DETAILED PROPOSAL REPORT (DPR)

PROPOSAL FOR RECONNAISSANCE SURVEY FOR REE & RM MINERALIZATION IN PALADUGU AREA, KHAMMAM DISTRICT, TELANGANA (G4-STAGE)

COMMODITY: REE & RM

By

M/S GMMCO Technology Services Ltd (GTS)

Hyderabad, Telangana

CKA Birla Group | GTS

FOR SUBMITTINGPROPOSALFORUNDERTAKING PRELIMNARYEXPLORATION

From:	To:
Dr. Akkala Surendra Babu	The Director &HoD
Chief of Technical Services	National Mineral Exploration Trust, Secretariat, Ministry of Mines,
GMMCO Technology Services Ltd (“GTS”)	Room No-325 & 326, Wing-F, Udyog Bhawan,
9th Floor (9A/2), Vaishnavi Cymbol, Puppalaguda, Gandipet Mandal,	Rajpath Area, Central secretariat
Rangareddy District, Hyderabad – 500089	New Delhi – 110011.

1. Name and address of the Applicant		
(a)	Name	GMMCO Technology Services Ltd (“GTS”)
(b)	Postal address	GTS Ltd, 9th Floor (9A/2), Vaishnavi Cymbol, Puppalaguda, Gandipet Mandal, Rangareddy District, Hyderabad, Telangana, India– 500089
(c)	Telephone No. (Office)	+91-7032711678
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(g)	E-mail address	pundarikarao.d@gts-india.com

2. Detail of Accreditation as Private Exploration Agencies and Notification under the Provision to Section 4(1) of the MMDR Act.		
(a)	Date of accreditation granted by QCI-NABET	20th May - 2024
(b)	Date of expiry of accreditation	15th May - 2027
(c)	Date of Notification under the provision to Section 4(1) of the MMDR Act.	13th September - 2024
(d)	Date of expiry of notification	12th September - 2027
(e)	Category of the Exploration agency (Category A or B) under Notification	Category – A
3. Location details of the area proposed		
(a)	State	Telangana
(b)	District(s)	Khammam
(c)	Nearby village(s)	Paladugu, Nagligonda, Rebbavaram, Rapalli and Konda Kodima
(d)	Survey of India (SOI) Toposheet No(s)	65C/08
(e)	Area in Sq. Km	100
(f)	Boundary co-ordinates of the Proposed Block (in Decimal Degree)	

Corner Points	**Latitude**	**Longitude**
A	17.012614	80.358644
B	17.107972	80.270783
C	17.168101	80.309488
D	17.056231	80.396322

4. Mineral Potential of the area		
(a)	Name of Mineral(s) identified/expected in the area/block	REE and RM
(b)	Title of the Project	Reconnaissance Survey for REE& RM Mineralization inPaladugu Block, Khammam District, Telangana (G4-Stage)
(c)	Stage of Exploration	G-4
(d)	Basis on which mineral potential of the area has been identified	Please refer enclosed “Summary proposal”
5. Documents enclosed with the application		
(i)	Location of the proposed block demarcated on Survey of India (SOI) Toposheet No. 65C/08	
(ii)	Documents mentioned in item 4(d) above.	

Signature of the applicant

Dr. Akkala Surendra Babu
Chief of Technical Services
GMMCO Technology Services Ltd
Mobile: 9630459992
Email: surendrababu.a@gts-india.com

Place: Hyderabad
Date: 18.06.2026

Summary of the Block

Reconnaissance Survey for REE and RM mineralization in Paladugu Block (100 Sq. Km), Khammam District, Telangana (G-4 stage)

<table>
<tr><th>S.No</th><th>Features</th><th>Details</th></tr>
<tr><td></td><td>Block ID</td><td>Paladugu Block</td></tr>
<tr><td></td><td>Exploration Agency</td><td>M/s GMMCO Technology Services Limited Hyderabad, India.</td></tr>
<tr><td></td><td>Commodity</td><td>REE and RM</td></tr>
<tr><td></td><td>Mineral Belt</td><td>Contact Zones of Peninsular Gneissic Complex-II (PGC-II), Eastern Ghats Mobile Belt (EGMB).</td></tr>
<tr><td></td><td>Completion Period with entire Time schedule to complete the project</td><td>Eight (10) months</td></tr>
<tr><td></td><td>Objectives</td><td>To target granites and pegmatites of the Neo-archaean-Palaeo-proterozoic rocks belonging to Peninsular Gneissic Complex-II (PGC-II), Palaeo-proterozoic rocks of Eastern Ghats Mobile Belt (EGMB), for delineation of Rare Earth Element (REE) and Rare Metal (RM) mineralized zones.</td></tr>
<tr><td></td><td>Whether the work will be carried out by the proposed agency</td><td>M/s GMMCO Technology Services Limited Hyderabad, India</td></tr>
<tr><td></td><td>Name/Number of Geoscientists</td><td>Two Senior Geologists and Two Junior Geologists</td></tr>
<tr><td></td><td>Expected Field days (Geology)Geological Party Days</td><td>Two Senior Geologists - 60 days (2x30 days)</td></tr>
<tr><td>1.</td><td>Location</td><td></td></tr>
<tr><td></td><td>Latitude and Longitude</td><td>
<table>
<tr><th>Corner Points</th><th>Latitude</th><th>Longitude</th></tr>
<tr><td>A</td><td>17° 0'45.41"N</td><td>80°21'31.12"E</td></tr>
<tr><td>B</td><td>17° 6'28.70"N</td><td>80°16'14.82"E</td></tr>
<tr><td>C</td><td>17°10'05.16"N</td><td>80°18'34.16"E</td></tr>
<tr><td>D</td><td>17° 3'22.43"N</td><td>80°23'46.76"E</td></tr>
</table>
</td></tr>
<tr><td></td><td>Villages</td><td>Paladugu, Nagligonda, Rebbavaram, Rapalli and Konda Kodima</td></tr>
<tr><td></td><td>Tehsil /Taluk</td><td>Wyra Mandal</td></tr>
<tr><td></td><td>District</td><td>Khammam</td></tr>
<tr><td></td><td>State</td><td>Telangana</td></tr>
<tr><td>2.</td><td>Area(hectares/square kilometers)</td><td></td></tr>
<tr><td></td><td>Block AreaSq.Km</td><td>100</td></tr>
<tr><td></td><td>Forest Area</td><td>Plain area</td></tr>
<tr><td></td><td>Government Land Area</td><td>Data not available</td></tr>
<tr><td></td><td>Private Land Area</td><td>Data not available</td></tr>
<tr><td>3.</td><td>Accessibility</td><td></td></tr>
<tr><td></td><td>Nearest Rail Head</td><td>Bona Kalu Railway station</td></tr>
<tr><td></td><td>Road</td><td>The proposed Paladugu block is located 31 KM</td></tr>
</table>

		towards South from District headquarters Khammam and 7 Km from Wyra Mandal.
	Airport	The nearest airport is Rajiv Gandhi International Airport (RGIA), Hyderabad
4.	**Hydrography**	
	Local Surface Drainage Pattern (Channels)	The drainage pattern of the area is dendritic to sub-dendritic nature and controlled by lithological structures.
	Rivers/Streams	MaddupeddaVagu is a tributary of BogguguttaVagu flowing southward and BogguguttaVagu is a tributary of Wyra River
5.	**Climate**	
	Mean Annual Rainfall	Mean annual rainfall ranging from 700 to 900 mm
	Temperatures (December-Minimum) (June-Maximum)	Tropical climate with hot summers, mild winters, and southwest monsoon rainfall.
6.	**Topography**	
	ToposheetNumber	65C/08
	Morphology of the Area	The Paladugu block of Khammam district is characterized by gently undulating to moderately dissected pediplain terrain, punctuated by low rocky hillocks and occasional inselbergs formed by resistant granitoids. The landscape shows moderate relief with shallow to moderately deep weathering profiles.
7	**Availability of baseline geosciences data**	
	Geological Map (1:50K/25K)	Regional Geological Map - GSI (1:50000 scale)
	Geochemical Map	NGCM data available
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well also Local scale GP maps)	Available
8.	**Justification for taking up Reconnaissance Survey / Regional Exploration**	The present proposal aims to target younger granites and pegmatites of the Neoarchaean-Palaeoproterozoic Peninsular Gneissic Complex-II (PGC-II) and the Palaeoproterozoic rocks of the Eastern Ghats Mobile Belt (EGMB) for delineation of Rare Earth Element (REE) and Rare Metal (RM) mineralized zones. The Paladugu proposed block occupies a geologically strategic position along the tectonic contact between the EGMB and the Archaean Peninsular Gneissic Complex of the Eastern Dharwar Craton. This contact is marked by a prominent NE–SW-trending regional shear zone, which has acted as a major structural corridor for emplacement of younger granites and pegmatites and has played a key role in localization and enrichment of REE mineralization.

		Previous investigations by GSI (Banothu et al., 2022) have reported significant enrichment of Total Rare Earth Elements (TREE) within pegmatites intruding the granitic host rocks, with values ranging from 602.68 to 2644.46 ppm (average 1531.70 ppm; n = 8). The REE assemblage is characterized by dominant LREE enrichment, with allanite identified as the principal REE bearing mineral phase. These results clearly demonstrate the REE fertility of the granitic-pegmatitic system and warrant detailed follow-up exploration. GSI carried out geochemical investigations have documented a well-defined NW-SE-trending anomalous zone within the proposed block, coinciding with exposures of younger granites. Fourteen (14 nos.) composite samples from this zone have yielded consistently elevated TREE values ranging from 500 to 1000 ppm, which are anomalous and encouraging at the present stage. The coherence and spatial continuity of these anomalies strongly suggest a genetically related REE source, with younger granites interpreted as the primary contributors. The integration of favorable geology, strong structural control and robust geochemical anomalies provides strong justification for systematic G-4 stage exploration to delineate the extent and continuity of REE mineralization. As per the recommendations of the committee during the 91st (TTC-1) meeting, GMMCO Technology Services Limited, Hyderabad carried out field work in and around Paladugu, Rebbavaram and Mallavaram areas of the proposed block. The bedrock samples were collected from the potassic rich granite and allanite bearing pegmatites and which were, analyzed at Chemical Laboratory, Geological Survey of India, Hyderabad. The analytical results indicate significant TREE concentrations, ranging from 2128 to 4082 ppm (n=4). These findings indicate promising potential for undertaking G4-stage exploration. Analysis report is attached in Annexure-1 and sample locations are shown in plate -6.

Reconnaissance Survey for REE & RM mineralization in Paladugu Block, Khammam District, Telangana (100 Sq.Km, G4-stage)

Contents

1. Block Summary

1.a. Location and details of the area

The proposed block falls in Survey of India toposheet No. 65C/08 and is situated in the southeastern part of Telangana State (Plate-3). The area forms part of Wyra Mandal, Khamam District, Telangana, where granitoids of the Peninsular Gneissic Complex, Eastern Dharwar Craton and Eastern Ghats Mobile Belt (EGMB) are exposed. Khammam, the nearest major town, It is located about 193 kilometres (120 mi) east of the state capital, Hyderabad.

1.b. Physiography

The proposed forms part of the gently undulating to moderately dissected plateau terrain of the Eastern Dharwar Craton, adjoining the Eastern Ghats Mobile Belt. The physiography of the area is characterised by low to moderate relief with isolated hillocks and ridges developed mainly over resistant granitic and gneissic rocks. Elevation in the area generally ranges between about 150 m and 350 m above mean sea level. The terrain slopes gently towards the southeast and east, and is dissected by seasonal nalas forming a sub-dendritic to dendritic drainage pattern. Drainage is structurally controlled in places, particularly along NE-SW and NW–SE lineaments, and ultimately contributes to the Godavari River system.

The granitic and gneissic rocks form prominent rocky exposures, low ridges and inselbergs, whereas intervening areas are covered by thin to moderate soil cover. Lateritic caps and weathered mantles are locally developed over granitic terrains. The area is largely rural, with sparse vegetation and agricultural land occupying low-lying plains, while rocky uplands are generally barren.

1.c. Lineaments

The proposed block exhibits a well-developed lineament pattern reflecting the regional tectonic framework of the Eastern Dharwar Craton and its interaction with the Eastern Ghats Mobile Belt. Prominent lineaments trend mainly in NE-SW and NW-SE directions, with minor ENE-WSW trends. The NE-SW lineaments correspond to major regional shear zones marking the tectonic contact between the Peninsular Gneissic Complex-II and the EGMB and have acted as primary conduits for emplacement of younger granites and pegmatites. The NW-SE lineaments intersect the shear fabric and are spatially associated with REE geochemical anomalies, enhancing the mineral potential of the block.

1.d. Regional Geological setup

The Paladugu proposed block forms part of the eastern segment of the Indian Peninsular Shield and lies within the transitional tectonic zone between the Eastern Dharwar Craton (EDC) and the Eastern Ghats Mobile Belt (EGMB) (Plate-2). Regionally, this area represents a complex crustal domain marked by repeated episodes of magmatism, deformation and metamorphism from the Archaean to the Palaeo-proterozoic. The Archaean basement in the region is represented by granitoids and gneissic rocks of the Peninsular Gneissic Complex (PGC-II), comprising tonalite-trondhjemite-granodiorite (TTG) gneisses, granitic gneisses and migmatites. These rocks exhibit well-developed gneissosity and are intruded by

multiple generations of younger granites and pegmatites. The PGC-II forms the dominant lithological assemblage in the western part of the region and constitutes the cratonic basement of the Eastern Dharwar Craton. Towards the east, the PGC-II rocks are tectonically juxtaposed against the high-grade metamorphic assemblages of the Eastern Ghats Mobile Belt, which is of Palaeo-proterozoic age. The EGMB is characterised by granulite-facies rocks comprising khondalites, charnockites, leptynites, enderbites and mafic granulites, representing a deeply exhumed orogenic belt. The contact between the EGMB and PGC is marked by a prominent NE–SW-trending regional shear zone, which has played a critical role in crustal reworking and magmatic emplacement.

The regional tectonic framework is dominated by NE-SW to ENE–WSW trending ductile shear zones and fractures, which have acted as favourable pathways for emplacement of younger granites, pegmatites and quartz veins. These late- to post-tectonic intrusions are spatially associated with REE and Rare Metal mineralisation, particularly within pegmatites emplaced along shear zones and lithological contacts. Overall, the regional geological setting, marked by craton-mobile belt interaction, repeated magmatic events and strong structural control, provides a favourable environment for concentration of REE and RM mineralisation, thereby justifying systematic G-4 stage exploration in the Paladugu block.

1.e. Geology of the Block

The Paladugu proposed block is underlain predominantly by granitoids and gneissic rocks of the Peninsular Gneissic Complex-II (PGC-II), representing the Archaean to Neoarchaean basement of the Eastern Dharwar Craton. These rocks are mainly composed of grey to pink, medium to coarse-grained granitic gneiss, migmatitic gneiss and granitoids exhibiting well-developed foliation defined by alternating quartzo-feldspathic and mafic mineral bands. The general strike of gneissosity is NE-SW with moderate to steep dips, conformable to the regional structural trend.

Younger granites intrude the PGC-II gneisses as massive to weakly foliated bodies and occur as stocks, lenses and irregular plutons. These granites are medium to coarse-grained, leucocratic to mesocratic in nature and are composed chiefly of quartz, K-feldspar, plagioclase and biotite, with accessory apatite, zircon and allanite. The younger granites are spatially associated with prominent shear zones and fractures and are commonly traversed by pegmatite and quartz veins.

Pegmatites form a significant lithological component within the block and occur as tabular to lenticular bodies intruding both the granitic gneiss and younger granites. They are coarse to very coarse grained and consist mainly of quartz, K-feldspar and plagioclase, with biotite and muscovite as minor constituents. Accessory minerals such as allanite, monazite and zircon have been recorded in some pegmatite bodies, indicating REE enrichment. The pegmatites show variable thickness and are predominantly oriented parallel to the NE-SW structural fabric, suggesting strong structural control on their emplacement.

Structurally, the block is characterised by a NE-SW-trending shear zone marking the tectonic contact between the PGC-II and the Eastern Ghats Mobile Belt. This shear zone is manifested by mylonitisation, grain size reduction, stretching lineations and

development of quartz-feldspar augen structures in the granitic rocks. The shear-related deformation has provided favourable conduits for magmatic and hydrothermal fluids, leading to emplacement of younger granites and pegmatites and subsequent enrichment of REE and Rare Metals.

1.f. Scope for proposed exploration

The proposed G-4 stage exploration in the Paladugu block is aimed at systematic evaluation of Rare Earth Element (REE) and Rare Metal (RM) mineralisation associated with younger granites and structurally controlled pegmatites emplaced along the tectonic contact between the Peninsular Gneissic Complex-II (PGC-II) and the Eastern Ghats Mobile Belt (EGMB). The scope of work is designed to delineate mineralised zones, establish their surface and sub-surface continuity and assess their grade potential.

The exploration programme will include detailed geological mapping on 1:12,500 scale with special emphasis on lithological contacts, shear zones, pegmatite bodies, alteration zones and structural features controlling REE mineralisation. Detailed structural mapping will document shear fabrics, fractures, joints and lineations influencing emplacement of younger granites and pegmatites.

Systematic geochemical sampling comprising bedrock, channel and trench samples will be carried out across identified pegmatite bodies and mineralised granite zones to evaluate REE and RM distribution and enrichment patterns. Trenching and pitting will be undertaken over promising zones to expose fresh bedrock, ascertain sub-surface continuity of pegmatites and facilitate representative sampling.

Table No.1 Generalized Stratigraphic succession of Archaean to Palaeo-proterozoic rocks in Telangana.

Era	Supergroup	Group	Intrusive	Lithology
Palaeo-Proterozoic to Archean	Eastern Ghat (1850-1950 Ma)	Migmatite Charnockite Khondalite	Mafic dykes Younger granitoids (2500 Ma)	Dolerite, gabbro and pyroxenite Granite, alkali felspar granite, quartz syenite Closepet Granite Migmatiteneisses Pyroxene ranulites Quartzite graphite gneiss
	Peninsular Gneissic Complex	Karimnagar granulites (2550 Ma) Peninsular Gneiss-II (2550-2600Ma)		Migmatites (banded gneisses, garnetiferousquartzo feldspathic gneisses, hypersthene gneiss, quartzo-feldspathic granulites) Granite gneiss, granite and it's variants with enclaves of Dharwars
Archaean	Dharwar (2900 Ma)	Ghanpur Yerraballi Peddavuru Gadwal Khammam		Metamorphosed volcanogenic and sedimentary rocks, Chimalpahad gabbro anorthosite complex and other mafic-ultramafic rocks
	Peninsular Gneissic Complex	Peninsular Gneiss-I (3000 Ma)		Aplite, quartz vein, pegmatite granite, granodiorite, tonalite with enclaves of Sargurs.
		Older metamorphics (Sargurs) (Seen as enclaves in PGC-I) (3300 Ma)		Garnet-biotite schist/gneisses, biotite-staurolite schist, kyanite-muscovite schist/ quartz, amphibolite ± garnet and banded ferruginous quartzite.

Sub-surface exploration will be undertaken through core drilling by drilling four (4) boreholes, each to a depth of about 45 m, to test the depth persistence, thickness and grade continuity of REE-bearing pegmatites and mineralised granites below surface indications. Core recovery will be logged in detail for lithology, structure,

alteration and mineralisation, and representative core samples will be collected for geochemical and petro-mineralogical analysis.

Petrographic and mineralogical studies will be carried out to identify REE-bearing mineral phases such as allanite, monazite and zircon and to understand their mode of occurrence and paragenesis. All geological, geochemical and drilling data will be integrated to delineate priority REE-RM mineralised zones and to assess their potential for follow-up G-3/G-2 stage exploration.

1.g. Mineral Potentiality based on Geology, Geophysics and Ground GeochemistryGeological Indicators

The Paladugu block exhibits a favourable geological setting for Rare Earth Element (REE) and Rare Metal (RM) mineralisation, characterised by the presence of younger granites and structurally controlled pegmatites emplaced along the tectonic contact between the Peninsular Gneissic Complex-II (PGC-II) of the Eastern Dharwar Craton and the Eastern Ghats Mobile Belt (EGMB). The area is traversed by a prominent NE-SWtrending regional shear zone, which has acted as a major conduit for magmatic and hydrothermal fluids. Spatial association of pegmatites with shear zones, lithological contacts and fracture networks indicates strong structural control on REE mineralisation. The occurrence of REE-bearing accessory minerals such as allanite and monazite within pegmatites and granitic host rocks further substantiates the geological favourability of the block (Plate-4, 6).

1.h. Geophysical Signatures (Plate-7,8,9)

Regional and semi-detailed geophysical datasets indicate significant structural and lithological heterogeneity within the block. Lineament analysis derived from aeromagnetic and gravity data reveals prominent NE-SW and ENE-WSW trending linear features corresponding to major shear zones and fracture systems. These structures coincide with zones of younger granite and pegmatite emplacement and are considered favourable loci for REE and RM mineralisation. Subtle magnetic lows associated with granitic and pegmatitic intrusions, juxtaposed against relatively higher magnetic responses of country rocks, suggest magmatic differentiation and crustal reworking conducive to REE enrichment.

The Bouguer gravity data delineates a prominent NNW-SSE trending gravity low within the Paladugu Block, suggesting low-density intrusive/altered zones under structural control, which are considered favourable for REE and RM mineralisation

The proposed Paladugu Block lies along a regionally persistent NNW-SSE trending linear anomaly interpreted as a major litho-contact/shear-controlled corridor, favourable for felsic intrusive and hydrothermal mineralisation, thereby justifying systematic G-4 stage exploration."

1.i. Geochemical Anomalies (Plate- 4 & 6).

Ground geochemical investigations carried out in the region have delineated significant REE anomalies associated with pegmatites intruding granitic rocks. Analytical results reported by GSI indicate elevated total rare earth element (TREE)

concentrations ranging from 602.68 to 2644.46 ppm, with an average of 1531.70 ppm, and a marked dominance of light rare earth elements (LREE) (Plate-4). The presence of allanite as the principal REE-bearing mineral phase supports a magmatic-hydrothermal origin for the mineralisation. The spatial coincidence of geochemical anomalies with structurally controlled pegmatites and shear zones underscores the potential for continuity of mineralisation at depth.

1.j. Integrated Mineral Potential Assessment

Integration of geological, geophysical and ground geochemical datasets clearly highlights multiple zones within the Paladugu block that are favourable for REE and RM mineralisation. The convergence of favourable lithology (younger granites and pegmatites), strong structural control (regional shear zone and lineaments), supportive geophysical signatures and robust geochemical anomalies collectively indicate moderate to high mineral potential. These integrated evidences justify systematic G-4 stage exploration, including limited core drilling, to delineate REE-bearing zones and evaluate their sub-surface continuity and economic significance.

1.k. NGCM (Geochemical Interpretation) (Source: GSI) (Plate- 5).

GSI geochemical investigations have delineated a well-defined NW-SE trending anomalous zone within the proposed block, which is spatially coincident with surface exposures of younger granites. Fourteen (14) composite samples collected from this anomalous zone have yielded consistently elevated Total Rare Earth Element (TREE) values ranging from 500 to 1000 ppm, which are considered anomalous and highly encouraging at the present stage of exploration (Plate-5).

The spatial coherence and lateral continuity of the anomalous zone, together with its close association with younger granite exposures, strongly suggest a genetically linked magmatic source for the observed REE enrichment. The geochemical signature, characterised by sustained TREE anomalies, supports the interpretation that the younger granites and pegmatites acted as the primary source and host for REE mineralisation, with possible remobilization along structurally controlled pathways. These geochemical results provide strong support for further systematic G-4 stage exploration to delineate the extent and sub-surface continuity of REE-bearing zones.

2. Previous Work

The proposed Paladugu block is located at the junction of the Eastern Dharwar Craton (EDC), the Eastern Ghats Belt (EGB), and the Khammam Schist Belt (KSB), where the cratonic rocks of EDC host lithological ensembles of KSB and EGB. The area has been intermittently investigated since 1881.

King (1881) was the pioneer in documenting the geology of Khammam and Krishna districts and suggested that the gneisses and schists of Khammam represent the northern extensions of the Nellore and Krishna Crystallines, forming the Kannegiri and Kondapalli hills.

Sarvothaman (1992) proposed the concept of a marginal zone along the cratonic margin of EDC, reclassifying granite-gneiss and amphibolite assemblages around the Kannegiri Hill range as the Khammam Schist Belt (KSB). The Kannegiri Hill range was interpreted as a horst structure uplifted complementary to the Godavari graben in the north and the Tallada-KalluruGondwana outliers in the south along WNW-ENE faults.

Tripathy et al. (2004) Carried systematic thematic mapping around the Shernawala outlier and identified it as a boundary separating granitoid terrain to the west from gneissic terrain to the east. Their study noted that granitoids on either side share similar geochemistry and tectonic setting, but eastern exposures exhibit higher deformational and metamorphic imprints, with shear zones affecting the entire outlier.

Banothu et al. (2022) carried out detailed 1:25,000 scale thematic mapping over ~700 km² around Kalakodima-Siripuram-Gobbagurti-Tallada (SOI Toposheets 65C/07 & 65C/08), delineating lithological units, structural features and pegmatite bodies, and recommended the area for detailed exploration (Plat-4,6).

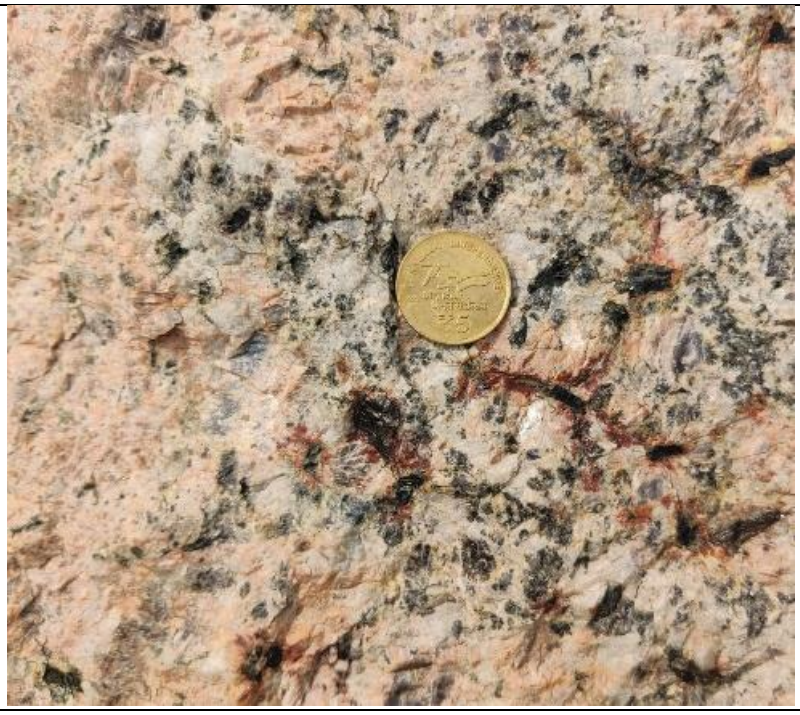
Rai.et.al., (2019) Carried out geochemical mapping over Toposheet 65C/08, reporting elevated Total Rare Earth Element (TREE) values above the granites and gneisses of the PGC, confirming significant REE potential in the area.

2.a. Field evidence by GMMCO

As per the committee's recommendations, the GTS team carried out detailed fieldwork in the proposed block and collected four bedrock samples, comprising three granites and one pegmatite, which were subsequently analysed at the GSI Laboratory, Hyderabad. The analytical results indicate significant rare earth element (REE) concentrations in the pink-coloured granites, with total REE (TREE) values ranging from approximately 2128 to 4082 ppm.

Lithologically, the area is predominantly composed of pink feldspar-rich granite hosting allanite and associated mafic minerals, suggesting a favourable environment for REE enrichment. Structurally, NW–SE and NE–SW trending pegmatite zones were observed in the vicinity of the Paladugu and Rebbavaram areas.

These pegmatite bodies vary in size from about 2 m to 100 m in length and 10 cm m to 2 m in width, and are composed mainly of quartz, feldspar, mica, and mafic minerals, with noticeable occurrences of allanite. The presence of allanite in both granite and pegmatite indicates its role as a carrier of REEs in the study area.

	Latitude: 17° 4'49.99"N Longitude: 80°20'8.03"E Paladugu area Sample No: 1	TREE: 2128 ppm
	Latitude: 17° 6'57.69"N Longitude: 80°20'54.71"E Sample No: 3	TREE: 2777 ppm

Sample Ref.No.	Lithology	Latitude	Longitude	La	Ce	Pr	Nd	Eu	Sm	Tb	Gd	Dy	Ho	Er	Tm	Yb	Lu	Hf	TREE
				Values in ppm															
01/PL/R/26	Pink Granite	17° 4'49.99"N	80°20'8.03"E	505	1017	104	365	12	54	4	30	14	2	5	1	4	1	10	2128
02/PL/R/26	Pink Granite	17° 2'47.39"N	80°21'6.50"E	761	1609	187	777	35	157	13	105	61	9	23	3	19	3	22	3785
03/PL/R/26	Pink Granite	17° 6'57.69"N	80°20'54.71"E	597	1256	136	527	22	97	7	59	30	4	10	1	8	1	21	2777
04/PL/R/26	Pegmatite	17° 6'57.69"N	80°20'54.71"E	987	1899	193	711	26	117	8	67	32	4	11	1	8	1	15	4082

Figure; 1 Field photographs of allanite and mafic mineral bearing pegmatiodal granite at Paladugu area

Figure: 2 Allanite bearing pegmatiodal granite of Mallavaram area. (17° 2'47.39"N; 80°21'6.50"E)

3. Block description

Corner Points	Latitude	Longitude
A	17° 0'45.41"N	80°21'31.12"E
B	17° 6'28.70"N	80°16'14.82"E
C	17°10'05.16"N	80°18'34.16"E
D	17° 3'22.43"N	80°23'46.76"E

4. Planned Methodology

The proposed G-4 stage exploration in the Paladugu block is aimed at systematically delineating REE and Rare Metal (RM) mineralisation associated with younger granites and structurally controlled pegmatites along the tectonic contact between the Peninsular Gneissic Complex-II (PGC-II) and the Eastern Ghats Mobile Belt (EGMB). The methodology integrates geological, structural, geochemical and sub-surface investigative techniques as outlined below:

Geological Mapping: Detailed mapping will be carried out at 1:12,500 scale, focusing on lithological contacts, younger granites, pegmatites, alteration zones, and structural features such as shear zones, lineaments and fractures.

Geochemical Sampling: Systematic bedrock, channel, trench and composite samples will be collected across pegmatites and mineralised granites. Samples will be analysed for REE, RM and associated trace elements to evaluate enrichment patterns and spatial continuity.

Sub-surface Exploration (Core Drilling): Four (4) exploratory boreholes of 45 m depth each are planned at geochemically and structurally favourable locations to test the depth persistence and grade continuity of REE-bearing pegmatites and granites. Core recovery will be logged for lithology, structure, alteration, and mineralisation, and representative samples will be analysed for geochemical and petro-mineralogical studies.

Petrographic and Mineralogical Studies: Representative samples from pegmatites and granites will be examined to identify REE-bearing minerals such as allanite, monazite and zircon, and to understand their mode of occurrence and paragenesis.

Data Integration: Geological, geochemical, structural, and drilling data will be integrated using GIS and thematic mapping to delineate priority REE and RM zones and recommend follow-up advanced-stage exploration.

5. Nature Quantum and Target

The following work components are proposed for the reconnaissance (G- 4) stage exploration programme in the Paladugu block:

Table No. 2 Proposed works in Paladugu Block

S.No	Activities	Unit	Proposed Target
1	Reconnaissance Survey (1:12,500 Scale)	Sq. Km	100
2	Pitting /Trenching	Cu m	100
3	**Drilling:**(5 bore holes, 40 m depth each & One borehole for every 40Sq.Km)	m	200
	a. Core logging	m	200
4	**Sampling**		
	a) Bed Rock Samples	Nos.	100
	b) PTS	Nos.	75
	c) Core samples (Core Samples will be collected at 5m interval)	Nos.	100
	d) Check samples	Nos.	28
	e) Preparation of thin polished section	Nos.	15
	f) Study of thin polished section	Nos.	15
	g) SEM	Nos.	5
5	Chemical analysis		303
6	**Report Preparation**		
7	**Peer Review**		

6. Manpower deployment

The following manpower is proposed for systematic execution of the G-4 stage exploration programme in the Paladugu block:

Table No.3 Manpower deployment for Paladugu Block

S.No	Category	Number	Role / Responsibility
1	Senior Geologists	2	Overall supervision, planning and execution of geological mapping, structural studies, and data integration
	Field Labour	2	Collection, labeling, preparation, and dispatch of bedrock, trench and pit
3	Sampler	1	Collection, labeling, preparation, and dispatch of bedrock, trench, pit, and core samples.
4	Supporting Labour for core Sampling	2	Assist sampler in sample collection, handling, and processing.
5	Surveyor	1	DGPS Survey for BH fixation & RL determination

7. Time Schedule for Reconnaissance Survey (G-4 stage)

The proposed G-4 stage exploration programme in the Paladugu block is planned to be completed within a period of ten (10) months.

Table No. 4 Time schedule for Reconnaissance survey

Reconnaissance Survey for REE & RM mineralization in Paladugu Block, Khammam District, Telangana, 100 sq. km, No.of BH:05, Meterage 200m, Borehole depth range-40 m; (Schedule Timeline: Ten (10) months) Implemeting Agency: GMMCO Technology Services Limited														
S. No	Activity	Unit	Months											
			1	2	3	4	Review-1	5	6	7	8	Review-2	9	10
1	Camp Establishment	Months												
2	Geological mapping	Months												
3	Sampling (BRS, Pitting/Trenching)	Months												
4	Sampling analysis (BRS, Pitting/Trenching)	Months												
5	Survey (Boundary points and Drill collars)	Months												
6	Scout Drilling	Months												
7	Core logging & sampling	Months												
8	Sampling analysis (Drill core samples)	Months												
9	Laboratory analysis (Petrography & SEM)	Months												
10	Camp winding	Months												
11	Report preparation and submission	Months												

8. Break-up of expenditure

Table No. 5 Break-up expenditure

Cost Estimate - Reconnaissance Survey for REE & RM mineralization in Paladugu Block, Khammam District, Telangana, 100 sq. km, No.of BH:05 Meterage 200m, Borehole depth range-40 m; (Schedule Timeline: ten (10) months)		
S. No	Item of Work*	Estimated cost of the Proposal Total Amount (Rs)
A	Geological Mapping Other Geological Work	34,24,236
B	Survey work	1,20,000
C	Trenching/Pitting	4,42,500
D	Drilling (after review)	27,58,750
E	Laboratory Studies	23,48,700
F	Geological Report Preparation	2,50,000
G	Preparation of Exploration Proposal	1,81,884
	Total Estimated Cost without GST	95,56,070
	Provision for GST (18%)	17,20,093
	Total Estimated Cost with GST	**1,12,76,162**
	Say Rs. In Lakhs	**112.76**

8. Break-up of expenditure

Reconnaissance Survey (G4) for REE & RM mineralization in Paladugu Area, Khammam District, Telangana Area: 100 sq. km, No. of BH:05, Total Drilling Meterage: 200m, Borehole depth -40 m; Schedule timeline: 10 months; Review after: 4 and 8 months						
S.No	**Item of Work ***	**Unit ***	**Rates as per NMET SoC 2025**		**Estimated Cost of the Proposal**	
			SoC-Item No. *	**Rates as per SoC * (a)**	**Qty (b)**	**Total Amount (Rs) (a*b)**
A	Geological Mapping Other Geological Work & Surveying					
	a. Geological mapping, (1:12,500 scale) & Trenching , drilling work	Sq.km	1.1	18,300	100	18,30,000
	b. Charges for Geologist per day (Field) for geological mapping & trenching work, drilling work	day	1.2.1a	14,500	60	8,70,000
	c. Labours (2 Nos)	day	5.8	556	120	66,720
	d. Charges for Geologist per day (HQ)	day	1.2.1a	10,500	30	3,15,000
	e. Charges for one Sampler per day (1 Party)	one sampler per day	1.2.1b	7,850	34	2,66,900
	f. Labours Charges; Bedrock, Core sampling and preparation of sample	day	1.5.2	556	136	75,616
	Sub Total- A					**34,24,236**
B	Survey work					
	a. Charges of Surveyor for boundary demarkcation	one surveyor per day	1.3.1	10,500	0	0
	b. DGPS Survey for BH fixation & RL determination	Per Point of observation	1.3.2	24,000	5	1,20,000
	c. Labours Charges for survey work	day	1.5.2	541	0	0
	Sub-Total B					**1,20,000**
C	**Trenching/Pitting**					
	a)Trenching	per cu.m	2.1.2	4,125	50	2,06,250
	b) Excavation of Pitting	per cu.m	2.1.1	4,725	50	2,36,250
	Sub-Total C					**4,42,500**
D	**Drilling (after review) (In house)**					
	a. Core drilling :5 points (each 40 m deep) 5*40 in granite hard rock terrain	m	2.2.1.1d	10,000	200	20,00,000

	b. Construction of concrete Pillar (12"x12"x30")	per borehole	2.2.7	2,000	5	10,000
	c. Borehole Plugging by cement	per borehole	2.2.8	10,000	5	50,000
	d. Miscellaneous Charges (Transportation, Accomidation,Camp Setting, Camp Winding and drill core preservation	Lump sum	2.2.9 (1)	25% of the Drilling cost	5 Shiftings	5,00,000
	Drill core preservation	m	5.3	1590	125	1,98,750
	Sub Total D					**27,58,750**
E	**Laboratory Studies**					
1	Chemical Analysis					
	a. Bedrock samples (Channel Samples) (ICPMS) (sequential technique)	Per Sample	4.1.15	7,400	100	7,40,000
	b. Drill Core samples (ICPMS) (sequential technique)	Per Sample	4.1.15	7,400	100	7,40,000
	c. Pit & Trench samples (ICPMS) (sequential technique)	Per Sample	4.1.15	7,400	75	5,55,000
	d. External Check (10%) (ICPMS) (sequential technique)	Per Sample	4.1.15	7,400	28	2,07,200
						22,42,200
2	Physical & Petrological Studies					
	a. Preparation of thin polished section	Per sample	4.3.1	800	15	12,000
	b. Study of thin polished section	Per sample	4.3.4	2,800	15	42,000
	f. EPMA Studies	Per day	4.4.1	10,500	5	52,500
						1,06,500
	Sub Total E (1+2)					**23,48,700**
F	**Total A to E**					**90,94,186**
G	Geological Report Preparation	Soft copy	5.2 (ii)	5.2		2,50,000
H	Peer review Charges		As per EC decision			30,000
I	Preparation of Exploration Proposal (5 Hard copies with a soft copy)	Soft copy	5.1	2% of the Cost or Rs. 5.0 Lakhs whichever is less		1,81,884
K	**Total Estimated Cost without GST**					**95,56,070**
L	**Provision for GST (18% of K)**					**17,20,093**
M	**Total Estimated Cost with GST**					**1,12,76,162**

9. References

Banothu et.al (2022). Thematic geological mapping on 1:25,000 scale around Kalakodima-Siripuram-Gobbagurti-Tallada area, Khammam District, Telangana (SOI Toposheets 65C/07 & 65C/08). Geological Survey of India, Unpublished Report.

King, W. (1881). The geology of the Pranhita-Godavari Valley. Memoirs of the Geological Survey of India, 18, 1-226.

Rai,et.al (2019). Geochemical mapping of Toposheet No. 65C/08, Khammam District, Telangana. Geological Survey of India, Unpublished Report.

Sarvothaman, A. (1992). Granite-greenstone relationships and evolution of the Eastern Dharwar Craton. Journal of the Geological Society of India, 40, 1-20.

Tripathy, V., Ramesh, B., & Rao, P. S. (2004). Geological and structural studies around the ShernawalaGondwana outlier, Khammam District, Andhra Pradesh. Journal of the Geological Society of India, 64, 321-334.

Plates

Plate -1: Telangana State map showing the location of the proposed block

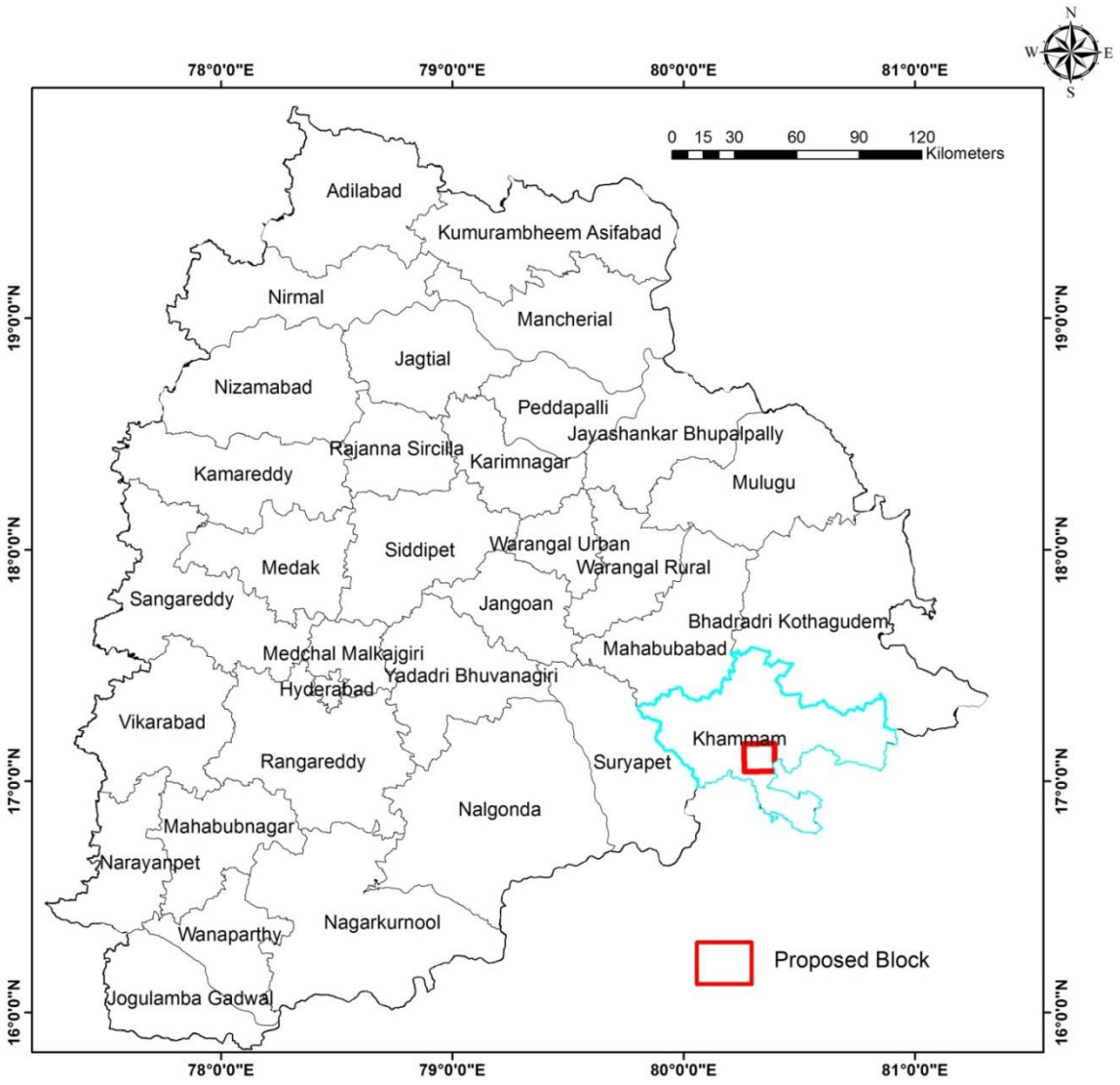


Plate-2: Generalized geological map of the Dharwar Craton and Eastern Ghat Mobile Belt and proposed Paladugu Block (after Geological Survey of India 1996)

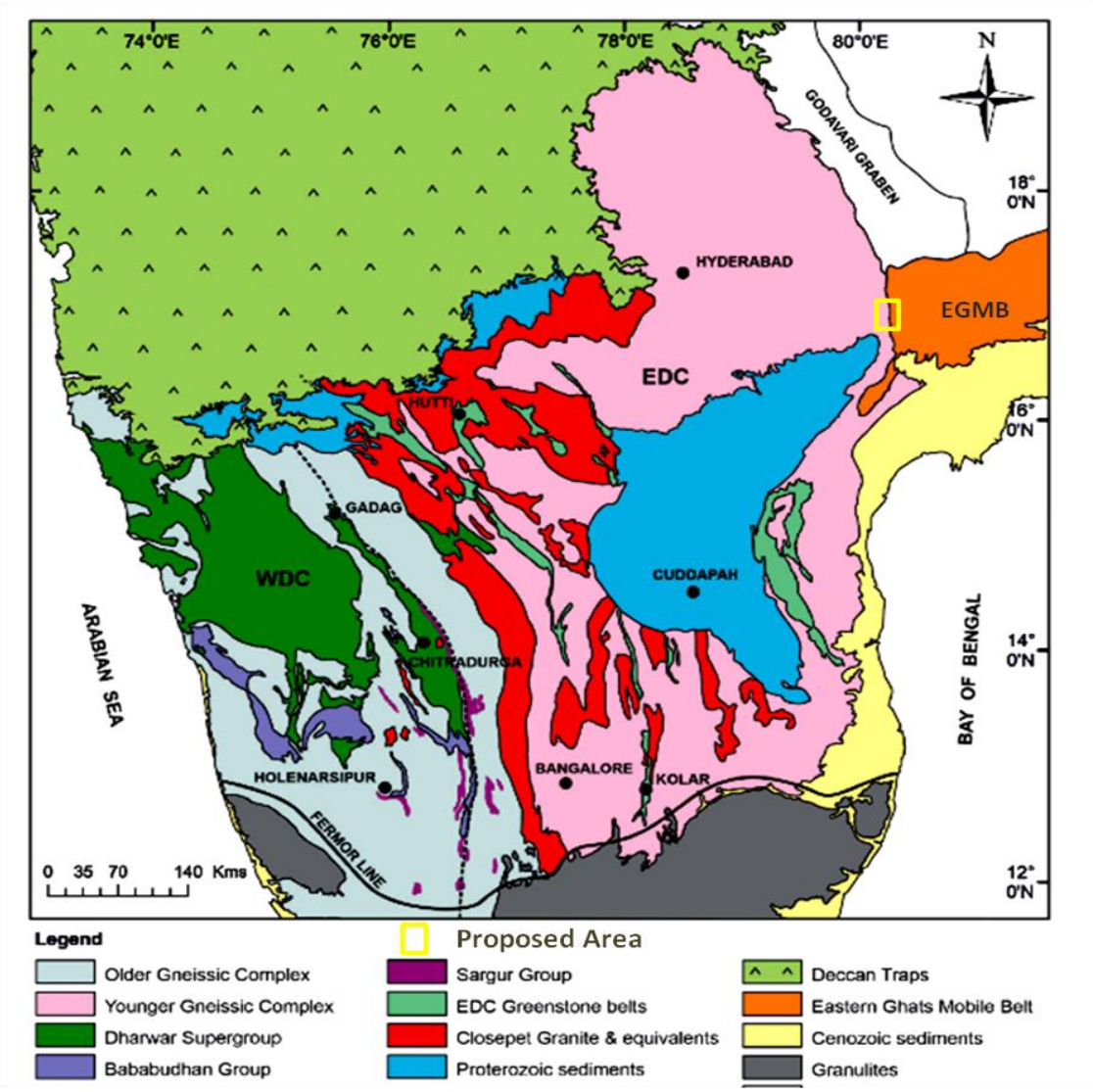


Plate-3: Survey of India Toposheet No. 65C/08 showing the proposed Paladugublock.

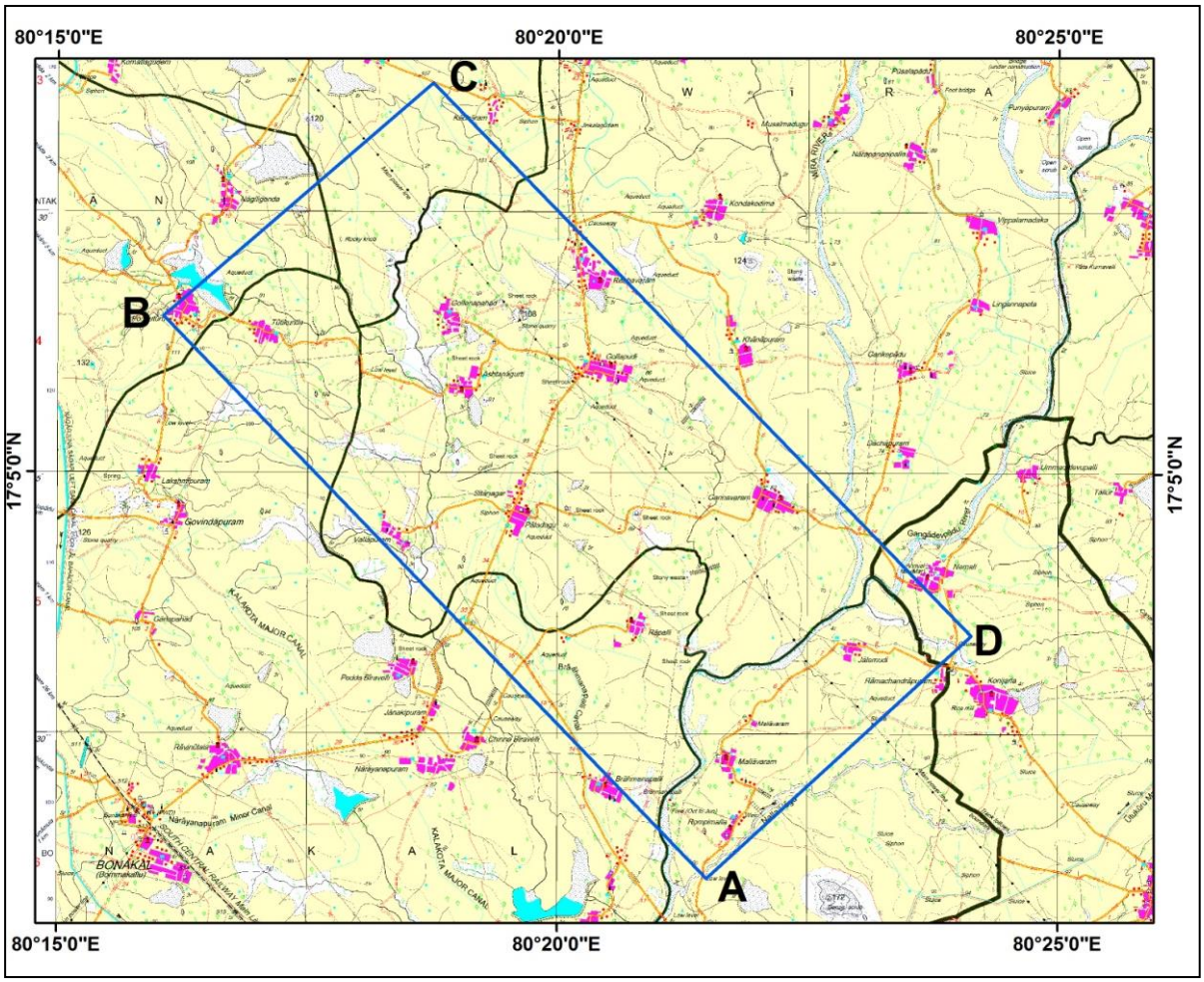
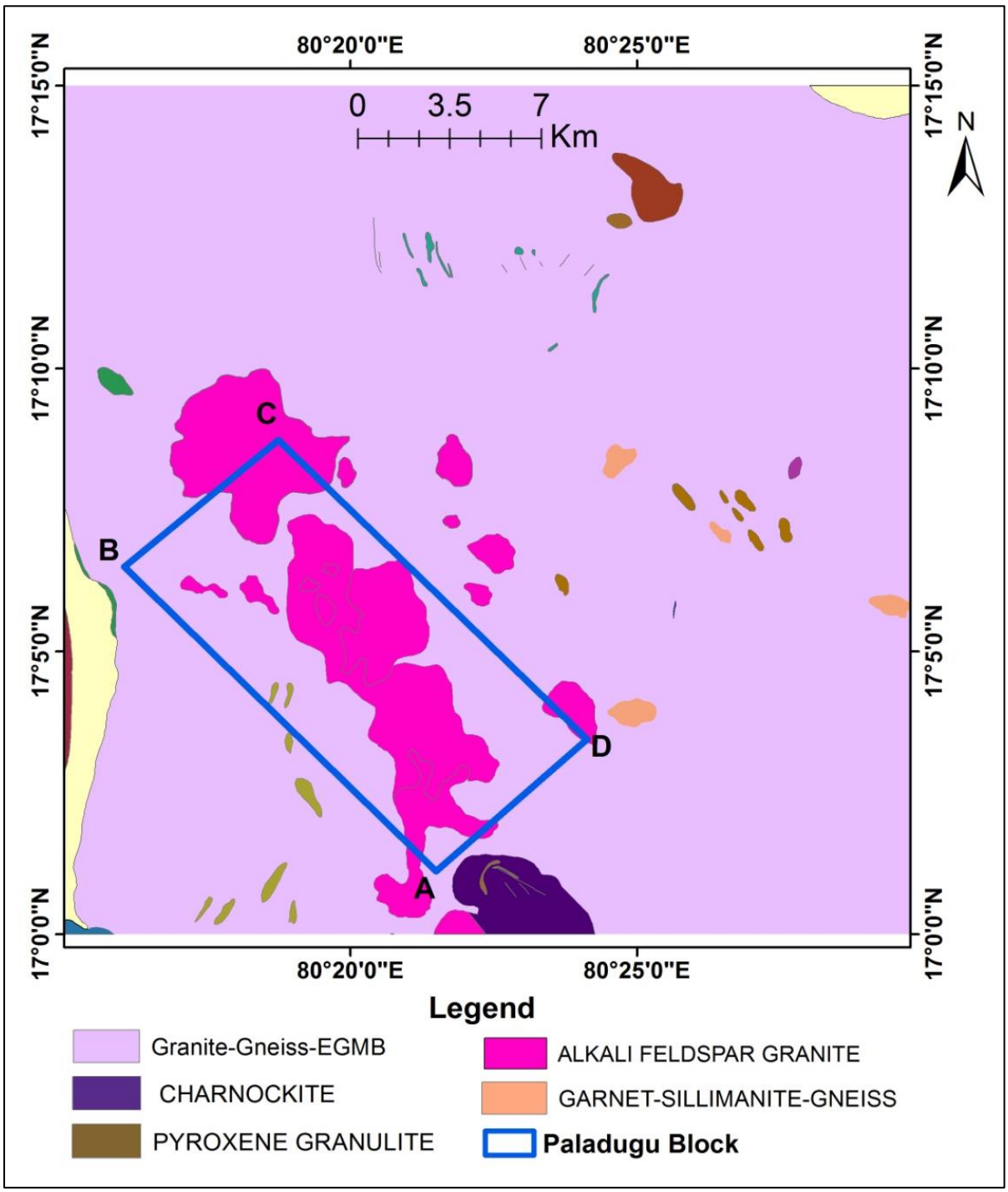
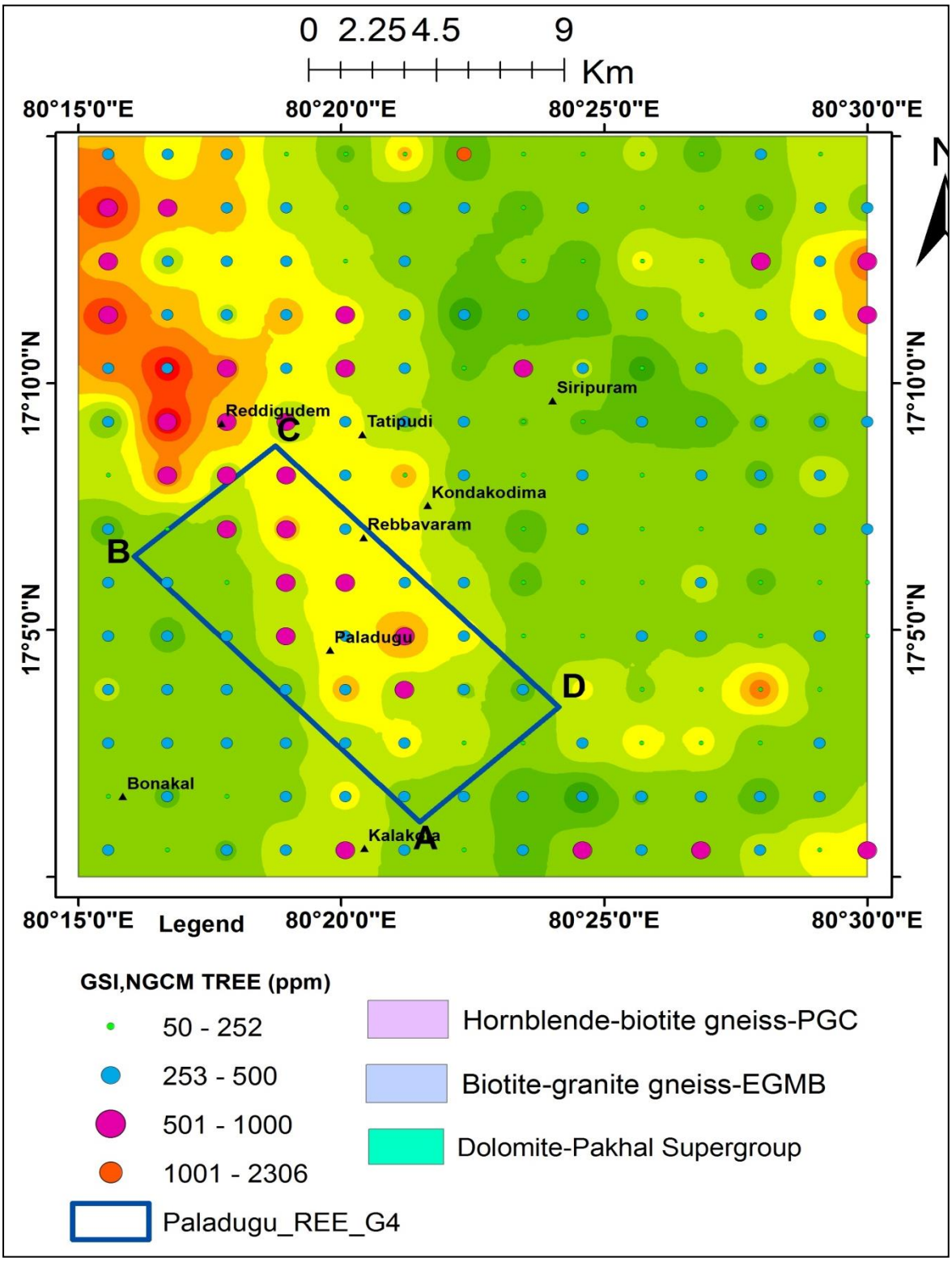


Plate - 4: Geological map (1:50000 scale) showing the proposed block



(Source. GSI, NGDR)

Plate - 5: NGCM-Geochemical map of TREE showing the proposed block.



(Source. NGCM, GSI)

Plate - 6:Map shows the bedrock samples collected by GMMCO.

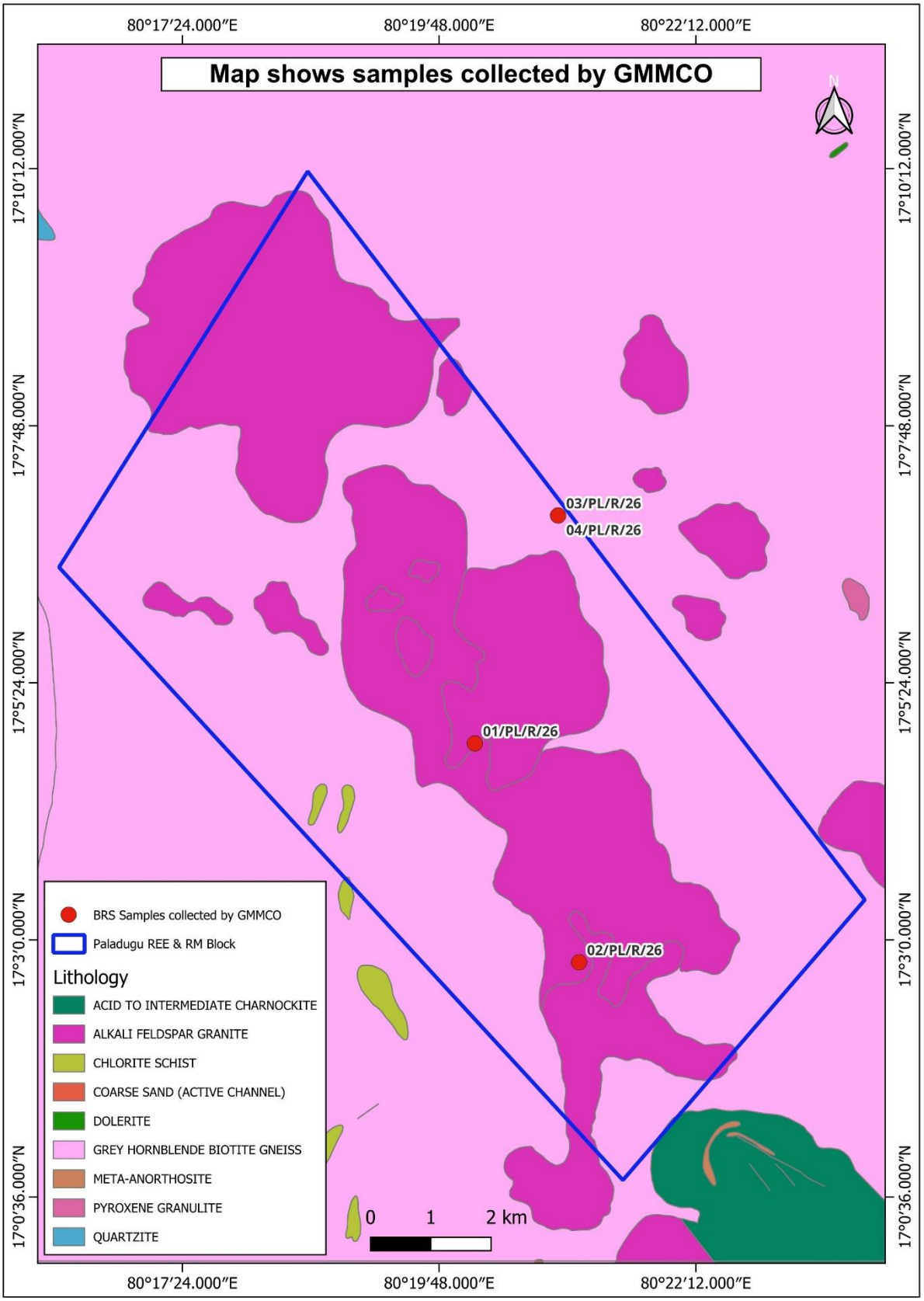
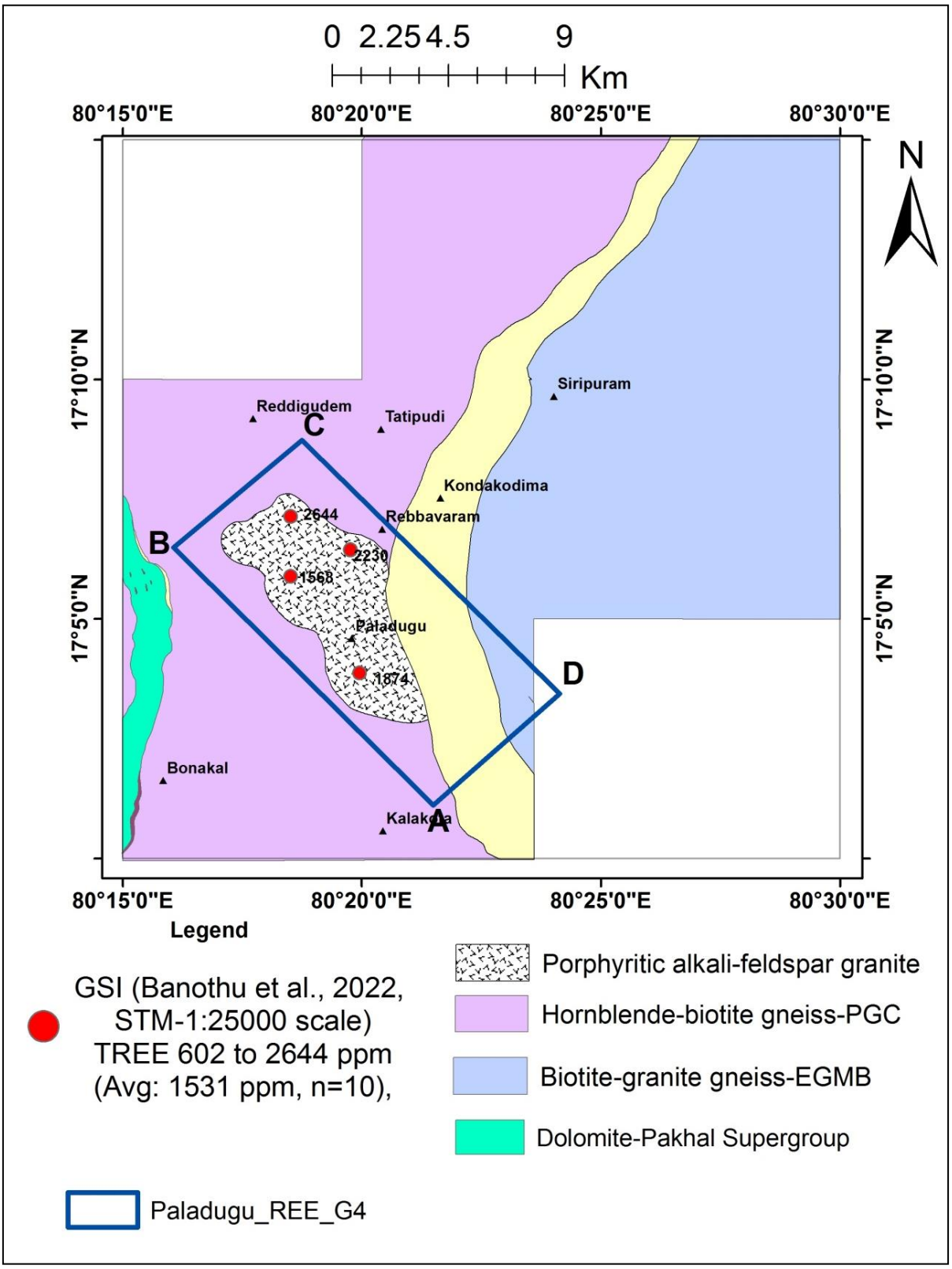
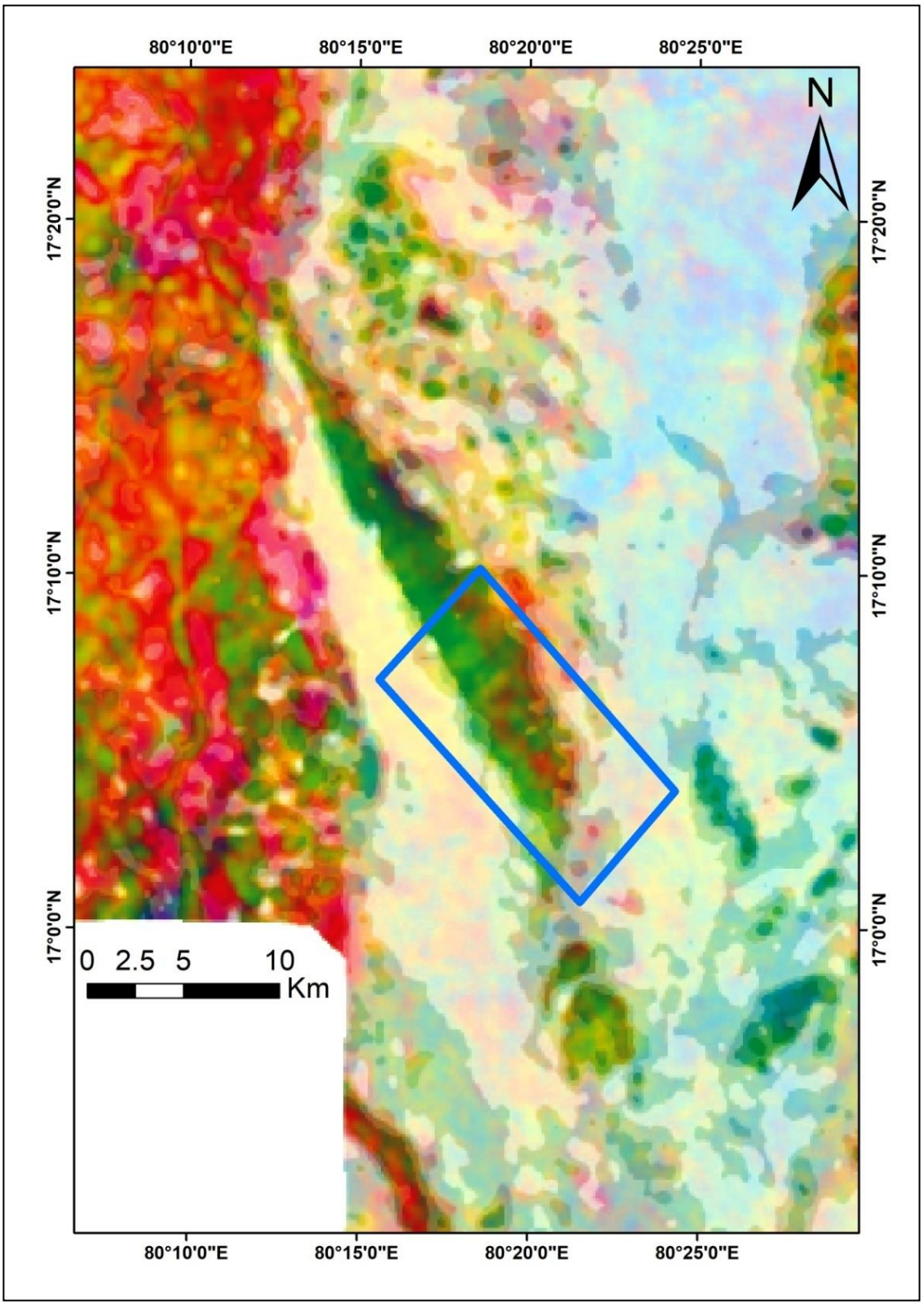


Plate - 7: Geological map 1:25000 scale and BRS-TREE data with proposed block



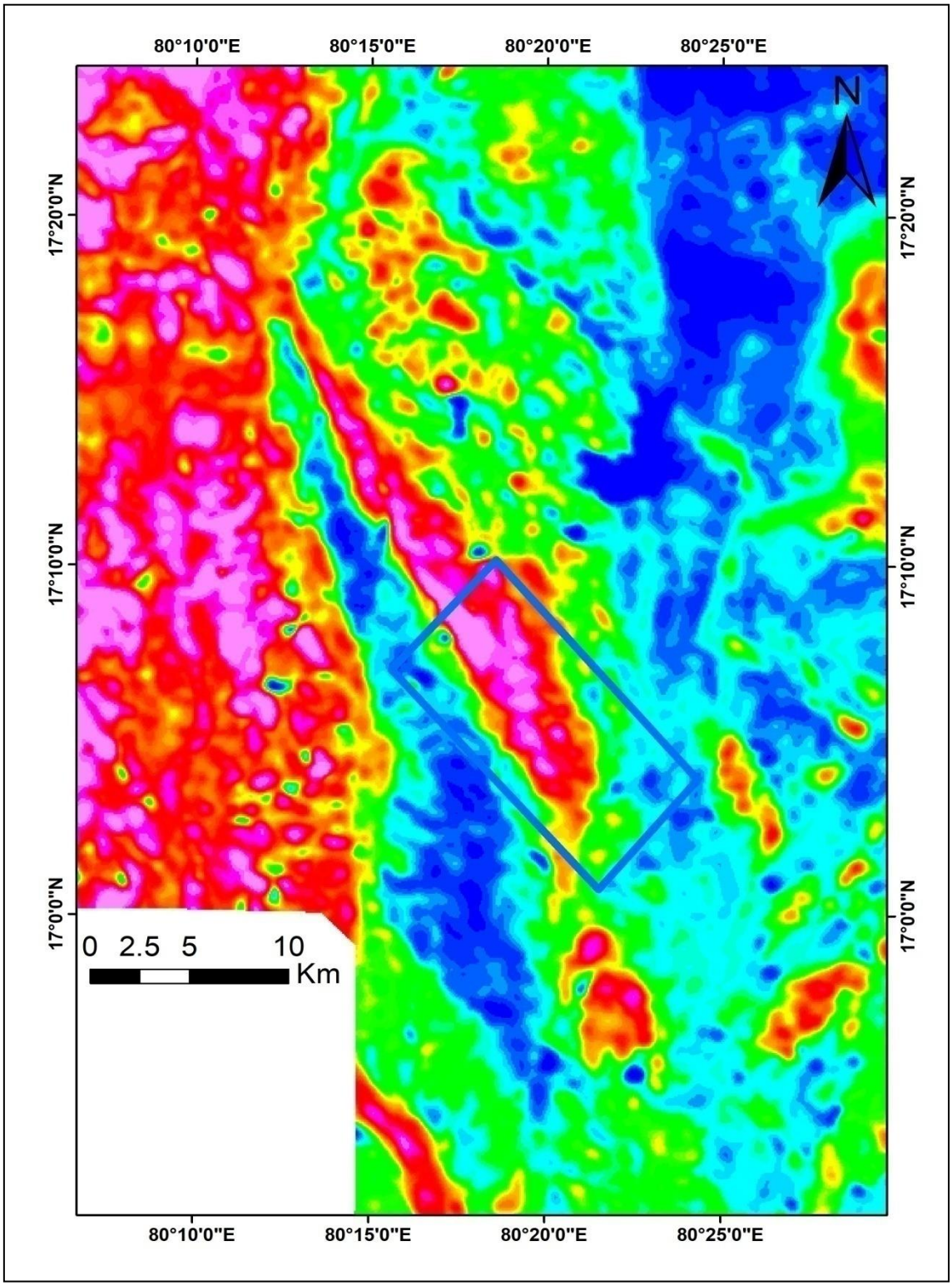
(Source. NGDR, GSI)

Plate - 8: Aeromagnetic map of proposed block (Source. NAGMP, GSI)



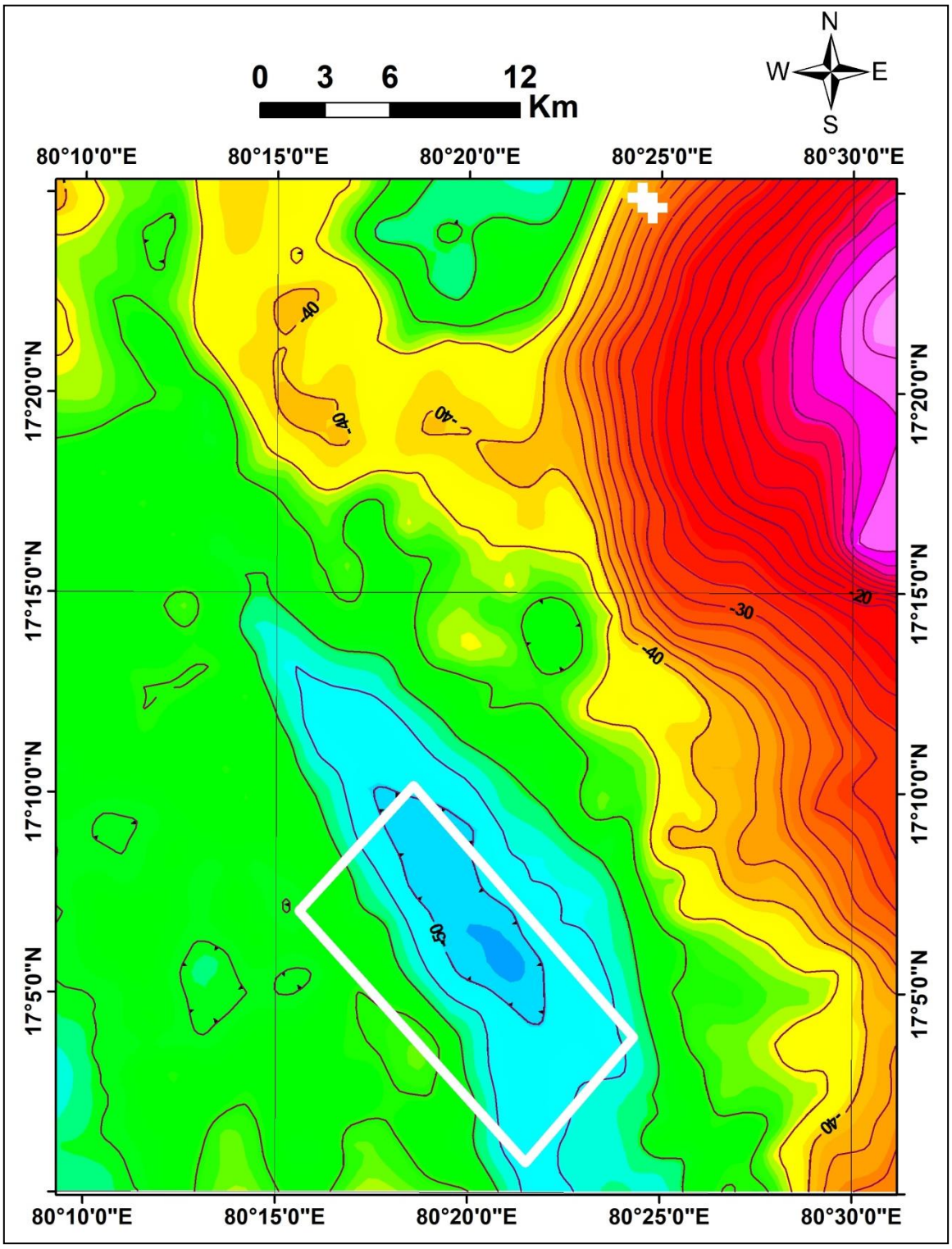
Source:NAGMP, Block-6 report Figure 6.8: Radiometric ternary employing the following colour scheme: potassium–magenta, uranium–cyan, thorium–yellow. Higher-intensity colours indicate higher concentrations of the elements.

Plate - 9: Aeromagnetic signal map of proposed block (Source. NAGMP, GSI)



Source:NAGMP, Block-6 report Figure 6.8: Radiometric ternary employing the following colour scheme: potassium – magenta, uranium – cyan, thorium – yellow. Higher-intensity colours indicate higher concentrations of the elements.

Plate - 10: Bouguer gravity map of proposed block (Source. NAGMP, GSI)



Source:NGPM Data

Annexure-1: Analysis Results from Geological Survey of India (GSI) laboratory, Hyderabad.

NO/2713

भारतीय भूवज्ञानिक सर्वेक्षण / GEOLOGICAL SURVEY OF INDIA
रसायन प्रभाग / CHEMICAL LABORATORY
दक्षिणी क्षेत्र / SOUTHERN REGION
बंडला गुडा, हैदराबाद / Bandlaguda, Hyderabad-500 068
रासायन विश्लेषण रिपोर्ट /Chemical Analysis Report
आइसीपी-एमएस रिपोर्ट /ICP-MS Test Report

1. प्रेषक का नाम / Name of the Sender:GTS Limited

2. प्रेषक का पता एवं दूरभाष नं / Address/contact of the Sender: No.9A, Ninth Floor, Vaishnavi's Cymbol, Survey No. 345/A, Puppalguda village, Gandipet Mandal, Ranga Reddy District, Hyderabad, Telangana-500008

3. संदर्भ पत्र सं / Reference Lr. No: 1246/Samples/SR/2025-26 dated:12/03/2026

4. पंजीकरण दिनांक/Date of Registration: 13/03/2026

5. परियोजना/प्रभाग / Project/Division:NA

6.फील्ड सत्र कार्यक्रम / FSP:NA

7.फील्ड सत्र कार्यक्रम आइटम सं/ FSP Item No: NA

8. नमूना प्रकार / Nature of Sample:Rock

9. प्राथमिक रजिस्ट्रेशन सं / Preliminary Registration No: GTSL-1 (1-8)

10. विश्लेषण प्रकार / Method of Analysis: आइसीपी-एमएस फ्यूशन प्रणाली / ICP-MS Fusion Method (GSI/SR-HYD/CL/SOP/02A)

11. प्रयोग किया गया उपकरण / Instrument Used: आइसीपी-एमएस / ICP-MS (Agilent, 7700x)

12. इस पर कार्य करनेवले रसायन प्रभाग के पदाधिकारी / Working group: Sri K. Sivasankar, Director (Chemistry)., Mr. Swamy Madapa, Mrs. Susmita Jana, Sr. Chemists, Dr. J.Md. Rafi, Mr. Sandipan Mandal, Mr. Somnath Majumdar, Chemists, Mr. Himanshu Singh, Asst. Chemist
के. शिव शंकर , निदेशक (रसायन); स्वामी मदप्पा, व. रसायनज्ञ; जे. मो. रफि, आलोलिका गंगूली, रसायनज्ञ, श्री उमा चक्रवर्ती सहायक. रसायनज्ञ

13. विश्लेषण तिथि / Date of Analysis: March,2026

14. रिपोर्ट जारी होने की तिथि / Date of Issue of the Report: 25.03.2026

15. एआर सं / AR No.: 124/ICPMS/2026

पीआर सं / PR No.	नमूना संदर्भ सं / Sample Ref. No.	Be	Ge	As	Rb	Sn	La	Ce	Pr	Nd	Eu	Sm	Tb	Gd	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	Th	U
		पीपीएम में संकेन्द्रण (एमजी/केजी) / Concentrations in ppm (mg/Kg)																						
		एलएलडी मात्रा / LLD Value																						
		0.3	0.05	1	3	5	1	2	0.1	0.3	0.02	0.1	0.03	0.05	0.03	0.01	0.02	0.02	0.02	0.01	0.5	0.2	4	0.5
GTSL-1-1	01/PL/R/26	2.45	1.04	2.95	275.25	<5	504.99	1017.05	104.31	365.24	12.14	54.43	3.53	30.11	14.16	2.05	5.06	0.69	3.98	0.65	9.81	<0.2	244.44	24.26
GTSL-1-2	02/PL/R/26	1.76	3.27	3.04	240.66	<5	760.70	1608.74	187.42	777.00	34.59	157.48	13.18	104.88	61.12	8.95	23.35	3.15	19.31	2.71	22.30	6.92	761.24	30.85
GTSL-1-3	03/PL/R/26	1.90	1.32	1.49	265.49	<5	596.56	1255.89	136.37	526.68	22.29	97.32	7.16	59.23	30.18	4.39	9.86	1.34	7.87	1.23	20.80	0.69	253.40	19.31
GTSL-1-4	04/PL/R/26	2.28	1.31	4.80	315.19	<5	987.34	1898.87	193.43	710.95	26.03	116.82	7.94	66.84	31.55	4.43	11.06	1.45	8.41	1.27	15.41	0.82	614.04	18.28
GTSL-1-5	01/SP/R/26	2.42	2.01	1.86	78.47	<5	750.98	1349.93	138.41	493.15	17.45	76.93	5.95	46.92	27.13	4.17	10.99	1.51	8.60	1.40	5.67	0.55	315.20	17.12
GTSL-1-6	02/SP/R/26	1.74	0.86	<1	103.84	<5	58.74	103.13	11.75	40.77	1.65	6.61	0.59	4.81	3.14	0.54	1.37	0.22	1.56	0.24	5.95	0.60	30.01	5.34
GTSL-1-7	03/SP/R/26	2.34	0.71	<1	122.16	<5	80.39	128.10	12.93	39.03	1.87	4.45	0.27	2.26	0.96	0.13	0.31	0.02	0.13	0.04	2.21	<0.2	30.76	4.91
GTSL-1-8	04/SP/R/26	3.00	1.04	<1	159.17	<5	49.14	105.56	15.01	62.72	2.59	12.36	1.19	8.79	5.95	1.04	2.65	0.42	2.05	0.33	21.57	0.67	9.15	6.06

नोट 1 विचाराधीन जांच नमूना भूवैज्ञानिक द्वारा नमूनाकृत किया गया तथा जैसा नमूना प्राप्त होता है परिणाम, उसी पर ला प्राप्त नमूने पर होगा
Note 1 : The Test item under consideration is sampled by the Geologist and the results apply to the sample as received
रसायन प्रभाग, द. क्षेत्र हैदराबाद के लिखित अनुमोदन के बिना यह रिपोर्ट पुन:उत्पादित नहीं किया जा सकता है
Note 2 : The report shall not be reproduced in full without written approval of the Chemical Laboratory, GSI, SR, Hyderabad
नोट : बताए गए परिणाम इस प्रयोगशाला द्वारा जांच गए आइटमों से ही संबंधित है
Note 3: The Results reported relate only to the items tested by the laboratory.

द्वारा रिपोर्ट किया गया / Reported by:
ज. मो. रफ़ी/Dr. J.Md. Rafi
रसायनज्ञ / Chemist

द्वारा समीक्षित / Reviewed by:
के. शिव शंकर , निदेशक (रसायन) / K. Sivasankar, Director (Chemistry)
निदेशक(रसायन) Director (Chemistry)

अधिकृत हस्ताक्षरकर्ता /Authorised Signatory
पी.वी.वी. आर शर्मा / Sri. P. V. V.R. Sarma
निदेशक (रसायन) /Director (Chemistry)
प्रभारी अधिकारी, रसायन प्रभाग /OIC, Chemical Division
द. क्षेत्र / हैदराबाद /SR, HYDERABAD