PROPOSAL FOR RECONNAISSANCE (G-4) SURVEY FOR LIMESTONE IN LONGPLAIDISA AREA, DIST: DIMA HASAO, ASSAM (THROUGH NMET FUND)

খনিজ সম্পদৰ অন্বেষণত

GOVERNMENT OF ASSAM

DIRECTORATE OF GEOLOGY & MINING GUWAHATI

RECONNAISSANCE SURVEY FOR LIMESTONE IN VOTERANLANGSO AREA OF WEST KARBI ANGLONG DISTRICT- (ASSAM) EXPLORATION G-4

Details enclosed with map

i.	Name of Mineral	Limestone
ii.	Name of Block	Longplaidisa
iii.	Location	Latitude: 25°33'18.90"N to 25°33'26.03"N Longitude: 92°48'32.98"E to 92°52'46.53"E
iv.	Toposheet No.	83 C/14
v.	Name of villages	Longplaidisa, Waterdisa
vi.	Sub-division	Umrangso
Vii.	District	Dima Hasao
Viii.	Area	25 km^2 (approximately)
ix.	Type of Land	Agriculture land belongs to private and Govt.
x.	Status of Exploration	Partly explored by DGM
xi.	Detailed mapping	25 sq. km. in 1:12,500 Scale
xii.	Present Category of UNFC	334
xiii.	Total Meterage to be drilled	500mtrs (approx.)
xiv.	Number of borehole to be drilled	10 nos. (approx.)
xv.	Spacing of boreholes	More than 800 Mtr. (borehole to borehole)
xvi.	Depth of borehole	50 Mtr. (approx.)
xvii.	Category of exploration as per UNFC	334
xviii.	Logging	All the borehole cores (Approx. 300 Mtr.)
xix.	Sampling	300 Nos. (Approx.)
xx.	Analysis	DGM Lab.
xxi.	Report Writing	Will be done by Exploration agency

Reconnaissance survey (G-4 level) for Limestone Exploration Longplaidisa Area in 25 sq. km. area District Dima Hasao (Assam)

1. Introduction:

Assam is the state where Cement is in short supply from the local production. Limestone is perhaps, the most exploited minerals since limestone constitute the basic raw materials for these industries. But today bulk of the cement comes to Assam outside of the state as the local plant is hardly able to meet the growing demand. In view of the above, the central and state government have been evincing keen interest in promoting cement plants, mini or major, within the state of Assam. In this background, the state Directorate of Geology and Mining was entrusted with the task of undertaking raw materials investigation forcement and lime manufacture within the State.

2. Location of the Block:

The area under investigation lies in the Longplaidisa area in Dima Hasao district, Umrangso subdivision under Umrangso Police Station of Dima Hasao, Assam.

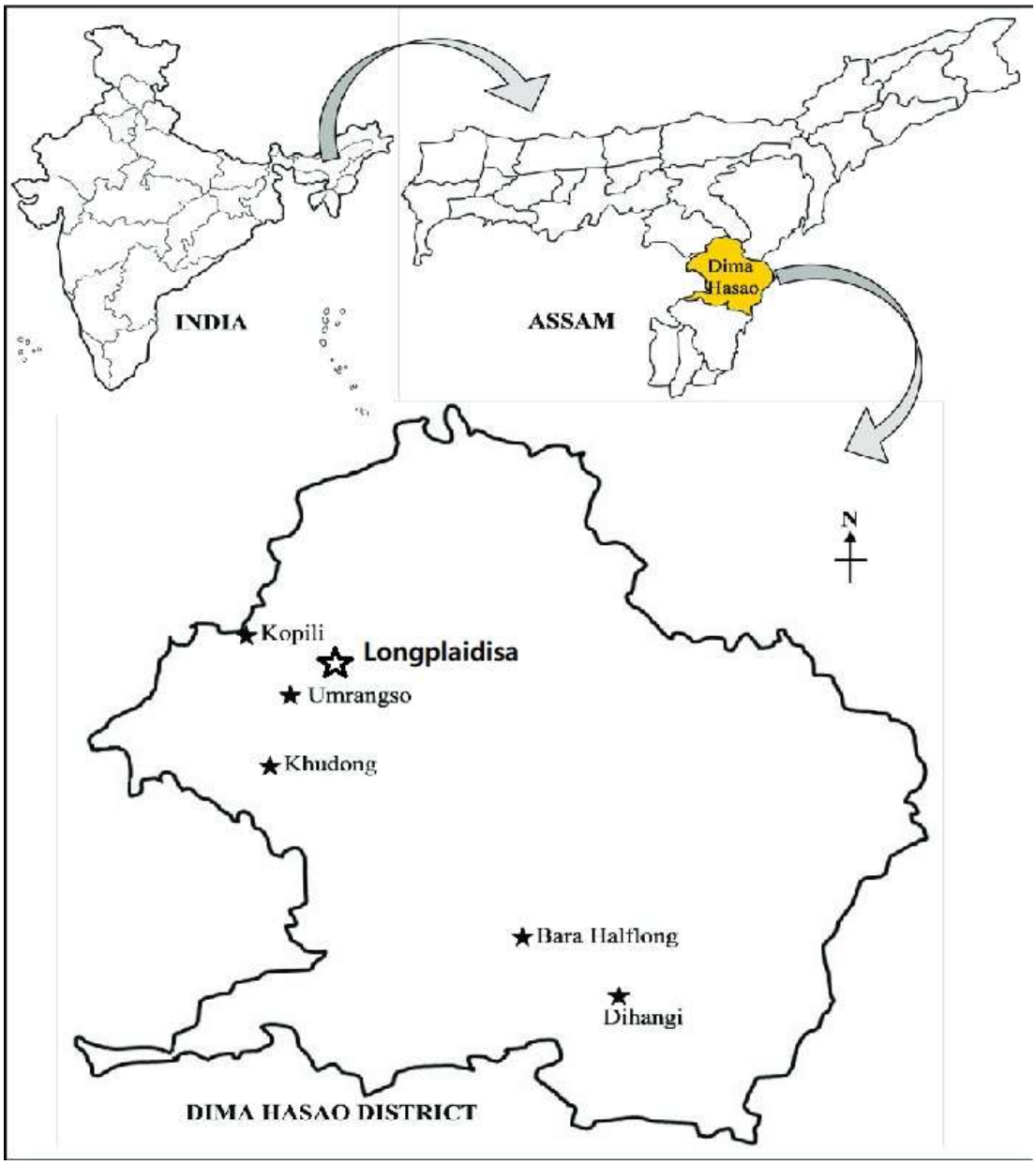
The Limestone Deposits of Longplaidisa is located near the Lanka Umrangso road in Dima Hasao district. It is 62 Km. south-west from Lanka, 50 Km. SW from Kheroni and 24 Km. south from Panimur Picnic Spot and around 18 km from Umrangso. The nearest train station is Lanka Railway Station which fall the main line of North East Frontier railway which lies at a 151km from Guwahati.

The deposit occurs on an area with undulating topography with several Nalas cutting across the region forming valley like topography. The deposit is bounded by the following boundary points:

Sl No	Boundary Point	Latitude	Longitude
1	A	25° 33’ 18.90” N	92° 48’ 32.98” E
2	B	25° 35’ 16.13” N	92° 48’ 33.12” E
3	C	25° 35’ 19.10” N	92° 52’ 45.48” E
4	D	25° 33’ 26.03” N	92° 52’ 46.53” E

The block lies near the Lanka Umrangso road which is all weather road but the roads leading to the block from the highway are kuccha roads which can be used only during dry season. The block is also filled with thick vegetation which can be cleared during dry season only.

The area under investigation is shown as location as in the figure Map.1 below:



3. Physiology and Drainage:

The area of the investigation lies is in the western extremity of N.C. Hills district and are bordered on west by the Kopili River. The region constitutes the eastern flank of the Shillong Plateau. The drainage system of the area is controlled by river Kopili which flows in an east west direction. Several Nalas cut across the proposed deposit forming ravines. As the area lies in the vicinity of Kopili fault zone, some Nalas may be inferred as minor faults that are linked to the main Kopili Fault zone. The area comprises small flat-topped hillocks whose elevations vary from 580m to around 840m above mean sea level.

4. Previous Work:

The hydel potentiality of the Kopili River and the limestone belt of the Garampani area in N.C. Hills was drawing attention of geologists since the middle of the current century. Oldham (1883) and La Touche made some geological traverses in the area. However, Sondhi (1949) and Mukherjee (1949 and 1955) of G.S.I. were the pioneer geologists to visit this area for systematic geological mapping.

Since 1972-73, geologists of the State Directorate of Geology & Mining have been carrying out systematic geological mapping for location of promising limestone deposits. The efforts of the State DGM resulted in locating one of the largest limestone deposits of the region during 1978 in Umrangso area of erstwhile North Cachar Hills district, presently in Dima Hasao district.

The investigation is carried out in the form of detailed geological mapping, sampling, chemical analysis of the samples andpetrography of the samples collected from the respective locations. This investigation has resulted that the limestone deposit hasthe Cao % along with a lower percentage of MgO % which is favorable for the cement plant.

In the year 2023-24, during the survey of Voterolangso area (under NMET fund), by the Directorate of Geology and Mining, Assam under the supervision of Smt Barnalee Nath, Joint Director, DGM Assam, Shri Monoj Gogoi, Senior Geologist, Shri Santanu Misra, Assistant Geologist and Anupom Dutta, Surveyor, this new block was seen which can be surveyed for Limestone in FS 2024-25.

5. Geology and Structure:

5.1. Regional Geology:

Geologically, Assam and NE India compile most astonishingstratigraphy. Starting from oldest Archean gneissic rocks to recent quaternary alluvium found in this part of India. Among all other parts of Assam Karbi-Anglong host most complex geological stratigraphy. These complex stratigraphy, structure, and deformations results in Karbi- Anglong as the most mineralized part of Assam. The Archean basement gneissic complex forms the basement as other parts of NE India. It is followed by quartzites and phyllites metasediments belong to Shillong Group of rocks. But these metasediments are mostly absent in West Karbi- Anglong area. These gneisses and Precambrian metasediments of central part are intruded by younger acidic granitoid intrusive bodies. These granitoid bodies are scattered as Inselberg. These Precambrian rocks are overlain by the younger Tertiary shelf sediments, which are again overlainat places by the Quaternary and Recent deposits.

Gneissic Complex represents the oldest group of rocks. The gneiss, when highly weathered, looks like sandstone. However, on carefulexamination, the dark toned mafic bands can be identified). The most prominent foliation (Gneissossity/ Schistosity/ Cleavage) strike along NE- SW direction and dip by 60°-70° towards southeast (GSI NER Report 1986-87). Exposure of equigranular, hard, compact homogeneous dark colored granite occurs at many places. The granites are generally grey- white in color with a pink tinge on fresh surface. On weathering it becomes dark grey to black in color with sub rounded spheroidally weathered surface. These Precambrian rocks are overlain by tertiary sedimentary sequences of sandstone, limestone and shale and thin coal beds. These strata are mainly horizontal to sub-horizontal striking NNE-SSW dippingtowards SE by an amount of about 40 -100.

The limestone deposit near Longplaidisa is part of the carbonate belt extending from the Kopili-Kharkar confluence in the south-west to Panimur in the north-east. Along its 40 km of extension, good outcrops appear at Tumbung and at 29 kilo, 13 kilo post on the Garampani-Lanka road and also near New Umrangsho village. The width of the limestone belt varies from 1 km to 2.4 km. The limestone belongs to the Shella Formation of the Jaintia Group of Eocene age. The top band of Limestone is Ferrugeneous Limestone which is less fossiliferous in nature while the bottom band is Grey Fossiliferous Limestone that is rich in fossils of Nummulites and Alveolina. The two beds are separated by a layer of Shale which is around 6 m thick. It is overlain by a thick shale-sandstone alternation and is underlain by a sandstone bed which occurs at the top of Pre-Cambrian rocks or occasionally over Jurassic Traps.

The general stratigraphic sequence of the area can be summarized as below:

Age	Group	Formation	Lithounits
Quaternary to recent			Soil and alluvium
Late Eocene to Late Paleocene	Jaintia Group	Kopili Formation	Alteration of splintery shale and fine to medium grained brownish sandstone
		Shella Formation	Sylhet Limestone Member (Fossiliferous Limestone)
			Sylhet sandstone Member with clay and thin coal seam

	Disconformity		
Precambrians	Shillong Group		Quartzo feldspathic and quartz veins Intrusives- biotite- granitoid
	Angular Unconformity		
	Basement Gneissic Complex(BGC)		Granitoid Gneisses

Table 1: Generalized regional stratigraphic succession of the area (GSI 1985-86)

The stratigraphy of the Shella Formation can be divided into two (2) litho-units: -

Age	Group	Formation	Lithounits	Description
Quaternary to recent			Soil and alluvium	Red color soil
Late Paleocene to late Eocene	Jaintia Group	Shella Formation	Sylhet Limestone	**Band I**: Ferrugeneous less fossiliferous Limestone **Band II:** Grey highly fossiliferous Limestone
			Basal Sandstone	Medium to fine grained gritty sandstone grey to brown color quartzitic in character
Disconformity ----------				
Precambrian	Basement Crystalline	Granite and various gneissic rocks		

5.2 General Geology

The limestone deposit of the proposed area is expected to have two bands as the same Shella Formation Limestone is expected to be present in the block. The upper band is Ferrugeneous Limestone which is light brownish in color owing to comparatively higher FeO (T) content, less fossiliferous in nature while the lower band is highly fossiliferous in nature, comprising of colonies of foraminifera fossils like Nummulites and Alveolina. The two bands of Limestone are separated by a layer of Shale which is around 6m to 8m thick.

5.2. Description of the Rock Unit

5.2.1 Limestone:

The Limestone present in the area belongs to Shella Formation of Jaintia Group of Palaeocene to Mid Eocene age. The Limestones are present as bedded deposits but are highly deformed in some areas as it is present in tectonically active Kopili fault zone. In many areas, interbedded layers of Shale occur within Limestone. The Limestone present are greyish to greenish grey in color, highly fossiliferous in nature comprising colonies of foraminifera such as Nummulites, Alveolina and so on.

The thickness of Limestone exposure that is present in the surface varies from centimetres to metres, however, majority of Limestone is present in the subsurface. From the Limestone outcrops seen in the Nala sections after taking NW-SE traverses, it is evident that they are gently dipping towards SE direction.

Some of the readings taken at various outcrops are specified below:
1. 45, 225/ 8 → N 135 (SE)
2. 40, 220/ 10 → N 130 (SE)
3. 55, 235/ 6 → N 145 (SE)

5.2.2 Shale

Shale is found within the layers of limestone. The shale layers are calcareous in composition but are highly weathered and deformed as it lies in tectonically active Kopili fault zone. These shale layers are very thin, thickness ranges from few inches to metres in some areas. They are soft and friable in nature for which they get easily weathered.

5.2.3 Sandstone

The Sandstone is light grey to brownish in color, fine to medium grained and the grain size is uniform throughout the rock. Local secondary ferrugenisation of matrix has imparted brownish to yellowish brown color of the rock. The Sandstone is friable and weathered in nature, neither durable nor compact for which it can be broken easily. The rock is primarily composed of Quartz with Feldspar and some Ferrugenious minerals as accessory minerals forming most of the matrix. The rock samples collected show very low signs of metamorphism, for which it is termed as **Quartzitic Sandstone** by some authors.

Pic 1, 2: Field photographs of Limestone at Longplaidisa area, Dist: Dima Hasao

Pic 3: Traversing at Longplaidisa area with Gaon Pradhan of Longplaidisa village, Dist: Dima Hasao, Assam

5.3 Structures

The general trend of the lithology is NE-SW with gently dipping towards SE. As the area is present in the vicinity of Kopili fault zone that is tectonically disturbed, the Limestone is highly deformed and local variation of trends and dip can be observed in the area. The Limestone can be seen dipping at SE direction at very low dip angle.

Some of the readings taken at various outcrops are specified below:

1. 45, 225/ 8 → N 135 (SE)
2. 40, 220/ 10 → N 130 (SE)
3. 55, 235/ 6 → N 145 (SE)

Chemical Composition of Limestone:

A few grab samples were collected from Longplaidisa area while surveying in Voterolangso area. The samples were analyzed for Major Oxides (CaO, MgO, Al_2O_3, SiO_2, Na2O, K2O, Fe_2O_3 and TiO2). The analytical result is tabulated below:

S No.	Sample No	SIO_2 (%)	TIO_2 (%)	Al_2O3 (%)	$Fe_20_3(T)$ (%)	MnO (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	P_2O_5 (%)
1	LD-1	12.62	0.19	2.38	7.55	0.35	1.47	39.86	<0.1	0.20	0.10
2	LD-2	13.69	0.16	2.26	6.83	0.30	1.47	40.68	<0.1	0.19	0.21
3	LD-3	12.75	0.15	2.19	6.44	0.30	1.44	41.72	<0.1	0.20	0.10
4	LD-4	12.59	0.12	2.03	5.54	0.28	1.40	42.53	<0.1	0.17	0.14
5	LD-5	12.83	0.14	2.15	6.23	0.29	1.44	41.25	<0.1	0.19	0.15

Analysis is done in the GSI, NER Lab.

6. Objective of the proposed exploration program:

The following are the objectives of proposed exploration:

i) To demarcate the Limestone occurrence in the study area by GeologicalMapping on 1: 12500 Scale for G-4 level of exploration.

ii) To collect surface out crop samples and get analysed for six radical to find out the quality & grade of Limestone.

iii)In case the results of the proposed exploration are encouraging then future exploration can be planned.

iv) To carry out the exploration as per Mineral (Evidence of Mineral Contents) Rule- 2015, Mineral Auction Rule-2015 and MMDR ACT, 1957 Amended,2015 in turn to facilitate the State Govt. (Assam) in Auctioning of Blocks.

7. Methodology of Exploration:

7.1. Topographic Survey & Geological Mapping:

Triangulation network will be laid down in the proposed study area of 25 Sq.Km. Detailed Geological Mapping will be done in the proposed block on 1:12500 scale. Borehole will be fixed on the ground. RL's and co-ordinates of survey and exploration points will be determined. All the geological features will be recorded. This map willbe used as base map for future work.

7.2. Surface Sampling:

Surface / outcrop samples will be collected during Geological Mapping from out crops / exposures of Limestone formations on a systematic 400m x 400m grid interval in an area of 25 sq.km (Approx).In case outcrops are not available on systematic grid then random samples will be collected from the available outcrops / exposures. On systematic 400m x 400m grid interval approximately 300 number samples will be generated/ collected. Then the Limestone samples will be tested for 6 radicals/ major oxides i.e. CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3 and LOI.

7.3. Core Drilling:

a) After the analysis of surface samples, number of continuous or detached mineralized zones may come up on map.

b) Drill Core Logging: The drill core will be logged for rock types, structural features, textures, intersection of ore zones and type of mineralization an occurrence of various core minerals.

c) Drill Core Sampling: During the geological logging of drill core, mineralized zones will be marked based on concentration and Lithological variation. All core samples (primary) will be analyzed.

7.4. Laboratory Studies:

7.4.1 Chemical Analysis: All the surface / outcrop samples approximately 10 Nos will be analysed for 6 radicals/ all major oxides CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3 and LOI.

7.4.2 Petrological Studies: Petrological studies will be done on around 10 Nos. of drill core specimen.

7.4.3 Specific Gravity Determination: Specific Gravity will be determined on 10 Nos drill core specimen.

8. Quantum of Work Time Schedule Proposed:

8.1. **Time Schedule:** The proposed exploration programme is planned for activities like, camp setting, topographic survey and geological mapping and surface sample collection winding and laboratory work will be completed within 3 months' time. Report writing will take another 2 months' time including one month overlapping period of one month of laboratory studies. Thus, the total duration of project shall be completed in 6 months from the date of commencement of the project.

Table-1: Time Schedule/ Action Plan, for Exploration Work of Limestone, Longplaidisa, Dima Hasao district, District - Assam

SL No.	Activities	Unit	MONTHS					Total
			Financial Year 2024-25					
			1	2	3	4	5	
			08/25	09/25	10/25	11/25	12/25	
1	Camp Setting	Month	———					1 month
2	Survey Party days (2 Party)	day		———	———			120
3	Geological Party days for Geological Mapping of 25 Sq. Km Area(3 Party)	day		———	———	———		120
4	Sampling Party days, Sampling (3 party)	day		———	———	———		90
5	Core drilling	day		———	———			150
6	Laboratory Studies	days			———	———	———	60
7	Report Writing	Months				———	———	2 months

* The Schedule is planned for optimal weather condition, as Assam has long rainy season, drilling and surveying activity can be hampered so need to be planned accordingly.

Table No.2: - Quantum of Work Proposed

Sl. No.	Item of Work	Unit	Quantum
1	Topographic Survey on 1:12500 scale.	Sq. Km.	25.00
2	Geological Mapping on 1:12500 scale.	Sq. Km.	25.00
3	Surface / Out crop sampling	Nos.	300 numbers in an area of 25 Sq. Km
4	Core drilling (B.H)	Nos	10
5	Laboratory Studies: Surface and Drill core Samples for 6 radicals i.e. CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3 and LOI	Nos	518
6	Petrological Studies (Petrographic Studies)	Nos	10
7	Specific Gravity Determinations	Nos	5
8	Report Preparation (Digital format)	Nos.	1

9. Exploration Report:

Data generated from proposed exploration along with integration of earlierdata of GSI will be utilized in Report preparation.

10. Cost Estimate:

Cost has been estimated based on actual and provisional escalation as per RBI indices as on 31-03-15 and provisional escalation of @ 25% points for Geological and Laboratory Studies for the subsequent years. The total estimated cost is Rs 341.50 Lakhs. The details of cost estimates are given inTable 3 and summary is given below.

Table 3: Summary of Cost Estimates

Sl. No.	Item	Total Estimated Cost (Rs.)
1	Geological Work	22,76,760.00/-
2	Pitting and Trenching	6,66,000.00/-
3	Core drilling	47,87,000.00/-
As the area falls in remote and inaccessible terrain of North Eastern States and Hilly terrain, the amount will be 3.35 times higher than the normal SoC. Total amount for field = 3.35 x (2276760+ 666000+ 4787000) =Rs 2,58,94,696.00		

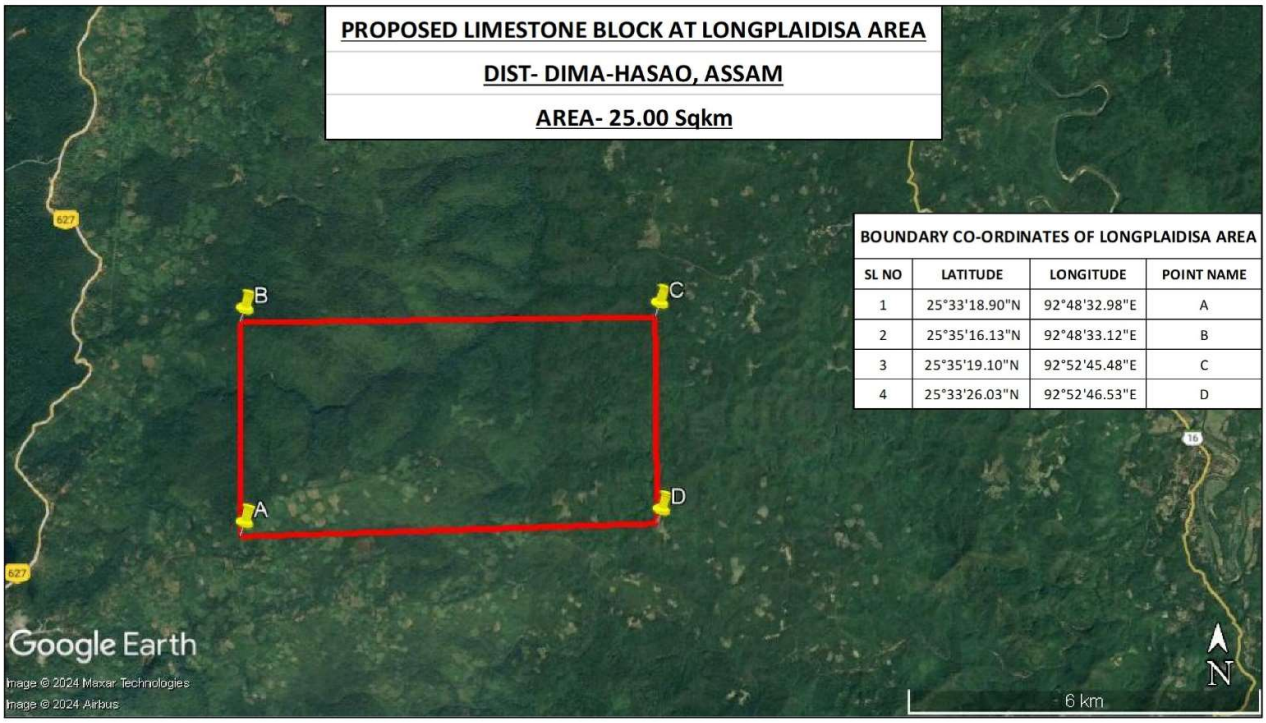
4	Laboratory Studies (Include Quantitative analysis of 6 radicals, Petrological study, Bulk density determination)	18,25,188.00/-
5	Misc. Charges (Includes Report Preparation)	12,21,596.00/-
	Total estimated cost (without GST)	2,89,41,480.00/-
	Provision for GST (18%)	52,09,466.00/-
	Total estimated cost (with GST)	Rs 3,41,50,946.00 Or say Rs 341.50 Lakh

11. Justification

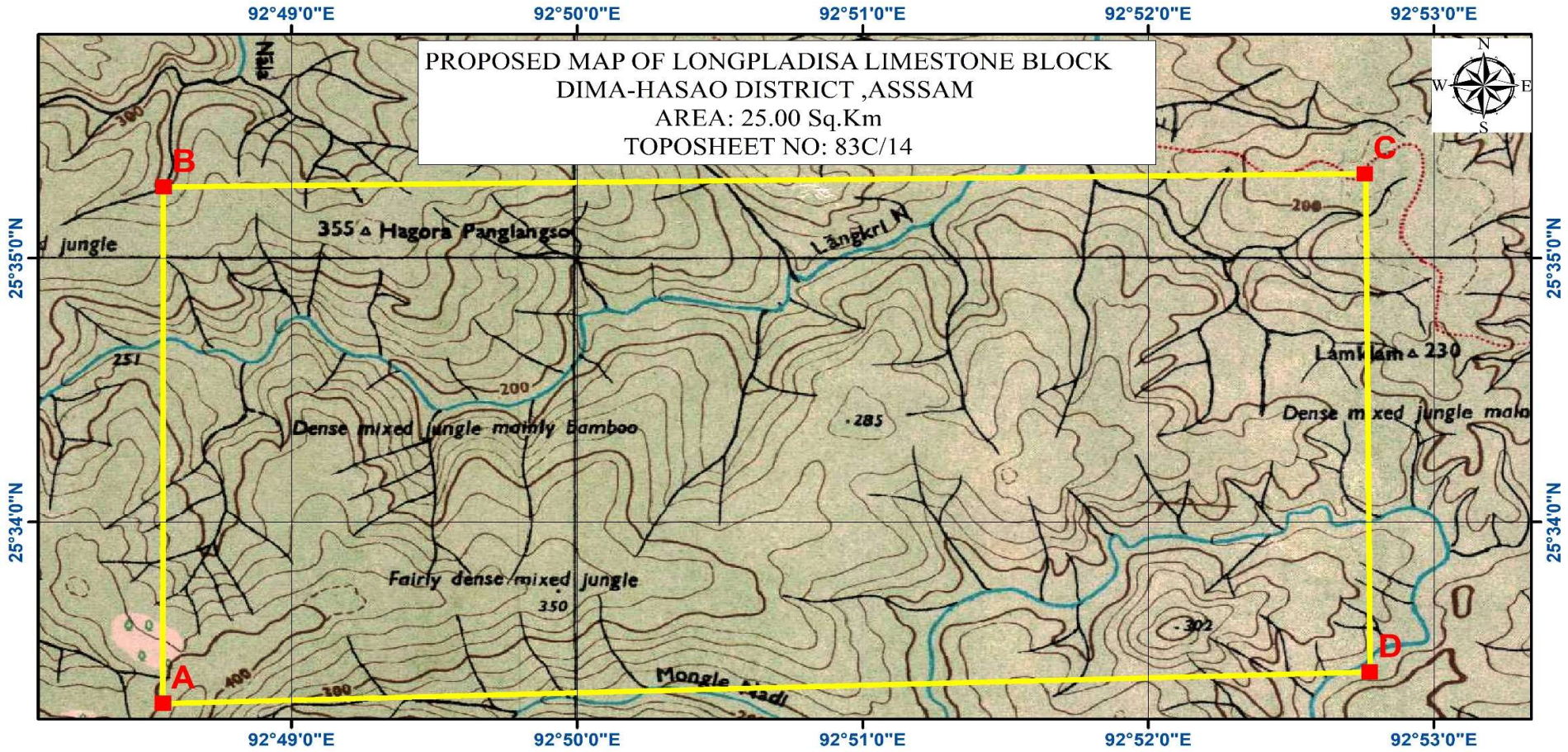
- In view of MMDR Act, 1957 and Mineral Auction Rule 2015, DGM, Assam is willing to take up the exploration in this block.
- The exploration work has to be carried out systematically i.e. Geological Mapping, Survey, 800 metre spacing of Borehole (G-4 level) initially.
- The exploration will help in planning of future exploration programme.

Schedule of Charges for LIMESTONE IN LONGPLAIDISA AREA, DIMA HASAO DISTRICT, ASSAM					
Sl No.	**Work Activity**	**Unit**	**Charges / Cost in Rs**	**Qty**	**Total In Rs**
A Geological Mapping and Geological Survey Work					
1	Charges for Geologist (Field)	Days	₹11,000.00	120	₹13,20,000.00
1	Charges for Surveyor	Days	₹8,300.00	30	₹249,000.00
	Labour charges for geological mapping/ survey	days	₹437.00	240	₹1,04,880.00
	Charges for Sampler	Days	₹5100.00	60	₹3,06,000.00
2	Labour charges for sample work	Days	₹437.00	240	₹1,04,880.00
3	Borehole fixation and Determination of Coordinate & RL	No.	₹19,200.00	10	₹1,92,000.00
Sub Total A					**₹22,76,760.00**
B Pitting & Trenching					
1	Pitting and Trenching	per cu m	₹3,330.00	200	₹6,66,000.00
Sub Total B					**₹6,66,000.00**
C Core Drilling					
1	Drilling – Soft rock	Mtr	₹5242.00	500	₹6,66,000.00
2	Land/Crop compensation in case BH falls in agricultural land	Per BH	₹20000.00	10	₹2,00,000.00
3	Construction of concrete pillar (12" x 12" x 30")	Per BH	₹2000.00	10	₹20,000.00
4	Transportation of Drill rig & truck associated per drill	km	₹36.00	500	₹18,000.00
5	Monthly accommodation charges for drilling camp (upto 2 Rigs)	Month	₹50,000.00	3	₹1,50,000.00
6	Drilling camp setting cost	Nos.	₹2,50,000.00	1	₹2,50,000.00
7	Drilling camp winding up cost	Nos.	₹2,50,000.00	1	₹2,50,000.00
	Road making (Flat terrain)	Km	₹32,200.00	15	₹4,83,000.00
	Drill core preservation	Per m	₹1590.00	500	₹7,95,000.00
Sub Total C					**₹47,87,000.00**
As the area falls in remote and inaccessible terrain in NE states and Hilly terrain, the amount is 3.35 times higher than the normal SoC, hence the total amount = 3.35x(2276760 + 666000 + 4787000) = **Rs 2,58,94,696.00**					
D Laboratory Studies					
a) Chemical Analysis					
1	Primary samples (CaO,MgO,Al2O3,SiO2,Fe2O3 & LOI)	Per Sample	₹2841.00	450	₹12,78,450.00
2	Check samples (CaO,MgO,Al2O3,SiO2,Fe2O3 & LOI)	Per sample	₹2841.00	68	₹1,93,188.00
b) Physical Analysis					
1	Preparation of thin section	No.	₹2,353.00	10	₹23,530.00
2	Bulk density determination	No.	₹3,540.00	5	₹17,700.00
3	Petrographic Studies	No.	₹2353.00	10	₹23,530.00
4	Charges of one Geologist per day at HQ	day	₹9000.00	30	₹2,70,000.00
Sub Total D					**₹18,25,188.00**
Total of A+B+C+D					**₹2,77,19,884.00**
E Miscellaneous Charges					
1	Preparation of Exploration proposal	5 Hard Copies and Soft Copies	2% of the Total A+B+C+D	1	₹3,80,000.00
2	Geological Report Preparation	5 Hard Copies and Soft Copies	3% of the Total A+B+C+D or Minimum of 7.5 Lakhs	1	₹8,31,596.00

3	Peer review charges	As per EC decision			₹10,000.00
Total estimated cost without GST					**₹2,89,41,480.00**
Provision for GST (18%)					**₹52,09,466.00**
Total estimated Cost (With GST 18%)					**₹3,41,50,946.00**
Or Say Rs 341.50 Lakh					



Map 1: Google Earth image of the proposed Longplaidisa block, Dist: Dima Hasao, Assam



BOUNDARY POINT	BOUNDARY COORDINATE	
A	92°48'32.98"E	25°33'18.90"N
B	92°48'33.12"E	25°35'16.13"N
C	92°52'45.48"E	25°35'19.10"N
D	92°52'46.53"E	25°33'26.03"N

0 0.55 1.1 1.65 2.2
Kilometers

GOVERNMENT OF ASSAM
DIRECTORATE OF GEOLOGY AND MINING,ASSAM
KAHILIPARA, GUWAHATI-19