Proposal for Reconnaissance survey for REE and other Critical Minerals in Udaipur – Ramgarh area, Surguja District ,Chhattisgarh(G4 Stage) under NMET

Strategic & Critical

Agency
MMPL PRIVATE LIMITED

Place: Kolkata
Date: 08-03-2025

Summary of the Block for Reconnaissance Survey (G4Stage)
GENERAL INFORMATION ABOUT THE BLOCK

	Features	**Details**
	Block ID	Udaipur_Ramgarh Block
	ExplorationAgency	
	Commodity	REE and other critical minerals
	Mineral Belt	Chhotanagpur Gneissic Complex (CGC) exposed in the northern part of the proposed area and sedimentary sequences of Lower Gondwana Group covering the remaining area.
	Completion Period with entire Time schedule to complete the project	Twelve Months
	Objectives	Based on the evaluation of geological data available, the present exploration program has been formulated to fulfil the following objectives: 1. To carry out geological mapping on 1:12,500 scale of the block (150 Sq. Km) to assess mineralized zone of REE and other critical minerals along with associated litho units. 2. To study different geological sections to build up local stratigraphy and classification of REE and other critical minerals bearing lithology in Chhotanagpur Gneissic Complex and Gondwana sandstone. 3. Petrological studies of possible host rock and their chemical analysis. 4. To carry out systematic grab/channel sampling of bed rocks and Stream Sediment samples (by heavy mineral separation) for analyses of REEs and Rare Metals to decide further course of exploration program. 5. Pitting 200 m of selected area and sampling to know the concentration of RM/ REE within the target area. 200 cubic meters of orientation pitting will be carried out. Collecting 50 soil samples from B horizon, C horizon followed by heavy mineral separation. 6. Drilling of 5 scout boreholes of total 200 m to delineate subsurface mineralisation of REE and other critical minerals. 7. Attempt to delineate a potential block or more than one block to upgrade the investigation in G3 stage.
	Whether the work will be carried out bythe proposed agency or through outsourcing and details thereof.Componentstobeoutsourcedand name of the outsource agency	Work will be carried out by MMPL PVT LTD
	Name/Numberof Geoscientists	Three nos. of Geoscientists (2 Field, 1 HQ)

<table>
<tr><td></td><td>Expected Field days (Geology)
GeologicalPartyDays</td><td>200 days</td></tr>
<tr><td>1.</td><td>Location</td><td>The coordinates of corner points of proposed Udaipur-Ramgarh G4 Block are as follows</td></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Point ID</th><th>X</th><th>Y</th></tr>
<tr><td>UR-A</td><td>82.87747</td><td>22.90307</td></tr>
<tr><td>UR-B</td><td>82.99097</td><td>22.90524</td></tr>
<tr><td>UR-C</td><td>82.99924</td><td>22.90177</td></tr>
<tr><td>UR-D</td><td>82.99706</td><td>22.75826</td></tr>
<tr><td>UR-E</td><td>82.9227</td><td>22.75826</td></tr>
<tr><td>UR-F</td><td>82.94401</td><td>22.79218</td></tr>
<tr><td>UR-G</td><td>82.91487</td><td>22.80827</td></tr>
</table>
</td></tr>
<tr><td></td><td>Villages</td><td>Tendu Tikra, Maheshpur, Pahadkoria, Garhputa, Kathmunda, Dawa, Chakeri, Sanibarra, Laxmangarh, Sarma, Sukhari Bhandar, Kudarbaswar, Manoharpur, Bangru, Amadugu, Beldhab</td></tr>
<tr><td></td><td>Tehsil/Taluk</td><td>Udaipur</td></tr>
<tr><td></td><td>District</td><td>Surguja</td></tr>
<tr><td></td><td>State</td><td>Chhattisgarh</td></tr>
<tr><td>2.</td><td>Area(hectares/squarekilometres)</td><td></td></tr>
<tr><td></td><td>BlockArea</td><td>150 sq km</td></tr>
<tr><td></td><td>Forest Area</td><td>-</td></tr>
<tr><td></td><td>GovernmentLandArea</td><td></td></tr>
<tr><td></td><td>PrivateLand Area</td><td></td></tr>
<tr><td>3.</td><td>Accessibility</td><td></td></tr>
<tr><td></td><td>Nearest Rail Head</td><td>Ambikapur Railway station is 40km towards north of the block.</td></tr>
<tr><td></td><td>Road</td><td>The National Highway (NH130) from Ambikapur to Chotiya passing through the block.</td></tr>
<tr><td></td><td>Airport</td><td>The nearest airport is Ambikapur Airport, 40 km towards north of the proposed block.</td></tr>
<tr><td>4.</td><td>Hydrography</td><td></td></tr>
<tr><td></td><td>Local Surface Drainage Pattern (Channels)</td><td>Southwest portion of the area falls under the Hasdo valley, but northeastern part, which is drained by the Rehar River. Rehar River, originating in the hilly tract south of Matringa (22°40'00":83°02'30"), flows northward and is fed by numerous nalas such as Khurkhuri, Phuski, Gerua, Tungi, Kharpari etc. and drains into the Son River.</td></tr>
<tr><td></td><td>Rivers/Streams</td><td>Southwest part fall in The Hasdo River, which drains into the Mahanadi and the Northeastern part forms the watershed of the Son River valleys.</td></tr>
<tr><td>5.</td><td>Climate</td><td></td></tr>
<tr><td></td><td>MeanAnnualRainfall</td><td>Annual rainfall goes upto 150 mm during the rainy season.</td></tr>
<tr><td></td><td>Temperatures(December)(Minimum)
Temperatures(June) (Maximum)</td><td>Winters in these parts are very cold possibly due to extensive forests and high altitude. Temperature varies from 0^{o}C to 44^{o} C</td></tr>
</table>

6.	**Topography**	
	Toposheet Number	64J/13
	Morphology of the Area	The southern part of the area is highly rugged with an average elevation of 814 m above the mean sea level. The northern part is more or less a plain area with respect to the Ramgarh Pahar Δ976 (22°54':82°54') standing prominently as an isolated peak.
7	**Availabilityofbaselinegeosciencedata**	
	GeologicalMap(1:50K/25K)	1:50,000 (Bhukosh)
	GeochemicalMap	YES Available
	Geophysical Map (Aeromagnetic, ground geophysical,Regional as well as local scale GP maps)	-
8	**Justification for taking up Reconnaissance Survey / Regional Exploration**	1. ***National Geochemical Mapping (NGCM), GSI, Bhukosh***. The values obtained from the stream sediment analysis for total REE having maximum values > 1514.64 ppm. **2. The NGCM data for other critical minerals shows values as : Co- 340 ppm, Rb-192 ppm, Sr- 132ppm, Zr- 1261 ppm, Sc- 94 ppm, V- 164ppm, Hf- 73 ppm, Ba- 1570 ppm and K2O- 5.28%, HREE -263 ppm in the proposed Block.** 3. The proposed Udaipur -_Ramgarh Block lies in Lower Gondwana rocks and rocks of Chhotanagpur Gneissic Complex (CGC) which host numerous economically viable prospects. Reconnaissance survey for Li, REE, Tungsten, done by GSI during F.S.2018-19 in the adjacent Toposheet No 64J/10 and 11 from the proposed block have analysed anomalous values for Rare Metals. 4. ***GSI carried out G-4 explorations for Li and Rare Metals in 2022-23 in the adjoining toposheet which have encouraging total REE values in NGCM samples***. The proposed block lies to the Northeastern extension having similar geological setup suitable for hosting REE and Rare metal mineralization. Based on the NGCM data and previous exploration in the adjoining areas, the current proposed block maybe studied for REE and RM mineralization at G-4 Stage.

PROPOSAL FOR RECONNAISSANCE SURVEY (G-4 STAGE) FOR REE MINERALIZATION IN UDAIPUR-RAMGARH BLOCK, DISTRICT – SURGUJA, STATE – CHHATTISGARH (AREA 150 SQ KM)

1.0.0 INTRODUCTION:

Present block has been proposed for REE and other critical minerals in Toposheet no. 64J/13. The present exploration programme is proposed on the basis of stream sediment data of NGCM programme of GSI uploaded in Bhukosh. The proposed block lies to the northeastern extension of the area studied by GSI, in G-4 stage of exploration for Li and Rare Metals in 2022-23.

1.2.0 LOCATION AND ACCESSIBILITY

The proposed Udaipur-Ramgarh Block comprises of 150 sq km area and lies in Udaipur Tehsil of Surguja District (Toposheet No. 64J/13), Chhattisgarh. Tendu Tikra, Maheshpur, Pahadkoria, Garhputa, Kathmunda, Dawa, Chakeri, Sanibarra, Laxmangarh, Sarma, Sukhari Bhandar, Kudarbaswar, Manoharpur, Bangru, Amadugu, Beldhab villages are located within the proposed area. The National Highway-130 connecting Ambikapur to Chotiya passes through the block. The district headquarters Ambikapur is located at 40 km north of the block. All the villages in the area are well connected to each other and to the highways by motorable roads and tracks. The nearest Railway Station is Ambikapur Railway Station which is at about 40 km north of the proposed block. The nearest airport is Ambikapur city Airport, at a distance of 38 km north of the proposed block.

1.3.0 PHYSIOGRAPHY

The area shows a mixed type of topography. The northern part is moderately undulated with a number of nalas. In contrast the south and south-western part is characterised by the sharp topographic relief with deep gorges and nalas. Dense habitations are seen in the northwest and northeast of the study area nearly these areas are plane. The maximum elevation Δ976 m of Ramgarh hill above msl located about 4 Kms South-west of Udaipur tehsil almost at the centre area of toposheet. The lowest elevation Δ400 m above msl located at Parogiya village in Chhoti Chornai nadi course near southern most part of the area.

1.4.0 Drainage

The area is drained by a number of streams which expose excellent sections of Gondwanas. The first generation of streams are mainly N-S, which join the S-W trending streams. They are dendritic and have mainly perennial flow. An east-west trending water divide can be noticed in north of Tipari Pahar roughly along the line joining Chakeri-Tendutikra villages. ChhotiChornaiNadi is the main drainage channel of the south-western part of the area. They have formed deep gorges through the sedimentaries. Atem Nadi is the main drainage channel in the northern part of the area. The western part of the channel cut by Atem Nadi is very wide and devoid of good rock exposures. The north-eastern part of the area is drained by almost northerly flowing Rehar river and its tributaries which fulfils the needs of local people. The eastern part is drained by the Rehar River. Rehar River, originating in the hilly tract south of Matringa (22°40'00":83°02'30"), flows northward and is fed by numerous nalas such as Khurkhuri, Phuski, Gerua, Tungi, Kharpari etc. Along its courses, it passes into the Bisrampur coalfield and finally drains into the Son River. The Hasdo River, which drains into the Mahanadi, flows southerly along the western limit of the coalfield, fed by its numerous tributaries.

1.5.0 Climate and Rainfall:

The climate of the area is sub-tropical, characterised by a hot summer and good seasonal rainfall during the southwest monsoon season. Summer continues upto middle of June. The southwest monsoon prevails from the middle of June to the end of September. October and November constitute the post monsoon season. The area experiences wide temperature variation from summer to winter. The temperature increases upto 44ºC during the summer and drops to 0ºC during the winter which results in chilly nights. Dense cover of vegetation and altitude of the area makes nights pleasant even in summer. The period from June 12 to September is generally

experienced as rainy season. The area receives average annual rainfall between 1400 mm to 1500 mm (approximately).

1.6.0. Vegetation and Wild Life:

Almost the whole area mapped is thickly forested, particularly the southern region. The forests contain good timber yielding Saal, Beeja etc. Open country is very limited, with only local patches of cultivable lands around villages.

Wild life in the form of deer, hyena and bear are not a very rare site even today. Occasionally, presence of one or two tigers is also reported.

2.0.0 GEOLOGY OF THE AREA

2.1.0 Regional Geology-

The area is located in Toposheet no 64J/13, mostly occupied by Lower Gondwana rocks, while portions are also covered by Archaean metamorphics and post-Gondwana basic igneous rocks. The stratigraphic succession of the area (after GSI) is as follows:

General stratigraphic succession of the area

Basic intrusive (sills and dykes)	Deccan Trap	Upper Cretaceous (?)
Tough compact sandstone, with intercalations of argillaceous sandstones, ferruginous shales, buff-coloured cherty sandstones and occasional thin pebble beds	Supra-Barakars (Regarded as equivalents to Kamthis or Raniganj)	
-----Disconformity-----		
Predominately of feldspathic massive Barakar sandstone, with intercalations of carb-shale, coal seams and micaceous flaggy beds, boulder bed at the base	Barakar Formation	LOWER GONDWANAS
Khaki-green shales, green and cream coloured sandstones, with boulder bed at the base.	Talchir Formation	
-----Unconformity-----		
Porphyritic granite, Gneisses and quartzites.	Metamorphics	Precambrians

Precambrians:

The metamorphic are exposed in a continuous stretch along the eastern and the north-eastern boundary of the area mapped and also as isolated in the southeastern corner of the coalfield. The predominant rock-types are the pink porphyritic granite and quartzites, the former frequently exhibiting gneissic banding which has a general east-west trend, with a steep southerly dipping foliation. Pink to flesh-red coloured feldspars and quartz are the dominant constituents of these granites with subordinate amounts of biotite and other minerals.

The small oval shaped metamorphic inlier occurring about 1 km west of Patkura(22°45'30":83°07'30") stretches in an east-west direction for about 3.2 km. The rock-types are the same as described above and show the trend of foliation as N70°W with a steep southerly dip.

Lower Gondwanas

Talchir Formation:

The main belt of Talchir rocks is well developed along the eastern and northern fringes of the area mapped. Along the eastern margin they occur as a thin strip varying in width from 2 to 4 km but it

widens along the northern fringe and possibly connects with the Lakhanpur coalfield to the north. Apart from the above mentioned Talchir belt, there is another small inlier of Talchir exposed in the southeastern corner of the coalfield, around the village Patkura, Kedma (22°45':83°03'30") and south of Kesma (22°45':83°04') village. It occurs as a thin strip along the Rehar River course up to 6 km south of Kesma.

The rocks of the Talchir Formation consist of a boulder bed at the base overlain by khaki-green, chocolate and olive-green shales and compact, fine grained, generally well-sorted sandstones with undecomposed feldspars. The boulder bed consists of highly assorted pebbles and boulders of metamorphic quartzites, gneisses, chert, jasper, and quartz-pebbles, embedded in a compact greenish grey sandy matrix.

Good sections of Talchir are well-exposed in the Tungi and Gerua nalas in the east, Turrapani and Kharpari to the north and Rehar River in the south-eastern part. In the eastern sector Talchirs unconformably overlie the Metamorphics as evidenced by the occurrence of an impersistent boulder bed of about 5m to 6m thickness, which rests directly on the basement as noticed in the Gerua nala, in the nalas south-east of Kuni (22°52':83°04') and south of Tirkela (22°50'30":83°05'00"). Higher up in the sequence khaki-green shales and compact sandstones occur, but towards the top cream-coloured sandstones become prevalent. In the north-eastern portions the sandstone exhibit weathering features like broken pottery.

The Talchir occurring as a fringe south of the metamorphic inlier in the southeastern part mostly comprise khaki-green shales siltstones and green- and cream-coloured sandstones. The Talchir in this part are mostly horizontal or show very low dip. South of the metamorphic inlier these have east-west strike, but towards the southern part show a NNW-SSW trend with low rolling dip.

The fringe of Talchir in the eastern part shows a general NW SE strike with low (average 5°) south-westerly dip, while towards the northern part strike becomes east-west with low southerly dip.

Barakar Formation:

Rocks of the Barakar Formation cover a wide and continuous stretch of country south of latitudes 22°56' and west of longitudes 83°07' and extend over 400 sq km of the area mapped.

The Barakars are well exposed in the southern part, particularly in the Chhoti Chornainadi, which has cut a 50m deep gorge in the Barakars at places and also in its feeder nalas. Rehar River in the south-eastern part of the coalfield also provides some good exposures.

Barakars are mainly composed of medium to coarse grained feldspathic massive sandstones with intercalations of grey micaceous flaggy beds, carbonaceous shale and coal seams. Tough ferruginous bedded sandstones have also been noticed at places. The massive sandstones are highly friable, grey or buff coloured and mostly consist of angular grains of quartz and altered feldspars with little mica showing wide range of grain size from gritty to fine grained and are ill-sorted. Occasionally pebble beds have been found to have developed locally within these sandstones. An interesting feature noted in the massive sandstones, is the widespread occurrence of pyritiferous sandstone nodules.

The Barakars are disposed as horizontal or gently dipping beds, showing swinging of strike within a very short distance. The General strike of the Barakar rocks is NW-SE with low south westerly dips, the amount varying from 2° to 5°. The beds frequently exhibit rolling dips. The sandstones frequently exhibit cross-bedding which varies in magnitude, the maximum length of the fore set measuring about 3m to 4m. Pothole structures of various dimensions are also very common in the massive sandstones in the nala beds.

It is not possible to estimate the total thickness of the Barakars unless the mapping of the entire coalfield is completed. But within the area covered so far, the thickness of the Barakars strata on the minimum side appears to be 436m. The thickness of the Barakars exposed in the Ramgarh Pahar Δ3202 and in the Dula Pahar Δ3204 (22°44'50":82°57'30") is about 365m and 153m respectively. It can be clearly seen from the map (plate I) that the Barakars exposed in the northern part of Rehar River and Atemnadi sections represent the basal part the coal measures, while those revealed by the Chhoti Chornai in the central part are higher up in the sequence. The basal Barakars are generally devoid of carbonaceous horizons, where as those higher up in the sequence in the ChhotiChornai are quite rich in carbonaceous horizons and thick coal seams.

Supra-Barakars (Kamthis?):
Feldspathic porous sandstones and tough compact, often cherty ferruginous sandstones with occasional argillaceous sandstone, ferruginous shale and reddish siltstones which overlie the Barakars have been regarded as equivalents to Kamthis by Lala Hiralal. They occur in the south-eastern corner of the area mapped, in the ridges trending NE-SW to the south of Kedma and at the top of Dula Pahar Δ3204 and Koranja.
Relationship of these rocks with the underlying Barakar formations Pahar Δ2692 (22°46'15":82°58'05") is not quite discernible. They occur generally as horizontal beds and appear to be in conformity with the underlying beds. But frequently pebble beds, varying in thicknessfrom 0.30m to 1.83m and consisting of quartzite and quartz pebbles have been observed within this formation. The ferruginous sandstones are at places feldspathic grey and differ from those of the Barakars in becoming highly porous. These rocks are barren of any carbonaceous horizon or fossil remains. The total thickness of these sediments has been estimated to be roughly about 122m in this area.

Sills and Dykes:
Few dykes of dolerites of various dimensions ranging in width from 25m to 40m have been noticed in the south-eastern part of the area. Amongst these the dykes occurring south of Patkura and south of Kedma have been noticed to be continuous for about 2.5 km and 5 km respectively. The general trend of the dykes in this part is mostly east-west.

The isolated Ramgarh Pahar and those in the south-eastern corner of the coalfield are capped by fine grained basaltic trap rock, tongues of which are seen in the underlying Kamthi and Barakar formations.

3.1.0 GEOLOGY OF THE PROPOSED BLOCK AREA

Proposed block area mainly comprises of sedimentary sequences of Gondwana group. In the north-western part of the block, rocks of CGC are also exposed.

The proposed area exposes the rocks of Gondwana group mainly Barakar, Raniganj and Talchir formation exposing mainly sandstone in the area.

The CGC in the northern part of the proposed block comprises biotite gneiss, granite and quartzite of Precambrian and form basement for the Gondwana Supergroup. Talchir Formation and Barakar formation of Lower Gondwana lie unconformaly over rocks of CGC. Talchir Formation is represented by fine buff and green sandstone, khaki green shale and medium-to fine-grained sandstones, boulder conglomerate over a very large area. The Barakar is composed of different types of sandstone, shale, carbonaceous shale and the main coal bearing horizons of the area. Stratigraphically, Barakar Formation is conformably overlain by ferruginous sandstone of Barren Measure Formation. The Barren Measure Formation is overlain by Rainganj Formation (Late Permian) which mainly comprises of coal. Rainganj Formation is exposed on Ramgarh hills, carbonaceous shale and grey sandstone. The Kamthi Formation (Early Triassic) is the youngest litho assemblage of Gondwana Supergroup which overlies the Raniganj Formation. Kamthi Formation mainly comprises of intensely fractured ferruginous cross bedded sandstone with bimodal grain size (sand to granule size) on the top of Ramgarh hills. In contrast to grey sandstone of Raniganj Formation, red ferruginous sandstone and red clay are predominant in Kamthi Formation.

Dolerite dykes of Amarkantak Group intrude the sequence of Lower Gondwana Group in this area. The general attitude of the beds is E-W with horizontal to gentle northerly dipping in the area. Fault is the major structural element in the area. In the south-western part two sets fault trending NW-SE and E-W and in the southeastern part NNE-SSW trending faults are noticed. Majority of coal fields are covered by Gondwana sediments comprising Talchir, Barakar, Raniganj Formation and Kamthi Formation. The rocks of Lower Gondwana sediments as a whole show very low dip (2º to 4º) towards south. Northern part of the area which was earlier mapped as Chhotanagpur gneissic complex and Talchir Formation (T.S.Radhakrishna, F.S.1960-61) whereas southern part, which was earlier mapped exclusively as Barakar sediments has been classified into Barakar, Barren Measures

and Raniganj Formation in the area adjacent to Chakeri, Basen, Kente and Parsa coal field.

4.1.0 STRUCTURE

The structural elements observed in the Gondwana rocks of the study area are as follows:

A. Bedding

It is the predominant primary structure observed in all the rock types. Bedding in the arenaceous rocks is represented by grain size variation, compositional banding and bedding thickness varies from few cm to about one meter. Argillaceous rocks show thinly bedded character and colour-cum-compositional banding. Layering is sometimes distinct feature when the sandstone contains ferruginous layers and shale bands. The compositional bedding was noticed in the sandstone of Barakar Formation south of Gidmuri village.

B. **Cross Bedding**

The sandstone of the Barakar and Raniganj formations exhibits cross bedding at most of the places in the study area. Most of the cross beds are of simple type. The other important primary structures observed in the area are ripple marks, mud cracks and graded bedding. The cross bedding was observed in the sandstone of Barakar Formation and in sandstone of Raniganj Formation occurs cross bedding near MurgiGaurani cave on Ramgarh hill in the mapped area.

.

5.1.0 PreviousWork

3.1.0. NGCM Stream Sediment data from Bhukosh portal of GSI was downloaded, Using NGCM data Stream Sediments of ToposheetNo 64J/13 and calculated LREE, HREE and TREE values.

With above study, the current proposed block may be studied for REE and RM mineralization at G-4 level of exploration

4.0.0 BLOCK DESCRIPTION

4.0.1 The proposed Udaipur-Ramgarh Block area falls in Survey of India Toposheet No 64J/13 and covers an area of about 300 sq km in and around villages of Tendu Tikra, Maheshpur, Pahadkoria, Puta, Kathmunda, Dawa, Chakeri, Sanibarra villages, Surguja District, Chhattisgarh. Location plan marked in toposheet is enclosed as **Plate-I.** The Cardinal points of the block area are given below:

Point ID	X	Y
UR-A	82.87747	22.90307
UR-B	82.99097	22.90524
UR-C	82.99924	22.90177
UR-D	82.99706	22.75826
UR-E	82.9227	22.75826
UR-F	82.94401	22.79218
UR-G	82.91487	22.80827

4.2.0. PLANNED METHODOLOGY

4.2.1 The exploration program is proposed in accordance to the objective set for reconnaissance survey (G-4) of the block. The Exploration shall be carried out as per

Minerals (Evidence of Mineral Contents) Amendment Rules, 2021. Accordingly, the following scheme of exploration is formulated in order to achieve the objectives.

i. To carry out Geological Mapping on 1:12,500 scale of the block (150 Sq. Km) to assess various litho units using field equipments and Mapping of REE and other Critical minerals bearing outcrops alongwith other lithounits.
ii. To study different geological sections to build up local stratigraphy and classification of REE and other Critical minerals bearing lithology in Chhotanagpur Gneissic Complex
iii. Petrological studies of possible host rock and their chemical analysis.
iv. To carry out systematic grab/channel sampling of bed rocks and Stream Sediment Samples (by heavy mineral separation) for analyses of REEs and Rare Metals to decide further course of exploration program.
v. Pitting (200 m) of selected area and sampling.To know the concentration of RM/ REE in the regolith within the target area, 50 cubic meters of orientation pitting will be carried out to collect 50 Soil Samples from B horizon, C horizon and by heavy mineral separation.

4.2.2 The details of different activities to be carried out are presented in subsequent paragraphs:

1. Geological Mapping

Geological mapping will be carried out in the entire 150 sq.km area on 1:12,500 scale. Rock types, their contact, structural features will be mapped. Surface manifestations of the mineralisation available along with their surface disposition will be marked on map.

2. Geochemical Survey

2.1. Bed Rock Sampling And Stream Sediment Sampling:

During the course of Geological mapping bed rock and stream sediment samples shallbe collected. The stream sediment samples will be subjected to heavy mineral separation, following which the heavies will be crushed and sieved to 120 mesh size.The final sample will be sent to laboratory for ICPMS analysis of REE and RareMetals.

a. Stream Sediment Samples from 1st order streams will be collected during Geological Mapping and will be analysed for assay of 34 elemental analysis includes Co, Nb, Sr,Ta, W, Mo, Zr, Rb, Be, Ba, Cs, Hf, V, Li & REE. Regolith samples will also be collected.
b. Bedrock systematic sampling will be carried out by analyzing stream sediments, followed by regolith sediments. Based on the outcome of the chemical survey, anomalous zones will be delineated. Based on the identified anomalous zones, bedrock samples and chip samples will be collected.

2.2 **Technological survey (Pitting):**

Shallow pitting (Excavation) shall be carried out in the potential zones identified based on the results of geological mapping and stream sediment sampling. A provision of shallow pitting on the identified anomalous zone (1.5 m wide X 2.0 m deep) with 200 cubic meters is kept. Pitting will be carried out on surface up to a depth of 2 m (maximum 2 m depth from surface) after removal of soil/ weathered column inthe area. Locations of pits on ground will be decided by field geologist based on field observations and positive outcome of the geochemical sampling.

3. Drilling:

Five Nos. scout boreholes of total 200 m, with 40 m depth of each boreholes are to be drilled to intersect the subsurface mineralisation of REE and other critical minerals.

4. Petrographic & Mineralographic Studies:

During the course of Geological mapping and sampling 10 nos. of samples from outcrops of various lithounits will be collected to carry out Petrography and Mineralogy.

1. References

i. Asit Kumar Mishra, Lipisudha Badapanda., F.S. 2022-2023, GSI, Report on preliminary Exploration for Lithium in Katghora_ Rampur Block, Korba District, Chhattisgarh (G3 Statge).
ii. H. Nagaraja and A. Choudhary, F.S. 1962-63, GSI, Report on Geology Of The Eastern Part Of The Hasdo-Arand Coalfield, Surguja District, Madhya Pradesh.
iii. Dr. S. Mukherjee, S. K. Barua and Chowdhury., F.S. 1987, GSI, Final Report on Regional Exploration For Coal In Sendurgarh Coalfield, Bilaspur District, Madhya Pradesh.
iv. GSI's online data portal – Bhukosh (for NGCM raw data source, Block Geology and Regional Geology

List of Plates

Plate1: Proposed block boundary over Survey of India Toposheet number 64J/13.
Plate 2: Proposed Block boundary over Geological map on 1:150000
Plate 3: Proposed block boundary over google earth image
Plate 4-: Geology Map with total REE values in Udaipur- Ramgarh Block, District: Sarguja District , State: Chhattisgarh (Source: Bhukosh, GSI).
Plate5-8:Geology Map with RM values in Udaipur- Ramgarh Block, District: Sarguja, State: Chhattisgarh (Source: Bhukosh, GSI).

1. **NATURE, QUANTUM AND TARGET-**
   Envisaged Quantum of proposed work in

Components	G4Stage	Unit	Target
Geological Survey	i) 1:12,500 scale	sq km	150
	ii) Assessment of lithology, structure, surface mineralization and analysis of old history of mining, if any.		
Geochemical Survey	i) 200 core samples + 150 pit samples + 30 BRS + 20 SS	nos.	400
	ii) Recording of broad geomorphology, drainage, etc.	Sq Km	150
Pitting/Trenching	Pitting 200 cu m	Cu m	200
Laboratory Studies	i) Heavy Mineral Separation (50 Stream Sediment Samples)	Nos.	50
	ii) Surface Sampling: bedrock samples (Primary samples + 10% External Check Samples) for analysis of REE and other minerals	Nos.	400
	iv) Pit samples (Primary samples+10% External Check Samples samples)	Nos.	165
	v) Analysis of one rock/ soil sample for determination of a package by 34 elements by ICP-AES / ICPMS (sequential technique)	Nos.	40
	Analysis of major oxides and trace samples by XRF	Nos.	20
Petrographic and	Petrological Samples (Surface Samples)	Nos.	10
Mineralographic studies	Mineralographic Studies (Surface Samples)	Nos.	10
	XRD Mineral phase analysis	Nos.	50
	Report Preparation (5 Hard copies with a soft copy)	Nos.	1
	Preparation of Exploration Proposal (5 Hard copies with a soft copy)	Nos.	1
Drilling	Scout drilling (200 m, 40 m depth)	Nos.	5

2. Break-up of expenditure

Annexure 7A							
Estimated cost for Reconnaissance Survey (G4) for REE and Other Critical Minerals in Udaipur-Ramgarh Block, Sarguja District, Chhattisgarh							
Total area: 150 sq km, Period of Completion: 12 months BH: 5nos. , 200m , Review: After 6 months							
			Rates as per NMET SoC		**Estimated Cost of the Proposal**		
S. No.	**Item of Work ***	**Unit ***	**SoC-Item No.***	**Rates as per SoC * (a)**	**Qty. (b)**	**Total Amount (Rs)**	**Remarks**
A	**Geological Mapping Other Geological Work & Surveying**						
	Geological mapping, (1:12,500 scale) & Trenching , drilling work						
i	a. Charges for Geologist per day (Field) for geological mapping & trenching work, drilling work	day	1.2. b	11,000	200	2200000	150 sq km area on 1:12,500 scale
ii	b. Labours Charges; Base rate	day	5.7	541	400	216400	Amount will be reimbursed as per the notified rates by the Central Labour Commissioner or respective State Govt. whichever is higher.
	c. Charges for Geologist per day (HQ)	day	1.2. a	9,000	45	405000	
	Sub Total- A					**2821400**	
B	**Survey work**						

a	DGPS Survey for BH fixation & RL determination	Per Point of observation of observation	1.6.2	19,200	5	96000	
	Sub-Total B					**96,000**	
C	**Trenching/Pitting**						
	Pitting	per cu.m	2.1.2	3,300	200	660000	
	Sub Total C					**660000**	
D	**DRILLING (after review)- In -house**						
1	Drilling for Coal/ drilling in soft rock/strata	m	2.2.1.1b	5,242	200	1048400	scout boreholes , total 5 nos.
2	Land / Crop Compansation (in case the BH falls in agricultural Land)	per BH	5.6	20,000	5	100000	As per actuals
3	Construction of concrete Pillar (12"x12"x30")	per borehole	2.2.7a	2,000	5	10000	
4	Transportation of Drill Rig & Truck associated per drill (1 rig)	Km	2.2.8	36	1,300	46800	Raniganj to sarguja = 525 km , sarguja to Block area Udaipura Ramgarh = 125
5	Monthly Accomodation Charges for drilling Camp (up to 1 Rigs)	month	2.2.9	50,000	3	150000	
6	Drilling Camp Setting Cost	Nos	2.2.9a	250000	1	250000	
7	Drilling Camp Winding up Cost	Nos	2.2.9a	250000	1	250000	
8	Road Making (Flat Terrain)	Km	2.2.10a	22,020	5	110100	As per actuals
9	Drill Core Preservation	per m	5.3	1,590	200	318000	60 m 1 BH, 4 Bh*15 =60 (as per actuals)
10a	Charges for one Sampler per day (1 Party)	one sampler per day	1.5.2	5,100	58	295800	

10b	Labours (4 Nos)	day	5.7	522	232	121104	Amount will be reimbursed as per the notified rates by the Central Labour Commissioner or respective State Govt. whichever is higher.
	Sub Total D					**2700204**	
E	**LABORATORY STUDIES**						
1	**Chemical Analysis**						
i)	**Geochemical Sampling-Surface samples (Bedrock/Channel /Soil/Stream sediment)**						300
	a. Analysis of major oxides and trace samples by XRF	Nos	4.1.15a	4,200	20	84000	
	Analysis of one rock/ soil sample for determination of a package by 34 elements by ICP-AES / ICPMS (sequential technique)		4.1.14	7,731	400	3092400	
ii)	**Surface Check samples (10% External)**						
	a. Analysis of major oxides and trace samples by XRF	Nos	4.1.15a	4,200	2	8400	
	Analysis of one rock/ soil sample for determination of a package by 34 elements by ICP-AES / ICPMS (sequential technique)		4.1.14	7,731	40	309240	
2	**Physical & Petrological Studies**						
i	Preparation of thin section	Nos	4.3.1	2,353	10	23530	
ii	Study of thin section	Nos	4.3.4	4,232	10	42320	

iii	Separation of heavy minerals from stream sediment samples of - 2mm size through gravity and magnetic separation	Nos	4.3.6b	13,820	50	691000	
iv	Preparation of polish section	Nos	4.3.2	1549	10	15490	
v	study of polished section	Nos	4.3.4	4,232	10	42320	
vi	Bulk density analysis	Nos	4.8.1	1,605	5	8025	
vii	Digital Photographs	Nos	4.3.7	280	10	2800	
	EPMA Lab						
i	EPMA Studies per hour	hrs	4.4.1	8,540	10	85400	
	Total E					**4404925**	
F	**Total A to E**					**10,682,529**	
G	Geological Report Preparation	**5 Hard copies with a soft copy**	5.2	ii		538126.45	Reimbursement will be made after submission of the final Geological Report in Hard Copies (5 Nos) and the soft copy to NMET.
H	**Peer review Charges**		**As per EC decision**	30,000	**1**	**30,000**	
I	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. 5.0 Lakhs whichever is less		213650.58	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-NMET in its meeting while clearing the proposal.
J	**Total Estimated Cost without GST**					**11460306**	

K	**Provision for GST (18% of J)**				**2062855.08**	GST will be reimburse as per actual and as per notified prescribed rate
L	**Total Estimated Cost with GST**				**13,523,161**	
				Rs. In Lakhs	**₹ 135.23**	
Note:						
1	**Strict adherence to the Ministry of Finance's and GFR guidelines is mandatory. Every transaction must adhere to GFR rule 21.**					
2	**In case of delay/non- performance, the appropriate action will be taken by competent authority against delinquent agency as per prevailing govt. of India rules/guidelines on procurement.**					
3	**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.**					
4	**Necessary efforts should be made to minimize any adverse impact on the environment during exploration activities.**					
5	**Any item of work not mentioned above shall be added as per SoC.**					

Plate1: Proposed block boundary over Survey of India Toposheet number 64J/13.

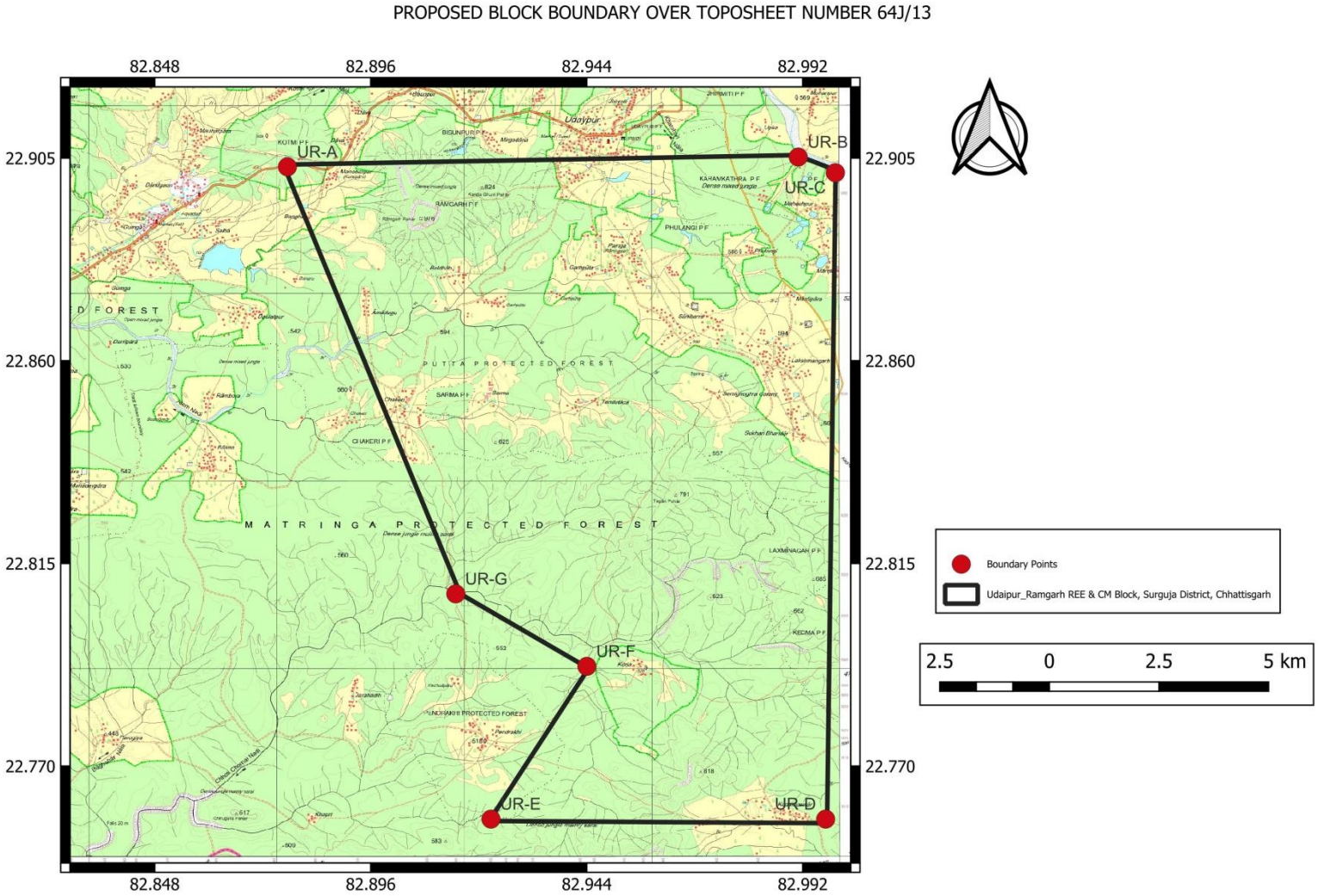


Plate 2: Proposed Block boundary over Geological map on 1:150000

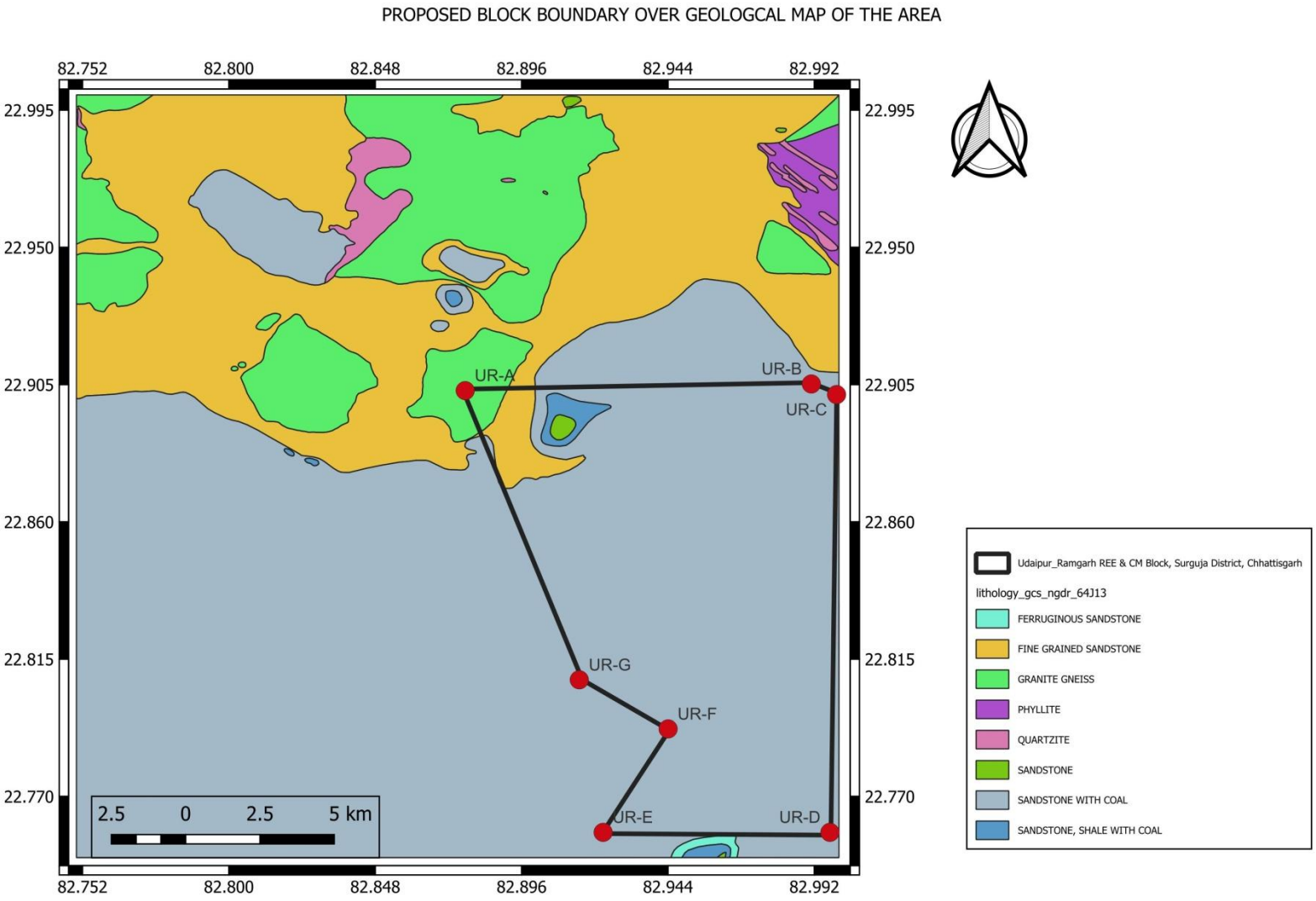
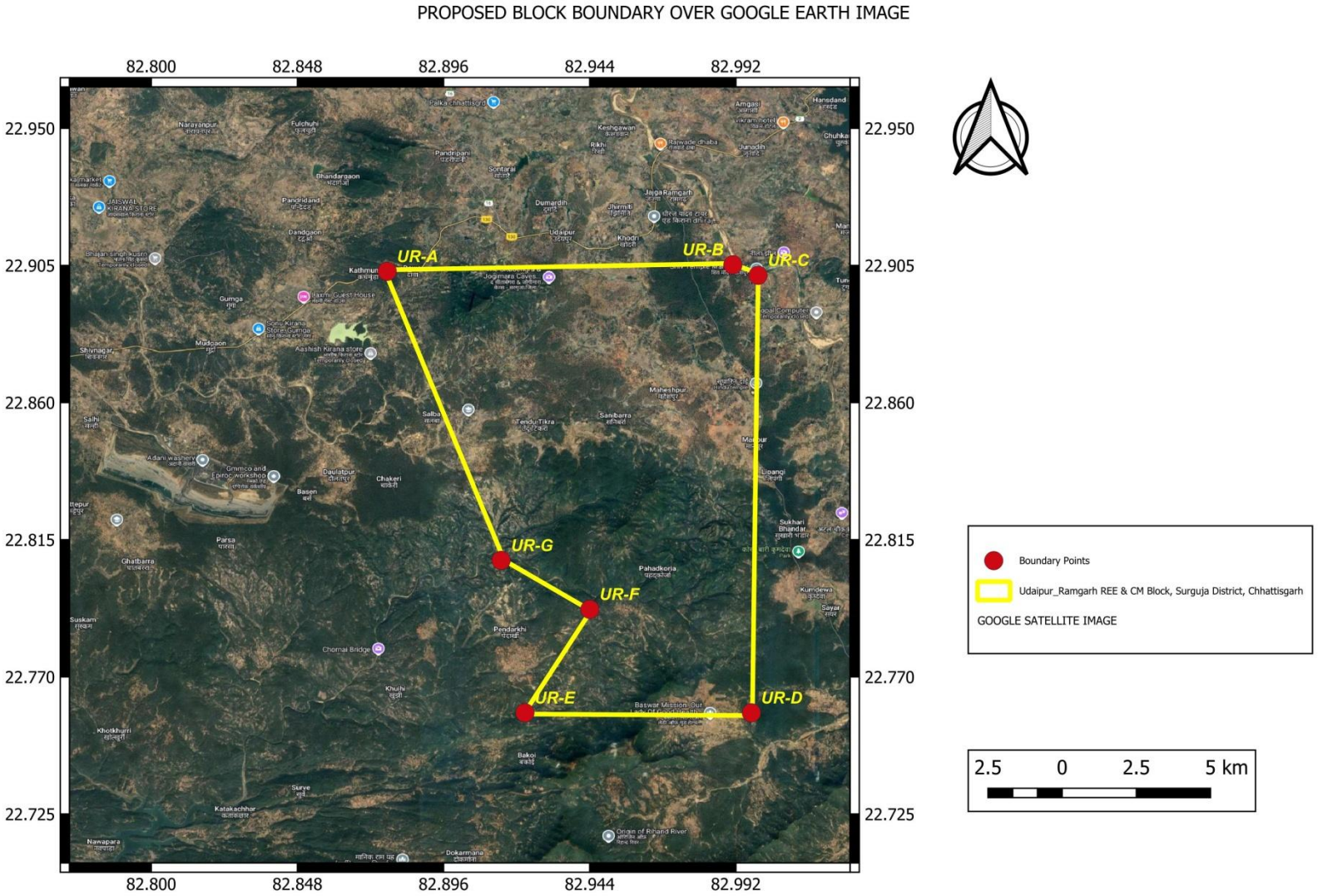
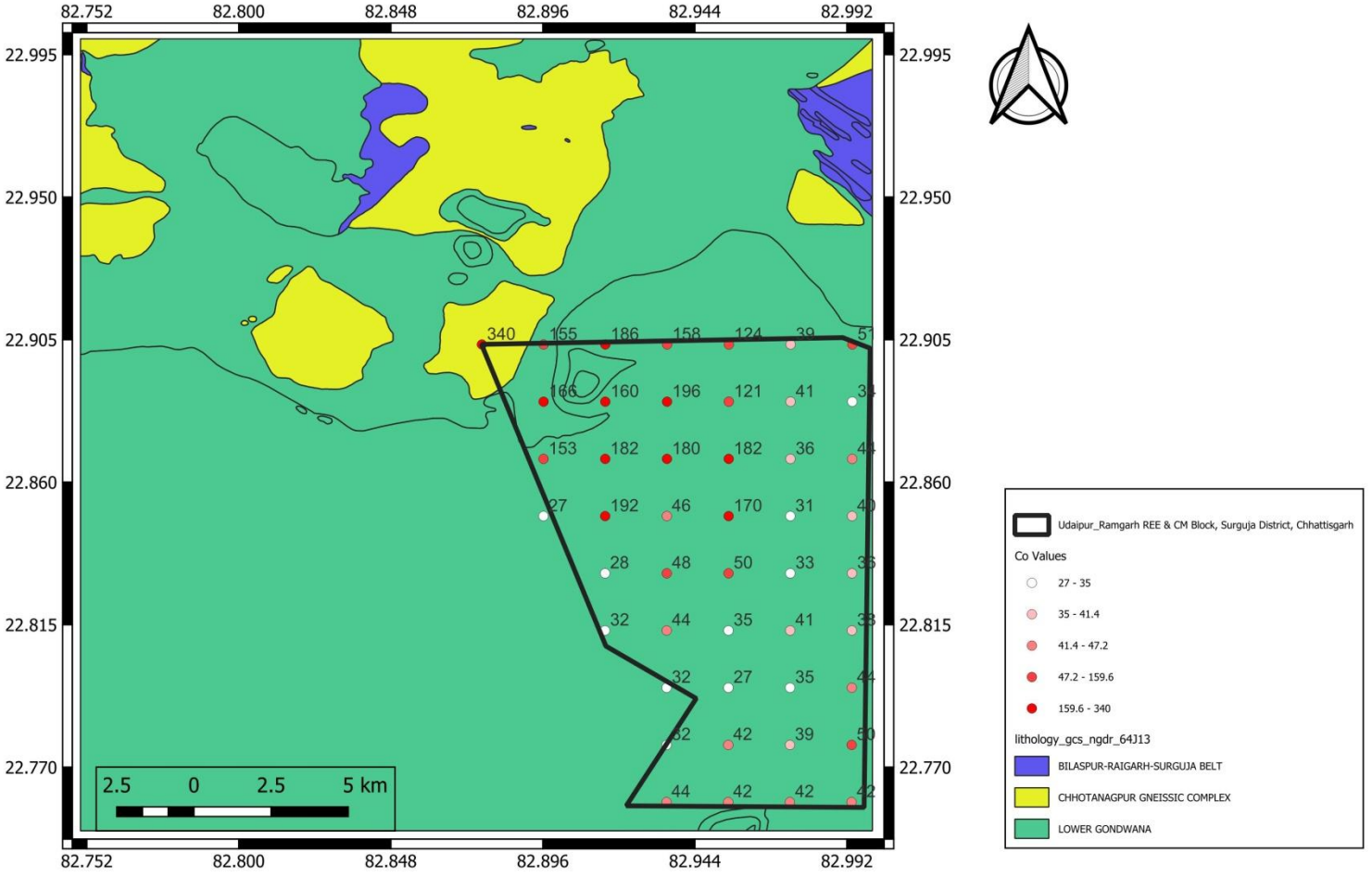


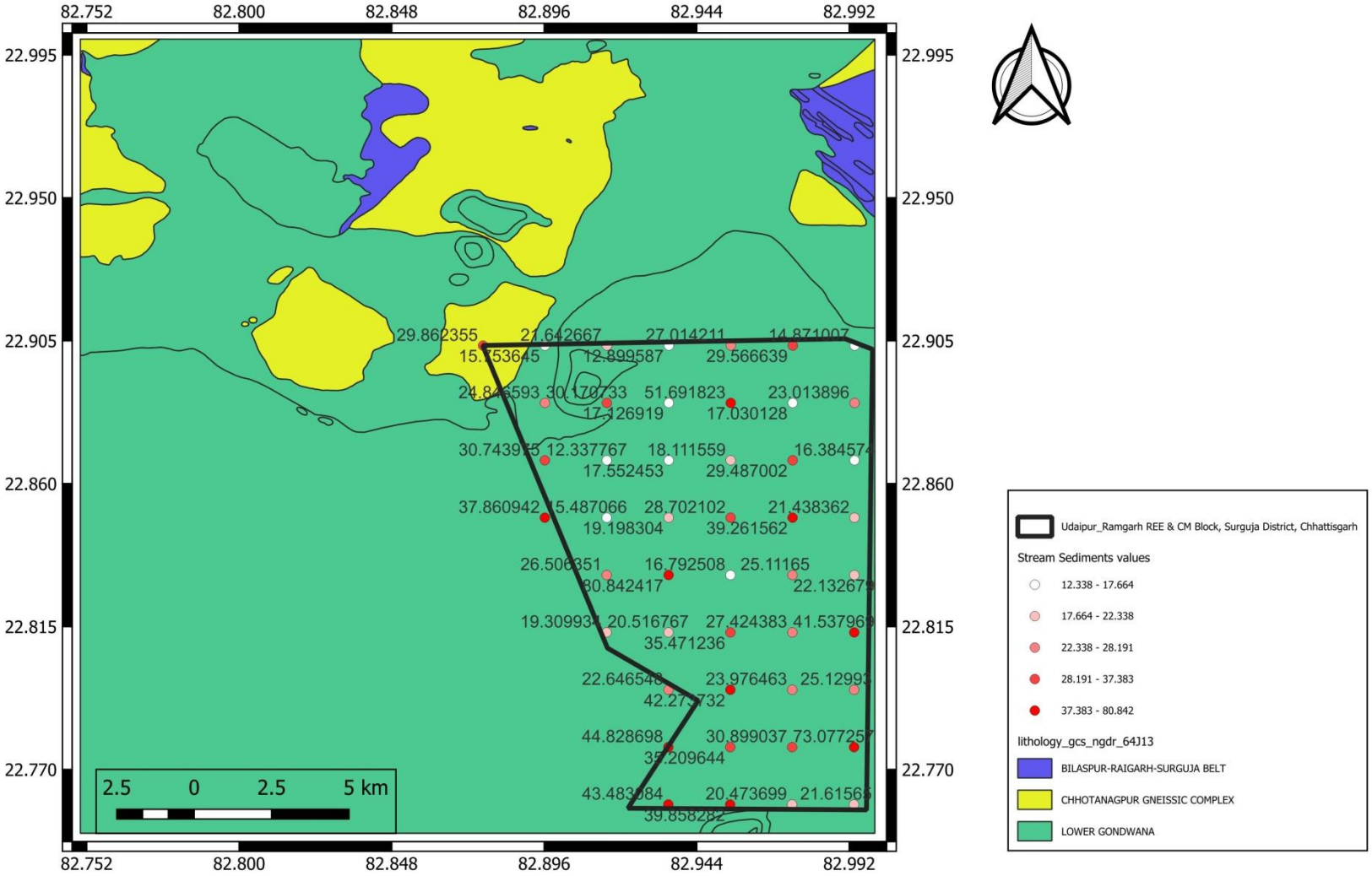
Plate 3: Proposed block boundary over google earth image



Geological map of Ramgarh Udaipur Block In parts of SOI toposheet number 64J/13 , shoiwng proposed block boundary and Co values in stream sediments.



Geological map of Ramgarh Udaipur Block In parts of SOI toposheet number 64J/13 , shoiwng proposed block boundary and Hf values in stream sediments.



Geological map of Ramgarh Udaipur Block In parts of SOI toposheet number 64J/13 , shoiwng proposed block boundary and Ni values in stream sediments.