PROPOSAL FOR
MINERAL EXPLORATION OF LIMESTONE(G-3 LEVEL) IN KHONGKHA LIMESTONE BLOCK 1 AND KHONGKHA LIMESTONE BLOCK 2, KIPHIRE DISTRICT, NAGALAND

UNDER
NATIONAL MINERAL EXPLORATION TRUST (NMET)
MINISTRY OF MINES, GOVT OF INDIA

Submitted by:

Directorate of Geology & Mining
Government of Nagaland
Nagaland: Dimapur

MINERAL EXPLORATION OF LIMESTONE(G-3 LEVEL) IN KHONGKHA LIMESTONE BLOCK 1 AND KHONGKHA LIMESTONE BLOCK 2, KIPHIRE DISTRICT, NAGALAND

1.0.0 Introduction

1.1.0 Nagaland is home to deposits of high gradelimestone, associated with the ophiolite complex,the Naga Metamorphics and Mimi Formation, occurring on the south eastern part near the Indo-Myanmar border.The mineral potential of these deposit areas has been assessed by various workers of Directorate of Geology & Mining, Nagaland (DGM) and Geological Survey of India (GSI). However all geological activities still remain in the G4 level only, except at Wazehoand Longpotrop, Mimi-Pyakatsublocks of Mimi limestone deposit, where exploratory drilling and resource estimation has been carried out by DGM in the former two blocks and MECL-DGM collaboration in the latter.

1.2.0 The detailed limestone exploration of Mimi-Pyakatsu block of Mimi limestone deposit, Kiphire district, 2014 (MECL-DGM collaboration under promotional funding) has reported the overall potential of the block as 167.77 million tonnes under 332 & 333 categories of UNFCover an area of 5 sq km. The Mimi limestone deposit is the largest limestone deposit in Nagaland which extends over a strike length of 10 km from Khongka in south west to Longpotrop in North east. The deposit occurs in and around Mimi village and hence named as Mimi limestone deposit.

1.3.0 The Khongkalimestone block is located just 18 km south of theMimi limestonedeposit. The Khongka in addition to the Mimi limestone deposit is capable of sustaining mega cement plantset up in the vicinity of the deposit areafor several decades. The Khongka limestone contains CaO content of 31.22-55.86%, MgO 0.06-1.96% and SiO_2 0.13-7.39%. The proposed exploration will be helpful to systematically explore the limestone resource and demarcating the various grades of limestone in the block as per UNFC norms and assess its potential for limestone based industry in the region.

2.0.0 Objective of the proposed exploration programme

i) Detailed Geological mapping (1:2000), topographical survey, core logging, sampling and laboratory studies.
ii) To drill 7 nos. of borehole at 400 m strike interval with borehole depth ranging from 115-210m inKhongka limestone block 1.
iii) To drill6 nos. of borehole at 400 m strike interval with borehole depth ranging from 100-210 m in Khongka limestone block2.
iv) To estimate category wise in-situ limestone resource and quality.

2.1.0 **Location of the block**

2.1.1. The block is located in the south eastern corner of Nagaland towards the Indo-Myanmar border. It falls under SOI toposheet No 83 K/14.The district headquarter Kiphire is located 176 km north west of the block while the sub district headquarter Pungro is located 100 km north west of the block.The nearest railway station and airport is at Dimapur. Khongka is connected to Dimapur by around 366 km road distance via NH 29 till Phek and NH 202 from Phek to Kiphire and via local road from Kiphire to Khongka village.The coordinates of the corner points of the block is given below and covers an area ofapprox2.326 sq. km.

Sl.No	Block	Coordinates		
		Longitude	Latitude	Total area
A	Khongka Limestone block 1	94° 53' 44.875" E	25° 40' 48.363" N	1.129
B		94° 53' 58.639" E	25° 40' 40.903" N	
C		94° 53' 42.034" E	25° 39' 44.454" N	
D		94° 53' 16.247" E	25° 39' 27.858" N	
E		94° 53' 14.420" E	25° 39' 38.887" N	
F		94° 53' 29.009" E	25° 39' 51.788" N	
E	Khongka Limestone block 2	94° 53' 14.420" E	25° 39' 38.887" N	1.193
D		94° 53' 16.247" E	25° 39' 27.858" N	
G		94° 53' 2.219" E	25° 39' 17.353" N	
H		94° 53' 1.557" E	25° 38' 44.400" N	
I		94° 52' 38.960" E	25° 38' 43.553" N	
J		94° 52' 41.177" E	25° 39' 29.535" N	

Table 2.1: Coordinates of the corner points of the block

2.2.0 **Drainage**

2.2.1. The topography of the area is characterized by rugged terrain, with steep cliffs and narrow valleys.The highest elevation of1952m within the block is situated at SE cornernear Hakamute villagewhile the lowest elevationof 1208 m is situated at NW corner at a tributary of Chizatinala.TheNgongunnala, Tsupsitangnalaand Pvuruzunala are the major streams draining Khongka. They flow from south east tonorth west directionand drains into the Tizu river. Drainage pattern varies from dendritic to sub-trellis pattern.Khongka Limestone block 1 is separated from Khongka Limestone block 2 by a tributary of Tsupsitangnala.

3.0.0 Previous work

3.1.0 The exploration of the Naga Hill Ophiolite region was initiated in 1883 by Oldham, with Pascoe continuing the work in 1912. With the establishment of the Directorate of Geology and Mining, Govt. of Nagaland in 1968, significant emphasis was placed on exploring the geology and mineral resources of the state.Between 1969 and 1978,

numerous geological expeditions were conducted, which, for the first time, established the stratigraphy and structural framework of the Nagaland Ophiolites.

3.2.0 Mimi limestone deposit is the largest limestone deposit in Nagaland, which is divided into five blocks viz Khongkha block, Mimi-Khetri block, Mimi block, Pyakatsu block and Longpotrop block.O.P. Agrawal and K.S. Rao carried out preliminary appraisal of the Mimi limestone belt in 1971. K.S. Rao and Pandey carried out preliminary assessment of the resource and divided the Mimi limestone into four blocks (1972-73) and carried out geological mapping of Mimi and Pyakatsu block (1972-74). L.P Yaden and S.N. Chishi (1987-90) carried out detailed exploration of limestone deposit at Longpotrop block.

3.3.0 L.PangerYaden&A.JungshiJamir (2009-10)DGM, Nagaland carried out assessment of limestone resourceofKhongkhalimestone block during Assessment of Limestone resources in Nagaland for viable small scale industries. This block comes under Mimi limestone belt. The deposit is spread over an area of 1.5 sq. km. It is massive and bedded in nature and occur in association with quartzite, phyllite and some lensoid bodies of volcanic and ultramafics of the Mimi Formation. A total resource of 85 MT has been established.

3.4.0 No exploration work has been conducted in the block by any agency, apart from reconnaissance investigation.

4.0.0 Geology & Structure

4.1.0 Regional Geology, structure and metamorphism of the area

4.1.1. The Naga hills are an integral part of the larger Indo-Myanmar Orogenic belt. This belt represents a collision zone between the Indian and Burma plate, extending northward into the Eastern Himalayas and southward through the Andaman and Nicobar islands, eventually reaching the Mentawai islands of Sumatra. The Naga hills can be divided geotectonically into four distinct domains. These are: 1. Assam shelf, at the western edge of the Naga hills, consist of sediments of Barail, Surma and Tipam Group resting unconformably on a pre-Tertiary granitic basement exposed mainly in Dhansiri valley. 2. Schuppen Belt, characterized by imbricate structures where multiple slices of sedimentary rock have been stacked over each other due to compressional tectonics. 3. Inner Palaeogene Fold Belt, comprising thick folded sequence commencing from Disang Group onwards to Pleistocene sediments. 4. Ophiolite Complex, occurring further east, close to Indo-Myanmar border, comprises remnants of ancient oceanic crust. This complex is further over thrust by metamorphic rocks of the Nimi Formation and Naga Metamorphites from the east.

Table 4.1: Litho-stratigraphic succession of eastern part of Nagaland (modified after Agarwal)

Age	Formation			Lithology	
Recent	Alluvium & High level terraces			Laterites & Alluvium	
Oligocene	Jopi Formation			Ophiloite derived younger sedimentary Cover of repeated sequence of Polymictic conglomerate, grit, subgrewacke, sandstone and tuffaceous shale	
	~~unconformity~~~~~~~~~~~~~~~~~~~~~~~~~~~				
Late Cretaceous To Eocene	Disang	Tectonic contact	Ophiolite complex	**Disang Flysh** Slate, Phyllite siltstone, subgraywacke minor limestone	**Ophiloite complex** Meta-ultramafic peridodite, pyroxenite dunite, serpentinite, Blueschist, chert, mafic-ultramafic cum-Late, limestone, mafic volcanics & its derivates
	------------------------Tectonic contcact--				
Mesozoic?	Nimi Formation			Phyllite, schist, limestone & quartzite with Occasional serpentinite intrusion	
	--------------------------Tectonic contact--				
Post Mesozoic?	Naga Metamorphics			Quartzites, marble, calc-silicate rocks, Quartzose mica schist, phyllite, sheared granites	

4.1.2. Nimi Formation is named after Nimi village, after the type area. This formation tectonically overrides the Naga Hills Ophiolite from the east (Brunnschweiler, 1966). This thrust is marked by imbrication, mylonitization, silicification, brecciation, truncation of beds and formation of sheared mass of agglomeration of litho-units of the two at the confluence of Turati–Tizu Rivers (Agrawal 1985). The contact of ophiolite with Nimi Formation trends NE–SW with moderate to steep dip towards SE. The generalised litho-stratigraphic succession of East part of Nagaland (modified after Agarwal) is given in table 3.1.

4.1.3. Nimi formation consist of low to medium grade accretionary wedge metasediments of possible Mesozoic age. The main lithounits comprise interbands of phyllite, quartzite, limestone, marble and quartz- sericite-schist.Associated with this formation is an extensive deposit of whitish grey to grey colour crystalline limestone/marble associated with feldspathic-quartzites which occurs as a belt of

continuous to discontinuous bands in the vicinity of Nimiantiform (Bhattacharya and Sonwal, 1985). The general trend of the unit varies from NE-SW to NNE-SSW and they occur both in NW and SE limb of asymmetric Nimi anticline.

4.1.4. Mimi limestone belt extends continually for more than 10 kms along its strike length from Khongka in south west to Longpotrop in north east. This belt is divided into five blocks viz Khongka block, Mimi-Kheti block, Mimi block, Pyakatsu block and Longpotrop block. The continuation of the limestone belt is suspected to occur further south beyond Hakkomute village.

4.1.5. Extensive occurrence of limestone (140–200 m thickness) trending NNE to NE has been noted with the development of stalactites and stalagmites in caves (Agrawal and Ghose 1986). There are major caves in several localities viz north of the Turatinala, NW and SE of the Khongkha village. The limestone bands are affected by longitudinal and transverse faults. The limestone sequence exposed around Mimi has a faulted contact with phyllite along the western side of Pyakatsu-Mimi ridge. it is further offset by another transverse fault on its southward extension along Chizati creek (Agrawal, 1975). The metasediments are affected by tight isoclinal folding with steep axial planes dipping 80–85º towards SSE and show development of slaty cleavage and stripping lineation (Vidyadharan et al. 1986).Near Turatinala, rocks assume vertical dips and show broad warps.

4.1.6. The rocks have undergone multiple phase of deformation and metamorphism. Three phases of deformation are recorded (Chattopadhya& Roy 1975). The first folds are isoclined with NNE-SSW trending with plunge in either direction. The second folds vary from open to medium tight in nature and have NE-SW trend with low plunge. The third folds are very broad with long wavelength and low amplitude. Chevron folds and crenulation cleavages in phyllite and other schistose rocks are observed. The rocks are dissected by a number of dislocation systems represented by thrusts, high angle reverse faults, gravity faults and wrench faults. They are broadly discernable into NE-SW trend and WNW-ESE- trend.

4.1.7. Lithologically and homotaxially these are similar to the Pansat Beds recorded from adjacent sections from the Burmese side (Brunnschweiler 1966). Orbitolina sp. from Nimi Formation indicate a middle Cretaceous age.

4.2.0 **Geology & Structure of the block**

4.2.1. The lithounits exposed in the area are represented by limestone, marble,quartzite, phyllite and schist. Small tectonic slices of gneiss are noted within the metamorphic sequence west of Khongka village. The limestone has litho-contact with low grade schist, phyllite, quartzite on the west and with quartzite and phyllite on the east.The stratigraphicsuccession of the area (after O.P Agrawal &Iqbal) is given in table 3.2.

Table 4.1.: Stratigraphic succession of the area (after O.P Agrawal & Iqbal)

Formation	Lithology
Disang	Shale/slate/phyllite,siltstone, greywacke
----------	Tectonic contact----------
Ophiolite complex	Serpentinite, ultramafics, basic tuffs, basalt, schist, chert, limestone, phyllite, greywacke
----------Tectonic contact----------	
Naga Metamorphics	Quartzite, phyllite, limestone, serpentinite, schist, ultramafics

4.2.2. The Khongka limestone block extends from Khongka in the north to Hakamute in the south for strike length of about 4kms.The block has further been divided into two sub-blocks. The average thickness of limestone deposit at Khongka canbe taken as 150 m.South of Hakumate, thickness of limestone is reduced in comparision to those exposed near Khongka.The limestone shows variable recrystallisationand vary incolour from ash grey to dark grey in color with fine interbands of slate and phyllite.The general rock trend is NNE-SSW dipping towards east. The dip of the northern part of the deposit is steep with beds dipping 65° due east. The dip of beds decreases further towards south with beds dipping 42° due east at the southern end.The estimation of precise thickness is difficult due to folded nature of the rocks.Limestone forms scarps and structural features like stalactites, stalagmites, cavesand solution cavities.

5.0.0 Proposed scheme of exploration

The exploration scheme is formulated in accordance with the objectives set for the block. The details of different activities to be carried out are given as

5.1.0 Core drilling

5.1.1. 13 nos. of angular boreholes (55°) involving total meterage of 2190 m at 400 m interval will be drilled along the strike length. The depth of borehole ranges

5.1.2. from 100 m to 210 m.Thetentative drilling scheme for exploration of limestone in Khongkablock is given below as:

Table 5.1.: Tentative exploratory drilling scheme in Khongka Limestone block 1 &Khongka Limestone block 2

Block	BH.no	Tentative depth target (m)	Co-ordinates		Elevation (m)
			Longitude	Latitude	
Khongka Limestone block 1	KLB1	190	94° 53' 50.220" E	25° 40' 38.517" N	1379
	KLB2	165	94° 53' 45.201" E	25° 40' 26.630" N	1435
	KLB3	210	94° 53' 44.219" E	25° 40' 13.813" N	1450
	KLB4	210	94° 53' 42.414" E	25° 40' 0.840" N	1346
	KLB5	160	94° 53' 36.894" E	25° 39' 49.404" N	1476
	KLB6	115	94° 53' 32.869" E	25° 39' 50.154" N	1420
	KLB7	210	94° 53' 29.667" E	25° 39' 38.270" N	1571
Khongka Limestone block 2	KLB8	100	94° 53' 3.530" E	25° 39' 35.756" N	1618
	KLB9	130	94° 52' 53.220" E	25° 39' 25.848" N	1791
	KLB10	110	94° 52' 47.066" E	25° 39' 26.962" N	1789
	KLB11	200	94° 52' 43.710" E	25° 39' 17.347" N	1759
	KLB12	210	94° 52' 46.420" E	25° 39' 4.977" N	1739
	KLB13	180	94° 52' 47.740" E	25° 38' 52.256" N	1745

5.2.0 **Core Logging**

5.2.1. Drill cores will be analyzed in a systematic manner to identify different litho units, along with their physical properties and structural features. Rock Quality Determination will also be assessed.

5.3.0 **Core Sampling**

5.3.1. Primary core sampling will be conducted based on comprehensive core logging. The limestone horizon will be clearly delineated, with sample interval generally maintained at 3 m. However, the sample interval may be modified as necessary, depending on the physical characteristics and variation of the horizon.

5.4.0 **Check Sampling**

5.4.1. Approximately 5 % of the primary samples will be subjected to check analysis to verify the accuracy and reliability of the chemical results.

5.5.0 **Composite Sampling**

5.5.1. Composite samples will be prepared from borehole primary samples, with sample interval generally maintained at 6 m.This is to confirm the reproducibility of primary analysis and also distribution of other radicals and detrimental elements present if any.

5.6.0 **Outcrop sampling**

5.6.1. Outcrop sampleswill be collected from outcrop exposures especially along areas where boreholes cannot be placed due to topographyand steep locations. The outcropsamples will be analysed as primary samples and also considered for resource estimation.

5.7.0 **Chemical Analysis**

5.7.1. All primary samples and composite samples will be analysed for major oxides

5.7.2. 5 % of total primary samples will be subjected to check analysis for major oxides

5.7.3. Composite samples will be analysed for for major oxides

5.8.0 **Spectroscopic studies**

5.8.1. 20 nos. of composite samples will be subjected to spectroscopic

5.9.0 **Petrological and Mineralogical studies**

5.9.1. Petrological and mineralogical studies will be carried out for 30 nos for borehole samples and surface outcrop samples.

5.10.0 **Specific gravity determination**

5.11.0 20 nos. of composite samples and outcrop samples will be subjected to specific gravity determination.

5.12.0 **Quantum of work proposed**

5.13.0 The details of quantum of proposed work is given below

Table 5.2: Proposed Quantum of work in Khongka limestone block 1 and Khongka limestone block 2, Kiphire district, Nagaland

Sl. No	Item of work	Unit	Quantum of work	
			Khongka limestone block 1	**Khongka limestone block 2**
1	Exploration Drilling	m	1260 (7 Bhs)	930 (6 Bhs)
2	Geological mapping (1:2000 scale),topographical survey. Core Logging and sampling.	sq km	1.129	1.197
3	Laboratory studies			
	A. Chemical studies			
	i) Primary samples (major oxides)	Nos	422	312
	ii) Check samples (major oxides)	Nos	21	16
	iii) Composite samples (major oxides)	Nos	212	157
	iv) Outcrop samples-Primary (major oxides)	Nos	15	15
	B. Physical studies			
	i) Petrological studies (surface & BH core samples)	Nos	10	10
	ii) Specific gravity determination	Nos	10	10
	iii) Spectroscopic (XRD) studies	Nos	10	10
6	Report preparation {As per Mineral (Evidence of Mineral Contents) Rule - 2015}	Nos	1	1

6.0.0 TIME SCHEDULE& COST ESTIMATE

6.1.0 Time schedule

6.1.1. The project is proposed for 12 months duration where all geological, drilling, survey and laboratory works will be complete within the stipulated time. The time schedule for execution of various activity is projected as below:

Table 6.1: Time schedule in months for exploration of limestone (G3 level) in Khongka limestone block 1, Kiphire district, Nagaland

ACTIVITY	1	2	3	4	5	6		7	8	9	10	11	12
Geological mapping 1:2000 scale and core logging													
Drilling and sampling													
Sample preparation							Review						
Analytical works													
Geological report documentation and preparation													

Table 6.2: Time schedule in months for exploration of limestone (G3 level) in Khongka limestone block 2, Kiphire district, Nagaland

ACTIVITY	1	2	3	4	5	6		7	8	9	10	11	12
Geological mapping 1:2000 scale and core logging													
Drilling and sampling													
Sample preparation							Review						
Analytical works													
Geological report documentation and preparation													

6.2.0 **Cost estimate**

6.2.1. The project cost with provisional escalation is estimated at say **Rs 1472 lakhs**. The details of item wise cost estimate has been taken and given below

Table 6.3: Item wise cost estimate for exploration of limestone (G3 level) in Khongka limestone block 1, Kiphire district, Nagaland

Sl.No	Item	Total estimated cost (Rs)
A	i. Geological mapping, survey &sampling work	8890746
B	ii. Exploratory core drilling	55046690.8
C	iii.Laboratory studies	2935900
Sub –Total A+B+C		**66873337**
D	Report and operational charges for outsourced component	4520000
E	**Add:GST@18%*** **	**12850800.62**
Total A+B+C+D		**84244137.42**
		SAY Rs.842 Lacs

Table 6.4: Item wise cost estimate for exploration of limestone (G3 level) in Khongka limestone block 2, Kiphire district, Nagaland

Sl.No	Item	Total estimated cost (Rs)
A	i. Geological mapping, survey & sampling work	7167774
B	ii.Exploratory core drilling	40000259.6
C	iii. Laboratory studies	2221900
Sub –Total A+B+C		**49389933.6**
D	Report and operational charges for outsourced component	53391631.61
E	**Add:GST@18%*** **	**9610493.689**
Total A+B+C+D		**63002125.3**
		SAY Rs.630 Lacs

The Applicable GST Rates

***Mineral Exploration and Evaluation 18% (SAC code:9C)

7.0.0 JUSTIFICATION

i) Upon completion, the proposed exploration program will yield crucial data on the limestone resource, including its grade and its potential for commercial use.

ii) The output of regional exploration will form the basis for further detailed exploration of the block and mining of the resources which will ultimately have positive economic and impact to the people of the region and also to the Nagaland state.

iii) Although occurrence of limestone is evident from exposed outcrops, lack of systematic exploration data is a setback for any private firms to come forward for investment in the area. Therefore, the proposed systematic explorationwork when complete will pave way for more investments opportunities thereby improving the socio-economic conditions of the people.

Table 7.1: Cost estimate for G-3 Level of exploration for Limestone in Khongka Limestone Block 1, Kiphire district, Nagaland (Total Area=1.129 sq. km)

Sl. No.	Work/Activity	Item No. in NMET SoC 2020	Unit	Rate as per NMET SoC 2020	Estimated cost of the Proposal		Remarks
				Rate(Rs.)	Qty	Amount (Rs)	
A	**GEOLOGICAL WORK**						
	i) Detailed geological mapping 1:2000 scale, core logging and sampling. Charges for one geologist per day at field.	1.3 & 1.5.1a	per day	11000	90	990000	

	iii) Labour charges for geological work	5.7	per day	526	180	94680	**Amount will be reimbursed as per the notified rates by the Central Labour Commission or respective State Govt., whichever is higher**
					Sub-total A1	**1084680**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region Sub-total A2					**3633678**	
B	**SURVEY WORK**						
	Topographical Survey **i)** Charges for surveyor per day at field without labour	1.6.1a	per day	8300	60	498000	
	ii) Labour charges for survey work	5.7	per day	526	240	126240	**Amount will be reimbursed as per the notified rates by the Central Labour Commission or respective State Govt., whichever is higher.**
	iii) DGPS Survey of boreholes including labour and boundary coordinates (including charges for labours deployed for the work)	1.6.2	per point	19200	13	249600	
					Sub-Total B1	**873840**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region Sub-total B2					**2927364**	
C	**DRILLING**						
	i) Core drilling	2.2.1.3a	per m	10100	1260	12726000	

	ii)Transportation of drill rig and truck associated per drill to and from headquarter and previous drill site	2.2.8	per km	36	1468	52848	**Distance being 366 km each trip and Considering transportation of 2 drill rigs to and from Dimapur to drill site and from previous drill site to next drill site**
	iii)Accommodation	2.2.9	monthly	50000	7	350000	
	iv) Camp setting	2.2.9a	per drill	250000	2	500000	**For two drill rigs**
	v)Camp Winding	2.2.9b	per drill	250000	2	500000	**For two drill rigs**
	v)Road making (Hilly terrain)	2.2.10b	per km	32200	3	96600	
	vi) Borehole plugging by cement	2.2.7b	per m	150	1260	189000	**NQ size: Rs. 150/m, HQ size: Rs. 200/m**
	vii) Construction of concrete pillar (12"x12"x30")	2.2.7a	per BH	2000	7	14000	
	viii)Core preservation Charges in GI Sheets Core Boxes	5.3	per m	1590	1260	2003400	**This amount will be reimbursed as per actual meter of drilled cores and after successful delivery of drilling cores to the concerned core libraries/authorities.**
					Sub-Total C1	**16431848**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region				**Sub-Total C2**	**55046690.8**	
D	**SAMPLE WORK**						
	i)Charges for one sampler per day without labour	1.5.2	per day	5100	80	408000	
	ii) Labour charges for sampling	5.7	per day	526	240	126240	**Amount will be reimbursed as per the notified rates by the Central Labour Commission or respective State Govt., whichever**

							is higher
					Sub-Total D1	**534240**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region Sub-Total D2					**1789704**	
E	**Sub Total of escalated 3.35 times the normal SoC rate for exploration work in NE and Himalaya region: Sub Total E (Sub-total A2+B2+C2+D2)**					**63397436.8**	
F	**Chemical analysis**						
	i) Charges for one geologist per day at Headquarters.	1.3 & 1.5.1a	per day	9000	60	540000	
					Sub-Total F	**540000**	
G	**LABORATORY STUDIES**						
	Chemical analysis						
	i) Primary samples (major oxides)	4.1.15a	per sample	4200	422	1772400	
	ii) Check samples (major oxides)	4.1.15a	per sample	4200	21	88200	
	iii) Composite samples (major oxides)	4.1.15a	per sample	4200	212	890400	
	iv) Outcrop samples-Primary (major oxides)	4.1.15a	per sample	4200	15	63000	
	Physical analysis						
	i) Preparation of thin section	4.3.1	per sample	2353	10	23530	
	ii) Complete petrographic studies	4.3.4	per sample	4232	10	42320	
	iii) Specific gravity determination (BH core + surface samples)	4.8.1	per sample	1605	10	16050	
	iv) Spectroscopic (XRD) studies	4.5.1	per sample	4000	10	40000	

	Sub-Total G					**2935900**	
H	**Total cost of outsourced component Sub Total H (Sub-Total E+F+G)**					**66873336.8**	**Reimbursement of outsourced component will be made as per Paragraph 3 of SoC and item no. 6.0 (iii). The copy of contract agreement for outsourced component is required to be provided.**
I	**MISCELLANEOUS CHARGES**						
	i) Preparation of Exploration Proposal	5.1	5 Nos. Hard Copies along with soft copy	2% of approved Project cost subject to Maximum of 5 lakh whichever is lower.	5 Nos. Hard Copies along with soft copy	**500000**	**EA has to submit the Hard Copies and the soft copy of the fiunal proposal along with maps and plan as suggested by the TCC-NMET in its meeting while clearing the proposal**
	ii) Peer Review Charges	as per EC decision		10000	2	**20000**	
	iii) Tendering Process cost for Outsourced component	2.3		2% of outsourced cost or Rs.5 lakh which ever is lower		**500000**	**Will be reimbursed when copy of the signed agreement/tender for outsourced component will be submitted**

	iv) Operational charges for outsourced component	Paragraph 3 (ii) of SoC and item no. 6.0 (iii)		For projects having cost more than 1 crore. Rs. 8.75 Lakhs plus 5% on the balance of outsourced cost in excess of Rs. 1Cr will be paid to the EA. The maximum ceiling of operational charges is Rs. 15 Lakhs.		**1500000**	**Will be reimbursed as per point 3 of NMET-SoC after recalculation when actual cost of outsourcing component will be be provided. The copy of contract agreement for outsourced component and work completion report are also required to reimburse the operational charges**
	v) Geological Report preparation	5.2(iv)	5 Nos. Hard Copies along with soft copy	For the project costs exceeding Rs. 300 Lakhs, A Minimum of Rs. 9 lakhs or 3% of the work whichever is more subject to a maximum amount of Rs. 20 lakhs and additional Rs. 10000/- per each additional copy.	5 Nos. Hard Copies along with soft copy	**2000000**	**This amount will be reimbursed after submission of the final geological report in Hard Copies (5 Nos) and the soft copy to NMET by the EA.**

	Sub-Total I	**4520000**	
	Total estimated cost of the project without GST (Sub-Total H+I)	**71393336.8**	
	Provision for GST @18%	**12850800.62**	**GST will be reimbursed as per actual and as per applicable and as per notified rate**
	Total estimated cost of the project with GST	**84244137.42**	
	Or say Rs. In Lakhs	**842 Lakhs**	
	Note: **i)Strict adherence to the Ministry of Finance's and GFR guidelines is mandatory. Every transaction must adhere to GFR rule 21.** **ii)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.** **iii) 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 execusion of the project by NEA on its own, a Certifiate regarding non outsourcing of any component/project is required.** **iv) Necessary efforts should be made to minimize any adverse impact on the environment during exploration activities.** **v) Any item of work not mentioned above shall be added as per SoC.**		

Table 7.2: Cost estimate for G-3 Level of exploration for Limestone in Khongka Limestone Block 2, Kiphire district, Nagaland (Total Area=1.197 sq. km)

Sl. No.	Work/Activity	Item No. in NMET SoC 2020	Unit	Rate as per NMET SoC 2020	Estimated cost of the Proposal		Remarks
				Rate(Rs.)	Qty	Amount (Rs)	
A	**GEOLOGICAL WORK**						
	i) Detailed geological mapping 1:2000	1.3 & 1.5.1a	per day	11000	60	660000	

	scale, core logging and sampling. Charges for one geologist per day at field.						
	iii) Labour charges for geological work	5.7	per day	526	120	63120	**Amount will be reimbursed as per the notified rates by the Central Labour Commission or respective State Govt., whichever is higher**
					Sub-total A1	**723120**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region Sub-total A2					**2422452**	
B	**SURVEY WORK**						
	Topographical Survey **i)** Charges for surveyor per day at field without labour	1.6.1a	per day	8300	60	498000	
	ii) Labour charges for survey work	5.7	per day	526	240	126240	**Amount will be reimbursed as per the notified rates by the Central Labour Commission or respective State Govt., whichever is higher**
	iii) DGPS Survey of boreholes including labour and boundary coordinates (including charges for labours deployed for the work)	1.6.2	per point	19200	12	230400	
					Sub-Total B1	**854640**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region Sub-total B2					**2863044**	
C	**DRILLING**						
	i) Core drilling	2.2.1.3a	per m	10100	930	9393000	

	ii)Transportation of drill rig and truck associated per drill to and from headquarter and previous drill site	2.2.8	per km	36	1466	52776	**Distance being 366 km each trip and Considering transportation of 2 drill rigs to and from Dimapur to drill site and from previous drill site to next drill site**
	iii)Accommodation	2.2.9	monthly	50000	6	300000	
	iv) Camp setting	2.2.9a	per drill	250000	1	250000	**For one drill rig**
	v)Camp Winding	2.2.9b	per drill	250000	1	250000	**For one drill rig**
	v)Road making (Hilly terrain)	2.2.10b	per km	32200	2	64400	
	vi) Borehole plugging by cement	2.2.7b	per m	150	930	139500	**NQ size: Rs. 150/m, HQ size: Rs. 200/m**
	vii) Construction of concrete pillar (12"x12"x30")	2.2.7a	per BH	2000	6	12000	
	viii)Core preservation Charges in GI Sheets Core Boxes	5.3	per m	1590	930	1478700	**This amount will be reimbursed as per actual meter of drilled cores and after successful delivery of drilling cores to the concerned core libraries/authorities.**
					Sub-Total C1	**11940376**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region				**Sub-Total C2**	**40000259.6**	
D	**SAMPLE WORK**						
	i)Charges for one sampler per day without labour	1.5.2	per day	5100	60	306000	
	ii) Labour charges for sampling	5.7	per day	526	180	94680	**Amount will be reimbursed as per the notified rates by the Central Labour Commission or respective State Govt., whichever is higher**

	Sub-Total D1					**400680**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region Sub-Total D2					**1342278**	
E	**Sub Total of escalated 3.35 times the normal SoC rate for exploration work in NE and Himalaya region: Sub Total E (Sub-total A2+B2+C2+D2)**					**46628033.6**	
F	**Chemical analysis**						
	i) Charges for one geologist per day at Headquarters.	1.3 & 1.5.1a	per day	9000	60	540000	
	Sub-Total F					**540000**	
G	**LABORATORY STUDIES**						
	Chemical analysis						
	i) Primary samples (major oxides)	4.1.15a	per sample	4200	312	1310400	
	ii) Check samples (major oxides)	4.1.15a	per sample	4200	16	67200	
	iii) Composite samples (major oxides)	4.1.15a	per sample	4200	157	659400	
	iv) Outcrop samples-Primary (major oxides)	4.1.15a	per sample	4200	15	63000	
	Physical analysis						
	i) Preparation of thin section	4.3.1	per sample	2353	10	23530	
	ii) Complete petrographic studies	4.3.4	per sample	4232	10	42320	
	iii) Specific gravity determination (BH core + surface samples)	4.8.1	per sample	1605	10	16050	
	iv) Spectroscopic (XRD) studies	4.5.1	per sample	4000	10	40000	
	Sub-Total G					**2221900**	

H	**Total cost of outsourced component Sub Total H (Sub-Total E+F+G)**					**49389933.6**	**Reimbursement of outsourced component will be made as per Paragraph 3 of SoC and item no. 6.0 (iii). The copy of contract agreement for outsourced component is required to be provided.**
I	**MISCELLANEOUS CHARGES**						
	i) Preparation of Exploration Proposal	5.1	5 Nos. Hard Copies along with soft copy	2% of approved Project cost subject to Maximum of 5 lakh whichever is lower.	5 Nos. Hard Copies along with soft copy	**500000**	**EA has to submit the Hard Copies and the soft copy of the fiunal proposal along with maps and plan as suggested by the TCC-NMET in its meeting while clearing the proposal**
	ii) Peer Review Charges	as per EC decision		10000	2	**20000**	
	iii) Tendering Process cost for Outsourced component	2.3		2% of outsourced cost or Rs.5 lakh which ever is lower		**500000**	**will be reimbursed when copy of the signed agreement/tender for outsourced component will be submitted**

	iv) Operational charges for outsourced component	Paragraph 3 (ii) of SoC and item no. 6.0 (iii)		For projects having cost more than 1 crore. Rs. 8.75 Lakhs plus 5% on the balance of outsourced cost in excess of Rs. 1Cr will be paid to the EA. The maximum ceiling of operational charges is Rs. 15 Lakhs.		**1500000**	**Will be reimbursed as per point 3 of NMET-SoC after recalculation when actual cost of outsourcing component will be be provided. The copy of contract agreement for outsourced component and work completion report are also required to reimburse the operational charges**
	v) Geological Report preparation	5.2(iv)	5 Nos. Hard Copies along with soft copy	For the project costs exceeding Rs. 300 Lakhs, A Minimum of Rs. 9 lakhs or 3% of the work whichever is more subject to a maximum amount of Rs. 20 lakhs and additional Rs. 10000/- per each additional copy.	5 Nos. Hard Copies along with soft copy	**1481698.008**	**This amount will be reimbursed after submission of the final geological report in Hard Copies (5 Nos) and the soft copy to NMET by the EA.**

	Sub-Total I	**4001698.008**	
	Total estimated cost of the project without GST (Sub-Total H+I)	**53391631.61**	
	Provision for GST @18%	**9610493.689**	**GST will be reimbursed as per actual and as per applicable and as per notified rate**
	Total estimated cost of the project with GST	**63002125.3**	
	Or say Rs. In Lakhs	**630 Lakhs**	
	Note: **i)Strict adherence to the Ministry of Finance's and GFR guidelines is mandatory. Every transaction must adhere to GFR rule 21.** **ii)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.** **iii) 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 execusion of the project by NEA on its own, a Certifiate regarding non outsourcing of any component/project is required.** **iv) Necessary efforts should be made to minimize any adverse impact on the environment during exploration activities.** **v) Any item of work not mentioned above shall be added as per SoC.**		

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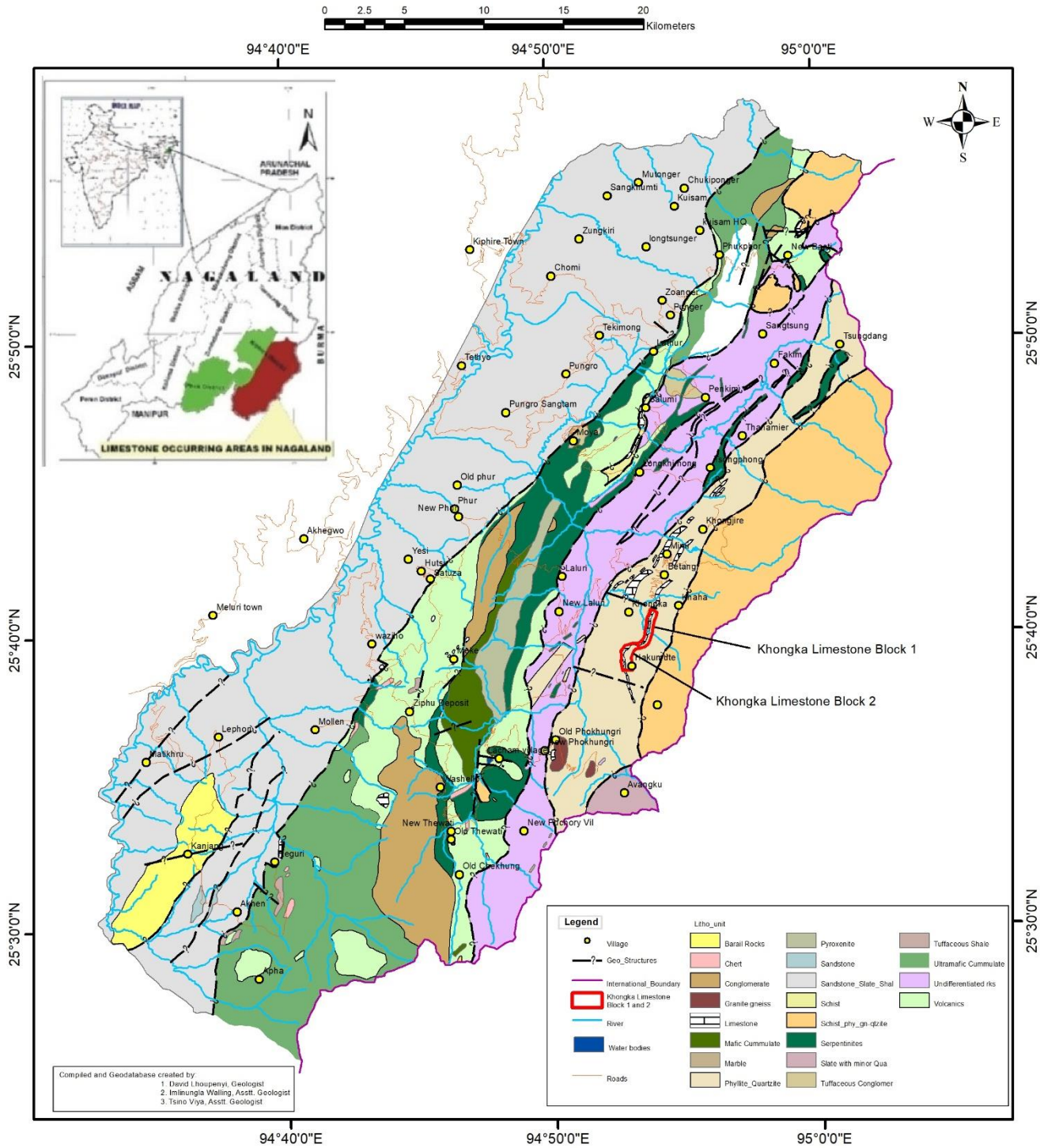
GEOLOGICAL MAP OF NAGA HILL OPHIOLITE SHOWING STUDY AREA FOR EXPLORATION OF LIMESTONE(G3 STAGE) IN KHONGKA LIMESTONE BLOCK 1 AND KHONGKA LIMESTONE BLOCK 2



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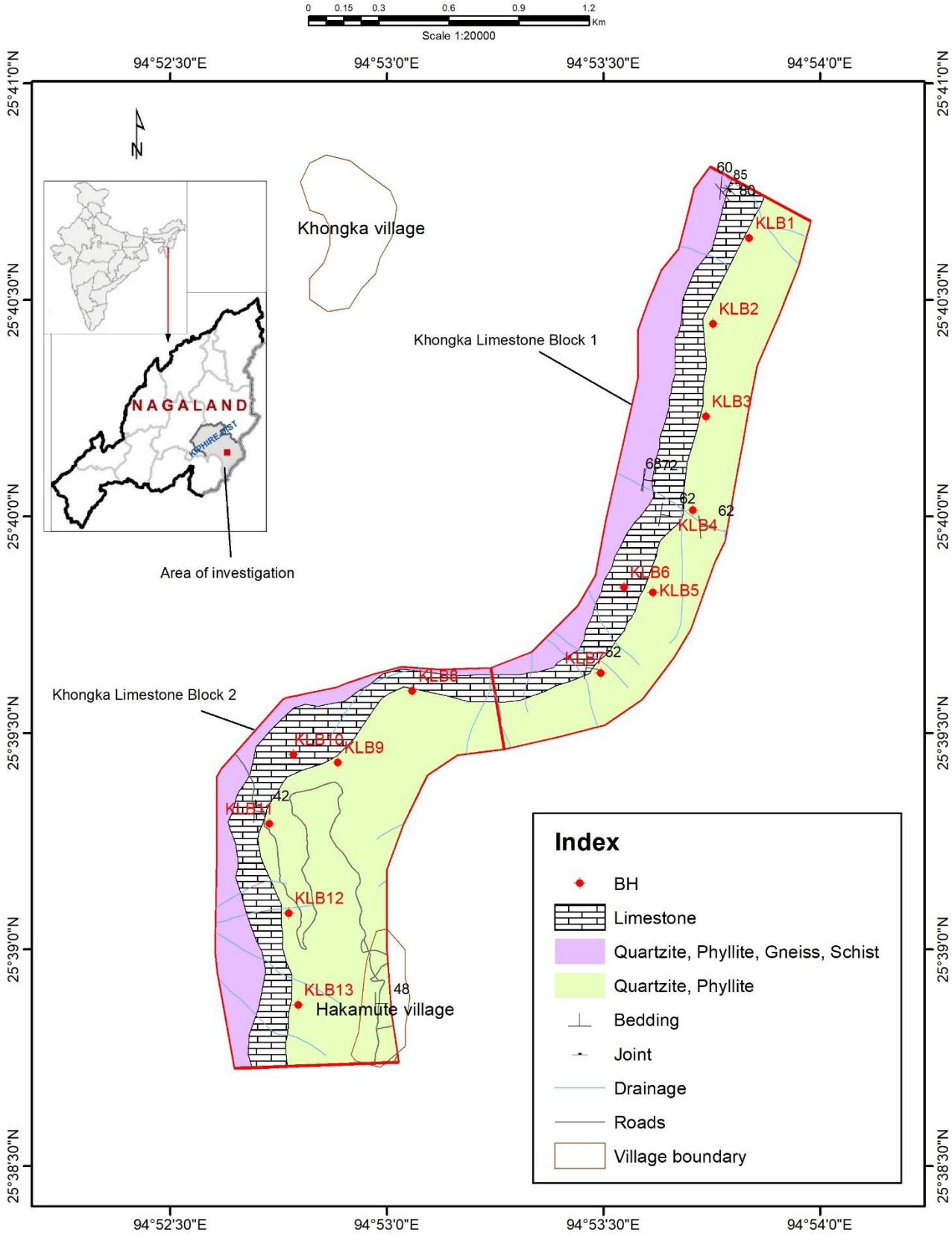
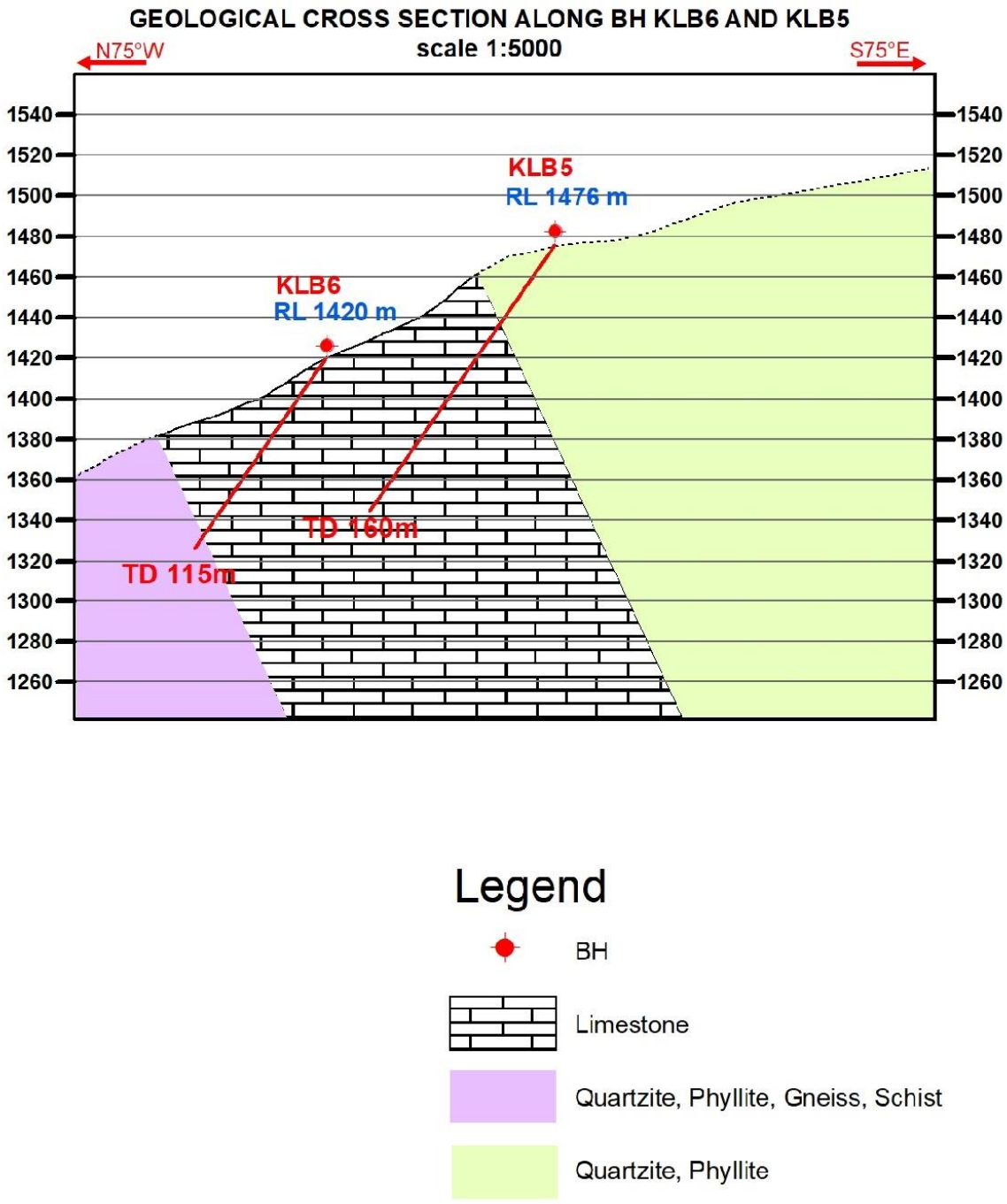
GEOLOGICAL MAP OF KHONGKA LIMESTONE BLOCK 1 AND KHONGKA LIMESTONE BLOCK 2




GEOLOGICAL CROSS SECTION ALONG BH KLB6 AND KLB5
scale 1:5000
N75°W
S75°E
1540
1520
1500
1480
1460
1440
1420
1400
1380
1360
1340
1320
1300
1280
1260
KLB5
RL 1476 m
KLB6
RL 1420 m
TD 160m
TD 115m
Legend
BH
Limestone
Quartzite, Phyllite, Gneiss, Schist
Quartzite, Phyllite