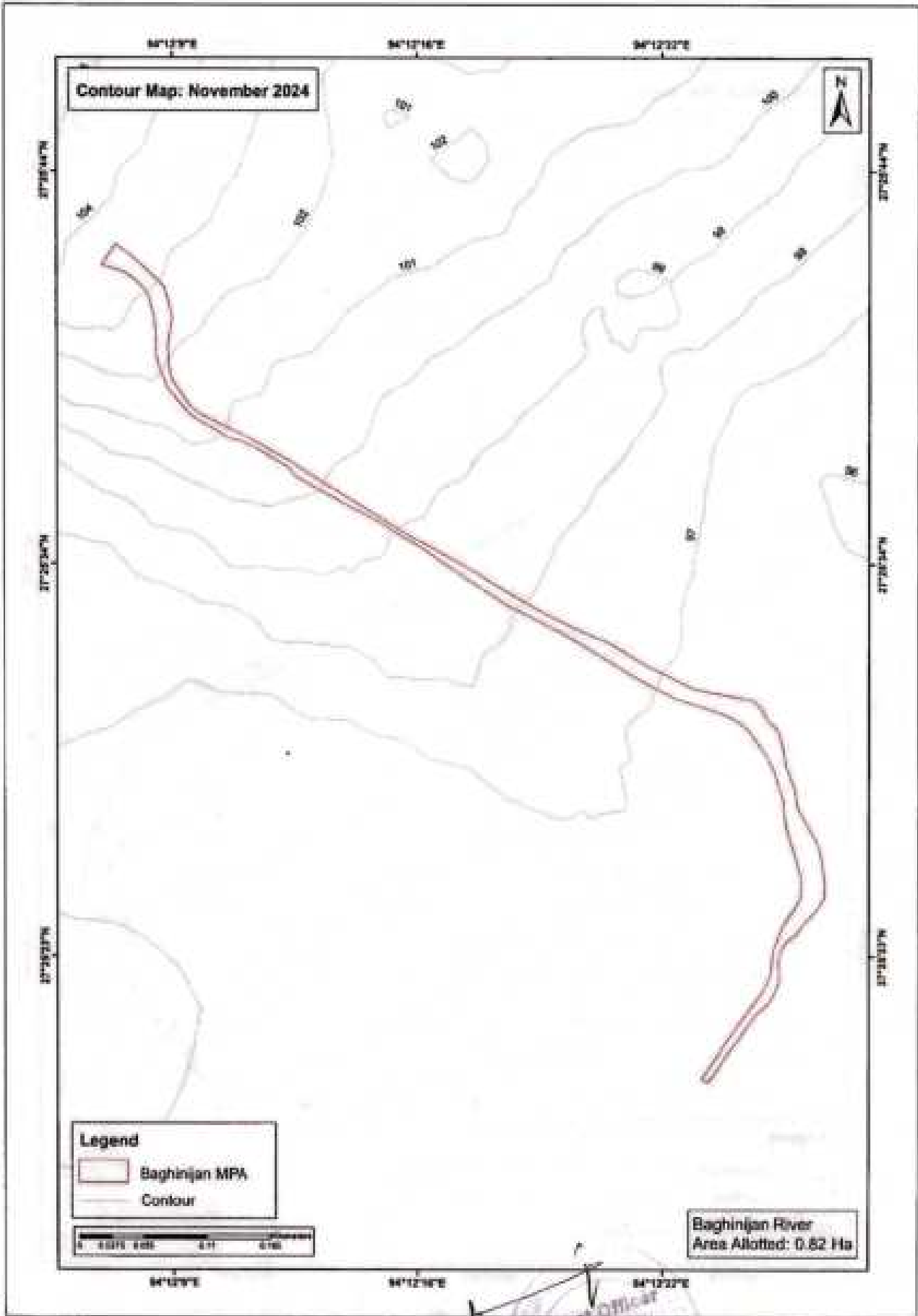




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Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Contour Map: November 2024

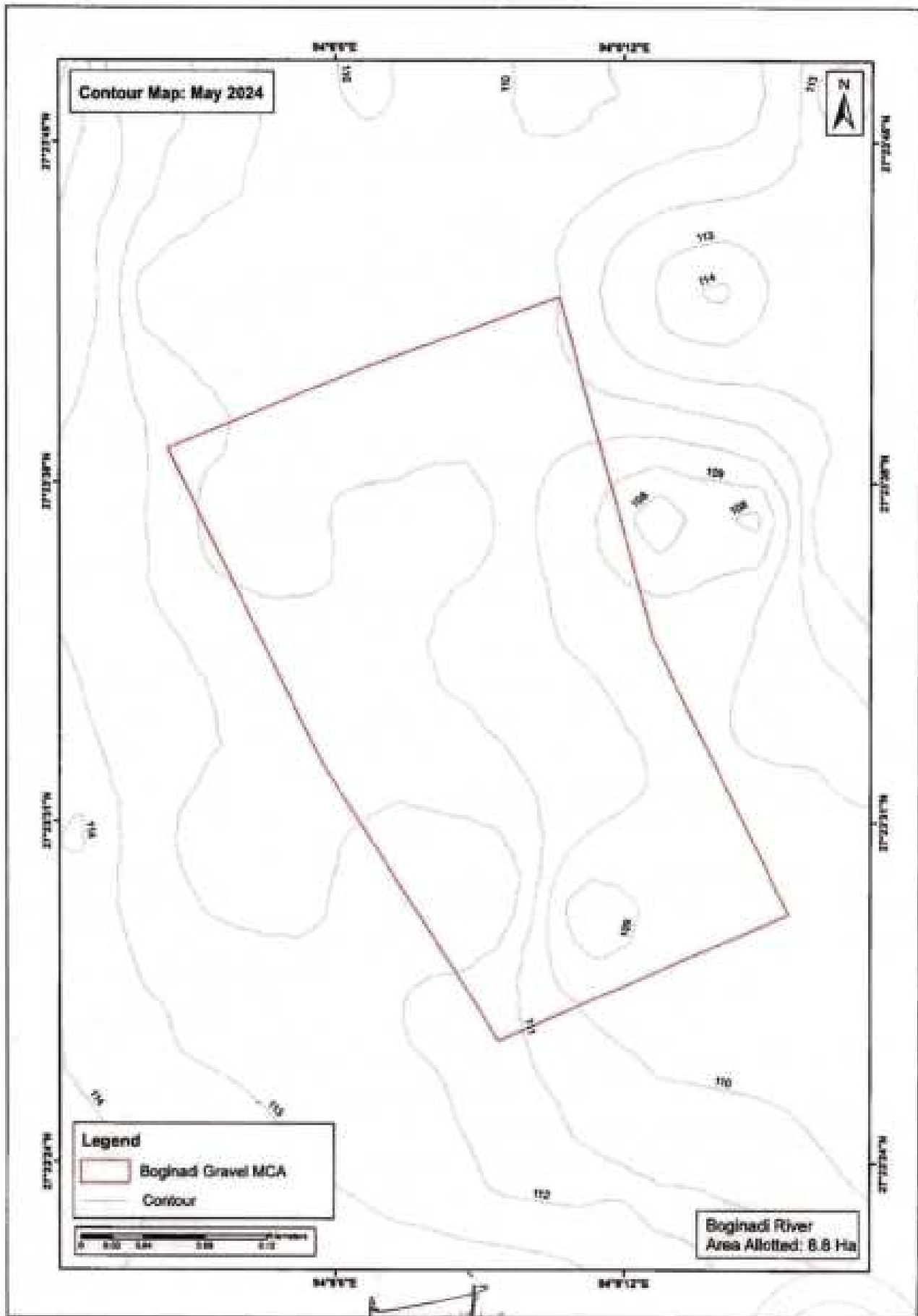


Legend
Baghinjan MPA
Contour



Baghinjan River
Area Allotted: 0.52 Ha

Divisional Forest Officer
Lalajungar Division
North Lakhimpur



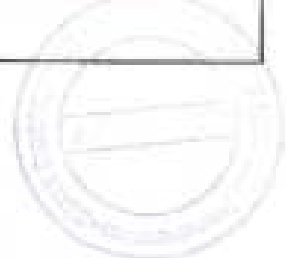
Contour Map: May 2024

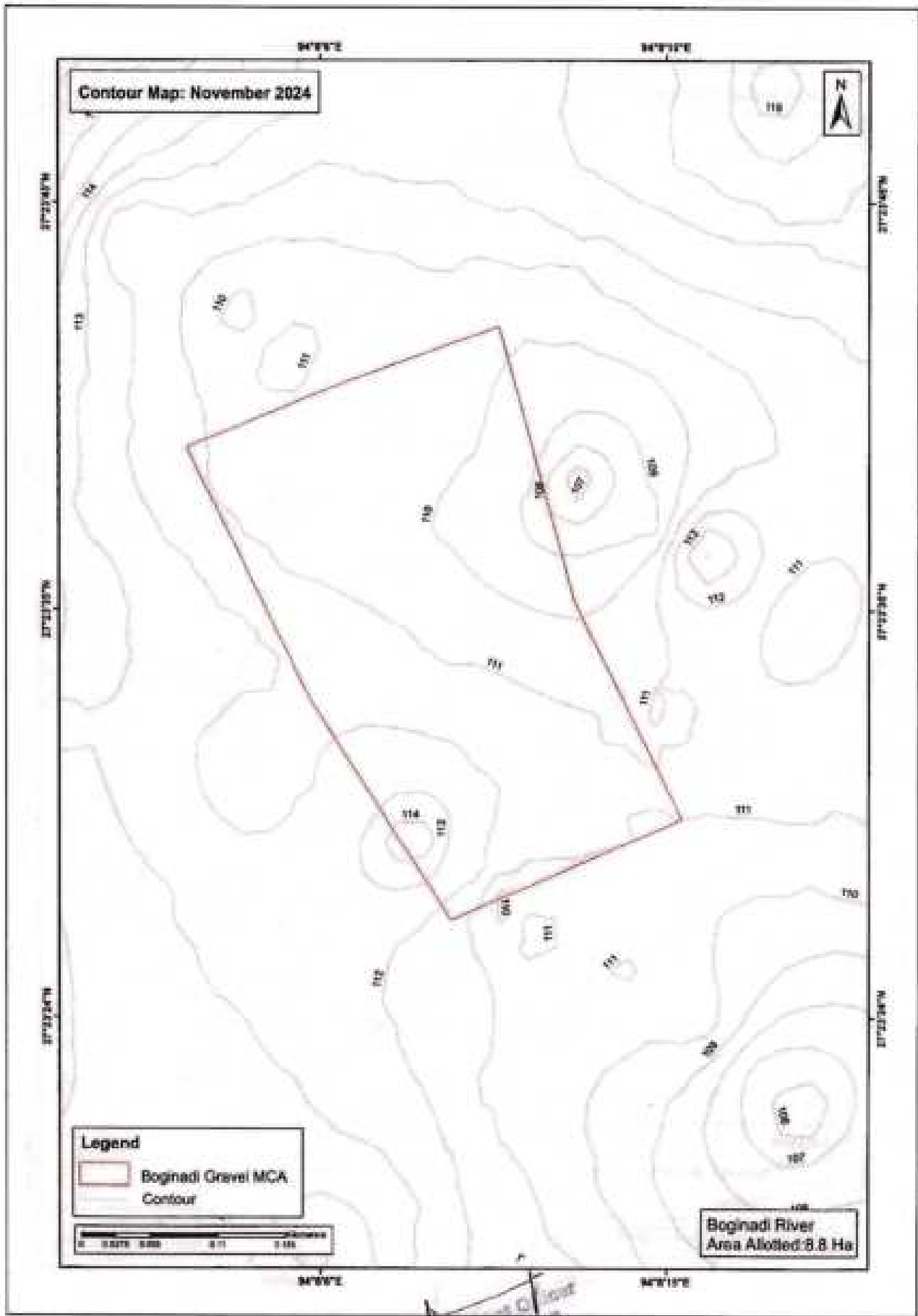
Legend
Boginadi Gravel MCA
Contour



Boginadi River
Area Allotted: 8.8 Ha

Divisional Forest Office
Lakhimpur Division
North Lakhimpur







Contour Map: November 2024



Legend

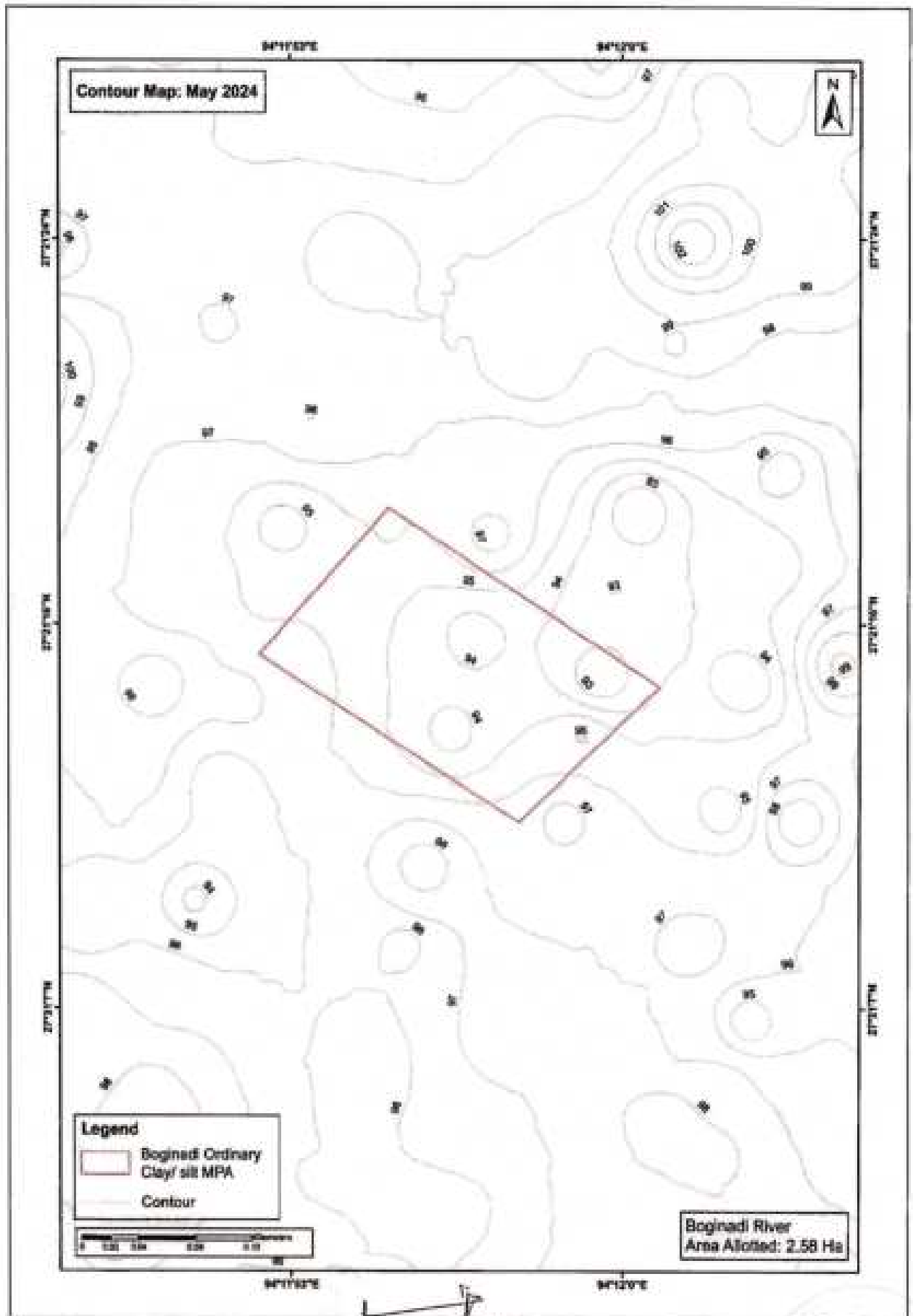
-  Boginadi Gravel MCA
-  Contour



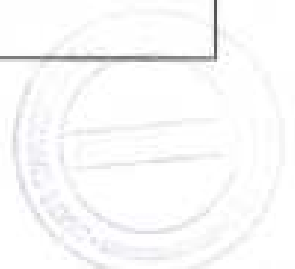
Boginadi River
Area Allotted 8.8 Ha

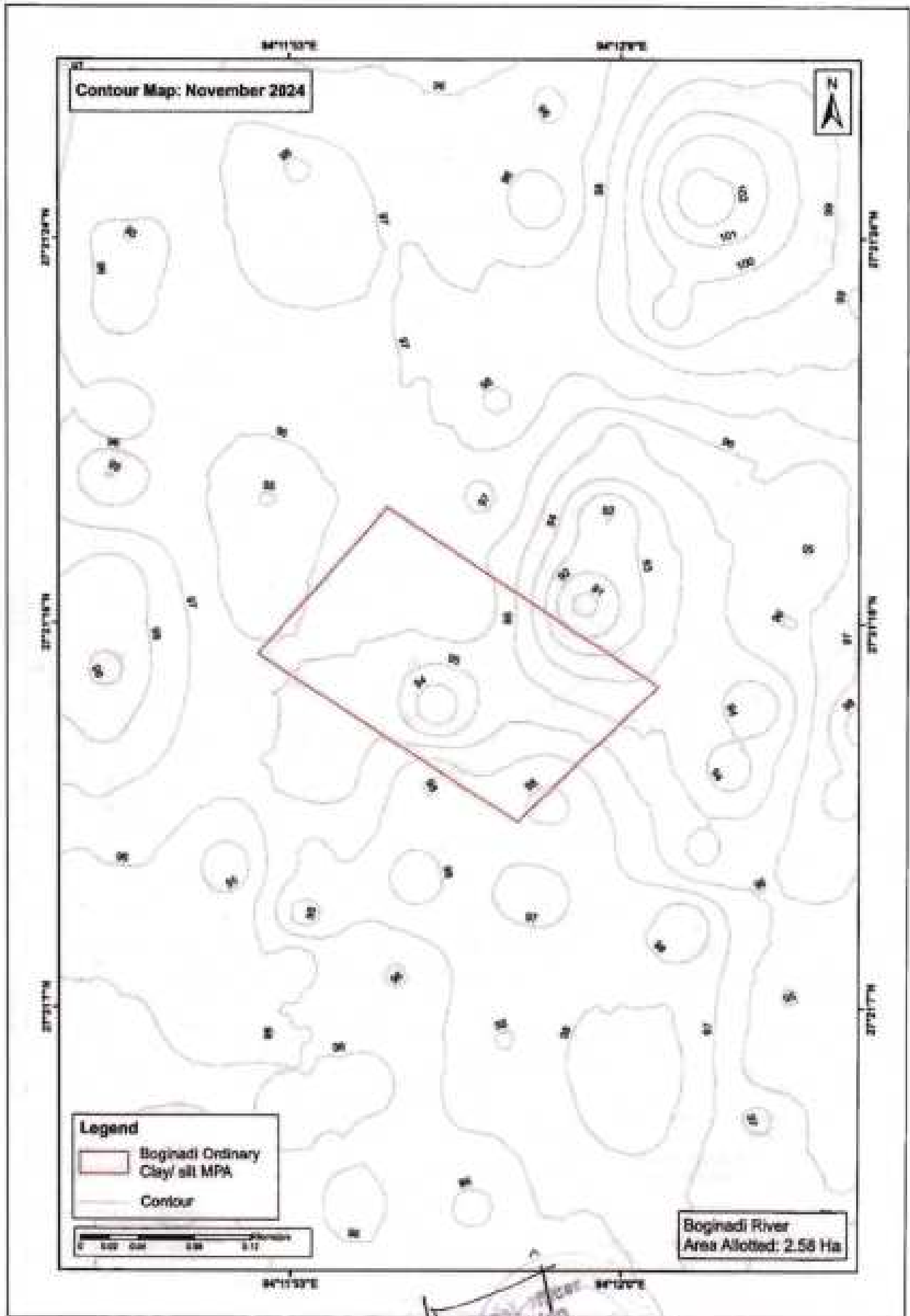
Divisional Forest Officer
Lakhimpur division
North Cachar district



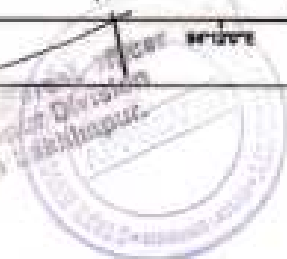


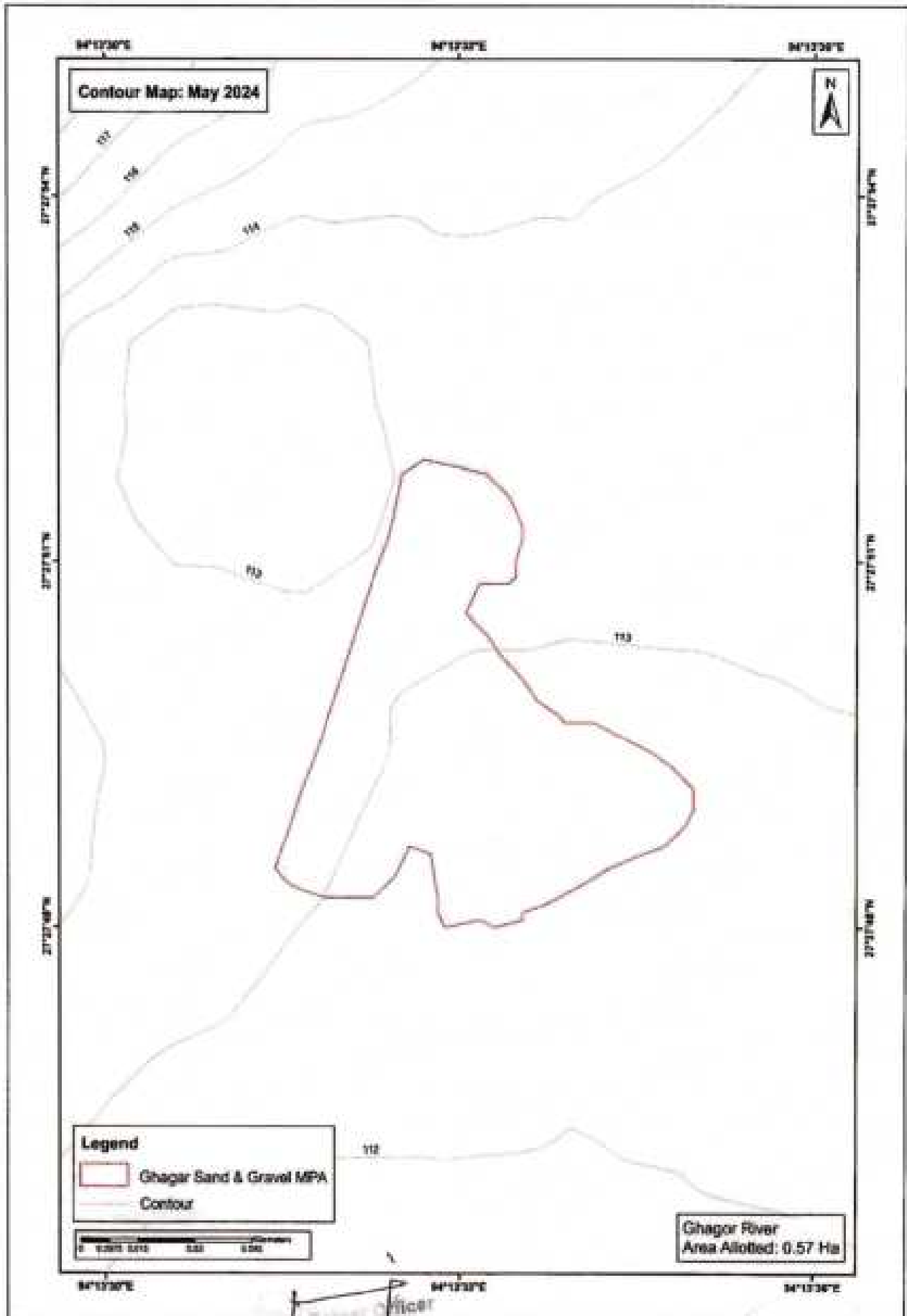
Division Forest Officer
Lakshmeeswar Division
North Lakshmeeswar



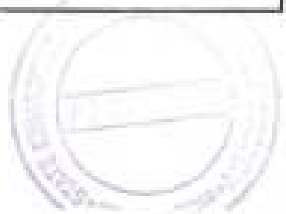


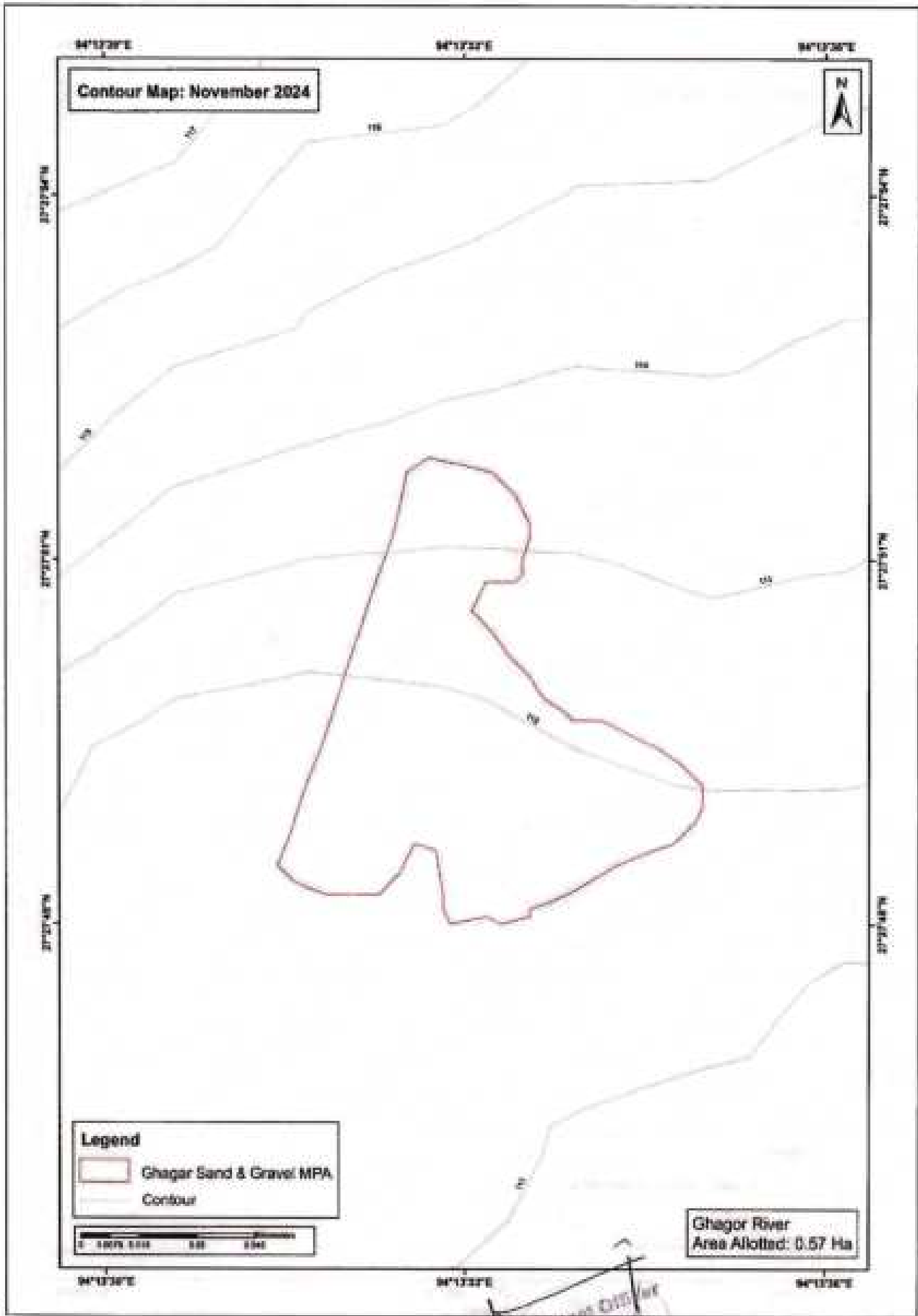
Divisional Forest Officer
Lachimpur Division
North Lakhimpur



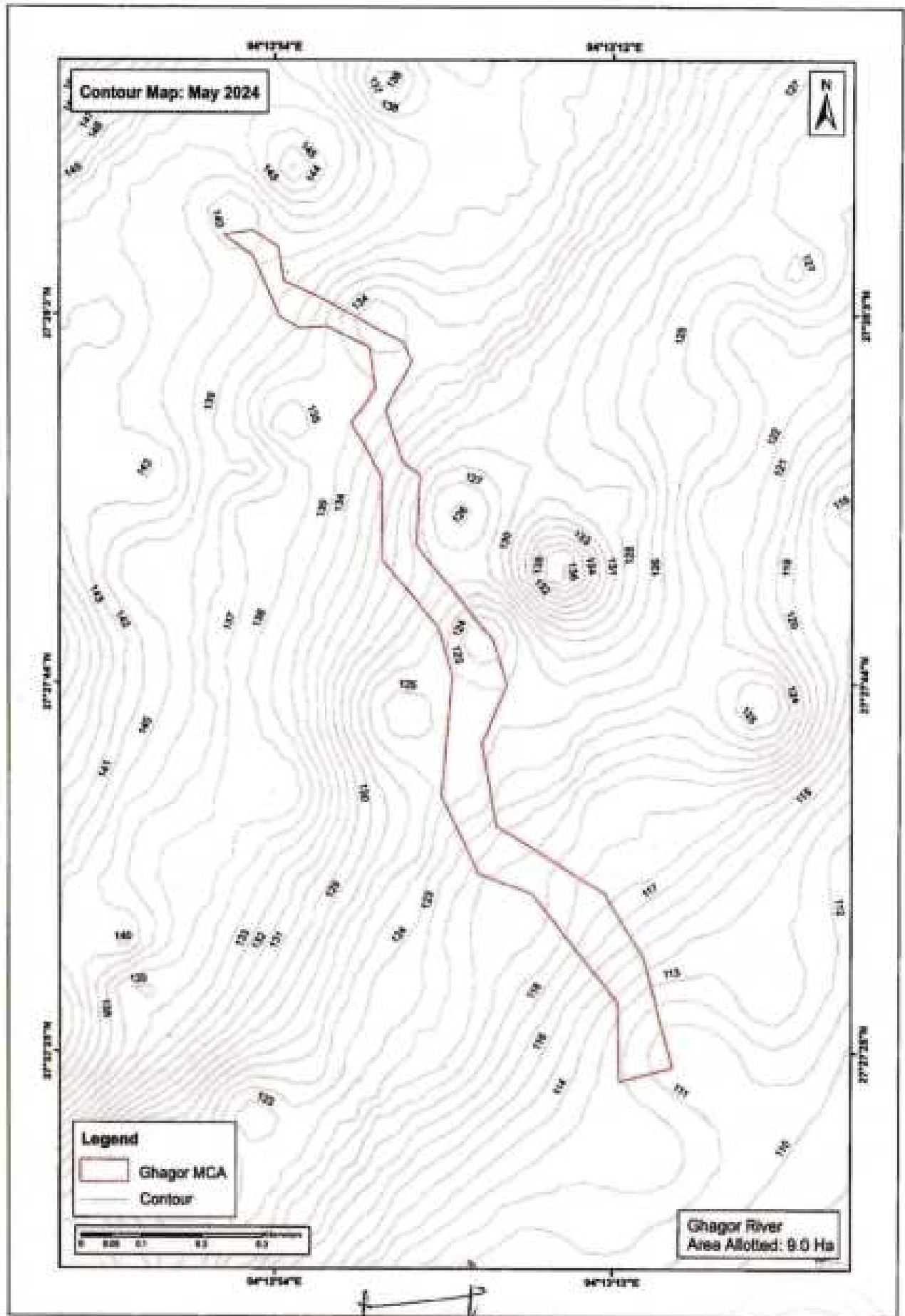


Divisional Forest Officer
Lakhimpur division
North Lakhimpur.





Divisional Forest Officer
Lehimpur Division
North Ladakh
1975

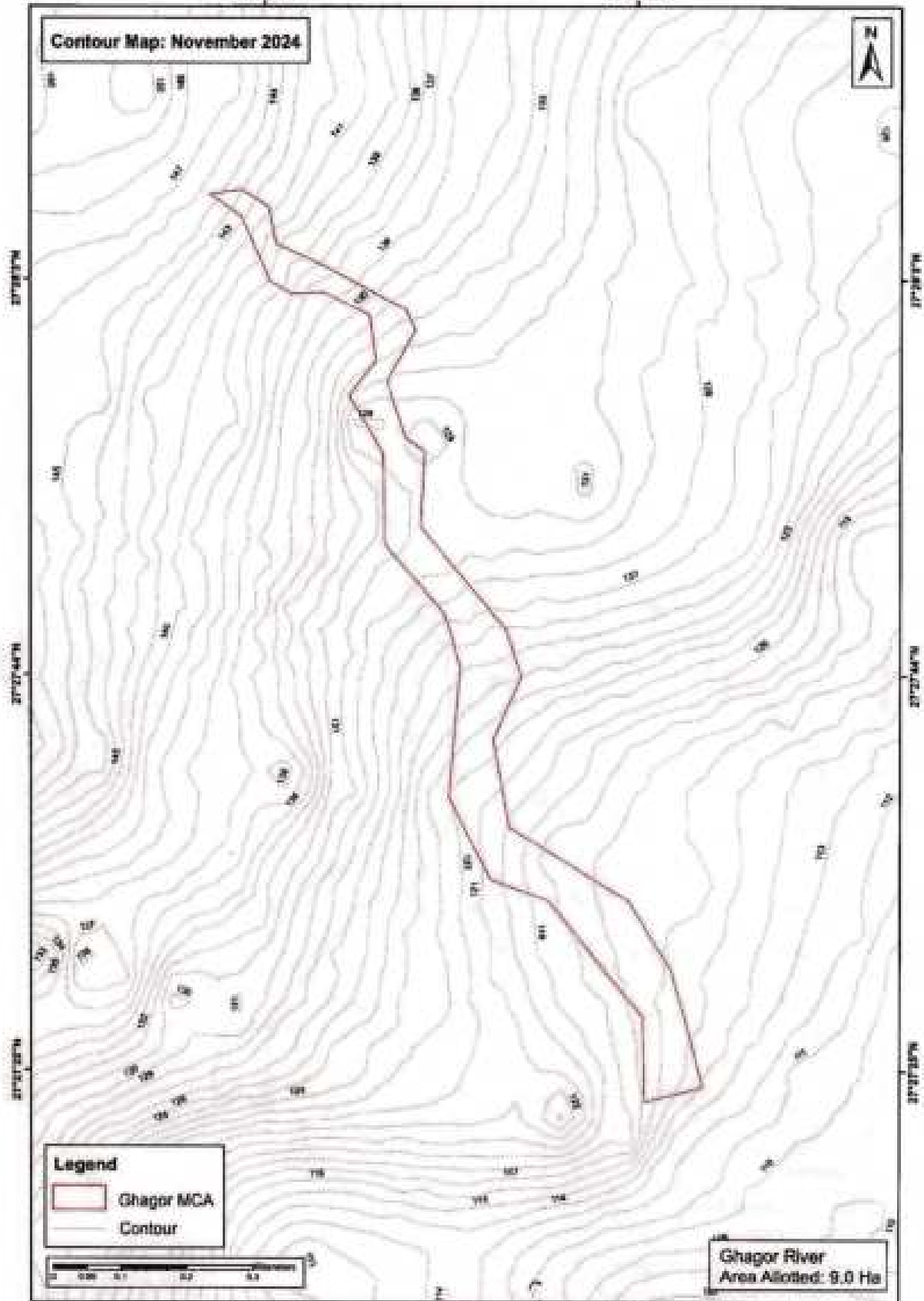


100

Divisional Forest Officer
Lakhimpur Division
North Lakhimpur



Contour Map: November 2024

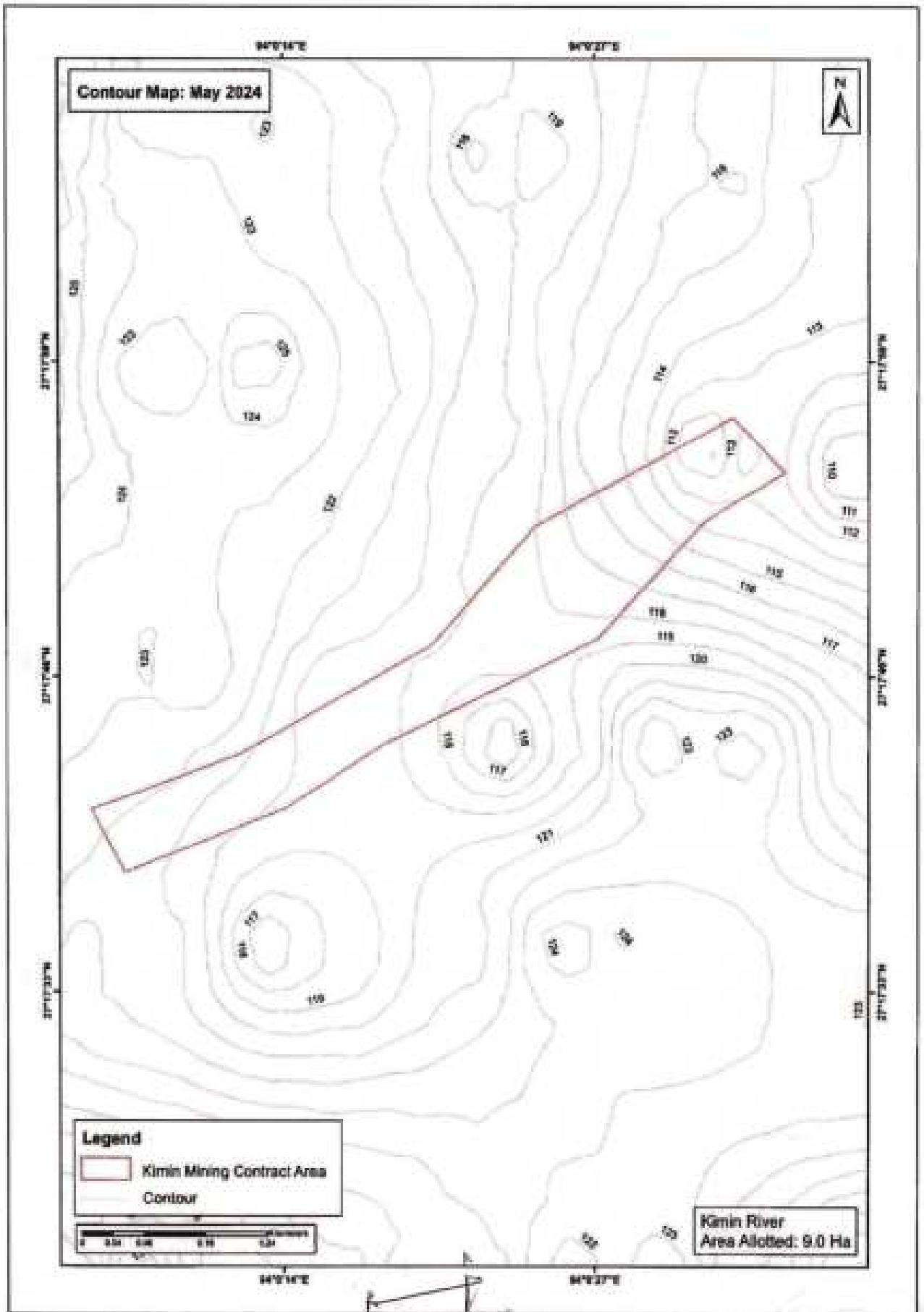


Legend
Ghagor MCA
Contour



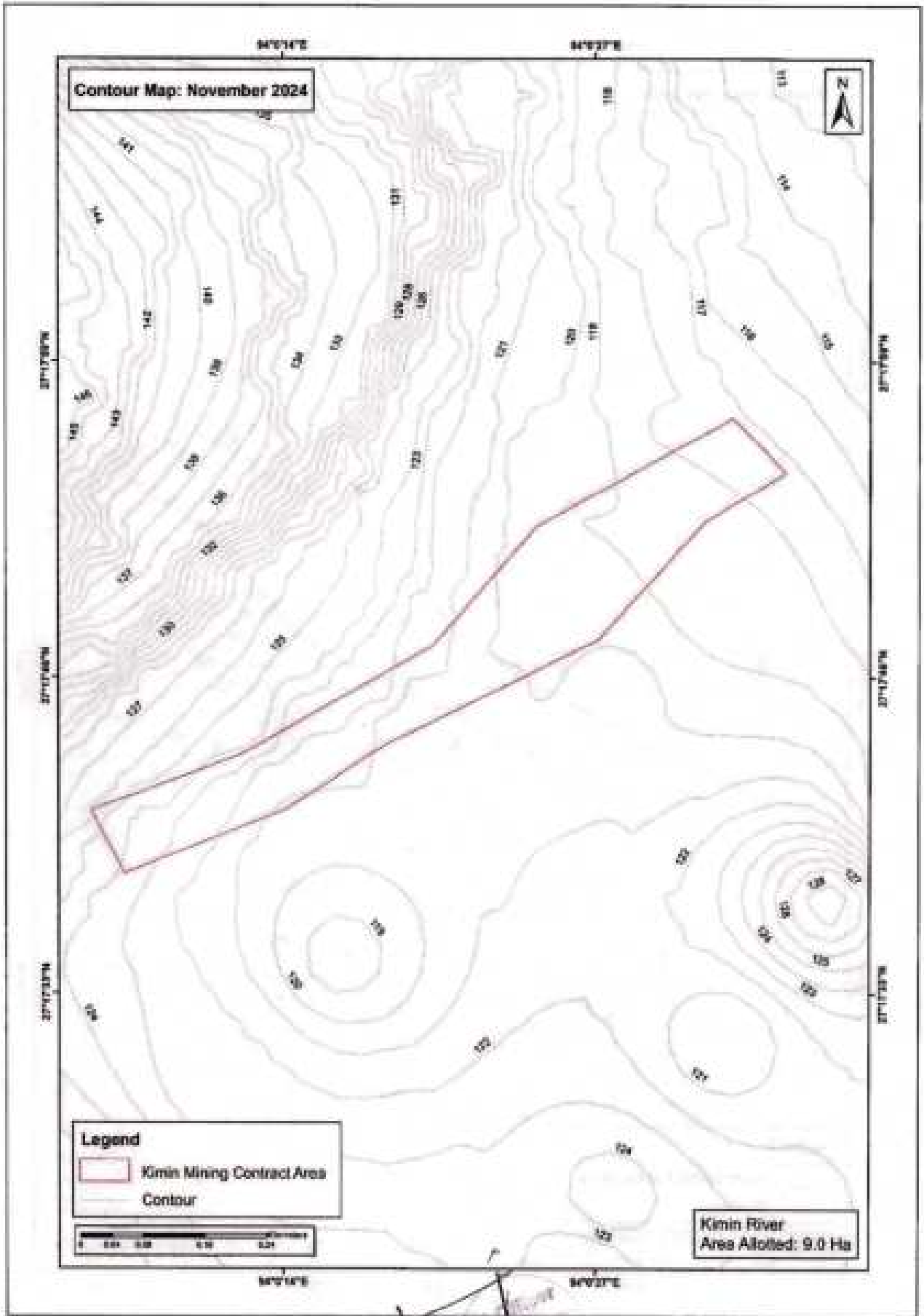
Ghagor River
Area Allotted: 9.0 Ha



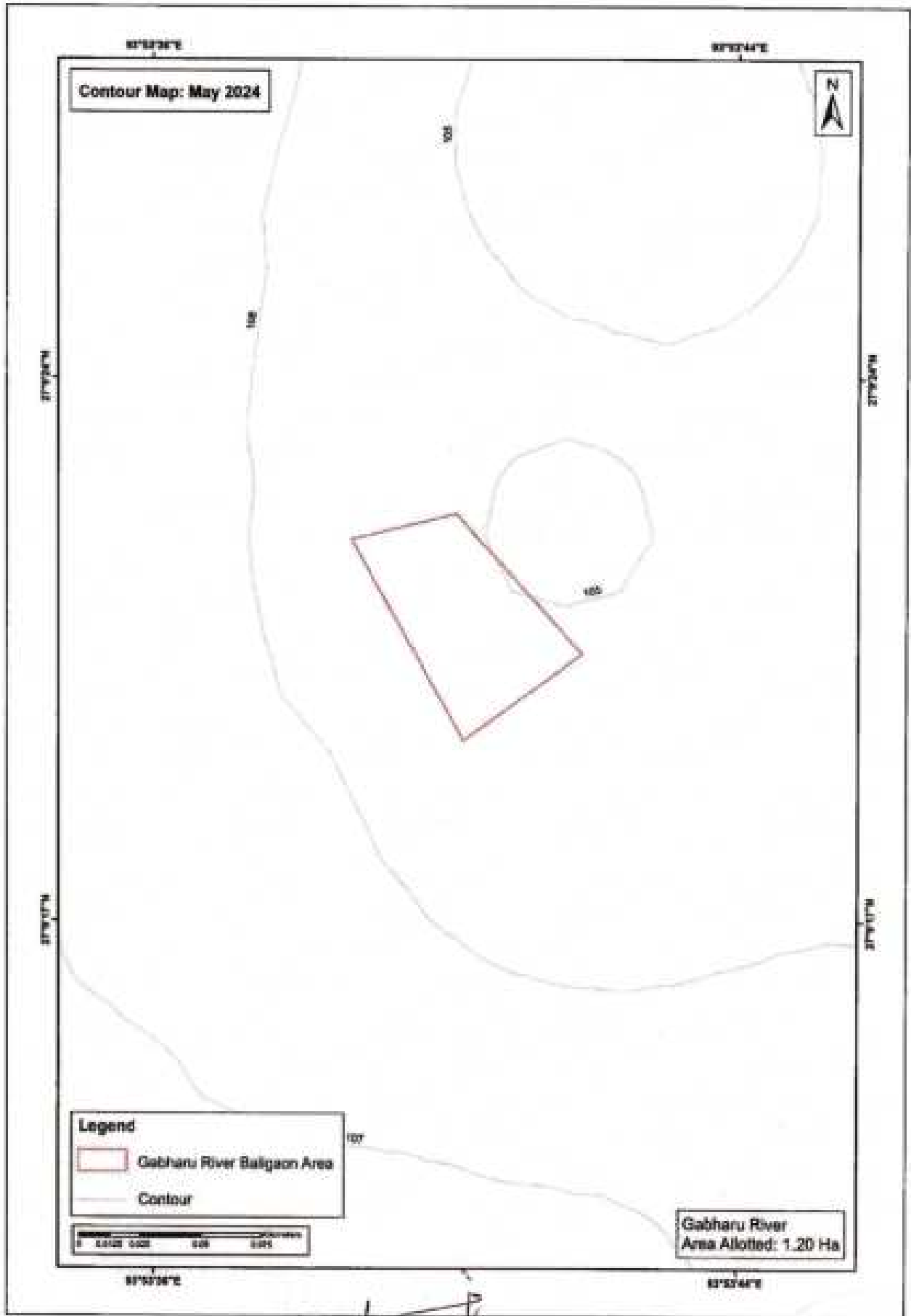


Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.



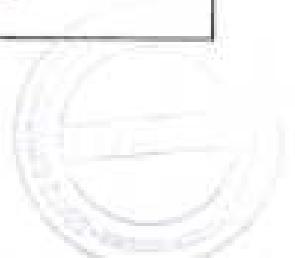


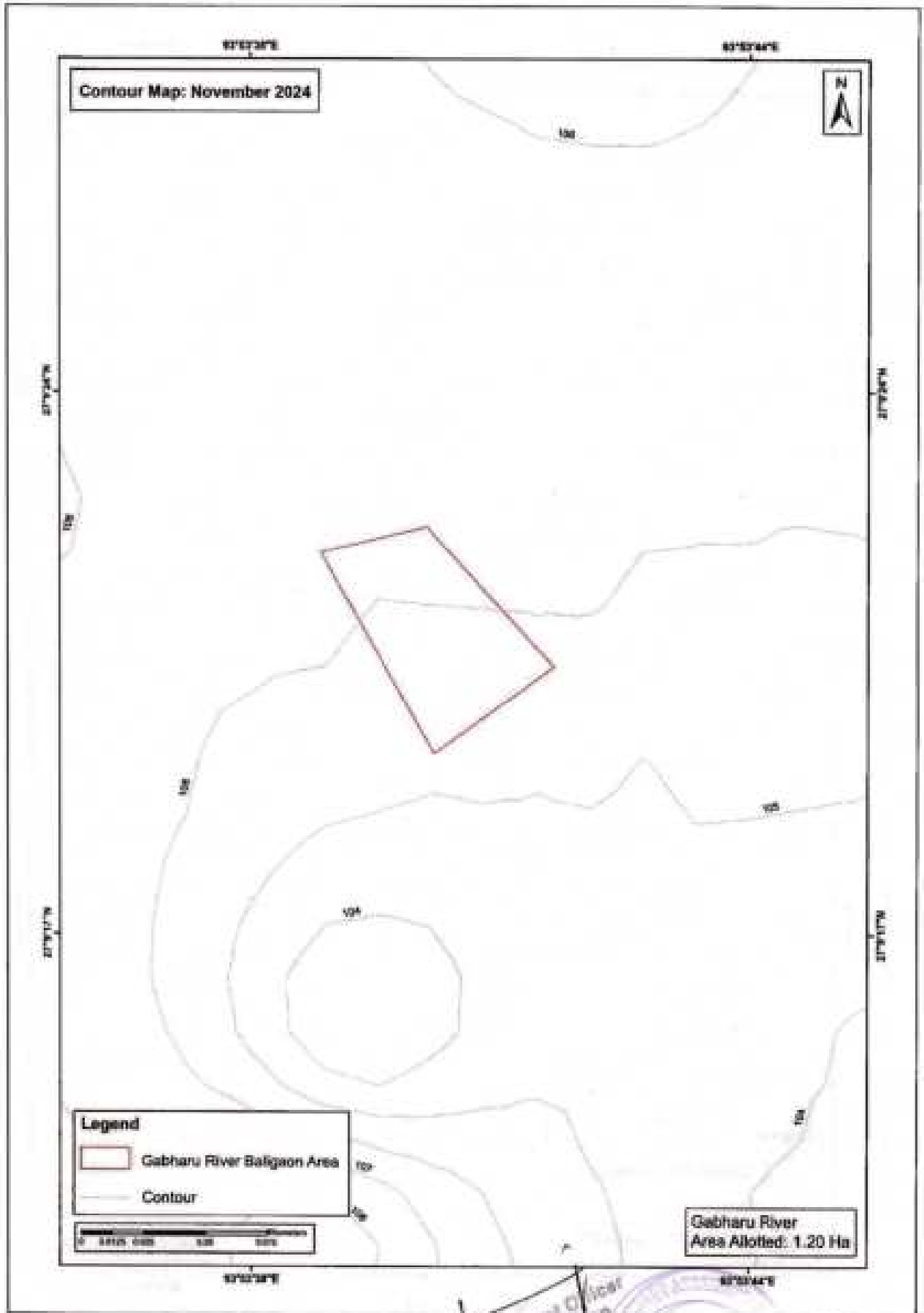
Divisional Forest Officer
Lathimur Division
North Calicut



100

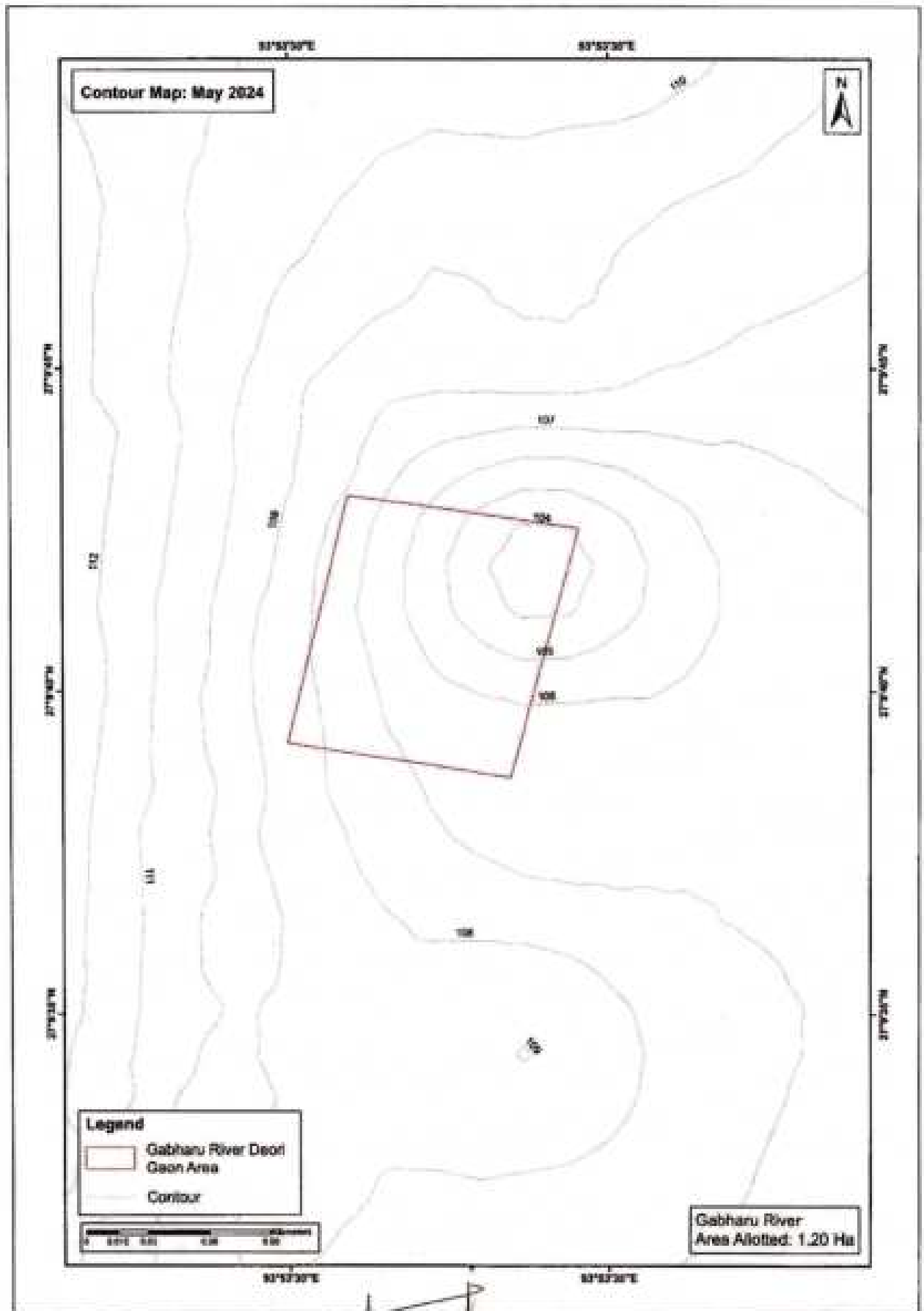
Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.





Divisional Forest Officer
Lalsonpur Division
North Lalsonpur





Contour Map: May 2024



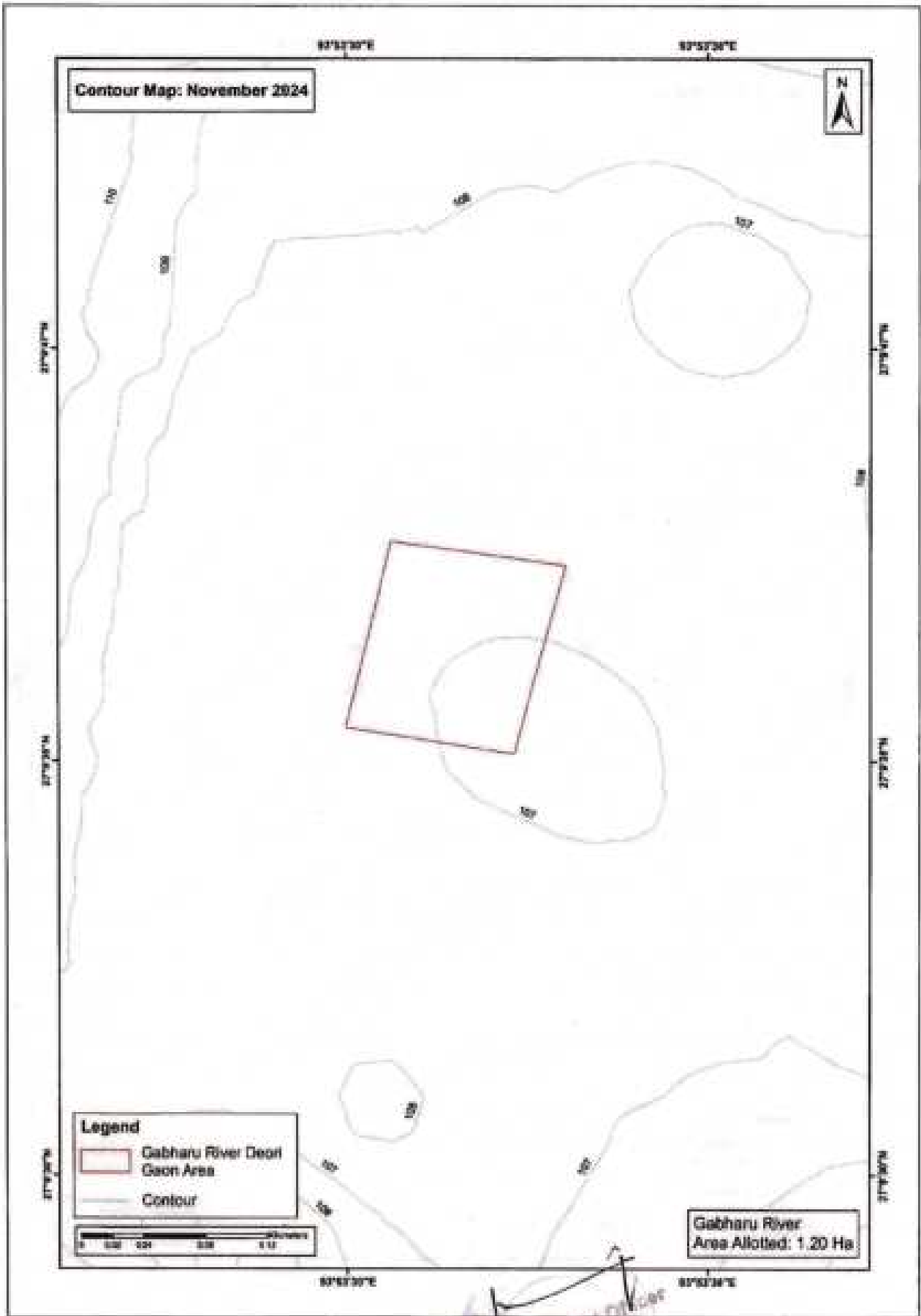
Legend
 Gabharu River Deorif Geon Area
 — Contour



Gabharu River
 Area Allotted: 1.20 Ha

Divisional Forest Officer
 Lakhimpur Division
 North Lakhimpur.





Divisional Forest Officer
Lakhimpur Division
North Lakhimpur.

CHAPTER 15: IMPACT OF MINING ON ENVIRONMENT AND REMEDIAL MEASURES

15.1 Introduction:

Pollution due to mining is a very significant environmental problem. Some principal causes of mining pollution are described below:

15.1.1 Air Pollution:

Mining operations produce airborne particles, including particulate matter, dust and gases, which definitely impact adverse effects on air quality and human health. Mining operations can release harmful gaseous emissions from heavy machinery, blasting activities, material transport, wind erosion, waste dumps, haul road etc. As soon as pollutants enter the atmosphere, they undergo physical and chemical changes before reaching a receptor. These pollutants can cause serious effects on human health and to the environment.

15.1.2 Degradation of land and loss of habitat:

Mining activities can lead to destruction of natural landscapes, deforestation and loss of habitats for flora and fauna. Irreversible damage to ecosystem occurs due to excavation, clearing of vegetation and creation of mine waste piles

15.1.3 Acid drainage:

Mine with acid mine drainage has the potential for long term devastating impacts on river, streams and aquatic life. Plants, animals or fish are unlikely to survive in such water. Such thing particularly happens when sulphide minerals like pyrites are exposed to air and water during mining.

15.1.4 Mining waste:

The generation of mining waste, such as tailings and waste rock dumps is another cause of pollution. These wastes may contain toxic substances and heavy metals

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that can leach into soil and groundwater. Tailings, in particular, may contain cyanides and other hazardous chemicals.

15.1.5 Loss of biodiversity and disruption of ecosystem:

Mining operations pose serious and highly specific threats to biodiversity. Mining activities often result in fragmentation or destruction of natural habitats, leading to the loss of biodiversity and disruption of ecological processes. Open-pit mining and their techniques of excavation alter the natural landscape drastically. However, reclamation and green belt development is carried out at present as per laid regulations.

15.1.6 Water Pollution:

Mining activities can contaminate water bodies through the discharge of wastewater, leaching of chemicals and the release of sediments. Release of acidic water due to mining can make the water unsafe for drinking and also can kill marine life.

15.1.7 Noise and Vibration:

Noise pollution associated with mining includes noise generated from vehicle engines, loading and unloading operations, power generation and other sources. Cumulative impact of noise from shovelling, ripping, blasting, transport, stock-piling etc. can significantly affect nearby residents and the wildlife. Vibrations generate from equipment used during mining operation, but the major source of vibration is blasting. Vibration affects stability of infrastructure, buildings and homes of people residing nearby.

15.1.8 Human displacement and Resettlement:

The displacement of settled communities due to large scale mineral development is a major cause of resentment. Adequate Rehabilitation and Resettlement programme often lacks sincere approach from the authorities.



15.2 Remedial measures in order to mitigate the impact of sand mining:

15.2.1 Air Environment:

The only source of air pollution during mining is excavation, transportation, loading and handling of minerals. Following measures are suggested to mitigate the negative impact of the mining activities to control the spreading of pollutants by plantation of trees along the haul roads, especially near settlements, planning transportation routes of mined mineral by shortest routes and regular water sprinkling on unpaved roads.

15.2.1.1 Air Emissions:

Probable Impact	Mitigation Suggested
<p>1. Dust and air emission particularly due to excavation, construction and movement of vehicles leading to air pollution</p>	<p>1) Provision for spraying water to reduce dust emission on unpaved roads, particularly near existing settlements, ($> 2 \text{ L per m}^2$)</p> <p>2) Excavated topsoil to be preserved and reused for landscaping</p> <p>3) Amount of exposed ground stockpiles to be minimized so that re-suspension due to wind and following dust fall may be prevented.</p> <p>4) Care should be taken in making arrangement of the soil in such a manner such that the existing drainage pattern, even if altered, will still ensure that runoff does not carry away topsoil but reaches the water bodies with which it is connected.</p>



	5) To ensure that all generators, vehicles, compressors are regularly serviced and well maintained.
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Other measures to be adapted:

- A. Transportation of material must be carried out during day time only.
- B. To plan multiple transportation routes in different direction to minimize the dust generation. Planned paved roads outside the mining lease area will minimize dust generation. In order to minimize transportation over unpaved roads, it is advised to plan transportation so as to reach the nearest paved road by shortest route.
- C. All the workers are to be provided with Dust mask at points like excavation and loading.
- D. The loaded material should be covered with tarpaulin during transportation.

15.2.1.2 Movement of Traffic:

Probable Impact	Mitigation Suggested
<ol style="list-style-type: none"> 1. Due to mining activity, number of vehicles per hour will increase in the existing traffic leading to undesired sound resulting in impact in human health. 2. Increase in number of vehicle movement will lead to air pollution affecting the health of local villagers with respiratory system, asthma, breathing problems etc. 	<ol style="list-style-type: none"> 1. Truck drivers to be instructed to make minimum use of horns in the village area and sensitive zones. It is advisable to plant local species of trees (fruit bearing and medicinal) along the haul road, in consultation with Forest Department. 2. All vehicles must possess proper and up-to-date PUC Certificate. Plantation of trees, as stated earlier will minimize the effect of air

<p>3. Vehicles moving with over-speed can lead to accidents</p>	<p>pollution. Moreover, Regular health check-up camps should be organized.</p> <p>3. Vehicle speed should be limited to 20 km/hr. Nearby medical facilities must be available in case of any mishap.</p>
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15.2.1.3 Noise Pollution:

Probable Impact	Mitigation Suggested
<ol style="list-style-type: none"> 1. Impact of noise due to mining activities. 2. Prolonged exposure of noise from the machinery can cause hypertension, hearing loss, sleep disturbances etc. 3. Increase in number of transports will lead to more noise and discomfort. 	<ol style="list-style-type: none"> 1. Noise generated from the equipment like generators must be within prescribed limit of 75 dB. The noise must not be continuous. 2. Noise measurement should be done at specified intervals and the data must adhere to permissible limits as per National Ambient Noise Quality Standards. 3. Truck drivers to be instructed to make minimum use of horns. Plantations along the approach roads will minimize noise propagation.



15.2.2 Water Environment:

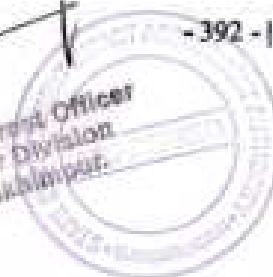
Probable Impact	Mitigation Suggested
<ol style="list-style-type: none"> 1. Flow pattern might get changed due to river bed mining. 2. Increase in mining depth will result in increase in flow velocity. 3. Change in qualities of ground water and surface water. 4. Mode of waste water discharge 	<ol style="list-style-type: none"> 1. Diversion of flow pattern should be avoided. Thus there will be no change in flow pattern, surface hydrology and ground water regime. 2. Mining activities must be restricted to 3m depth which will not affect the flow pattern. 3. Mining should not be done below the water levels. Water samples should be tested at regular basis as a precautionary measure. Mining will be done as per approved Mining Plan and approved Rules and Regulations e.g. mining should be restricted to central 3/4th width of the river and should not be less than 7.5 meters etc. 4. It is advised to use portable bio-toilets so that no sewage or liquid effluent will contaminate the ground water due to percolation.

15.2.3 Soil Environment:

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Probable Impact	Mitigation Suggested
<ol style="list-style-type: none"> 1. Mining activity may lead to increase of soil erosion and degradation which results in adverse impact in soil quality. 2. Extraction of top soil from outside riverbed may affect the soil fertility and productivity. 3. Soil erosion takes place during the flood. 	<ol style="list-style-type: none"> 1. Plantation of local species trees on regular basis along the haul roads, outer periphery within the mining area will help to enhance the binding property of the soil and check erosion. Water to be sprinkled on unpaved roads. 2. If it is a river bed, then top soil will not be generated. 3. To construct dams for protection of river banks. No bank cutting is permitted.

15.2.4 Land Use:

Probable Impact	Mitigation Suggested
<ol style="list-style-type: none"> 1. In case mining activity is carried out outside riverbed, a pit will be formed which will cause soil erosion. 2. Mining in riverbed may lead to a change in complete land use pattern and even land geometry, sediment transportation capacity, bed elevation etc. leading to a change in flow pattern of the river and erosion in the downstream. 	<ol style="list-style-type: none"> 1. In such a case, proper reclamation to be implemented either by planting of trees or converting the pit into a fishery project. 2. Mining should be carried out only during non-monsoon seasons so that the excavated area is replenished naturally during the subsequent rainy season. 3. Pre and post-monsoon survey for sedimentation in the riverbed should be carried out regularly.


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	<ol style="list-style-type: none"> 4. Dams to be constructed at required places for protection of banks. 5. Safety distance from the bank inwards to be maintained not to disturb the channel geometry.
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15.2.5 Hydrogeology:

Probable Impact	Mitigation Suggested
<ol style="list-style-type: none"> 1. Ground water contamination is very much susceptible for mining in river beds, due to intersection with water table. 2. Any change in topography will divert the river flow. 3. Any change in slope of mining area will lead to soil erosion and rain water run-off channel may get diverted. 	<ol style="list-style-type: none"> 1. Proper analysis and monitoring must be done so that intersection with water table is avoided. Moreover, depth of mining should not exceed 3 m. 2. Mining activity should not involve any diversion or modification of topography. 3. Maximum depth permissible for riverbed mining is 3 m, which must be adhered to.

15.2.6 Biological Environment:

Probable Impact	Mitigation Suggested
<ol style="list-style-type: none"> 1. Transportation of minerals in trucks or dumpers will hamper the movement of wild animals like jungle cat, jackal and other reptiles. Moreover, Fugitive 	<ol style="list-style-type: none"> 1. Movement of vehicles should be limited during day time only. Access roads should never encroach into the riparian zone. Water to be sprinkled on unpaved

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<p>emission from vehicle movement will form a layer on plant leaves leading to reduction in gaseous exchange process. This will ultimately affect the growth of plants (stomatal index may get minimized).</p> <p>There is also a possibility of collision with wildlife as and when they attempt to cross the road.</p> <ol style="list-style-type: none"> Human settlement in the mining area will destroy the vegetation cover and disturb the reptiles. Adverse effects on benthic fauna which inhabits the bottom sandy substratum in case indiscriminate mining is carried out. Extraction of excessive sand from riverbed will affect the eco-biology of many terrestrial insects whose initial life begins in aquatic environments. 	<p>roads which will minimize dust generation.</p> <ol style="list-style-type: none"> Human settlement not to be permitted in the mining lease area or nearby. Mining should be carried out as per principles laid down by the authorities. As such, there will be no impact on benthic fauna.
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15.2.7 Socio-Economical Effect:

Probable Impact	Mitigation Suggested
<ol style="list-style-type: none"> Mining and transportation activities will generate small shops, dhabas, garage, restaurants, vegetable shops etc. 	<ol style="list-style-type: none"> Positive impact, welcome. Positive impact, welcome. Garbage bins to be provided at proper places. Proper reclamation procedure to be adapted in the mined out areas.



<p>along the roads creating direct employment.</p> <ol style="list-style-type: none"> 2. Local people will get employment in the mining activities. 3. There will be generation of solid wastes along the roads due the shops opened. 4. Deep pits created in the channel can lead to accidents for villagers who goes to collect river water for their own domestic purposes. 5. There is huge possibility of accidents due to rash driving of dumpers carrying the materials through the village roads. 6. Generation of dust due to traffic movement will be injurious to health for the villagers. 	<p>Mining must be carried out in non-monsoon period so the excavated portion gets replenished during the subsequent rainy season.</p> <ol style="list-style-type: none"> 5. Shortest and safe roads to be used to reach the nearest paved roads. It will be better if graveled roads are constructed between mine lease area and the nearest paved road. 6. Water to be sprinkled regularly on unpaved roads to minimize dust generation. Speed of vehicles carrying the material to be controlled within limit. Moreover, materials being carried to be covered properly with tarpaulin.
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15.2.8 Remedial Measures for Land Environment:

1. The Mining activities must be carried out within the lease area only.
2. The surface run-off from the lease area should be retained within the lease area and to be used for plantation, dust suppression etc. so that there is no erosion of soil from the lease area and surroundings on account of mining activity.
3. Retaining wall and garland drains for the proposed waste dump to be constructed to arrest wash offs from the dumps. The dump must have inner slope with catch drains at inward side of the terrace and the catch drain of the

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individual terrace is to be connected to the garland drain outside to periphery of the dump. The waste materials are to be used for construction of road.

4. Maintenance and repair work of vehicles and machineries should be carried out outside the mining area

15.2.9 Remedial Measures for Waste Management:

1. Solid waste to be dumped systematically with proper repose angle.
2. Solid waste is to be stabilized in the following manner:
 - a) Stabilization of dump with top soil and tree plantation shall make the dump stable.
 - b) Dump should be terraced for every 5 m height.
 - c) Gradation of the dump should be done automatically as coarse materials go down to the bottom at finer at the top. As such the drain of rain water will flow freely to the bottom without hampering the stability of the dump
 - d) 1 m height parapet should be constructed for dumps more than 6 m height.

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CHAPTER 16 RECLAMATION OF MINED-OUT AREA

16.1 Introduction:

A reclamation plan is a strategic guideline prescribed for the restoration of disturbed land due to activities like mining, construction, oil or gas extraction etc. The objective is to bring back the land to a state that is equal or very close to its original state i.e. that existing before the disturbances were carried upon. The reclamation process is considered to be successful when it delivers a self-sustaining and diverse native plant community that will prevent erosion and support wildlife habitat. The planning for mine reclamation activities should begin prior to mining operation is permitted or being completed. It is true that returning the landscape to its original status is not always possible, however, it is possible to create useful landscapes that meet a variety of goals ranging from the restoration of productive ecosystems.

As and when the mining operation ends, the project proponent must restore the land to its approximate original contour (AOC) or leave the land graded and or a "higher and better" post- mining land use (PMLU) that has been approved as part of the original mining permit application.

16.2 Stages of Reclamation Plan

Reclamation Plan involves the following steps:

1. **Pre-construction:** To plan for reclamation critically well before the mining operation. It includes salvaging topsoil and preparing for interim reclamation measures.
2. **Interim Reclamation:** This will take place during operational phase, where efforts will be made to minimize environmental impacts and restore unused areas.
3. **Final Reclamation:** As soon as the mining operation ends, final reclamation will involve restoring the original landform along with revegetation with native species, controlling erosion and ensuring long-term ecosystem restoration. In general, in open cut mines, rocky materials are used for backfilling the excavated portion. A layer of soil that was stored in the pre-mining period is placed on the

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rocky material. On top of this layer, a layer of topsoil is placed. The final step is the restoration of vegetation and long-term development program.

16.3 Phase 1 of Reclamation

16.3.1 Landscaping:

Landscaping or site preparation covers all the activities used removal of soils and overburden, disposal of wastes and the modification of disturbed land, and waste disposal sites for achieving the reclamation of the areas mined. It may include:-

- i. Contouring or reshaping the back filled pits or dump of waste rock/soil
- ii. Installation of an effective drainage and sedimentation control system
- iii. Covering of toxic wastes, barren waste rocks, tailings or any inhibition to plant with the previously stored top soil (up to a minimum of 30 cm
- iv. Tillage operation
- v. Prevention of erosion and excessive run off by grading and levelling of top dressed areas.
- vi. Preparation of seed bed, including ploughing and application of mulches
- vii. Pittings, gouging and land imprinting.

Thus, the site preparation is carried out with a view to improving the physical condition of the mined land, overburden and waste disposal area for eventual land use. In most of cases, the ultimate land use may be in the form of revegetation by agriculture or forestry.

16.3.2 Grading:

The final slopes shall be so designed and then subsequently developed that after the closure of the mine, there is no likelihood of any slope failure. It is very important to consider the slope of the site to be reclaimed vis-a-vis the ultimate use of the surface area. Gradients are made keeping in view the slope stability of the material. Grading, is usually carried out with bull-dozers. Voids due to mining are to be dealt



and the final land use plan will include filling the voids for land reclamation where possible to provide for a gentle slope.

The external waste dump must be developed as per the proposed design so that slope failure do not create any safety hazard to the local community.

Since the old dumps or tips are to be used for revegetation or agriculture, they are first graded to a gentle slope of less than 1:4 or 1:5. The graded surface is then covered with 15-30 cm thick layer of topsoil to ensure proper growth of vegetation. Compacted top soils of old dumps are not suitable for plantation because of the closing of voids due to the compact and hard nature of the soil. These compacted soils are made suitable for plantation by deploying tillage methods i.e. ripping, disking or scarifying.

These operations are used in areas with a scanty supply of moisture. They help in holding the water in place rather than allowing it to run down slopes and cause erosion. Pitting is done on steeper types and gouging is done on less steeper slopes.

16.3.3 Tillage Operations

Tillage operations help in developing the suitable conditions for growth of vegetation on the top layer of soil. Tillage operations are useful for providing soil aeration, mixing fertilizer and mulches into the soil reducing compaction in the soil, facilitating moisture infiltration, and in providing good seed-to-soil contact. Contour tillage and contour planning helps in controlling erosion.

Tillage is generally of two types viz. primary tillage and secondary tillage. Primary tillage is used for cutting and shattering spoil and for burying it by inversion. It may mix the trash into the tilled layers.

Primary tillage is relatively a deeper operation giving rougher surface. Primary tillage operations used in surface mine revegetation consist of shallow and deep ripping, some kind of disking, chisel plowing and stubble mulch.

Secondary tillage is used for working the spoils to a shallow depth, pulverizing the lumps of soils, closing air pockets and farming the spoils, conserving moisture



and killing the weeds. It is implemented through disk harrowing, roller harrowing and packing and tooth type harrowing.

Tillage operations are carried out as soon as the mined site or the spoils are shaped and covered with top soil. Seeding and planting follow the tillage operations. The general sequence of site preparation is (i) ripping, (ii) disking or harrowing, (iii) fertilizing, (iv) harrowing in fertilizer, and (v) seeding/planting.

16.3.4 Construction of New Tips:

The reclamation activities can be taken up side by side with the mining operation and they need not wait till the mining is complete, however in this case the reclamation has to be conducted since mining in these two diverted areas are already concluded. Such a construction of new tips can be started with an idea of reclaiming them. Top soil and subsoil layers should be analyzed for their capacity to support vegetation and if they are found to be of better quality than the material being tipped should be stripped from the tipping area and be stacked separately. Topsoil should preferably be handled dry. These layers of stripped soil can be used subsequently for re-spreading over the tip or on any other surface to be taken up for reclamation. While no reliable information about the shelf life of topsoil is available, it is advisable that the topsoil should not be stock-piled for a longer period, the earlier it is used the better. Topsoil stock-piled for over six months suffers deterioration in its fertility and micro-organisms in it.

Constructing dumps of minimum height and maximum surface area helps in avoiding loss of micro-organisms and death of active seeds to some extent.

Sequence of activities of constructing new tip on plane grounds with an aim of future reclamation is shown in Progressive reclamation with re-vegetation is followed as the tipping continues. Similarly, perimeter tipping which consists of constructing the outer tip-faces first and then in filling the intermediate area can also be followed both on the level ground and the slopping ground as discussed earlier. The outer-faces of the perimeter tips are covered with good soil and the revegetation is started simultaneously. The progressive reclamation allows

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maximum time for the vegetation to grow, besides the cost of reclamation, is spread over the whole life of the tip.

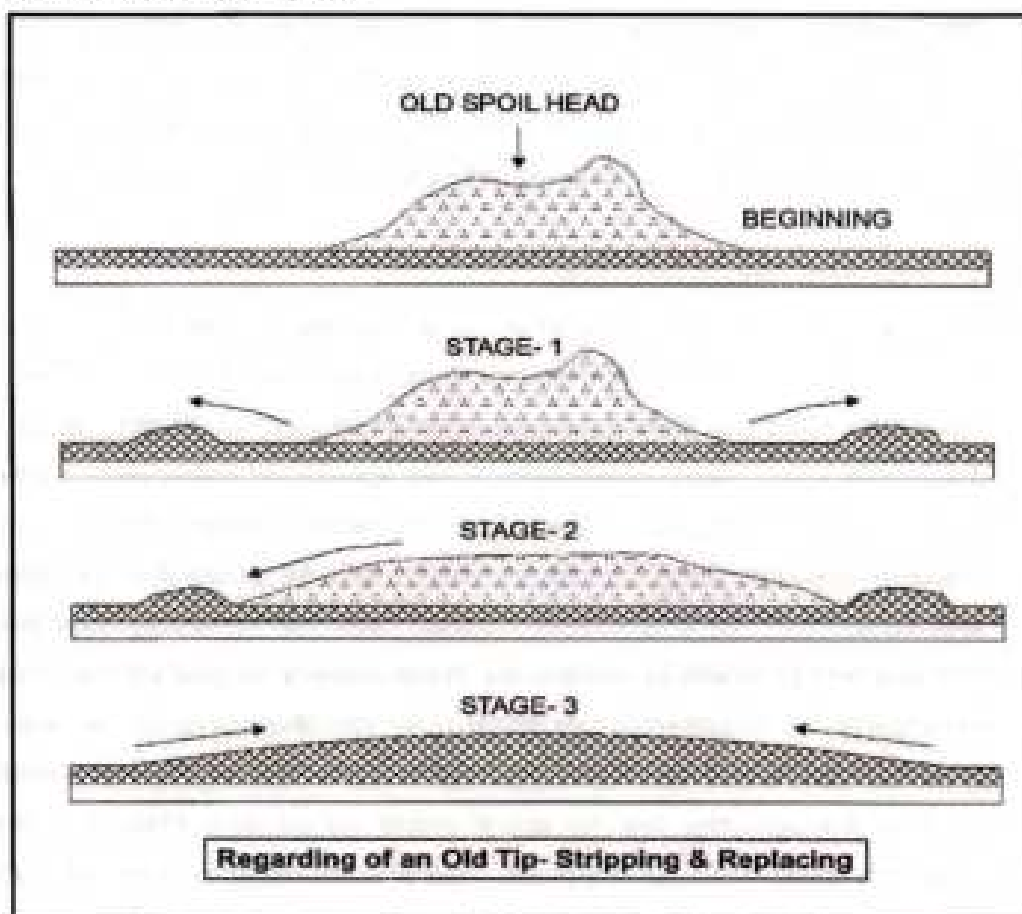


Fig. 16.1

If the material being tipped is inhibitory to plant growth it should be buried within the tip, away from the root zone and capped with inert material clay. Finally, a layer or fertile topsoil can be spread over it. Similarly, if the material being tipped is likely to produce acidic drainage on reacting with percolating water. It may be capped with a layer of limestone which will reduce any acidity or reduce the solubility of toxic metal ions. If the surface of a tip has become hard and impenetrable for roots of vegetation it is subjected to tillage for loosening the soil

16.3.5 Replacement of Soil;

Topsoil removed from the mining site is separately stock-piled for future use. However, care is taken to protect it against erosion and degradation. The topsoil so stockpiled separately is then replaced on mine spoils with the help of scrapers. Dozers are used to level the surface. Generally, a minimum of 15 cm of soil is replaced as top soil. Subsequently, a programme of physical site preparation or tillage is implemented. Tillage provides for mechanical and spoil stirring actions which helps in developing a suitable environment for seed germination, weed control, soil erosion and control and moisture control, etc.

In case of non-available of adequate quantity Of soil available, rock material can be crushed and used after mixing with the suitable quantity of fertilizer and organic material.

16.3.6 Soil Amendments:

Treatment of Highly Acidic or Alkaline Spoils: On the acidic and alkaline spoils, both physical and chemical means are used to improve the conditions which are unfavorable for plant growth.

Acidic spoils: Physical treatment of the acidic spoils includes addition of organic matter. Top soiling also helps in burying the acidic spoils deeper. In chemical treatment of acidic spoil, lime is applied during crimping and harrowing. Lime is applied to depth of soil disturbance to maintain a neutral soil. Lime is applied in its various forms like ground limestone (calcium carbonate) or burnt lime (calcium oxide), hydrated lime, or lime residue from sugar beet processing. Ground limestone is insoluble in water but it is soluble in acid. Thus, for ensuring long range effect, ground limestone having various particle sizes is mixed in soil at depth of at least 25 cm. Calcium oxide and calcium hydroxide are very soluble in water and they have an immediate effect. However, the effect of calcium oxide and calcium hydroxide is not long lasting. Application of burnt lime or hydrated lime help in temporarily raising the pH of soil to 8.5-9.0.

Besides correcting the acidic conditions, lime also helps in improving the physical conditions of soil supplying calcium to the soil accelerating decomposition of

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organic matter, increasing the availability of nutrients, decreasing of toxicity of aluminum and also ferric irons.

16.3.7 Soil Amelioration:

Soil amelioration activities are undertaken to overcome the adverse conditions including salinity, and deficiencies of nutrients, the presence of toxic compounds, poor texture and structure of soil and lack of organic matter. Soil amelioration is necessary in the revegetation program of the spoils from acidic and sulfide ores. However, most of the mine wastes require some amount of soil amelioration prior to revegetation program. Soil amelioration for revegetation consists of

- i). Laying or spreading an additional layer of topsoil required.
- ii) Preparation of seed bed and incorporation required amount of fertilizers
- iii) Treatment of surface soil with mulches and/or adhesive chemical stabilizers. (Mulches help in preventing erosion and encourage establishment of a vegetative cover)
- iv) Soil amendment by way of application of lime to neutralize acidity or gypsum to neutralize the alkalinity.

16.3.8 Mulches

Mulch may be defined as any suitable protective layer of organic or inorganic material applied or left on or on the soil surface as a temporary aid in stabilizing the surface and improving soil microclimatic conditions for establishing vegetation. Mulches often shorten the time for establishing adequate plant growth, and also protect the site until plants became established.

Some of the common mulches are straw or hay, wood residues (saw dust, wood chips, bark shaves) fibre tackifiers and soil binders, plastic film, manure and sewage sludge, emulsion of resin in water, asphalt, latex emulsion, and mats (jute, paper, plastics, and nets), etc.

Besides supplying valuable organic matter the mulches are also beneficial the following:

- a) Insulating disturbed lands against extreme soil temperature.

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- b) Increasing soil moisture holding capacity.
- c) Reducing impact of rainfall.
- d) Accelerating the growth of micro-organism.
- e) Reducing the rate of evaporation.

16.3.9 Management of Hydrology and Hydro-Geology:

In the mine closure plan, the surface flow pattern of precipitation and mine water would be clearly developed and water channel suitably laid down so that it does not disturb the general hydrology of the area.

A garland drain around the mined out area is mandatory and the same should lead to a sedimentation tank. The sedimentation tank has to be of a minimum surface area of 40 sq. meter per hectare of mined out area and should have a siltation storage capacity of minimum 10 cubic meter.

16.4 Phase 2 of Reclamation:

16.4.1 Re-vegetation:

Establishing a cover of vegetation on the mine spoils or over the mined area is beneficial in a number of ways. The vegetative cover established on mine spoils helps in:

- i) Stabilizing erodible slopes of minimize pollution.
- ii) Establishing perimeter wind-breaks and shelter belts.
- iii) Control of dust.
- iv) Enhancement of aesthetic value.
- v) To maximize evapo-transpiration which helps in minimizing run off.
- vi) Facilitating product land use for agriculture and forestry or grazing land, etc.
- vii) Reducing oxidation which often gives rise to acid mine drainage.
- viii) Wide belts of forests trees help in reducing noise.

Studies have shown that forests are very effective in controlling erosion.

Forested Watersheds gave 10% lower peak discharges than agricultural watersheds and the soil loss also was less by 38.5%. Similarly, studies on the effect of



afforestation on hydrology have shown that afforestation causes a reduction of 28% in run off and reduction off 73% in peak rate of flow.

Forests also reduce the maximum temperature and increase the average rainfall of the area.

In cases where the dumps height is more and the area is restricted the dumps may be vegetated in the existing position. In such cases, the dumps should be vegetated by grasses followed by a plantation of trees. The trees may be planted by giving contour and drains all around the dumps and also on the top of the dumps after flattening them. However, arrangements for watering have to be made.

16.4.2 Planting Vegetation for Wildlife:

While planting vegetation for developing wildlife habitat, due consideration should be given to the food habit and places of shelter preferred by the various types of wild life. It may be kept in view that some animals graze on grasses and herbs, some brows on shrubs and tree leaves, some eat seeds, berries and corn. Moreover, different animals use different places for shelter.

Thus due provision should be made in providing proper groups of vegetation to attract the animals.

16.4.3 Selection of Plant Species:

Plant to be grown in a particular area are selected on the considerations of nature of spoil, climate of the area, and the eventual land use. Besides, there may be some specific local consideration in selection of plant material. These local conditions may include insect resistance, landscape planting, growth habits and compatibility with other plants and availability of seeds or root stock of the particular species.

Generally, native species of plants are most commonly used for revegetation. The native species easily adapt to the local climate.

Moreover, the rehabilitated site is in harmony with local landscape, and encourage recolonization by the wildlife.



16.4.3.1 Useful Plant Species

Plants that can improve soil quality and benefit other plants are listed below. They can improve structure and fertility of soil, fix nitrogen and potassium, bind the soil to avoid erosion, improve moisture content and retain nutrients in soil, inhibit development of diseases, improve the health of nearby plants etc.

Examples are Astragalus, Basil, Borage, Buckwheat, Caraway, Chamomile, Chicory, Chervil, Chives, Comfrey, Dandelion, Dill, Garlic, Horseradish, Legumes i.e. peas, beans, lupin etc., Marigold, Marjoram, Mustard plants, Nettles, Oregano, Tansy, Yarrow, Alfalfa, Carrot, Clovers and a few others.

Root slips of perennial grasses such as Cenchrus, Dichanthium, Schima, Lasiurus and Saccharum may also be tried.

Topsoil can also serve as a source of viable seeds of indigenous species. Nearly 93% of viable seeds are present in top 2 cm of soil. Propagative pieces of rhizomes are also abundant in this layer.

16.4.3.2 Rate of Seed Plantation

There are lot of variations in suggested rates in the application of seeds as the rates of application from 22 kg per hectare of agriculture grass mixture for ironstone workings in England to 337 kg per hectare hydro seeded on copper tailings in Arizona. The rate of seed application depends on the species sown, viability of the seed, method of application and the condition of site.

However, a rate of 25-200 kg per ha provides a suitable range for application of seeds for reclamation of mine wastes.

16.4.3.3 Manual Planting of Trees:

It is not always convenient to establish vegetation through seeds. Some varieties grow easily at mine sites if their nursery grown varieties or cuttings are used for the purpose. Trees may be planted manually in the form of tubelings, transplants, whips, shrubs, bushes, standards, half standards and feathered trees and are planted to their former depth with roots well spread, in a properly prepared solid-bed.

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16.5 Phase 3 of Reclamation

16.5.1 Monitoring

The access trenches made for entry to the opencast mine shall be properly closed. Fencing is of primary importance to keep the herbivorous animals out of the reclaimed area when the vegetation is young and is prone to being eaten by the animals. Further, fencing is required to stop the egress of public and possible damage to the reclaimed area.

Continuous monitoring of the reclaimed area has to be carried out by means of satellite and Ground truthing. In satellite monitoring, over years of passage, inaccuracies in digital imagery may occur due to systematic errors attributed to earth curvature and rotation as well as non-systematic errors attributed to satellite receiving station itself. Raw digital images contain geometric images, which make them unusable as maps. Therefore, geo-referencing is required for correction of image data using ground control points (GCP) to make it compatible to toposheet of Survey of India.

Further, ground truthing of the reclaimed land has to be done by field team.

A periodic schedule shall be maintained vide which any degradation of the same shall be rectified immediately.

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CHAPTER 17: RISK ASSESSMENT AND DISASTER MANAGEMENT

17.1 Introduction:

Most of the accidents occur during transportation by trucks / dumpers and movement of mining equipment. Following mitigation matters to be adapted:

- a) Regular training of all vehicle / machinery drivers / operators to be ensured.
- b) Regular maintenance and testing of all mining equipment according to manufacturer's guidelines.
- c) All safety precautions and provisions of MMR 1961 shall be strictly followed.
- d) Broad sign to be provided at each and every turning point of vehicles.
- e) All transportation activities within the main working area should be carried out under direct supervision and control of the management.
- f) At the embankment and tripping points, reversing lorries should be made man-free, have proper indication lamps and warning horns.

17.2 Hazard Identification and Risk Assessment (HIRA):

Hazard Identification and risk Assessment are two processes necessary for maintaining a high level of safety and efficiency in the workplace. These processes aim to identify potential risks and hazards, assess their severity, and put the management team in a better position to put controls and take preventive and corrective actions.

It is desired that the entire mining operation is carried out under the supervision of the Mining Engineer or Mines Manager having second class mine's manager's certificate of competency to take adequate measure during following circumstances:

- 1) Slope failure at mine faces
- 2) Accident due to sliding of dumps
- 3) Accident due to storage of fuel
- 4) Accident due to fly-rock generation
- 5) Accident due to transportation or movement of heavy machineries
- 6) Accident due to use of explosives

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7) Mishandling of mining equipment

It is advisable that a 5 x 5 risk assessment Matrix is prepared on day-to-day basis. In this matter, Likelihood (Probability) is put along the x-axis and pertains to the extent how likely the risk may occur. The 5 risk rating levels under this component are.... **Rare** – unlikely to happen and/or have minor or negligible consequences

Unlikely – possible to happen and/or will have moderate consequences.

Moderate – likely to happen and/or have moderate consequences

Likely – almost sure to happen and/or to have major consequences

Almost certain – sure to happen and have major consequences.

Impact which is also called severity, is placed along the y-axis to determine the level of effects that the hazard can cause to workplace, health and safety.

The levels are

Insignificant – won't cause serious injuries or illness

Minor – can cause injuries or illness only to a mild extent.

Significant – can cause injuries that may require medical treatment but limited one.

Major – can cause irreversible injuries that require constant medical attention

Severe – can cause fatality

17.3 Risk and Mitigation Measures:

17.3.1 Over Burden Risk:

The overburden dumps are susceptible to landslides. If the dump is very high, it may slide down at the quarry edge or may cause failure of the pit slope due to excessive loading. This may lead to loss of life and property. Siltation of surface water may also cause run-off from overburden dumps.

- A. Mitigation: 1. Height of overburden dump should be restricted.
2. Proper garland drain and bund to be constructed around the dump. This will prevent slippage.
3. No loose rock or stone or loose tree to be allowed within 3 meters of the edge of the quarry.



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4. In order to prevent siltation of surface water, it is necessary to construct retaining wall on the downside of each overburden dump

- B. Fuel Storage: Major storage of fuel in the mining lease area is strictly prohibited.
- C. Water Logging: In case mine pit gets filled up with rainwater, adequate number of pumps of proper capacity should be arranged well in advance. Garland drainage should be properly maintained to prevent inflow of rain water into the pit.

17.4 Disaster Management:

Disaster is an event, natural or manmade, sudden or progressive which impacts with such severity that the affected community or workers must respond by taking exceptional measures. It is a sudden or progressive occurrence of such magnitude as to effect normal working conditions or pattern of life.

- A. Types of Disaster: Fire and explosion, Large oil spillage, Toxic gas release, Flood, Cyclone, Equipment failure, Transportation of hazardous material, improper storage of debris etc. etc.
- B. Phases of Disaster:
 - a. Warning Phase: Many disasters are preceded by some sort of warning. During any industrial operation, a detection and alarm system to be installed in such cases.
 - b. Impact phase: This is the period when the disaster actually strikes and very little can be done in order to lessen the effects of it.
 - c. Rescue phase: This phase starts after the impact phase and to be continued till the situation becomes under control.
 - d. Relief and Rehabilitation phase.

As such, during mining activities, the workforce must be made aware of all the above factors and proper responsibilities to be assigned to each individual or coordinators in the organization about each phases of disaster and make



preparatory work before the emergency, implement operational plan during the emergency and carry out investigation of the causes of disaster.

17.5 Details of Occupational Health Issues in the District:

As Lakhimpur district is industrially backward and has no large scale heavy industries. However, the drinking water in the district has been found to contain heavy metals which can pose health hazard.

Some other occupational health hazards include:

- 1) Leptospirosis: It affects people who come into contact with animals and their discharges. Rodents, which are common in underground sewers, can carry leptospira, which is excreted in their urine.
- 2) Musculoskeletal injuries: These can occur when the patients are lifted, transferred, or repositioned without proper techniques.
- 3) Exposure to hazardous chemical: These include cleaning and disinfecting agents, sterilants, mercury, toxic drugs, pesticides, latex and laboratory chemicals.
- 4) Breathing problems and lung diseases: These can be caused by dust, fumes, vapours or gases emitted in the air.
- 5) Dermatitis: this can occur from skin exposure to hazardous substances.

17.6 Plantation and Green Belt Development in respect of Lease already granted in the district:

As per MoEF&CC Office Memorandum F.No.22-34/2018-IA-III dated*16th January, 2020, at the end of mining lease period "the mining lease holder shall, after ceasing mining operations, undertake re-grassing the mining area and any other area which may have been disturbed due to their mining activities and restore the land to a condition which is fit for folder, flora fauna etc."

The green belt shall be developed around the lease area, haul roads, undisturbed area, reclaimed area, workshop, mine office etc. The strategic approach for establishing this greenbelt depends on several prime conditions.

Minerals: Sand, Gravel, Boulder, Ordinary Clay



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- 1) Selection of plant species to be such that these are capable of rapid growth and resilience.
- 2) Selected species must be capable of forming a dense crown cover, thus providing ample shade and habitat for ecosystem.
- 3) The species must be wind-resistant and have a long lifespan to ensure the sustainability of the greenbelt.
- 4) The plants should be able to contribute towards maintenance of the ecosystem health by producing abundant litter on the plantation floor.
- 5) To prioritize use of local indigenous fast growing trees and shrubs, in alignment with the region's natural biodiversity.
- 6) Fencing and regular watering to protect from grazing animals and nurture must be undertaken as a precautionary measure.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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CHAPTER 18: APPLICABILITY OF ENVIRONMENTAL SENSITIVITY FOR MINING OPERATION

18.1 Water management:

- 1) Establishing a water balance (including probable climatic events) for the mine and related process plant circuit and use this to inform infrastructure design; ·
- 2) Developing a Sustainable Water Supply Management Plan to minimize impact to natural systems by managing water use, avoiding depletion of aquifers, and minimizing impacts to water users; ·
- 3) Minimizing the amount of make-up water;
- 4) Consider reuse, recycling, and treatment of process water where feasible (e.g. return of supernatant from tailings pond to process plant); ·
- 5) Consider the potential impact to the water balance prior to commencing any dewatering activities; ·
- 6) Consultation with key stakeholders (e.g. government, civil society, and potentially affected communities) to understand any conflicting water use demands and the communities' dependency on water resources and/or conservation requirements that may exist in the area.
- 7) The quality and quantity of mine effluent streams discharged to the environment, including storm water, leach pad drainage, process effluents, and overall mine works drainage should be managed and treated to meet the applicable effluent discharge guideline values.

18.2 Wastes:

Mines generate large volumes of waste. Structures such as waste dumps, tailing impoundments / dams, and containment facilities should be planned, designed, and operated such that geotechnical risks and environmental impacts are appropriately assessed and managed throughout the entire mine cycle.

Solid wastes may be generated in any phase of the mine cycle. The most significant waste generating mining activities will likely occur during the



operational phases, which require the movement of large amounts overburden and creation of rock waste and tailings.

Other types of solid wastes, depending on the type of mining undertaken, may include leach pad waste, workshop scrap, household and non-process-related industrial waste, as well as waste oils, chemicals, and other potentially hazardous wastes.

18.3 Waste Rock Dumps:

Depending on the stripping ratio (in open pit mines), large quantities of overburden or waste rock often need to be removed to expose the mineral to be mined. The overburden and waste rock is often disposed of in constructed waste rock dumps. Management of these dumps during the mine life cycle is important to protect human health, safety and the environment. Recommendations for management of waste rock dumps include the following:

- Dumps should be planned with appropriate terrace and lift height specifications based on the nature of the material and local geotechnical considerations to minimize erosion and reduce safety risks;
- Management of Potentially Acid Generating (PAG) wastes should be undertaken as described in the guidance below;
- Potential change of geotechnical properties in dumps due to chemical or biologically catalyzed weathering should be considered. This can reduce the dumped spoils significantly in grain size and mineralogy, resulting in high ratios of clay fraction and a significantly decreased stability towards geotechnical failure. These changes in geotechnical properties (notably cohesion, internal angle of friction) apply especially to facilities which are not decommissioned with a proper cover system, which would prevent precipitation from percolating into the dump's body. Design of new facilities has to provide for such potential deterioration of

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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geotechnical properties with higher factors Environmental, Health, and Safety Guidelines Mining, December10,2007.

18.4 Land Use and Biodiversity:

Habitat alteration is one of the most significant potential threats to biodiversity associated with mining. Habitat alteration may occur during any stage of the mine cycle with the greatest potential for temporary or permanent alteration of terrestrial and aquatic habitats occurring during construction and operational activities. Additionally, exploration activities often require the development of access routes, transportation corridors, and temporary camps to house workers which may all result in varying degrees of land-clearing and population in-migration. Depending on the type of mining, development and construction activities often require land clearing for the mine as well as for the process plant, tailings facility, waste and stockpile areas, and infrastructure such as buildings, roads, construction camps, town sites, water management structures, power plant, transmission lines and access corridors to the mine site. The protection and conservation of biodiversity is fundamental to sustainable development. Integrating conservation needs and development priorities in a way that meets the land use needs of local communities is often a critical issue for mining projects. Recommended strategies include consideration of the following:

- Whether any critical natural habitats will be adversely impacted or critically endangered or endangered species reduced;
- Whether the project is likely to impact any protected areas;
- The potential for biodiversity offset projects (e.g. proactive management of alternative high biodiversity areas in cases where losses have occurred on the main site due to the mining development) or other mitigation measures;

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18.5 Air Quality:

Management of ambient air quality at mine sites is important at all stages of the mine cycle. Airborne emissions may occur during each stage of the mine cycle, although in particular during exploration, development, construction, and operational activities. The principal sources include fugitive dust from blasting, exposed surfaces such as tailings facilities, stockpiles, waste dumps, haul roads and infrastructure, and to a lesser extent, gases from combustion of fuels in stationary and mobile.

Dust Fugitive

Dust emissions from the dry surfaces of tailings facilities, waste dumps, stockpiles and other exposed areas should be minimized. Recommended dust management strategies include: · Dust suppression techniques (e.g. wetting down, use of all weather surfaces, use of agglomeration additives) for roads and work areas, optimization of traffic patterns, and reduction of travel speeds; Exposed soils and other erodible materials should be revegetated or covered promptly; · New areas should be cleared and opened-up only when absolutely necessary; · Surfaces should be re-vegetated or otherwise rendered non-dust forming when inactive; · Storage for dusty materials should be enclosed or operated with efficient dust suppressing measures; · Loading, transfer, and discharge of materials should take place with a minimum height of fall, and be shielded against the wind, and consider use of dust suppression spray systems; Conveyor systems for dusty materials should be covered and equipped with measures for cleaning return belts.

18.6 Noise and Vibration:

Sources of noise emissions associated with mining may include noise from vehicle engines, loading and unloading of rock into steel dumpers, chutes, power generation, and other sources related to construction and mining activities. Additional examples of noise sources include shovelling, ripping, drilling, blasting, transport (including corridors for rail, road, and conveyor belts), crushing,



grinding, and stockpiling. Good practice in the prevention and control of noise sources should be established based on the prevailing land use and the proximity of noise receptors such as communities or community use areas. Recommended management strategies include:

Noise levels at the nearest sensitive receptor should meet the noise guidelines in the General EHS Guidelines; · Where necessary, noise emissions should be minimized and controlled through the application of techniques which may include:

1. Implementation of enclosure and cladding of processing plants o Installation of proper sound barriers and / or noise containments, with enclosures and curtains at or near the source equipment (e.g. crushers, grinders, and screens)
 2. Installation of natural barriers at facility boundaries, such as vegetation curtains or soil berms.
 3. Optimization of internal-traffic routing, particularly to minimize vehicle reversing needs (reducing noise from reversing alarm) and to maximize distances to the closest sensitive receptors
- The most significant vibrations are usually associated with blasting activities; However, vibrations may also be generated by many types of equipment. Mines should minimize significant sources of vibration, such as through adequate design of crusher foundations. For blasting-related emissions (e.g. vibration, air blast, overpressure, or fly rock), the following management practices are recommended: · Mechanical ripping should be used, where possible, to avoid or minimize the use of explosives; · Use of specific blasting plans, correct charging procedures and blasting ratios, delayed / micro-delayed or electronic detonators, and specific in-situ blasting tests (the use of downhole initiation with short-delay detonators improves fragmentation and reduces ground vibrations); · Development of blast design, including a blasting-surfaces survey, to avoid over-confined charges, and a drill-hole survey to check for deviation and consequent blasting recalculations; · Implementation of ground vibration and



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overpressure control with appropriate drilling grids; · Adequately designing the foundations of primary crushers and other significant sources of vibrations.

18.7 Energy Use:

Among the most significant energy consuming activities in mining are transport, exploration activities, drilling, excavation, extraction, grinding, crushing, milling, pumping, and ventilation processes. Recommended energy conservation measures include the following: · Use of non-invasive technologies such as remote sensing and ground-based technologies to minimize exploratory digging and drilling.

18.8 Reclamation Design and Procedure:

The reclamation design and procedures should take into consideration the proximity to public viewpoints and the visual impact within the context of the viewing distance. Mitigation measures may include strategic placement of screening materials including trees and use of appropriate plant species in the reclamation phase as well as modification in the placement of ancillary facilities and access roads. Health and Safety Mining activities should seek to provide an operation where people are able to work without being injured and where the health of the workforce is promoted. Facility-specific occupational health and safety hazards should be identified based on job safety analysis or comprehensive hazard or risk assessment using established methodologies such as a hazard identification study [HAZID], hazard and operability study [HAZOP], or a quantitative risk assessment.

18.9. Use of Explosives:

Blasting activities that may result in safety impacts are typically related to accidental explosion and poor coordination and communication of blasting activities. Using, handling, and transporting explosives in accordance with local and / or national explosives safety regulations; Assigning certified blasters or explosives experts to conduct blasts; Actively managing blasting activities in terms of loading, priming, and firing explosives, drilling near explosives, misfired

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shots and disposal; Adoption of consistent blasting schedules, minimizing blast-time changes; Specific warning devices (e.g. horn signals, flashing lights) and procedures should be implemented before each blasting activity to alert all workers and third parties in the surrounding areas (e.g. the resident population). Warning procedures may need to include traffic limitation along local roadways and railways; Specific personnel training on explosives handling and safety management should be conducted; Blasting-permit procedures should be implemented for all personnel involved with explosives (handling, transport, storage, charging, blasting, and destruction of unused or surplus explosives); Blasting sites should be checked post-blast by qualified personnel for malfunctions and unexploded blasting agents, prior to resumption of work; - Specific audited procedures should be implemented for all activities related to explosives (handling, transport, storage, charging, blasting, and destruction of unused or surplus explosives) in accordance with relevant national or internationally recognized fire and safety codes; Qualified security personnel should be used to control transport, storage, and use of explosives on site.

Disclaimer: The present study is based on the available satellite images, remote sensing data set, past and present field investigation. The area of the existing sand, gravel & boulder leases were provided by the office of the Divisional Forest Officer, Lakhimpur and Geology & Mining Department, Government of Assam based on which the estimation and analysis was done. The results have no bearing on economic viability of the lease or proposed area.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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**Site Visit Photographs by
The Members of District DSR
Committee**

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Location: Lower Subansiri Sand & Gravel MCA



Location: Boginadi Gravel MCA

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Location: Dirgha Sand, Gravel & Ordinary Clay/ Silt MCA



Location: Ranganadi Sand & Gravel MCA.

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Location: Kakoi Sand, Gravel & Ordinary Clay/ Silt MCA



Location: Dikrong Sand & Gravel MCA

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Location: Lower Dikrong Sand & Gravel MCA



Location: Lower Dikrong Meneha Sand, Gravel & Boulder MPA

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Location: North Dikrong Sand & Gravel MCA



Location: 2.33 Ha. Pithaguri Sand & Gravel MPA

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Boginadi Gravel MCA

Area Allotted: 8.8 Ha

Mine Contract Area reference in Chapter: 4, Table: 4.1 (Sl. No. 1)

Google Image (different time scale with date):



Date of Acquisition: 02.12.2017



Date of Acquisition: 17.03.2020



Date of Acquisition: 05.09.2023

Minerals: Sand, Gravel, Boulder, Ordinary Clay

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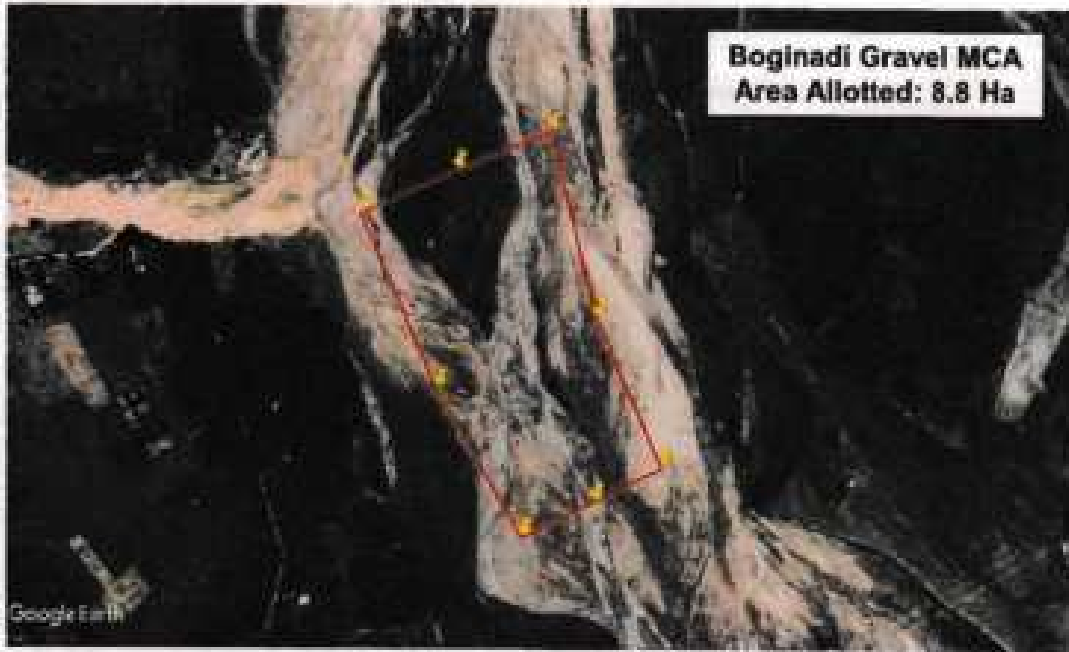
Site Photographs:



Minerals: Sand, Gravel, Boulder, Ordinary Clay

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KML file of Site:



Minerals: Sand, Gravel, Boulder, Ordinary Clay

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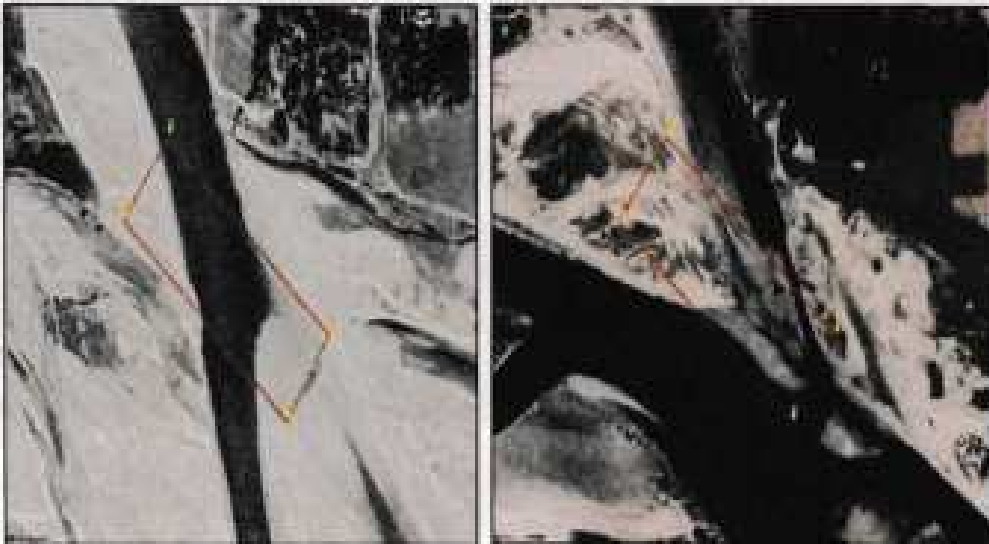


Upper Dikrong Boulder MPA

Area Allotted: 1.5 Ha

Mine Permit Area reference in Chapter: 4, Table: 4.2 (Sl. No. 1)

Google Image (different time scale with date):



Date of Acquisition: 03.02.2017 Date of Acquisition: 24.11.2020



Date of Acquisition: 27.10.2023

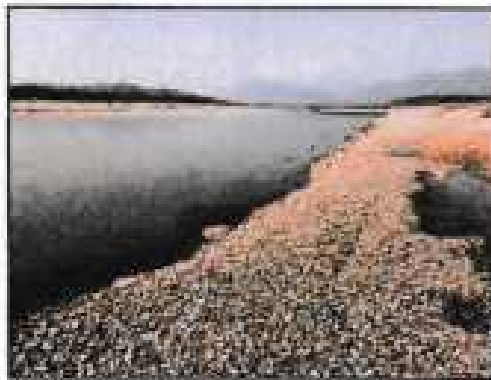
Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Site Photographs:



Minerals: Sand, Gravel, Boulder, Ordinary Clay

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KML file of Site:



Minerals: Sand, Gravel, Boulder, Ordinary Clay

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**Report on
Gradation of Minor Minerals
1.5 Ha Upper Dikrong Boulder MPA**

Site : 1.5 Ha Upper Dikrong Boulder MPA in Lakhimpur Division of North Lakhimpur District, Assam

Distribution percentage of aggregate particle like Boulder, gravel sand etc present in naturally occurred quarry is determined through sieve analysis.

It is done as per IS 2386-Part 1.

Procedure to determine particle size distribution of Aggregates.

- i) The test sample is dried to a constant weight at a temperature of $(110 \pm 2^\circ\text{C})$ and weighed.
- ii) The sample is sieved by using a set of IS Sieves.
- iii) On completion of sieving, the material on each sieve is weighed.
- iv) Cumulative weight passing through each sieve is calculated as a percentage of the total sample weight.

Classification of aggregate as per IS 1488-1978 are as follows

Designation	Size (mm)
Boulder	Above 300
Cobble	400-75
Gravel	75-4.75
Sand	4.75-0.075

Three samples from different location are tested

Sample No	% Boulder	% Gravel	% Sand	% Silt
Sample1	64.78	5.26	29.81	0.13
Sample2	65.22	3.03	29.06	0.09
Sample3	61.56	5.76	32.54	0.14

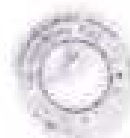
From analysis of three samples on weight basis, it is broadly classified as

% Boulder = 63%

% Gravel = 9%

% Sand = 30%

% of silt is very small so ignored



Loose density of Boulder = 1.47 Tonn/m³

Loose density of Gravel = 1.46 Tonn/m³

Loose density of Sand = 1.44 Tonn/m³

Proportion of gravel : Sand : Boulder on weight = 5.30:67 = 1:13.13

Proportion of gravel : Sand : Boulder on Volume = $\frac{(13.13 \times 1.46) + (1.44)}{(13.13 \times 1.47)}$
 $= 0.86 : 4.18 : 3.84 = 1 : 4.83 : 4.45$

Proportion of gravel : Sand : Boulder on Volume %

$= \frac{(1 \times 100) + (4.84 \times 10.28) + (4.45 \times 100)}{(1 + 29 + 44.75) \times 100} = 4.84 : 10.27$
 $= 6.20 : 30.6 : 63.2$

Therefore % of gravel in Volume = 6.20 say 6%

% of Sand in Volume = 30.6 say 30%

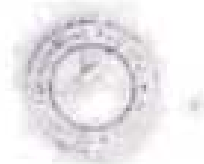
% of Boulder in Volume = 63.2 say 64%

Volume basis distribution of aggregate

% Boulder = 64%

% Gravel = 6%

% Sand = 30%



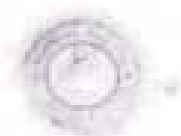
Location: 1.5 km Upper Fleming Boulder Area

SIEVE ANALYSIS OF MINERAL MATERIAL

Sample 1

IS Sieve Size (mm)	Weight Retained (gm)	% Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing
200	1540	64.76	64.76	35.24
75	523	21.11	85.87	14.13
47.5	464	18.92	84.75	15.25
4.75	343	14.27	70.48	29.52
0.075	238	9.81	60.67	39.33
Pass	32	1.32		
Total	2368			

% Boulder = 64.76 %
 % Gravel = 1.32 %
 % Sand = 29.81 %
 % Silt = 3.11 %



Minerals: Sand, Gravel, Boulder, Ordinary Clay

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 Lakhimpur Division



Location : 1.5 Km Upper Dikong Boulder MPA

SIEVE ANALYSIS OF minor mineral MATERIAL

Sample#2

Sieve Size (mm)	Weight Retained (gm)	% Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing
300	1773	85.22	85.22	14.78
75	471	1.79	87.01	12.99
20	488	1.85	88.86	11.14
4.75	365	1.39	90.25	9.75
0.075	2812	29.62	99.87	0.03
Fin	22			
Total	26032			

% Boulder = 85.22 %
 % Gravel = 1.03 %
 % Sand = 29.66 %
 % Silt = 0.09 %



Minerals: Sand, Gravel, Boulder, Ordinary Clay

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Location: 1.5 Km Upper Dikong Boudier MVA

SIEVE ANALYSIS OF minor mineral MATERIAL

Sample 3

Sieve Size (mm)	Weight Retained (gm)	% Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing
80	1519	61.56	61.56	38.44
75	245	9.80	71.36	28.64
20	873	34.90	40.06	59.94
4.75	340	13.60	53.66	46.34
0.075	873	34.90	88.56	11.44
Pass	34	1.36		
Total	2467			

% Boulder = 61.56 %
 % Gravel = 9.80 %
 % Sand = 34.94 %
 % Silt = 0.14 %



Minerals: Sand, Gravel, Boulder, Ordinary Clay

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15 Sieves



Digital Balance



Hot Air Oven

Photograph of Equipment Used



Minerals: Sand, Gravel, Boulder, Ordinary Clay

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