Proposal for

Reconnaissance survey (G4) for Basemetal in Chupra-Khet, Kuta area, Pithoragarh District, Uttarakhand

(Cu-Pb-Zn-Au-Ag)

By

Geovale Services Private Limited

Place: Kolkata

Date: 11th February 2025

Contents

Summary of the Block for Reconnaissance Survey

(G4 Stage)

GENERAL INFORMATION ABOUT THE BLOCK

	Features	Details
	Block ID	GSPL/NMET/UP/2023/BLOCK-A
	Exploration Agency	Geovale Services Private Limited
	Commodity	Cu, Mo, Zn, Au
	Mineral Belt	Askot Crystallines of the Inner Lesser Himalaya
	Completion Period with entire Time schedule to complete the project	14 months
	Objectives	i. To locate basemetal mineralization in association with the Askot VMS system. ii. To closely study few reported suspect gossan areas to understand their origin and possible relation with mineral deposits.
	Whether the work will be carried out by the proposed agency or through outsourcing and details thereof. Components to be outsourced and name of the outsource agency	Primarily M/s. Geovale Services would carry out the work. However, the Geovale Services would outsource some specialized works.
	Name/ Number of Geoscientists	
	Expected Field days	Total field man-days (Geologist): approximately 250 man-days

	(Geology) Geological Party Days	Geological Party Days: Approximately 4 months
1.	**Location**	
	Latitude (N)	29.768698° to 29.896190°
	Longitude (E)	80.139901° to 80.349393°
	Localities	Chupra Khet, Nainthal, Rani Khet, Kuta (Plate 3)
	Tehsil/ Taluk	Didihat, Munsiari and Dharchula
	District	Pithoragarh
	State	Uttarakhand
2.	**Area (hectares/ square kilometers)**	
	Block Area	66 square kilometers
	Forest Area	
	Government Land Area	Not known
	Private Land Area	Not known
3.	**Accessibility**	
	Nearest Rail Head	Tanakpur, Haldwani, Kathgodam
	Road	NH-9
	Airport	Nani Sani Airport, Pithoragarh
4.	**Hydrography**	
	Local Surface Drainage Pattern (Channels)	Radial dendritic pattern
	Rivers/ Streams	Gori Ganga, Ram Ganga, Sarayu River
5.	**Climate**	

	Mean Annual Rainfall	360 cm (140 in)
	Temperatures	Minimum (December): 3-4 ºC / 37.4-39.2 ºF Maximum (June): 30-35ºC / 86-95 ºF
6.	**Topography**	Rugged topography
	Topo sheet Number	62C/1 and 62C/5
	Morphology of the Area	The area forms a part of the Inner Lesser Himalayas, which is usually very rugged.
7.	**Availability of baseline geoscience data**	Baseline data available from Bhukosh (GSI)
	Geological Map (1:50K/ 25K)	1:50000 scale geological map available (Bhukosh, GSI)
	Geochemical Map	NGCM data available (NGCM, GSI)
	Geophysical Map (Aeromagnetic, ground geophysical, Regional/ local scale GP maps)	Not Available in GSI Portal
8.	**Justification for taking up reconnaissance survey / Regional Exploration**	i. **Pb & Zn prospect:** i. Govil et al. 2018, reported galena (PbS) and sphalerite (ZnS) from Pithoragarh limestone from the samples collected from the Kuta village (44% Zn and 70% Pb) (Fig.1) i. Geovale's has already analyzed a few samples from the nearby area and got about 10% Zn from this Kuta limestone (Fig.1). . Polymetal (W and V) prospect in carbonaceous phyllite: . Geovale has observed carbonaceous shale/phyllite associated with the limestone of this proposed block and analyzed a few samples. Highest value of W is 277 ppm and V is 275 ppm (marked in Fig.1) i. Another gossan sample developed over carb shale Pb is 161ppm, V 283, W 129 ppm, Zn 319 ppm 106316 i. 106344 black shale V 216 ppm, i. 106306 limestone Zr 148ppm, V 181 ppm, Ba 5000 ppm

		t. Similar carbonaceous shale within the carbonates of Pithoragarh Formation in Askot project area is found to be rich in vanadium, Cu and other basemetals,ppm tungsten (284 pmm, 106309), molybdenum (max. 22ppm, 106307), As (max. 596 ppm, 106342), Cu (543 ppm, 106342), Pb (119 ppm, 106307), therefore, we can expect these precious metals from this project area as well. t. Geovale has noted one large tract containing mega sized boulders of granite within this proposed block, thus, this could be related with some unmapped outcrops of granite (intrusive body or the basement). i. The Askot VMS deposit has undergone two high-grade metamorphic events following mineralization. It is likely that these high grades metamorphisms have mobilized low-melting-temperature chalcophile elements (LMCE), such as zinc,lead, gold, molybdenum etc and might have dumped them limestone.

DETAILED DESCRIPTION OF THE BLOCK

I. Block Summary

Physiography

The area forms a part of the Inner Lesser Himalaya, which usually represents rugged topography (Plate 2). The highest elevation being 2,200 m Harchandpur Deo peak, in the western part of the block. The lowest elevation being the Ramganga riverbed having elevation of 700 m. The Ramganga River, which is a tributary to the Sarju River, flows in a north-south direction in the eastern part of the block. The river starts on the southern slopes of the Nandakot massif and is fed by the glaciers on that slope.

Background Geology (Regional Geology, Geology of the Block)

Regional geology:

The target area is a part of the Askot Crystallines in the Inner Lesser Himalayas of Kumaon province of Uttarakhand (Fig.1). The rock types present in the blocked area belong to three litho-stratigraphic units. These are: (i) the Askot Crystalline Complex (ACC), exposed in the southern part of the block. Granite gneiss, amphibolite and metapelites make up the Askot Crystalline Complex. Granite gneiss is the most dominant rock type of the ACC. The ACC is exposed as elliptical E-W trending outcrop with ~30 km long dimension and 10-12km short dimension. Margins of the granite gneiss of the ACC is represented by thin lithounits of mica schist, chlorite

schists. The ACC is variously interpreted as an allochthonous or para-autochthonous thrust sheet structurally overlying the Garhwal Group of rocks.

The Garhwal Group of rocks surrounds the ACC. Two lithostratigraphic units represent it: viz., the lower being the Berinag Formation and the upper unit of limestone dominated Pithoragarh Formation. The Berinag Formation represents an alternation of low-grade metapelites, quartzites and metabasalts.

Structurally, the Askot Crystallines Complex is an open doubly plunging synform. ACC rocks are well foliated, while the rocks of the Garhwal Group are weakly foliated.

Geochronologically, the tuffaceous rock units of the Berinag Formation of the Garhwal Group and the granite gneiss of the ACC have yielded similar U-Pb zircon ages of ~1.86 Ga (Mondal et al., 2016), even though intrusive relations of the granite gneiss in the quartzites near the contact zones with the Berinag Formation exists. There is no radiometric date available for the limestone dominated Pithoragarh Group. However, the Pithoragarh Group is considered to be of Mesoproterozoic age, even though inter-layering between the quartzites of the Berinag Formation and the limestones of the Pithoragarh Group is present near the contact zones.

Stratigraphy of the lithounitrs of this area is as below

Garhwal Group	Pithoragarh Formation	Limestone, dolomite, shale
	Berinag Formation	Alternating sequence of quartzite, basic and acid volcanics and tuffaceous rock
Askot Crystalline Complex	Granite gneiss, leucogranite, amphibolite, chlorite schist, quartzite, garnetiferous mica schist,	

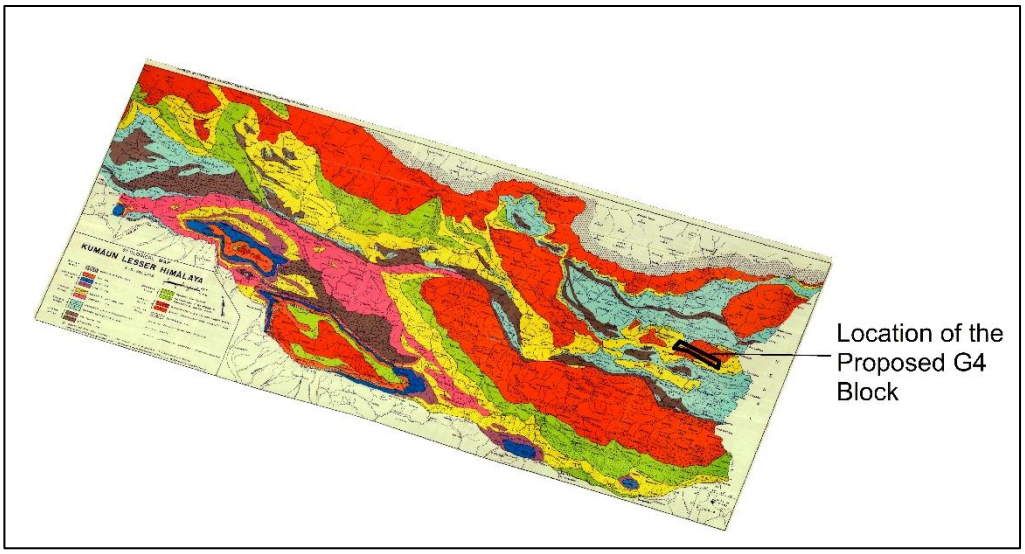

Figure 1 Location of the Chupra Khet- Kuta Base Metal Prospect Block in the geological map by Valdiya (1980)

Geology of the Block area:

The proposed block covers part of the northern part of the Askot Crystalline Complex (ACC) as well part of the Garhwal Group (Fig 2). ACC in the area is represented by granite gneiss with augen gneiss being the most common variety. Compositionally, biotite granite gneiss is the most dominant phase followed by leucogneiss. Amphibolite, garnet-bearing pelitic schists and quartzites are common in the ACC. Thin slivers of garnetiferous mica schists, tremolite-actinolite schist and chlorite schists mark the contact zone of the ACC with the rocks of the Garhwal Group. At places, these schistose rocks bear evidences of secondary potassic alteration in the form of development of secondary biotite. These rocks generally strike from the northwest to the southeast and dip southward.

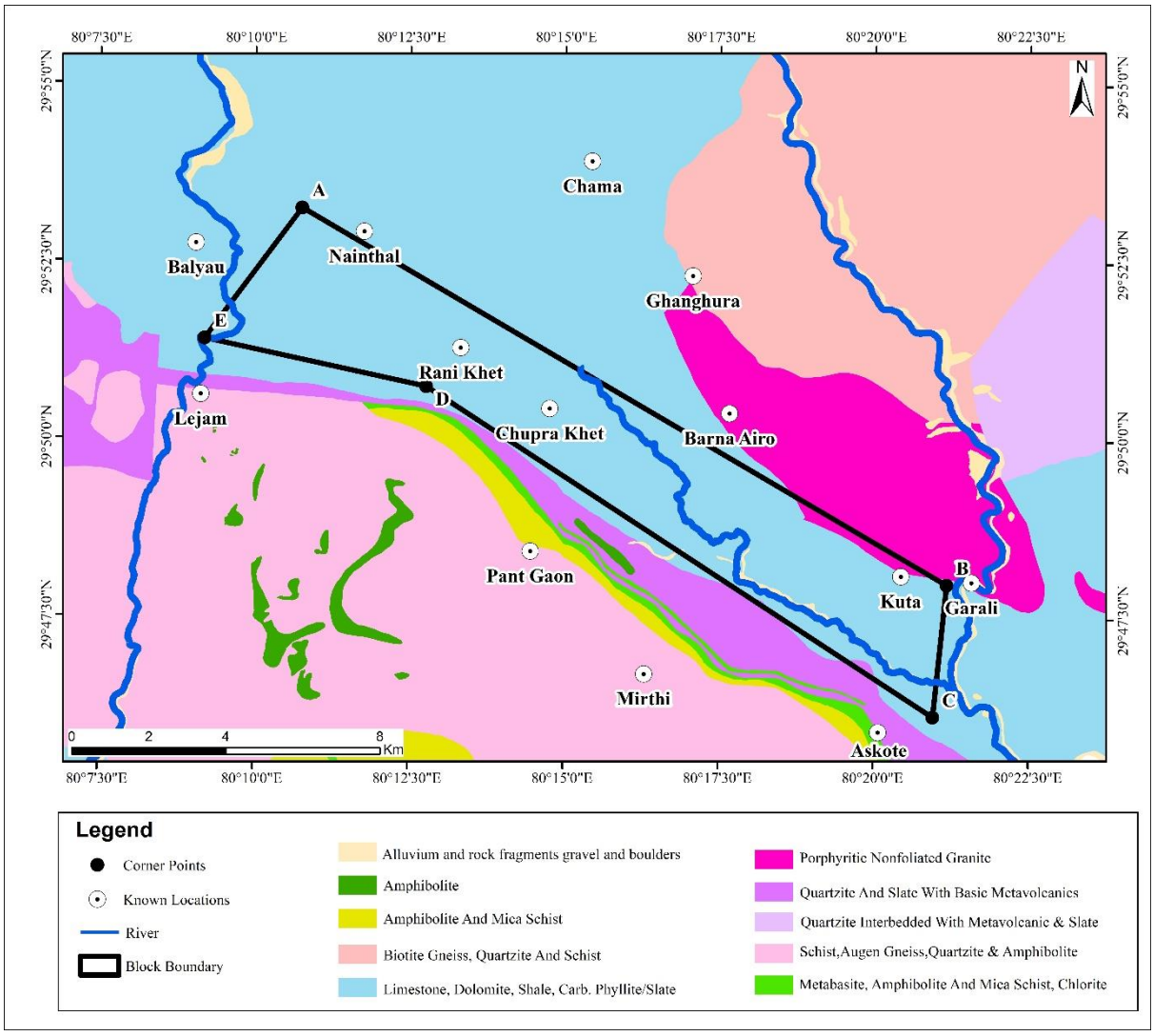

Figure 2 Geological map of Askot Base Metal Prospect Block (Source: Bhukosk)

Mineral potentiality of the block based on geology and ground geochemistry:

1. The polymetallic deposit in the Askot area is regarded as a volcanogenic massive sulphide (VMS) deposit (GSI Miscellaneous Publication No-30, Part-XIII A; 2019). Lenticular shapes, polymetallic massive sulphide ore bodies that are sub-concordant to volcano-sedimentary litho package supports a VMS origin. If the polymetallic deposit is of VMS type, additional deposits may be present in the nearby area as VSM deposits usually occurs in clusters and such clusters are spatially separated by some regular distance depending on presence of discharge zones and recharge zones.
2. Surficial expression of mineralization is nearly absent in the block area. Even in the Askot area where proven polymetallic deposit exists, there is almost no surficial expression. A very small gossan exposure in the Askot area led to the discovery of the Askot deposit in the 1970s. Limited geophysical data (ground magnetic and electrical surveys) that are available through GSI's reports are also not very explicit.
3. In recent times, GSI officers noticed two more suspect gossan areas in the area (T. Saha & S. Manna; GSI FS: 2020-2021). (Fig. 2). One of these suspect gossan was pursued by the GSI with limited geochemical analyses from the area. However, such results were not explicit for presence of base-metal anomaly. A third suspect gossan area is mentioned by Govil et al. (Fig.2) who has zeroed in the suspect gossan through remote sensing studies on alteration mineralogy interpretation.
4. According to a press release from the parent company of ADI Mining Limited, an anomalous geophysical and geochemical signature is said to extend for more than 3 km along the northern limb of the Askot syncline and they conduct expletory mining in this region. As a result, the ore body may have a longer strike length than indicated by the MECL.

7. NGCM data is also showing anomaly of Bi, AS, Sb, Pb, Zn (Fig 3)

GSI's NGCM mapping in this area:

The proposed block area is covered by GSI's NGCM (National Geochemical Mapping) survey. In this area the geochemical data shows the high values for As (upto 29 ppm), Bi (upto 1 ppm), Sb (upto 2.2 ppm), Au (upto 10 ppb), Pb (upto 91 ppm), Zn (upto 91 ppm). Higher value of Arsenic and Bismuth is present in the central part of the proposed block (Fig.3).

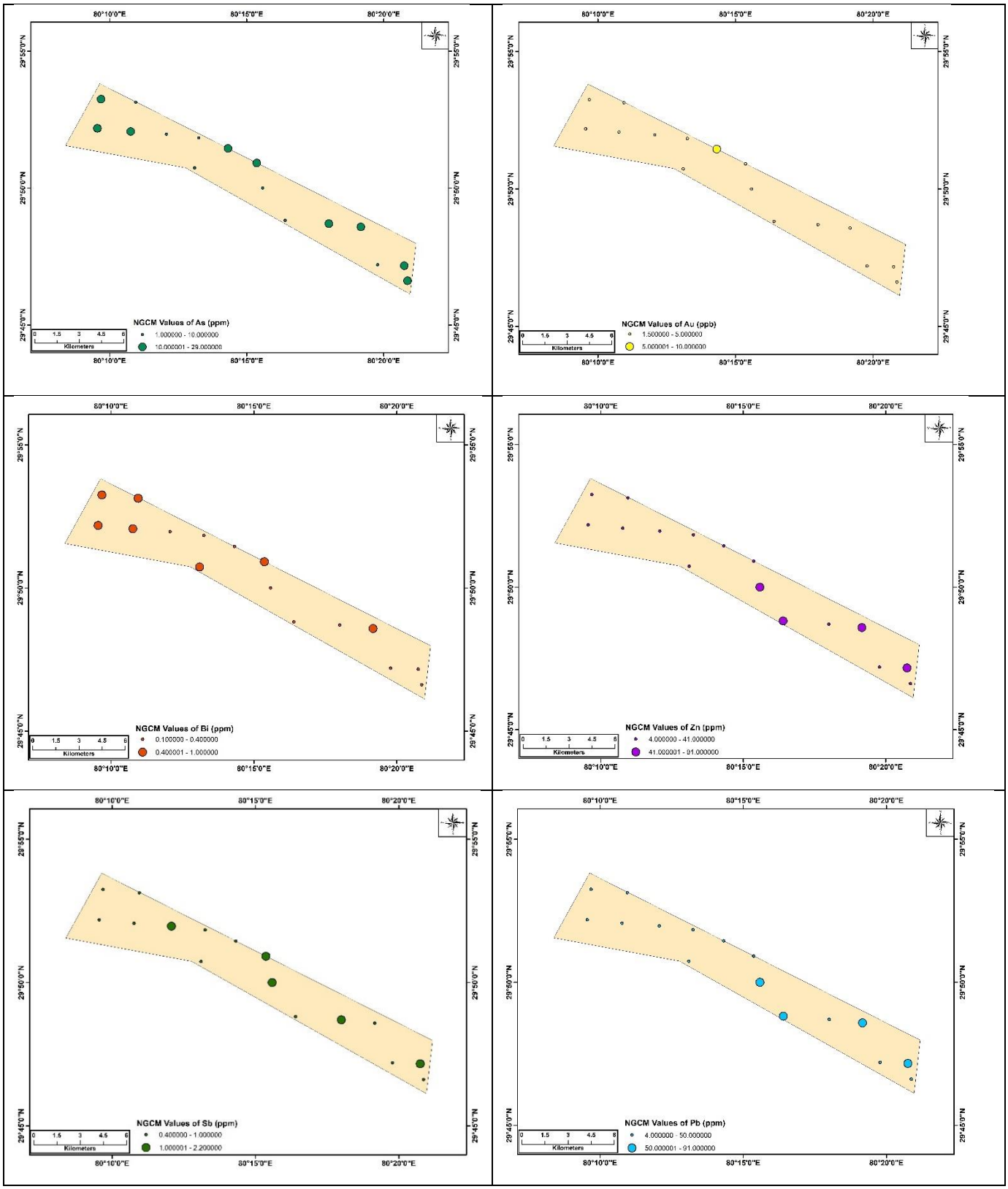

Figure 3 Highlights of NGCM data (As, Au, Bi, Zn, Pb and Sb) for the Chupra Khet block

GSI's NGPM mapping in this area:

The area is not covered by any aero-geophysical survey. But a number of ground geophysical survey was carried out both by GSI and MECL in the mineralized parts of the Askot area (southern part of the block), which is outside but adjacent to the present block area.

A Mineral System Analyses of mineralization potential of the area:

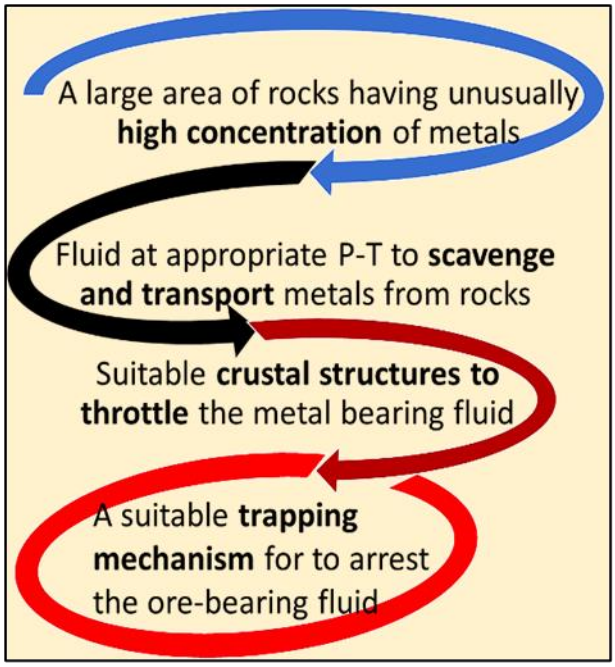

Figure 4. Principal components of Mineral System Analysis (MSA) and their relationship

A mineral system analyses revolves round four important components (Fig. 4)

(i) A fertile host rock terrain

(ii) Fluids to scavenge metals from fertile host rocks

(iii) Tectonic force and architecture to channelize the metal bearing fluids and

(iv) Suitable structural or lithological traps

i. **Fertile host rock**: The reported Askot sulphide deposit is a very high-grade polymetallic deposit, located to the southeast and outside the proposed G4 block. There the total metal sulfide content including zinc, copper, and gold, is near about 12%. The ore body is hosted by altered metabasic

volcanic rocks, tuffaceous (sericitic) schist, and chlorite-biotite-muscovite schist. The granite gneiss occurring at the core of the Askot Crystalline Complex and the ore-hosting volcanics are of similar age. Thus, it is possible that the granite gneiss represents syn-volcanic intrusions that drives circulation of ore-fluids in a VMS setup.

ii. **Ore fluid**: The host rock is sericite schist, actinolite schist and chlorite schist. These rocks have secondary biotite in them. It is possible that these rocks are hydrothermal fluid altered volcanic and volcanoclastic rocks. Systematic alteration mineralogy and alteration geochemistry need to be studied to constrain fluid involved.

iii. **Structure and ore hosts**: As yet there is no study to relate structural architecture and ore localization. However, it is possible that some of the structures are synvolcanic structures that helps localizing the ore bodies. Some sharp bends (Fig. 2) in regional tectonic trends might have helped in localizing the ore fluids.

Scope of the present exploration:

The exploration task flow is proposed to be done in two phases, each having distinct tasks and milestone. A summary of activities and milestones in both phases of the proposed exploration is given below:

Phase I (Approximately 6 to 8 months):

For the total block area, fertility assessment will be performed by geological mapping (1:12,500 scale) and regional geochemical analysis for preparation of alteration map. This will lead to an area reduction (approximately 30 sq km from 38 sq km). After reducing the area of exploration geophysical survey (ground magnetic and EM survey) will be to identify anomalous mineralised targets.

Phase II (Approximately 6 to 8 months):

This phase will consist of 600 m core drilling in 2 boreholes and thereafter the chemical and petrographic analysis of the core samples. Core drilling will help to identify and characterise potential mineralized zones/ore bodies.

Decision points:

The exploration strategy incorporates the GO- NO GO milestones to be collaboratively decided between the Geovale Services, State of Uttar Pradesh and the NMET based on the results of the ongoing phases. Total duration of the work plan is 14 months. The exploration plan incorporates one decision point.

II. Previous work:

Previous reports of mineralization in the adjoining area (regional area):

A summary of exploration carried out in the adjacent area is given below-

1. In the Askot area, which is outside and adjacent to the southeast part of the block, GSI and MECL have reported a polymetallic deposit of 1.35 million tonnes grading 2.12% copper, 2.87% lead and 5.14% zinc.
2. Earliest works about the structural and lithological features of the Askot area were started by **Heim and Ganssar (1939)**. After that, Nautiyal (1953) mapped parts of Pithoragarh district and perhaps first reported the occurrence of chalcopyrite from the mica schist and gneiss of Askot Crystalline. Detailed stratigraphical works were done by Valdiya (1962). Thereafter Geological survey of India carried out investigation of polymetallic mineralization around Askot by **Arabinda Ghose in Field Season 1969-70**. They reported mineralization in the form of veins, pockets, stringers, disseminations and specks of chalcopyrite, sphalerite and galena within the sheared schistose zone comprising quartz sericite-epidote–chlorite schist occurring in the northern limb of an asymmetric doubly plunging synform of Askot crystalline.
3. Self-potential and magnetic surveys have been carried out by **Srivastava and Pathak (1970)** in the Askot Kholiagaon and Didihat areas (Fig. 5). This geophysical survey in the Didihat area did not indicate any significant anomalies, except broad S.P. lows at places over the contact between the crystalline gneisses and the mica schists. They have also done regional survey for searching the extension of the sulphide ore body and indicated significant S.P. and magnetic anomalies.
4. Yogendra and Surovi of GSI (FS. 2021-22) reported a new area adjacent to the Askot polymetallic deposit with very high As and Hg anomaly (Fig. 2).
5. In order to identify potential zones of sulphide mineralization, Kothiyal and Srivastava (1987) conducted a regional geochemical survey in the Pasma-Urma area in Pithoragarh District. In quartzite and quartz-chlorite schist, copper content ranges from 10 ppm to 55 ppm, with high values reaching up to 200 ppm, while it ranges from 10 ppm to 120 ppm in schist and gneisses of the Askot Crystalline. In contrast to Askot Crystalline schists and gneisses, which have lead contents that range from 10 ppm to 95 ppm, quartzite and quartz-chlorite schists have lead values that range from 10 ppm to 145 ppm. The lead content in metabasics ranges from 10 ppm to 100 ppm. Zinc concentrations in quartzite and quartz-chlorite schist range from 10 ppm to

95 ppm, with peak values of 140 ppm. Zinc concentrations in schists and gneisses vary from 30 ppm to 130 ppm, whereas those in metabasics range from 20 ppm to 90 ppm. From 10 ppm to 70 ppm of nickel can be found in quartzite and quartz-chlorite schist. Nickel concentrations in schists and gneisses range from 10 ppm to 75 ppm, whereas those in metabasic rocks range from 15 ppm to 95 ppm. It varies in schist and gneiss from 10 ppm to 50 ppm. The cobalt concentrations in metabasic range from 15 ppm to 50 ppm.

6. Mineral investigations for copper, magnesite, talc and cement grade limestone were carried out in the area by GSI since 1960s (Nautiyal, 1963; Jangpangi, 1971; Safaya and Shanmugan, 1975; Ghose, 1986).
7. GSI carried out mineral exploration for polymetallic sulphides in Askot area in different phases. For example, Arabinda Ghose (Field Season 1969-70), B. De and S.C. Roy (Field season: 1971-1972), carried out exploratory drilling in the Barigaon-Gadali and Dewal-Hinkot blocks, Askot blocks. Parts of these blocks were mapped in 1:1000 and 1:2000 scales. Sphalerite, galena, chalcopyrite, arsenopyrite, cuprite, covellite, etc. are the main minerals that make up the sulphide mineralization in the Barigaon-Gadali block. The polymetallic ores are very high grade. For example, in three GSI boreholes, viz., ASK-1, ASK-2, and ASK-4, the mineralized zones have values of copper upto ~9%, lead >8%, and zinc ~ 9%. Both disseminated and massive ore bodies are present in the area.

Previous Exploration in the block area:

Govil et al. 2018, reported sulfide mineralization in dolomitic host rocks and confirmed the presence of lead (Pb), zinc (Zn), copper (Cu), silver (Ag), arsenic (As), and antimony (Sb). They observed 44% Zn and 70% Pb from Pithoragarh limestone from the samples collected from the Kuta village.

III. Block description with boundary coordinates:

Corner Point	Latitude	Longitude
A	29.85920	80.139800
B	29.89690	80.160600
C	29.79970	80.353000
D	29.76870	80.349400
E	29.84570	80.212900
A	29.85920	80.139800
B	29.89690	80.160600

IV. Planned methodology and broad exploration approach as proposed:

Exploration activities are elaborated below:

1. **Remote sensing, multispectral and DEM data analysis**

2. **Geological mapping (1:12,500 scale) and regional geochemical analysis for preparation of alteration map:**

a. Study and interpretation of available Aero Geo – physical, NGPM, NGCM data and maps of the areas including previous Study Reports (if any, to be obtained from GSI or other agencies) for creating a geological Base Map of the Blocks.

b. Preparation of detailed geological map and alteration map by traversing, to identify and demarcate different lithological components like schists, granites, quartzites, volcanic rocks etc.

c. Bed Rock / channel samples, pit samples will be collected and analyzed for proving mineralization.

3. Geophysical Survey

1. Resistivity Profiling (Station interval 200m.)
2. IP cum resistivity, S.P., magnetic (8-10 line km)
3. Ground Magnetic (10 sq km, 1,000 station)

4. Core Drilling, Logging and Sample Assay

Based on geological mapping, alteration mapping, and geophysical survey the potential zones will be marked. To find out the disposition of potential polymetallic sulphide bearing zones total 900 m core drilling in 6 boreholes will be planned.

4. Laboratory Studies

a. Petrography: Thin section study will be performed for 100 samples to identify different minerals. XRD will be done for 50 samples.

b. Chemical analysis: XRF will be done for major oxides, minor and trace elements present in the samples.

c. 10% of primary samples will be subjected to analysis at a NABL certified external laboratory as Check Samples

5. Final Report Submission

a. Providing targets for G3 stage additional ore bodies.

b. Generate a detailed Report (Final G3 level Report).

Exploration task flow:

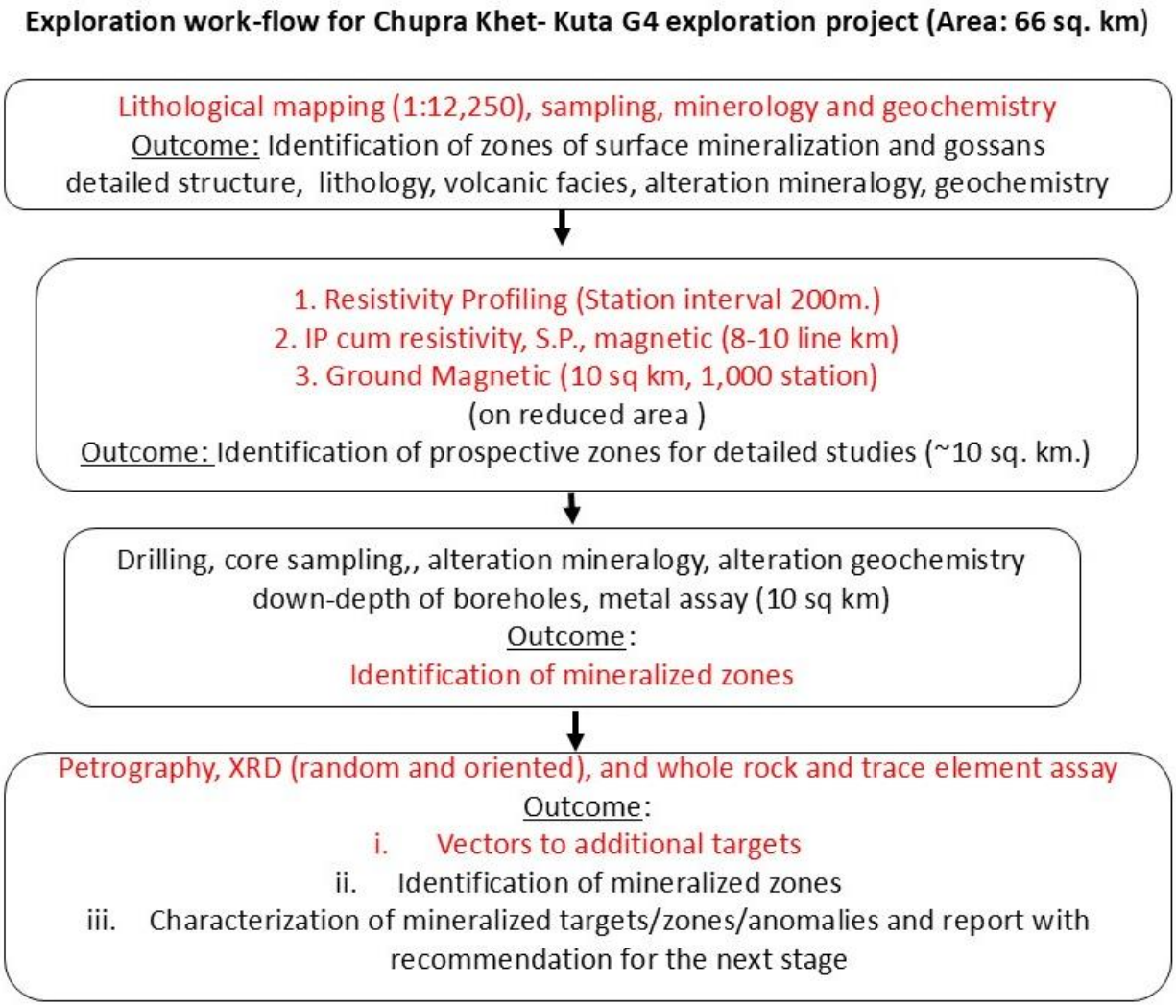

Figure 7 Exploration workflow for Askot G4 Base Metal Prospect Block

V. Nature Quantum and Target

A table containing the NQT table is given in *Annexure I.*

Borehole spacing (As per MEMC, 2015)

Type of deposit	Bedded Stratiform and Tabular deposit of regular habit minerals to be identified	Bedded stratiform and tabular deposits of irregular habit (Minerals to be identified)	Lenticular bodies occurring en echelon Lenses, pockets. (Different minerals)
G4 Stage	Not Applicable	Not Applicable	6 core drilling with an average of 900 m depth in an area of approximately 10 sq. km.
(Vertical depth of intersection of mineralized zone should be specified (first level), number of boreholes, approximate borehole spacing, approximate length of boreholes may be specified)			

Geophysical Studies

Geophysical studies may be introduced at a later stage based on reconnitory studies carried out in the area and on an understanding of the structural/ lithological control of the mineralization. Magnetic survey (3000 points) and EM survey (350 sounding) will be done on identified targets for drilling target generation.

VI. Manpower deployment:

A table containing the manpower deployment table is given in *Annexure II*.

VII. Summary Expenditure

The summary expenditure for each phase is given in *Annexure III*.

VIII. Breakup of Expenditure

The breakup expenditure for each phase is given in *Annexure IV*.

IX. Timeline

Time Schedule /Action Plan for Reconnaisance Survey (G4) for Chupra Khet - Kuta Metal Prospect Block, Pithoragarh District, Uttarakhand																		
Sl. No.	**Activities**	**Unit**	**MONTHS**															
			1	**2**	**3**	**4**	**5**	**6**		**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1	Geological Mapping and Sampling (1:12,500)	Days																
2	Sampling Party days	Days																
3	Geologist Party days, HQ	Days																
4	Pitting/Trenching	Cu.m																
5	Laboratory Studies	Nos.																
6	Petrographic Studies	Nos.																
7	Geophysical Survey (after review)	Days							**Review**									
8	Geological Work (after review) (drilling)	m																
9	Laboratory Studies (after review)	Nos.																
10	Petrographic Studies (after review)	Nos.																
11	Report Writing	Months																
12	Peer Review	Months																
NOTE																		
1	**Commencement of project may be reckoned from the day the exploration acreage is available along with all statutory clearances.**																	
2	**Time loss on account of monsoon/agricultural activity/forest clearance / local law & order problem/ lockdown etc will be additional to above time line.**																	

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List of Plates

Plate 1: Geological map on 1:50,000 with location index.

Plate 2: Geological map/s on 1:50,000.

Plate 3: Geological map with Block Boundary on 150,000 scale

Plate 4: Proposed block boundary over Land Use Land Cover

Plate 5: Accessibility map on 150,000 scale

Plate 6: Proposed block boundary over topographic map on 150,000 scale

Annexure- I

Title of Project - Reconnaisance Survey (G4) for Chupra Khet - Kuta area, Pithoragarh District, Uttarakhand					
NQT table					
S.N	**Nature of work**	**Quantum**	**Unit**	**Target**	**Remarks**
1	**Geological Work**				
A	**Geological Mapping (1:12,500) & sampling**				66 sq km
a	Geologists (HQ) days (1 No)	45	one geologist per day	Identification of anomalous mineralized zones for detailed characterization	
b	Geologist field-days (2 No. geologists for 120 days)	250	one geologist per day		66 sq.km
c	Labor (Field days) (2 workers per geologist, i.e Total 4 No.)	500	per labor day		Amount will be reimburse as per the notified rates by the Central Labor Comission or respective State Govt. whichever is higher
B	**Pitting**				
a	Pitting	160	per cu.m		No of samples 60 samples
2	**Laboratory Studies**				
A	**Geochemical Analysis for regional and detail survey**				40 BRS; 100 Auger drilling sample; 60 pitting samples

a	XRF (major oxides)	50	per sample		10% of total sample
b	Check samples for XRF	5	per sample		
c	ICPMS (34 elements)	220	per sample		10% of total sample
d	Analysis for gold by fire assay technique	100	per sample		10% of total sample
g	Sampler man-days	42	one sampler per day		
h	Labor(4 workers per sampler)	168	per labor day	Fertility assessment and target selection	Amount will be reimburse as per the notified rates by the Central Labor Comission or respective State Govt. whichever is higher
3	**Petrological studies**				
a	Thin section preparation	50	per sample		
b	Microscopic study	50	per sample		
c	EPMA (10 samples, 20 hours)	0:00:00	per hour		
4	**Geophysical Survey**				
a	S.P. & Shallow electrical resistivity (10-20 line km)	20	per line km	To identify drilling targets	

b	IP cum resistivity, S.P., magnetic (8-10 line km)	1	per line km		
c	Magnetic (10 sq km, 1000 points)	1000	per station		
d	Expert Charges for Geophysicist (Field)	30	Geophysicist per day		
5	**Geological Work (Drilling)**				
a	Core drilling up to 400m depth (6 BH)	900	per meter	Characterising potential anomalous targets	No of samples 300 samples
c	Land / Crop Compansation	6	per BH		
d	Transportation of Drill Rig & Truck associated per drill (2 rigs)- Two way	6400	km		
e	Monthly Accomodation Charges for drilling Camp	3	month		
f	Drilling Camp Setting Cost	1	Nos		
g	Drilling Camp Winding up Cost	1	Nos		
h	Approach Road making for rugget/hilly terrain	4	km		
i	Drill core preservation	500	per meter		
6	**Laboratory Studies**				
7	**Geochemical Analysis (BH samples)**				(200BHS)

a	XRF (major oxides)	50	per sample		10% of total sample
c	ICPMS (34 elements)	500	per sample		
f	XRD	20	per sample		10% of total samples
g	EMPA	10	per hour		
h	Sampler man-days	73	per day		
i	Labor (4 workers per sampler)	290	per labor day	Characterization and prioritization of mineralized targets/zones/anomalies	Amount will be reimburse as per the notified rates by the Central Labor Comission or respective State Govt. whichever is higher
7	**Petrological studies (After Review)**				
a	Thin section preparation	100	per sample		
b	Microscopic study	100	per sample		
c	SEM-EDX	20	per hour		
8	Preparation of Exploration Proposal (5 Hard copies with a soft copy)	1	Lumpsum		This amount 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 TCCNMET in its meeting while clearing the proposal.
9	Final report preparation	1	3% of project cost or 7.5 lakh whichever is higher		Final report submission, peer review and project conclusion
10	Report Peer Review	1	Lump sum		

Annexure- II

Manpower Deployment Reconnaissance Survey (G4 stage) for Basemetal -Prospect in Chupra Khet - Kuta area, Pithoragarh District, Uttarakhand					
Activity	**Type of Job**	**Geologist HQ (mandays)**	**Geologist (mandays)**	**Labour (mandays)**	**Sampler (mandays)**
Geological Mapping, sampling and pitting	Field	10	250	688	47
Laboratory Studies	Field+desktop	10			
Petrographic Studies	Desktop	15			
Review					
Geophysical Survey	Field		30		
Core drilling, minerology and chemical assay	Field	10		290	73
Report Preparation and Recommendation	Desktop				
Discussion with State authorities and NMET	Desktop				

Annexure- III

Reconnaisance Survey (G4) for Chupra Khet - Kuta area, Pithoragarh District, Uttarakhand		
Summary Expenditure		
Sl. No	**Item**	**Estimated Cost in INR**
1	Geological Work	12,535,350
2	Laboratory Studies	3,301,073
3	Petrological Studies	500,050
4	Geophysical Survey	15,098,082
5	Geological Work (Drilling)	37,438,730
6	Laboratory Studies (BH samples)	5,990,572
7	Petrological studies (After Review)	388,050
8	Exploration Proposal preparation	500,000
9	Report preparation	2,257,557
10	Peer review charges	30,000
11	GST (18%)	14,047,103
	Grand Total	**92,086,566.77**

Annexure IV

Title of Project - Reconnaissance Survey (G4 stage) for Basemetal in Chupra Khet - Kuta area, Pithoragarh District, Uttarakhand
Name of the Exploration Agency - Geovale Services Pvt. Ltd.
Total Area - 66 sq. km; Nos. of Borehole: 06 -Core drilling: 900m; Completion Time -12 Months

S. N	Item of work	Unit	Rates as per NMET SoC		Estimated Cost of the Proposal			Remarks
			SoC-Item -Sl No.	Rates as per SOC	Quantum	Special Rate	Total Amount (Rs)	
1	**Geological Work**							
A	**Geological Mapping & sampling (1:12,500 scale)**	66 sq km						
a	Geologists (HQ) days (1 No)	Man-days	1.2	9,000.00	45	1	405,000.00	
b	Geologist field-days	Man-days	1.2	11,000.00	250	3.35	9,212,500.00	
c	Labor (Field days) (2 workers per geologist)	Per labor day	5.7	526.00	500	3.35	881,050.00	Amount will be reimbursed as per the notified rates by the Central Labor Commission or respective State Govt. whichever is higher
B	**Pitting/Trenching**							
a	Pitting (20 Nos.)	per cubic meter	2.1.2	3,800.00	160	3.35	2,036,800.00	No of samples 20 samples
	Sub-Total 1						**12,535,350.00**	
2	**Laboratory Studies**							
A	**Geochemical Analysis for regional**							Sample: 100 BRS, 100 Stream sediments and 20 Pit samples

	and detail survey							
a	XRF (major oxides)	per sample	4.1.15a	4,200.00	50	1	210,000.00	BR and Pit samples
b	Check samples for XRF-External 10%	per sample	4.1.15a	4,200.00	5	1	21,000.00	
c	ICPMS (34 elements)	per sample	4.1.14	7,731.00	220	1	1,700,820.00	Stream Sediments and Surface samples
d	Analysis for gold by fire assay technique	per sample	4.1.5a	2,380.00	100	1	238,000.00	BR and Drill samples
e	Sampler man-days	one sampler per day	1.5.2	5,100.00	47	3.35	800,859.38	
f	Labor (Man days) (4 labours per sampler)	per labor day	5.7	526.00	188	3.35	330,393.75	Amount will be reimbursed as per the notified rates by the Central Labor Comission or respective State Govt. whichever is higher
	Sub-Total 2						**3,301,073.13**	
3	**Petrological studies**							
a	Thin section preparation	per sample	4.3.1	2,353.00	50	1	117,650.00	
b	Microscopic study	per sample	4.3.4	4,232.00	50	1	211,600.00	
c	EPMA (10 samples, 20 hours)	per hour	4.4.1	8,540.00	20	1	170,800.00	
	Sub-Total 3						**500,050.00**	
	Review							

4	**Geophysical Survey (After Review)**							
a	Resistivity Profiling (Station interval 200m.)	per line km	3.6a	58,880.00	20	3.35	3,944,960.00	
b	IP cum resistivity, S.P., magnetic (8-10 line km)	per line km	3.4.b	1,448,693.00	1	3.35	4,853,121.55	
c	Ground Magnetic (10 sq km, 1,000 station)	per station	3.2a	1,800.00	1000	3.35	6,030,000.00	
d	Expert Charges for Geophysicist (Field)	Geophysicist per day	3.18	9,000.00	30	1	270,000.00	
	Sub-Total 4						**15,098,081.55**	
5	**Geological Work (After Review, Drilling in-house)**							
a	Core drilling up to 400m depth (6 BH)	per meter	2.2.1.4a	11,500.00	900	3.35	34,672,500.00	No of samples 300 samples
b	Land / Crop Compansation	per BH	5.6	20000	6	1	120,000.00	
c	Transportation of Drill Rig & Truck associated per drill (2 rigs)-Two way	km	2.2.8	36	6400	1	230,400.00	Kolkata to Chupra Khet 1600 km , 2 trucks, 2 rigs, 2 way; 1600km*2*2= 6400km
d	Monthly Accomodation Charges for	month	2.2.9	50000	3	1	150,000.00	

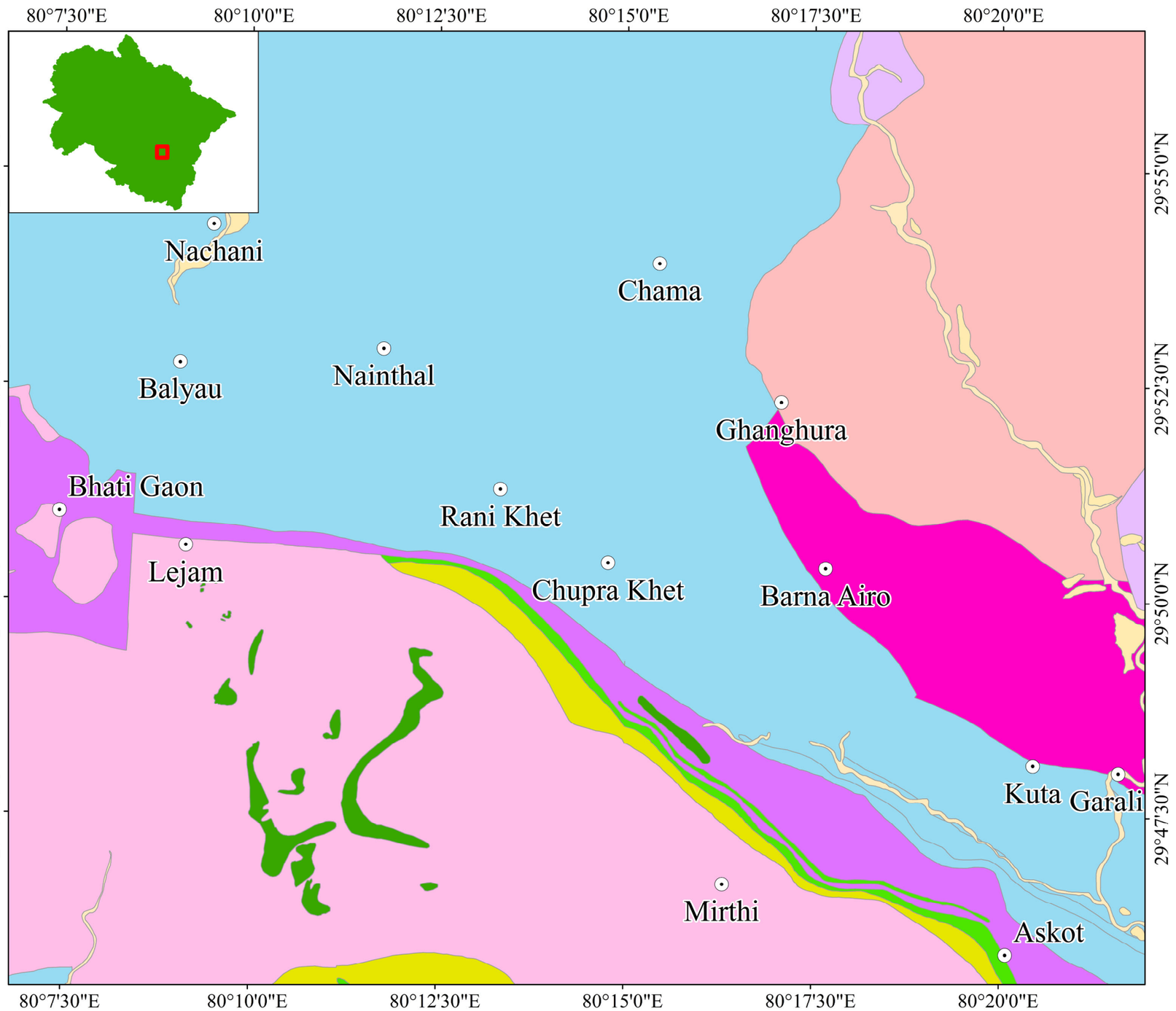
	drilling Camp							
e	Drilling Camp Setting Cost	Nos	2.2.9 a	250000	1	1	250,000.00	
f	Drilling Camp Winding up Cost	Nos	2.2.9 b	250000	1	1	250,000.00	
g	Approach Road making for rugget/hilly terrain	km	2.2.1 0b	32200	9	3.35	970,830.00	
h	Drill Core Preservatio n	per meter	5.3.0	1590	500	1	795,000.00	
	Sub-Total 5						**37,438,730.00**	
6	**Laboratory Studies (After Review, BH samples)**							
A	**Geochemic al Analysis (BH samples)**							
a	XRF (major oxides)	per sample	4.1.1 5a	4,200.0 0	50	1	210,000.00	
b	ICPMS (34 elements)	per sample	4.1.1 4	7,731.0 0	500	1	3,865,500.00	
c	XRD	per sample	4.5.1	4,000.0 0	20	1	80,000.00	
d	EPMA (5 samples, 10 hours)	per hour	4.4.1	8,540.0 0	10	1	85,400.00	
e	Sampler man-days	per day	1.5.2	5,100.0 0	73	3.35	1,238,662.50	
f	Labor (Man days) (4 labours per sampler)	per labor day	5.7	526.00	290	3.35	511,009.00	Amount will be reimbursed as per the notified rates by the Central Labor Comission or

								respective State Govt. whichever is higher
	Sub-Total 6						**5,990,571.50**	
7	**Petrological studies (BH samples)**							
a	Thin section preparation	per sample	4.3.1	2,353.00	50	1	117,650.00	
b	Microscopic study	per sample	4.3.4	4,232.00	50	1	211,600.00	
c	SEM-EDX	per hour	4.4.2	2,940.00	20	1	58,800.00	
	Sub-Total 7						**388,050.00**	
	Total (Sub-Total 1-7)						**75,251,906.18**	
8	Preparation of Exploration Proposal (5 Hard copies with a soft copy)	Lumpsum	5.1	2% of the cost subject to a maximum of 5 lakhs	1		500,000.00	This amount 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.

9	Final report preparation	3% of project cost or 7.5 lakh whichever is higher	5.2	For the projects having cost exceeding 300 lakhs-A minimum of 9 lakhs or 3% of the value of work whichever is more	1		2,257,557.19	Final report submission, peer review and project conclusion
10	Report Peer Review	Lump sum	As per EC	30,000.00	1		30,000.00	
Project Cost without GST							**78,039,463.36**	
18% GST							**14,047,103.40**	GST will be reimbursed as per actual and as per the applicable notified rate
Total Project Cost							**92,086,566.77**	

GEOLOGICAL MAP ON 1:50K SCALE WITH LOCATION INDEX

PLATE 1



N

W E

S

SCALE

1:50,000

0 1.5 3 4.5

Kilometers

Legend

⊙ Known Locations

LITHOLOGY

- Alluvium
- Amphibolite
- Ambhibolite and Mica Schist
- Biotite Gneiss, Quartzite & Schist
- Limestone, Dolomite, Shale, Carb.Phyllite/Slate
- Metabasalt, Ambhibolite & Mica Schist, Chlorite
- Porphyritic Bonfoliated Granite
- Quartzite & slate with basic metavolcanics
- Quartzite interbedded with metavolcanics & slate
- Schist, Augen Gneiss, Quartzite & Amphibolite

GEOVALE SERVICES

SOLUTIONS TO GLOBAL MINERAL EXPLORATION & MINING INDUSTRY

GEOLOGICAL map/s ON 1:50K SCALE

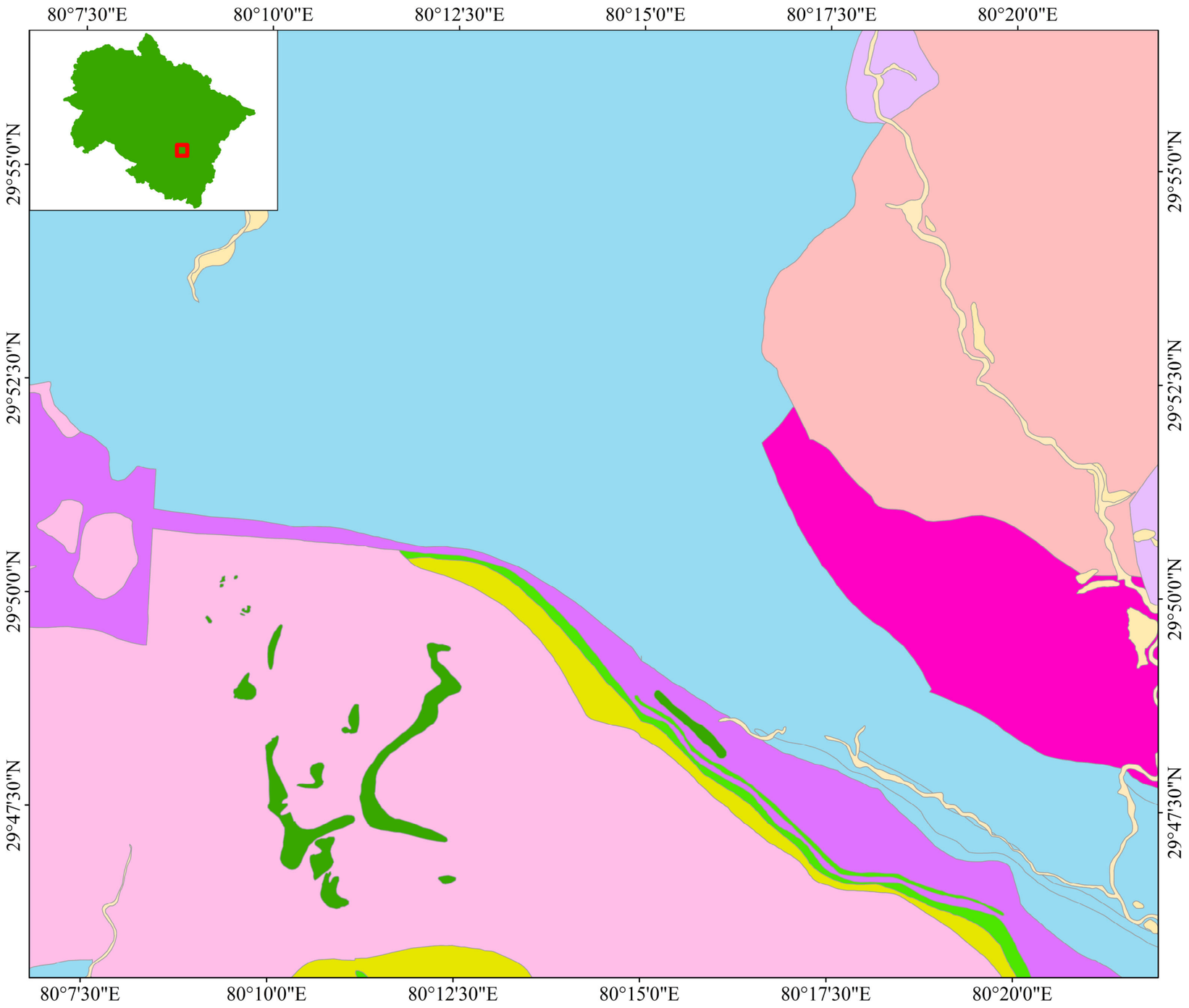


PLATE 2

N
W
E
S

SCALE

1:50,000

0 1.5 3 4.5

Kilometers

LITHOLOGY

- Alluvium
- Amphibolite
- Ambhibolite and Mica Schist
- Biotite Gneiss, Quartzite & Schist
- Limestone, Dolomite, Shale, Carb.Phyllite/Slate
- Metabasalt, Ambhibolite & Mica Schist, Chlorite
- Porphyritic Bonfoliated Granite
- Quartzite & slate with basic metavolcanics
- Quartzite interbedded with metavolcanics & slate
- Schist, Augen Gneiss, Quartzite & Amphibolite

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EOLOGICAL MAP WITH BLOCK BOUNDARY OF CHUPRA KHET-KUTA BLOCK ON 1:50K SCA

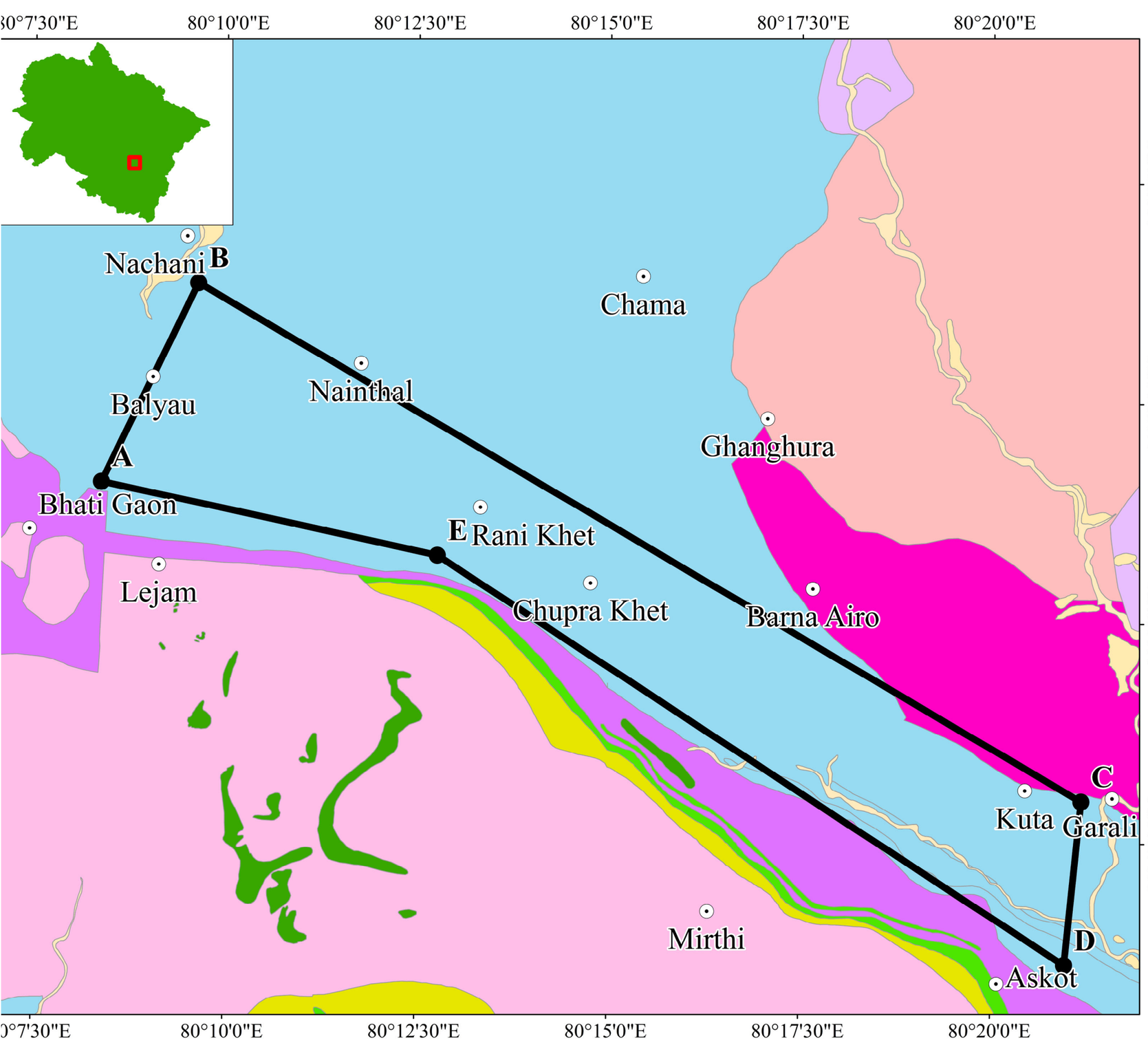

PLATE 3

N
W
E
S

SCALE

1:50,000

0 1.5 3 4.5

Kilometers

Legend

- Known Locations
- Corner Points
- Proposed Chupra Khet- Kuta block

LITHOLOGY

- Alluvium
- Amphibolite
- Ambhibolite and Mica Schist
- Biotite Gneiss, Quartzite & Schist
- Limestone, Dolomite, Shale, Carb.Phyllite/Sl
- Metabasalt, Ambhibolite & Mica Schist, Chl
- Porphyritic Bonfoliated Granite
- Quartzite & slate with basic metavolcanics
- Quartzite interbedded with metavolcanics &
- Schist, Augen Gneiss, Quartzite & Amphibol

GEOVAL SERVICE

SOLUTIONS TO GLOBAL MINERAL EXPLORATION & MINING

PROPOSED BLOCK BOUNDARY OF CHUPRA KHET-KUTA BLOCK OVER LAND USE LAND COVER

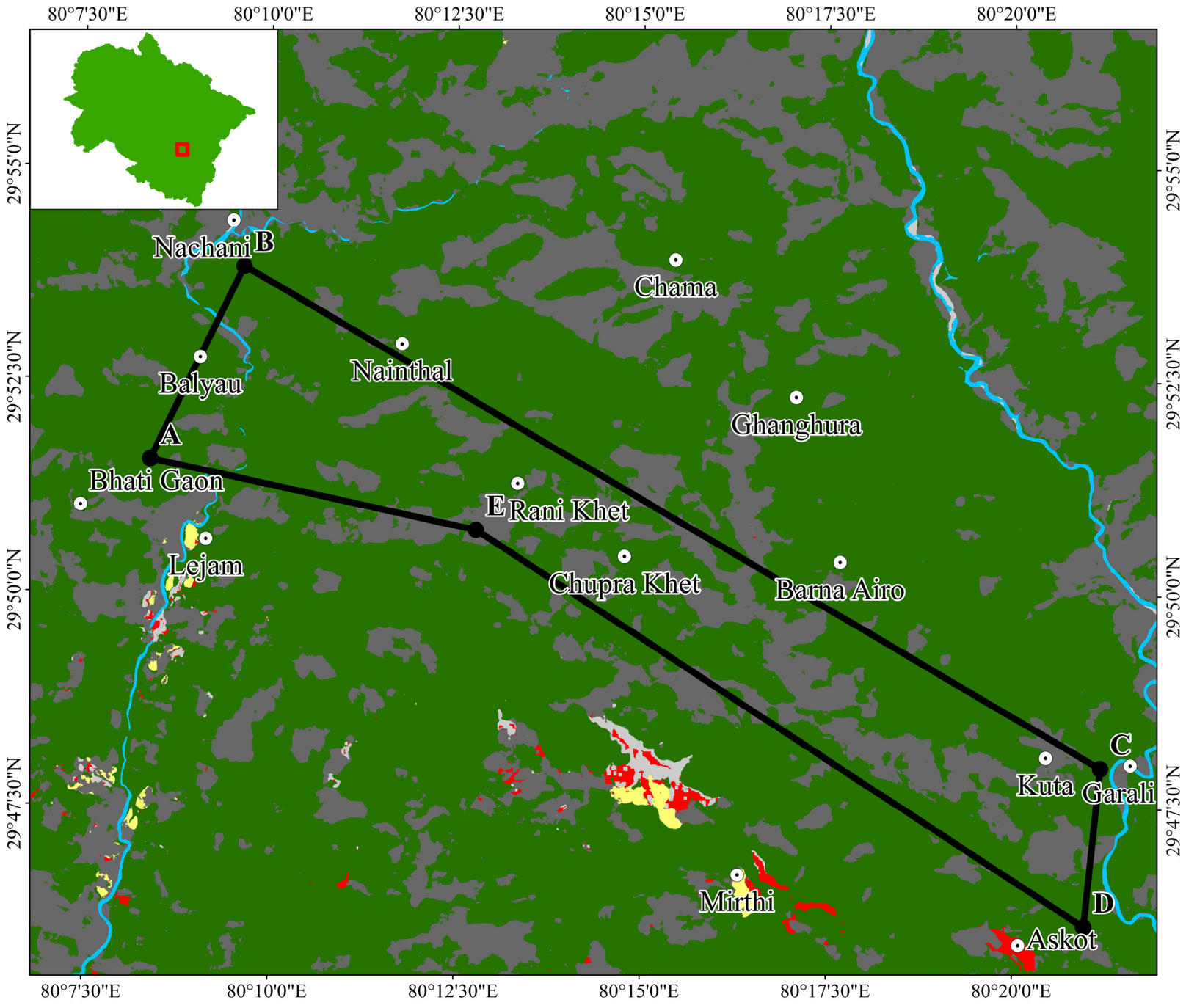

PLATE 4

N
W E
S

SCALE

1:50,000

0 1.5 3 4.5

Kilometers

Legend

- Boundary Corner Points
- Known Locations
- Proposed Chupra Khet-Kuta Block
- Water Bodies
- Vegetation
- Flooded Vegetation
- Cropland
- Built-Up
- Bare Ground
- Rangeland

GEOVALE SERVICES

SOLUTIONS TO GLOBAL MINERAL EXPLORATION & MINING INDUSTRY

PROPOSED BLOCK BOUNDARY OF CHUPRA KHET-KUTA BLOCK OVER ACCESSIBILITY MAP ON 1:50K SCALE

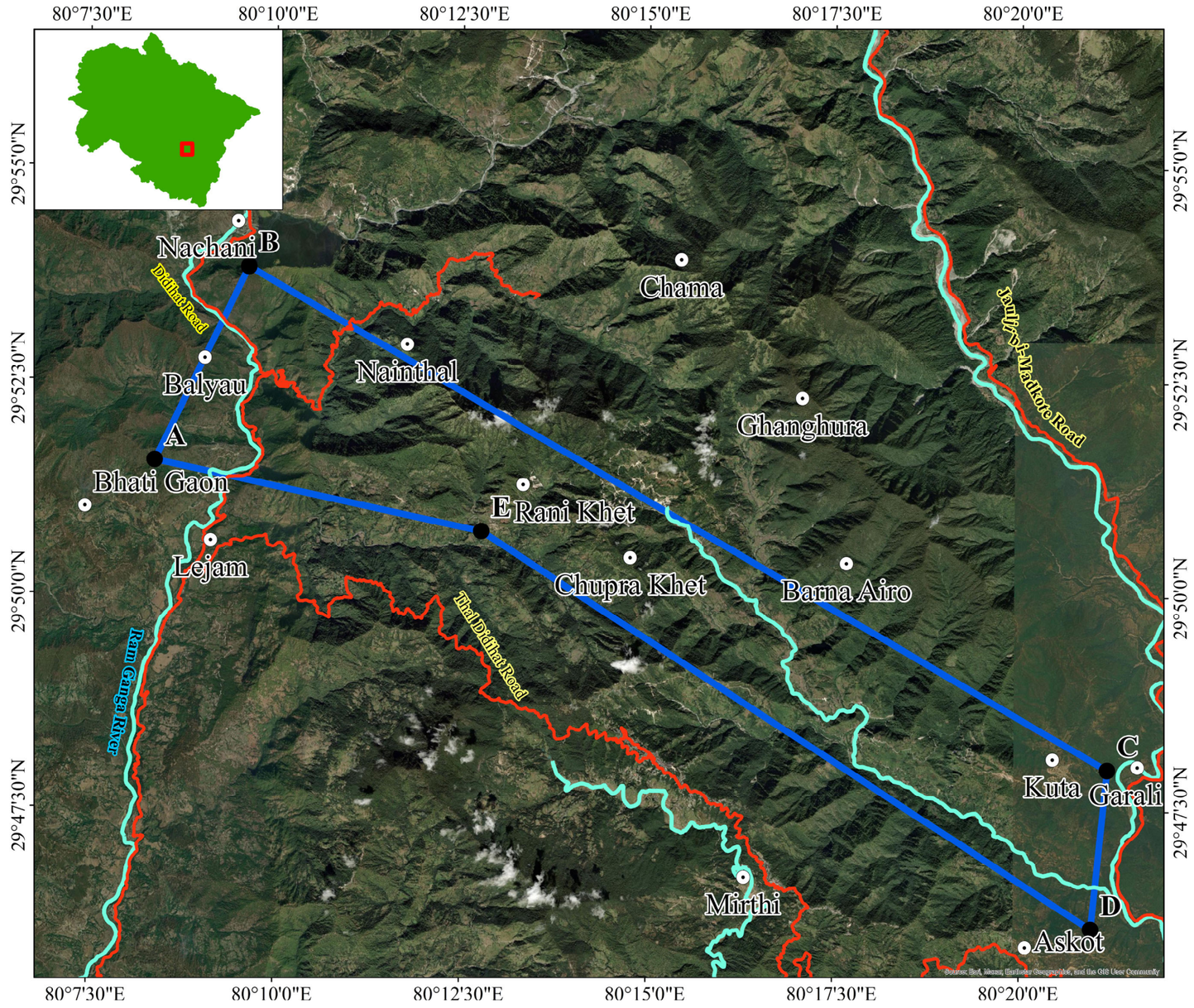

PLATE 5

N
W
E
S

SCALE

1:50,000

0 1.5 3 4.5

Kilometers

Legend

- Boundary Corner Points
- Known Locations
- Proposed Chupra Khet-Kuta Block
- Road
- River

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PROPOSED BLOCK BOUNDARY OF CHUPRA KHET-KUTA BLOCK OVER TOPOGRAPHIC MAP ON 1:50K SCALE

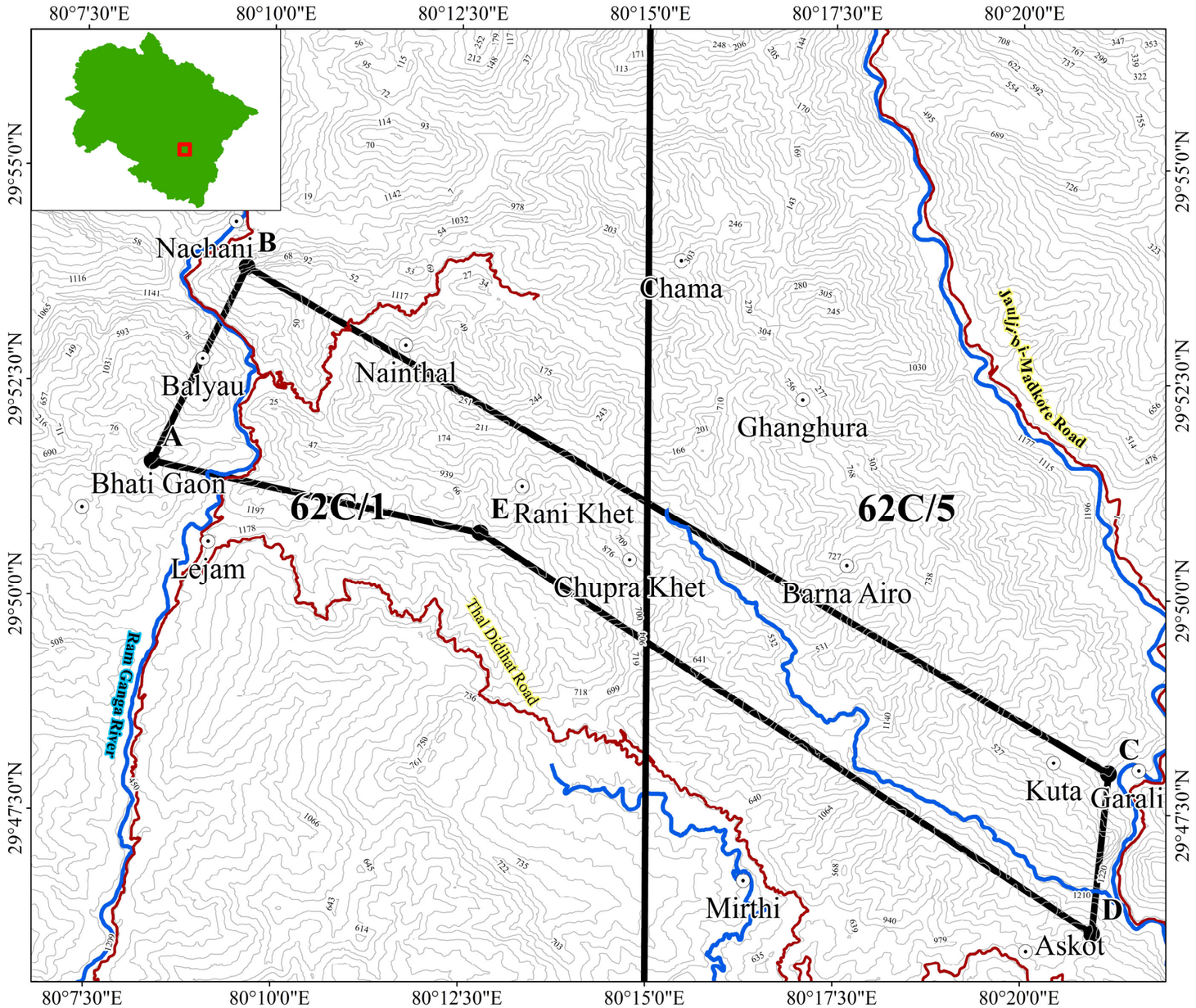

PLATE 6

N
W
E
S

SCALE

1:50,000

0 1.5 3 4.5

Kilometers

Legend

- Boundary Corner Points
- Known Locations
- Proposed Chupra Khet-Kuta Block
- Road
- River
- Contour 100m

GEOVALE SERVICES

SOLUTIONS TO GLOBAL MINERAL EXPLORATION & MINING INDUSTRY