PROPOSAL FOR PRELIMINARY EXPLORATION (G-3) OF LIMESTONE IN BARITOLA (7.34 sq km), JAHARITOLA (4.26 sq km), MUNDATOLA (7.17 sq km), GOPAPUR (6.39 sq km)BLOCK, GANGPUR GROUP, DISTRICT: SUNDARGARH, STATE: ODISHA

UNDER NMET PROGRAM

COMMODITY: LIMESTONE

BY

MINERAL EXPLORATION AND CONSULTANCY LIMITED
DR. BABASAHAB AMBEDKAR BHAWAN
SEMINARY HILLS

PLACE: NAGPUR **DATE: 14th AUGUST, 2024**

Summary of the Proposed Baritola, Jaharitola, Mundatola, Gopapur Blocks for Preliminary Exploration (G-3) of Limestone

	Features	**Details**
	Block ID	**Baritola, Jaharitola, Mundatola, Gopapur Blocks**
	Exploration Agency	Mineral Exploration and Consultancy Limited (MECL)
	Commodity	**Limestone**
	Mineral Belt	Gangpur Group, Odisha
	Budget & Time schedule to complete the project	829.86 Lakhs & 18 months
	Objectives	The present exploration program (G3) has been formulated on the basis of the outcomes of previous work to fulfill the following objectives: i. Geological mapping on 1:4000 scale to record the lithological and structural features present within the proposed block ii. Topographical contouring on 1:4000 scale to generate the topography of the area. iii. Exploratory drilling will be carried out at 800 m grid interval to prove the limestone occurrences upto 50 m vertical depth. iv. To establish the various grades of limestone along with the estimation of resources (333) as per the UNFC norms & Minerals (Evidence of Mineral Contents) Rules- 2015. v. To assess the feasibility of the block for auction purpose.
	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	Work will be carried out by the proposed agency.
	Name/Number of Geoscientists	
	Expected Field days (Geology, Survey)	Geologist Party days: Field -300 days (2 party)& HQ-90 days
		Survey Party days: 120 days (for Topographical survey)
		Sampling Party days: 432 days (2 party)
1.	**Location**	The proposed Baritola, Jaharitola, Mundatola, Gopapur Blocks comprises of total 25.16 sq km area and lies in Nuagaon Tehsil of Sunadargarh District (Toposheet No: 73B/15), Odisha. The district Headquarter Sundargarh is 100 km south-west of the proposed blocks. The blocks are bounded by latitude 22° 21' 32" N to 22° 24' 3" N and longitude 84° 48' 35" E to 84° 56' 37" E (Plate No I).

	Latitude and Longitude	

Block	Point	GCS- WGS 1984 (DMS)		UTM- Zone-45 (m)	
		Latitude	Longitude	Northing	Easting
Baritola Block	B1	22° 23' 43.401" N	84° 48' 36.235" E	2478234.1720	274545.8520
	B2	22° 23' 37.315" N	84° 52' 58.463" E	2477939.4832	282044.6861
	B3	22° 23' 22.696" N	84° 52' 50.388" E	2477492.9918	281807.3529
	B4	22° 23' 17.653" N	84° 52' 47.603" E	2477339.0090	281725.4998
	B5	22° 22' 49.979" N	84° 52' 32.179" E	2476493.8932	281272.2257
	B6	22° 23' 13.781" N	84° 50' 35.038" E	2477273.8129	277931.3576
	B7	22° 23' 14.622" N	84° 48' 35.191" E	2477349.2444	274503.0868
Jaharitola Block	J1	22° 23' 37.315" N	84° 52' 58.463" E	2477939.4832	282044.6861
	J2	22° 23' 30.487" N	84° 54' 32.559" E	2477691.7452	284733.5031
	J3	22° 22' 18.262" N	84° 54' 45.544" E	2475464.8030	285074.1425
	J4	22° 22' 36.897" N	84° 54' 4.071" E	2476054.5464	283895.5748
	J5	22° 22' 58.385" N	84° 53' 29.782" E	2476729.2859	282923.8098
	J6	22° 23' 0.700" N	84° 53' 15.200" E	2476806.3763	282507.6636
	J7	22° 23' 22.696" N	84° 52' 50.388" E	2477492.9918	281807.3529
Mundatola Block	M1	22° 23' 17.653" N	84° 52' 47.603" E	2477339.0090	281725.4998
	M2	22° 23' 4.468" N	84° 52' 54.456" E	2476930.6201	281915.8140
	M3	22° 22' 21.491" N	84° 53' 41.596" E	2475589.6043	283245.9172
	M4	22° 22' 1.663" N	84° 55' 44.823" E	2474930.7295	286763.1253
	M5	22° 21' 32.131" N	84° 55' 55.470" E	2474018.0971	287055.2673
	M6	22° 22' 4.508" N	84° 52' 6.837" E	2475105.3326	280527.3669
Gopapur Block	G1	22° 23' 22.412" N	84° 54' 48.515" E	2477436.9932	285186.5112
	G2	22° 24' 2.298" N	84° 55' 55.502" E	2478637.5099	287119.6950
	G3	22° 22' 51.632" N	84° 56' 36.561" E	2476447.5713	288264.4163
	G4	22° 21' 51.146" N	84° 56' 9.967" E	2474597.3271	287478.0812
	G5	22° 22' 30.488" N	84° 55' 26.044" E	2475824.8690	286238.0657

	Villages	Hathibari, Baidyanathpur, Purunapani, Nuagaon villages
	Tehsil/Taluk	Nuagaon Tehsil
	District	Sundargarh
	State	Odisha
2.	**Area (hectares/ square kilometres)**	
	Block Area	Baritola Block: 7.34 sq km, Jaharitola Block: 4.26 sq km, Mundatola Block: 7.17 sq km, Gopapur Block: 6.39 sq km
	Forest Area	Non-Forest area.
	Government Land Area (Bilanam)	Data not available
	Charagaha	Data not available
	Private Land Area	Data not available
3.	**Accessibility**	
	Nearest Rail Head	The nearest Railway Stations is at Rourkela (South Eastern Railway) which is 35 km south of the proposed block.

	Road	The National Highway 320D passes 15 km south of the proposed blocks and the National Highway 143 passes through 7 km west of the block.
	Airport	The nearest airport is at Ranchi, which is about 175 km north of the block.
4.	**Hydrography**	
	Local Surface Drainage Pattern (Channels)	The proposed area falls in the foothills of the Bemta Mundia hillocks, which are rather flat with encircling hill ranges made up of distinct lithological units. Generally the quartzites, conglomerates and metabasic rocks form the hills, whereas the schists, phyllite and limestone/dolomite form the flat grounds. The minimum and maximum height of the ground varies from 230 m to as high as 260 m from m.s.l. The Khatma River and Deo are the major streams flowing through the area which are fed by other smaller tributaries.
	Rivers/ Streams	Khatma River, Deo River and its tributaries
5.	**Climate**	
	Mean Annual Rainfall	Average annual rainfall is 125 cm to 150 cm
	Temperature	Minimum temperatures: 11°C (Dec-Feb), Maximum temperatures: up to 44°C (March-June)
6.	**Topography**	
	Toposheet Number	73B/15
	Morphology of the Area	The area comprises of mostly gently undulating plane. The minimum and maximum height of the ground varies from 230 m to as high as 260 m from m.s.l. Thick alluvium accumulated due to the network of drainage has helped the area to form cultivable land.
7.	**Availability of baseline geoscience data**	
	Geological Map (1:50K/25K)	Bhukosh Map (1:50000)
	Geochemical Map	NGCM data available in Bhukosh. (No Geochemical anomaly for any commodities has been observed)
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	NGPM Gravity Data available in Bhukosh,
8.	**Justification for taking up Preliminary Exploration**	i. The proposed blocks are part of the amalgamated blocks (cluster of 10A 2(b) leases/ taken over leases) selected for further exploration by the State Technical Committee (JWG) on 06.02.2023. The State government allotted the blocks to MECL for necessary actions. The State Govt. of Odisha desired that some mineral prospects of the State be explored on priority basis through National Mineral Exploration Trust (NMET) fund so that those could be auctioned and

thereby earn revenue for the state along with the augmentation of reserve and resource of the country. Limestone occurrences in Sundargarh district in Odisha is among them.

ii. MECL has carried out preliminary field visit in the blocks where few limestone quarries were observed. MECL have collected few samples for limestone from the surface exposures which show 29.67 % to 52.66 % of CaO.

BLOCK	Sample No.	CaO%	MgO%
Baritola Block	S-02	45.57	5.35
	S-05	45.63	3.65
	S-06	52.66	1.93
Jaharitola/ Mundatola Block	S-01	32.49	16.44
	S-03	33.19	17.05
Gopapur Block	S-09	31.89	15.54
	S-10	29.67	14.31

iii. No exploration activities have been carried out in the block since the completion of the Systematic Thematic Mapping (STM) during FY 1979-80. The present exploration programme would help to generate the data and further estimation of resources which in turn will facilitate the State Govt. to put the blocks on auction platform.

iv. After enactment of the amendments in MMDR Act few limestone blocks in the surrounding area particularly the limestone of Gangpur group have been auctioned successfully which indicates demand of the limestone in the area.

v. Many active mines are producing limestone in the surrounding area by the different mining agencies.

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1.0.0 INTRODUCTION

1.1.0 Limestone is a sedimentary rock, originated mainly by chemical/ biochemical precipitation of carbonate minerals in a variety of depositional environments, ranging from marine to terrestrial. The marine system is either neritic (shelf) or pelagic (open-ocean) (James and Jones, 2016). Most of the limestone in geological history is deposited in neritic system. On the other hand, evidences show that pelagic limestones are in the operation since Jurassic time. In terrestrial setting carbonates are usually formed in lakes, springs, caves depending upon water temperature and local climate. Calcium carbonate ($CaCO_3$) in the form of calcite is the predominant mineral constituent of limestone. It also contains some amount of magnesium carbonate ($MgCO_3$) and/or dolomite ($CaMg(CO_3)_2$). Variable amount of ferruginous quartz, clay, pyrite, haematite, chert etc., present as non-carbonate minerals, control the quality/grade of limestone.

1.2.0 Limestone is primarily used to manufacture of cement. However, the uses of limestone, now a day, have not been confined only to construction material; rather the versatility in its uses in different industries made it a valuable mineral. In Iron & Steel Industry, limestone is used both in blast furnace and steel melting shop as a flux. In chemical industry, limestone is consumed to produce bleaching powder, toothpaste, calcium carbide etc. It is used as a purifier in the sugar industry. Limestone is also consumed by industries like paper, fertilizer and foundry etc.

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. Karnataka is the leading State having 24% of the total resources followed by Andhra Pradesh (13%), Rajasthan (12%), Gujarat (10%), Meghalaya (10%), Telangana (7%), Chhattisgarh (5%) and Madhya Pradesh (4%). The remaining 15% is shared by other states. Grade-wise, Cement grade (Portland) has leading share of about 68% followed by Unclassified grades (11%) and BF grade (6%).

1.4.0 India was the second largest cement producing country in the world after China. In 2019-20, the total consumption of limestone, as reported by different industries was 328.62 million tonnes registering negative growth of 0.87% over that of preceding

year. Cement was the major consuming industry accounting for 308.66 million tonnes (94%) consumption, followed by iron & steel 12.68 million tonnes (4%) and chemical5.29 million tonnes (2%). The remaining consumption was reported by aluminium, alloy steel, sugar, paper, fertilizer, glass, metallurgy, foundry, etc.

2.0.0 BACKGROUND

2.1.0 In view of the enactment of the MMDR Amendment Act, 2015 and Mineral Auction Rule, 2015 by the Govt. of India, the State administration of Odisha desired that some mineral prospects of the State be explored on priority basis through National Mineral Exploration Trust (NMET) fund so that those could be auctioned and thereby earn revenue for the state along with the augmentation of reserve and resource of the country. Limestone occurrences in Sundargarh district in Odisha is among them.

2.2.0 The proposed block is a cluster of 10A 2(b) leases/ taken over leases selected for further exploration by the State Technical Committee (JWG) on 06.02.2023. State government allotted the blocks to MECL for necessary actions. MECL has carried out preliminary field visit where limestone quarries were observed. MECL collected few samples for limestone from the surface exposures.

2.3.0 In light of preliminary field visit and requirement of DoMG Odisha proposal for preliminary exploration of limestone in Baritola (7.34 sq km), Jaharitola (4.26 sq km), Mundatola (7.17 sq km), Gopapur (6.39 sq km) Blocks is prepared and submitted for discussion. The details of the proposal are described in the following paragraphs.

3.1.0 LOCATION AND ACCESSIBILITY

3.1.1 The proposed Baritola, Jaharitola, Mundatola, Gopapur Blocks comprises of total 25.16 sq km area and lies in Nuagaon Tehsil of Sunadargarh District (Toposheet No: 73B/15), Odisha. Hathibari, Baidyanathpur, Purunapani, Nuagaon villages fall around the proposed area. The National Highway 320D passes 15 km south of the proposed blocks and the National Highway 143 passes through 7 km west of the block. The district Headquarter Sundargarh is 100 km south-west of the proposed blocks. All the villages in the area are well connected to each other and to the highways by motorable roads and tracks. The nearest Railway Stations is at Rourkela (South Eastern Railway) which is 35 km south of the proposed block. The nearest airport is at Ranchi, which is about 175 km north of the block. The blocks are bounded by latitude 22° 21' 32" N to 22° 24' 3" N and longitude 84° 48' 35" E to 84° 56' 37" E (Plate No I).

Table 2.1
Coordinates of Corner Points of Proposed Baritola, Jaharitola, Mundatola, Gopapur Blocks, Sundargarh District, Odisha

Sl. No.	Block	Points	GCS- WGS 1984 (DMS)		UTM- Zone-45 (m)		Area (sq. km.)
			Latitude	Longitude	Northing	Easting	
1	Baritola Block	B1	22° 23' 43.401" N	84° 48' 36.235" E	2478234.1720	274545.8520	7.34
		B2	22° 23' 37.315" N	84° 52' 58.463" E	2477939.4832	282044.6861	
		B3	22° 23' 22.696" N	84° 52' 50.388" E	2477492.9918	281807.3529	
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		J2	22° 23' 30.487" N	84° 54' 32.559" E	2477691.7452	284733.5031	
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3	Mundatola Block	M1	22° 23' 17.653" N	84° 52' 47.603" E	2477339.0090	281725.4998	7.17
		M2	22° 23' 4.468" N	84° 52' 54.456" E	2476930.6201	281915.8140	
		M3	22° 22' 21.491" N	84° 53' 41.596" E	2475589.6043	283245.9172	
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4	Gopapur Block	G1	22° 23' 22.412" N	84° 54' 48.515" E	2477436.9932	285186.5112	6.39
		G2	22° 24' 2.298" N	84° 55' 55.502" E	2478637.5099	287119.6950	
		G3	22° 22' 51.632" N	84° 56' 36.561" E	2476447.5713	288264.4163	
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		G5	22° 22' 30.488" N	84° 55' 26.044" E	2475824.8690	286238.0657	

3.2.0 PHYSIOGRAPHY AND DRAINAGE

3.2.1 The proposed area falls in the foothills of the Bemta Mundia hillocks, which are rather flat with encircling hill ranges made up of distinct lithological units. Generally the quartzites, conglomerates and metabasic rocks form the hills, whereas the schists, phyllite and limestone/dolomite form the flat grounds. The minimum and maximum height of the ground varies from 230 m to as high as 260 m from m.s.l.

3.2.2 The Khatma River and Deo River are the major streams flowing through the area which are fed by other smaller tributaries. All the streams belongs to the tributaries of Koel River.

3.3.0 CLIMATE

3.3.1 Broadly, the climate of the areas can be described as moderately hot. The maximum temperature recorded in these areas is 44°C in summer and the minimum 35°C in

winter. The area experiences comparatively a hotter spell of dry summer as it mainly a flat terrain with less of vegetations than the other parts. The rainy season sets in June and continuous upto the end of September. The average rainfall in these parts of the district varies from 125cm to 150cm. per annum.

3.4.0 FLORA AND FAUNA

3.4.1 The area has vegetation cover comprising bushes, shrubs, Sabai grass. Jackal is found in this part of the area.

4.1.0 REGIONAL GEOLOGY

4.1.1 A group of argillaceous, arenaceous and calcareous metasediments and sometimes sediments of carbonaceous nature form the main rock types of the areas. In general the mapped areas comprise mainly of the assemblages of conglomerate, schist and phyllite, quartzite, metabasic rocks, limestone-dolomite/calc silicates and carbonaceous phyllite associated with granites. The persistent E-W trending Raghunathpali conglomerate forms the major lineament in the area which divides the northerly lying Gangpur Group of rocks from the rock assemblages to its south.

4.1.2 The rocks of Gangpur basin extend nearly up to the Bihar-Orissa border and show complex structural history. In contrast, the rock assemblages lying south of Raghunathpalli conglomerate offers different lithological and structural set-up.

Table 4.1: Regional Stratigraphy of the area (After GSI, 1980)

Age	Group/ Stage	Lithology
Quaternary to Recent		Soil and alluvium Laterite Tourmaline bearing vein quatz Granite(Pegmatitic)
Lower Proterozoic	**Gangpur Group**	Carbon quartzite
		Dolomite
		Phyllite with bands of cross bedded quatzite
		Limestone
		Metabasic rock
		Carbonaceous phyllite
		Phyllite and garnetiferous mica schist with thin bands of calcareous rocks
		Sheared conglomerate
Archean to Lower Proterozoic	**Iron Ore Group**	Granite and granite gneiss
		Carbonphyllite
		Calc-silicate rock
		Quartzite and silicified cherty quartzite
		Metabasic rock
		Phyllite and quartz mica schist
		Quartzite and quartz schist (locally magnetite bearing)
		Conglomerate

4.2.0 GEOLOGY OF BLOCK

4.2.1 The rocks belonging to the Gangpur Group, exposed in the mapped area, are described in the following paragraphs. The group has a persistent conglomerate zone at the base and is characterized by prolification of calcareous facies.

i. Phyllite and mica schist with bands of calcareous rock: The schist shows wide variation from low grade phyllite to dominant quartz-mica (mainly biotite) schist with local development of garnet and staurolite. It conformably overlies the conglomerate and quartzite. The phyllite is greenish white to ash grey coloured rock. Being softer in nature than the schist it weathers out to soil and now used as cultivated land. Under microscope it is found to contain fine flakes of mica (mainly muscovite) chloritoid and few granules of biotite, muscovite, sericite and chlorite with a little tourmaline and opaque minerals as accessories. Often garnet and staurolite are found as anherdal porphyroblasts within the schists. The staurolite shows twinning and is very often altered to biotite. Discontinuous bands of impure calcareous rock occur within the schist and phyllite. The surface width of this limestone-dolomite rock varies from a few meters, in different locations as mentioned above, to 100m.

ii. Carbonaceous phyllite: Carbonaceous phyllite occur as thin and long band conformably between the schist below and carbonate facies rocks above. Thus considering its lithostratigraphic importance and persistence in outcrop, it is tentatively taken as a marker bed in the area. The width of the band varies for less than 50m to as much as 500m. The carbonaceous phyllite is dull coal black in colour, soft in nature and soils hand. The colour often grades into ash grey colour when the rock assumes a slaty appearance.

iii. Metabasic rock: It is found to be associated with carbonphyllite. At some place it is altered over to a very light buff coloured fine-grained rock made up almost wholly of ferruginous matter. Locally at places it shows a typical trough shaped colour lamination. Under the microscope the rock contains mainly hornblende, actinolite, quartz and chlorite with some altered pyroxene minerals. The epidote sphene and some ilmenite are also observed as accessory minerals.) and (swelling and pinching structure) in the rocks might suggests its derivation from extrusive percentage.

iv. Limestone: Limestone is an important litho-unit of the Gangpur metasediments. It occurs as an economically exploitable band and also as other small occurrences. These small limestone bands vary in length from 5m to as much as 60m. The high angle about (75°) southerly plunging fold of the limestone has a structural control on the mode of distribution of its outcrops. Megascopically, the limestone and dolomitic limestone are dark bluish grey to brownish white in colour.

v. Dolomite: Dolomite occurs as a thick band varying in width from more than 50m in to more than a km. The length of the band extends for about 5km-6km at places. The rock shows gradational contact with underlying phyllite and the overlying

teremolite bearing calcsilicate rock. The dolomite is hard creamy to yellow to yellowish white in colour and shows saccaroidal texture.

vi. Carbonaceous Quartzite: Carbonaceous quartzite is the youngest of the Gangpur formations exposed in the area and occurs as a small band. This is a hard compact rock and contains thin lamination of quartzose band thickness varying from a few mms to 1 cm.

vii. Laterite: Discontinuous and elongated patches of laterite occur in the area. The outcrop pattern of the laterite also shows traces of a broad open fold in the area. It is mainly a ferruginous laterite capping band of quartzite, carbon phyllite and schists/phyllite. It appears that lateritisation has affected only the sheared and deformed band of quartzite sequence.

viii. Soil and alluvium: The major part of low lying terrains in all the areas mapped is covered by a very light coloured soil. It mostly contain clay and silt. The soil appears to have been primarily derived from mica schist and phyllite.

5.0.0 PREVIOUS WORK AND RECOMMENDATION

5.1.0 During the field season 1979-80, Das, G.C., Bhattacharya A.K., Bhattacharya A., & Panda P.K. carried out systematic geological mapping in part of Sundargarh District, Odisha. Total 945 sq km area was mapped in 1:50000 scale where the principal rock types met were conglomerate, schists, phyllite, quartzite, calc-silicate rocks, metabasics and carbonphyllite of the Iron Ore Group, and conglomerate (Raghunathpali) schists, carbonphyllite, limestone/dolomite, quartzite and metabasic rock of the Gangpur Group, and the associated granites. Structurally, the area occurred to the south of Raghunathpali conglomerate with complex polyphase deformational history having four stages of folding and associated shearing effects and transverse faults. Parts of mapping area occurring within the Gangpur antiform showed easterly closing refolded structure. The rocks around this area attained a stage of medium to high grade metamorphism of amphibolite facies with some retrogressive effects at places.

The main Puranapani-Hatibari limestone/dolomite band, along with several other local occurrences of limestone and dolomite were located in the area. Along with this a separate thick (the surface width varying from 10m to 200m) band of dolomite extending for about 5km from Potab to Kundrugutu-Khariajora in WSW directions with 60° to 70° dip due south was also observed. A composite sample (drawn by combining the individual samples collected at 1m interval) collected from this band assessed CaO and MgO as 9.38% and 7.34% respectively along with 58.03% of acid insoluble. The proposed Limestone Blocks falls 10 km south of the Potab-Kundrugutu-Khariajora limestone band having same geological setup suitable for limestone mineralization.

5.2.0 Singh S. N. and Sharma A. S. During the field season 1991- 1992, GSI carried out ground evaluation of Airborne Magnetic and Electromagnetic anomalies in parts of Bankura and Purulia districts of West Bengal, Gumla district of Bihar and Sundergarh district of Orissa (73I/11, 12, 15, 16 and 73B/14, 15). A total of 221 low priority EM anomaly intercepts were evaluated on the Ground. Most of these airborne EM anomaly intercepts were located in granitic terrain, alluvium, soil covered flat/undulating ground; low lying areas, cultivated paddy fields; near the course of the nala, rivulets, ravines, Rivers. The causative source of the most of these airborne E.M. anomaly intercepts were assigned to the factors related to other than sulphide/ basemetal mineralisation. However, six airborne E.M. anomaly intercepts were significant having favourable host represented by tremolite-actinolite schist, calc-silicate rocks, interesting geological structural (brecciation, silicification, fracturing, shattering and shearing) and surficial manifestation of mineralisation such as malachite and azurite stains. At places, specks and stringers of Chalcopyrite, pyrite, pyrrhotite were noticed in the rock exposures of the area. The analytical report of 107 samples collected from the area was not too encouraging with respect to basemetal mineralisation. The assay value for precious metal was reported to be 0.1 ppm Au and silver value 1 ppm. Panning for Au was reported to be carried out regularly by the local people in some of these areas. The 06 airborne EM anomalies do not fall in the Sundargarh District of Odisha and are mostly concentrated in Bankura and Purulia District of West Bengal.

5.3.0 The block consist of few expired/ taken over/ 10 A 2(b) leases however no previous exploration or mining data with respect to the block is available with the State Govt. of Odisha. The present exploration programme would help to generate the data and further estimation of resources.

5.4.0 Geochemical NGCM data for the area is available in NGDR Portal, GSI. The same has been studied and no geochemical anomaly was observed in the proposed area.

6.0.0 OBJECTIVE OF THE PROPOSED PRELIMINARY EXPLORATION (G-3 STAGE):

6.1.0 The present exploration program (G3) has been formulated on the basis of the outcomes of previous work and recent field traverses to fulfill the following objectives:

i. Geological mapping on 1:4000 scale to record the lithological and structural features present within the proposed block
ii. Topographical contouring on 1:4000 scale to generate the topography of the area.
iii. Exploratory drilling will be carried out at 800 m grid interval to prove the limestone occurrences upto 50 m vertical depth.

iv. To establish the various grades of limestone along with the estimation of resources (333) as per the UNFC norms & Minerals (Evidence of Mineral Contents) Rules- 2015.

v. To assess the feasibility of the block for auction purpose.

7.0.0 PLANNED METHODOLOGY

7.0.1 In accordance to the objective set for Preliminary Exploration (G-3) of the block, the exploration programme is proposed. The Exploration shall be carried out as per Minerals (Evidence of Mineral Contents) Rule-2015. Accordingly, the following scheme of exploration is formulated in order to achieve the objectives. The details of different activities to be carried out are presented in subsequent paragraphs.

7.1.0 GEOLOGICAL MAPPING

7.1.1 Detailed geological mapping will be carried out in the 25.16 sq.km area on 1:4,000 scale. Rock types, their contact, structural features will be mapped by taking traverses and marked in the map. The surface disposition of limestone will be marked in the map.

7.1.2 Thin section study on drill cores samples would be done for ascertaining the petrographic characteristics. These samples would be drawn from ore zones and host rocks. A provision of 3 specimens for petrographic study has been kept in each block, i.e. total 12 nos. of Petrographic samples will be carried out.

7.2.0 TOPOGRAPHICAL SURVEY

7.2.1 The block area would be tied up with the triangulation network and contouring/ topographical survey will be updated in the entire block area of 25.16 sq.km. The surface features in the block area will be picked up and marked on the map on 1:4,000 scale. The reduced levels and co-ordinates of boreholes and boundary coordinates would be determined. The contouring will be carried out at 2m interval. The exploratory boreholes and block boundary (total 25 block boundary points and 57 boreholes) shall be surveyed by DGPS and total station in WGS-84 datum, for demarcation of block boundary/corner point's.

7.3.0 EXPLORATORY DRILLING

7.3.1 The present scheme for limestone exploration includes 3625m drilling in 57 nos. of boreholes with an average depth of 65 m. In all the blocks limestone occurs as a steep inclined body with thickness varying between 400 m to 900 m hence in the strike direction 800 m spacing and along the dip direction 400 m spacing of boreholes have been planned to intersect the limestone where qualitative and

quantative information can be assessed. Conventional polygon will not suffice to assess the resources and quality of such inclined limestone body. All the proposed boreholes have been planned to intersect the limestone at 50 m vertically from the surface.

7.3.2 In the Baritola block, the strike of the limestone body is E-W with an average dip of 70°S. Thus the proposed boreholes have been planned with dip of 50° towards north. The strike interval for the boreholes have been considered 800 m with the dip separation of 400 m as the dip of the limestone is 70°S which is near vertical (Due to thicker and steep dipping limestone body, wider spacing boreholes along dip may not assess the actual quality of the limestone). The total no of proposed boreholes for Baritola Block is 20 with a total drilling of 1300 m.

7.3.3 In the Jaharitola block, the strike of the limestone body is E-W with an average dip of 40°N. Thus the proposed boreholes have been planned with dip of 50° towards south. The strike interval for the boreholes have been considered 800 m with the dip separation of 400 m as the dip of the limestone is 40°N (Due to thicker and steep dipping limestone body, wider spacing boreholes along dip may not assess the actual quality of the limestone). The total no of proposed boreholes for Jaharitola Block is 10 with a total drilling of 650 m.

7.3.4 In the Mundatola block, the strike of the limestone body is E-W with an average dip of 60°S. Thus the proposed boreholes have been planned with dip of 50° towards north. The strike interval for the boreholes have been considered 800 m with the dip separation of 400 m as the dip of the limestone is 60°S (Due to thicker and steep dipping limestone body, wider spacing boreholes along dip may not assess the actual quality of the limestone). The total no of proposed boreholes for Mundatola Block is 11 with a total drilling of 715 m.

7.3.5 In the Gopapur block, the strike of the limestone body is E-W with an average dip of 30°N. Thus the proposed boreholes have been planned with dip of 60° towards south. The strike interval for the boreholes have been considered 800 m with the dip separation of 400 m as the dip of the limestone is 30°N (Due to thicker and steep dipping limestone body, wider spacing boreholes along dip may not assess the actual quality of the limestone). The total no of proposed boreholes for Gopapur Block is 16 with a total drilling of 960 m.

7.4.0 CORE LOGGING

7.4.1 The borehole cores would be logged systematically. Viz. details of the litho units, colour, structural feature, texture, besides the recovery, rock quality designation (RQD) and graphite ore type would be recorded. On the basis of these parameters, grade of limestone can be broadly presented and it will also be helpful in sampling.

7.5.0 CORE SAMPLING

7.5.1 Primary samples will be drawn at 1m interval subject to change in lithology and core recovery. The following parameters shall be considered while sampling the drill cores.

1) Colour, grain size.
2) Fossil variation.
3) Thin intercalations of shale/siltstone.
4) Partially weathered zone.

7.5.2 For preparation of samples the borehole core will be longitudinally split into two equal halves by using core splitter. One half will be powdered to -200 mesh size and the other half will be kept for future studies. The powdered material will be mixed thoroughly and about 100 gm of samples will be taken for chemical analysis by successive coning and quartering as primary samples and rest of the material (-200 mesh size) will be kept as duplicate half for future reference. All primary and check samples will be analysed for 09 radicals i.e., CaO, MgO, SiO_2, Fe_2O_3, Al_2O_3, SO_3, P_2O_5, K_2O & LOI.

7.5.3 Total 3625 numbers of primary samples for limestone are likely to be generated from drill cores. It has been considered that 3 m soil would be encountered in each borehole. The drilling in Baritola Block would generate 1240 nos, Jaharitola Block would generate 620 nos, Mundatola Block would generate 682 nos and Gopapur Block would generate 912 nos of core samples approximately. Around 10% of Primary samples i.e. total 345 nos will be sent to NABL External Labs for analysis of 9 radicals i.e., CaO, MgO, SiO_2, Fe_2O_3, Al_2O_3, SO_3, P_2O_5, K_2O & LOI as external check samples.

7.6.0 Bulk Density Determination

7.6.1 A provision of 3 samples for bulk density determination has been kept in each block i.e. total 12 samples will be carried out for Bulk Density determination.

7.7.0 Quantum of work:

7.7.1 The quantum of work proposed by MECL in Baritola, Jaharitola, Mundatola, Gopapur Limestone (G-3) Blocks is given in Table-7.1.

Table-7.1

Proposed Quantum of Exploratory Work in Baritola, Jaharitola, Mundatola, Gopapur Limestone (G-3) Blocks, District- Sundargarh, Odisha.

Sl. No.	Item of Work	Proposed Quantum of Work in each block					Total Quantum
		Unit	Baritola	Jaharitola	Mundatola	Gopapur	
1	**Topographical Survey (1:4000)**	sq. km	7.34	4.26	7.17	6.39	**25.16**
2	**Geological Mapping (1:4000)**	sq. km	7.34	4.26	7.17	6.39	**25.16**
3	**Core Drilling**	m.	1300 (20 nos.)	650 (10 nos.)	715 (11 nos.)	960 (16 nos.)	**3625 (57 nos.)**
4	**DGPS Survey**	Nos.	BH-20 BP- 4	BH-10 BP- 7	BH-11 BP- 6	BH-16 BP- 5	(BH-57 BP- 22)=79
5	**Sample Preparation & Chemical Analysis**						
i	**Primary samples for 9 radicals i.e., CaO, MgO, SiO_2, Fe_2O_3, Al_2O_3, SO_3, P_2O_5, K_2O, Na_2O & LOI**	Nos.	1240	620	682	912	**3454**
ii	**External Check sample (10% of Primary samples) for 9 radicals i.e., CaO, MgO, SiO_2, Fe_2O_3, Al_2O_3, SO_3, P_2O_5, K_2O, Na_2O & LOI**	Nos.	124	62	68	91	**345**
6	**Petrographic Studies**	Nos	3	3	3	3	**12**
7	**Bulk Density Determination**	Nos	3	3	3	3	**12**
8	**Report Preparation (Digital format)**	Nos.	1	1	1	1	**4**

7.9.0 MANPOWER DEPLOYMENT

7.9.1 Manpower deployment List may be provided later.

8.0.0 TIMELINE AND BREAK-UP OF EXPENDITURE

8.1.0 The proposed exploration programme is planned for Preliminary Exploration (G-3). The work activities like camp setting, geological work, geophysical survey, drilling & laboratory work, report writing will be completed within 18 months' time. The bar chart showing activities wise time schedule is placed at **Table-8.1.**

Table-8.1

Estimated time schedule for Preliminary Exploration (G-3) for Limestone in Baritola (7.34 sq km), Jaharitola (4.26 sq km), Mundatola (7.17 sq km), Gopapur (6.39 sq km) Blocks, Districts: Sundargarh, State: Odisha [Schedule timeline- 18 months]

Sl. No.	Particulars	Months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Camp Setting/ mobilization	Months																		
2	Geologist days (2 party)	days																		
3	Survey Days (1 party)	days																		
4	Drilling (2 rig)	m																		
5	Sampling days	days																		
6	Camp winding	Months																		
7	Laboratory Studies	days																		
8	Geologist days, HQ	days																		
9	Report Writing with Peer Review	days																		

8.2.0 Tentative cost has been estimated based on Schedule of Charges (SoC) of projects funded by National Mineral Exploration Trust (NMET) w.e.f. 01/04/2020 and the total estimated cost is **Rs. 829.86 Lakh.** The summary of tentative cost estimates for Preliminary Exploration is given in **Table No.- 6.3** and details of tentative cost estimates are given as Annexure-I.

Table No.- 8.2

Summary of Tentative cost estimates for Preliminary Exploration in Baritola, Jaharitola, Mundatola, Gopapur Limestone (G-3) Blocks

Sl. No.	Item	Total
1	Geological Work	10,291,776
2	Drilling	45916596
3	Laboratory Studies	11,498,640
	Sub total	**67707012**
4	Report	2000000
5	Peer Review	120,000
6	Proposal Prepration	500,000.00
	Total	**70327012**
7	GST (18%)	12658862.16
Total cost including 18% GST		**82985874**
SAY, in Lakhs		**829.86**

9.0.0 JUSTIFICATION

9.1.0 The proposed blocks are part of the amalgamated blocks (cluster of 10A 2(b) leases/ taken over leases) selected for further exploration by the State Technical Committee (JWG) on 06.02.2023. The State government allotted the blocks to MECL for necessary actions. The State Govt. of Odisha desired that some mineral prospects of the State be explored on priority basis through National Mineral Exploration Trust (NMET) fund so that those could be auctioned and thereby earn revenue for the state along with the augmentation of reserve and resource of the country. Limestone occurrences in Sundargarh district in Odisha is among them.

9.2.0 MECL has carried out preliminary field visit in the blocks where few limestone quarries were observed. MECL have collected few samples for limestone from the surface exposures which show 29.67 % to 52.66 % of CaO.

BLOCK	Sample No.	CaO%	MgO %	Al_2O_3 %	SiO_2 %	Fe_2O_3 %	SO_3 %	P_2O_5 %	K_2O %	LOI%
Baritola Block	S-02	45.57	5.35	1.34	4.56	2.11	0.09	0.02	0.69	39.61
	S-05	45.63	3.65	2.42	10.03	1.79	0.04	0.02	0.84	35.21
	S-06	52.66	1.93	0.98	4.72	0.88	0.02	0.01	0.30	38.32
Jaharitola/ Mundatola Block	S-01	32.49	16.44	0.59	4.23	1.39	0.05	0.01	0.04	44.48
	S-03	33.19	17.05	0.39	1.65	1.51	0.04	0.01	0.08	45.79
Gopapur Block	S-09	31.89	15.54	0.82	4.51	2.66	0.48	0.03	0.42	42.27
	S-10	29.67	14.31	3.23	6.86	3.61	0.01	0.03	1.15	40.73

9.3.0 No exploration activities have been carried out in the block since the completion of the Systematic Thematic Mapping (STM) during FY 1979-80. The present exploration programme would help to generate the data and further estimation of resources which in turn will facilitate the State Govt. to put the blocks on auction platform.

9.4.0 After enactment of the amendments in MMDR Act few limestone blocks in the surrounding area particularly the limestone of Gangpur group have been auctioned successfully which indicates demand of the limestone in the area.

9.5.0 Many active mines are producing limestone in the surrounding area by the different mining agencies.

10.0.0 REFERENCES

i. G. C. Das, A. K. Bhattacharya, A. Bhattacharya, & P. K. Panda, F.S. 1979-80, GSI cReport on systematic geological mapping in parts of Sundargarh District, Odisha.

ii. Singh S. N. and Sharma A. S. F.S. 1991- 1992, GSI, Ground evaluation of Airborne Magnetic and Electromagnetic anomalies in parts of Bankura and Purulia districts of West Bengal, Gumla district of Bihar and Sundergarh district of Orissa (73I/11, 12, 15, 16 and 73B/14, 15).

11.0.0 LIST OF PLATES

1. Plate-I: Location Map of Limestone Blocks (Baritola, Jaharitola, Mundatola, Gopapur Blocks) for Preliminary Exploration, Nuagaon Tehsil, Sundargarh District, Odisha.

2. Plate-II: Regional Geology Map showing Limestone Blocks (Baritola, Jaharitola, Mundatola, Gopapur Blocks) for Preliminary Exploration, Nuagaon Tehsil, Sundargarh District, Odisha.

3. Plate-III: Geology Map showing Limestone Blocks (Baritola, Jaharitola, Mundatola, Gopapur Blocks) for Preliminary Exploration, Nuagaon Tehsil, Sundargarh District, Odisha.

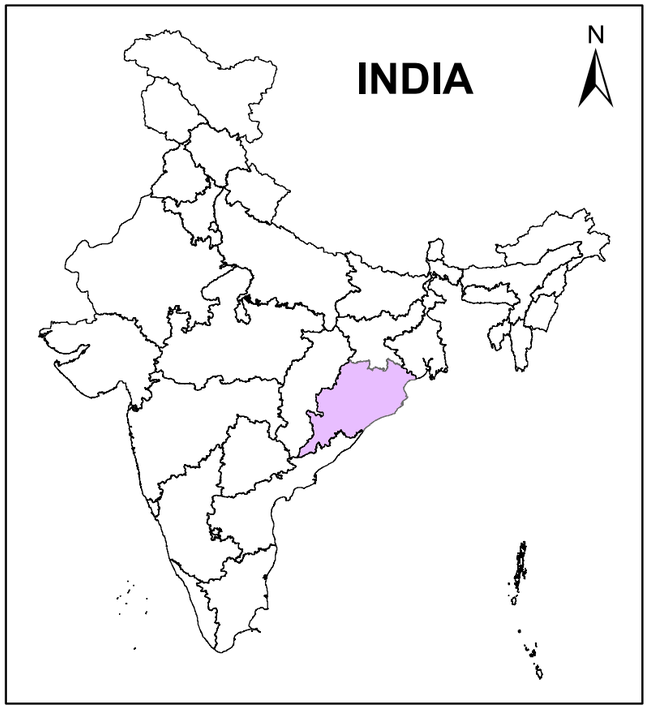
4. Plate-IV: Borehole Loaction Plan for Preliminary Exploration of Limestone in Baritola, Jaharitola, Mundatola, Gopapur Blocks, Nuagaon Tehsil, Sundargarh District, Odisha.

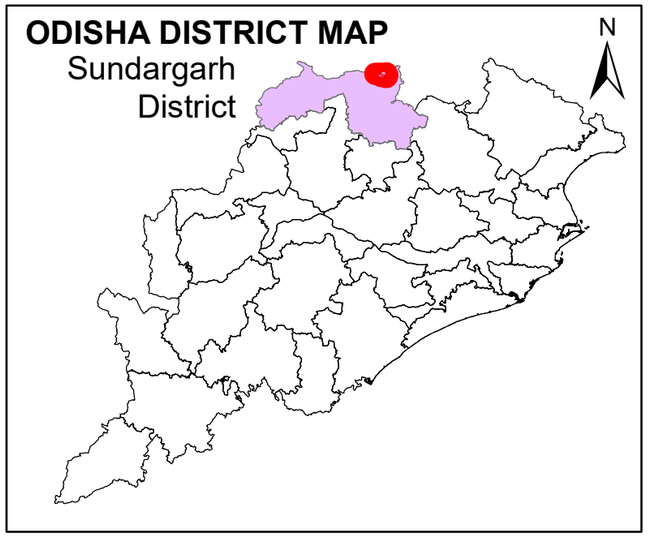
5-8. PLATE-VA, VB, VC, VD: Representative Geological Cross Sections of Baritola, Jaharitola, Mundatola, Gopapur Blocks, Nuagaon Tehsil, Sundargarh District, Odisha.

12.0.0 LIST OF ANNEXURES

- Estimated Time Schedule and Details of Tenative Cost for Preliminary Exploration (G-3) for Limestone in Baritola, Jaharitola, Mundatola, Gopapur Blocks (Area- 25.16 sq. Km), Districts: Sundargarh, State: Odisha

Location Map of Limestone Blocks (Baritola, Jaharitola, Mundatola, Gopapur Blocks) for Preliminary Exploration, Nuagaon Tehsil, Sundargarh District, Odisha

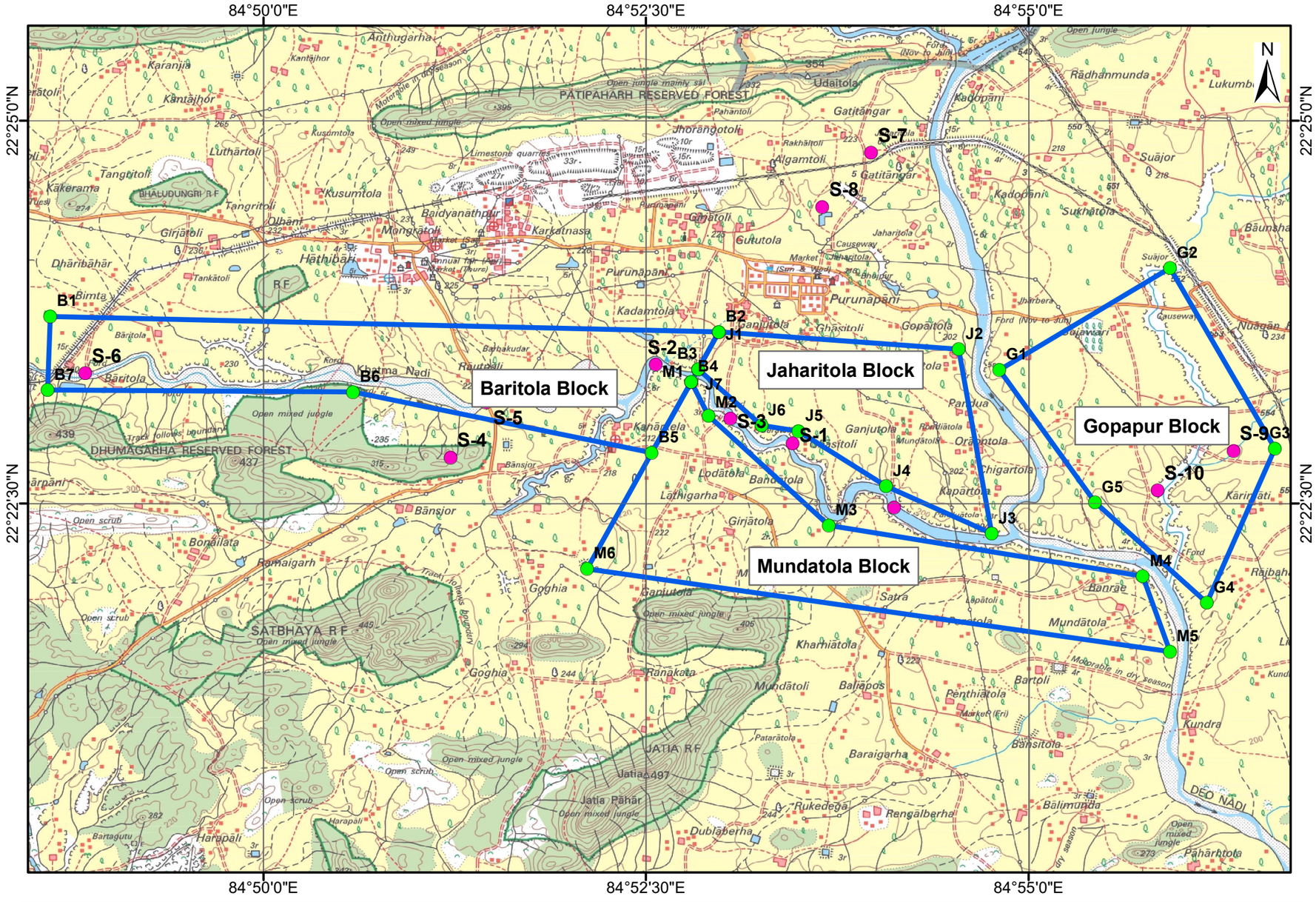




Source: Part of Survey of India
Toposheet No. 73B/15

Legend

- Corner Points of Proposed Limestone Blocks
- Proposed Limestone Blocks
- Field Sample Location

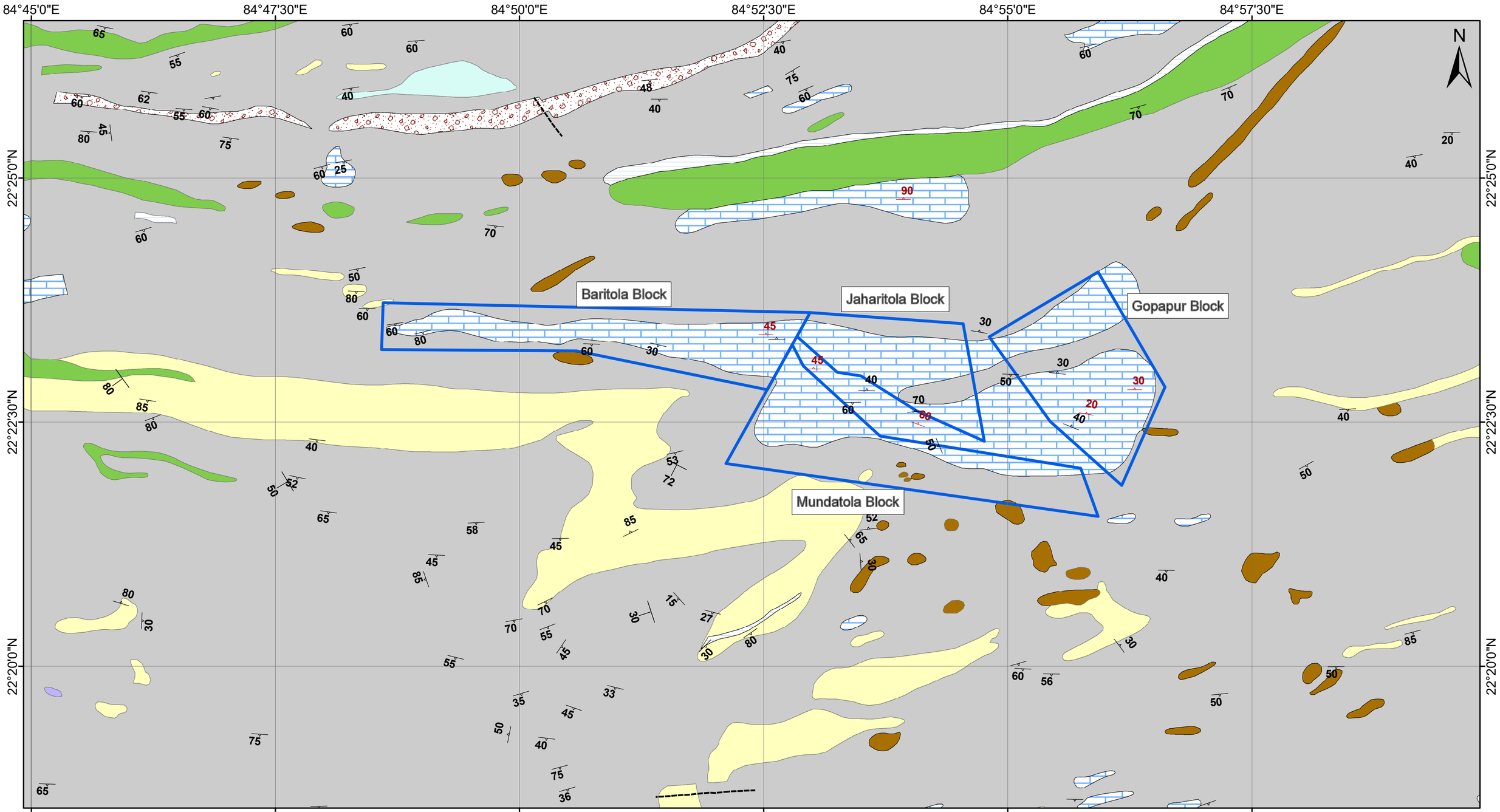


Sl. No.	Block	Points	Latitude(DMS)	Longitude (DMS)	Area (sq. km.)
1	Baritola Block	B1	22° 23' 43.401" N	84° 48' 36.235" E	7.34
		B2	22° 23' 37.315" N	84° 52' 58.463" E	
		B3	22° 23' 22.696" N	84° 52' 50.388" E	
		B4	22° 23' 17.653" N	84° 52' 47.603" E	
		B5	22° 22' 49.979" N	84° 52' 32.179" E	
		B6	22° 23' 13.781" N	84° 50' 35.038" E	
		B7	22° 23' 14.622" N	84° 48' 35.191" E	
2	Jaharitola Block	J1	22° 23' 37.315" N	84° 52' 58.463" E	4.26
		J2	22° 23' 30.487" N	84° 54' 32.559" E	
		J3	22° 22' 18.262" N	84° 54' 45.544" E	
		J4	22° 22' 36.897" N	84° 54' 4.071" E	
		J5	22° 22' 58.385" N	84° 53' 29.782" E	
		J6	22° 23' 0.700" N	84° 53' 15.200" E	
		J7	22° 23' 22.696" N	84° 52' 50.388" E	

Sl. No.	Block	Points	Latitude(DMS)	Longitude (DMS)	Area (sq. km.)
3	Mundatola Block	M1	22° 23' 17.653" N	84° 52' 47.603" E	7.17
		M2	22° 23' 4.468" N	84° 52' 54.456" E	
		M3	22° 22' 21.491" N	84° 53' 41.596" E	
		M4	22° 22' 1.663" N	84° 55' 44.823" E	
		M5	22° 21' 32.131" N	84° 55' 55.470" E	
		M6	22° 22' 4.508" N	84° 52' 6.837" E	
4	Gopapur Block	G1	22° 23' 22.412" N	84° 54' 48.515" E	6.39
		G2	22° 24' 2.298" N	84° 55' 55.502" E	
		G3	22° 22' 51.632" N	84° 56' 36.561" E	
		G4	22° 21' 51.146" N	84° 56' 9.967" E	
		G5	22° 22' 30.488" N	84° 55' 26.044" E	

PLATE-I

Regional Geology Map showing Limestone Blocks (Baritola, Jaharitola, Mundatola, Gopapur Blocks) for Preliminary Exploration, Nuagaon Tehsil, Sundargarh District, Odisha



Legend

- PROPOSED LIMESTONE BLOCKS
- CARBONACEOUS PHYLLITE
- CONGLOMERATE AND QUARTZITE
- GRANITE / GANGPUR GRANITE
- LATERITE
- LIMESTONE, DOLOMITE, CALC SILICATE ROCKS
- METABASIC ROCKS,HORNBLENDE SCHIST
- QUARTZ VEIN/REEF
- QUARTZITE
- SLATE, PHYLLITE, MICA SCHIST
- FAULT
- BEDDING
- CLEAVAGE/FOLIATION/SCHISTOSITY (S1)
- JOINT
- FOLIATION

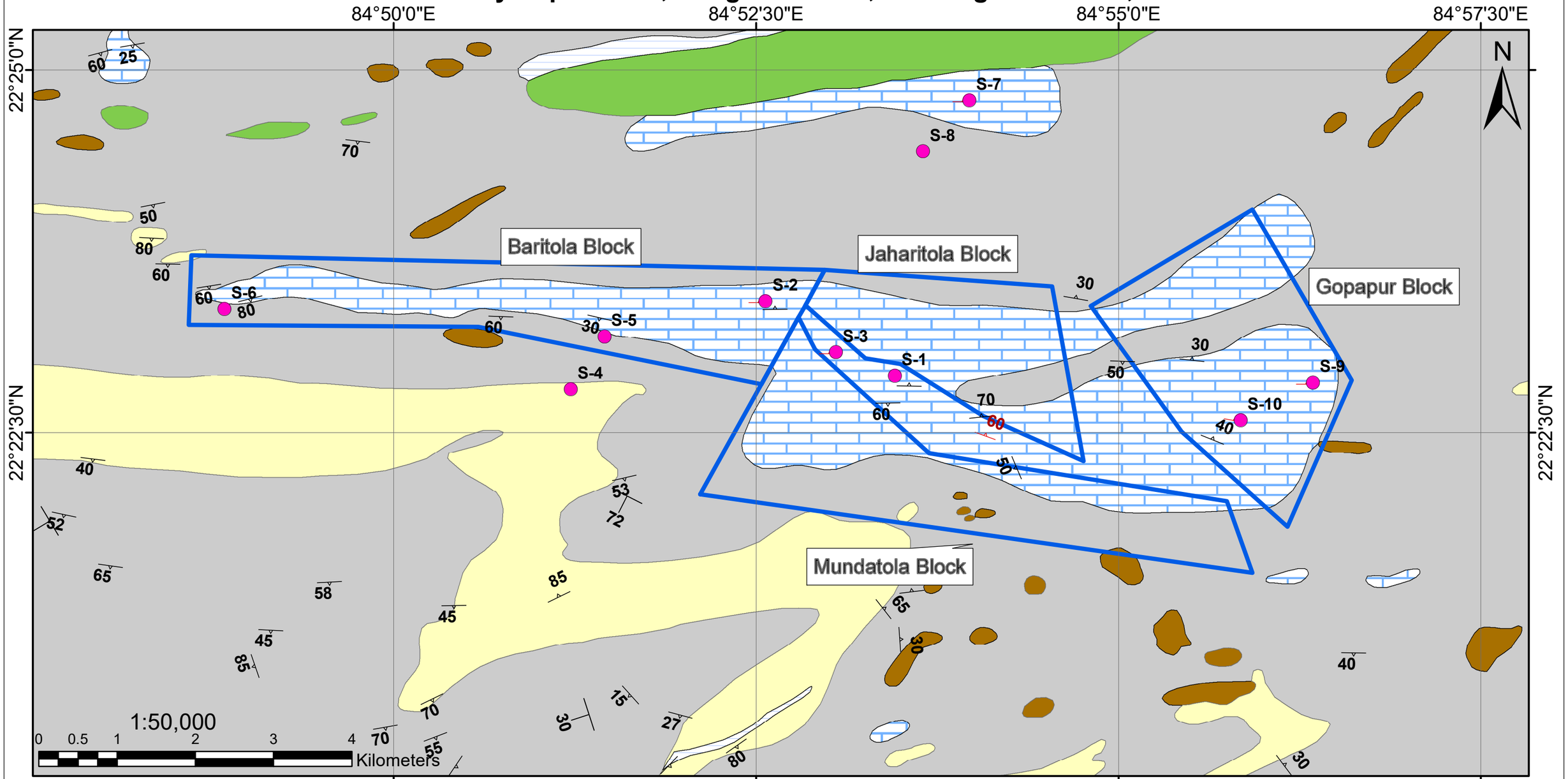
1:50,000

0 1 2 4 6 8 Kilometers

Source: NGDR Portal

PLATE-II

Geology Map showing Limestone Blocks (Baritola, Jaharitola, Mundatola, Gopapur Blocks) for Preliminary Exploration, Nuagaon Tehsil, Sundargarh District, Odisha



Legend

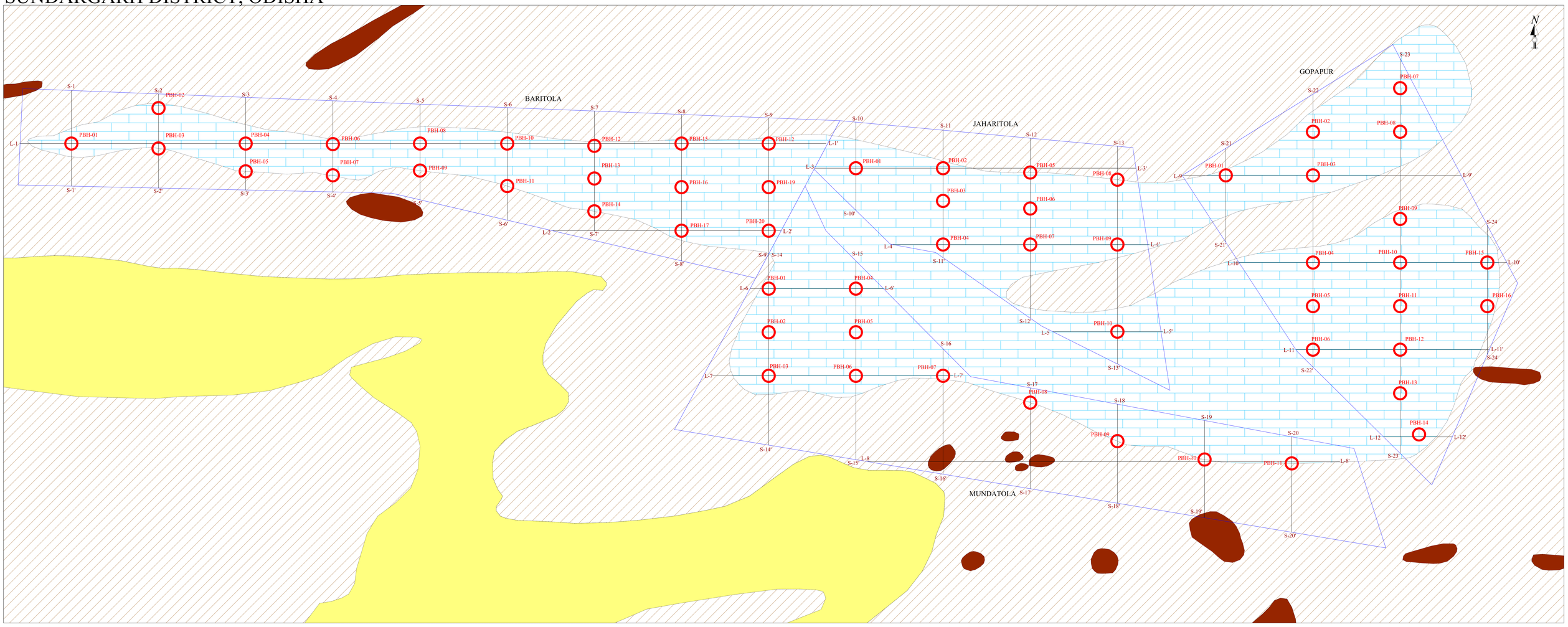
Source: NGDR Portal

- PROPOSED LIMESTONE BLOCKS
- CARBONACEOUS PHYLLITE
- LATERITE
- LIMESTONE, DOLOMITE, CALC SILICATE ROCKS
- METABASIC ROCKS,HORNBLENDE SCHIST
- QUARTZITE
- SLATE, PHYLLITE, MICA SCHIST
- MECL Sample Location
- BEDDING
- CLEAVAGE/FOLIATION/SCHISTOSITY (S1)
- JOINT
- FOLIATION

BLOCK	Sample No	CaO%	MgO%	Al_2O_3%	SiO_2%	Fe_2O_3%	SO_3%	P_2O_5%	K_2O%	LOI%
Baritola	S-02	45.57	5.35	1.34	4.56	2.11	0.09	0.02	0.69	39.61
	S-05	45.63	3.65	2.42	10.03	1.79	0.04	0.02	0.84	35.21
	S-06	52.66	1.93	0.98	4.72	0.88	0.02	0.01	0.30	38.32
Jaharitola/ Mundatola	S-01	32.49	16.44	0.59	4.23	1.39	0.05	0.01	0.04	44.48
	S-03	33.19	17.05	0.39	1.65	1.51	0.04	0.01	0.08	45.79
Gopapur	S-09	31.89	15.54	0.82	4.51	2.66	0.48	0.03	0.42	42.27
	S-10	29.67	14.31	3.23	6.86	3.61	0.01	0.03	1.15	40.73
	S-07	52.88	1.67	0.35	1.51	0.78	0.03	<0.01	0.17	42.48
	S-08	32.92	17.03	1.05	2.35	0.91	0.02	0.01	0.38	45.17
	S-04	0.41	0.55	3.93	91.08	1.05	0.10	0.07	1.05	1.47

PLATE-III

PROPOSED BOREHOLE LOCATION PLAN FOR BARITOLA (7.34 sq km), JAHARITOLA (4.26 sq km), MUNDATOLA (7.17 sq km), GOPAPUR (6.39 sq km)BLOCKS, SUNDARGARH DISTRICT, ODISHA



INDEX

- LATERITE
- QUARTZITE
- LIMESTONE
- PHYLLITE

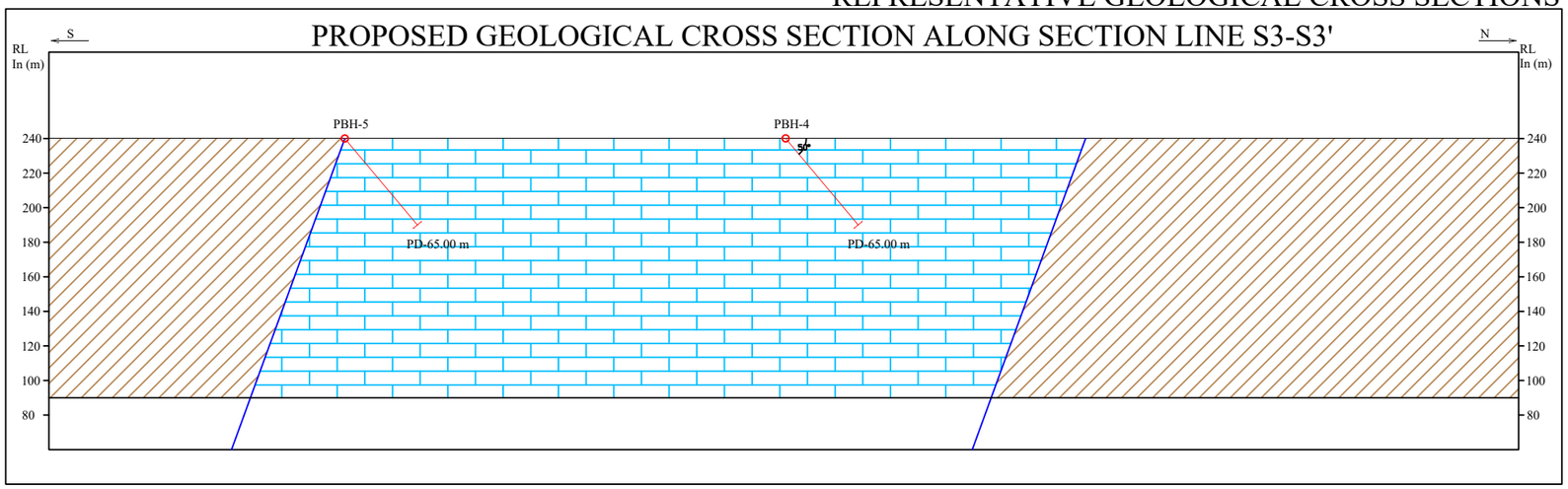
PBH-04 — PROPOSED BOREHOLE

S-11 / S-11' — PROPOSED SECTION LINE

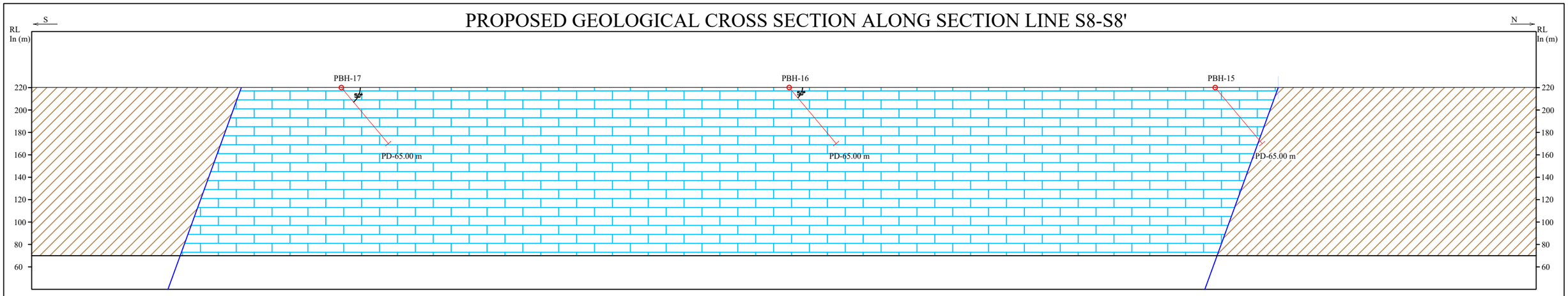
0 500 1000 2000 Meters

REPRESENTATIVE GEOLOGICAL CROSS SECTIONS FOR BARITOLA BLOCK

PROPOSED GEOLOGICAL CROSS SECTION ALONG SECTION LINE S3-S3'



PROPOSED GEOLOGICAL CROSS SECTION ALONG SECTION LINE S8-S8'



INDEX

LIMESTONE

PHYLLITE

LATERITE

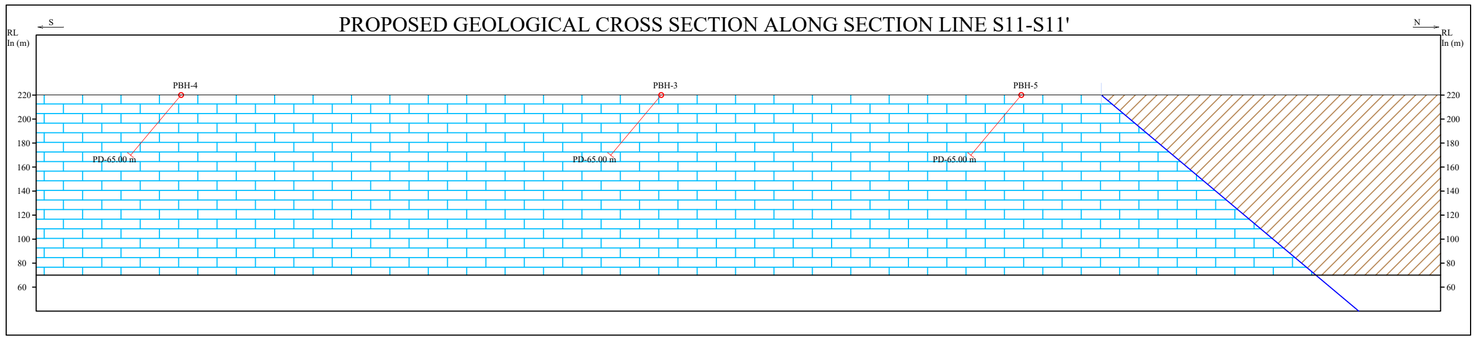
PBH-15 — PROPOSED BOREHOLE

PD-65.00 m — PROPOSED DEPTH

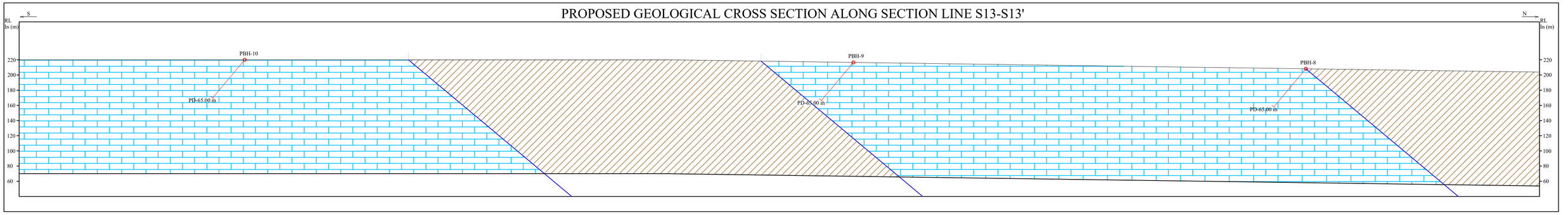
PLATE-VA

REPRESENTATIVE GEOLOGICAL CROSS SECTIONS FOR JAHARITOLA BLOCK

PROPOSED GEOLOGICAL CROSS SECTION ALONG SECTION LINE S11-S11'



PROPOSED GEOLOGICAL CROSS SECTION ALONG SECTION LINE S13-S13'



INDEX

- LIMESTONE
- PHYLLITE
- LATERITE

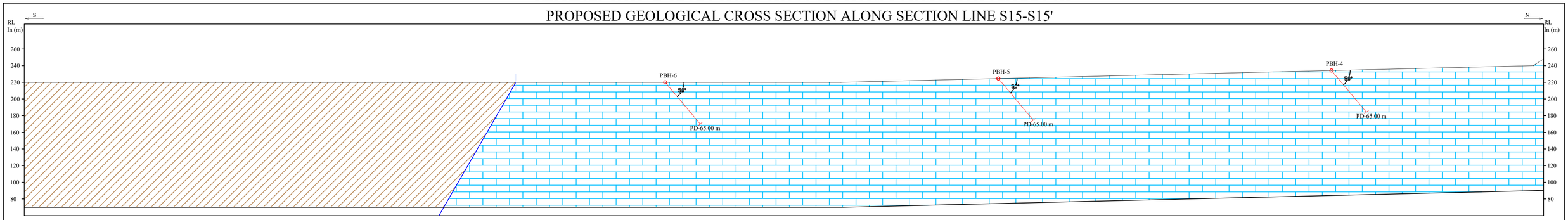
PBH-9 — PROPOSED BOREHOLE

PD-65.00 m — PROPOSED DEPTH

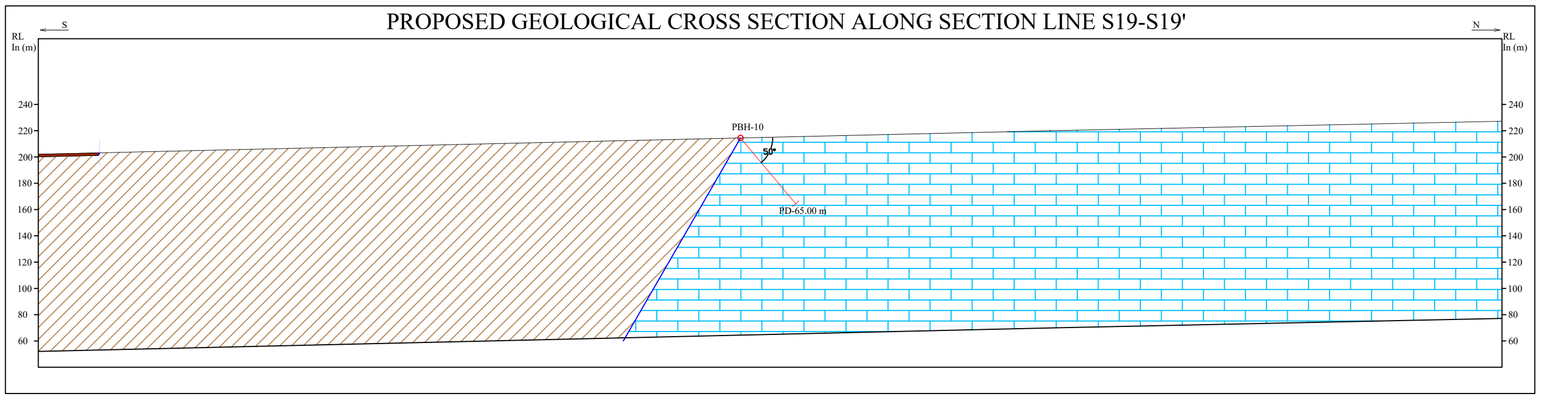
PLATE-VB

REPRESENTATIVE GEOLOGICAL CROSS SECTIONS FOR MUNDATOLA BLOCK

PROPOSED GEOLOGICAL CROSS SECTION ALONG SECTION LINE S15-S15'



PROPOSED GEOLOGICAL CROSS SECTION ALONG SECTION LINE S19-S19'



INDEX

- LIMESTONE
- PHYLLITE
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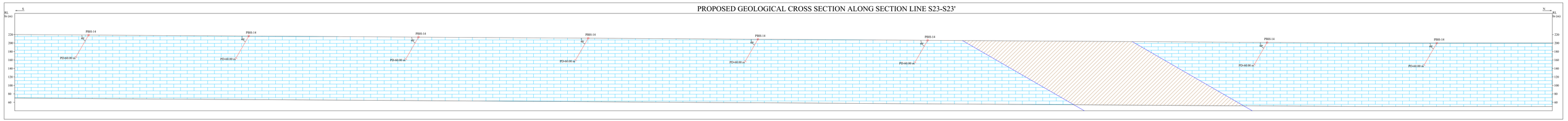
PBH-15 — PROPOSED BOREHOLE

PD-65.00 m — PROPOSED DEPTH

PLATE-VC

REPRESENTATIVE GEOLOGICAL CROSS SECTIONS FOR GOPAPUR BLOCK

PROPOSED GEOLOGICAL CROSS SECTION ALONG SECTION LINE S23-S23'



INDEX

- LIMESTONE
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PHH-14 — PROPOSED BOREHOLE

PD-60.00 m — PROPOSED DEPTH

PLATE-VD

Estimated cost for Preliminary Exploration (G-3) for Limestone in Baritola (7.34 sq km), Jaharitola (4.26 sq km), Mundatola (7.17 sq km), Gopapur (6.39 sq km) Blocks, District: Sundargarh, Odisha. [Nos. of Borehole- 57; Borehole depth range: 60-65m; Schedule timeline- 18 months]							
S. No.	**Item of Work**	**Unit**	**Rates as per NMET SoC 2020-21**		**Estimated Cost of the Proposal**		**Remarks**
			SoC-Item -Sl No.	**Rates as per SoC**	**Qty.**	**Amount (Rs)**	
A	**GEOLOGICAL WORK**						
1	**Geological Mapping (1:4000), Borehole logging, sampling & Report writing**						
i	Charges for Geologist- Field (2 party)	day	1.2	11,000	300	33,00,000	
ii	Charges for one Geologist - HQ	day	1.2	9,000	90	8,10,000	
iii	2 labours/ party (Rs 522/day/labour) (As per rates of Central Labour Commissioner)	day	5.7	522	600	3,13,200	Amount will be reimbursed as per the notified rates by the Central Labour Commissioner or respective State Govt. whichever is higher
iv	Core Sampling -2 Samplers Labour charge not included	day	1.5.2	5,100	432	22,03,200	
v	4 labours/ party (Rs 522/day/labour) (As per rates of Central Labour Commissioner)	day	5.7	522	1,728	9,02,016	Amount will be reimburse as per the notified rates by the Central Labour Commissioner or respective State Govt. whichever is higher
2	**Survey**						
i	Topographical Survey	day	1.6.1a	8300	120	996000	Topographical Survey on 1:2000 (2 m contour interval)
ii	4 labours/ party (Rs 522/day/labour) (As per rates of Central Labour Commissioner)	day	5.7	522	480	2,50,560	
iii	Bore Hole Fixation and determination of co-ordinates & Reduced Level of the boreholes by DGPS and boundary coordinates	Per Point of observation	1.6.2	19,200	79	15,16,800	57 BHs and 22 boundary coordinates
					Sub Total- A	**1,02,91,776**	
B	**DRILLING**						
i	Drilling upto 300m (Hard Rock) (1 rig)	m	2.2.1.4a	5,242	7,168	3,75,74,656	Baritola-(20 nos:1300 m), Jaharitola-(10 nos: 650 m), Mundatola-(11 nos: 715 m), Gopapur-(16 nos: 960 m).
ii	Land / Crop Compansation	per BH	5.6	20,000	57	11,40,000	Amount will be reimburse as per actuals or max. Rs. 20000 per BH with certification from local authorities
iii	Construction of concrete Pillar (12"x12"x30")	per borehole	2.2.7a	2,000	57	1,14,000	
iv	Transportation of Drill Rig & Truck associated per drill (2 rigs)	Km	2.2.8	36	3,000	1,08,000	Certification in this regard is required to be provided
v	Monthly Accomodation Charges for drilling Camp (up to 2 Rigs)	month	2.2.9	50,000	8	4,00,000	
vi	Drilling Camp Setting Cost (2 rigs)	Nos	2.2.9a	2,50,000	2	5,00,000	
vii	Drilling Camp Winding up Cost (2 rigs)	Nos	2.2.9b	2,50,000	2	5,00,000	
viii	Approach Road Making (Flat Terrain)	Km	2.2.10a	22,020	4	88,080	Road Making will be considered as per the requirement and Road Making Charges will be reimbursed later
ix	Core Preservation: One complete borehole plus mineralised cores of all the remaining Bhs	m	5.3	1,590	3,454	54,91,860	This amount will be reimbursed after successful delivery of the cores to concerned libraries/authorities
					Sub Total- D	**4,59,16,596**	
C	**LABORATORY STUDIES**						
1	**Chemical Analysis**						
i	**Primary & Check samples for Graphite**						
	a. Primary samples for 9 radicals i.e., CaO, MgO, SiO2, Fe2O3, Al2O3, SO3, P2O5, K2O, Na2O & LOI	Nos	4.1.16	3,000	3,454	1,03,62,000	Baritola-(1240 nos), Jaharitola-(620 nos), Mundatola-(682 nos), Gopapur-(912 nos).
	b-External(10%) Check samples from NABL Lab for 9 radicals i.e., CaO, MgO, SiO2, Fe2O3, Al2O3, SO3, P2O5, K2O, Na2O & LOI	Nos	4.1.16	3,000	345	10,35,000	
2	**Physical & Petrological Stusies**						
i	Preparation of thin section	Nos	4.3.1	2,353	12	28,236	
ii	Complete petrographic study report	Nos	4.3.4	4,232	12	50,784	
v	Digital Photographs	Nos	4.3.7	280	12	3,360	
vi	Bulk Density studies	Nos	4.8.1	1,605	12	19,260	
					Sub Total- E	**1,14,98,640**	
D					**Total A to E**	**6,77,07,012**	
E	**Geological Report Preparation**		**5.2**	For the projects having cost exceeding Rs. 300 lakhs - A minimum of Rs. 9 lakhs or 3% of the value of work whichever is more subjected to a maximum amount of 20 lakh and 10000 per each additional copy		**20,00,000**	Reimbursement will be made after submission of the final Geological Report in Hard Copies (5 Nos) and the soft copy to NMET.
F	**Peer review Charges**		**As per EC decision**			**1,20,000**	For 4 separate geological report.
G	**Preparation of Exploration Proposal (5 Hard copies with a soft copy)**	**5 Hard copies with a soft copy**	**5.1**	2% of the Cost or Rs. 5 Lakhs whichever is lower		**5,00,000**	EA has to submit 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.
H	**Total Estimated Cost without GST**					**7,03,27,012**	
I	**Provision for GST (18% of I)**					**1,26,58,862**	GST will be reimburse as per actual and as per notified prescribed rate
J	**Total Estimated Cost with GST**					**8,29,85,874**	***or Say Rs. 829.86 Lakh***
Note :							
1	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.						