PROPOSAL FOR
EXPLORATION OF LIMESTONE (G-3 LEVEL) IN MIMI KHETI BLOCK A AND MIMI KHETI BLOCK B, 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

PROPOSAL FOR EXPLORATION OF LIMESTONE (G-3 LEVEL) IN
IN
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1.0.0 Introduction

1.1.0 Limestone is a sedimentary rock composed mainly of calcium carbonate ($CaCO_3$) in the form of the mineral calcite. About 10% of sedimentary rocks are limestone. Calcite and dolomite are the two most important constituents of limestone. In limestones, magnesium carbonate are present either as dolomite $CaMg(CO_3)_2$ or magnesite ($MgCO_3$) mixed with calcite. Limestone altered by dynamic or contact metamorphism become coarsely crystalline and are referred to as 'marble' and 'crystalline limestone'.

1.2.0 India has huge resources of limestone distributed over different parts of the country. Limestone constitutes about 30% of sedimentary reserves in India. The limestone is of Archaean to Tertiary and coral reefs of Recent. However, flux grade and cement grade deposits of workable magnitude are found in rocks of Dharwar, Cuddapah Vindhyan and their equivalents and also found in rocks of Eocene, sub recent and recent. Limestone of chemical grade is mostly confined to Tertiary and Recent. Cement grade limestone occurs in all the limestone bearing areas, where as SMS, BF and chemical grade limestone occur in selective areas. The limestone which is used by industries in bulk quantity is of bedded type sedimentary limestone.

1.3.0 The total reserves/resources of limestone of all categories and grades as per NMI database based on UNFC system as on 1.4.2020 has been estimated at 2,27,589 million tonnes, of which 19,028 million tonnes (8%) are placed under Reserves category and 208,560 million tonnes (92%) are under Remaining Resources category.

1.4.0 Nagaland is endowed with substantial deposit of high grade limestone which can be used in various limestone based industries such as Hydrated lime plant, Calcium carbide plant, bleaching powder plant, marble cutting and polishing unit etc.

2.0.0 Objectives

2.1.0 The following points are the main objectives of the proposed exploration programme:

a) to carry out detailed geological mapping and topographical survey on 1:2000 scale on Mimi Kheti Block A and Mimi Kheti Block B with 5m contour interval.

b) to drill

i) 13 inclined boreholes of depth upto 200m over a strike length of about 1400-1600m at Kheti block A.

ii) 9 inclined boreholes of depth upto 200m over a strike length of about 1000-1600m at Kheti block B.

c) to estimate category-wise in-situ geological resources and limestone quality on both the blocks.

3.0.0 Location and Accessibility

3.1.0 The Mimi Kheti block A and Mimi Kheti block B both covering approximately 1.8 sq km each fall under Survey of India Toposheet No.83 K/14. Mimi village is connected to its headquarter i.e Kiphire town via NH 202 and is about 158 km away from it. The nearest railhead and airport is at Dimapur which is about 348 km away from the blocks. The nearest township is Pungro located north west of the block which is also the sub divisional administrative headquarter. The coordinates of the corner points of the two blocks are given in the tables below:

Table 1(A):

1. MIMI KHETI BLOCK A				
Sl. No.	Block corner points	Longitude	Latitude	Total area
1	A	94° 54' 10.206" E	25° 43' 19.072" N	1.8 sq km(approx.)
2	B	94° 54' 48.730" E	25° 43' 51.300" N	
3	C	94° 55' 9.118" E	25° 43' 49.687" N	
4	D	94° 55' 14.243" E	25° 43' 44.522" N	
5	E	94° 55' 36.830" E	25° 43' 35.763" N	
6	F	94° 54' 56.568" E	25° 43' 6.265" N	
7	G	94° 54' 34.268" E	25° 43' 15.176" N	

Table 1(B):

2. MIMI KHETI BLOCK B				
Sl. No.	Block points	Longitude	Latitude	Total area
1	A	94° 54' 10.206" E	25° 43' 19.072" N	1.8 sq. km(approx.)
2	F	94° 54' 56.568" E	25° 43' 6.265" N	
3	G	94° 54' 34.268" E	25° 43' 15.176" N	
4	H	94° 54' 19.399" E	25° 42' 24.301" N	
5	I	94° 54' 1.113" E	25° 42' 37.434" N	
6	J	94° 53' 47.093" E	25° 42' 50.738" N	

4.0.0 Physiography and Drainage

4.1.0 The topography is highly rugged and consists of sub-parallel hill ranges and valleys aligned in a NE-SW direction. The hill range attains altitude towards the east.

4.2.0 Mimi village and the limestone belt is situated on the western slope of the Saramati Range. Turati nala is a major nala dividing Mimi Kheti Block A and Mimi Kheti Block B in its North and South respectively.

5.0.0 Climate

5.1.0 The area experiences cool climate generally with severe winter. The Saramatic Range is covered by thin blanket of snow during December and January. It receives heavy rainfall during monsoon between June & September. The average precipitation is 240cm.

6.0.0 Forests and Vegetation

6.1.0 Generally the area is cultivated in the valley portions. "Jhuming" is the traditional method of cultivation. The forests are cleared and farming made for one to 3 year depending on the fertility of the soil or else, it get shifted to other places.

7.0.0 Back Ground Information

7.1.0 The occurrence of limestone of Mimi - Pyakatsu was brought to limelight only after the geological expedition in 1968-1970 [Agrawal and Iqbal 1970] of State Directorate of Geology and Mining, Government of Nagaland. However, the subsequent preliminary investigation by Shri O.P. Agrawal and K.S. Rao, DGM, Nagaland brought out the vastness of limestone deposit. It occurs up to Lungpotrop in north-east and in Phokhungri village in south-west over a strike length of 20 km. Moreover, the appreciably thick limestone persists from Pyakastu peak [1918m] to Turati nala and termed as "MIMI Limestone Belt".

7.2.0 Subsequent to the approach by Government of Nagaland with Ministry of Coal and Ministry of Mines for the exploration of Mimi Limestone deposit the task force [NIMI] for development Mineral industries in NE states on their 12.11.2003 meeting in New Delhi had recommended the exploration for limestone.

8.0.0 Previous Work

8.1.0 The preliminary investigation carried out in Mimi-Pyakatsu Block of Mimi- Limestone Belt, Kiphire District, Nagaland during the field season of 1972-73 and 1973-74, a total of six limestone bands inner layered with phyllites and quartzites were encountered. It occurs over a distance of 3.1 km with uniform quality. Of the total inferred mineral resources (333) of 111.07 million tonnes in the Mimi-Pyakatsu Block, the main limestone band alone accounts for 66 million tonnes.

8.2.0 The earlier workers have carried out detailed geological mapping on 1:4000 scale covering 4.5 sq.km. A total meterage of 531.50m was drilled in 5 exploratory boreholes in Mimi-Pyakatsu block over strike length of 1.37 km by DGM, Nagaland. The boreholes viz. MMP1 – MMP5 were drilled between April-2011 and June-2013, while sampling and other related works were completed by February-2014. The limestone band occur all along 4.5 km southwest of Turati nala upto Pyakatsu peak and beyond

outcrop samples were collected and analysed which reveals persistence of quality limestone.

8.3.0 After drilling 531.5m in 9 boreholes out of approved 1000m target in 9 boreholes DGM, Nagaland had shown their inability to drill the remaining four boreholes due to limited accessibility and challenging terrain conditions. Subsequently, the matter was discussed in the 27th SCPP meeting held in MOM, New Delhi on 4th September 2013 and decided that the Director (Technical), MECL will visit the exploration block to find out the possibility of continuation of work. The official visited the block and after discussion with the DGM officials, it was decided that surface outcrop samples may be collected from the locations of non-drilled borehole points for logical conclusions.

8.4.0 The range of major constituents of Mimi-Pyakatsu block of Mimi-Limestone belt is as follows:

Table 2:

Range of Major constituents in Mimi-Pyakatsu blocks	**CaO**	**MgO**	**SiO2**	**Al2O3**	**Fe203**	**LOI**
MMP-1	56.17	0.21	0.24	0.21	0.34	42.02
MMP-2	53.63	2.32	0.4	0.32	0.24	40.17
MMP-3	56.27	0.19	0.17	0.2	0.2	42.3
MMP-4	54.41	0.85	0.95	0.41	0.24	42.8
MMP-5	54.36	1.33	0.44	0.4	0.27	42.78

8.5.0 It was recommended that the investigations carried out in this block was on wider grid and the resources have been placed under 332 and 333 category of UNFCand further necessary to explore the block sufficiently with optimum pitting and drilling in order to assess the tremendous limestone potential.

9.0.0 GEOLOGY AND STRUCTURE

9.1.0 **Regional Geology**

9.1.1 Geo-tectonically four distinct domains has been identified in the Naga hills, which are formed between the foreland spur of Shillong and Mikirmassif to the west and central Myanmar basin to the east. The domains are i) Assam shelf ii) Schuppen belt, an outer belt of imbricate anastomising thrusts (Evan and Mathur 1964) iii) Inner Palaeogene fold belt comprising thick folded sequence of Disang and Barail rocks and iv) Ophiolitic complex occurring further east, close to Indo-Myanmar border associated with less Mesozoic Tertiary sediments.

9.1.2 Ophiolite belt has a tectonic contact with Inner Palaeocene fold belt in west and Saramati formation in the east of pre Mesozoic age as the oldest formation in the belt. Mimi formation overlies Saramati formation succeeded by Ophiolite suite and further followed by Salumi formation. Phokphur formation is the youngest group of rocks in the belt.

9.1.3 The Generalized stratigraphic succession of Mimi Limestone belt is given in Table 3 below:

Table 3:

Age	**Formation**	**Member**
Middle Eocene	Phokphur formation	Polymictic conglomerate tuffaceous greywacke, lithic feldspathic arenite (derived mainly from underlying ophiolites)
----------Unconformity ----------		
Palaeocene to Lower Eocene	Salumi formation	Shale and Siltstone with interbands of radiolarian chert.
Cretaceous to Lower Eocene	Ophiolite series	Dismembered tectonic slices of serpenites, cumulates and volcanics associated with cherts and limestones.
---------- Tectonic contact ----------		
Lower Eocene to Up. Cretaceous	Mimi formation	Quartz sericite chlorite schist, phyllite, feldspathic quartzite, limestone.
---------- Tectonic contact ----------		
Pre Mesozoic	Saramati formation (Naga metamorphites)	Quartz muscovite biotite schist, quartz schist, carbonaceous phyllite, quartzite , sheared granites.

10.0.0 Regional Structure

10.1.0 All the rock formation show N – S to NE – SW trend and are folded and faulted. The tectonic intermixing of the rock types in the ophiolite complex is very common.

10.2.0 The rocks have undergone multiple phases of deformation and metamorphism. Three phases of deformation are reported (Chattopadhya and Roy 1975). The first folds are isoclinals with trend of North-South to NNE-SSW with plunge in either direction. The plunge reversal is due to superimposition of later folds. 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; the plunge being moderately high. Chevron and Crenulation cleavages in phyllites and other schistose rocks are observed.

10.3.0 The rock units are dissected by a number of dislocation systems represented by thrusts, high angle reverse faults, gravity faults and wrench faults. They are broadly discernible into NE-SW trends and WNW-ESE trend.

11.0.0 Metamorphism

11.1.0 The rocks have undergone low grade regional metamorphism, mostly of green schist facies. The high pressure, low temperature, metamorphism of blue schist facies is present in ophiolite suite. Rocks of amphibolite facies are also noticed in ophiolite.

11.2.0 The ophiolite complex along with the characteristic lithologic, metamorphic, tectonic and geophysical characters suggests under thrust of Indian plates below the Myanmar blocks in Cenozoic times before the continental collision.

12.0.0 Geology of the study area

12.1.0 The area constitutes of two blocks, namely MIMI Kheti block A in the northeast and Mimi Kheti Block B in the southwest covering over an area of about 1.8 sq.km. in each block. The lithounits exposed in the area are represented by quartzite, phyllite, limestone. The thickness of the soil intersected in boreholes varies is between 0.88 to 7.45 m, the soil is rich in calcareous matter.

12.2.0 The area consists of thick limestone bands associated with feldspathic quartzites. It occurs as a belt of continuous to discontinuous bands with the general trend of NE-SW with moderate steep dip of 60-80^{o} towards northwest. The limestone is whitish/ light grey in colour and fine grained. The limestone is fine grained, grey, whitish in colour with occasionally pyrite cubes. The phyllites is generally greenish grey to silvery while in colour and well foliated.

12.3.0 Mimi formation has been thrust over the ophiolite belt along the steeply inclined fault plane in the east. The litho-units show a general trend of NE-SW with moderate steep dip of 60° to 70° towards North West. The foliations and bedding are parallel owing to tight folds. The Mimi-Pyakatsu Block is found to have limestone formations persistent both along the dip and strike directions within the block.

13.0.0 Proposed scheme of exploration

13.1.0 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

13.2.0 **Core drilling**

13.2.1 13 nos of inclined boreholes involving total meterage of 1660 m of depth varying from 70m upto 200m over a strike length of 1400-1600m at Kheti block A. The average depth of borehole is targeted at 128m.

The tentative drilling scheme for exploration of limestone in Mimi Kheti Block A is as given below:

Table 4(a):

Sl. No.	Borehole No.	Tentative depth target(m)	Coordinates		Altitude(m)
			Longitude	Latitude	
1	KLB 1	120	94° 55' 19.327" E	25° 43' 43.980" N	1420
2	KLB 2	90	94° 55' 22.263" E	25° 43' 40.734" N	1490
3	KLB 3	140	94° 55' 5.675" E	25° 43' 44.606" N	1231
4	KLB 4	130	94° 55' 11.309" E	25° 43' 38.379" N	1425
5	KLB 5	120	94° 55' 14.056" E	25° 43' 35.344" N	1490

6	KLB 6	180	94° 54' 55.163" E	25° 43' 35.377" N	1214
7	KLB 7	200	94° 55' 2.405" E	25° 43' 27.442" N	1413
8	KLB 8	200	94° 54' 42.950" E	25° 43' 28.819" N	1094
9	KLB 9	120	94° 54' 47.900" E	25° 43' 23.348" N	1174
10	KLB 10	100	94° 54' 51.692" E	25° 43' 19.140" N	1032
11	KLB 11	100	94° 54' 31.391" E	25° 43' 21.830" N	919
12	KLB 12	70	94° 54' 36.571" E	25° 43' 16.136" N	877
13	KLB 13	90	94° 54' 33.783" E	25° 43' 19.189" N	927

13.2.2 9 nos of inclined boreholes involving total meterage of 1170 m at of depth varying from 80m upto 200m over a strike length of 1080-1600m at Kheti block B. The average depth of borehole is targeted at 130m.

The tentative drilling scheme for exploration of limestone in Mimi Kheti Block B is as given below:

Table 4(b):

Sl. No.	Borehole No.	Tentative depth target(m)	Coordinates		Altitude(m)
			Longitude	Latitude	
1	MLB 1	160	94° 54' 21.031" E	25° 43' 14.949" N	772
2	MLB 2	90	94° 54' 32.229" E	25° 43' 7.352" N	1063
3	MLB 3	200	94° 54' 13.869" E	25° 43' 4.679" N	964
4	MLB 4	200	94° 54' 23.816" E	25° 42' 57.903" N	1223
5	MLB 5	130	94° 54' 6.975" E	25° 42' 54.207" N	1142
6	MLB 6	130	94° 54' 15.068" E	25° 42' 48.691" N	1340
7	MLB 7	80	94° 53' 59.639" E	25° 42' 44.000" N	1180
8	MLB 8	80	94° 54' 3.297" E	25° 42' 41.499" N	1305
9	MLB 9	100	94° 54' 26.203" E	25° 43' 11.450" N	946

14.0.0 Core Logging

10.3.1 Drill cores will be logged systematically to demarcate various litho units, their physical characteristics and structural details such as fractures, joints etc. Logging for Rock Quality Determination will also be carried out.

15.0.0 Core Sampling

10.4.1 Primary core sampling will be done based on detailed core logging. Limestone horizon will be delineated and sample length maintained as 2.0 m. However the sample length may be suitably adjusted on the physical characteristics of the horizon. The drilled cores will be sampled based on variation in physical characteristics.

16.0.0 Check Sampling

16.1.0 About 5% of total primary sample in each block will be subjected to check analysis to confirm the reliability of the chemical analysis.

17.0.0 Composite Sampling

17.1.0 Composite samples will be prepared from borehole primary samples from both the limestone blocks to have the representative zone of 6m-10m. This is to confirm the reproducibility of primary analysis and also distribution of other radicals and deleterious elements present if any.

18.0.0 Outcrop sampling

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

19.0.0 Chemical Analysis

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

19.2.1 5% of total primary samples in both the blocks will be subjected to check analysis for major oxides.

19.2.2 10 nos. of composite samples from each block will be subjected to spectroscopic studies.

20.0.0 Petrological and Mineralogical studies

20.1.0 Petrological and mineralogical studies will be carried out for 25 nos of borehole samples and surface outcrop samples for both Mimi Kheti Block A and B each.

21.0.0 Specific gravity determination

21.1.0 5 nos of composite samples and 5 nos of outcrop samples from each block will be subjected to specific gravity determination.

22.0.0 Quantum of work proposed

22.1.0 The details of quantum of proposed work is given below

Table 5: Proposed Quantum of work in Mimi Kheti Block A and Mimi Kheti B limestone Blocks, Kiphire district, Nagaland

Sl. No	Item of work	Unit	Quantum of work	
			Mimi kheti block A	**Mimi Kheti block B**
1	Exploration Drilling	m	1660 (13Bhs)	1170 (9 BH)
2	Geological mapping (1:2000 scale) and sampling, Core Logging	m	1.8 sq km	1.8 sq Km
	Topographical Survey (5m contour intervals)			
3	Laboratory studies			
	A. Chemical studies			
	i) Primary samples (major oxides)	Nos	554	390
	ii) Check samples (major oxides)		28	20
	iii) Composite samples (major oxides)		10	10
	iv) Composite samples (major oxides)		277	195
	v) Outcrop samples-Primary (major oxides)		15	15
	B. Physical studies			
	i) Spectroscopic studies on composite samples	Nos	10	10
	ii) Petrological studies (surface & BH core samples)	Nos	10	10
	iii) Specific gravity determination	Nos	10	10
6	Report preparation {As per Mineral (Evidence of Mineral Contents) Rule - 2015}	Nos	1	

23.0.0 TIME SCHEDULE & COST ESTIMATE

23.1.0 Time schedule

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

Table 6(a): Time schedule in years for exploration of limestone (G3 level) in Mimi Kheti Block A, 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(b): Time schedule in years for exploration of limestone (G3 level) in Mimi Kheti Block B, 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													

24.0.0 Cost estimate

The total project cost with provisional escalation is estimated to be **Rs. 1890/- Lakhs** i.e. **Rs 1070 lakhs** Mimi Kheti Block A and Rs. **820 Lakhs for** Mimi Kheti Block B. The details of item wise cost estimate has been taken and given below

Table 7: Item wise cost estimate for exploration of limestone (G3 level) in Mimi Kheti Block A and B, Kiphire district, Nagaland

Sl.No	Item	Total estimated cost Total estimated cost	
		Mimi Kheti Block A (Rs.)	**Mimi Kheti Block B (Rs.)**
A	i. Geological mapping, sampling and topographical survey work	10235925	9622808
B	ii. Exploratory core drilling and preservation	71326565.2	51864405.2
C	iii. Headquarter work and Laboratory studies	4602700	3535900
D	iv. Operational charges for outsourced component, Geological report and other miscellaneous charges	4520000	4470693.396
Sub –Total A+B+C+D		**90685190.2**	**69493806.6**
E	**GST@18%*** **	**16323334.24**	**12508885.19**
	Total A+B+C+D+E	**107008524.4**	**82002691.78**
		SAY Rs. 1070/- Lacs	**SAY Rs. 820/- Lacs**

25.0.0 JUSTIFICATION

i) The proposed regional exploration programme when completed will provide valuable information on the limestone resource, its grade and its potential for commercial utilization.

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 exploration work when complete will pave way for more investments opportunities thereby improving the socio-economic conditions of the people.

26.0.0 COST ESTIMATE

Table 8(a):

Cost estimate for G-3 Level of exploration for Limestone in Mimi Kheti Block A, Kiphire district, Nagaland (Total Area=1.8 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	120	1320000	

	iii) Labour charges for geological 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**
					Sub-total A1	**1446240**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region Sub-total A2					**4844904**	
B	**TOPOGRAPHICAL SURVEY WORK**						
	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	20	384000	
					Sub-Total B1	**1008240**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region Sub-total B2					**3377604**	
C	**DRILLING**						
	i) Core drilling	2.2.1.3a	per m	10100	1660	16766000	
	ii)Transportation of drill rig and truck associated per drill to and from headquarter and previous drill site	2.2.8	per km	36	1392	50112	**Distance being 348 km each trip and Considering transportation of 2 drill rigs to and from Dimapur to drill site**
	iii)Accommodation	2.2.9	monthly	50000	8	400000	
	iv) Camp setting	2.2.9a	per drill	250000	2	500000	
	v)Camp Winding	2.2.9b	per drill	250000	2	500000	
	v)Road making (Hilly terrain)	2.2.10b	per km	32200	5	161000	
	vi) Borehole plugging by cement	2.2.7b	per m	150	1660	249000	**NQ size: Rs. 150/m, HQ size: Rs. 200/m**
	vii) Construction of concrete pillar (12"x12"x30")	2.2.7a	per BH	2000	13	26000	

	viii) Core preservation Charges in GI Sheets Core Boxes	5.3	per m	1590	1660	2639400	**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					**21291512**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region Sub-Total C2					**71326565.2**	
D	**SAMPLE WORK**						
	i) Charges for one sampler per day without labour	1.5.2	per day	5100	90	459000	
	ii) Labour charges for sampling	5.7	per day	526	270	142020	**Amount will be reimbursed as per the notified rates by the Central Labour Commission or respective State Govt., whichever is higher**
	Sub-Total D1					**601020**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region Sub-Total D2					**2013417**	
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)**					**81562490.2**	

F	**HEADQUARTER WORK**						
	i) Charges for one geologist per day at Headquarters.	1.3 & 1.5.1a	per day	9000	90	810000	
					Sub-Total F	**810000**	
G	**LABORATORY STUDIES**						
	Chemical analysis						
	i) Primary samples (major oxides)	4.1.15a	per sample	4200	554	2326800	
	ii) Check samples (major oxides)	4.1.15a	per sample	4200	28	117600	
	iii) Composite samples (major oxides)	4.1.15a	per sample	4200	277	1163400	
	v) 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	**3792700**	

H	**Total cost of outsourced component Sub Total H (Sub-Total E+F+G)**					**86165190.2**	**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)	**90685190.2**	
	Provision for GST @18%	**16323334.24**	**GST will be reimbursed as per actual and as per applicable and as per notified rate**
	Total estimated cost of the project with GST	**107008524.4**	
	Or say Rs. In Lakhs	**1070 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.**		

Cost estimate for G-3 Level of exploration for Limestone in Mimi Kheti Block B, Kiphire district, Nagaland (Total Area=1.8 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**
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	120	1320000	
	iii) Labour charges for geological 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**
					Sub-total A1	**1446240**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region Sub-total A2					**4844904**	
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	15	288000	
					Sub-Total B1	**912240**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region Sub-total B2					**3056004**	
C	**DRILLING**						
	i) Core drilling	2.2.1.3a	per m	10100	1170	11817000	
	ii)Transportation of drill rig and truck associated per drill to and from headquarter and previous drill site	2.2.8	per km	36	1392	50112	**Distance being 348 km each trip and Considering transportation of 2 drill rigs to and from Dimapur to drill site**
	iii)Accommodation	2.2.9	monthly	50000	8	400000	
	iv) Camp setting	2.2.9a	per drill	250000	2	500000	
	v)Camp Winding	2.2.9b	per drill	250000	2	500000	

	v)Road making (Hilly terrain)	2.2.10b	per km	32200	5	161000	
	vi) Borehole plugging by cement	2.2.7b	per m	150	1170	175500	**NQ size: Rs. 150/m, HQ size: Rs. 200/m**
	vii) Construction of concrete pillar (12"x12"x30")	2.2.7a	per BH	2000	9	18000	
	viii)Core preservation Charges in GI Sheets Core Boxes	5.3	per m	1590	1170	1860300	**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	**15481912**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region Sub-Total C2					**51864405**	
D	**SAMPLE WORK**						
	i) Charges for one sampler per day without labour	1.5.2	per day	5100	75	382500	
	ii) Labour charges for sampling	5.7	per day	526	250	131500	**Amount will be reimbursed as per the notified rates by the Central Labour Commission or respective State Govt., whichever is higher**
					Sub-Total D1	**514000**	
	3.35 times the normal SoC rate for exploration work in NE and Himalaya region Sub-Total D2					**1721900**	

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)**					**61487213**	
F	**HEADQUARTER WORK**						
	i) Charges for one geologist per day at Headquarters.	1.3 & 1.5.1a	per day	9000	90	810000	
					Sub-Total F	**810000**	
G	**LABORATORY STUDIES**						
	Chemical analysis						
	i) Primary samples (major oxides)	4.1.15a	per sample	4200	390	1638000	
	ii) Check samples (major oxides)	4.1.15a	per sample	4200	20	84000	
	iii) Composite samples (major oxides)	4.1.15a	per sample	4200	195	819000	
	v) 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	**2725900**	
H	**Total cost of outsourced component Sub Total H (Sub-Total E+F+G)**					**65023113**	**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	**1950693.4**	**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	**4470693.4**	
	Total estimated cost of the project without GST (Sub-Total H+I)					**69493807**	
					Provision for GST @18%	**12508885**	**GST will be reimbursed as per actual and as per applicable and as per notified rate**
	Total estimated cost of the project with GST					**82002692**	
					Or say Rs. In Lakhs	**820 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.**

PLATE I

Government of Nagaland
Directorate of Geology and Mining
Dimapur : Nagaland

GEOLOGICAL MAP OF NAGA HILL OPHIOLITE SHOWING STUDY AREA FOR EXPLORATION OF LIMESTONE(G3 STAGE) IN MIMI KHETI BLOCK A AND MIMI KHETI BLOCK B

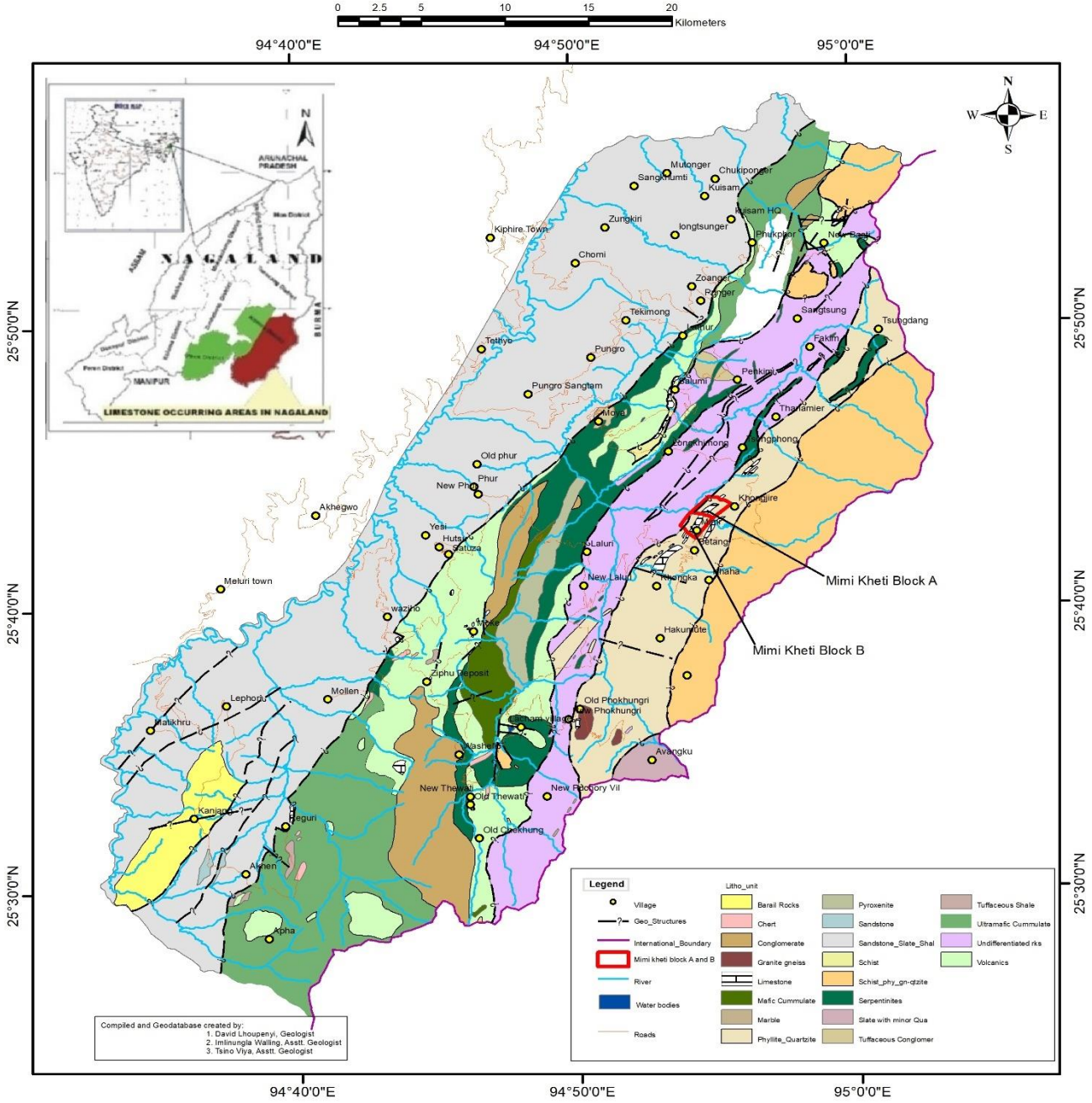


PLATE II

Geological map showing proposed area for Exploration of limestone (G-3 level) in Mimi Kheti Block and Mimi Kheti block B, Kiphire District, Nagaland

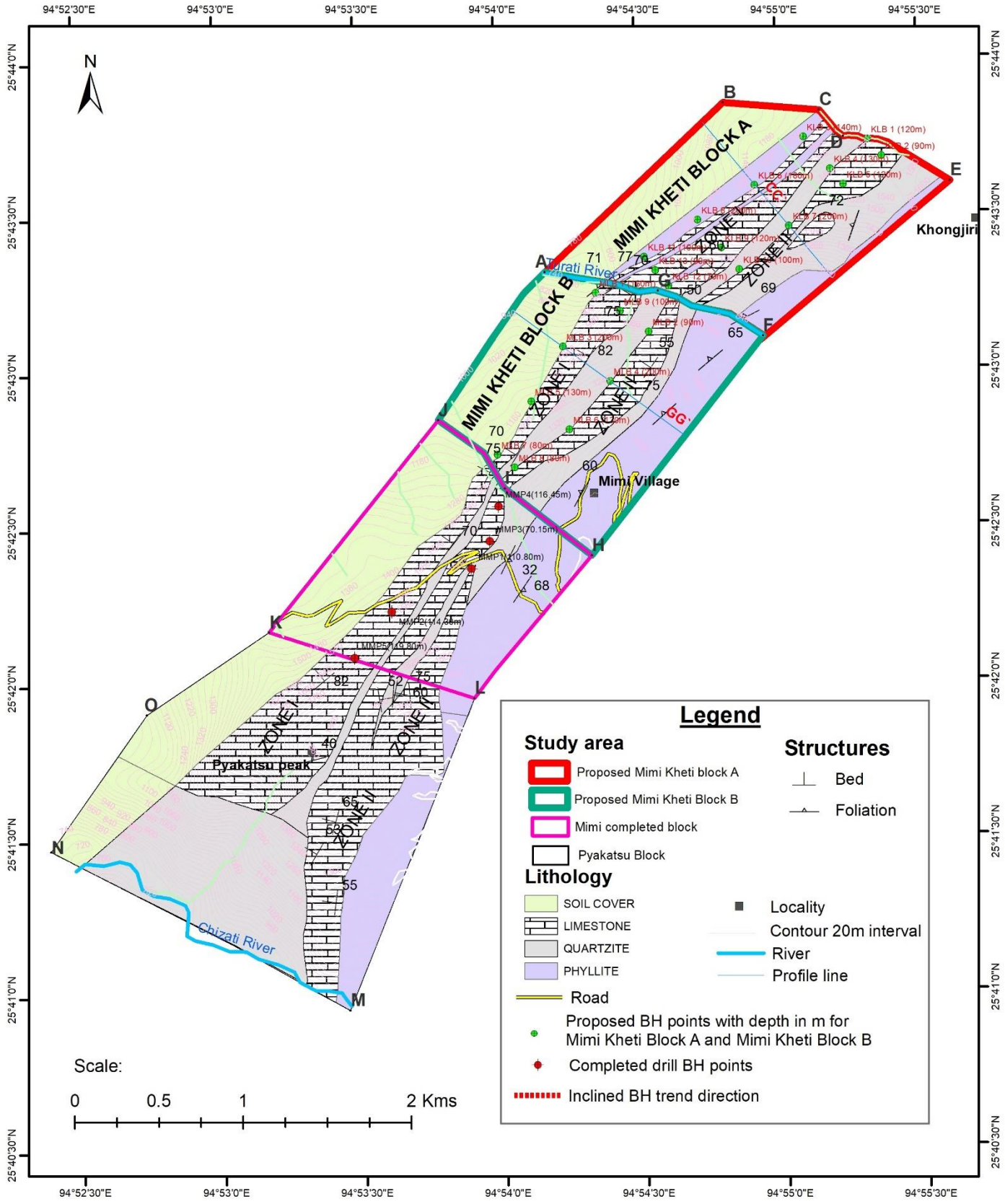
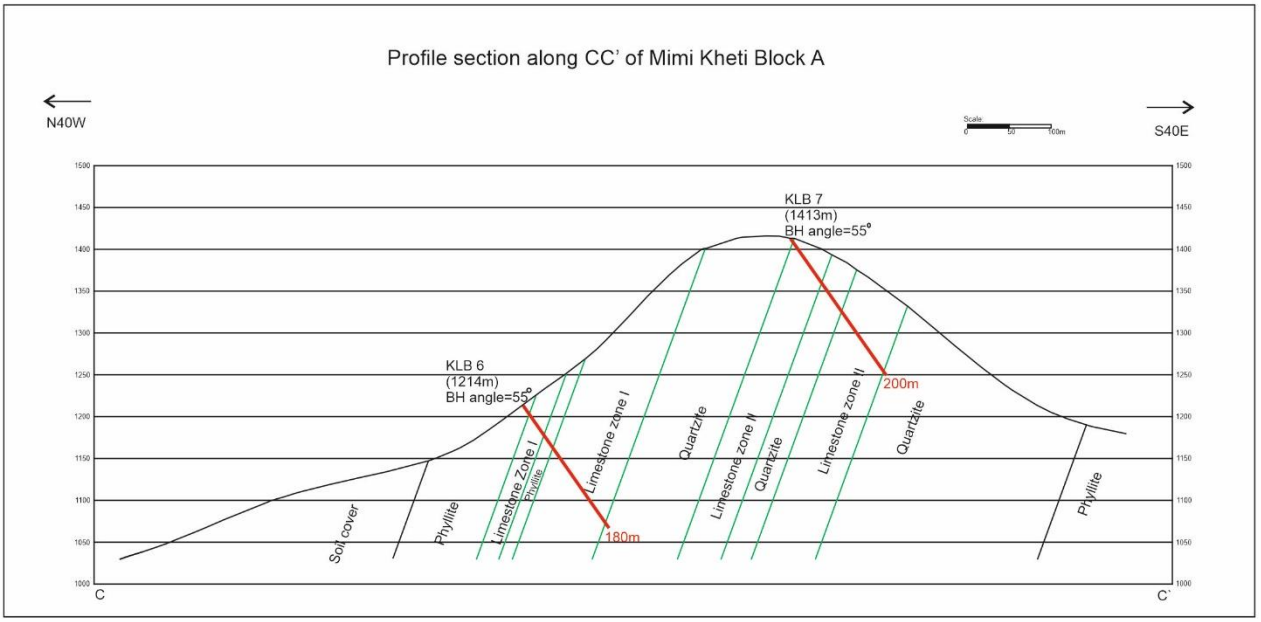
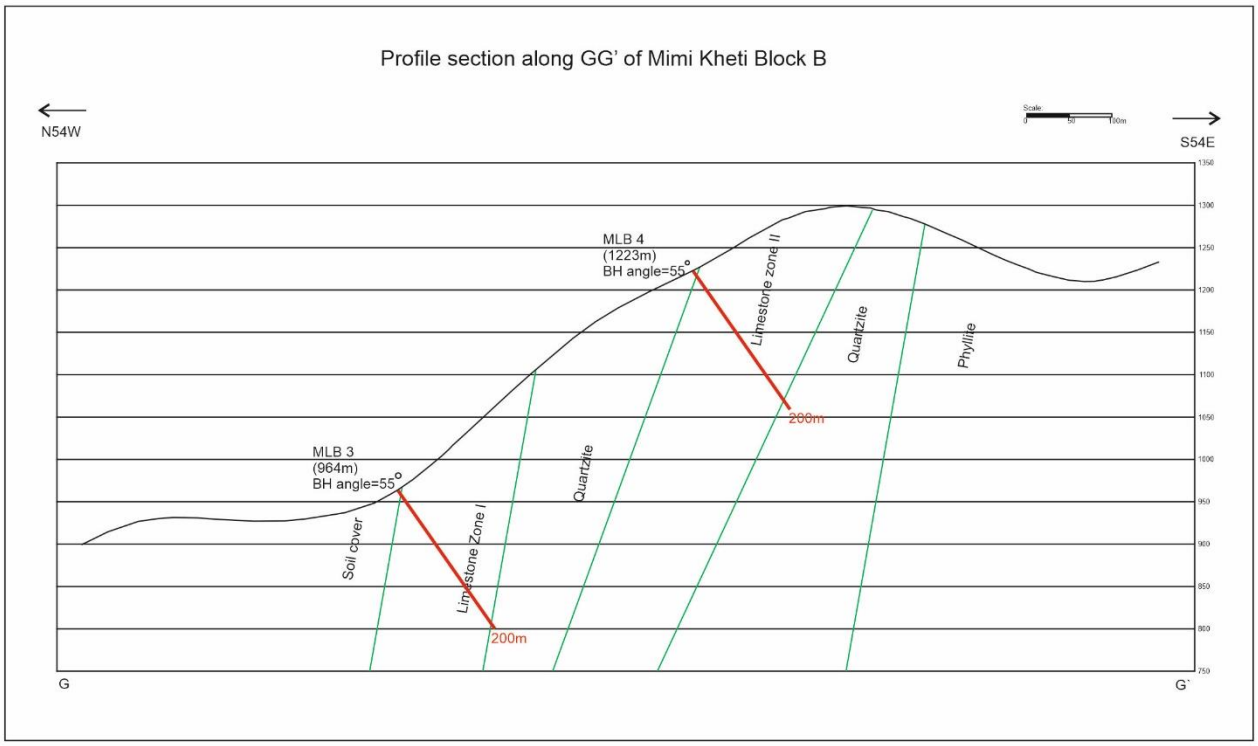


PLATE III


Profile section along CC' of Mimi Kheti Block A
N40W
S40E
KLB 7
(1413m)
BH angle=55°
KLB 6
(1214m)
BH angle=55°
200m
180m
Soil cover
Phyllite
Limestone Zone I
Limestone zone I
Quartzite
Limestone zone II
Quartzite
Limestone zone II
Quartzite
Phyllite
C
C`


Profile section along GG' of Mimi Kheti Block B
N54W
S54E
MLB 4
(1223m)
BH angle=55°
MLB 3
(964m)
BH angle=55°
200m
200m
Soil cover
Limestone Zone I
Quartzite
Limestone zone II
Quartzite
Phyllite
G
G`