

**PROPOSAL FOR RECONNAISSANCE SURVEY (G-4 STAGE) FOR
REE, RARE METALS (RM) AND PGE MINERALIZATION IN
KATHAPULLAPATTI BLOCK, PART OF DISTRICT – TIRUPPUR,
STATE – TAMIL NADU (AREA 143.37 SQ.KM)**

COMMODITY: REE, RM AND PGE

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

PLACE: NAGPUR

DATE: 22nd FEBRUARY 2024

Summary of the Block for Reconnaissance Survey (G-4 Stage)

GENERAL INFORMATION ABOUT THE BLOCK

	Features	Details
	Block ID	Kathapullapatti Block
	Exploration Agency	Mineral Exploration and Consultancy Limited (MECL)
	Commodity	REE , RARE METALS (RM) & PGE
	Mineral Belt	-
	Completion Period with entire Time schedule to complete the project	15 months
	Objectives	Based on the evaluation of geological data available, the present exploration program has been formulated to fulfill the following objectives. - To carry out Geological & Structural mapping on 1:12500 scale for identification of REE, RM and PGE bearing formation (host rock) with the structural features to identify the surface manifestation and lateral disposition of the mineralized zones. - To collect surface sample such as bed rock, stream and soil samples for the analysis of REE, RM and PGE to identified the anomalous zones for further course of exploration program. - Shallow pitting can be done for the collection of soil samples from the B and C horizon to identification the secondary dispersion of mineralization. - To know the sub surface extension of mineralization proved during the Phase-1 exploration campaign, 500m drilling in few scout boreholes including auger drilling will be done in the target area. - To estimate reconnaissance resources of REE, RM and PGE as per UNFC norms and Minerals (Evidence of Mineral Contents) Amendment Rules, 2021 at G-4 level mineral

		exploration.																							
	Whether the work will be carried out by the proposed agency or through outsourcing and details thereof. Components to be outsourced and name of the outsource agency	Work will be carried out by the proposed agency.																							
	Name/ Number of Geoscientists	Three nos. of Geoscientist (2 Field + 1 HQ)																							
	Expected Field days (Geology) Geological Party Days	Geologist Party Days: 180 Days Survey Party Days: 15 Days																							
1.	Location																								
	<table border="1"> <thead> <tr> <th>Corner Points</th><th>Latitude</th><th>Longitude</th><th>Area</th></tr> </thead> <tbody> <tr> <td>A</td><td>10°49'46.45"</td><td>77°24'00.72"</td><td rowspan="6">143.37 sq. km</td></tr> <tr> <td>B</td><td>10°51'38.66"</td><td>77°36'19.12"</td></tr> <tr> <td>C</td><td>10°48'07.09"</td><td>77°36'13.97"</td></tr> <tr> <td>D</td><td>10°47'49.96"</td><td>77°29'45.92"</td></tr> <tr> <td>E</td><td>10°45'13.21"</td><td>77°26'46.03"</td></tr> <tr> <td>F</td><td>10°45'14.90"</td><td>77°25'13.55"</td></tr> </tbody> </table>	Corner Points	Latitude	Longitude	Area	A	10°49'46.45"	77°24'00.72"	143.37 sq. km	B	10°51'38.66"	77°36'19.12"	C	10°48'07.09"	77°36'13.97"	D	10°47'49.96"	77°29'45.92"	E	10°45'13.21"	77°26'46.03"	F	10°45'14.90"	77°25'13.55"	
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	Villages	Gettalrevu, Toppampatti, Kanjipuram, Suryanallur, Kallipalaiyam, Kottanur, Kathapulapatti, etc.																							
	Tehsil/ Taluk	Dharapuram																							
	District	Tiruppur																							
	State	Tamil Nadu																							
2.	Area (hectares/ square kilometers)																								
	Block Area	143.37 sq.km.																							
	Forest Area	Reserved Forest (As per the validation on DSS portal of MoEF, the proposed block is Not Inviolable)																							
	Government Land Area	Data Not Available																							
	Private Land Area	Data Not Available																							
3.	Accessibility																								
	Nearest Rail Head	Tiruppur Railway station is 52 km SE from the proposed																							

		block.
	Road	Dharapuram - Tiruppur National Highway No. 381 and state highway Dharapuram – Kangeyam passes from inside the proposed block.
	Airport	The nearest airport is Coimbatore International Airport located 70 km from Dharapuram.
4.	Hydrography	
	Local Surface Drainage Pattern (Channels)	The whole region is a dry plain with a few scattered tanks, and a system of nullahs flow from west to east, serving as feeders to the main drainage system, composed of the Amaravathi river and its tributary streams Uppar Odai, Nelali Karai (Vattamalao Karai), Varattu Karai and Nallatungal Odai. Except the Amaravathi river which is perennial, the other streams are dry for most part of the year, though carrying torrential quantities of water during monsoons.
	Rivers/ Streams	Uppar Odai and Amaravathi River.
5.	Climate	
	Mean Annual Rainfall	There are four seasons in the area viz (i) Winter season (Jan-February), (ii) Hot weather season (March-May), (iii) South-west monsoon (June-September) and (iv) North-east monsoon (October-December). The annual rainfall of the Tiruppur district is 1020 mm and co-efficient of variation is 20 to 30 per cent increasing from west to east and is about 40 per cent in the extreme south-eastern part. 75 percent of the area falls in rain shadow region where the annual rainfall ranges from 508 to 1016 mm with an average of 842.2 mm and thus constitutes a semiarid region.
	Temperatures (December) (Minimum) Temperatures (June) (Maximum)	The maximum temperature in summer is often higher than 43°C and the minimum is a little lower than 18°C
6.	Topography	
	Toposheet Number	58F/05 & 58F/09
	Morphology of the Area	Topography in general is low rolling with minor isolated

		mounds. Elevation is ranging from 260m to 320m. The highest elevation in area 320m noted near Suriyanallur and lowest elevation observed 260m near Kullakalipalayam village.
7	Availability of baseline geosciences data	
	Geological Map (1:50K/ 25K)	1:50000 (Bhukosh)
	Geochemical Map	NGCM (raw) data from Bhukosh was downloaded, stream sediment sample results from NGCM was used to compute LREE, HREE & Total REEs and accordingly geochemical anomaly map is prepared and presented as plates in this proposal.
	Geophysical Map	Available
8.	Justification for taking up Reconnaissance Survey / Regional Exploration	i). GSI carried out Specialised Thematic Mapping on 1: 25,000 scale covering parts of Toposheet 58F/1 & 5 in Coimbatore and Erode district to bring out the variations in terms of tectono-magmatism, metamorphic evolution and related metallogeny along the Kinattukadavu – Kangayam – Chinnadharapuram tectonic zone in the Kinattukadavu – Kangayam sector. The total 560 sq.km area have been covered for Specialised Thematic Mapping. The mapped part of the area lies west of Kangayam and has similar type of rocks and structural continuity. In the east the ultramafic rocks in Tirumankaradu shows anomalous values of Cu, Ni, Cr, Sc, Th, U and REE elements and many of the ultramafic rocks occur around 252 hill, Tevanampalaiyam, Kungarplaiyam and Tirumankaradu areas indicated presence of Platinum group of elements in the range between 6ppb and 84ppb. Among these ultramafic rocks occur in 252 hill resulted in 84ppm. Since present study area is western continuity of afore said areas and many of the ultramafic and pegmatite bodies are continuous in this part , these rocks, particularly, ultramafic rocks are need

		to be sampled systematically to explore for important trace, REE and platinum group of elements. Few pegmatites in the east yielded up to 600ppm of Sc. Few ultramafic samples show anomalous values of Cr, Cu and Ni contents. These elements respectively range from 920 to 5145ppm, 38 to 1093ppm and 174 to 2024ppm. The highest values of these elements are recorded in the sample 22B collected east of semmakavundanpudur. All analysis are derived from random rock samples, the detail study of these rocks may yield good result. Therefore, in terms of mineral potential the mapped area needs detail study and sampling. ii). NGCM raw data from Bhukosh was downloaded and stream sediment sample results from that was used for creating LREE, HREE & Total REE geochemical anomaly map which is presented as plates with this proposal. A clear high geochemical anomaly has been observed in those plates. In the proposed block 37 stream sample were collected by GSI, out of 37 samples 15 stream samples shows Total REE (TREE) of more than 1000 ppm. The TREE value in the proposed block varies from 173.18 to 2889.67 ppm. HREE and LREE values vary from 7.38 ppm to 345.97 ppm and 165.3 ppm to 2860.7 ppm respectively. The concentration of HREE is lesser than that of LREE in the proposed block. iii). Based on the result of NGCM data, proposed block may be taken for Reconnaissance Survey (G-4 Stage) to identify the source for REE and to be establish the resources for auction this block.
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1.0.0 INTRODUCTION

- 1.0.1 Rare earths are characterized by high density, high melting point, high conductivity and high thermal conductance. These unique properties i.e., distinctive electrical, metallurgical, catalytic, nuclear, magnetic and luminescent properties make them indispensable for a variety of emerging high end and critical technology applications relevant to India's energy security i.e., clean energy technology, defense, civilian application, environment and economic areas. Demand for REE is expected to continue to grow, especially because of their use in low carbon technology. The ever-increasing demand for these Rare Metals and REE necessitates a concerted effort to augment the resource position of our country.
- 1.0.2 A study, conducted by the Council on Energy Environment and Water, identified 12 minerals out of 49 that were evaluated as 'most critical' for India's manufacturing sector by Vision 2030 which makes more thrust for exploration in Strategic Mineral, Precious Metals, Platinum Group of Elements by Government of India.

1.1.0 BACKGROUND

- 1.1.1 The Exploration for strategic, critical, rare metals, rare earths elements, PGE and precious metals is given top priority by Govt. of India after amendment of MMDR act 2015. Keeping this in view, the present proposal is being put up for Reconnaissance Survey (G-4) for REE , RM and PGE in Kathapullapatti Block.

1.2.0 LOCATION AND ACCESSIBILITY

- 1.2.1 The proposed Kathapullapatti Block lies in Dharapuram Tehsil of Tiruppur, district Tamil Nadu and falls in the Survey of India Toposheet No 58F/05 & 58F/09. Gettalrevu, Toppampatti, Kanjipuram, Suryanallur, Kallipalaiyam, Kottanur, Kathapulapatti, etc. are the villages falling in the proposed area. Dharapuram - Tiruppur National Highway No. 381 and state highway Dharapuram – Kangeyam passes from inside the proposed 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 Tiruppur about 52 km SE from the proposed block. The nearest airport is Coimbatore International Airport located 70 km from proposed block.

1.3.0 PHYSIOGRAPHY, DRAINAGE AND CLIMATE:

- 1.3.1 Topography in general is low rolling with minor isolated mounds. Elevation is ranging from 260m to 320 m. The highest elevation in area 320 m noted near Suriyanallur and lowest elevation observed near Kullakalipalayam village. The general slope of the area is towards east.
- 1.3.2 The area is drained by Amaravathi River and its tributaries. Amaravathi river borders the area in the south eastern margins. Uppar River flows eastern direction in the south western part of the block and connecting to Amaravathi River. Uppar Dam is constructed in Uppar river which is the major tributary of Amaravathi River.
- 1.3.3 The climate of the area is moderately dry and wet. It receives monsoon rains from July to September and experiences maximum rainfall during the months of July and august. The annual rainfall of the Tiruppur district is 1020 mm and co-efficient of variation is 20 to 30 per cent increasing from west to east and is about 40 per cent in the extreme south-eastern part. 75 percent of the area falls in rain shadow region where the annual rainfall ranges from 508 to 1016 mm with an average of 842.2 mm and thus constitutes a semiarid region. The winter season is quite pleasant and starts from November and lasts up to February. The day temperature during winter ranges from 18° to 25°C, whereas night temperature ranges from 10° to 18°C. From March, summer commences and it becomes very hot during the months of April and May with temperatures rising upto 45° C. The night temperature falls appreciably. The night temperature during summer ranges from 25 to 30°C.

1.4.0 FLORA & FAUNA:

Most of the area is plain country under cultivation by well irrigation. Paddy, millets, sweet potatoes and vegetables are cultivated in the plains.

2.0.0 REGIONAL GEOLOGY

- 2.0.1 The granulite - gneissic terrain of central Tamil Nadu is divided into three distinct litho tectonic domains, viz. Northern Nilgiri - Sittampundi domain, Central Dharapuram domain and Southern Kodaikkanal domain. Based on the litho assemblages, structure, tectonics and the associated metallogeny. The northern part of the Dharapuram area has been mapped by Subramanian (1952-53) while the southern part has been studied by Subramanian & Sundaram (1972-73) and Ramachandran (1975-77). The Dharapuram domain exposes migmatitic gneisses and charnockite showing varying stages of retrogression. The silica - under saturated Sivanmalai syenite pluton is emplaced in the northern part of this domain. Several small bodies of anorthosite / gabbroic anorthosite have been emplaced along a

major ENE-WSW trending shear zone. The earlier workers have proposed that the Palghat - Cauvery Lineament (PCL) represents the Archaean - Neoproterozoic terrain boundary (Harris et al, 1994) implying that the central Dharapuram domain forms part of the younger PanAfrican mobile belt, however, based on recent geochronological studies by Rb-Sr, Sm-Nd and V-Pb systematics, Ghosh et al (1998) and Bhaskar Rao et al (2003) have opined that the Dharwar craton, showing Archaean crustal history, extends south of PCL upto the northern margin of the Kodaikanal massif, thereby indicating that the contact between the Dharapuram domain and the Kodaikkanal domain forms a major terrane boundary.

2.0.2 The Kodaikkanal domain is essentially made up of charnockite which shows Rb / Sr whole rock isochron age of 2400 Ma. The intrusive younger charnockite in this domain has been dated to be 650 - 700 Ma. The contact between the Kodaikkanal and Dharapuram Domain is marked by a 12 km wide, ENE-WSW trending Palani - Chattrapatti shear zone. The Oddanchatram anorthosite is emplaced along the southern margin of this zone. Granite gneiss, pegmatite, anorthosite and younger intrusives that characterise this zone have been dated to be 650 - 700 Ma.

2.0.3 The central Dharapuram domain is made up of charnockite, pyroxene granulite, pink granite gneiss, hornblende-biotite gneiss, ultrabasic rock and quartz and pegmatite veins. The protolith charnockite in this domain yielded an age of 2600 Ma. And the migmatite gneiss an age of 2400 Ma. A number of ultrabasic / ultramafic bodies, ranging in size from 200m X 30m to 2 km X 200m and quartz and pegmatite veins have been recorded around Kangeyam, in the northern part of the Dharapuram Domain (Baskaran et al 2006-07). Sivanmalai Nepheline Syenite occurs 4 km WNW of Kangeyam. EPMA studies have indicated that the ultramafics consist of olivine (chrysolite to hyalosiderite composition) and bronzite with minor amount of diopside, pargasitic hornblende, tschermakite and chrome spinel. The chrysolite olivine records 83.60 - 86.88% of Fo, bronzite registered 82.61 - 86.22% of enstatite end member and chrome spinel containing 20.50-33.40% chromite. The hyalosiderite records fosterite 68.77 - 69.23%, bronzite with enstatite end member of 72.16 - 73.05 %. Preliminary studies indicate, these ultramafics have been emplaced in different pulses with varying composition. The litho assemblages indicate that the ultramafics were differentiated. The ultramafic bodies occur scattered over an area 2500 sq. km. The famous "gem tract" of Kangeyam is also situated in this zone. Magnesite veins upto 50 cm width occur within the ultramafics in Tirumankaradu, Δ 252, Lakamanaikanpatti, Valavanallur, Kungarpalaiyam and other places. The work carried out in the Kangeyam area has indicated that the northern part of the Dharapuram domain is

characterised by a number of ultramafic bodies of considerable length and width trending parallel to regional, ENE - WSW, foliation. These ultramafic bodies appear to be a part of a major ENE-WSW trending tectonic zone. Reconnaitory strike traverses coupled with the study of the remotely sensed data have revealed that the tectonic zone extends from Kinattukadavu in the west to Chinna Dharapuram in the east through Kangayam. Madusudana Rao (1949), A.P. Subramaniyan (1954), S. K. Srivastava (1975-76) and K. Gopalakrishnan (1973) have mapped these areas. Since then, no work has been carried out. A number of basic and ultrabasic bodies and pink granite have been reported in this area besides charnockite, pyroxene granulite, granite gneiss, hornblende-biotite gneiss, magnetite quartzite, pegmatite and quartz veins. Thus, this tectonic zone, prima facie, has the potentials to become one of the major ultramafic complexes of Tamil Nadu with granite emplacement and late stage hydrothermal activities. Major rock types of these Group/ Super Groups are described in table -1 and for Regional geological map for proposed Kathapullapatti Block, Tiruppur, district Tamil Nadu is given as Plate-II.

Table -1 The regional stratigraphic succession is as follows (After, GSI)

Age	SUPERGROUP	Group	Lithology
Recent to Sub-Recent			Soil
			Gypsum in sub-soil.
			Kankar
			Dolerite
Archaean	Southern Granulite Terrain		Pegmatite and quartz vein
			Pink granite and granite gneiss
			Biotite hornblende gneiss (migmatite)
		Charnockite group	Charnockite admixed with biotite
			hornblende gneiss, pyroxenite,
			granulite, and magnetite quartzite.

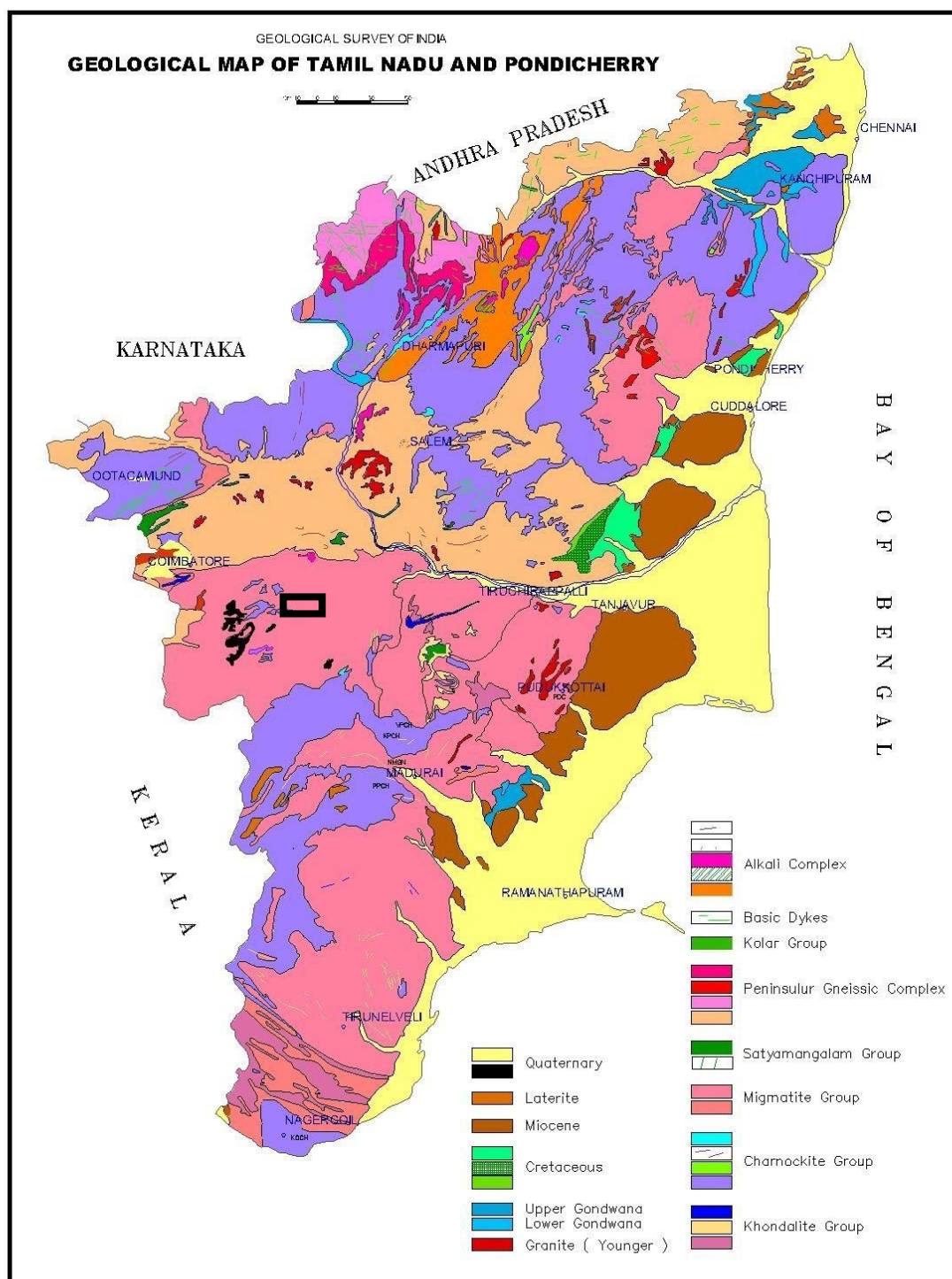


Fig:1 Geological Map of the Geological map of Tamilnadu and Pondicherry

2.1.0 GEOLOGY OF THE BLOCK

2.1.1 The most striking feature of the block is the paucity of fresh rock outcrops and the extensive cover of soil and kankar. The thickness of soil cover varies from 1.0 m. to 5.0 m.

and kankar 0.5 to 3.0 m. Rock exposures are restricted to open dug wells and to some nala sections, as many of the wells are old, geology had to be mainly interpreted from well dumps only. The block geological map of proposed block given as Plate III and following tentative stratigraphic succession has been arrived at.

Table - 2

The generalized stratigraphic succession of the proposed block is as follows (After, GSI)

AGE	SUPERGROUP	GROUP_NAME	FORMATION	LITHOLOGIC
NEOPROTEROZOIC				GRANITE
			CHALK HILLS	PYROXENITE
ARCHAEAN- PROTEROZOIC	SOUTHERN GRANULITE TERRAIN	CHARNOCKITE		ACID TO INTERMEDIATE CHARNOCKITE
		MIGMATITE		HORNBLENDE- BIOTITE GNEISS
				PINK GRANITE GNEISS
		CHARNOCKITE		PYROXENE GRANULITE

2.1.2 Charnockite group : The charnockite group of rocks comprise charnockite with small pods and lenses of pyroxenite and bands of basic granulites in the form of pyroxene granulite, pyroxene-hornblende granulite, hornblende granulite etc., and magnetite quartzite. Because of extensive cover of soil and kankar and the scarcity of good outcrops, the inter-relationship between the different rocks of the charnockite is not clear. The pods of pyroxenite may represent original intrusives into the rocks which formed the charnockites, boudinaged during later deformations or formed as 'basic front' (Reynolds, 1947), or 'restites' (Mehnert, 1971) or metamorphic differentiates (Loberg, 1963) during initial migmatization and/or during the later metamorphism under katozonal conditions forming the charnockite-group of rocks. The magnetite-quartzites may represent metasediments. While some of the pyroxene and other basic granulites associated with magnetite-quartzite could represent metasediments, some others with less of quartz may be metamorphosed basic volcanics and intrusive dykes and sills. Regarding the gneisses of the charnockite itself, no conclusions can be arrived at from the meagre data available from the

small area of work. All the rocks of the charnockitic group occur as 'resistors' (Read, 1948) or nonmigmatized relicts within the biotite-hornblende gneisses.

- 2.1.3 **Basic Granulites:** Thin impersistent bands of basic granulite (pyroxene granulite, hornblende granulite) carrying magnetite occur interbanded with charnockite and biotitehornblende gneisses
- 2.1.4 **Pyroxenite:** small pods and lenses pyroxenite, often of unmappable dimensions are noticed within the charnockites in well sections north of Nasuvampalaiyam, N.W. of Venkatapuram, WNW of Kettanur, east of Krishipalaiyam and at Tirumalaikavundanpalaiyam etc. The rock is of dark colour, fine grained and carries pyroxene, hornblende and biotite. Biotite flakes are developed as outer rim around the pods and lenses of pyroxenite. It shows granulose texture (GK/C/346,349, 366, 372 and 387) with 90-95% of its constituents being mafics. Pale green diopside and diopsidic augite predominate over hypersthene. Hornblende and biotite occur in subordinate amounts. Hornblende is developed around the margins and fractures of pyroxenes, and biotite after the pyroxene and hornblende. Plagioclase (andesine) in minor amounts, magnetite and apatite as accessories are also observed.
- 2.1.5 **Pink Granites:** Small bodies of pink granites are noticed in the biotite-hornblende gneisses in the form of bands, lenses and islands. They comprise (a) Non-foliated fine to medium grained granite, (b) well foliated medium grained-biotite granite and (c) non-foliated medium to coarse grained graphic granite.
- 2.1.6 **Biotite-Hornblende Gneisses:** Biotite-hornblende gneiss carrying thin bands, small pods and lenses of charnockite of varying shapes constitute the country rock in the mapped area. The gneisses are considered to be migmatites derived from the charnockites as evidenced by the gradual transformation of charnockite to gneisses, observed all over. The absence of good exposures, however from an impediment for observing the characteristic structures of migmatites. But the thin Sections of the biotite hornblende gneiss bring out certain interesting characteristics typical of migmatites. The gneisses are medium to coarse grained leuco to melanocratic rocks of mafic and felsic minerals forming contrasting band

2.2.0 STRUCTURE

- 2.2.1 **Foliation Trends :** The strike of foliation of the rocks in the area varied from WNW-ESE through E-W to ENE-WSW with dips varying from 500 to 800 or vertical, forming a number of antifolds and synforms. North of Madappur and around Singanur, the foliation

of rockstrends from NNW-SSE through N-s to NNE-SSW with dips varying from 300 to 650 on both sides. The variation in the strike of foliation may be due to cross folding.

- 2.2.2 **Folds:** Based on the available structural data, two sets of folds can be clearly recognised in the area:-
- 2.2.3 F1 folds- whose axial traces trend E-w with low to moderate easterly plunge. These are the primary folds forming a series of antiforms and synforms. The axial traces of F1 folds show swerving from WNW to ESE and these warpings are considered to be due to the superposed folding of second generation.
- 2.2.4 F2 folds-whose axial traces trend NNE-SSW with low plunge towards SSW. The F2 folds are well seen towards north of Madappur. Mineral lineations and minor folds seen to the east of Ramampalaiyam plunge at 250 towards SSW.
- 2.2.5 It is probable that there is one more set of folds between and F2 folds, whose axial traces trend ENE-WSW with low to moderate plunges towards ENE, developed mainly along the limbs of F1 folds. This could be interpreted from the disposition of leases of pink foliated granite around Karasamadal. Because the axial trace of these folds deviate at very low angles from those of F1 folds and because of extensive soil cover, ENE-WSW folds are not clearly recognisable.
- 2.2.6 **Joints:** Joints are noticed both in the charnockites and gneisses. These are found to be in two major directions:- (i) WNW-ESE with steep to vertical dips. (ii) NNE-SSW with steep dip towards west or vertical.

2.3.0 METAMORPHISM

The mineral assemblages of different rock types from the mapped area indicate metamorphic impress of a amphibolite and granulite grades. It is considered that the charnockite group rocks including the pyroxenite, pyroxene granulite, magnetite quartzite etc. were initially elevated to granulite facies of metamorphism and then retrograded to amphibolite facies due to migmatization and later deformations. Due to this retrogression the charnockite has been converted into biotite-hornblende gneiss, the pyroxenite into pyroxene hornblende biotite rock, pyroxene granulite into hornblende granulite and amphibolite etc.

3.0.0 PREVIOUS WORK - OBSERVATION AND RECOMMENDATIONS

- 3.1.0 **Field Season 2007- 2008:** Geological Survey of India field season program for 2007-08 under item No/STM/SR/TNP/2004/036 in parts of topo sheet no 58F/01 & 5 was taken up for Specialised Thematic Mapping. The mapped part of the area is bounded by northern latitude between 10°45'00" and 11°00'00" and eastern longitude between 77°00'00" and

77°30'00" The report embodies the result of work carried out as special thematic mapping on 1: 25,000 scale covering in parts of Coimbatore and Dindigul district.

- 3.2.0 GSI Recommendation on Specialised Thematic Mapping The mapped part of the area lies west of Kangayam and has similar type of rocks and structural continuity. In the east the ultramafic rocks in Tirumankaradu shows anomalous values of Cu, Ni, Cr, Sc, Th, U and REE elements and many of the ultramafic rocks occur around 252 hill, Tevanampalaiyam, Kungarplaiyam and Tirumankaradu areas indicated presence of Platinum group of elements in the range between 6ppb and 84ppb. Among these ultramafic rocks occur in 252 hill resulted in 84ppm. Since present study area is western continuity of afore said areas and many of the ultramafic and pegmatite bodies are continuous. in this part, these rocks, particularly, ultramafic rocks are need to be sampled systematically to explore for important trace, REE and platinum group of elements. Few pegmatites in the east yielded up to 600ppm of Sc. Few ultramafic samples show anomalous values of Cr,Cu and Ni contents. These elements respectively range from 920 to 5145ppm,38 to 1093ppm and 174 to 2024ppm. The highest values of these elements are recorded in the sample 22B collected east of semmakavundanpudur. All analysis are derived from random rock samples, the detail study of these rocks may yield good result. Therefore, in terms of mineral potential the mapped area needs detail study and sampling.
- 3.4.0 MECL has amalgamated the NGCM data downloaded from Bhukosh website of GSI and previous exploration work carried out by GSI and calculated TREE, HREE & LREE for a total 37 no of stream sediment samples falling in proposed area and seeing the potentiality of the area the present proposed block is submitted to TCC, NMET for approval.
- 3.5.0 Calculated LREE, HREE and TREE values for 37 no of stream sediments from NGCM data whose range are given in table below, anomaly maps are prepared and submitted as plate IV, V and VI.

Table-3

Data showing NGCM Stream Sediment results for TS No. 55O/10 from Bhukosh of GSI

Item	Sl. No.	Element	RANGE (PPM)		Average crustal abundance values are from Lide (2004, p.17); REE, rare earth element
			MIN	MAX	
LREE	1	Lanthanum(La)	43.15	902.87	39
	2	Cerium(Ce)	72.33	1261.78	66.5
	3	Praseodymium (Pr)	7.82	156.57	9.2
	4	Neodymium(Nd)	30.59	441.11	41.5
	5	Promethium (Pm)			

	6	Samarium (Sm)	5.53	54.86	7.05
	7	Europium(Eu)	1.35	12.27	2
	8	Gadolinium(Gd)	4.39	31.24	6.2
		LREE	165.3	2860.7	
HREE	9	Yttrium (Y)	0	333	33
	10	Terbium(Tb)	0.61	3.44	
	11	Dysprosium(Dy)	2.86	13.11	5.2
	12	Holmium(Ho)	0.5	2.02	1.3
	13	Erbium(Er)	1.47	4.72	3.5
	14	Thulium (Tm)	0.19	0.61	0.52
	15	Ytterbium(Yb)	1.23	3.25	3.2
	16	Lutetium(Lu)	0.14	0.51	0.8
		HREE	7.38	345.97	
		TREE	173.18	2889.67	
Rare Elements	17	Hafnium(Hf)	2.84	56.24	
	18	Tantalum (Ta)	0.05	0.87	
	19	Rubidium (Rb)	15.91	65	
	20	Zirconium (Zr)	37	2256	
	21	Germanium (Ge)	1.02	3.01	
Radioactive Elements	22	Uranium(U)	0.25	2.47	
	23	Thorium(Th)	0	84.66	
Other elements	24	Strontium (Sr)	18	1856	
	25	Barium(Ba)	1705	6349	
	26	Scandium (Sc)	12	42	

4.0.0 SCOPE FOR PROPOSED EXPLORATION.

4.0.1 The Reconnaissance survey at G-4 stage exploration program proposed comprises, Geological mapping (1:12,500 scale), Surface sampling (Bedrock, Soil, Stream Sediments), pitting/trenching, drilling of 5 Nos of scout boreholes involving about 300m core drilling and 200m Auger drilling with associated survey, chemical analysis, physical analysis and geological report preparation.

4.1.0 JUSTIFICATION

4.1.1 The Specialised Thematic Mapping was taken up during the Field Season 2007- 2008, in parts of toposheet no 58F/01 & 05 , covering in parts of Coimbatore and Dindigul district. as per the geochemical result in the east the ultramafic rocks in Tirumankaradu shows anomalous values of Cu, Ni, Cr, Sc, Th, U and REE elements and many of the ultramafic rocks occur around 252 hill, Tevanampalaiyam, Kungarplaiyam and Tirumankaradu areas indicated presence of Platinum group of elements. It was recommended that ultramafic and pegmatite bodies are need to be sampled systematically to explore for important trace, REE and platinum group of elements.

- 4.1.2 NGCM raw data was downloaded from Bhukosh portal of GSI and a total 37 no of stream sediment sample (SSS) were collected by GSI and these 37 no of sample were calculated for LREE, HREE & Total REE, upon preparation of geochemical anomaly map the area is promising for REE mineralization was identified and to be presented to TCC of NMET for approval, Geochemical anomaly map are enclosed as plate IV, V, VI.
- 4.1.3 With above study, the current proposed block may be studied for REE & RM mineralization at G4 level of exploration.

4.2.0 BLOCK DESCRIPTION

- 4.2.1 The Kathapullapatti Block falls in Survey of India Toposheet No 58F/01 & 05 and covers 143.37 sq.km in around villages of, Gettalrevu, Toppampatti, Kanjipuram, Suryanallur, Kallipalaiyam, Kottanur, Kathapulapatti, etc of Dharapuram Tehsil of Tiruppur, district Tamil Nadu. The block location in topo sheet is given in **PLATE-I**. The Co-ordinates of the corner points of the block area both geodetic and UTM are given in **Table No.- 4**.

Table- 4

Co-ordinates of the Corner points of the Kathapullapatti Block

Corner Points	Latitude	Longitude	Area
A	10°49'46.45"	77°24'00.72"	143.37 sq. km
B	10°51'38.66"	77°36'19.12"	
C	10°48'07.09"	77°36'13.97"	
D	10°47'49.96"	77°29'45.92"	
E	10°45'13.21"	77°26'46.03"	
F	10°45'14.90"	77°25'13.55"	

5.0.0 PLANNED METHODOLOGY

- 5.0.1 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. The details of different activities to be carried out are presented in subsequent paragraphs.

5.1.0 GEOLOGICAL MAPPING

- 5.1.1 Geological mapping will be done in the entire 143.37 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. 10 nos. of surface samples and borehole samples of various lithounits for

petrological studies and 10 nos. of surface samples and borehole samples of various lithounits for mineragraphic studies.

5.2.0 GEOCHEMICAL SAMPLING

5.2.1 Bed Rock Sampling and Soil Sampling:

5.2.1.1 During the course of Geological mapping the bed rock and stream sediment samples shall be collected. Stream sediment samples will subjected to heavy mineral separation. A total 200 nos. bed rock and Stream samples will be collected for assay 34 elemental package analysis includes Nb, Sr, Ta, W, Mo, Sn, Rb, Be, Cs, LI & REE analysis by ICP-AES / ICPMS (sequential technique). Also, total 30 nos. check samples [5% internal (10) + 10% External (20)] will be analyzed for same.

5.3.0 SURVEYING:

5.3.1 DGPS survey will be carried out for drilled boreholes and block boundary will be demarcated using handheld GPS.

5.4.0 EXPLORATORY MINING (PITTING/TRENCHING):

5.4.1 Shallow pitting of 50 cum (Excavation) shall be carried out in the potential zones identified based on the results of geological mapping and geochemical sampling, for the collection soil samples from the B and C horizons , to identify the secondary dispersion of mineralization . A total 25 Nos of samles will be collected from the pits and will be submitted for heavy mineral separation and further analysis .

5.4.2 A provision of shallow trenching on mineralized zones (if any) (1m wide X 2m deep) with 100 cubic meters is kept. Trenching will be carried out on surface up to a depth of 1 m (maximum 2 m depth from surface) after removal of soil/weathered column in the area. Locations of trenches on ground will be decided by field geologist based on field observations (positive outcome of the bedrock sampling). A provision of 50 no of primary along with check is kept for analysis for REE,RM and PGES

5.4.3 The trench walls will be mapped on 1:200 scale.

5.5.0 CORE DRILLING:

5.5.1 Based on Geological Mapping, Geochemical Sampling, the extension of the mineralized zones (ore bodies) will be marked. To find out the potentiality of mineralized zones in strike & dip direction, 300m scout boreholes (core drilling) and 300m AUGUR drilling will be carried out . The azimuth and angle of inclination of the proposed boreholes will be decided by the field geologist once the attitude (strike

& dip) of mineralized zones (host rock) is deciphered after the completion of the phase 1 exploration.

5.6.0 DRILL CORE LOGGING:

5.6.1 The drill core will be logged for rock types, structural features, textures, intersection of mineralization/ore zones, types of mineralization and occurrence of various ore minerals. Rock quality designation (RQD) will also be undertaken.s

5.7.0 DRILL CORE SAMPLING:

5.7.1 During geological logging of drill core, mineralized zone will be marked on the basis of concentration of ore minerals and lithology. Total 150 no of primary and 22 nos check (5% Internal Check+10% External Check) samples each will be analysed for assay 34 elemental package analysis includes Nb, Sr, Ta, W, Mo, Sn, Rb, Be, Cs, LI & REE analysis by ICP-AES / ICPMS (sequential technique),and 50 no.s primary samples and 8 no,s of check samples can be analyzed for PGE minerals by (Icp-MS Ni-S Fire assay technique)

5.8.0 CHEMICAL ANALYSIS

5.8.1 WHOLE ROCK ANALYSIS:

5.8.1.1 Whole Rock analysis for SiO₂, Al₂O₃, Fe₂O₃, TiO₂, MnO, CaO, MgO, Na₂O, K₂O, H₂O, P₂O₅, CO₂, & S radicals will be carried out on 10 nos. of rock samples to check the rock types, their variation in chemical composition.

5.9.0 PETROLOGICAL & MINERAGRAPHIC STUDIES:

5.9.1 During the course of Geological mapping and core logging 10 nos. of samples from various lithounits from outcrop and borehole core will be studied for petrography and 10 nos. of samples from mineralized zones will be studied for the ore mineral assemblages and their distribution, alteration, enrichment etc in polished sections (Mineragraphic studies).

6.0.0 PROPOSED QUANTUM OF WORK

6.0.1 Details of the particular, Quantum and the targets are tabulated in **Table No.-V.A.**

Table No-V. A Envisaged Quantum of proposed work in Kathapullapatti Block

S. No.	Item of Work	Unit	Estimated Cost of the Proposal
			Qty.
1	Large scale (LSM) Geological mapping/ Trenching/Pitting	sq.km	143.37
2	Trenching and Pitting	per cu m	150
3	Drilling		
a	Auger Drilling	M	200
b	Core Drilling	m	300
3	Laboratory Studies		
3.1	Separation of heavy minerals from stream sediment samples and pit samples of - 2mm size through gravity and magnetic separation	Per sample	175 (Stream Sediments = 150 + Pit = 25)
3.2	Chemical Analysis		
i)	Surface sampling (Bed Rock Samples/ Stream Sediment + Soil/Pit Primary Samples)		
a	34 elements by ICP-AES / ICPMS (sequential technique)	per sample	200 (BRS = 25 + Stream Sediments = 150 + Pit = 25)
b	For PGE (Icp-MS Ni-S Fire assay technique)	per sample	25 from BRS
ii.	Borehole Samples		
a	34 elements by ICP-AES / ICPMS (sequential technique)		150
b	For PGE (Icp-MS Ni-S Fire assay technique)		50
iii)	Check Samples - 5% Internal & 10% External		
	34 elements by ICP-AES / ICPMS (sequential technique)	per sample	52
	For PGE (Icp-MS Ni-S Fire assay technique)		11
4	Whole rock studies	per sample	10
5	Petrological / Mineralographic studies		
	Petrographic Study	per sample	10
	EPMA	Hour	20
	SEM	Hour	20
6	Geological Report Preparation	Nos	1

6.1.0 BREAK-UP OF EXPENDITURE

6.1.1 Tentative Cost has been estimated based on Schedule of Charges (SoC) of projects funded by National Mineral Exploration Trust (NMET) w.e.f. 01/04/2020 The total estimated cost is **Rs. 257.69 Lakhs.** The summary of cost estimates for Reconnaissance Survey (G-4 Level) is given in **Table No.-VI** and 6.0.1 Details of the particular, Quantum is given in **Table No. -V.A.**, Summary of Cost Estimates for Reconnaissance Survey (G-4 Level) Exploration given in table no. V.B and **Detail** cost sheet for proposed Reconnaissance Survey (G-4) for REE, RM and PGE as Annexure No.I

Table No-V. B

Summary of Cost Estimates for Reconnaissance Survey (G-4 Level) Exploration

Sl. No.	Item	Total Estimated Cost (Rs.)
1	Geological Mapping (LSM), Other Geological Work	27,01,440
2	Pitting	5,70,000
3	Drilling	58,23,380
4	Laboratory Studies	1,12,67,191
	Sub Total (1 to 4)	2,03,62,011
5	Exploration Report Preparation	10,18,101
	Proposal Preparation	4,27,602
6	Peer review charges	30,000
	Sub Total (1 to 6)	2,18,37,714
7	GST 18%	39,30,788
	Total:	2,57,68,502
	Say Rs. In Lakh	257.69

6.2.0 TIME SCHEDULE

6.2.1 The proposed exploration programme envisages surveying, updating of geological mapping, geochemical sampling, exploratory mining, sample preparation and laboratory studies, which will be completed within 10 months by geological report preparation will consume 4 more months with one month overlapping. Therefore, a total of 15 months is planned for completion of the entire programme.

Table -VI: Tentative Time schedule / Action plan of Reconnaissance Survey (G-4) for REE & RM in Kathapullapatti Block , Tiruppur District, Tamil Nadu															
S.No.	Activities	MONTHS													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Camp setting														
2	Geological mapping & Sampling														
3	Sample preparation														
4	Analytical work														
5	Exploratory mining for trenching														
6	Sample preparation (Trench samples)														
7	Analytical work														
8	Survey work														
9	Geologist at HQ														
10	Geological report														
11	Peer Review														
* Commencement of project will be reckoned from the day the exploration acreage is available along with all statutory clearances															
*Time loss on account of monsoon/agricultural activity/forest clearance/ local law & order problems will be addition to above time line.															

7.0.0 REFERENCE

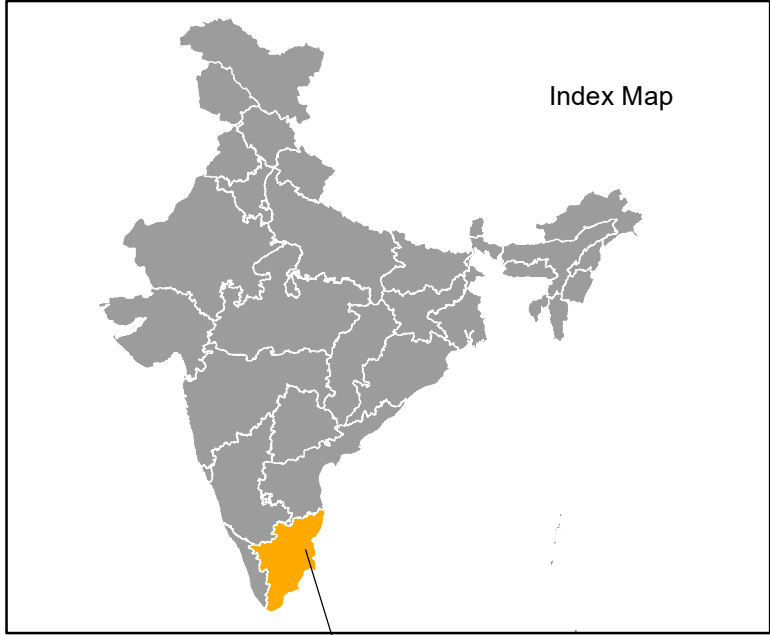
1. Progress Report for The Field-Season 1953-54 by GSI, A.P. Subramaniam.
2. Report On the Investigation of Semi-Precious Stones in Parts of Dharapuram Taluk, Coimbatore Disttict (Madras) (Field Season 1964-65) by GSI, N.G.K, Murthy Geologist (Sr).
3. Progress report for the field season 1972-73, Geology of Palladam Taluk, Coimbatore District, Tamil Nadu by GSI K. Goalakrishnan, Geologist (Jr.)
4. Integration Of Geological, Geochemical, Geophysical, Aerogeophysical, Photogeological Data of Parts of Mahakoshal Belt and Its Surroundings to Identify Target Areas of Gold Mineralization Using Gis, Field Season: 2014-2015 & 2015-2016 by GSI, P K Singh, Superintending Geologist; Ranjeeta Jha, Assistant Geologist; S.K. Singh, Senior Geophysicist; Jaya Singh, Superintending Geologist; R. K. Sharma, R. K. Gupta, D. K. Soni, Pratibha Singh, Senior Geologists
5. Specialised Thematic Mapping in The Kinattukkadavu – Kangayam Sector of Kinattukkadavu – Kangayam – Chinnadharapuram Tectonic Zone (KKC-Tectonic Zone) Coimbatore And Erode Districts, Tamil Nadu (Parts of Toposheets: 58F/1&5) (Field Season 2007-09) by GSI R. Baskaran, Geologist (Sr.), Nagendra Kumar, Geologist (Jr.) and V.K Rahothishan, Geologist (Jr.)
6. Bhukosh, GSI <https://bhukosh.gsi.gov.in/>

List of Plates

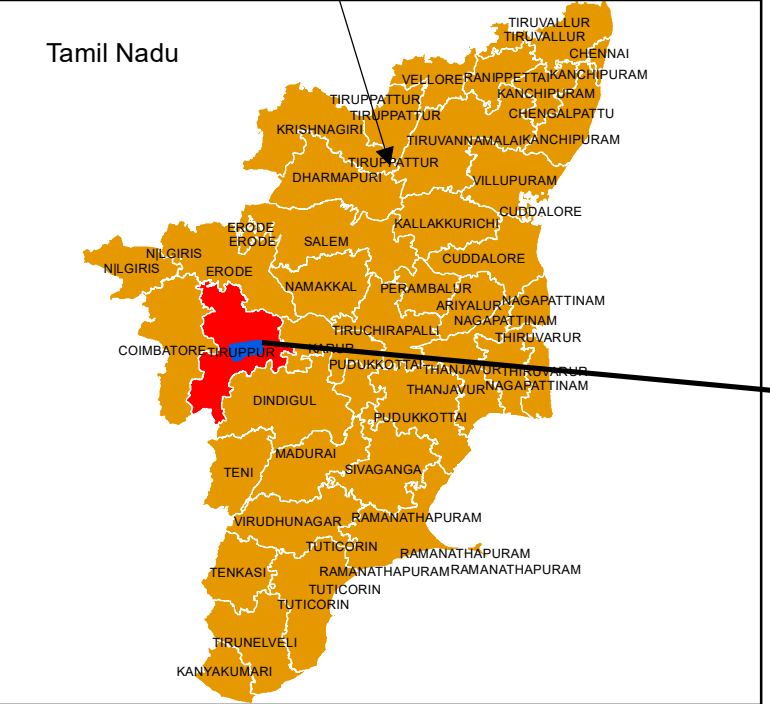
1. Plate-I: Location Map of Kathapullapatti Block , Tiruppur District, Tamil Nadu.
2. Plate-II: Regional Geological Map of Kathapullapatti Block , Tiruppur District, Tamil Nadu (Source: Bhukosh, GSI).

3. Plate-III: Geological Map of Kathapullapatti Block , Tiruppur District, Tamil Nadu (Source: Bhukosh, GSI).
4. Plate – IV: Kathapullapatti Block -NCGM anomaly map for TREE (Source: NGCM data Bhukosh, GSI).
5. Plate – V: Kathapullapatti Block -NCGM anomaly map for LREE (Source: NGCM data Bhukosh, GSI).
6. Plate – VI: Kathapullapatti Block -NCGM anomaly map for Total HREE (Source: NGCM data Bhukosh, GSI).
7. Plate-VII: Drainage map with proposed stream sample location of Kathapullapatti Block , Tiruppur District, Tamil Nadu

PROPOSED KATHAPULLAPATTI (G4) BLOCK FOR REE & RM, IN TIRUPPUR DISTRICT, TAMIL NADU
(TOPOSHEET NO. 58F/5 & 58F/9) : AREA- 143.37 SQ KM



Index Map



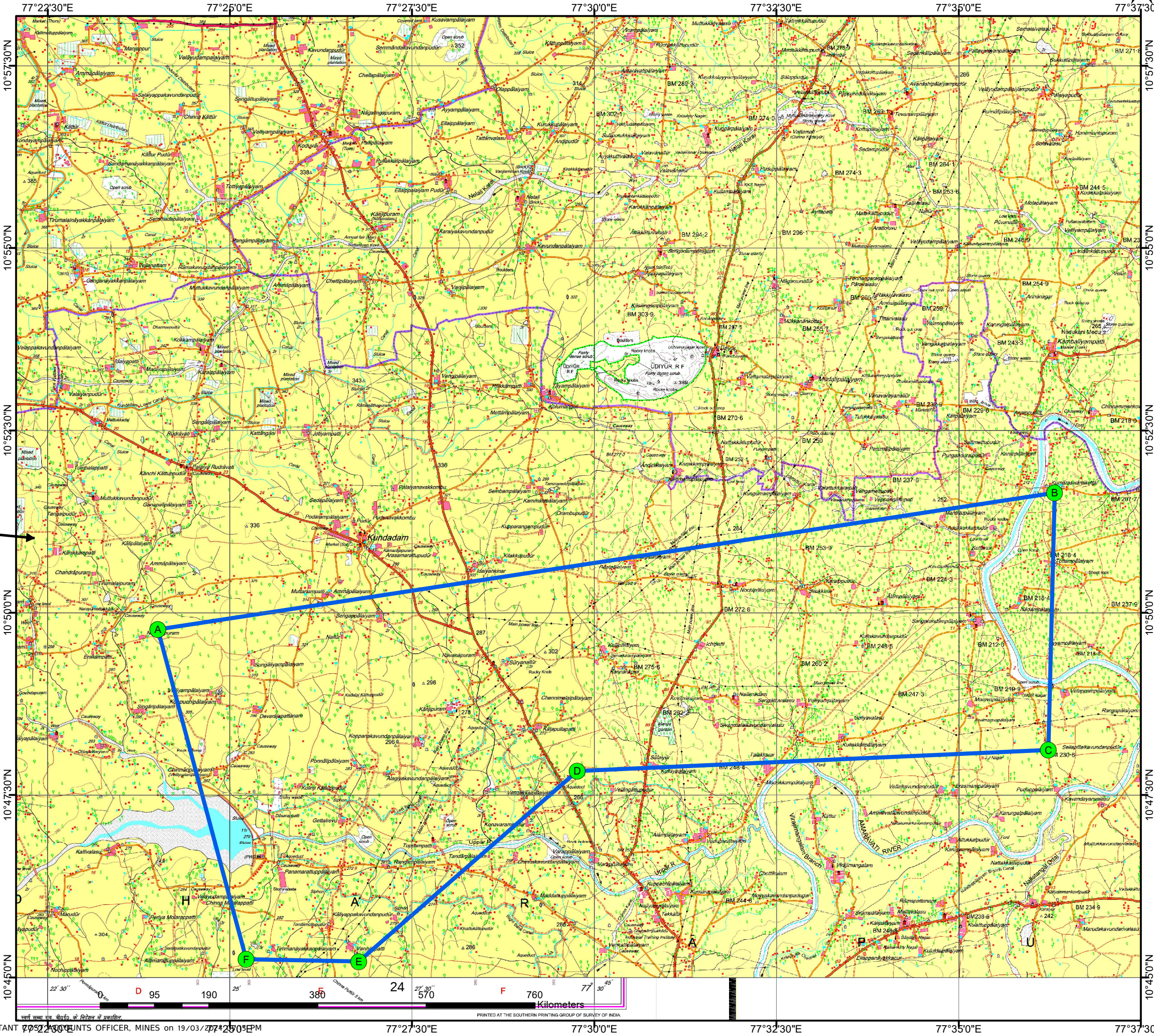
Tamil Nadu

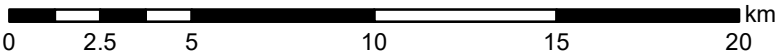
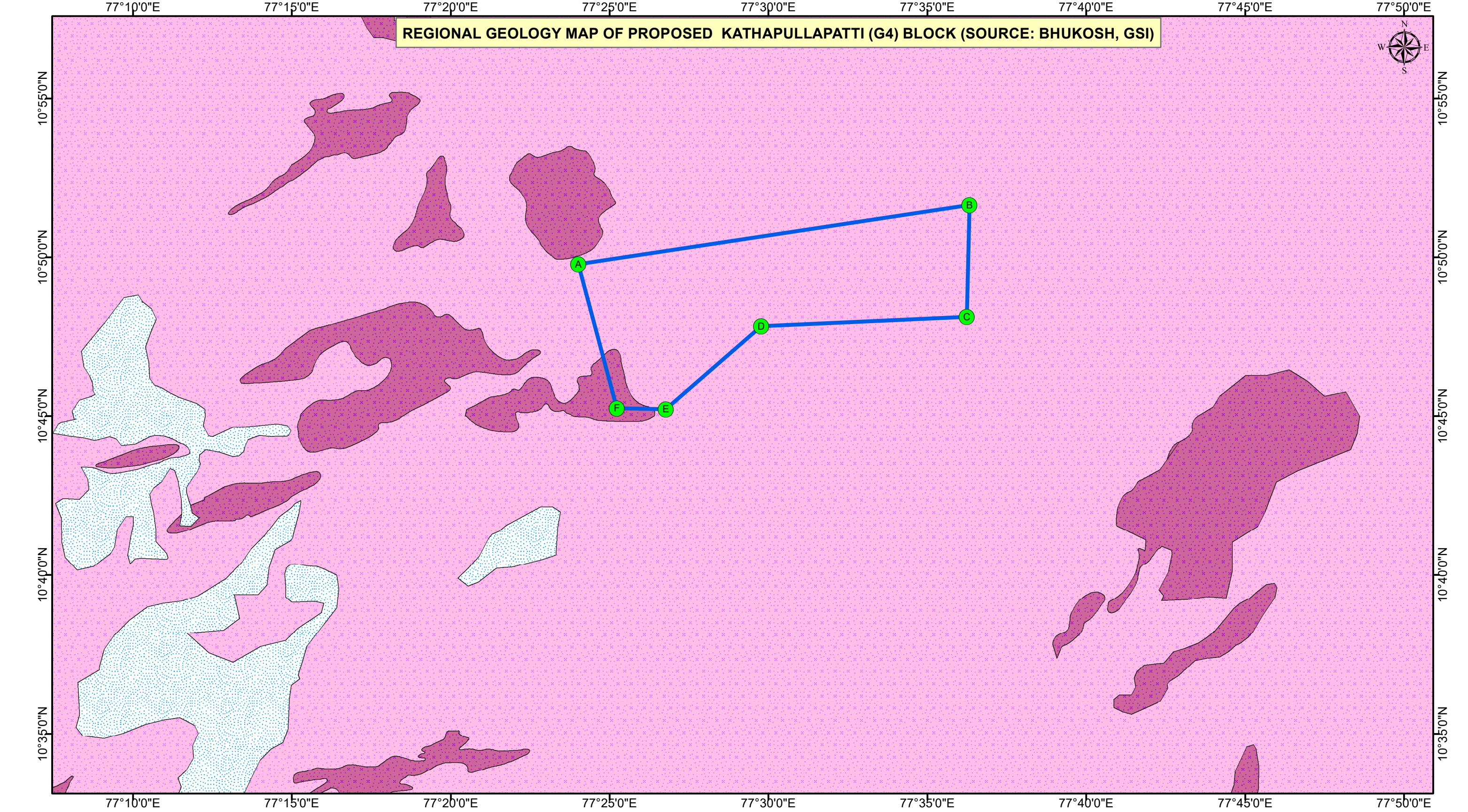
Corner Points	Latitude	Longitude	Area
A	10°49'46.45"	77°24'00.72"	143.37 sq. km
B	10°51'38.66"	77°36'19.12"	
C	10°48'07.09"	77°36'13.97"	
D	10°47'49.96"	77°29'45.92"	
E	10°45'13.21"	77°26'46.03"	
F	10°45'14.90"	77°25'13.55"	

Legend

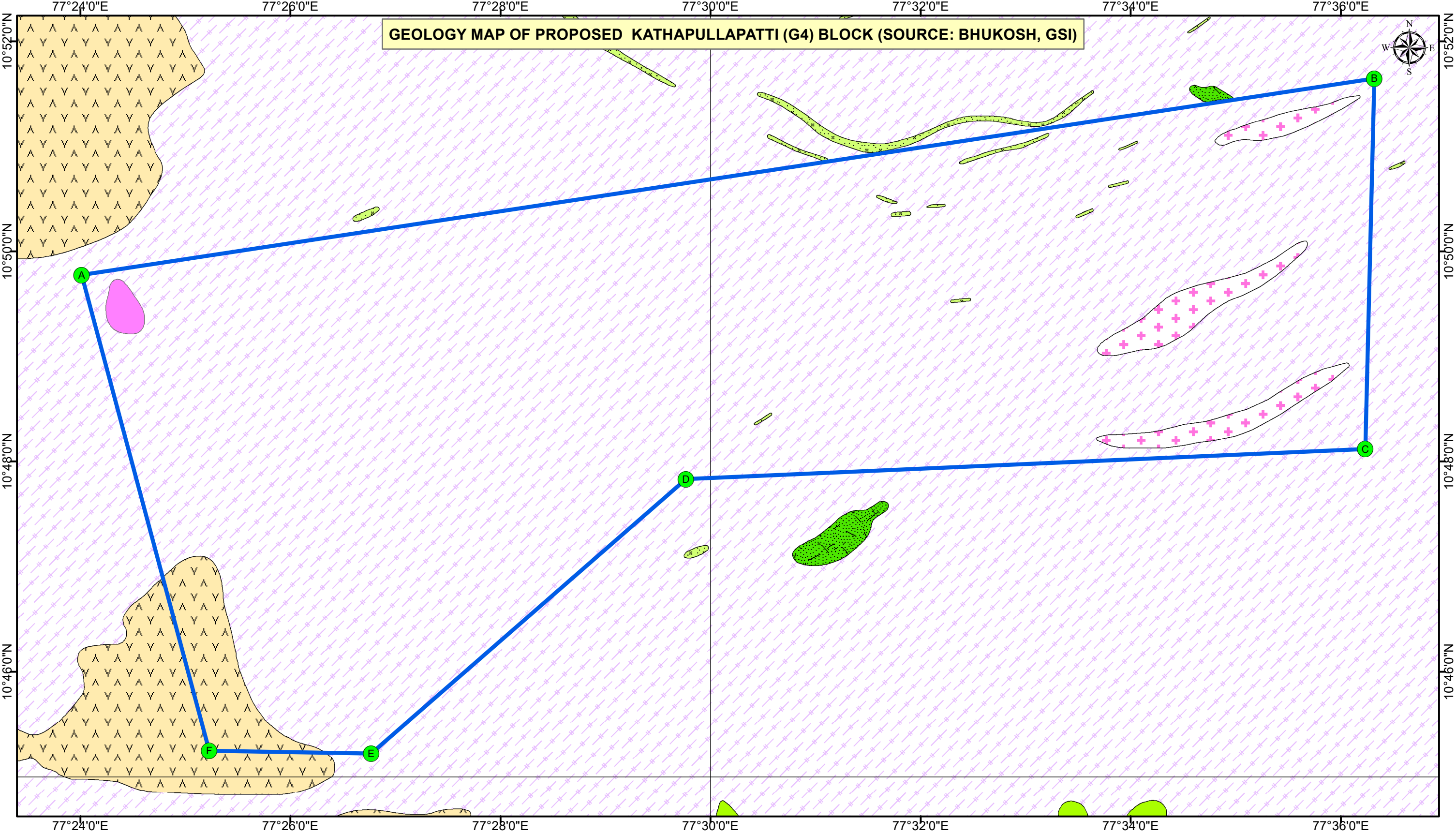
- Corner Points
- Proposed Kathapullapatti REE Block

Plate - I





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Legend

Corner Points

Proposed Kathapullapatti REE Block

Lithology

ACID TO INTERMEDIATE CHARNOCKITE

CALCRETE

GRANITE

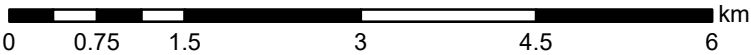
HORNBLLENDE-BIOTITE GNEISS

PINK GRANITE GNEISS

PYROXENE GRANULITE

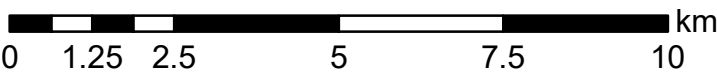
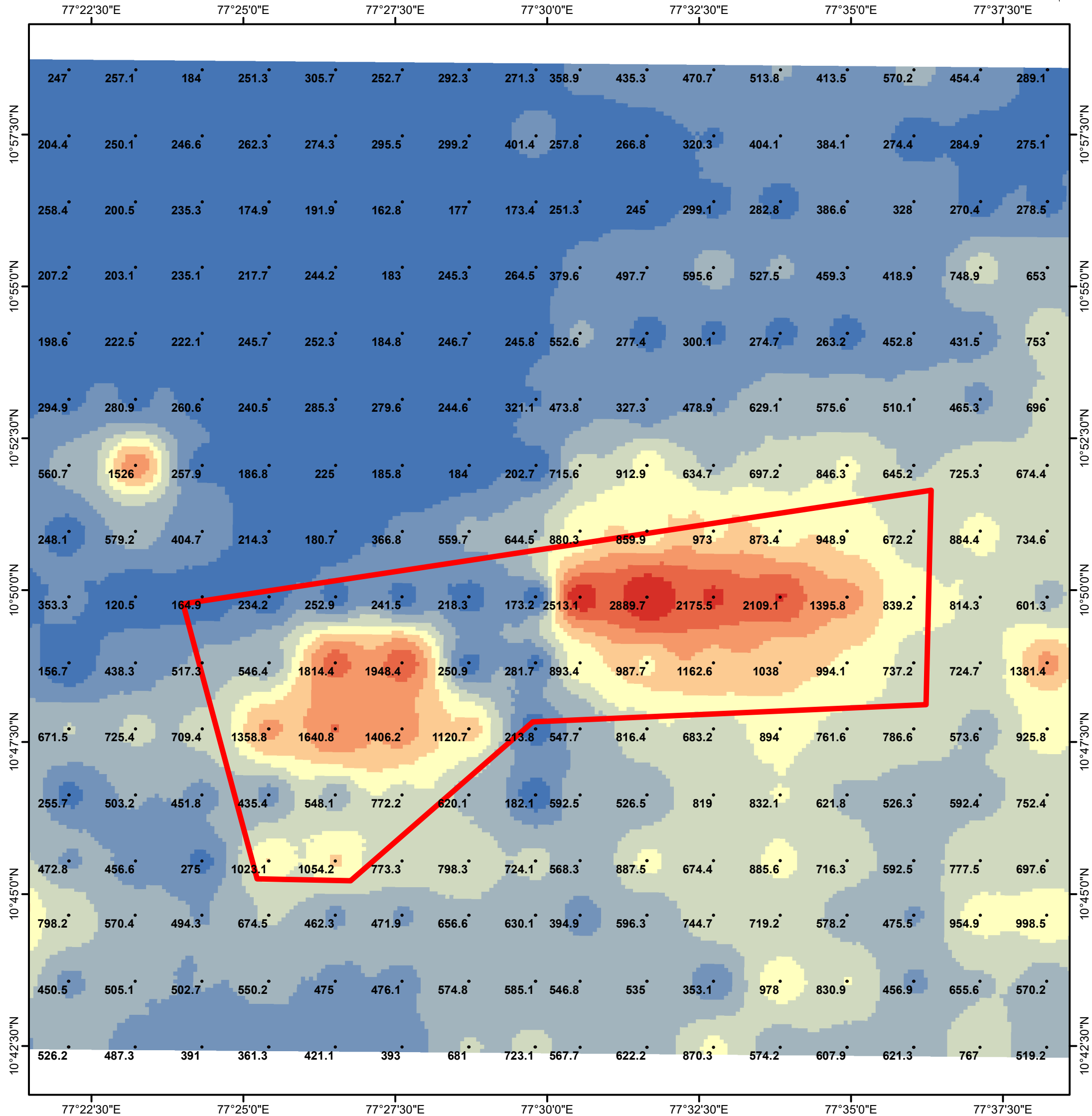
PYROXENITE

Plate - III



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ANOMALY MAP OF TREE IN PROPOSED KATHAPULLAPATTI (G4) BLOCK (SOURCE: NGCM DATA, GSI)



Legend

• Stream Sediment

 Proposed Kathapullapatti REE Block

TREE.tif

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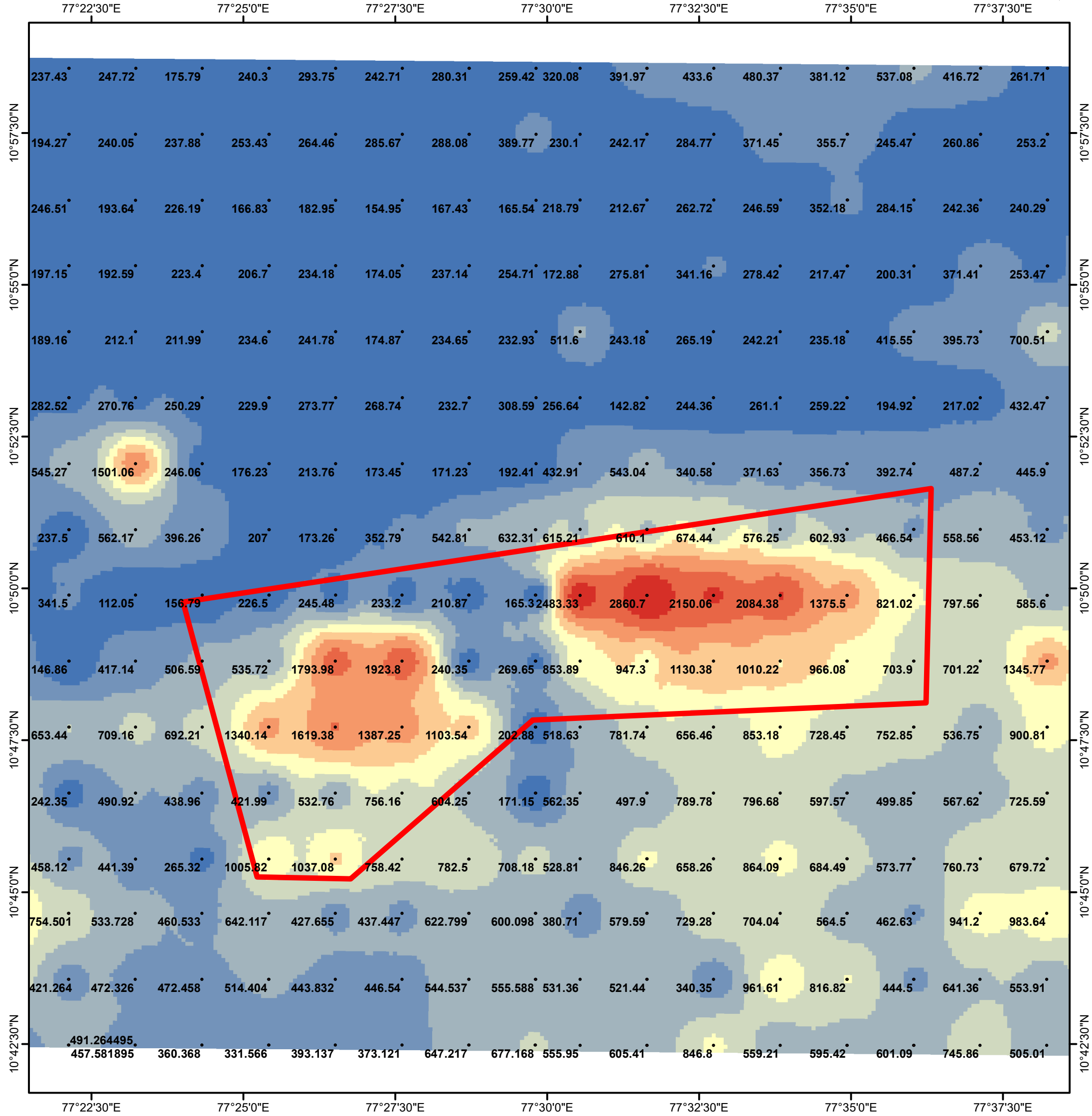
	662.2458077 - 824.2353602
	824.2353603 - 1,018.622823
	1,018.622824 - 1,277.806108
	1,277.806109 - 1,623.38382
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	2,076.954569 - 2,876.103027

Plate: IV

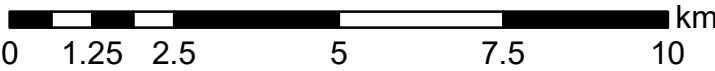


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ANOMALY MAP OF LREE IN PROPOSED KATHAPULLAPATTI (G4) BLOCK (SOURCE: NGCM DATA, GSI)



1:115,000



Legend

- Stream Sediment
- Proposed Kathapullapatti REE Block

LREE.tif

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	488.9291497 - 649.6777103
	649.6777104 - 810.426271
	810.4262711 - 1,014.041115
	1,014.041116 - 1,271.238812
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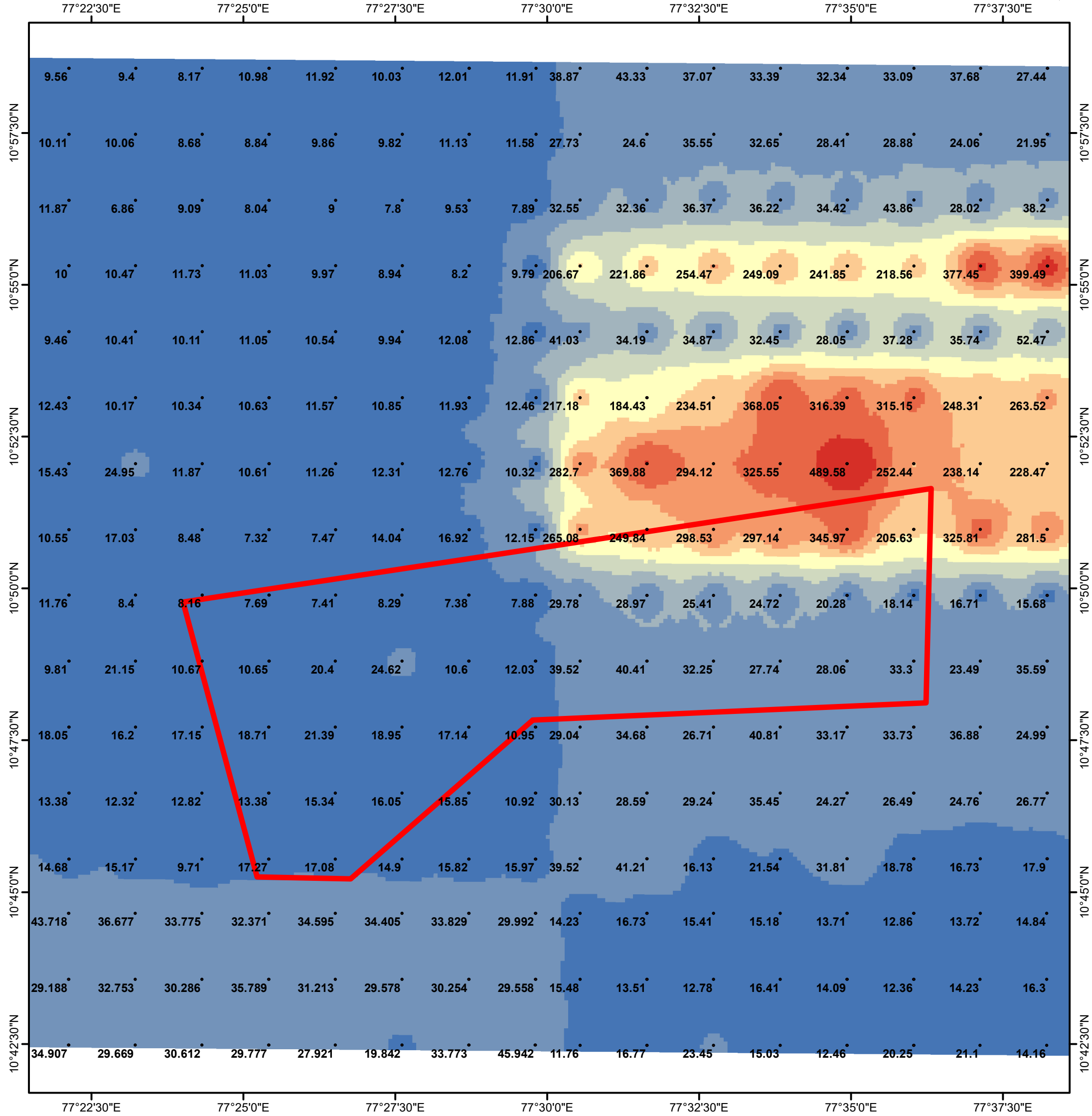
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Plate: V

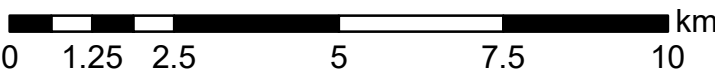


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ANOMALY MAP OF HREE IN PROPOSED KATHAPULLAPATTI (G4) BLOCK
(SOURCE: NGCM DATA, GSI)



1:115,000



Legend

- Stream Sediment
- Proposed Kathapullapatti REE Block

HREE.tif

<VALUE IN PPM>

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	22.01626605 - 50.37127653
	50.37127654 - 97.62962733
	97.62962734 - 152.4493143
	152.4493144 - 205.3786672
	205.3786673 - 252.637018
	252.6370181 - 299.8953688
	299.8953689 - 367.9473939
	367.947394 - 488.928772

29

Plate: VI



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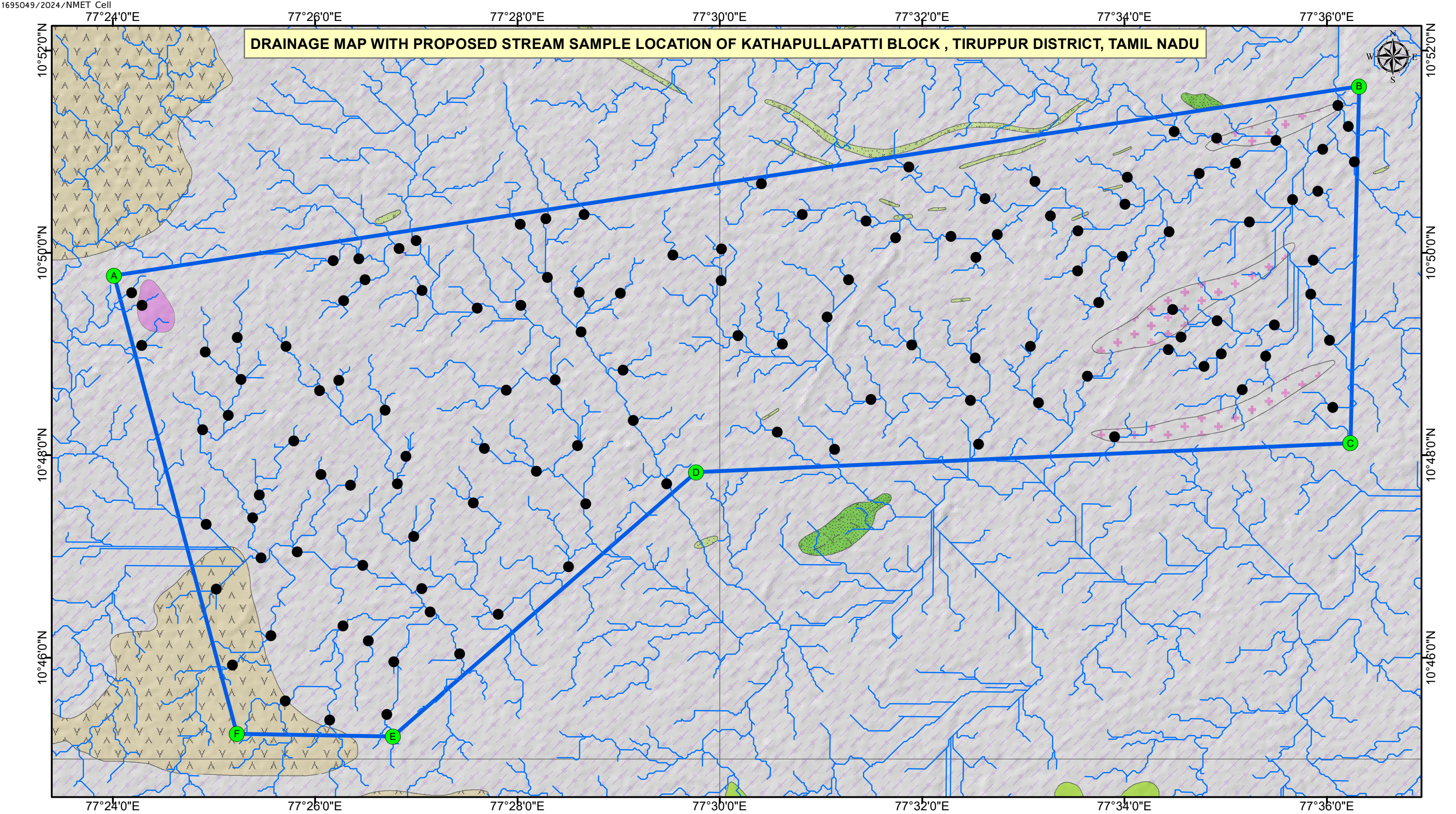


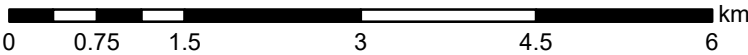
Plate-VII

Legend

- Proposed Stream Sample Location
- Corner Points
- Drainage
- Proposed Kathapullapatti REE Block

Lithology

- | | | | |
|--|----------------------------------|--|----------------------------|
| | ACID TO INTERMEDIATE CHARNOCKITE | | HORNBLLENDE-BIOTITE GNEISS |
| | CALCRETE | | PINK GRANITE GNEISS |
| | GRANITE | | PYROXENE GRANULITE |
| | | | PYROXENITE |



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Annexure I. Estimated cost for Reconnaissance Survey (G-4) for REE & RM in Kathapullapatti Block , Tiruppur District, Tamil Nadu Total block area- 143.37 sq km; Completion Time- 15 Months							
S. No.	Item of Work	Unit	Rates as per NMET SoC 2020-21		Estimated Cost of the Proposal		Remarks
			SoC- Item- S. No.	Rates as per SoC	Qty.	Total Amount (Rs)	
1.0	Large scale (LSM) Geological mapping/ Trenching/ Drilling						
a)	Geologist man days (1 No.) for Geological map & Report (HQ)	days	1.2	9,000	60	5,40,000	
b)	Geologist man days (2 No) for Large scale (LSM) Geological mapping/ sampling (Field)	days	1.2	11,000	180	19,80,000	
c)	Labour (field) for (Total 4 Nos i.e. 4 workers)	per worker	5.7	504	360	1,81,440	Amount will be reimburse as per the notified rates by the Central Labour Commissioner or respective State Govt. whichever is higher
	Sub-Total A					27,01,440	
2.0	Mineral Investigation						
2.1	Pitting/Trenching	per cu m	2.1.2	3,800	150	5,70,000	
	Sub-Total B					5,70,000	
3.0	Drilling						
A	Core Drilling						
i	Drilling upto 300m (Hard Rock) (1 rigs)	m	2.2.1.4a	11,500	300	34,50,000	
ii	Borehole deviation Survey	m	2.2.6	-	-	-	
iii	Land / Crop Compansation	per BH	5.6	20,000	8	1,60,000	Amount will be reimburse as per actuals or max. Rs. 20000 per BH with certification from local authorities
iv	Construction of concrete Pillar (12"x12"x30")	per borehole	2.2.7a	2,000	8	16,000	
v	Transportation of Drill Rig & Truck associated per drill	Km	2.2.8	36	2,800	1,00,800	Certification in this regard is required to be provided
vi	Monthly Accomodation Charges for drilling Camp (up to 2 Rigs)	month	2.2.9	50,000	1	50,000	
vii	Drilling Camp Setting Cost	Nos	2.2.9a	2,50,000	1	2,50,000	
viii	Drilling Camp Winding up Cost	Nos	2.2.9b	2,50,000	1	2,50,000	
ix	Approach Road Making (Flat Terrain)	Km	2.2.10a	22,020	4	88,080	Road Making will be considered as per the requirement and Road Making Charges will be reimbursed for max. 4 km.
x	Bore Hole Fixation and determination of co-ordinates & Reduced Level of the boreholes and by DGPS	Nos	1.6.2	19,200	9	1,72,800	*8 Boreholes and 1 base station
xi	One complete borehole plus mineralised cores of all the remaining Bhs	m	5.3	1,590	150	2,38,500	This amount will be reimbursed after successful delivery of the cores to concerned libraries/authorities
B	Auger Drilling						
i)	Auger Drilling soft Strata upto 150 m Depth (30 Boreholes X 7m average depth)	m	2.2.2	4760	200	9,52,000	
ii)	Operational Charge = C.1 X 10%		6.0 (i)	10% of Total outsourced Cost in case of total ousouce cost up to 50 lakh		95,200	
	Sub-Total C					58,23,380	
4.0	Laboratory Studies						
4.1	Separation of heavy minerals from stream sediment samples of - 2mm size through gravity and magnetic separation	No.	Outsourcing	30,759	175	53,82,825	
4.2	Chemical Analysis						
i)	Surface sampling (Bed Rock/Stream Sediment/regolith Samples)						
	Analysis of stream sediment/ regolith samples for determination of a package by 34 elements by ICP-AES / ICPMS (sequential technique)	per sample	4.1.14	7,731	200	15,46,200	BRS= 100, SSS=100, Soil=50
ii	PGE Surface sampling						
	For PGE (Icp-MS Ni-S Fire assay technique)	per sample	4.1.5d	11,800	50	5,90,000	
iii)	Sub Surface sampling						
	Trench/pitting	per sample	4.1.14	7,731	100	7,73,100	
	Core Sample	per sample	4.1.14	7,731	150	11,59,650	
	Auger Sample	per sample	4.1.14	7,731	100	7,73,100	
iv)	Check Samples (Stream Sediment/regolith Samples) - 5% Internal & 10% External					-	
	Analysis of one rock/soil sample for determination of a package by 34 elements by ICP-AES / ICPMS (sequential technique)	per sample	4.1.14	7,731	86	6,64,866	
4.3	Whole rock studies	per sample	4.1.15a	4,200	10	42,000	
4.4	Petrological / Mineralographic studies					-	
	a) Preparation of thin section	per sample	4.3.1	2,353	10	23,530	
	b) Study of thin section for petrography	per sample	4.3.4	4,232	10	42,320	
	c) XRD analysis	per sample	4.5.1	4,000	10	40,000	
4.5	EPMA Studies per hour	Hour	4.4.1	8,540	20	1,70,800	
4.6	SEM Studies per hour	Hour	4.4.2	2,940	20	58,800	
	Sub-Total D					1,12,67,191	
5.0	Total (1.0 to 4.0)					2,03,62,011	
6.0	Geological Report Preparation	Nos	5.2	A Minimum of Rs. 7.5 lakhs or 3% of the work whichever is more	1	10,18,101	For the projects having cost up to exceeding Rs. 50 Lakhs but less than 150 Lakhs: A Minimum of Rs. 2.5 lakhs or 5% of the work whichever is more and Rs. 3000/- per each additional copy.
7.0	Preparation of Exploration Proposal	Nos	5.1	2% of project cost	1	4,27,602	EA has to submit the final proposal
9.0	Report Peer Review Charges	lumpsum	As per 30th EC	30000	1	30,000	
10.0	Total Estimated Cost without GST (7+8+9+10)					2,18,37,714	
11.0	Provision for GST (18%)					39,30,788	GST will be reimburse as per actual and as per notified prescribed rate
12.0	Total Estimated Cost with GST					2,57,68,502	
					Say, in Lakhs	257.69	
Note:							
*	Marked items not indicated in SoC and required to be taken up during the course of exploration shall be charged separately (as peractuals)						
\$	Pitting dimensions are tentative may vary depending upon the geology and field conditions						
i	Satellite imageries shall be procured from website/NRSA as the case may be and procurement charges if any shall be charged at actuals.						