Proposal for Reconnaissance Survey (G4 Stage) in Pasubera-West Block, West Singhbhum District, Jharkhand State under NMEDT

Commodity: Ni, Cr, PGE, Au and Ti

By

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MMPL PRIVATE LIMITED
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SECTOR III, SALT LAKE, KOLKATA-700091

Place: Kolkata
Date: 20.02.2026

Summary of the Block for Reconnaissance Survey (G4 Stage)

Sl No.	Features	Details
A.	Block ID	Pasubera -West Block
B.	Exploration Agency	M/S MMPL Private Limited
C.	Commodity	Ni, Cr, PGE, Au and Ti
D.	Mineral Belt	Ongarbira Volcano-Sedimentary Suite
E.	Completion Period with entire Time schedule to complete the project	12 months
F.	Objectives	The Objectives for Reconnaissance survey for Ni, Cr, PGE, Au and Ti in Ongarbira volcano-sedimentary sequence of Pasubera-West Block, West Singhbhum district, Jharkhand (G4 Stage) are: 1. To carry out Geological Mapping on 1:12,500 scale of the block to assess various litho units using field equipments and mapping of Ni, Cr, PGE, Au and Ti bearing outcrops along with other lithounits. 2. To study different geological sections to build up local stratigraphy. 3. Classification of Ni, Cr, Au, PGE and Ti bearing rocks in the mineralized area. 4. To carry out systematic grab/ channel sampling of bed rocks. 5. Petrological studies of possible host rock and their chemical analysis. 6. Pitting-trenching of selected area and sampling. 7. Based on the outcome of surface geochemical sample results, and trenching/ pitting work total 8 numbers of scout boreholes will be drilled to assess the thickness of mineralized zone. Attempt to delineate a mineralized block or more

<table>
<tr><td></td><td></td><td>than one block to upgrade the investigation in G3 stage.</td></tr>
<tr><td>G.</td><td>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</td><td>Work will be carried out by the proposed agency</td></tr>
<tr><td>H.</td><td>Name/Number of Geoscientists</td><td>Field Geologist: Two numbers
HQ Geologist: Two numbers</td></tr>
<tr><td>I.</td><td>Expected Field days (Geology)
Geological Party Days</td><td>180</td></tr>
<tr><td>J.</td><td>Location</td><td></td></tr>
<tr><td>i.</td><td>Latitude and Longitude</td><td>
<table>
<tr><th>Sl. No.</th><th>LATITUIDE</th><th>LONGITUDE</th></tr>
<tr><td>A</td><td>22.5586°</td><td>85.5911°</td></tr>
<tr><td>B</td><td>22.5682°</td><td>85.6438°</td></tr>
<tr><td>C</td><td>22.4747°</td><td>85.6438°</td></tr>
<tr><td>D</td><td>22.4753°</td><td>85.5912°</td></tr>
</table>
</td></tr>
<tr><td>ii.</td><td>Villages</td><td>Pasubera, Hesabund, Rangamati, Talahatu, Chetansika, Karkatta, Latarsika, Barkella</td></tr>
<tr><td>iii.</td><td>Tehsil/Taluk</td><td>Chakradharpur</td></tr>
<tr><td>iv.</td><td>District</td><td>West Singhbhum</td></tr>
<tr><td>v.</td><td>State</td><td>Jharkhand</td></tr>
<tr><td>K.</td><td>Area (hectares/ square kilometres)</td><td></td></tr>
<tr><td>i.</td><td>Block Area</td><td>53.00 sq km</td></tr>
<tr><td>ii.</td><td>Forest Area</td><td>-</td></tr>
<tr><td>iii.</td><td>Government Land Area</td><td>Not available.</td></tr>
<tr><td>iv.</td><td>Private Land Area</td><td>Not available.</td></tr>
<tr><td>L.</td><td>Accessibility</td><td></td></tr>
<tr><td>i.</td><td>Nearest Rail Head</td><td>Chakradharpur 20 km</td></tr>
<tr><td>ii.</td><td>Road</td><td>Chakradharpur (CKP) is well-connected by road and rail to nearby towns and cities. Tatanagar (Jamshedpur) is the closest city as well as district headquarters of East Singhbhum, just 65 kilometers away by road and a quick 50-minute train ride. Chaibasa, the district headquarters of West Singhbhum is about 15 km by road.</td></tr>
</table>

iii.	Airport	Birsa Munda Airport Ranchi, 75 km
M.	**Hydrography**	
i.	Local Surface Drainage Pattern(Channels)	Drainage Pattern observed in the block is dendritic. Drainage density is high in hilly terrain compared to low lying phyllitic country.
ii.	Rivers/Streams	To the north of the block (and just south of Chakradharpur) Sanjai Nadiflows west to east.
N.	**Climate**	
i.	Mean Annual Rainfall	170 cm
ii.	Temperatures(December) (Minimum) Temperatures(June) (Maximum)	6ºC in winter to 45ºC in summer.
O.	**Topography**	
i.	Toposheet Number	73F/10 & 73F/11
ii.	Morphology of the Area	Physiographically, the area can be divided into two units, the eastern and southeastern part of undulating topography, dissected by shallow nalas forming gullies and the northern, northwestern and western part is composed of hills covered with dense forest of Sal. The human habitation restricted only to the plain areas.
P.	**Availability of baseline geoscience data**	
	Geological Map (1:50000/ 25000)	Available
	Geochemical Map	Available
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	Available
8.	**Justification for taking up Reconnaissance Survey / Regional Exploration**	Based on the study carried out in the area there is a need to take up G4 stage exploration covering 53.00 sq km area as marked in the map/ Toposheet. Based on STM, the following localities are potential for detailed assessment of mineralization:

		I. Pasubera and adjoining area to identify potential zone/s of mineralisation in orthopyroxenite, brecciated contact zone of this unit and the country rock for Ni, Ti, Cr, PGE, Gold and associated minerals. II. The ferruginous laterite and lateritic soil developed over orthopyroxenite west of Pasubera for Cr, Ni, Ti, Co, Mn, V and Au.

Detailed description on the following titles to be made in the proposal

1. Block Summary

i. Physiography:

Physiographically, the area can be divided into two units, the eastern and southeastern part of undulating topography, dissected by shallow nalas forming gullies while the northern, northwestern and western part is composed of hills covered with dense forest of Sal. The hills/ hillocks are controlled by lithology and follows the strike of the lithounits. The main drainage is represented by Sanjai Nadi and Roro Gara. All the nalas originating from western and northern parts of hills debouch in the Sanjai Nadi while the nalas originating from the eastern and south of hill range flows to meet the Roro Gara Nadi which further flows towards east and meets the Kharkai River NE of Chaibasa.

2. Background Geology (Regional Geology, Geology of the Block):

i. Regional Geology:

The Ongarbira volcano sedimentary sequence lies to the south of Chakradharpur in West Singhbhum district of Jharkhand. The Ongarbira-Lotapahar-Sahedba area has been investigated by several workers on different aspects of geology viz. lithology, structure, stratigraphy, geochemistry, tectonics, petrological characteristics etc. (Sarkar and Saha, 1977, 1983; Bose and Chakraborty, 1981; Sarkar 1982; Banerjee, 1982; Gupta et. al. 1981; Blackburn and Srivastava, 1994; Mukhopadhyay et. al. 1990; Raza et. al. 1995) but most of the studies were concentrated on the Proterozoic mafic volcanics and associated metasedimentaries flanking the Singhbhum Craton. Banerjee (1982) worked on the stratigraphy, petrology and geochemistry of some of the basic volcanics and associated rocks of Singhbhum including the Ongarbira sequence while Basu (1986) mapped the area to decipher geology and tectonic framework. Comparative study of geochemistry and tectonic significance of Ongarbira metavolcanic rock suggest that the basalts fall either in MORB field or very close to it. Chattopadhyay et. al. (1997), on the basis of petrography and chemical characteristics have concluded that the core of the Ongarbira synform is occupied by ash flow tuffs (ignimbrite) related to felsic volcanism and hence the Ongarbira volcanism is bimodal in nature.

ii. Geology of the block and adjoining area:

In order to delineate potential zones of high magnesia rocks and associated Cu, Au, Mn, , Cr and asbestos mineralization besides identification of petrological characteristics of different rock units Specialised Thematic Mapping of 150 sq km area was studied by Dutta & Mukhopadhyay (2010) to the SE of Chakradharpur falling in parts of Survey of India toposheet no. 73 F/10 and western part of Toposheet no. 73F/14 with collection of Geochemical Samples

(GCS), Petrological Samples (PS) and Petrochemical Samples (PCS).

In a dominantly northerly dipping sequence of phyllite, tuffaceous phyllite, tuff, shale, siltstone, quartzite and chert (at times brecciated and sulphide bearing) the Ongarbira volcanics are identified as a definite stratified volcanic assemblage that included basalt, gabbros and tuffaceous derivatives. The mafic volcanics (mainly basalt) and the associated metasedimentaries are folded into a regional synformal fold with an easterly closure and moderate north-westerly plunge. The axial trace of the fold is almost E-W which swerves towards SW further west. East of Pasubera the cherty quartzite is underlain by 'acid agglomerate' which contain angular fragments of phyllite, chert, ferruginous quartzite etc. of varying size.

Table I: Stratigraphic sequence in and around Ongarbira Volcanics (Parts of Toposheet nos. 73 F/10 & 14)

Lithology	Group/Formation name	Age
Laterite (Bouldery)		Cenozoic
Acid volcanics – Tuffs, chert	Ongarbira Volcanosedimentary (Sahedba Formation of Banerjee 1984)	Lower Proterozoic
Coarse grained Quartzite/Quartz Arenite		
Phyllite/Shale (grey, brown, purple)		
Gabbro		
Dolerite		
Jasper		
Grey Chert		
Khaki Green Phyllite/shale		
Metabasalt (Massive/Pillowed/Agglomeratic and Schistose)		
Orthopyroxenite	Jojohatu Ultramafics	Lower Proterozoic
Phyllite/Tuffaceous phyllite/Shale/Siltstone etc. interbanded with chert and cherty quartzite.	Upper Bonai Group (Iron Ore Group of Dunn, 1940)	Lower Proterozoic

Ongarbira Metasediments:

The metasediments which are interlayered with basaltic flows include khaki green phyllite, grey chert, jasper, grey and purple phyllite, quartzite and acid volcanics (tuffs and rhyolite).

The Ongarbira metasediments occur at two stratigraphic levels, first, above basalt and second above rocks of doleritic/ gabbroic composition. The first group of metasediments includes khaki phyllite, grey chert with phyllitic fragments and jasper while the second group of metasediments lies above rocks of doleritic/ gabbroic composition and represented by shale, phyllite, ferruginous phyllite, chert, quartzite, gritty quartzite along with acid volcanics.

Ultramafics:

The south western part of the mapped area west of Pasubera, is occupied by an orthopyroxenite body intruding the phyllitic country rock. The rock unit belongs to ‘Jojohatu Ultramafics’ which

intrude the Upper Bonai Group metasediments (phyllite, shale, siltstone etc.) of Palaeo-Proterozoic age. Megascopically, the rock is greyish green to dark green in colour, medium to very coarse grained, monomineralic and massive rock with presence of crude igneous layering showing shallow northerly dip in the central part and easterly and southeasterly dip towards northern part of the body. Sub horizontal layering in pyroxenite unit may be due to sharp change in the physical properties of a cumulus mineral such as size or habit or sudden change in proportion of cumulus minerals. Sawkins (1984) while describing the mineral deposits associated with MORB's has indicated presence of nickel and chromite in the associated cumulate layers. The geological setting of the Pasubera area which has sub horizontal layering is comparable with such deposits and may be a rich source of nickel and chromite at depth. The contact of ultramafic rock with the country rock in the northern as well as southern part shows effect of chilling, brecciation and silicification containing angular to sub angular lithic fragments of grey to buff coloured phyllite, chert and basic rocks in a ground mass of mafic composition. Such brecciated unit just at the contact has shown higher concentration of Ni and Cr. At times the dark grey and fine-grained variety shows limonitic alteration on the weathered part containing high Ni and Cr. At the top of hill west of Pasubera, the ultramafic body shows effect of lateritisation. Small boulders of ferruginous laterite and black soil together form approximately 1m thick horizon and shows high concentration of Au, Ni, Cr, Mn, Co, V, and Ti.

Mineral potentiality based on geology, geophysics, ground geochemistry etc.:

The Ongarbira area in West Singhbhum district, Jharkhand, as investigated through Specialised Thematic Mapping by the Geological Survey of India, exhibits significant mineral potential owing to its distinct geological, geochemical and structural characteristics. The mapped terrain comprises a volcano-sedimentary suite of rocks belonging to the Palaeo-Proterozoic age, including Ongarbira volcanics, Jojohatu ultramafics, and associated metasedimentary formations. These rock units are structurally folded into a regional synform, with the ultramafic body—particularly the orthopyroxenite exposed west of Pasubera (approximately 3 kilometer long and 2 kilometer wide) —playing a central role in the mineralization of the area. Petrographic and chemical analyses reveal that the orthopyroxenite is composed dominantly of enstatite, often altered to tremolite, serpentine, and talc, displaying typical cumulate textures. Geochemically the orthopyroxenite unit is rich in magnesium oxide (MgO ranging from 27.81% to 40.17%) and contains notable concentration of economically important elements such as chromium, nickel, gold, platinum, palladium, titanium, cobalt and vanadium. Additionally, small lateritic boulders developed over this ultramafic unit show significant enrichment in elements like Au, Ni, Cr, Mn, Co, Ag, V, and Ti, suggesting a lateritic enrichment process akin to nickel laterite deposits observed in tropical regions worldwide.

Synthesis of chemical results:

Samples collected from orthopyroxenite analysed Ni (170 ppm to 0.15% in 26 samples; 24 samples analysed more than 500 ppm), Cr (0.15% to 2.51% in 26 samples and all samples analysed more than 1500 ppm), Ti (300 ppm to 3.05% in 17 samples; six samples analysed more than 500 ppm). The contact of orthopyroxenite and country rock represents an intrusive contact and is marked by breccia and chilled margin. The brecciated unit exposed NW of Pasubera is light brown in colour with interspaces of brecciated clast occupied by same pyroxenitic material. Two nos. of samples collected from this unit have analysed Cr (0.76% & 1.87%), Ni (750 ppm & 880 ppm) and Au (62 and 80 ppb). Ferruginous lateritic boulders present over the orthopyroxenite body shows very high concentration of Au (670 ppb), Ni (0.17%), Cr (1.99%), Co (0.19%), Mn (0.99%), Ag (4ppm), V (480ppm), Ti (0.44%), Cu (91 ppm), Pb (10 ppm) and Zn (218 ppm). Important concentration of nickel tends to form in the lower soil horizons of ultramafic masses subjected to tropical weathering. Such lateritic nickel deposits have been extensively mined in New Caledonia, Dominian Republic and also from Colombia and Brazil (Sawkins, 1984). Thus, the entire orthopyroxenite body including the laterite exposed over it requires detailed surface exploration followed by sub-surface exploration.

G4 stage exploration with the help of detailed sampling, pitting/trenching, ground geophysical survey, scout drilling etc. will help delineate a block for detailed exploration.

Scope for proposed exploration:

The findings from the Ongarbira volcano-sedimentary suite and adjacent ultramafic bodies suggest a significant scope for further exploration in the region. The delineation of high-MgO orthopyroxenite, enriched in elements such as nickel, chromium, Platinum Group Elements () and gold, highlights the necessity for systematic, detailed investigations to assess the full economic potential of these units.

The overlying lateritic horizons showing anomalously high values of Au, Ni, Cr, Mn, Co and other trace metals indicate the potential presence of supergene enrichment zones, which are typically associated with tropical laterite-hosted nickel and gold deposits worldwide. These lateritic zones demand shallow drilling, pitting and geochemical profiling to understand vertical elemental distribution and define economic thickness.

NGCM data also support the economic potentiality of the area. Composite Stream Sediment samples analysed **Cr upto 10492 ppm and that of Ni upto 528 ppm.**

3. Previous exploration work:

"Report On Specialised Thematic Mapping in Ongarbira Volcano Sedimentary Suite of Rocks to Examine Regional Tectono Stratigraphic Setting and Delineate Potential Zones of High Magnesia Rocks and Associated Cu, Au, Mn, PGE, Cr and Asbestos Mineralization, West

Singhbhum District, Jharkhand" By Sanjay Kumar Dutta & P. K. Mukhopadhyay, Geologists (Sr.)

4. Block description

Sl. No.	LATITUIDE	LONGITUDE
A	22.5586°	85.5911°
B	22.5682°	85.6438°
C	22.4747°	85.6438°
D	22.4753°	85.5912°

5. Planned Methodology

In accordance with the objectives set for Reconnaissance Survey (G4 stage of exploration) in Pasubera-West Block, West Singhbhum District, Jharkhand, geological mapping in 1:12,500 scale, surface sampling, core drilling, core sampling, chemical analysis, petrological and mineralogical studies are proposed in the block. The exploration will be carried out as per Minerals (Evidence of Mineral contents) Rules-Ammended in 2021. Accordingly, the details of different activities to be carried out are presented in subsequent paragraphs.

6. Geological Mapping

Geological mapping on 1:12,500 scale in the area (53.00 Sq. Km) will be carried out by taking geological traverses. The contacts of different formations, surficial lithology, structural features, etc. will be noted in detail. The geological map on 1:12,500 scale will be generated based on the details gathered during the field visit.

7. Borehole plan:

Few scout boreholes if required along the positive profiles delineated by Surface sampling/ pitting trenching

8. Core drilling:

Drilling in orthopyroxenite: 500 m (8 vertical boreholes)

The total 500 m of core drilling is being proposed over the area 53.00 sqkm to intersect the mineralized zone.

9. Core Logging:

The drill cores would be logged systematically viz. details of litho-units, colour, structural feature, texture, mineralization, beside the recovery, rock quality designation and type of ore would be recorded.

10. Core Sampling

The drill core will be split into two equal halves and one part would be preserved in the core box. The other half will be powdered to 200 mesh size and the same would be divided into four

parts (250 g each) through coning and quartering. One part of 250g sample will be sent to chemical laboratory for analysis, second part to be preserved in the camp as duplicate sample, third part to be utilized for preparing composite sample for individual ore band and the fourth part would be kept as either check sample or sample to be used for any other specific purpose.

The length of each sample will be kept 0.50 m-1.00 m depending upon the width of particular types of ore and its physical character. The primary core samples will be analyzed for Major oxides including LOI by XRF methods. some samples would be analyzed by ICPMS and Fire Assay technique to ascertain the presence of any critical mineral in anomalous concentration.

11. Petrographic & Mineralographic Studies

Thin and polished sections will be prepared from outcrop samples and the core samples and those will be studied for detailed petrographic and mineralographic characteristics. These samples will be drawn from ore zones and associated rocks. A provision of 20 nos. specimens for petrographic studies is kept for the proposed area.

In addition, bulk density determination of 3 nos. of samples will be carried out for the proposed block.

12.Nature Quantum and Target for G4 stage

Quantum of work			
Sl No.	**Item of work**	**Unit**	**Quantity**
A	**Large Scale Geological Mapping (LSM)**		
1	on 1:12,500 Scale	sq. km	53.00
B	**Survey Work by surveyor days**		
2	Demarcation of proposed boundary, Fixation of Borehole and determination of co-ordinates & Reduced Level (RL) of the boreholes by DGPS	Per point of observation	12
C	**Geophysical survey**		
1	Magnetic survey (10-30 L.Km)	Per station	810
2	Gravity survey	Per station	100
D	**Surface sampling**		
1	Bed rock sample	Nos	140
E	**Trenching/pitting**		
1	Trenching	Cu.m	100
2	Pitting	Cu.m	100
F	**Drilling**		
1	Core drilling	m	500
2	Borehole Pillaring (12"x12"x30")	nos	8
G	**Chemical Analysis**		

Quantum of work			
Sl No.	**Item of work**	**Unit**	**Quantity**
i)	Surface samples + 10% Check Samples Chemical analysis by XRF radicals (Mn%, MnO%, Al2O3%, Fe%, Fe2O3%, SiO2%, P%, S%, In-solubles & LOI) + other major oxides	nos	50 External check =5
ii)	Analysis of 34 elements by ICPMS and 34 elements by ICP-AES / ICPMS (34 elements along with Cu, Pb, Zn, Fe, Ni, Co, Cr, Al, S, Bi etc.)	nos	Surface + P/T + Core sample: 50+100+150=300 External check: 5+10+15= 30
iii)	Analysis of gold by Fire Assay technique	nos	Surface+P/T+Core sample: 20+20+50=90 External check: 2+2+5=9
iv)	Analysis of PGE by ICP-MS Ni-S Fire assay technique	nos	Surface+P/T+Core sample: 20+20+50=90 External check: 2+2+5=9
H	**Physical Analysis**		
1	Preparation of polished thin section of rock	nos	20
2	Complete Petrographic Studies	nos	20
3	Digital Photomicrograph of thin polished section	Nos	20
I	**Bulk Density Determination**	**nos**	3
J	**3D ore body modelling using compatible software**		
K	**Report Preparation (as per MEMC Amendment Rule 2021/UNFC)**	**nos**	1

13. References:

i. Banerjee, P. K., (1982): Stratigraphy, petrology and geochemistry of some Precambrian basic volcanic and associated rocks of Singhbhum district, Bihar and Mayurbhanj and Keonjhardistts., Orissa, Mem. Geol. Surv. India, Vol. 111.

ii. Basu, A., (1986): Geology and tectonic framework of the Ongarbira volcanic and adjacent formation, Singhbhum, Bihar, Unpublished Prog. Rep., pp 1-54.

iii. Dutta, S. K. & Mukhopadhyay, P. K. (2010): Report on Specialised Thematic Mapping in Ongarbira volcano sedimentary suite of rocks to examine regional tectono-stratigraphic setting and delineate potential zones of high magnesia rocks and associated Cu, Au, Mn, , Cr and asbestos mineralization, West Singhbhum district, Jharkhand Unpublished Rep., GSI, pp 1-23

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Plate II: Proposed block boundary over Toposheet no. 72F/10 & 72F/11

Plate III: Proposed block boundary over Specialized Thematic Map

Plate IV: Proposed block boundary over Geological Map (1: 50,000)

Plate V: Proposed block boundary over Lithological Map with NGCM sample result for Ni

Plate VI: Proposed block boundary over Lithological Map with NGCM sample result for Cr

Plate VII: Proposed block boundary over Lithological Map with NGCM sample result for TiO2

Plate- I

Location Map of the Proposed block Pasubera-West, West Singhbhum District, Jharkhand

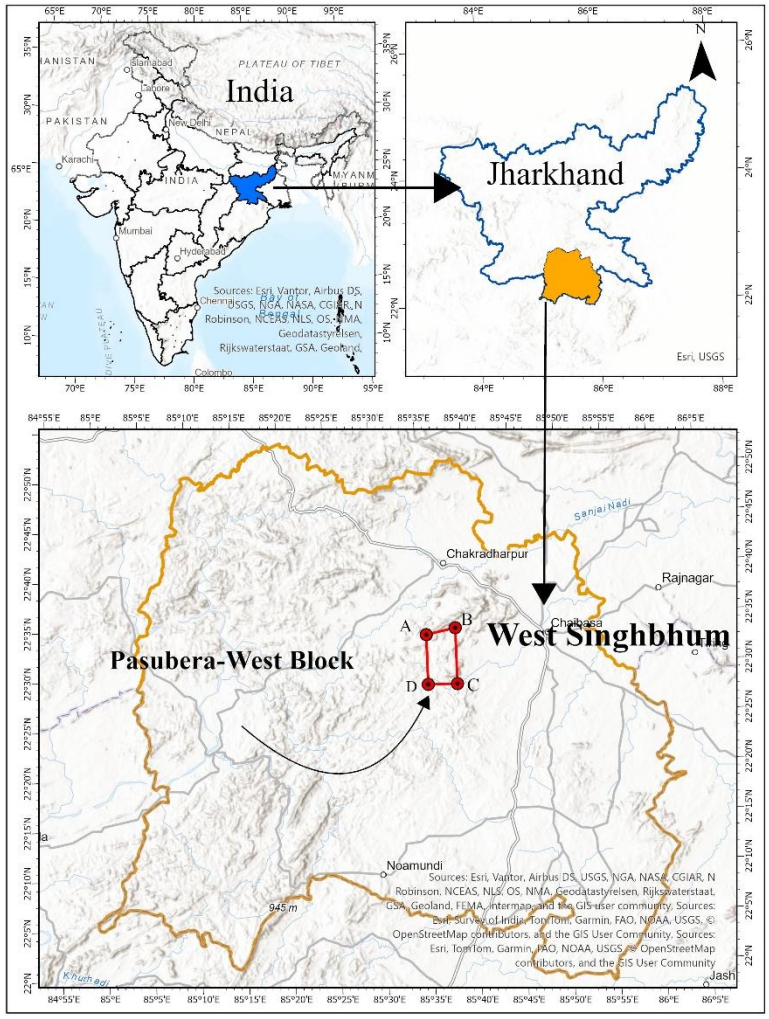
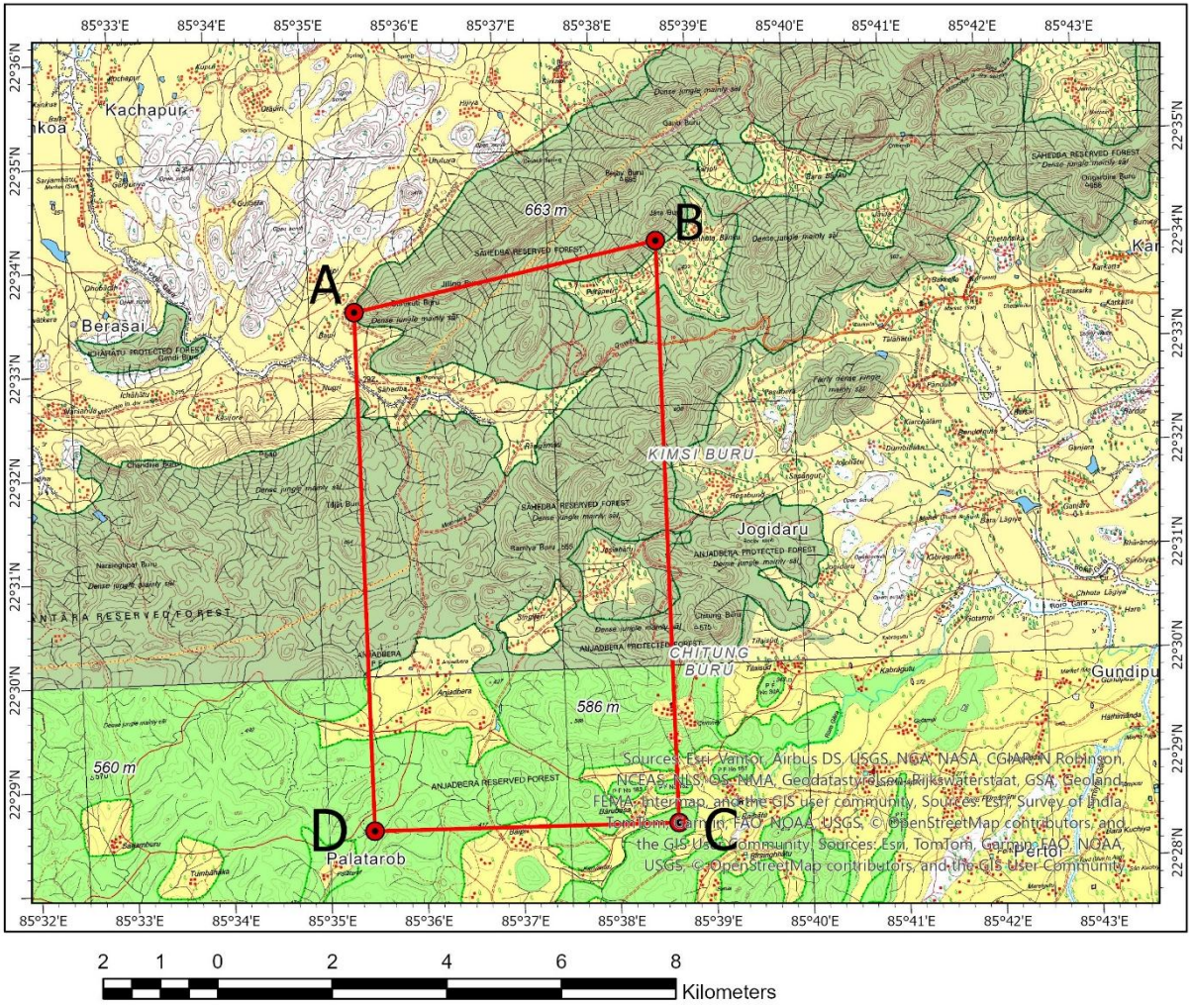


Plate- II

Proposed block boundary over Toposheet no. 72F/10 and 72F/11



N

Point ID	X	Y
A	85.5911	22.5586
B	85.6438	22.5682
C	85.6438	22.4747
D	85.5912	22.4753

Legend

Cardinal points

Plate- III

Proposed block boundary over Specialized Thematic Map

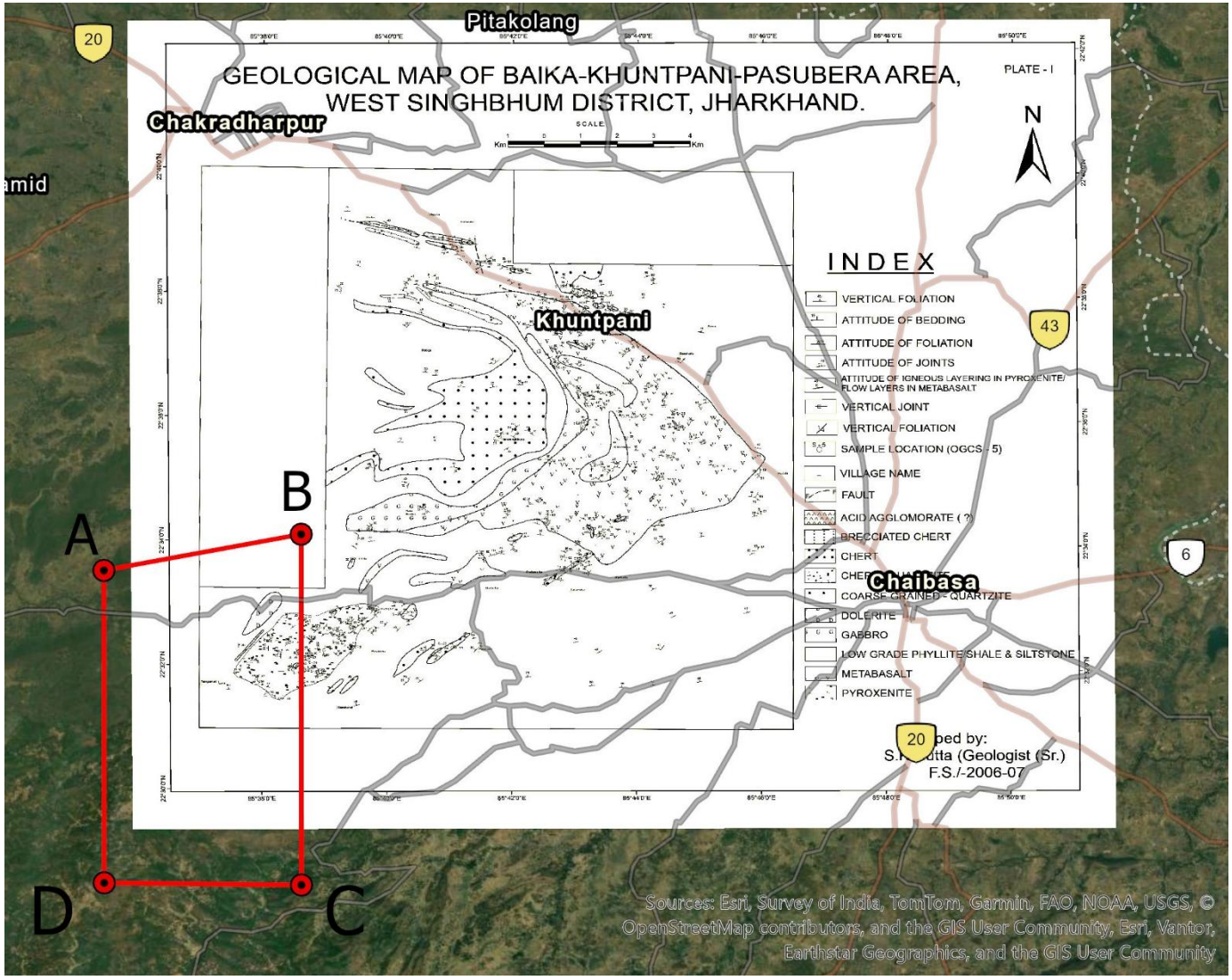
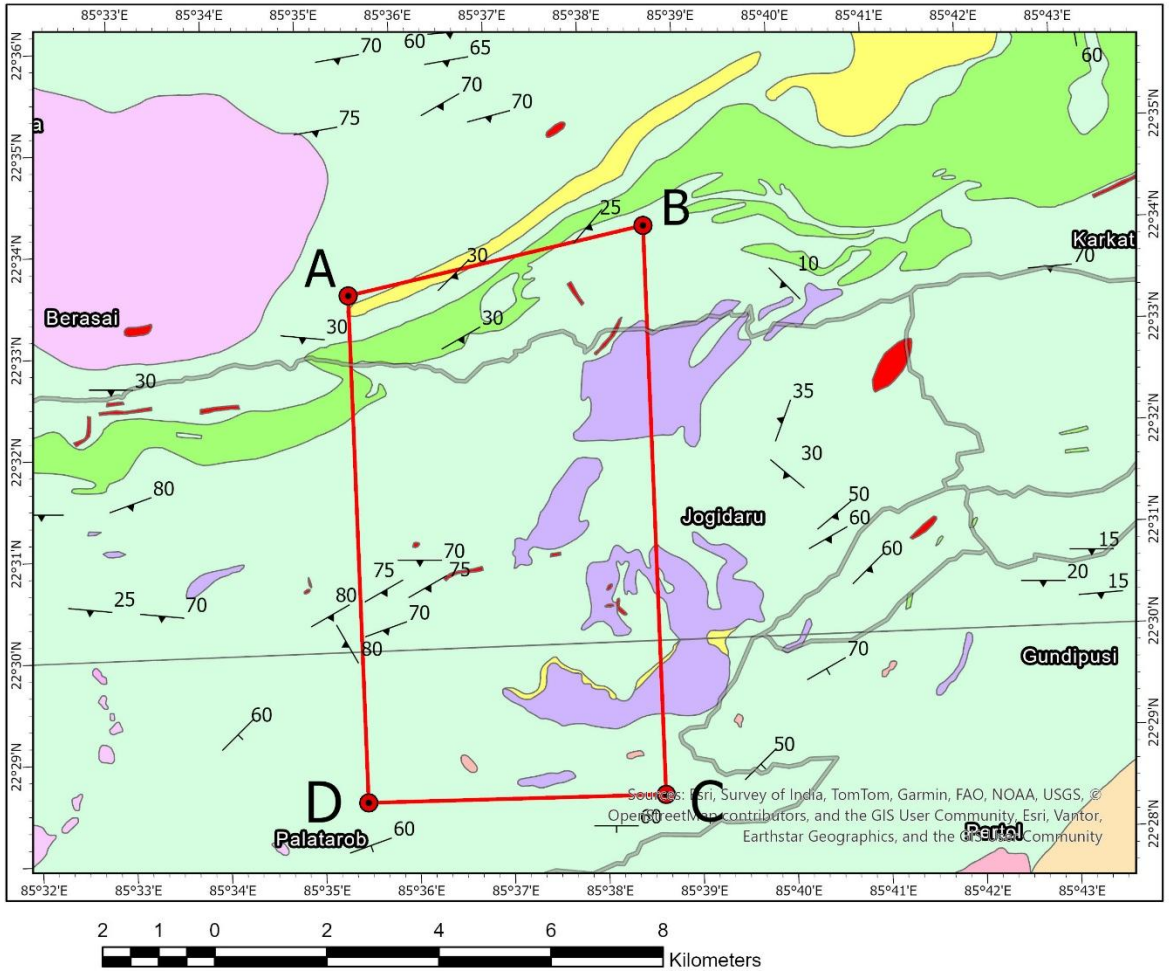


Plate- IV

Geological Map of the Proposed block in 1:50,000 scale



Point ID	X	Y
A	85.5911	22.5586
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C	85.6438	22.4747
D	85.5912	22.4753

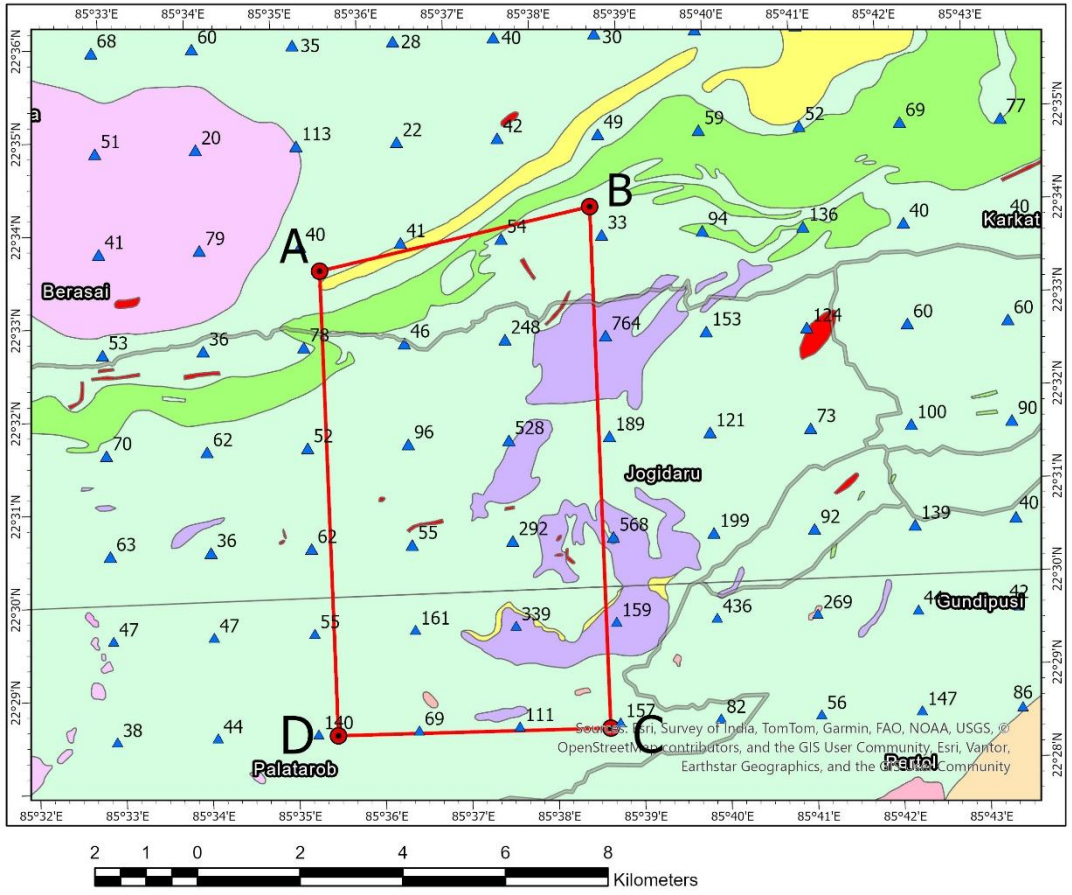
Legend

lithologic

- BASIC LAVA FLOW/ SUB VOLCANICS
- BASIC VOLCANICS WITH PSAMMO-PELITE
- CHERT,JASPERY QUARTZITE
- GRANITE
- GRANITE / GRANITE GNEISS
- QUARTZITE
- SANDSTONE, CONGLOMERATE
- SHALE AND PHYLLITE
- SLATE, PHYLLITE, MICA SCHIST
- TUFFACEOUS ROCKS
- ULTRAMAFICS
- Foliation (S1)

Plate- V

Proposed block boundary over Lithological Map with NGCM data for Ni



Point ID	X	Y
A	85.5911	22.5586
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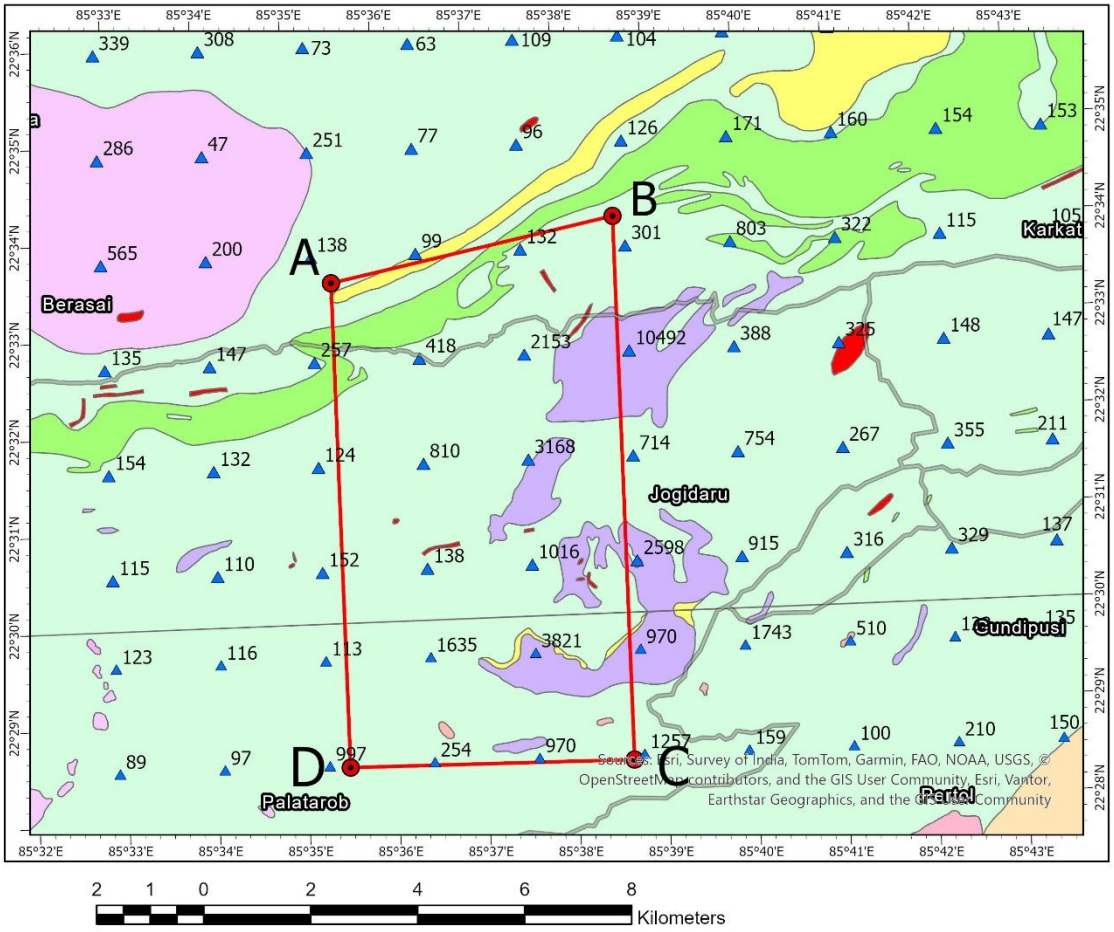
C	85.6438	22.4747
D	85.5912	22.4753

Plate- VI

Proposed block boundary over Lithological Map with NGCM data for Cr



Point ID	X	Y
A	85.5911	22.5586
B	85.6438	22.5682
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D	85.5912	22.4753

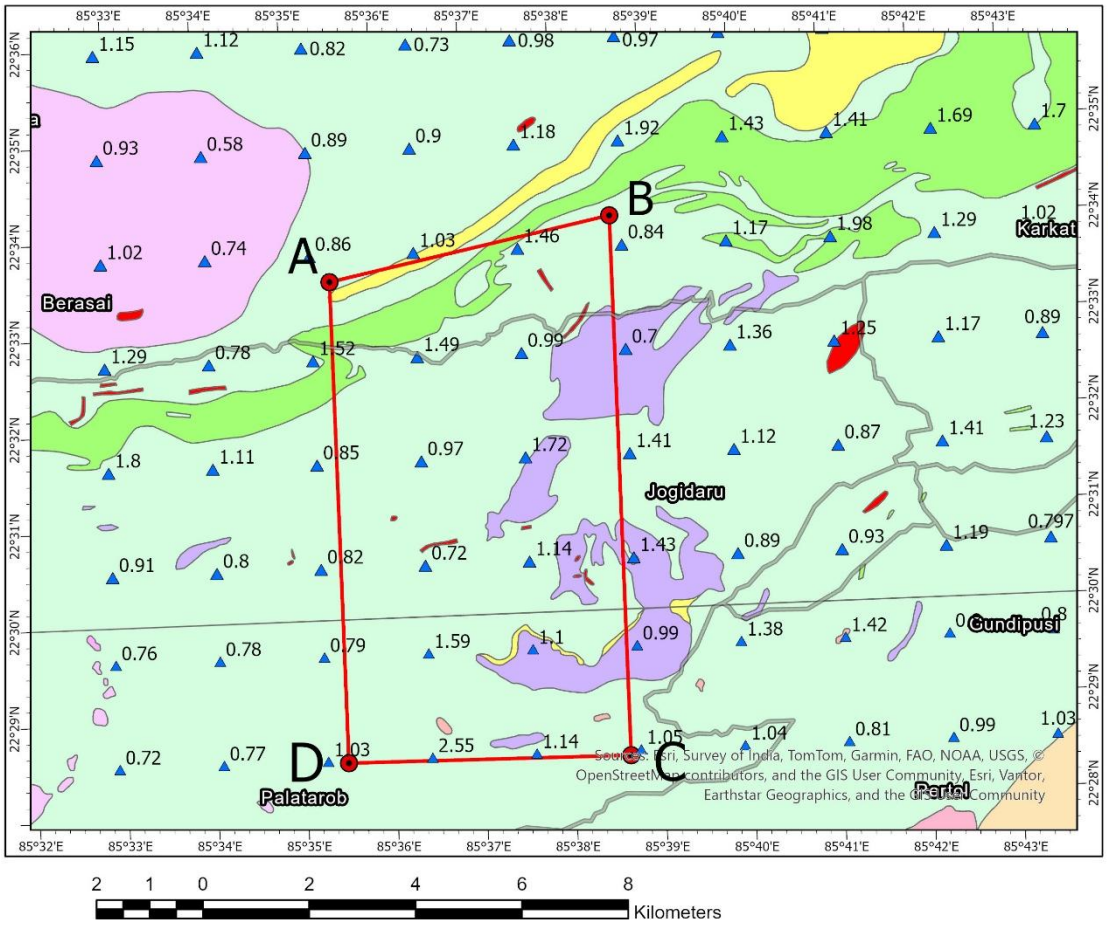
Legend

lithologic

- BASIC LAVA FLOW/ SUB VOLCANICS
- BASIC VOLCANICS WITH PSAMMO-PELITE
- CHERT,JASPERY QUARTZITE
- GRANITE
- GRANITE / GRANITE GNEISS
- QUARTZITE
- SANDSTONE, CONGLOMERATE
- SHALE AND PHYLLITE
- SLATE, PHYLLITE, MICA SCHIST
- TUFFACEOUS ROCKS
- ULTRAMAFICS
- Stream Sediment
- Stream sediment result for Cr

Plate- VII

Proposed block boundary over Lithological Map with NGCM data for TiO2



Point ID	X	Y
A	85.5911	22.5586
B	85.6438	22.5682
C	85.6438	22.4747
D	85.5912	22.4753

14. Manpower deployment:

Two geologists, two geophysicists with required laborers and one drilling rig with drilling crew will be deployed as per the requirement of the time schedule chart.

Title: Reconnaissance Survey (G4 Stage) for Ni, Cr, Au, PGE and Ti In Pasubera-West Block, West Singhbhum District, Jharkhand Area 53.00 sq. km, No.of BH: 8, Meterage - 500 m; Schedule timeline- 12 months Review: in 5th month													
S. No.	Item of work	Months											
		1	2	3	4	5		6	7	8	9	10	11	12
1	Camp Setup													
2	Large Scale Geological Mapping (1:12,500)													
3	Trenching/ Pitting													
4	Sampling and analysis of surface samples, P/T samples													
5	Physical & Petrographic study of surface samples, P/T samples													
6	Geophysical survey													
7	DGPS Survey for BH fixation & RL determination													
8	Scout drilling													
9	Core sampling and its preparation													
10	Chemical analysis of Core Samples													
11	Physical & Petrographic study of drill core samples													
12	Processing of Analytical data													
13	3D ore body modeling													
14	Preparation of Geological Report													

15. Breakup of Expenditure:

Estimated Cost for Reconnaissance Survey (G4 Stage) For Ni, Cr, Au, PGE and Ti in Pasubera-West Block, West Singhbhum District, Jharkhand Under NMEDT							
Total area - 53.00 Sq.km; Borehole - 8; Meterage - 500 m, Period of completion - 12 months, Review - in 5th month (after completion of field activity alongwith receival of chemical analysis results of surface samples and P/T Samples)							
SL.No	**Item Of Work***	**Unit***	**Rate As Per NMEDT SOC 2025**		**Estimated Cost of the Proposal**		
			SOC. Item No	**Rate As Per SOC* (a)**	**Qty. (b)**	**Total Amount (Rs) (a*b)**	**Remarks**
A	**Large Scale Geological Mapping Other Geological Work & Surveying**						
i	Geological mapping (1:12,500), Trenching & Drilling work	sqkm	1.1.1	₹ 18,300.00	53	₹ 9,69,900.00	
ii	Charges for Geologist per day (Field) for Geological mapping & Trenching work, drilling activity (without labour)	day	1.2.1a	₹ 14,500.00	360	₹ 52,20,000.00	
iii	Labours charges; Base rate (for 2 labours per geologists)	day	5.8	₹ 526.00	720	₹ 3,78,720.00	Amount will be reimbursed as per the notified rates by the Central Labour Commissioner or respective State Govt. whichever is higher.
iv	Charges for Geologist per day (HQ)	day	1.2.1a	₹ 10,500.00	120	₹ 12,60,000.00	
	Sub Total- A					**₹ 78,28,620.00**	

Estimated Cost for Reconnaissance Survey (G4 Stage) For Ni, Cr, Au, PGE and Ti in Pasubera-West Block, West Singhbhum District, Jharkhand Under NMEDT							
Total area - 53.00 Sq.km; Borehole - 8; Meterage - 500 m, Period of completion - 12 months, Review - in 5th month (after completion of field activity alongwith receival of chemical analysis results of surface samples and P/T Samples)							
SL.No	**Item Of Work***	**Unit***	**Rate As Per NMEDT SOC 2025**		**Estimated Cost of the Proposal**		
			SOC. Item No	**Rate As Per SOC* (a)**	**Qty. (b)**	**Total Amount (Rs) (a*b)**	**Remarks**
B	**Trenching/Pitting**						
i	Trenching	per cu.m	2.1.1	₹ 4,125.00	100	₹ 4,12,500.00	
ii	Pitting	per cu.m	2.1.2	₹ 4,725.00	100	₹ 4,72,500.00	
	Sub Total- B					**₹ 8,85,000.00**	
C	**Survey work**						
i	DGPS Survey for BH fixation & RL determination	Per Point of observation of observation	1.3.2	₹ 24,000.00	12	₹ 2,88,000.00	
ii	Labours Charges for survey work; Base rate	day	5.8	₹ 526.00	30	₹ 15,780.00	
	Sub Total- C					**₹ 3,03,780.00**	
D	**Ground Geophysical Survey (in- house)**						
i	Charges for Gravity survey	station	3.3.1a	₹ 3,800.00	100	₹ 3,80,000.00	Profile spacing of 1km and a station spacing of 200 meters
ii	Charges for Magnetic survey	station	3.3.2a	₹ 1,800.00	810	₹ 14,58,000.00	Profile spacing of 400 meters and a station spacing of 50 meters
iii	Charges for Geophysicist at field (without labourer)	day	3.18	₹ 14,500.00	60	₹ 8,70,000.00	

Estimated Cost for Reconnaissance Survey (G4 Stage) For Ni, Cr, Au, PGE and Ti in Pasubera-West Block, West Singhbhum District, Jharkhand Under NMEDT							
Total area - 53.00 Sq.km; Borehole - 8; Meterage - 500 m, Period of completion - 12 months, Review - in 5th month (after completion of field activity alongwith receival of chemical analysis results of surface samples and P/T Samples)							
SL.No	**Item Of Work***	**Unit***	**Rate As Per NMEDT SOC 2025**		**Estimated Cost of the Proposal**		
			SOC. Item No	**Rate As Per SOC* (a)**	**Qty. (b)**	**Total Amount (Rs) (a*b)**	**Remarks**
iv	Labours Charges; Base rate	day	5.8	₹ 526.00	120	₹ 63,120.00	
v	Charges for Geophysicist at Headquarters	day	3.18	₹ 10,500.00	30	₹ 3,15,000.00	
	Sub Total- D					**₹ 30,86,120.00**	
E	**Drilling (after review) (in-house)**						
i	Scout Drilling up to 500 m (Hard rock) (HQ)	per m	2.2.1.1d	₹ 10,000.00	500	₹ 50,00,000.00	500m drilling in Orthopyroxenite
ii	Borehole deviation by multi shot camera	per m	2.2.5	₹ 330.00	83	₹ 27,500.00	Interval 6m
iii	Land / Crop Compansation (in case the BH falls in agricultural Land)	per borehole	5.6	₹ 30,000.00	8	₹ 2,40,000.00	As per actuals as certified by local authorities subject to a maximum of 2000 per borehole
iv	Construction of concrete Pillar (12"x12"x30")	per borehole	2.2.7	₹ 2,000.00	8	₹ 16,000.00	
v	Transportation of Drill Rig & Truck associated per drill	Km	2.2.9	Lumpsum	25% of drilling cost	₹ 12,50,000.00	For drilling cpost less than 50 Lakhs, 25% of drilling cost
vi	Monthly Accomodation Charges for drilling Camp (up to 2 Rigs)	month					
vii	Drilling Camp Setting Cost	Nos					

Estimated Cost for Reconnaissance Survey (G4 Stage) For Ni, Cr, Au, PGE and Ti in Pasubera-West Block, West Singhbhum District, Jharkhand Under NMEDT							
Total area - 53.00 Sq.km; Borehole - 8; Meterage - 500 m, Period of completion - 12 months, Review - in 5th month (after completion of field activity alongwith receival of chemical analysis results of surface samples and P/T Samples)							
SL.No	**Item Of Work***	**Unit***	**Rate As Per NMEDT SOC 2025**		**Estimated Cost of the Proposal**		
			SOC. Item No	**Rate As Per SOC* (a)**	**Qty. (b)**	**Total Amount (Rs) (a*b)**	**Remarks**
viii	Drilling Camp Winding up Cost	Nos					
ix	Road Making (Flat Terrain)	Km					
x	Drill Core Preservation	per m	X	₹ 1,590.00	200	₹ 3,18,000.00	
xi	Charges for one Sampler per day (1 Party)	one sampler per day	1.2.1b	₹ 7,850.00	60	₹ 4,71,000.00	
xii	Charges for Labour	day	5.8	₹ 526.00	240	₹ 1,26,240.00	
	Sub Total- E					**₹ 74,48,740.00**	
F	**Laboratory Studies**						
1	**Chemical Analysis**						
i)	**Geochemical Sampling-Surface samples (Bedrock/Channel /Soil/Stream sediment)**						
a	Analysis of major oxides by XRF	Nos	4.1.17a	₹ 4,200.00	50	₹ 2,10,000.00	For rock characterization

Estimated Cost for Reconnaissance Survey (G4 Stage) For Ni, Cr, Au, PGE and Ti in Pasubera-West Block, West Singhbhum District, Jharkhand Under NMEDT							
Total area - 53.00 Sq.km; Borehole - 8; Meterage - 500 m, Period of completion - 12 months, Review - in 5th month (after completion of field activity alongwith receival of chemical analysis results of surface samples and P/T Samples)							
SL.No	**Item Of Work***	**Unit***	**Rate As Per NMEDT SOC 2025**		**Estimated Cost of the Proposal**		
			SOC. Item No	**Rate As Per SOC* (a)**	**Qty. (b)**	**Total Amount (Rs) (a*b)**	**Remarks**
b	Analysis of one rock/ soil sample for determination of a package by 34 elements by ICP-AES / ICPMS (34 elements along with Cu, Pb, Zn, Fe, Ni, Co, Cr, Al, S, Bi etc.)	Nos	4.1.15	₹ 7,400.00	50	₹ 3,70,000.00	For Rare metal & rare earth elements
c	Analysis of gold by Fire Assay technique	Nos	4.1.5a	₹ 5,000.00	20	₹ 1,00,000.00	
d	For PGE (ICP-MS Ni-S Fire assay technique)	Nos	4.1.6	₹ 13,600.00	20	₹ 2,72,000.00	
ii)	**Surface Check samples (10% External)**						
a	Analysis of major oxides by XRF	Nos	4.1.17a	₹ 4,200.00	5	₹ 21,000.00	For rock characterization
b	Analysis of one rock/ soil sample for determination of a package by 34 elements by ICP-AES / ICPMS (34 elements along with Cu, Pb, Zn, Fe, Ni, Co, Cr, Al, S, Bi etc.)	Nos	4.1.15	₹ 7,400.00	5	₹ 37,000.00	For Rare metal & rare earth elements

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SL.No	**Item Of Work***	**Unit***	**Rate As Per NMEDT SOC 2025**		**Estimated Cost of the Proposal**		
			SOC. Item No	**Rate As Per SOC* (a)**	**Qty. (b)**	**Total Amount (Rs) (a*b)**	**Remarks**
c	Analysis of gold by Fire Assay technique	Nos	4.1.5a	₹ 5,000.00	2	₹ 10,000.00	
d	For PGE (ICP-MS Ni-S Fire assay technique)	Nos	4.1.6	₹ 13,600.00	2	₹ 27,200.00	
iii)	**Pit/ Trench Samples**						
a	Analysis of one rock/ soil sample for determination of a package by 34 elements by ICP-AES / ICPMS (34 elements along with Cu, Pb, Zn, Fe, Ni, Co, Cr, Al, S, Bi etc.)	Nos	4.1.15	₹ 7,400.00	100	₹ 7,40,000.00	For Rare metal & rare earth elements
b	Analysis of gold by Fire Assay technique	Nos	4.1.5a	₹ 5,000.00	20	₹ 1,00,000.00	
c	For PGE (ICP-MS Ni-S Fire assay technique)	Nos	4.1.6	₹ 13,600.00	20	₹ 2,72,000.00	
iv)	**Pit/ Trench Check samples (10% External)**						

Estimated Cost for Reconnaissance Survey (G4 Stage) For Ni, Cr, Au, PGE and Ti in Pasubera-West Block, West Singhbhum District, Jharkhand Under NMEDT							
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SL.No	**Item Of Work***	**Unit***	**Rate As Per NMEDT SOC 2025**		**Estimated Cost of the Proposal**		
			SOC. Item No	**Rate As Per SOC* (a)**	**Qty. (b)**	**Total Amount (Rs) (a*b)**	**Remarks**
a	Analysis of one rock/ soil sample for determination of a package by34 elements by ICP-AES / ICPMS (34 elements along with Cu, Pb, Zn, Fe, Ni, Co, Cr, Al, S, Bi etc.)	Nos	4.1.15	₹ 7,400.00	10	₹ 74,000.00	For Rare metal & rare earth elements
b	Analysis of gold by Fire Assay technique	Nos	4.1.5a	₹ 5,000.00	2	₹ 10,000.00	
c	For PGE (ICP-MS Ni-S Fire assay technique)	Nos	4.1.6	₹ 13,600.00	2	₹ 27,200.00	
v)	**BH Core samples**						
a	Analysis of one rock/ soil sample for determination of a package by 34 elements by ICP-AES / ICPMS (34 elements along with Cu, Pb, Zn, Fe, Ni, Co, Cr, Al, S, Bi etc.)	Nos	4.1.15	₹ 7,400.00	150	₹ 11,10,000.00	For Rare metal & rare earth elements
b	Analysis of gold by Fire Assay technique	Nos	4.1.5a	₹ 5,000.00	50	₹ 2,50,000.00	
c	For PGE (ICP-MS Ni-S Fire	Nos	4.1.6	₹ 13,600.00	50	₹ 6,80,000.00	

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SL.No	**Item Of Work***	**Unit***	**Rate As Per NMEDT SOC 2025**		**Estimated Cost of the Proposal**		
			SOC. Item No	**Rate As Per SOC* (a)**	**Qty. (b)**	**Total Amount (Rs) (a*b)**	**Remarks**
	assay technique)						
vi)	**BH Core samples (10%External)**						
a	Analysis of one rock/ soil sample for determination of a package by 34 elements by ICP-AES / ICPMS (34 elements along with Cu, Pb, Zn, Fe, Ni, Co, Cr, Al, S, Bi etc.)	Nos	4.1.15	₹ 7,400.00	15	₹ 1,11,000.00	For Rare metal & rare earth elements
b	Analysis of gold by Fire Assay technique	Nos	4.1.5a	₹ 5,000.00	5	₹ 25,000.00	
c	For PGE (ICP-MS Ni-S Fire assay technique)	Nos	4.1.6	₹ 13,600.00	5	₹ 68,000.00	
2	**Physical & Petrological Studies**						
i	Preparation of polished thin section of rock	Nos	4.3.2	₹ 800.00	20	₹ 16,000.00	
ii	Complete petrographic/ ore microscopic study/ mineragraphic report of rock sample	Nos	4.3.4	₹ 2,800.00	20	₹ 56,000.00	

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SL.No	**Item Of Work***	**Unit***	**Rate As Per NMEDT SOC 2025**		**Estimated Cost of the Proposal**		
			SOC. Item No	**Rate As Per SOC* (a)**	**Qty. (b)**	**Total Amount (Rs) (a*b)**	**Remarks**
iii	Bulk density analysis	Nos	4.8.3	₹ 2,500.00	3	₹ 7,500.00	
	Sub Total- F					**₹ 45,93,900.00**	
G	**Total A to G**					**₹ 2,41,46,160.00**	
H	**Geological Report Preparation**	**5 Hard copies with a soft copy**	**5.2**			**₹ 7,50,000.00**	**Reimbursement will be made after submission of the Final Geological Report in Hard Copies (5 Nos) and the soft copy to NMET.**
I	**Peer review Charges**	**As per EC decision**		**₹ 30,000.00**	**1**	**₹ 30,000.00**	
J	**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 less**		**₹ 4,82,923.20**	**EA 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-NMEDT in its meeting while clearing the proposal.**

Estimated Cost for Reconnaissance Survey (G4 Stage) For Ni, Cr, Au, PGE and Ti in Pasubera-West Block, West Singhbhum District, Jharkhand Under NMEDT							
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SL.No	**Item Of Work***	**Unit***	**Rate As Per NMEDT SOC 2025**		**Estimated Cost of the Proposal**		
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K	**3D Ore Body Modeling using compatible software**	**Lumpsum**	**5.4**			**₹ 8,00,000.00**	**As rates varies from mineral to mineral and on mode of occurrence, hence charges applicable would be as per actual, based on market survey**
L	**Total Estimated Cost without GST**					**₹ 2,62,09,083.20**	
M	**Provision for GST (18% of L)**					**₹ 47,17,634.98**	**GST will be reimbursed as per actual and as per notified prescribed rate**
N	***Total Estimated Cost with GST***					***₹ 3,09,26,718.18***	
				Rs. In Lakhs		***₹ 309.27***	