PROPOSAL FOR PRELIMINARY EXPLORATION (G-3 STAGE) FOR REE MINERALIZATION IN MARAVAPALIYAM (G-3) BLOCK, DISTRICT - TIRUPPUR, STATE – TAMIL NADU (AREA- 2.00 SQ KM)

COMMODITY: REE

BY

MINEREAL EXPLORATION AND CONSULTANCY LIMITED

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SEMINARY HILLS

PLACE: NAGPUR

DATE: 11th July 2024

Summary of the Block for Preliminary Exploration (G-3 Stage)

GENERAL INFORMATION ABOUT THE BLOCK

	Features	**Details**
	Block ID	Maravapaliyam (G-3) Block
	Exploration Agency	Mineral Exploration and Consultancy Limited (MECL)
	Commodity	REE
	Mineral Belt	-
	Completion Period with entire Time schedule to complete the project	12 months
	Objectives	Based on the evaluation of Reconnaissance survey for Rare Earth Elements and Rare Elements in Rudrawathi (G-4) block explored by MECL in the FY 2023-2024 and based on exploration data available, the present exploration program has been formulated in 2.00 sq km potential area fulfill the following objectives. Phase-I i. Close spaced sampling along allanite bearing pegmatite and porphyry granite out crops and 100 cu.m trenching has been proposed to prove the lateral continuation of allanite bearing pegmatite/porphyritic granite. ii. The potential area is covered by soil (about 70%), In 22no of regolith samples have analysed for TREE which varies from 183.3 to 1162.9 PPM and in 4 bedrock samples TREE analyses varies from 1083.60 to 2573.7 PPM. It is proposed to conduct 200X200 spacing augur drilling with an average depth of 7m, to collect regolith samples for the secondary dispersion of REE mineralization. iii. To carry out detailed Geological & Structural mapping on 1:4000 scale for delineating REE bearing formation (Pegmatite) with the structural features to identify the surface manifestation and lateral disposition of the mineralized zones.

		Phase – II i. Based on Phase I exploration data, 400m of drilling at 400X400 interval will be taken up to prove the depth continuity of mineralized zones. ii. To estimate reconnaissance resources of REE as per UNFC norms and Minerals (Evidence of Mineral Contents) Amendment Rules, 2021 at G-3 level of 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	Four nos. of Geoscientist (2 Field + 2 HQ)
	Expected Field days (Geology) Geological Party Days	Geologist Party Days (Field): 150 Days (two geologist) Geologist Party Days (HQ): 60 Days (two geologist) Survey Party Days: 45 Days
1.	**Location**	

Boundary Coordinates of Maravapaliyam(G3) Block

CARDINAL POINTS	Geographic (WGS-84)	
	LATITUDE(N)	LONGITUDE (E)
A	10° 48' 23.217" N	77° 33' 37.806" E
B	10° 48' 58.052" N	77° 34' 49.187" E
C	10° 48' 35.770" N	77° 35' 1.378" E
D	10° 47' 57.804" N	77° 33' 50.173" E

	Villages	Maravapaliyam, Soliyavalasu, Kullakallipalyam, Kovilmaravapaliyam, Vellaikavundarpur.
	Tehsil/ Taluk	Dharapuram
	District	Tirupur
	State	Tamil Nadu

2.	**Area (hectares/ square kilometers)**	
	Block Area	2.0 sq.km.
	Forest Area	No Forest
	Government Land Area	Data Not Available
	Private Land Area	Data Not Available
3.	**Accessibility**	
	Nearest Rail Head	Tiruppur Railway station is 37km NNW from the proposed block.
	Road	Dharapuram main road, Dharapuram –Poolavadi road and Erode-Dharapuram Road passes through the proposed block.
	Airport	Coimbatore International Airport is 60km west from the proposed block.
4.	**Hydrography**	
	Local Surface Drainage Pattern (Channels)	A system of nalas flow from west to east, serving as feeders to the main drainage system, composed of the Amaravathi River. 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	Amaravathi river which is perennial.
5.	**Climate**	
	Mean Annual Rainfall	The average annual rainfall is around 700 mm with the North East and the South West monsoons contributing 58% and 42% respectively to the total rainfall. The area in general is very dry.
	Temperatures (December) (Minimum) Temperatures (June) (Maximum)	Minimum temperatures 18°C (winter), Maximum temperatures up to 35°C (summer)
6.	**Topography**	
	Toposheet Number	58F/09
	Morphology of the Area	The area is a gently undulating plain with a gentle north easterly slope. The river Amaravathi meanders through the southeastern portion of the proposed block. The average elevation ranges from 248m to 259m feet above sea level.

7	**Availability of baseline geosciences data**	
	Geological Map (1:50K/ 25K)	1:50000 (Bhukosh) 1:12500 Map (Rudrawathi G-4 Block) by MECL
	Geochemical Map	Stream sediment sample results from NGCM data from: - 1) Bhukosh, GSI for TS 58F/9 2) Interim report on Geochemical Mapping in TS 58F/5 in parts of Tiruppur and Coimbatore Districts, Tamil Nadu Field Season: 2019-20 3) Reconnaissance survey for REE and RM in Rudrawathi G-4 block, by GSI in FY 2023-24
	Geophysical Map	F.S. 2008-2009, Geological Survey of India (GSI) has carried out "Regional Gravity and Magnetic Surveys in Toposheet Nos.58 F/1, F/5 and F/9, Coimbatore and Tiruppur districts, Tamil Nadu." By Shri R.M.C.Prasad et. Al
8.	**Justification for taking up Reconnaissance Survey / Regional Exploration**	1. Based on the evaluation of Reconnaissance survey for Rare Earth Elements and Rare Metals in Rudrawathi (G-4) block explored by MECL in the FY 2023-2024 and based on exploration data available, the present exploration program has been formulated 2. Around 5 no of bedrock samples were collected from this 2.00 sq km area which has given ΣREE values ranging from 1083.6 to 2573.7 PPM. Further, in 22 soil samples ΣREE values ranges from 183.3 to 1162.9 PPM. 3. In concurrence with TCC committee of NMET during the technical review of Rudrawathi G-4 block, it is recommended to take up G-3 level of exploration in bedrock samples having more than 2000 PPM TREE.

PROPOSAL FOR PRELIMINARY EXPLORATION (G-3 STAGE) FOR REE MINERALIZATION IN MARUVAPALIYAM BLOCK, DISTRICT - TIRUPPUR, STATE - TAMIL NADU. (AREA 2.00 SQ.KM)

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 Preliminary Exploration (G-3) for REE in Maruvapaliyam Block.

1.2.0 LOCATION AND ACCESSIBILITY

1.2.1 The proposed Maruvapaliyam Block area lies in Dharapuram Taluk of Tiruppur District (Toposheet No 58F/09) of Tamil Nadu State. Maravapaliyam, Soliyavalasu, Kullakallipalyam, Kovilmaravapaliyam, Vellaikavundarpur, are the villages within the block. All the villages in the area are well connected to each other and to the highways by motorable roads and tracks by Dharapuram main road and Erode-Dharapuram. The nearest Railway Station is Tiruppur about 37 km NNW from the proposed block. The nearest airport is Coimbatore International Airport at 80km from the block.

1.3.0 PHYSIOGRAPHY, DRAINAGE, CLIMATE AND VEGETATION:

1.3.1 The area mapped is a gently undulating plain with a gentle easterly slope. The river Amaravathi meanders through the southeastern portion of the proposed block. The average elevation ranges from 248 m to 259m above sea level.

1.3.2 A system of nalas flow from west to east, serving as feeders to the main drainage system, composed of the Amaravathi River. 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.

1.3.3 The climate is moderate to hot with the maximum temperature in summer. The mean maximum and minimum temperatures of the study area during summer and winter vary between 35°C and 18°C.

1.3.4 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

2.1.0 Regionally, explored block is part of The Southern Granulite Terrane of India. The Southern Granulite Terrane occupies the southernmost portion of the Indian subcontinent and covers an area of >70 000 km^2 of poly deformed granulite-facies lower-crustal rocks. The northernmost portion of the Southern Granulite Terrane consists of variably metamorphosed Mesoarchaean to Neoarchaean basement of the Dharwar Craton that is bound to the south by Neoarchaean to Proterozoic meta-sedimentary and meta-igneous rocks of the Madurai, Trivandrum and Nagercoil Blocks (Collins et al., 2014; Collins et al., 2007a; Drury et al., 1984; Playsa et al., in press). Studies have shown that a large portion of the Southern Granulite Terrane has experienced high-pressure (>12kbar), ultra-high-temperature (>950°C) metamorphism (Brandt et al., 2011; Brown and Raith., 1996; Braun, 2006; Clark et al., 2009a; Collins et al., 2007b; Nishimiya et al., 2010; Santosh et al., 2004; Santosh and Sajeev, 2006; Tsunogae and Santosh, 2003) during the Ediacaran-Cambrian (ca. 620 — 500 Ma, see Collins et al., 2014 and references therein). Such extreme P—T conditions in this domain have been linked to the collision of a number of disparate continental blocks during the final stages of the amalgamation of the supercontinent Gondwana (Collins and Windley, 2002; Collins and Pisarevsky, 2005; Meert, 2003; Boger and Miler, 2004).

2.1.1 About 80% of the Tamil Nadu state is occupied by crystalline rocks of Archaean to late Proterozoic age which comprises predominantly of Charnockite and Khondalite groups and their migmatitic derivatives, supracrustal sequences of Sathyamangalam and Kolar groups and Peninsular Gneissic Complex (Bhavani Group), intruded by ultramafic-mafic complexes, basic dykes, granites and syenites. The granulite - gneiss terrain of central Tamil Nadu is divided into three distinct lithotectonic 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 proposed block forms a part of Southern Granulite Terrain of central Dharapuram domain and the rocks representing the area can be grouped as Migmatite Gneissic complex Peninsular Gneissic Complex II.

2.1.2 Regionally, the rocks can be grouped under nine categories viz., Sathyamangalam Group, Layered ultra-mafic / mafic, ultrabasic complex, (Peninsular Gneissic Complex I) (Bhavani Group), Khondalite Group, Charnockite Group, Migmatite Complex (Peninsular Gneissic Complex II), Alkali Complex (Younger), Ultrabasic/ basics (Younger) and Younger Granite. Major rock types of these Group/ Super Groups are described in table -1 and for Regional geological map of Maruvapalliyam block, Dist- Tiruppur, Tamil Nadu ref. Plate-II. The Detailed Stratigraphy after GSI is as per the table given below:

Table no 1: Regional Stratigraphy of the Southern Granulite terrain (After GSI)

(After, geology and mineral resources of the states of India Part VI – Tamil Nadu and Pondicherry, miscellaneous publication no. 30 GSI, 2006)

Era	Age	Group / Super Group	Major Rock Type
PROTEROZOIC to PALAEOZOIC	390-550 Ma	Younger Granite	Granite
	700 Ma	Ultrabasics / basics Younger)	Gabbro Anorthosite
NEO PROTEROZOIC	700-900 Ma	Alkali Complex (Younger)	Carbonatite ultrabasic Complex Alkaline complex Alkaline rocks Epidote-hornblende gneiss
LATE ARCHAEAN to PROTEROZOIC	2200-2550 Ma	Migmatite Complex Peninsular Gneissic Complex II	Older granite / granitoids Pink migmatite Pink augen gneiss Hornblende gneiss Garnetiferousquartzo-feldspathic gneiss Garnet-biotite gneiss
LATE ARCHAEAN	2600 Ma	Charnockite Group	Basic and ultramafic rocks Magnetite quartzite Pyroxene granulite Charnockite
ARCHAEAN		Khondalite Group	Calc granulite

			Limestone
			Quartzite
			Garnet-sillimanite-graphite gneiss
	3000 Ma	(Peninsular Gneissic Complex I) (Bhavani Group)	Pink migmatite Granitoid gneiss Fissile hornblende gneiss
	3000-3100 Ma	Layered ultra mafic / mafic, ultrabasic complex	Ultra mafic / mafic, ultrabasic rocks
	3200 Ma	Sathyamangalam Group (As)	Amphibolite, basic and ultrabasic rocks Sillimanite-Kyanite-corundum-mica schist Fuchsite-kyanite ferruginous quartzite

3.0.0 GEOLOGY OF THE BLOCK

3.1.0 Most of the area is soil covered in the north, north-west and western part while the northeast, eastern and southern part is covered by agricultural land and Amaravathi River. Although the area is dominated by soil cover, at places exposures of Granites, Pegmatites, Pyroxenites, Gabbro, Gabbro- Diorites, are exposed. The size of each exposure varies from a few cms to 20-25m is length with an approximate width range from 5-20m.

3.2.0 Major REE bearing minerals like Allanites are visible in Pegmatites and a few sporadic large crystals are observed in the feldspar quarry which is outside the proposed G-3 block.

Stratigraphy of the Maravapaliyam block (After GSI)

Group / Super Group	Lithology
	Alluvium Clacrete
Intrusive Post Tectonic	Quartz veins / Pegmatite Veins
Intrusive Pre-Tectonic	Anorthosite Meta gabbro Pyroxene granullite Meta pyroxenite
Metasedimentary	Granodiorite gneiss Alkali granite gneiss

	Pink granite gneiss Biotite gneiss
Charnockite group	Charnockite

4.0.0 STRUCTURE

The general strike of foliation of the rocks is N.N.E.-S.S.W. occasionally veering to N.E.-S.W. with steep easterly dips, occasionally vertical foliation. Lineation is generally parallel to the foliation, occasionally plunging at small angles to the N.E.

5.0.0 MINERAL POTENTIALITY BASED ON GEOLOGY, GEOPHYSICS, GROUND GEOCHEMISTRY ETC.

5.1.0 As far as mineralization is concerned Pegmatites show enrichment of total REE and their distribution is related to allanite-monazite bearing pegmatites. These intrusive pegmatites with minerals of Lanthanum and Cerium bearing epitode minerals i.e., Allanite within pegmatite marks the favorable geologic setting for REE mineralization further, the formation of clay rich horizon in the regolith which aids the formation of ion adsorbed REE deposition over pegmatites. The ore zones in the present study are essentially regolith/soil cover developed over the Pegmatites with average ΣREE value being 526.6 ppm (0.05 %).

5.2.0 Allanite-Monazite bearing pegmatites have given the values >100ppm of thorium in 4 nos. of samples.

5.3.0 Pegmatites mapped in Rudrawathi area, about 25 no of samples were collected in which the ΣREE ranges from 81.20 to 2851.30 ppm (average=908 ppm). The ΣLREE concentration varies from 22.00-2769.182 ppm (average =830 ppm). The ΣHREE concentrations vary from 9.2 to 426.2ppm (average=78.1 ppm).

TREE elemental concentration in Pegmatites of Rudrawathi block, Dist.Tiruppur, Tamil Nadu

REE Elements	Minimum (ppm)	Maximum (ppm)	Average
La	3.90	859.30	235.00
Ce	8.80	1461.70	433.50
Pr	1.10	133.50	44.20
Nd	4.40	280.60	98.70
Sm	3.40	75.20	17.50
Eu	0.30	8.00	1.90
Gd	14.30	70.50	14.30

REE Elements	Minimum (ppm)	Maximum (ppm)	Average
Tb	0.20	11.10	1.80
Dy	0.80	55.50	8.00
Ho	0.10	10.80	1.60
Er	0.40	26.90	4.30
Tm	0.10	3.90	15.90
Yb	0.30	18.60	3.50
Lu	0.10	2.30	13.10
ΣLREE	**43.52**	**2812.40**	**936.42**
ΣHREE	**9.16**	**43.24**	**81.24**
ΣREE	**81.24**	**2851.34**	**982.47**

5.4.0 In Granites gniesses and pyroxenites mapped in the area about 11 no of samples are collected in which the ΣREE ranges from 25.20 to 181.40 ppm (average=90.6 ppm). The ΣLREE concentration varies from 3.90-105.10 ppm (average =55.40 ppm). The ΣHREE concentrations vary from 7.0 to 76.3 ppm (average=35.2 ppm).

6.0.0 PREVIOUS WORK - OBSERVATION AND RECOMMENDATIONS

6.1.0 FS: 1953-54 Geological and petrological mapping was carried out in Dharapuram and Palladam Taluka of Tamil Nadu. the regional mapping on 1 inch = 1 mile of topo-sheet 58 / F/9 and portion of 58 F/5, an area of about 350 square miles were mapped.

6.1.1. Sporadic occurrence of Allanite was observed/reported in pegmatite and quartz vein east of suryanallur village, it was also reported that there is no major mineral occurrence. It was concluded in the report that

6.2.0 FS 1996-97, GSI carried out detailed studies on the major granites and pegmatites in Bhavani -PunjaiPuliyampatti, Karamadai and Coimbatore sectors of Central Tamil Nadu have brought out that the following three bodies show significant RM / REE mineralisation.

1. PunjaiPuliyampatti granite
2. Karamadai granite
3. Dumanur pegmatites.

6.2.1 In the Punjai Puliyampatti granite, studies have resulted in delineating a zone of high radioactivity in the northern part of the pluton near Marampalaiyampudur. This zone extending for a strike length of about 750 m with a width of about 250 m is represented by trondhjemiticpegmatoidal granite with rich concentration of magnetite, garnet and

radioactive minerals. Within this zone, the subzone 'B' with a strike length of 135 m and a width of 15 m records very high radioactivity of 8-10 times above background value. Samples collected from this zone have been sent for REE and trace element analyses. Based on the analytical results, a successor programme for collecting close spaced groove samples may be taken up to assess the economic potentiality of the zone. Similarly, the Karamadai granite showing anomalous enrichment of LREE may also be taken up by GSI for detailed sampling to evaluate its potentiality for REE mineralisation. The Dumanur pegmatites containing considerable amount of beryl, mica and gemstones needs to be investigated in detail for RM mineralisation. Proposed block is 32km south of these major granites and pegmatites bodies having significant RM / REE mineralisation and 7km south from the block where preliminary investigation for PGE carried out near tirumankaradu area, Tirupur district, Tamil Nadu.

6.3.0 JUSTIFICATION

6.3.1 Based on the evaluation of Reconnaissance survey for Rare Earth Elements and Rare Metals in Rudrawathi (G-4) block explored by MECL in the FY 2023-2024 and based on exploration data available, the present exploration program has been formulated in 2.00 sq km potential area fulfill the following objectives.

6.3.2 The selected area is dominated by soil cover. Some of the exposures of major rock types are namely Granite, Pegmatites, Pyroxenites, Gabbro, Diorites. Major REE bearing minerals like Allanites are visible in Pegmatites.

6.3.3 Around 5 no of bedrock samples were collected from this 2.0 sq km area which has given ΣREE values ranging from 1083.6 to 2573.7 PPM. Further, in 22 soil (Regolith) samples ΣREE values ranges from 183.3 to 1162.9 PPM.

6.3.4 In concurrence with TCC committee of NMET during the technical review of Rudrawathi G-4 block, it is recommended to take up G-3 level of exploration in bedrock samples having more than 2000 PPM TREE.

7.0.0 BLOCK DESCRIPTION

The Maravapaliyam G-3 block area falls in Survey of India Toposheet No 58 F/09 and covers an area of 2.00 sq km in around villages of, Maravapaliyam, Soliyavalasu, Kullakallipalyam, Kovilmaravapaliyam, Vellaikavundarpur.of Tiruppur District, State-Tamil Nadu. The block location in toposheet 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**.

CARDINAL POINTS	Geographic (WGS-84)	
	LATITUDE (N)	LONGITUDE (E)
A	10° 48' 23.217" N	77° 33' 37.806" E
B	10° 48' 58.052" N	77° 34' 49.187" E
C	10° 48' 35.770" N	77° 35' 1.378" E
D	10° 47' 57.804" N	77° 33' 50.173" E

7.1.0 SCOPE FOR PROPOSED EXPLORATION

The Preliminary exploration at G-3 stage exploration program proposed comprises, Detailed Geological mapping (1:4000 scale), 750m drilling comprising of 350m Auger drilling and 400m drilling in 6 core boreholes at 400m interval for pegmatite, with associated survey, chemical analysis, physical analysis and geological report preparation.

7.2.0 PLANNED METHODOLOGY

The exploration program is proposed in accordance to the objective set for Preliminary exploration (G-3) for this 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.

7.3.0 GEOLOGICAL MAPPING

Detailed Geological mapping will be done in the entire 2.00 sq km area on 1:4000 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.

7.4.0 GEOCHEMICAL SAMPLING

7.4.1 Auger and Core Sampling

During the course of Auger drilling will generate 50 no bulk of samples which will be collected and processed for Heavy Mineral Separation by gravity and magnetic separation and in core drilling 150 no of core samples will be collected from pegmatite zones thus a total 200 no of samples with will be assay for 34 elements including REE. Total 20 nos. check samples [10% External] will also be analyzed for the same.

7.5.0 SURVEYING:

7.5.1 Topographical survey will be carried out on 1:4000 scale, along with DGPS survey for block boundary and borehole locations.

7.6.0 **PITTING/TRENCHING**

7.6.1 Shallow trenching/pitting (Excavation) shall be carried out in the potential zones identified based on the results of Geological Mapping and Auger drilling. A provision of shallow trenching/pitting of 100 cubic meter is kept. Pitting shall be done for correlation of mineralized pegmatite zones on surface up to a depth of 1-2 m after removal of soil/weathered column in the area. Locations of pits/trenches on ground will be decided by field geologist based on field observations. A provision of 75 Nos of primary & 8 no of check (10% External) trench/pit samples is kept for analysis of assay 34 element Package analysis by ICP-MS

7.7.0 **AUGER DRILLING**

Auger drilling will be carried out from surface to collect regolith samples for the secondary dispersion of REE mineralization and the entire thickness of these materials will be considered as the ore zone. Auger drilling will be done upto 7 m depth, which will generate about 25kg bulk samples. Bulk sample will be processed for magnetic and gravity separation for heavies. The tonnage of heavy mineral content of auger samples collected from boreholes drilled in the in-situ soil/talus material will be calculated from the weight of the HM recovered from 25 kg of bulk sample from the respective borehole. The tonnage of HM with and without magnetic fractions will be calculated for each polygon for auger samples and in-situ formed soil/talus material.

7.8.0 **CORE DRILLING:**

7.8.1 Based on Geological Mapping, Auger drilling and sampling, the extension of the mineralized zones (Pegmatite bodies) will be marked. To find out the potentiality of Pegmatite body in strike & dip direction, 6no of boreholes at 400m interval involving 400m of drilling will be carried out for intersection of mineralized zones. 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 geological mapping.

7.8.2 **Drill Core Logging:**

7.8.2.1 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.

7.8.3 **Drill Core Sampling:**

7.8.3.1 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 15 nos check (10% External Check) samples each will be analysed for REE.

7.9.0 **CHEMICAL ANALYSIS**

7.9.1 **WHOLE ROCK ANALYSIS:**

Whole Rock analysis for SiO_2, Al_2O_3, Fe_2O_3, TiO_2, MnO, CaO, MgO, Na_2O, K_2O, H_2O, P_2O_5, CO_2, & S radicals will be carried out on 5 nos. of rock samples to check the rock types, their variation in chemical composition.

7.9.2 **PETROLOGICAL & MINERAGRAPHIC STUDIES:**

During the course of Geological mapping and core logging 30 nos. of samples from various lithounits from outcrop and borehole core will be studied for petrography and 20 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).

8.0.0 PROPOSED QUANTUM OF WORK

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 Maravapaliyam Block

Sl. No.	Item of Work	Unit	Target
1	**Geological Mapping** (on 1:4000 Scale)	Sq km	2.00
2	**Topographical Survey** (1:4000 scale)	Sq km	2.00
3	**Auger Drilling**		
	a) No of auger boreholes (200mX200m grid)	Nos	50
	b) Drilling in Auger boreholes (at 7m each bhs)	m	350
	c) Heavy Mineral separation	Nos	50
4	**Pitting/Trenching**	**Cu.m**	100
	a) Trench Samples for 34 Elemental analysis	Nos	75
	b) External check samples (10%)	Nos	8
5	**Drilling (coring)***	m	400
	a) Drill core samples (Primary for REE)	Nos	150
	b) Drill core samples (External Check)	Nos	15
6	**Whole rock analysis**	Nos	5
7	**Laboratory Studies**		
	i) Auger Primary & Check Samples (10%External)	Nos	55
	ii) Pit/Trenching Primary & Check samples	Nos	83
	ii) Drill Core (Primary & check) Samples*	Nos	165
8	**Petrological Samples (Surface & Borehole Core Samples)**	Nos	30

Sl. No.	Item of Work	Unit	Target
9	**Mineragraphic Studies (Surface & Borehole Core Samples)**	Nos	20
10	**Whole Rock Analysis**	Nos	5
11	**SEM EDS**	Nos	5
12	**EPMA**	Nos	5
13	Report Preparation (5 Hard copies with a soft copy)	Nos.	1
14	Preparation of Exploration Proposal (5 Hard copies with a soft copy)	Nos.	1

9.0.0 BREAK-UP OF EXPENDITURE

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. 200.19 Lakhs.** The summary of cost estimates for Reconnaissance Survey (G-4 Level) is given in **Table No.-VII.A** and details of cost estimates is given in **Table No. – V.A.** Tentative Time schedule/action plan for proposed Reconnaissance Survey (G-4) for REE is given in **Table No. VII-B.**

Table No-VII.A: Summary of Cost Estimates for Preliminary Exploration (G-3) for REE in Maruvapaliyam block

Sl. No.	Item	Total Estimated Cost (Rs.)
1	Geological Mapping (LSM), Other Geological Work	25,26,300
2	Survey, Pitting and trenching	4,67,460
3	Drilling & associated works	91,03,400
4	Laboratory Studies	34,37,623
5	Survey	3,33,000
	Sub Total (1 to 6)	**1,58,67,783**
6	Exploration Report Preparation	7,50,000
	Proposal Preparation	3,17,356
7	Peer review charges	30,000
	Sub Total (1 to 7)	1,69,65,138
8	GST 18%	30,53,725
	Total:	**2,00,18,863**
	Say Rs. In Lakh	**200.19**

References

1. Regional assessment of economic potentiality of major granites and pegmatites of central Tamil Nadu for rare metals and REE mineralization (Progress Report for field season 1996 - 97) by N.P. Nathan and B.V. Srinivasan Geologists (Sr)
2. Preliminary investigation for PGE in Tirumankaradu area, Tirupur district, Tamil Nadu UNFC code: G4 Item Code: ME/SR/TNP/2012/068 (Final Report for F. S. 2012 - 2013)*S.B.Vijay Kumar, Senior* project: PGE (Tirumankaradu) State Unit:Tamil Nadu & Puducherry.
3. Progress report for the field-season 1953-54 By A.P. Subramaniam, Geological Survey of India (SRO_GSI_2674)
4. GSI's online data portal – Bhukosh (for NGCM raw data source, Block Geology and Regional Geology)
5. ReconnaissanceSurvey (G-4) for REE in Rudrawathi block by MECL.

List of Plates

1. Plate-I: Location Map of Maravapaliyam Block, District Tiruppur, State Tamil Nadu
2. Plate-II: Regional Geological Map of Maravapaliyam block District Tiruppur, State Tamil Nadu (Source: Bhukosh, GSI).
3. Plate-III: Geological Map of Maravapaliyam block District Tirupur, State Tamil Nadu (Source: Bhukosh, GSI).

Location Map of proposed Maravapaliyam (G-3) Block, District: Tiruppur, State: Tamil Nadu (Part of Toposheet 58F/09)

Area: 2.00 sq km

0 0.75 1.5 3 4.5 6 Kilometers

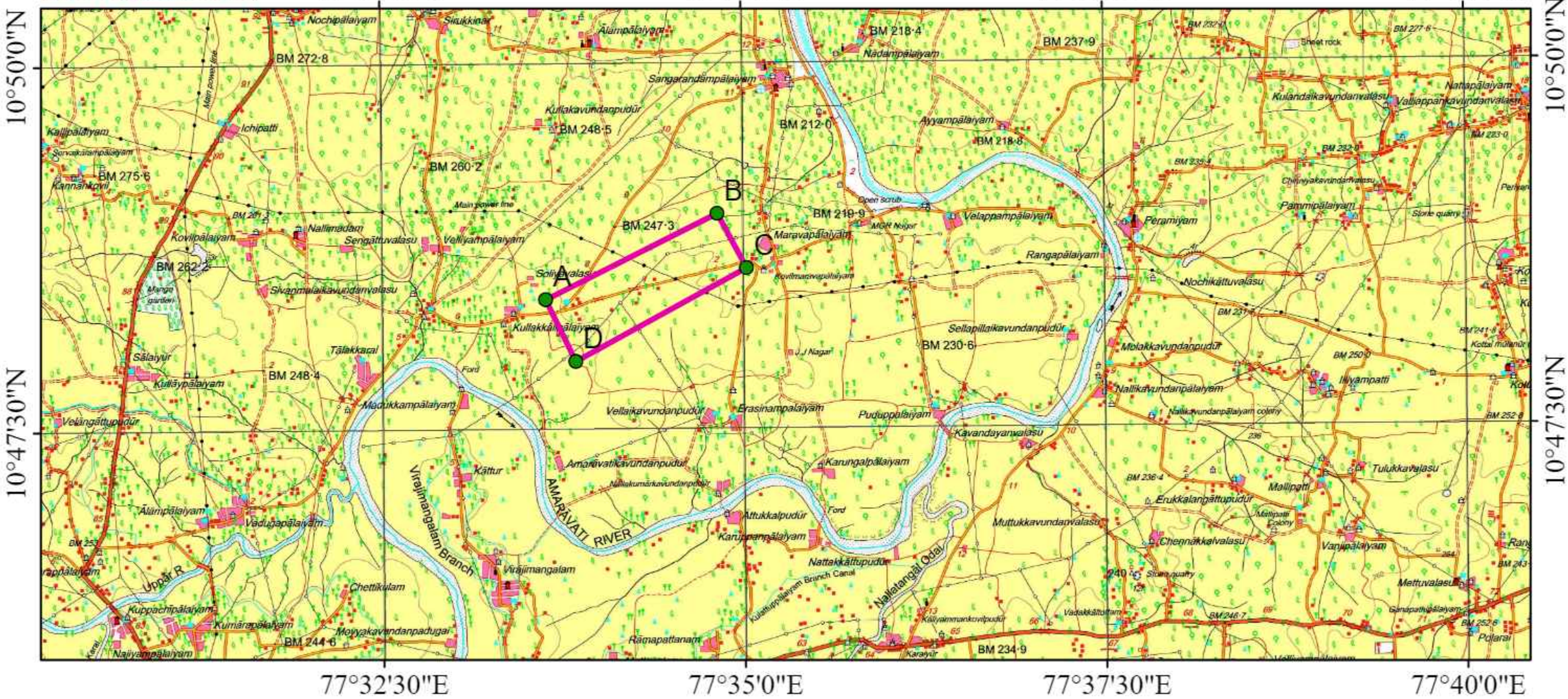
1:50,000

N W E S

(Part of Toposheet 58F/09)

77°32'30"E 77°35'0"E 77°37'30"E 77°40'0"E

10°50'0"N 10°47'30"N



Co-ordinate of the corner points of the proposed Maravapaliyam Block (G-3)

Points	Latitude	Longitude
A	10° 48' 23.217" N	77° 33' 37.806" E
B	10° 48' 58.052" N	77° 34' 49.187" E
C	10° 48' 35.770" N	77° 35' 1.378" E
D	10° 47' 57.804" N	77° 33' 50.173" E

Legend

- Maravapaliyam (G-3) Block Boundary Points
- Proposed Maravapaliyam Block Boundary (G-3)

MECL

Large Scale Geological Map in and around the proposed Maravapaliyam (G-3) Block for REE

0.8 0.4 0 0.8 1.6 2.4 3.2 Kilometers

1:12,500

770000 771000 772000 773000 774000 775000 776000 777000 778000 779000 780000 781000 782000

1200000 1199000 1198000 1197000 1196000 1195000 1194000

N W E S

A B C D

Legend

- Proposed Maravapaliyam (G-3) Block Boundary Points
- Proposed Maravapaliyam Block Boundary (G-3)

LITHOLOGY

- Amphibole Schist
- Biotite Schist
- Diorite?
- Feldspar Quarry
- Granite
- Lime slinter plant
- Limestone?/Calcrete?
- Pegmatite
- Pink Feldspar
- Pink Granite
- Quartz
- Quartz Vein
- Soil Cover

MECL

Large Scale Geological Map in and around the proposed Maravapaliyam (G-3) Block for REE

0.8 0.4 0 0.8 1.6 2.4 3.2 Kilometers

1:12,500

770000 771000 772000 773000 774000 775000 776000 777000 778000 779000 780000 781000 782000

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- Pink Feldspar
- Pink Granite
- Quartz
- Quartz Vein
- Soil Cover

MECL

Location Map of proposed Maravapaliyam (G-3) Block, District: Tiruppur, State: Tamil Nadu (Part of Toposheet 58F/09)

Area: 2.00 sq km

0 0.75 1.5 3 4.5 6 Kilometers

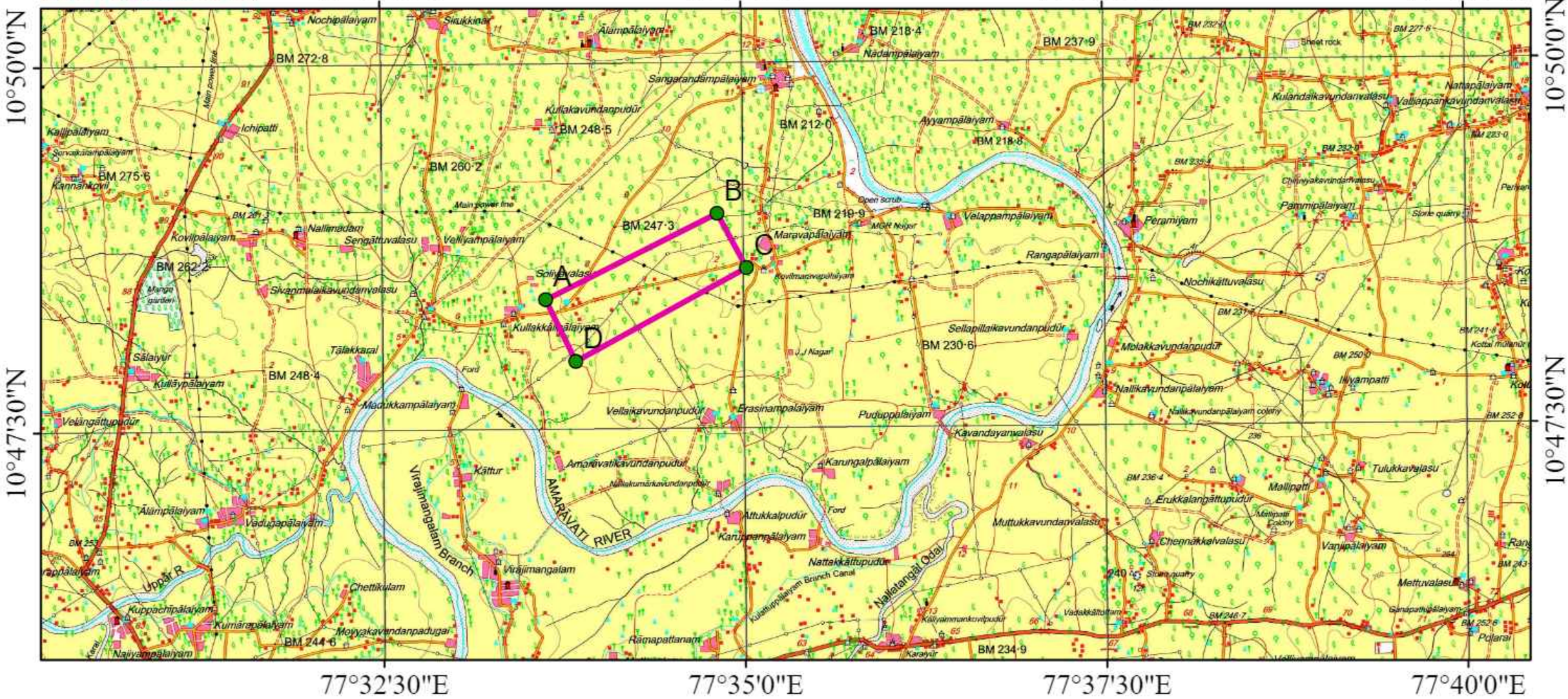
1:50,000

N W E S

(Part of Toposheet 58F/09)

77°32'30"E 77°35'0"E 77°37'30"E 77°40'0"E

10°50'0"N 10°47'30"N



Co-ordinate of the corner points of the proposed Maravapaliyam Block (G-3)

Points	Latitude	Longitude
A	10° 48' 23.217" N	77° 33' 37.806" E
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Legend

- Maravapaliyam (G-3) Block Boundary Points
- Proposed Maravapaliyam Block Boundary (G-3)

MECL

Estimated cost for Preliminary Exploration (G-3) for REE in Maruvapalliyam Block, Tiruppur District, Tamil Nadu
Total block area- 2.00 sq km; Completion Time- 12 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	**Detail Geological mapping/ Trenching/ Drilling**						
1.1	Detail Geological mapping/ Trenching/ Drilling					-	
	a) Geologist man days (1 No) for Large scale (LSM) Geological mapping/ Trenching/ Drilling	days	1.2	11,000	150	16,50,000	
	Geologist man days (1 No.) for data interpretation, Geological map & Report (HQ)	days	1.2	9,000	60	5,40,000	
	b) Labour (field)	per worker	5.7	522	300	1,56,600	Amount will be reimburse as per the notified rates by the Central Labour Commissioner or respective State Govt. whichever is higher
	c) Sampler for Suface Samples/ Trench Samples / Core Samples Labour charge not included	day	1.5.2	5100	25	1,27,500	50 HMS, 175
	d) 4 labours/ party (As per rates of Central Labour Commissioner)	day	5.7	522	100	52,200	Amount will be reimburse as per the notified rates by the Central Labour Commissioner or respective State Govt. whichever is higher
	Sub-Total A					25,26,300	
2.0	**Topographical Survey (1:4000)**						
	a) Surveyor Charges	day	1.6.1a	8,300	45	3,73,500	1:4000 scale
	b) 4 labours/ party (As per rates of Central Labour Commissioner)	day	5.7	522	180	93,960	Amount will be reimburse as per the notified rates by the Central Labour Commissioner or respective State Govt. whichever is higher
	Sub-Total B					4,67,460	
2.1	**Mineral Investigation**						
2.2	Trenching[$]						100 cu.m
	a) Excavation of trenches	per cu m	2.1.1	3,330	100	3,33,000	
	Sub-Total B					3,33,000	
3.0	**Drilling**						
3.1	a) Auger drilling	per m	2.2.2	4760	350	16,66,000	
3.2	b) Drilling up to 300m Rigs) (Very Hard Rock)	per m	2.2.1.5 a	12,650	400	50,60,000	
3.3	Borehole deviation survey	per m	2.2.6	330	0	-	
3.4	Borehole pilaring					-	
	a) construction of concrete pillar (12"x12"x30")	per borehole	2.2.7.a	2,000	10	20,000	
	b) Borehole plugging by cement	per m	2.2.7.b	150	0	-	
3.5	Transportation of drill rigs & truck associated per drill (To & Fro from HQ)	per km	2.2.8	36	2900	1,04,400	1450km one way
3.6	Monthly accommodation charges for drilling camp	monthly	2.2.9	50,000	3	1,50,000	
3.7	a) Drilling camp setting (1 rigs)	per drill	2.2.9a	2,50,000	1	2,50,000	
	b) Drilling camp winding (1 rigs)	per drill	2.2.9b	2,50,000	1	2,50,000	
3.8	Approach road making in rugged- hilly terrain (Partly rugged-hilly terrain)	per km	2.2.10b	32,200	3	96,600	
3.9	Drill core preservation	per m	5.3	1590	160	2,54,400	1 complete borehole and mineralized zone in other boreholes
3.10	Land/crop compensation	per borehole		20000	5	1,00,000	
3.11	Demarcation Fixation of borehole and determination of co-ordinates & Reduced Level (RL) of the boreholes by DGPS (including charges for labours deployed for the work)	Per point of observation	1.6.2	19,200	60	11,52,000	50 auger, 6 bh, 4 boundary pillars
	Sub-Total C					91,03,400	
4.0	**Laboratory Studies**						
4.1	Chemical Analysis						
	I)Heavy Mineral Separation by Magnetic and Gravity						
	a) Separation of Heavy minerals from stream sediments of 2mm size through gravity and magnetic separation	per sample	4.3.60	13,820	50	6,91,000	
	b) REE analysis(14 elements) by ICP-MS Method	per sample	4.1.14	7,731	50	3,86,550	
	II) Check Samples (Auger Samples) - 10% External					-	
	c) REE analysis(14 elements) by ICP-MS Method	per sample	4.1.14	7,731	5	38,655	External check 5
4.2	**Pit & Trench, Primary Samples**					-	
	a) 34 element Package analysis by ICP-MS for surface samples	per sample	4.1.14	7,731	75	5,79,825	
	II) Check Samples -10% External					-	
	REE analysis(14 elements) by ICP-MS Method	per sample	4.1.14	7,731	8	57,983	External check 8
4.3	**I) BH Core Sampling, Primary samples**					-	
	REE analysis(14 elements) by ICP-MS Method	per sample	4.1.14	7,731	150	11,59,650	1m sample interval
	II) Check Samples -10% External					-	
	REE analysis(14 elements) by ICP-MS Method	per sample	4.1.14	7,731	15	1,15,965	External check 15
4.7	**Whole rock studies**	per sample	4.1.15a	4,200	5	21,000	
4.8	**Petrological / Mineralographic studies**					-	
	a) Preparation of thin section	per sample	4.3.1	2,353	30	70,590	
	b) Study of thin section for petrography	per sample	4.3.4	4,232	30	1,26,960	
	c) Preparation of polished section	per sample	4.3.2	1,549	20	30,980	
	d) Study of polished section for mineragraphy	per sample	4.3.4	4,232	20	84,640	
	e) Digital photomicrograph of thin polished section	per sample	4.3.7	280	30	8,400	
	f) Specific Gravity	per sample	4.8.1	1,605	5	8,025	

	g\ EMPA	per hour	4.4.1	8,540	5	42,700	
	h\ SEM	per hour	4.4.2	2,940	5	14,700	
	Sub-Total D					**34,37,523**	
5.0	**Total (1.0 to 5.0)**					**1,56,67,783**	

6.0	Geological Report Preparation	Nos	5.2	A Minimum of Rs. 7.5 lakhs or 3% of the work whichever is more	1	7,50,000	For the projects having cost up to exceeding Rs. 150 Lakhs but less than 300 Lakhs: A Minimum of Rs. 7.5 lakhs or 3% of the work whichever is more and Rs. 3000/- per each additional copy.
7.0	Preparation of Exploration Proposal	Nos	5.1	A Minimum 2% of the work or max 5 lakhs whichever is less	1	3,17,356	
8.0	Report Peer Review Charges	lumpsum	As per EC decision	30000	1	30,000	Additional Rs.1500 as handling charges should be added
9.0	Total Estimated Cost without GST (7+8+5+10)					1,69,65,138	
10.0	Provision for GST (18%)					30,53,725	GST will be reimburse as per actual and as per notified prescribed rate
11.0	Total Estimated Cost with GST					2,00,18,863	
					Say, in Lakhs	200.19	
Note:							