

COMMODITY: PHOSPHORITE AND ASSOCIATED MINERALIZATION

**PRELIMINARY EXPLORATION FOR PHOSPHORITE AND ASSOCIATED MINERALIZATION IN
TUMGAON-BHORING BLOCK, MAHASAMUND DISTRICT, CHHATTISGARH**

**BY
GEOLOGICAL SURVEY OF INDIA
STATE UNIT: CHHATTISGARH, RAIPUR**

**PLACE: RAIPUR
DATE: JUNE 2026**

Summary of the Block for G3 Level Exploration

GENERAL INFORMATION ABOUT THE BLOCK

Feature	Details
Project Titled	Preliminary exploration for phosphorite and associated mineralization in Tumgaon-Bhoring block, Mahasamund District, Chhattisgarh
Year	2026-27
Commodity	Phosphorite and associated mineralization
Exploration Agency	Geological Survey of India, State unit: Chhattisgarh, Raipur
Tehsil/Taluka	Mahasamund
District	Mahasamund
State	Chhattisgarh
Project Stage	G3
Approved in PSC (No.)	10 th PSC
Mineral Belt / Geological Domain	Chhattisgarh basin
Toposheet / Degree Sheet	64K/04
Block Area	7.7 sq. km
Completion Period	One year
Objectives	To establish the sub-surface continuity and estimate the resource of phosphorite and associated mineralization.
Projected Outcome	To establish the sub-surface continuity and estimate the resource of phosphorite and associated mineralization.
Personnel	Two geoscientists
Expected Field Days	Officer-1: 100 days; Officer-2: 100 days; Supervisory Officer: 7 days

1. Location

BLOCK

Cardinal Points	Latitude	Longitude
A	21°13'31.08"	82°06' 55.06"
B	21°12'40.31"	82°08'31.94"
C	21°11'32.24"	82°07'51.26"
D	21°12'23.01"	82°06' 14.41"

2. Area

Block Area	7.7 sq. km.
Forest Area	NIL
Government Land Area	Data not available
Private Land Area	Data not available

3. Accessibility

Nearest town	Mahasamund town, about 15 km to the South west
District headquarters	Mahasamund town, about 15 km to the South west
Nearest Rail head	Mahasamund railway station about 15 km South west
Nearest Airport	Raipur, 55 km

4. Hydrography: Small seasonal streams, nala, pond & dam

5. Climate: Tropical and is characterized by hot, humid summers

6. Topography: Plains.

7. Availability of baseline geoscience data

Geological map	Large-scale geological mapping and earlier G4 investigations by GSI in and around the block
Geochemical data	NGCM, FS 2012-13
Geophysical data	-

8. Justification for taking up G3 level exploration

Based on the subsurface exploration carried out in G4 stage investigation in Parsadih-Bhoring area, during FS 2024-25, a G3 stage investigation is proposed in Tumgaon-Bhoring block for FS 2026-27. A total of 04m thick phosphatic clay horizon with an average grade of 6.43% P_2O_5 has been intersected in borehole CMPB-03 in Parsadih-Bhoring area. A total of 6m and 6.15m thick glauconite bearing sandstone/siltstone have been intersected with an average 5.71% K_2O and 6.18% K_2O respectively in borehole CPMB-03. Tumgaon-Bhoring block is proposed to check the subsurface potentiality and to estimate the resource of phosphorite and associated mineralization.

PRELIMINARY EXPLORATION FOR PHOSPHORITE AND ASSOCIATED MINERALIZATION IN. TUMGAON-BHORING BLOCK, MAHASAMUND DISTRICT, CHHATTISGARH

1.1.0 INTRODUCTION

The study area taken up for mineral investigation is located in the Mahasamund District of Chhattisgarh. The study area falls in part of toposheet no. 64K/04 and it is proposed to carry out Detail Mapping of 7.70 sq. km area. A total of 11 nos. of boreholes with 660m of drilling target are planned to be drilled with an average depth of 60±10m.

The programme is proposed to establish the sub-surface continuity and estimate the resource of phosphorite and associated mineralization.

2.1.0 BACKGROUND INFORMATION

a) Brief Introduction:

The phosphorite facies are generally associated with marine sediments and form mainly in the border zone between the shallow water (Platform) sediments and deep water (geosynclines) accumulations. The environment of phosphate deposition corresponding to anaerobic conditions is also favorable to the deposition of pyrite, chert and carbonaceous material, which by and large are associated with phosphate.

In India, the phosphate deposits found so far are associated with black shales, chert, limestone, dolomite, cherty quartzite and stromatolitic dolomites. Of these, the important lithofacies association that have yielded sizable deposits of phosphate in Uttaranchal and Rajasthan are the black shale-chert and carbonate-chert-quartzite association. The study area lies within the Meso to Neo-Proterozoic Chhattisgarh sedimentary basin, an important geological domain for mineral exploration. The Chhattisgarh Supergroup consists chiefly of undeformed and unmetamorphosed fluvial and marine siliciclastic, carbonate, and volcanoclastic sediments (Das et al. 1992). The mapping and exploration carried out by GSI in these depositional sequences were reported the occurrence of various economic minerals such as Limestone, Phosphorite, Glauconite, and minor sulphides.

3.1.0 LOCATION AND ACCESSIBILITY

Tumgaon-Bhoring block is situated in Mahasamund district, Chhattisgarh at a distance of 66km from the state capital Raipur well connected through National Highway 53. The Mahasamund town, about 15 km to the South west from the study area and the nearest railway station is Mahasamund. The nearest air port is Swami Vivekananda Airport, which is nearly 55km from the study area.

4.1.0 PHYSIOGRAPHY, DRAINAGE AND CLIMATE

The present area in general has a flat rolling topography with elevation varying between 240-250m having from Mean Sea Level. Mahanadi river is flowing in the west of the block at about 12 km from study area and Kodar reservoir is about 7km east from the block. The tributaries are flowing towards NW direction and the drainage pattern is generally dendritic. Most of the area is used as agricultural land.

5.1.0 PREVIOUS WORK

In Chhattisgarh basin, many of the blocks have been explored at various UNFC stage to establish the resource of phosphorite and associated mineralization. Vadhvani. A, Sahu. A (2021-22) carried out assessment of phosphorite and associated mineralization in Andi-Bhedi area in Balod district in toposheet no. 64H/01 and estimated inferred mineral resources of 27.13 MT and 20.21 MT resources of phosphorite at 5% Cut-off for 1m and 2m stopping width respectively. Inferred resource of cement grade (Portland, CaO 44-52%) limestone at 1m and 2m stopping width has been calculated as 45.95 and 38.98 MT.

Sahu and Dash, (2022-23) carried out G-3 stage investigation in Raipura block and estimated phosphorite resources in Raipura block 5.98 and 2.39 MT at 5% cut off for 1m and 2m stopping width with weightage average grade of 6.27 and 6.93 respectively. Inferred resource of cement grade (Portland, CaO 44-52%) limestone at 1m and 2m stopping width has been calculated as 169.25 and 145.75 MT having weightage average grade of 48.24 and 48.32 respectively.

Chaurasia G., Dash S.P. (2022-23) carried out G3 stage of exploration in Semhardih block and a total of 3.39MT (Beneficiable grade) inferred resource of Phosphorite was estimated at 5% cutoff grade with 6.02% average grade of P_2O_5 at 2m stopping width. A total of 428.89 MT inferred resource of Portland cement grade limestone was estimated at 44% cutoff grade with an average grade of 47.75% at 2m stopping width.

Chaurasiya and Soni, (2023-24) carried out G-4 stage investigation in Khaira-Nawagaon area and established a total of 38.27 MT reconnaissance resource of benificiable grade phosphorite with 5.57% average grade of P_2O_5 at 5% cut-off grade. A total of 577.83 MT and 2,230.27 MT reconnaissance resources of cement grade and benificiable grade limestone are estimated. The total reconnaissance resource of 314.19 MT glauconitic sandstone are estimated with an average grade of 5.44% K_2O at 5% cut-off grade. In addition to that a total of 540.80 MT reconnaissance resource of vanadium bearing aluminous laterite are also estimated with an average grade of 700 ppm V_2O_5 at 500 ppm cut-off grade.

Srivastava and Chaurasiya, (2023-24) carried out G-4 stage investigation in Latabor-Dewinawagaon area and a total of 499.36 and 3063.01MT reconnaissance resources of cement grade and benificiable grade limestone are estimated with an average grade of 46.34% CaO and 41.27% CaO respectively. The total reconnaissance resource of 345.78 MT glauconitic sandstone is also estimated with an average grade of 5.47% K_2O at 4% cut-off grade.

During FS 2024-25, Dewangan S. and Srivastava V. carried out G4 stage investigation in Parsadih-Bhoring area, Mahasmond District, Chhattisgarh in toposheet no. 64K/03 (part) and 64K/04 (part) to check the subsurface continuity and thickness of the phosphorite zone and associated mineralization. The Parsadih-Bhoring area is located 118km NE from the Andi-Bhedi block and at the eastern margin of the Chhattisgarh basin. During Large scale mapping phosphatic clay was found along the Kosam Nala, Dhaskund Nala and in borewells of Tumgaon village with positive result of Shapiro test. Glauconite bearing sandstone/siltstone of Kansapathar Formation below the Charmuria Formation has also been observed in the area. Total 05 scout boreholes were drilled during the investigation and significant phosphorite zone has been found in borehole CMPB-03 near Tumgaon village.

6.1.0 GEOLOGY OF THE AREA

The present area of exploration occupies the part of Chhattisgarh basin. Rock exposures in the proposed area mainly belongs to Charmuria formation (Raipur group) of Chhattisgarh super-group and the sandstone units belongs to Chandarpur group.

7.1.0 OBJECTIVES OF THE PROPOSED EXPLORATION PROGRAMME

The present exploration programme has been formulated with an objective to establish the sub-surface continuity and estimate the resource of phosphorite and associated mineralization.

8.1.0 PROPOSED SCHEME OF EXPLORATION

The proposed G3 exploration programme comprises geological mapping (1:4000), drilling, borehole geological logging, coal sample collection and processing, and laboratory studies. The depth continuity, thickness of phosphorite and associated mineralization will be checked through 11 vertical boreholes with borehole spacing between 800m in grid pattern with an average depth of 60±10m.

Borehole logging, core sampling, and laboratory analyses will support interpretation and preliminary resource estimation.

9.1.0 QUANTUM OF WORK

Item of Work	Unit	Proposed Quantum
Large Scale Mapping (1:4,000)	Sq. Km	7.7
Subsurface exploration: drilling	m	660
Core sampling (Nos.)	nos.	500
PCS (Nos.)	nos.	10 nos.
PS (Nos.)	nos.	10 nos.
XRD (Nos.)	nos.	10 nos.
REE (Nos.)	nos.	20 nos.
Check Samples (Nos.)	nos.	20 nos.

10.1.0 COST

Summary of the Cost estimates (As per 98th TCC-1)

Sl. No.	Item	Total Estimated Cost (Rs.)	Funding
1	Geology and Survey	0	By GSI
2	Drilling	36,30,000	NMEDT
3	Survey work	0	By GSI
4	Laboratory studies	0	By GSI
5	Geologist at HQ	0	By GSI
6	Exploration Report Preparation	0	By GSI
7	Proposal Preparation	0	By GSI
8	Peer review charges	0	By GSI
9	Sub Total (1to8)	36,30,000	By GSI
10	GST18%	6,53,400	
	Total:	42,83,400/-	
	Rs. In Lakh	42.83/-	

COST CALCULATION

Item of Work			Unit	SoC-Item -Sl No. NMEDT	Rates as per NMET SoC 2025		Estimated Cost	
							Qty.	Total Amount (Rs)
D. Drilling - OUT SOURCED								
18.a	DRILLING	Drilling in/ Drilling in Soft rock/ Strata: HQ size borehole up to 400m Depth and NQ Size beyond 400m depth in case of NQ size drilling is done before 400m depth, the rate shall decrease by 20%	m	2.2.1.1c		5,500.00	660	₹ 36,30,000.00
18.b		Drilling in/ Drilling in Hard rock/ Strata: HQ size borehole up to 400m Depth and NQ Size beyond 400m depth in case of NQ size drilling is done before 400m depth, the rate shall decrease by 20%	m	2.2.1.1d		10,000.00	0	₹ 0.00
18.c		Drilling in/ Drilling in Very Hard rock/ Strata: HQ size borehole up to 400m Depth and NQ Size beyond 400m depth in case of NQ size drilling is done before 400m depth, the rate shall decrease by 20%	m	2.2.1.1e			0	₹ 0.00
18.d		Drilling for Lignite	m	2.2.1.1a			0	₹ 0.00
18.e		Drilling for Coal	m	2.2.1.1b			0	₹ 0.00
18.a		Mechanised Auger Drilling for soft strata up to 30m depth	m	2.2.2.1			0	₹ 0.00
18.b		Hand Auger drilling in soft strata up to 30 m depth	m	2.2.2.2			0	₹ 0.00
18.c		RC Drilling	m	2.2.3			0	₹ 0.00
18.d		Non coring drilling	m	2.2.4			0	₹ 0.00
19	DRILLING RELATED EXPENDITURE HEADS	Borehole Deviation Survey by Multishot survey tool (interval 6m; azimuth and inclination to be recorded)	per shot	2.2.5		330.00	0	₹ 0.00
20		Land / Crop Compensation (in case the BH falls in agricultural Land)	per BH	5.6		30,000.00	0	₹ 0.00
21		Construction of concrete Pillar (12"x12"x30")	per borehole	2.2.7a		2,000.00	0	₹ 0.00
22		Borehole plugging with cement	per borehole	2.2.8		10,000.00	0	₹ 0.00
23		Miscellaneous Charges (Transportation of Drilling Rig, accommodation for Drilling Camp, Camp setting and winding, construction of approach road)	Lumpsum	0	2.2.9.4	For Drilling cost >2 Cr: 10 % of the Drilling Cost with a maximum ceiling of Rs.25 Lkh	0	₹ 0.00

24		Drill Core Preservation- One complete BH plus mineralised cores of all the BHs of the block/ prospect to be preserved in GI Core boxes and subsequently transported to the notified core repository.	per m	X		1,590.00	0	₹ 0.00
Total Cost D- outsourced								₹ 36,30,000.00
Total (Drilling)								₹ 36,30,000.00
GST 18%								₹ 6,53,400.00
Total Fund Required inclusive of 18% GST								₹ 42,83,400.00
								~0.428 Cr

The work programme for FS 2026-27 has been proposed with milestones covering field investigations, laboratory analysis, report preparation, and circulation etc. The proposed exploration programme has been planned to ensure that all activities, including drilling, logging, core sampling, associated geological investigations, and sample submission, are completed by February 2027. The final report is proposed to be circulated by June 2027, subject to the availability of chemical analysis data. The tentative timeline of the work proposed is as mentioned below;

	SCHEDULED TIMELINE FOR THE PROPOSED G-3 LEVEL EXPLORATION													
S.No.	Activities/NQT	APR 2026	MAY 2026	JUN 2026	JUL 2026	AUG 2026	SEP 2026	OCT 2026	NOV 2026	DEC 2026	JAN 2027	FEB 2027	MAR 2027	APR-JUN 2027
		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Detailed Mapping (1:4000)													
2	Core drilling*													
3	Sampling /Sample submission													
4	Lab studies/ chemical analysis													
5	Report writing/Peer review													
	* Drilling operations are subject to weather and agricultural constraints, potentially affecting timelines from mid-July to mid-November 2026. * Deploying two rigs will expedite drilling and may help to minimize upcoming monsoon disruptions.													

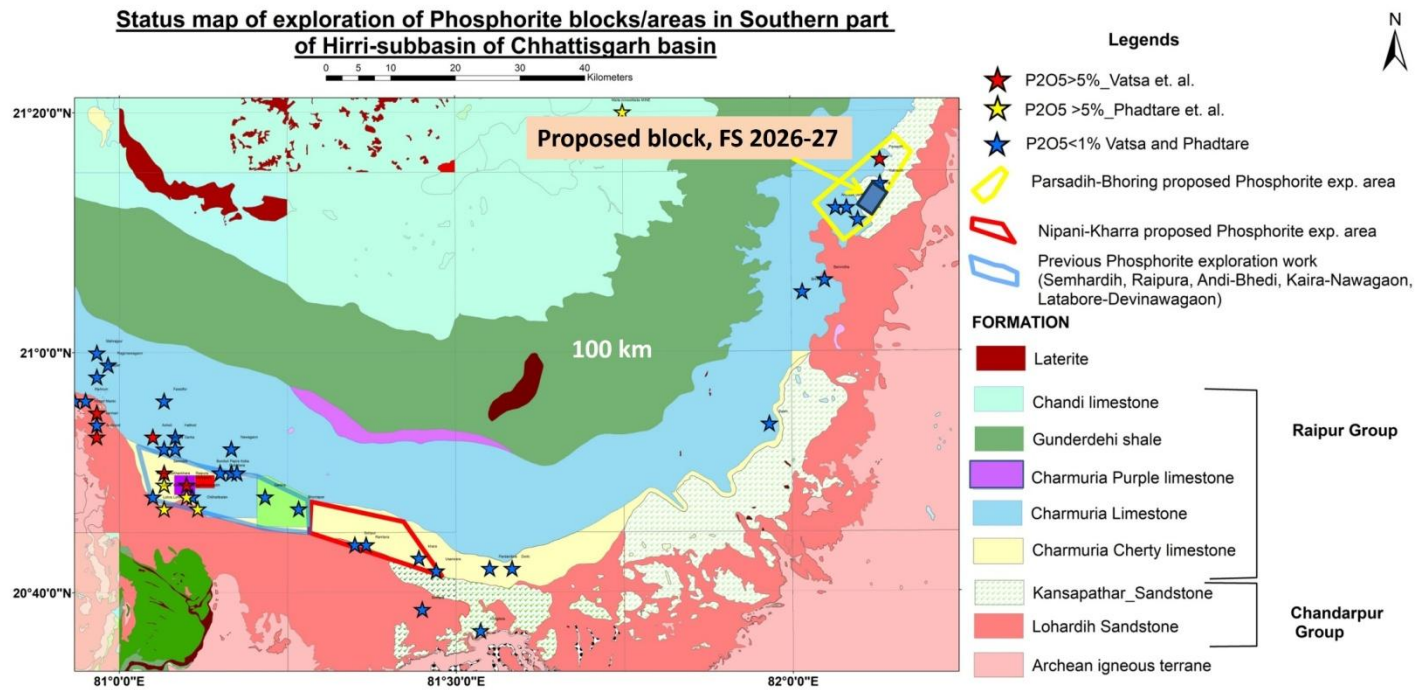


Fig. 1 Status Map showing exploration of Phosphorite in Hirri Sub Basin, Part of Chhattisgarh Basin.

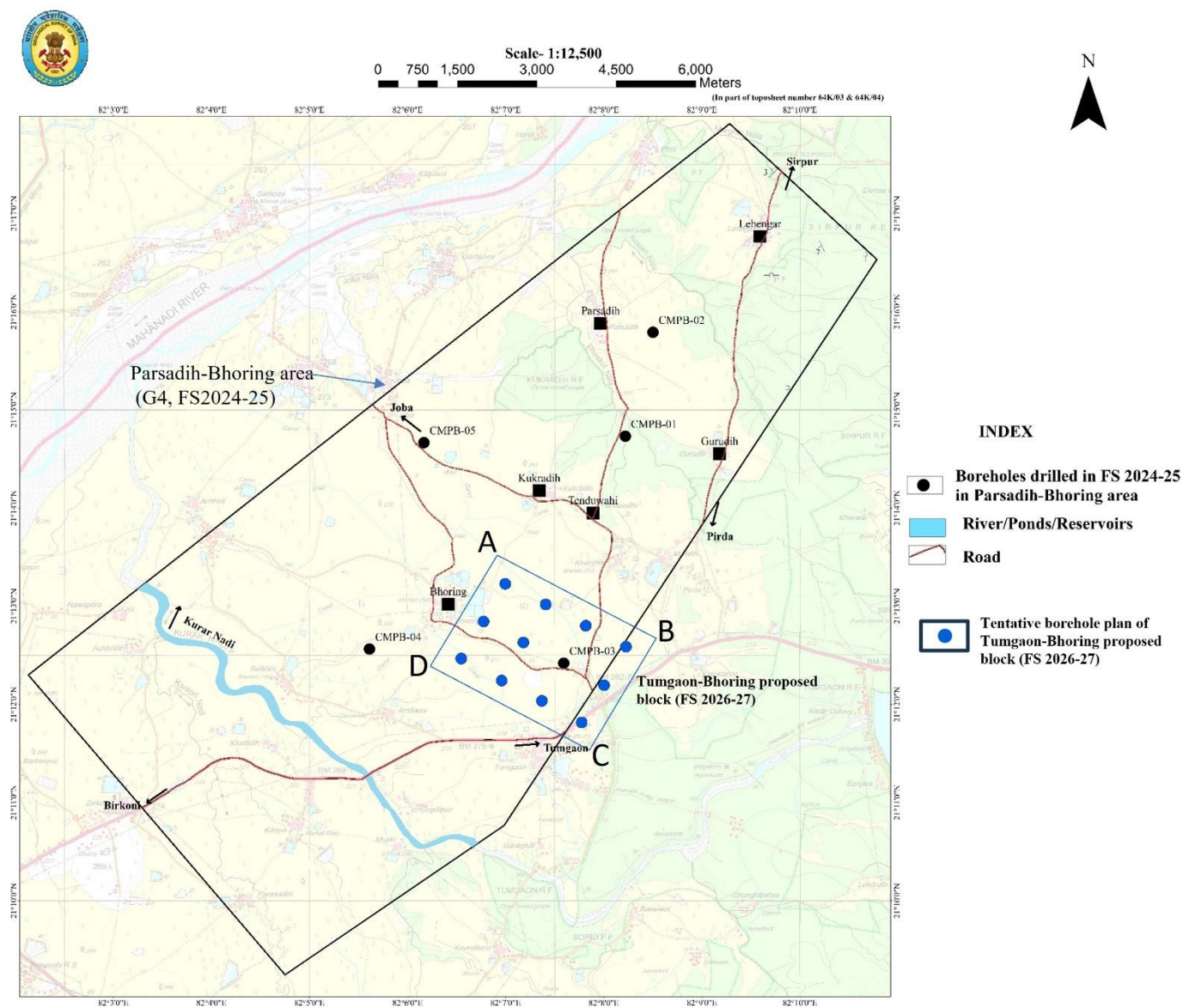


Fig.2. Location of the proposed Tumgaon-Bhoring block, Mahasamund District, Chhattisgarh

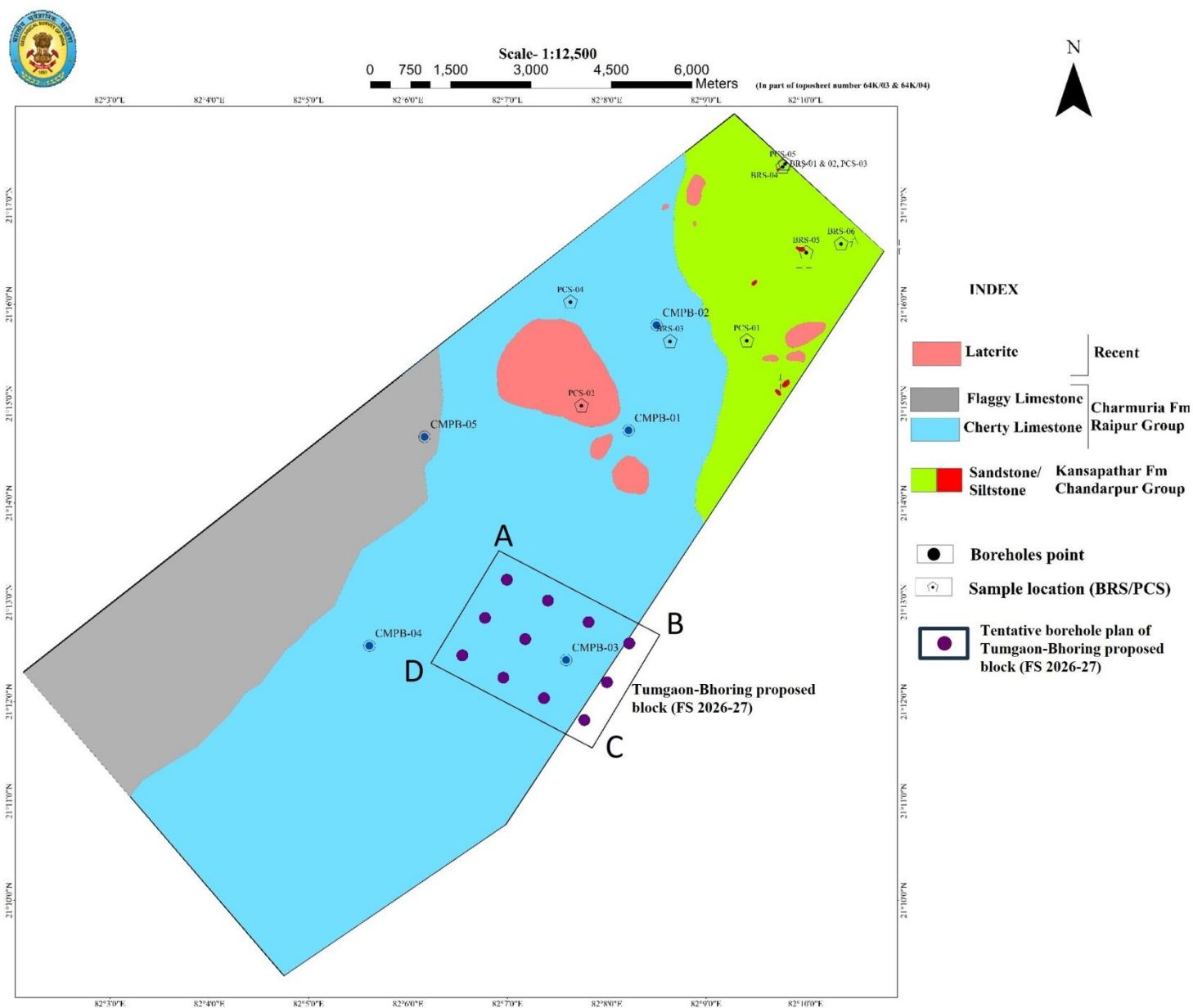
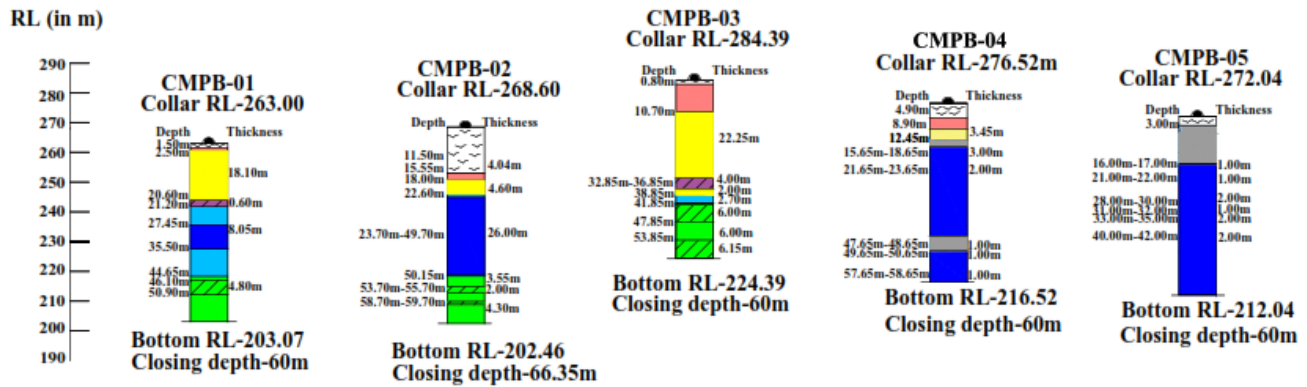


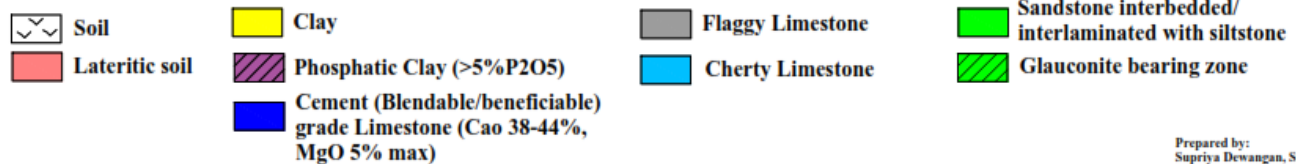
Fig.3. Large scale Interpreted Geological Map of Parsadih-Bhoring area Showing tentative borehole location of Tumgaon-Bhoring block, Mahasamund District, Chhattisgarh.



Graphical litholog of borehole CMPB-01, CMPB-02, CMPB-03, CMPB-04 and CMPB-05 of Parsadih- Bhoring area, Mahasamund District, Chhattisgarh, Toposheet no. 64K/03 & 64K/04



INDEX



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FS: 2024-25

Fig.4 Graphic litholog of borehole CMPB-01,02,03,04 & 5 in Parsadih-Bhoring block, Mahasamund District, Chhattisgarh, FS 24-25.