

**PROPOSAL FOR PRELIMINARY EXPLORATION (G3 STAGE) OF
LIMESTONE IN KEBANG NORTH BLOCK, SIANG DISTRICT, ARUNACHAL
PRADESH UNDER NMEDT**

Commodity: Limestone

BY



**MMPL PRIVATE LIMITED
FR 07 SHILPANGAN, PLOT NO – LB 1, SECTOR III, SALT LAKE,
KOLKATA-700091**

**Place: Kolkata
Date: 25.05.2026**

Summary of the Block G3 Stage Exploration

Table 1. Summary of the block		
Sl.no	Features	Details
A.	Block ID	Kebang North Block
B.	Current Exploration Agency	MMPL Private Limited (Formerly Maheshwari Mining Private Limited)
C.	Previous Exploration Agency	MMPL Private Limited (Formerly Maheshwari Mining Private Limited)
D.	G4 stage Geological Report (Previous stage Geological Report)	NA
E.	Commodity	Limestone
F.	Mineral Belt	Buxa Formation
G.	Completion Period with entire Time schedule to complete the project	12 Months
H.	Objectives	The present exploration program (G3) has been formulated on the basis of the outcomes of previous work to fulfil the following objectives: • Geological mapping on 1:4000 scale and demarcating Limestone occurrence with the structural features i.e. strike, dip, etc., for medium to high grade Limestone deposit. • Based on the outcome of the geological mapping, bedded stratiform regular deposit drilling with 800 m and closer spacing will be done, each borehole is planned with a maximum depth of 50m. • Chemical Analysis of core samples and surface samples. • Grade-wise determination of dimension of Limestone deposits and estimation of tonnage & grade in G3 stage as per ammended version 2021) of Minerals (Evidence of Mineral Contents) Rules (2015).
I.	Whether the work will be carried out by the proposed agency or through out-sourcing and details thereof. Components to be outsourced and name of the out-source agency	The work will be carried out by proposed agency.
J.	Name/Number of Geoscientists	Field Geologist: 2 HQ Geologist: 2
K.	Expected Field days (Geology) Geological Party Days	Item execution duration 10 Months and actual field days of field geologist 160 days for two Geologist and 60 days for HQ.

1.	Location	Corner Poins	Longitude	Latitude	
		A	95.0126°	28.1479°	
		B	95.0455°	28.1356°	
		C	95.0404°	28.1212°	
		D	95.0069°	28.1332°	
	Villages	KEBANG North, Babuk, Pangin, Pokleg			
	Tehsil/Taluk				
	District	Siang			
	State	Arunachal Pradesh			
2.	Area (hectares/square kilometres)				
	Block Area	5.98 sq km			
	Forest Area				
	Government Land Area				
	Private Land Area				
3.	Accessibility				
	Nearest Rail Head	Pasighat Railway Station			
	Road	NH-13			
	Airport	Pasighat Airport			
4.	Hydrography				
	Local Surface Drainage Pattern (Channels)	Dendritic to sub-parallel pattern			
	Rivers/Streams	Siang			
5.	Climate				
	Mean Annual Rainfall	3000-4000 mm			
	Temperatures (December)(Minimum)	10°C (50°F)			
	Temperatures (June)(Maximum)	30°C (86°F)			
6.	Topography				
	Toposheet Number	82P/04			
	Morphology of the Area	The area consists of steep hill slopes, narrow valleys and sharp ridges.			

7.	Availability of base line geoscience data	
	Geological Map (1:50000)	Available
	Geochemical Map	Not Available
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	Not Available
8.	Justification for taking up preliminary exploration (G3)	Justification for taking up the investigation in G3 stage: • The proposed area around KEBANG North, Babuk, Pangin, and Pokleg falls within carbonate-bearing sequences of the Buxa Formation and Miri Formation. • Earlier work by Vikram Rai and J.K. Srivastava (1992–93) reported dolomitic () limestone in the Siang–Yamne valley. Jamwal and Nagasashidhar (1992–93) identified marble/ limestone bands of 3–40 m thickness, with three major bands of 1500 m, 1500 m, and 300 m width and 4–5 km strike continuity. • Further, Sitaram and Bendre (1995–96) reported limestone with >40% CaO and <6% MgO, and estimated resources of 7.07 million tonnes (Pangin), 37 million tonnes (Lokpeng), and 1.49 million tonnes (Kabu). • These findings indicate significant but variable limestone mineralization. However, the data is limited to reconnaissance level and lacks subsurface continuity. • The field investigations carried out by MMPL PVT LTD confirms surface continuity and mineralization potential of limestone in Kebang North block—including established limestone bands within Buxa Formation and the presence of infra-trappean limestone below the Abor volcanics—indicate promising resource prospects.

Detailed description on the following titles to be made in the proposal.

1 Block Summary

1.1 Physiography

The area under investigation forms a part of the Lesser Himalayan Zone located north of the foothills of Assam and is characterized by highly dissected, low denudational hills of precipitous cliffs, deep gorgy valleys. The valleys towards north of the area have lithology-controlled topography. High topographical features are developed by more resistant rocks like carbonates, quartzites of Buxa (= Tenga) Formation. Dissected gorges with rugged topography rising to heights of 150m to 1600m above MSL are the common features in the area.

The Siyom and Siang rivers constitute the main drainage system of the area. The Siyom flows from west to east and then takes a southeasterly turn east of Pangin. The Siyom valley is very broad near Along in the west and becomes narrow in Lokpeng - Pangin area in the east with N-S flowing perennial nalas joining the river almost at right' angle. The valley narrows down further east of Pangin near its confluence with the Siang River. Kabu Korang, Paya nala are the perennial streams which join the Siyom river. Terraces of moderate heights are seen on the southern bank of the Siyom river.

Generally, the drainage system of the area is structurally controlled with sub-parallel to dendritic pattern at place.

1.2 Background Geology

1.2.1 Regional Geology

Regionally, the litho-units occurring in the area of investigation form the southwestern part of the western limb of a major anticline termed as "Siang antiform". This contains a number of digitations of smaller magnitudes framing thrust sheets. The rock types comprise limestone, dolomite, quartzite, phyllite, schistose, quartzite, metabasics and conglomerate and belong to the Pangin and Boleng Formations of the Rikor Group and the Gasheng and Rumgong Formations of the Siyom Group (Proterozoic). The Siyom and Rikor Group of rocks are correlatable to the lower and upper parts respectively, of the Tenga Formation of the Bomdilla Group of West Kameng district. Singh (1993), who systematically mapped the area, proposed the following tectono -stratigraphic succession on the basis of distinct litho-associations, tectonic setting and interrelation and metamorphism:

Age		Group		Lithology
Middle to Late Proterozoic	Bomdilla Group	Rikor Group (=Upper part of Tenga) (=Buxa Formation)	Pangin and Boleng Fm.	Limestone, dolomite with thin interbands of phyllite, quartzite/phyllite (variegated) Conglomerate.
		Siyom Thrust		
		Siyom Group (=Lower part of Tenga) (=Dirang Formation)	Gasheng Rumgong Fm.	Metabasics limestone/crystalline limestone, marble, slate, Schistose quartzite, Conglomerate.

The present area of investigation is occupied by the rocks of the Tenga Formation, classified as Lower and Upper parts. The Lower part is characterised by the presence of metabasics associated with limestone / variegated schistose quartzite. The Upper part is devoid of metabasics and is characterised by the dominance of phyllite and quartzite (at places variegated) and limestone.

Tenga Formation (Lower part)

The rocks of this formation were previously classified as Gasheng and Rumgong Formations. The litho assemblage consists of schistose quartzite, conglomerate, limestone / crystalline limestone, slate, and metabasic. These are exposed around Dali, Pangin, Yemsing and Kabu.

Schistose quartzite is greyish, greyish white, pale greenish, medium grained, thinly bedded / laminated, jointed, showing effects of shearing at places. The outcrops are scanty and the rock occurs as bands varying from a few mm to a few metres in thickness with occasional intercalations of limestone.

Under microscope, it is medium grained, comprising quartz, chlorite, sericite, muscovite, biotite, opaques (graphite) and rarely tourmaline. The quartz grains show effect of shearing and crushing. The grains of quartz and sericite form schistosity planes. Opaques show alignment along a particular direction and also occur as clusters around quartz grains. The rock carries secondary veinlets of quartz.

Conglomerate occurs as thin impersistent lenses. It consists of rounded / subrounded to elongated pebbles mainly of vein quartz, purple / green / white quartzite embedded in a matrix. Pebbles vary from 0.5 cm to 10.0 cm in diameter. The ratio of pebbles and matrix is almost 1:1.

Limestone is grey, white to creamy white, fine to medium grained and at places crystalline. It is thinly bedded, laminated, and jointed, and often fractured, showing occasional deformation by folding. The limestone occurs as linear bands and are interbedded mainly with phyllite and quartzite / schistose quartzite.

In thin section, it is fine to medium grained containing calcite as the dominant mineral with minor sericitic films and pyrite (cubes). The calcite shows serrated margins and striations. The grains are moderately packed and are recrystallised at places. Thin calcite vein fillings are often present along the fractures.

Metabasic rock is dark greenish to light green, medium grained, foliated and deformed by folding at places. This occurs as interbands of a few cm to about 2m in thickness within the limestone and schistose quartzite sequence, in general, these metabasics are altered to chlorite schists. Under microscope, the rock contains chlorite, biotite, epidote, actinolite, quartz, microlithons of feldspar and opaques.

Tenga Formation: (Upper part)

The rocks of this Formation were earlier classified as the Pangin and Boleng Formations. These are exposed around Lokpeng, Tarak, Pangin, and Yemsing. The main litho units are variegated quartzite, phyllite with interbands of limestone, dolomite. Thin bands of conglomerate occur locally.

Conglomerate: It occurs as thin, impersistent, lensoid bands measuring from 0.5m to 15m in width. It consists of rounded to subrounded pebbles of vein quartz, pinkish / whitish / greenish quartzite embedded in a matrix. The pebbles measure from 0.5cm to 10cm in diameter.

Quartzite: The quartzite is grey, greyish white, white, pink in colour. It is thinly bedded, laminated, jointed and shows current bedding at places. It is often traversed by quartz and carbonate veins. The quartzite is interbedded with thin bands of phyllite. Under microscope, the rock is fine to medium grained with anhedral to subhedral grains of quartz, microcline, plagioclase, minor sericite, sphene and opaques. The quartz grains show moderate to irregular outline and flattening. Thin laminae of sericite and fractured quartz grains are also present.

Phyllite: It shows variation of colours viz. grey, steel grey, greenish grey and pale pink. Silky sheen, and good fissility are often present in the rock. It is puckered, lineated and folded at places and occurs with thin and carbonaceous bands measuring from a few cm to 20cm in thickness. Under microscope, the phyllite shows quartz, sericite, muscovite, chlorite, and opaques.

Limestone: It is grey, bluish grey and whitish, fine to medium grained thinly bedded, jointed and occasionally deformed due to folding. It occurs as linear bands, at places intercalated with phyllite.

Dolomite: It is grey, creamy white to white, fine to medium grained and occurs as thin bands with the limestone, measuring from a few mm to a few cm in thickness. It also shows intraformational brecciation at places.

1.2.2 Local Geology

BUXA FORMATION:

Buxa Formation (Pangin Member, OP cit) comprises mainly moderately metamorphosed rocks viz., quartzite, phyllite, marble, conglomerate and lenses of basic rocks(?) The Buxa Formation in the Sibu Korang Kemi nala section exhibits variations in lithological assemblages with imprints of intense tectonic activity. The lithological assemblages representing the Buxa -Formation in the area are massive quartzite with

subordinate flaggy quartzite and phyllite in the Sibul Korang-siyit nala section; quartzite (massive, cherty and calcareous) with interbanded cherty marble/ marble. Lenses of basic rocks and conglomerate at the base in the Siyit- Sisan section; flaser quartzite, calc quartzite and phyllite in the Sisang- Rebung Kerang section and cherty quartzite with interbanded marble/ cherty marble in the Rebung KorJang-Kemi nala Section.

MIRI FORMATION:

The litho - sequence, underlying the Abor Volcanics in the Sibul Korang-Yembung Micro Hyc'el section, is grouped under the Miri Formation (Yembung iviemhrr-Op, cit.). This sequence comprises mainly granular dirty white quartzite with ferruginous tinge, trails of burrows and subordinfce dark grey and Yellowish-tinged limestone and cherry- brown shale. Thin bands of siltstone(?) and calcareous quartzite are also associated with this format ion.

ABOR VOLCANICS:

This effusive sequence, which is exposed in the northern parts of the area, mainly consists of melftnocratic amygdaloidal and vesicular basalt flows. Anyqdeloids consist mainly of silica. Patches of dark glass are also a conspicuous feature in the basaltic flows. Fine grained, dark grey, fractured and 12 to 40 cm. thick dykes traversing the Buxa and Miri Formation in the Yembung Hydel-Sisang Nala section are also grouped under Abor volcanics as these dykes are considered to be the feeder dykes for this effusive sequence.

Age	Group	Formation / Member	Lithology
Recent – Sub-Recent	—	Quaternary Formation	Alluvium/soil cover; river terrace deposits
Mio–Pliocene	Siwalik Group	Dafila & Subansiri equivalent	Sandstone, shale and boulder conglomerate
-----		M.B.F.	-----
Eocene to Palaeocene	—	Abor Volcanics (~1000 m)	Amygdaloidal, vesicular, agglomeratic basalt (locally pillow lava)
		Inter-trappean	Limestone, shale and siltstone
		Infra-trappean (12–40 m) – Pangl Member (Dura Formation)	Fossiliferous limestone with shale/siltstone; ferruginous sandstone/limestone
		Lichi Volcanics	Mete basalt
-----		Fault	-----
Permo–Carboniferous	Gondwana Group	Bichom / Rengging Formation	Diamictite, carbonaceous shale, quartzite; sandstone, siltstone, limestone
.....		Fault (with Buxa Formation)	
Lower–Middle Palaeozoic	—	Yembung quartzite (=Miri Formation; Yembung/Dite Member)	White to pink/grey massive quartzite with purple silty shale
-----		Unconformity (?)	-----
Upper Proterozoic (?)	Buxa Formation	Rotung Member	Alternate bands of quartzite, purple shale, limestone/dolomite
		Pangin Member	Quartzite, phyllite, marble, dolomite, calcareous quartzite, oligomictic conglomerate

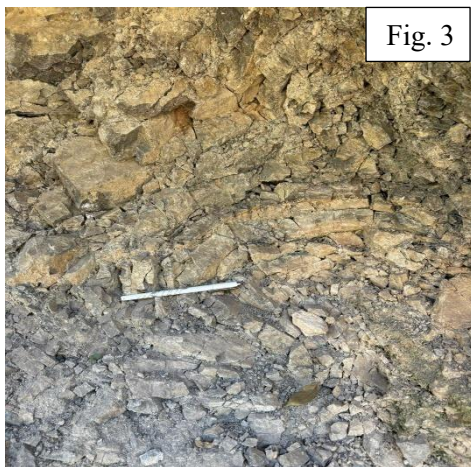


Fig. 1: Exposure of Basalt (Abor Volcanics) in Kebang village. **Fig. 2:** Infratrappean LST exposure in a nala section in Babuk block (BBK- 01). **Fig. 3:** Folded LST beds in road section (OKG-02). **Fig. 4:** LST beds on Yembung-Yemsing road section (OKG-01). **Fig. 5:** Limestone cave on hilltop (KBG-08). **Fig. 6:** LST exposure on hilltop (KBG-07).



Fig. 7: Exposure LST bed in Kebang block (KBG-02). **Fig. 8:** Stalactite exposure on Yembung-Yemsing road section (OKG-03). **Fig. 9:** LST beds in cave (KBG-08), bedding attitude $272^{\circ}/42^{\circ}$ towards North. **Fig. 10:** LST exposure on in Kebang block (KBG-03). **Fig. 11:** LST outcrop on hilltop (KBG-01). **Fig. 12:** LST exposure on hilltop

1.3 Mineral potentiality based on geology and ground geochemistry

KEBANG North Block, Siang District of Arunachal Pradesh.

The area is characterized by outcrops of Buxa formation and Abor volcanics with infratrappean Limestone. The Buxa formation has two members- Rottung member and Pangin member. This formation of Proterozoic age comprises predominantly phyllite, calcareous quartzite with a few bands of Limestone. Quartzite is the most dominant unit of the Buxa-Formation with wide variation in colour, texture and composition.

Field observations indicate bedded to massive limestone with occasional alternate bands of quartzite. The LST beds show a general strike of E-W with approx. 40° dip towards N. But the beds are highly deformed and folded. So, the attitude varies from one place to another. There were two previously reported limestone bands of Buxa formation by GSI in KEBANG North block. These two bands were traversed and were confirmed to be in composition.

Another major lithology was amygdaloidal basalt of younger Abor volcanics. This litho-unit comprises of basalt of Palaeocene to Eocene age. The volcanism represents sub-aqueous eruptive activity. In the Abor volcanics, there are bands of infra-trappean limestones. One such band (15-20m) was encountered within the Babuk block and another band was seen just outside the northern boundary of Babuk block. So, there are two types of Limestone present in the blocks- one is of Buxa formation which is in nature and the other one is Infra-trappean limestone.

The ground geochemistry for the area of interest has been done and we have received the following analysis:

Sample ID	CaO	MgO	SiO ₂
BBK-01	26.27	14.73	14.29
BBK-02	34.07	11.09	11.54
KBG-01	53.78	0.81	1.47
KBG-02	48.80	0.57	7.89
KBG-03	50.22	0.89	5.57
KBG-04	32.79	10.92	14.23
KBG-05	50.49	1.41	4.43
KBG-06	46.58	0.76	11.49
KBG-07	26.09	14.95	15.10
KBG-08	39.72	4.18	14.25
KBG-08	39.76	4.22	14.28
OBK-01	14.18	8.73	38.25
OKG-01	37.77	3.15	19.85
OKG-02	18.53	1.92	49.10
OKG-03	26.74	16.30	10.46
OKG-04	46.17	1.11	11.00
OKG-05	46.20	1.08	11.06
OKG-06	53.25	0.61	1.30
OKG-07	44.87	0.77	12.76

1.4 Recommendations of previous G4 stage mineral exploration report

The G4 stage investigations in the area have highlighted significant potential for limestone mineralization, warranting further detailed exploration. A systematic geological mapping at 1:50,000 scale was carried out by **Vikram Rai and J. K. Srivastava (1992–93)**, **Geological Survey of India**, in the area south of the Siang River up to the Main Boundary Fault (MBF). This study established the regional geological framework, identifying the Buxa Formation of Upper Proterozoic age as the oldest unit, comprising phyllite and calcareous quartzite with bands of limestone/marble. The Abor Volcanics was noted to be in tectonic contact with the Buxa Formation and disconformably overlying the Yembung Quartzites towards the eastern margin. A limestone band (~15 m thick) occurring at this contact yielded foraminiferal fossils such as *Nummulites atacicus* and *Assilina* sp., indicating a Late Palaeocene to Early Eocene age.

Further investigations by **Jamwal and Nagashidhar (1992–93)** in the northwestern part of Pasighat (T.S. No. 82P/4) reported multiple massive limestone bands belonging to the Buxa Formation. These bands show considerable lateral continuity, with widths up to 1500 m and strike extensions of 4–5 km along the Yembung–Yemsing road section, highlighting strong continuity and promising resource potential.

Subsequently, **Sitaram and Bendre (1995–96)** (T.S. No. 82 P/4, 82P/12 & 16, 83 I/13) carried out detailed investigations in areas southwest of the Siyom and Siang rivers and along the Pangin–Boleng road. Their studies confirmed the presence of multiple limestone bands with favorable chemical composition (>40% CaO and <6% MgO). Based on surface geological data and volumetric estimations, significant limestone resources were inferred in Pangin, Lokpeng, Kabu, and Dali areas, indicating substantial reserve potential.

In view of the work carried out by **GSI and subsequent investigators**, which established the geological continuity, favorable grade, and significant resource potential of limestone, G3 stage exploration is recommended. Detailed investigations are required to assess the geospatial disposition, subsurface continuity, and quality variation of the limestone bands. Considering the extension of host formations into the proposed block, it is expected that these mineralized bands persist within the area, making it prospective for systematic exploration and resource delineation.

Location of the samples collected from the proposed block boundary:

Total number of samples collected from KEBANG North Block-08 nos.

Sample ID	Latitude	Longitude	Elevation (m)	Description
KBG-01	28° 6'49.80"N	95° 1'0.80"E	715	Limestone (Buxa Fm.) Exposure on Hillface
KBG-02	28° 6'50.60"N	95° 1'0.70"E	729	Limestone (Buxa Fm.) Exposure on Hillface
KBG-03	28° 6'51.50"N	95° 1'1.90"E	757	Limestone (Buxa Fm.) Exposure on Hillface
KBG-04	28° 7'21.88"N	95° 1'11.69"E	633	Limestone (Buxa Fm.) Exposure on Hillface
KBG-05	28° 8'16.06"N	95° 1'21.50"E	941	Limestone (Buxa Fm.) Exposure on Hilltop
KBG-06	28° 8'7.40"N	95° 1'31.20"E	1030	Limestone (Buxa Fm.) Exposure on Hilltop
KBG-07	28° 7'55.60"N	95° 1'40.40"E	1043	Limestone (Buxa Fm.) Exposure on Hilltop

Sample ID	Latitude	Longitude	Elevation (m)	Description
KBG-08	28°7'45.60"N	95° 2'3.60"E	1090	Limestone cave Exposure on hilltop with bedding attitude 272°/42°

These samples confirm the surface continuity and potential of limestone mineralization in the block. Based on the field observations and subject to favorable analytical results, the identified limestone bands warrant detailed G3-stage exploration involving large scale geological mapping, systematic trench/channel sampling, drilling (where feasible), and preliminary resource estimation.

1.5 Objectives

From available reports and observations recorded by limited field checks by the geologists of Maheshwari Mining Pvt. Ltd an exploration of G3 stage is proposed to study the potentiality of the area:

- I) The objective of this project is to estimate the resource of Limestone in the area and demarcation of Limestone extension.
- II) Based on the outcome of the geological mapping, bedded stratiform regular deposit drilling with 800 m and closer spacing will be done, each borehole is planned with a maximum depth of 50m.
- III) Chemical Analysis of core samples and surface samples.
- IV) Grade-wise determination of dimension of Limestone deposits and estimation of tonnage & grade in G3 stage as per amended version 2021) of Minerals (Evidence of Mineral Contents) Rules (2015).

2. Previous work

“Report on Geology of The Area South of Siang River, Siang Yamne Valleys, East Siang District, Arunachal Pradesh.” (FS 1992-93) Vikram Rai and J. K. Srivastava Geologists (Jr.), Geological Survey of India has done systematic geological mapping on 1:50,000 scale between Siang River in the north and Main Boundary Faults (M. B. F) in the south. Buxa formation of Upper Proterozoic age is the oldest formation exposed in the area and is represented by dominant phyllite and calcareous quartzites with bands of limestone/marble. The Abor volcanics is in tectonic contact with the Buxa formation, whereas it is unconformably overlying the Yembung Quartzites at its eastern margin. A limestone band (15m) occurs between Yembung Quartzite (=Miri Quartzite) and Abor volcanics. Some of the important foraminifers recorded from this limestone are: Nummulites ataticus and Assilina sp. of Late Palaeocene - Early Eocene age.

3. Block Description

The detailed co-ordinate of the proposed block is given below-

Table 3. Coordinate of the cardinal points		
Corner Points	Longitude	Latitude
A	95.0126°	28.1479°
B	95.0455°	28.1356°

Table 3. Coordinate of the cardinal points		
Corner Points	Longitude	Latitude
C	95.0404°	28.1212°
D	95.0069°	28.1332°

4. Planned Methodology

In accordance to the objectives set for preliminary exploration (G3 stage) for Limestone in Kebang North, Siang District, Arunachal Pradesh, geological mapping in 1:4000 scale, pitting, core drilling, core sampling, chemical studies, petrological and mineralogical studies are proposed in the block. The exploration will be carried out as per Minerals (Evidence of Mineral contents) Amended Rules-2021. Accordingly, the details of different activities to be carried out are presented in subsequent paragraphs.

4.1 Topographic Surveying

Topography survey will be carried in the area (5.98 sq. km) and all the surface features will be marked in the 1:4000 scale. The block boundary will be surveyed by DGPS / total station in WGS-84 Datum and demarcation of the boundary pillars to enable the block auctionable. The reduced level and coordinate of the boreholes would be surveyed by DGPS/ total station.

4.2 Geological Mapping

Detailed geological mapping on 1:4000 scale in the area (5.98 sq. km) will be carried out by taking geological traverses. The contacts of different lithounits, surficial lithology, structural features, etc. will be noted in detail. The detailed geological map on 1:4000 scale will be generated based on the details gathered during the field visit.

4.3 Core Drilling

4.3.1 Borehole plan:

Based on the outcome of the geological mapping, bedded stratiform regular deposit drilling with 800 m and closer spacing will be done, each borehole is planned with a maximum depth of 50 m.

4.3.2 Core Logging

The drill cores would be logged systematically viz. details of litho-units, colour, structural feature, texture, mineralization, beside the recovery, rock quality designation and type of ore deposit and core photography would be recorded.

4.3.3 Core Sampling

The drill core will be split into two equal halves and one part would be preserved in the core box. The other half will be powdered to 120 mesh size and the same would be divided into four parts (250 g each) through coning and quartering. One part of 250 g sample will be sent to chemical laboratory for analysis, second part to be preserved in the camp as duplicate sample, third part to be utilized for preparing composite sample for individual ore band and the fourth part would be kept as either check sample or sample to be used for any other specific purpose. The length of each sample will be kept 0.50 m-1.0m depending upon the width of particular types of limestone band and its physical character. The primary

core samples will be analyzed for Total CaO, MgO, SiO₂, MnO, K₂O, Fe₂O₃, Al₂O₃, Na₂O, TiO₂, SO₃, P₂O₅, Cr₂O₃, ZnO, V₂O₅ & LOI by XRF methods.

4.4 Petrographic and petrochemical Studies

Thin sections will be prepared from outcrop samples and the core samples and those will be studied for detailed petrographic and mineralographic characteristics. These samples will be drawn from ore zones and associated rocks. A provision of 10 nos. specimens for petrographic and 10 nos. specimens for petrochemical studies is kept for the proposed area.

4.5 Bulk Density

Determination In addition, bulk density determination of 3 nos. of samples will be carried out for the proposed block.

5 Nature Quantum and Target for G3 stage

Nature and quantum of work for Preliminary Exploration (G3 Stage) of Limestone in Kebang North Block, Siang District, Arunachal Pradesh			
Sl. no	Item of work	Unit	Quantum
1	Detailed Geological mapping (on 1:4000)	Sq. Km	5.98
a	Topographic Survey and surface contouring 1:4000 scale	Sq. Km	5.98
b	Demarcation of proposed boundary, Fixation of Borehole and determination of co-ordinates & Reduced Level (RL) of the boreholes by DGPS		10 (BH) +4 (Cardinal points) =14
2	Surface sampling		
a	Geochemical sampling (Bedrock sampling)	Nos.	50
3	Pitting	Cubic meter	50
4	Core Drilling	Meter	500
5	Surface samples + Pit samples + 10% Check Samples complete analysis for limestone by XRF radicals (Al ₂ O ₃ %, Fe%, Fe ₂ O ₃ %, SiO ₂ %, P%, S%, Insolubles & LOI) + other oxides and traces	Nos.	50+20=70 and checks=7
6	Core samples+ 10% Check Samples complete analysis for limestone by XRF radicals (Al ₂ O ₃ %, Fe%, Fe ₂ O ₃ %, SiO ₂ %, P%, S%, Insolubles & LOI) + other oxides and traces	Nos.	450 and checks=45
7	Preparation of thin sections	Nos.	10
8	Study of thin section	Nos.	10
9	Bulk density/ specific gravity determination	Nos.	3
10	Drill core preservation	Meter	300

6 Manpower deployment

Two geologists, two geophysicists, one surveyor with required laborers and two drilling rigs with drilling crew will be deployed as per the requirement of the time schedule chart (Table: 4).

Timeline: Title Preliminary Exploration (G3 Stage) of Limestone in Kebang North Block, Siang District, Arunachal Pradesh
Area 5.98 sq. km, No.of BH: 10, Borehole depth range- 500 m; Schedule & timeline- 12 months Review: After 4 Months

S. No.	Item of work	Months												
		1	2	3	4	REVIEW	5	6	7	8	9	10	11	12
1	Camp Setup													
2	Detailed Mapping (1:4000)													
3	Bed Rock Sampling													
4	Pitting													
5	Chemical analysis of surface samples													
6	Systematic drilling (800X800m)													
7	Core sampling and its preparation													
8	Chemical analysis of Core Samples													
9	Processing of Analytical data													
10	3D ore body modeling													
11	Preparation of geological report													
12	Peer review													
13	Final submission													

7 Break up of expenditure

The breakup of expenditure is given in table 6.

Cost Estimate- Title Preliminary Exploration (G3 Stage) of Limestone in Kebang North Block, Siang District, Arunachal Pradesh Area 5.98 sq. km, No.of BH: 10, Borehole depth - 500 m; Schedule & timeline- 12 months Review: After 4 Months								
S. No.	Item of Work *	Unit *	Rates as per NMET SoC 2020-21		Estimated Cost of the Proposal			Remarks
			SoC- Item No. *	Rates as per SoC * (a)	Qty. (b)	Total Amount (Rs) (a*b)	Total Amount multiplying 2X (Rs) (a*b)	
A	Geological Mapping Other Geological Work & Surveying							
	Detailed Geological mapping, (1:4000 scale) & Trenching, drilling work	Per Sq Km	1.1	18,300	5.98	1,09,434	2,18,868	
i	a. Charges for Geologist per day (Field) for geological mapping & trenching work, drilling work	day	1.2.1 a	14,500	180	26,10,000	52,20,000	2 Geologist at field for Mapping, piting Drilling and core sample supervision
ii	b. Labours Charges; Base rate	day	5.8	541	360	1,94,760	3,89,520	Amount will be reimbursed as per the notified rates by the Central Labour Commissioner or respective State Govt. whichever is higher.
	c. Charges for Geologist per day (HQ)	day	1.2.1 a	10,500	60	6,30,000	6,30,000	
	d. Charges for one Sampler per day (1 Party)	one sampler per day	1.2.1b	7,850	45	3,53,250	7,06,500	
	e. Labours (4 Nos)	day	5.8	541	180	97,380	1,94,760	
	Sub Total- A					39,94,824	73,59,648	

Cost Estimate- Title Preliminary Exploration (G3 Stage) of Limestone in Kebang North Block, Siang District, Arunachal Pradesh
Area 5.98 sq. km, No.of BH: 10, Borehole depth - 500 m; Schedule & timeline- 12 months Review: After 4 Months

S. No.	Item of Work *	Unit *	Rates as per NMET SoC 2020-21		Estimated Cost of the Proposal			Remarks
			SoC- Item No. *	Rates as per SoC * (a)	Qty. (b)	Total Amount (Rs) (a*b)	Total Amount multiplying 2X (Rs) (a*b)	
B	Survey work							
a	DGPS Survey for BH fixation & RL determination and lease boundary demarcation	Per Point of observation	1.3.2	24,000	14	3,36,000	6,72,000	4 cardinal points + 10 BH points
b	Charges of one qualified surveyor with Total Station for carrying out topographical survey in different RF and surface contouring at different interval, fixation of borehole and determination of co-ordinates & Reduced Level (RL) of the boreholes with total station etc.	one surveyor per day	1.3.1	10,500	60	6,30,000	12,60,000	
c	Labours Charges for survey work;	day	5.8	541	240	1,29,840	2,59,680	
	Sub-Total B					10,95,840	21,91,680	
C	Trenching/Pitting							
	a) Excavation of Pitting	per cu.m	2.1.2	4,725	100	4,72,500	9,45,000	
	Sub-Total C					4,72,500	9,45,000	
D	DRILLING IN HOUSE (after review)							
1	Systematic Drilling up to 300m (soft Rock)	m	2.2.1.1e	5,500	500	27,50,000	55,00,000	

Cost Estimate- Title Preliminary Exploration (G3 Stage) of Limestone in Kebang North Block, Siang District, Arunachal Pradesh
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S. No.	Item of Work *	Unit *	Rates as per NMET SoC 2020-21		Estimated Cost of the Proposal			Remarks
			SoC- Item No. *	Rates as per SoC * (a)	Qty. (b)	Total Amount (Rs) (a*b)	Total Amount multiplying 2X (Rs) (a*b)	
3	Land / Crop Compansation (in case the BH falls in agricultural Land)	per BH	5.6	30,000	10	3,00,000	6,00,000	
4	Construction of concrete Pillar (12"x12"x30")	per borehole	2.2.7	2,000	10	20,000	40,000	
5	Miscellaneous Charges (Drill camp setting / transporation etc.)	Lumpsum	2.2.9			1,50,000	8,25,000	For drilling cost upto 50 lakhs, 1.50 lakhs
10	Drill Core Preservation	per m	X	1,590	800	12,72,000	25,44,000	
	Sub-Total D					44,92,000	95,09,000	
E	LABORATORY STUDIES							
1	Chemical Analysis							
i)	Major oxide (WD XRD) (Oxides+traces 24 elements)	per sample	4.1.17a	4,200	520	21,84,000	21,84,000	BRS:50, PIT: 20, BH CORE: 450
ii)	Major oxide (WD XRD) (Oxides+traces 24 elements) (10% external)	per sample	4.1.17a	4,200	52	2,18,400	2,18,400	
2	<u>Physical & Petrological Studies</u>						-	
i	Preparation of thin section	Nos	4.3.1	500	10	5,000	5,000	
ii	Study of thin section	Nos	4.3.4	2,800	10	28,000	28,000	

Cost Estimate- Title Preliminary Exploration (G3 Stage) of Limestone in Kebang North Block, Siang District, Arunachal Pradesh
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S. No.	Item of Work *	Unit *	Rates as per NMET SoC 2020-21		Estimated Cost of the Proposal			Remarks
			SoC- Item No. *	Rates as per SoC * (a)	Qty. (b)	Total Amount (Rs) (a*b)	Total Amount multiplying 2X (Rs) (a*b)	
v	Sp. Gravity	Nos	4.8.1	2,500	3	7,500	7,500	
	Sub-Total E					24,42,900	24,42,900	
	Total A to F					1,24,98,064	2,24,48,228	
G	Geological Report Preparation	5 Hard copies with a soft copy	5.2	5.2 (i/ii/iii/iv)		7,50,000	7,50,000	Reimbursement will be made after submission of the final Geological Report in Hard Copies (5 Nos) and the soft copy to NMET.
H	Peer review Charges		As per EC decision			30,000	30,000	
I	Preparation of Exploration Proposal (5 Hard copies with a soft copy)	5 Hard copies with a soft copy	5.1	2% of the Cost or Rs. 5 Lakhs whichever is lower		2,49,961	2,49,961	EA will be reimbursed after submission of the Hard Copies and the soft copy of the final proposal along with Maps and Plan as suggested by the TCC-NMET in its meeting while clearing the proposal.
J	3D Ore body modeling using compatible software	As per actual/ implementing agency to put the cost based on the market survey	5.4			8,00,000	8,00,000	
K	Total Estimated Cost without GST					1,43,28,025	2,42,78,189	
L	Provision for GST (18%)					25,79,045	43,70,074	GST will be reimburse as per actual and as per notified prescribed rate

**Cost Estimate- Title Preliminary Exploration (G3 Stage) of Limestone in Kebang North Block, Siang District, Arunachal Pradesh
Area 5.98 sq. km, No.of BH: 10, Borehole depth - 500 m; Schedule & timeline- 12 months Review: After 4 Months**

S. No.	Item of Work *	Unit *	Rates as per NMET SoC 2020-21		Estimated Cost of the Proposal			Remarks
			SoC-Item No. *	Rates as per SoC * (a)	Qty. (b)	Total Amount (Rs) (a*b)	Total Amount multiplying 2X (Rs) (a*b)	
M	Total Estimated Cost with GST					1,69,07,070	2,86,48,263	
				or Say Rs. In Lakhs		169.07	286.48	
Note:								
1	Strict adherence to the Ministry of Finance's and GFR guidelines is mandatory. Every transaction must adhere to GFR rule 21.							
2	In case of delay/non- performance, the appropriate action will be taken by competent authority against delinquent agency as per prevailing govt. of India rules/guidelines on procurement.							
3	If any part of the project is outsourced, the amount will be reimbursed as per the Paragraph 3 of NMET SoC and Item no. 6 of NMET SoC. In case of execution of the project by NEA on its own, a Certificate regarding non outsourcing of any component/project is required.							
4	Necessary efforts should be made to minimize any adverse impact on the environment during exploration activities.							
5	Any item of work not mentioned above shall be added as per SoC.							
*	SoC Item No, Unit and Rate for each item of work must be as mentioned in the SoC.							

List of plates

Sl. No	Description
I	Boundary of the proposed block on the SOI toposheet map
II	Boundary of the proposed block on the geological map of 1:50,000 scale along with location of sample collection

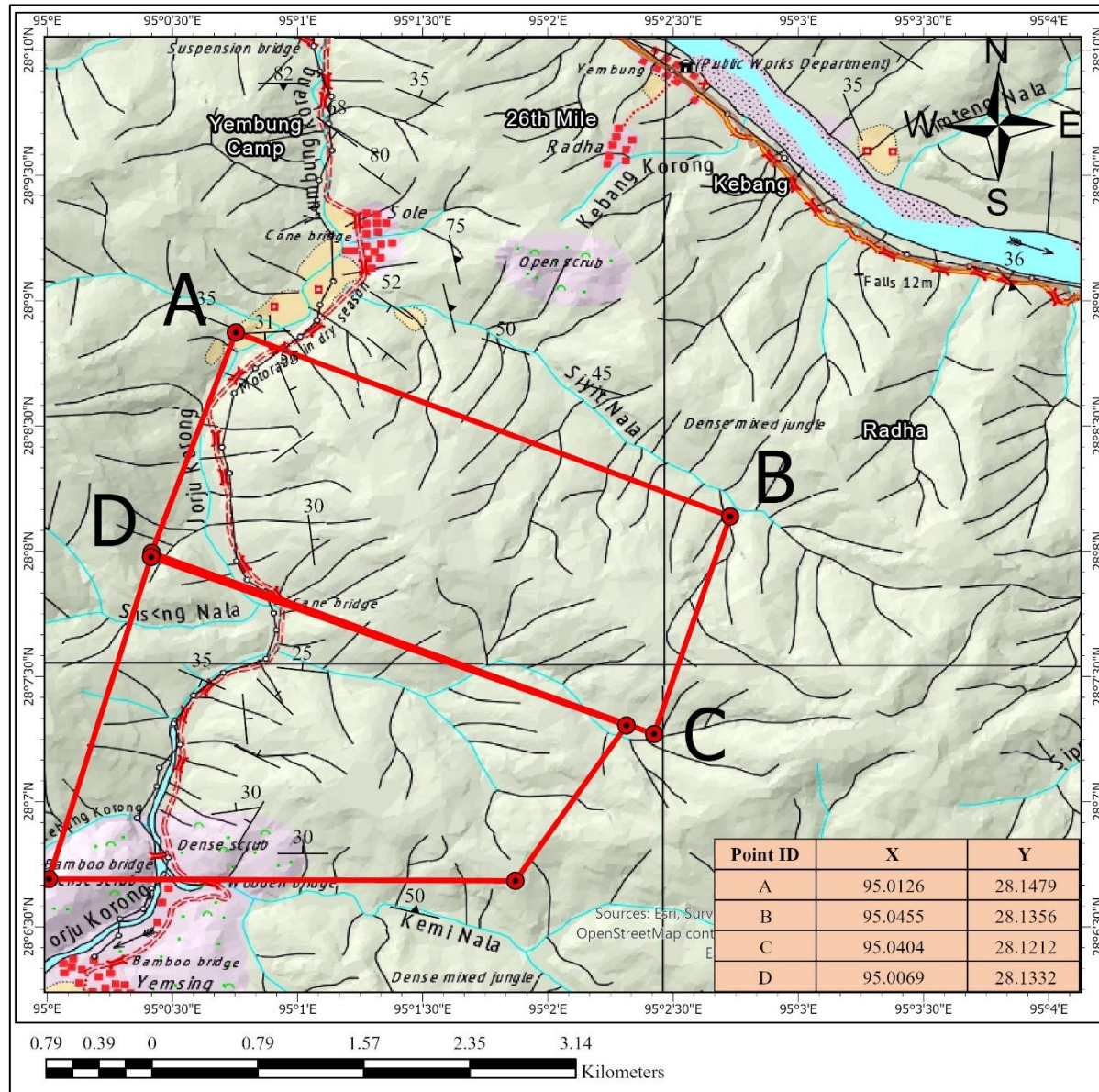


Figure 1: Location map of Kebang North block, Siang District, Arunachal Pradesh

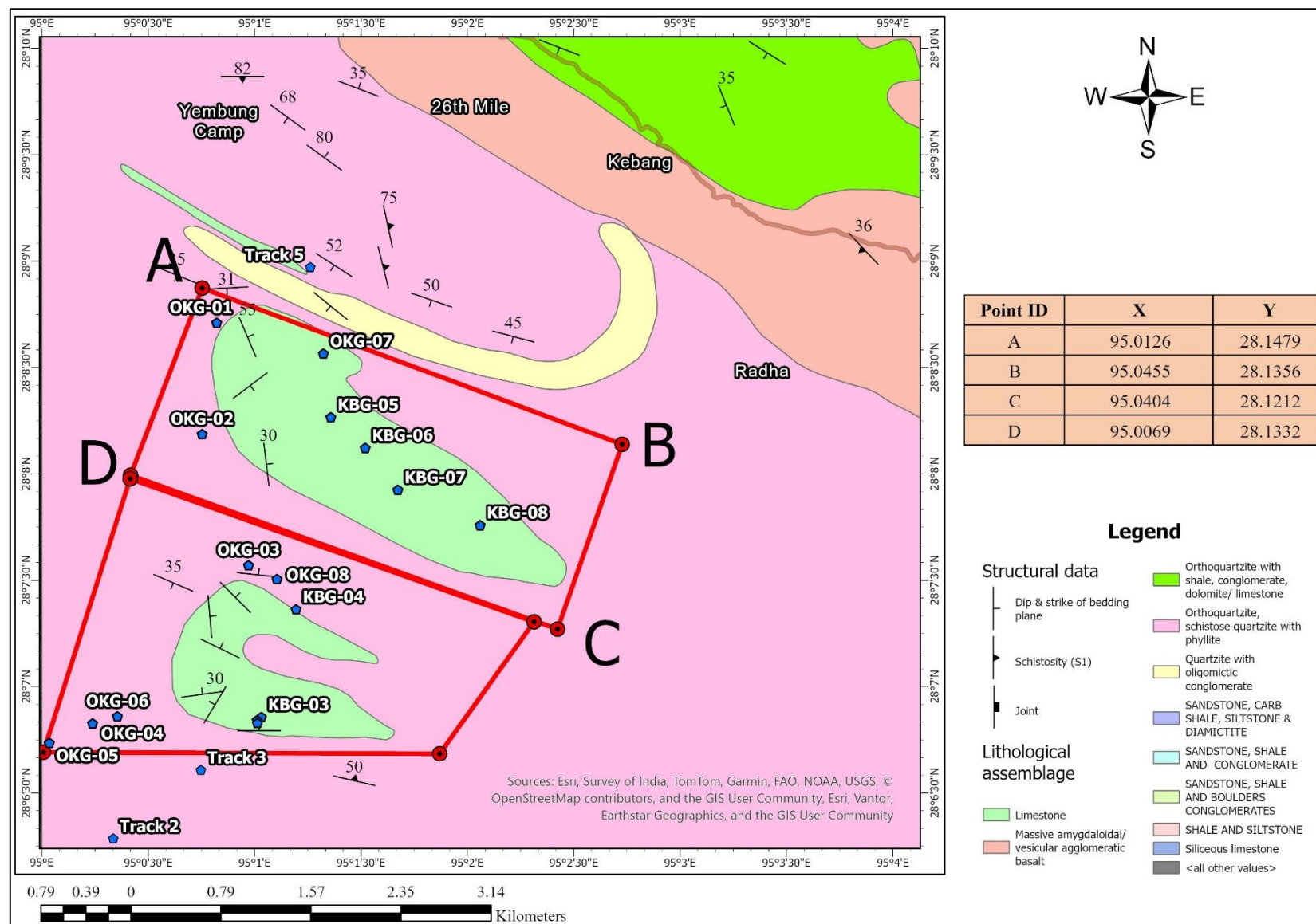


Figure 2: Geological map of 1:50,000 scale of Kebang North block, Siang District, Arunachal Pradesh