PROPOSAL FOR PRELIMINARY EXPLORATION (G-3 STAGE) FOR REEMINERALISATION IN SOUTH OF NAUSER (9.18 SQ. KM), BAMNI DHANI (3.70 SQ. KM), SOUTH OF DANDALI (3.37 SQ. KM) AND SOUTH OF SARNU (1.70 SQ. KM) AREASPART OF DISTRICT: BARMER, STATE: RAJASTHAN

COMMODITY: REEMINERALISATION

BY

MINERAL EXPLORATION AND CONSULTANCY LIMITED

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SEMINARY HILLS

PLACE: NAGPUR

DATE: 15th OCTOBER,2024

Summary of the Block for Preliminary Exploration (G-3 Stage)
GENERAL INFORMATION ABOUT THE BLOCK

	Features	**Details**
	Block ID	South of Nauser (9.18 Sq. Km), Bamni Dhani (3.70 Sq. Km), South of Dandali(3.37 Sq. Km) andSouth of Sarnu (1.70 Sq. Km) Areas
	Exploration Agency	Mineral Exploration and Consultancy Limited (MECL)
	Commodity	REEMineralization
	Mineral Belt	Sarnu Dandali Complex
	Completion Period with entire Time schedule to complete the project	14 months
	Objectives	Based on the evaluation of geological data available, the present exploration program has been formulated to fulfill the following objectives: i. To carry out geological mapping on 1:2,000 scale for identification of REEbearing formations (host rock) and soil profile with the structural features to identify the surface manifestation and lateral disposition of the mineralized zones. ii. To collect surface (Bedrock) samples for analyses ofREE to decide further course of exploration programme. iii. To know the concentration of REE in the regolith and know the dispersion pattern within the target area by pitting. iv. The future course of exploration program will be decided after Preliminary Exploration (G-3) outcome. v. To estimate resources of REE as per UNFC norms and Minerals (Evidence of Mineral Contents) Amendment Rules, 2021 at G-3 levelmineral 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	Two
	Expected Field days (Geology) Geological Party Days	Geologist Party Days: 150 (Field)+60 Days (HQ)
1.	**Location**	

Sl. No.	Cardinal Point	WGS 84 Datum, DMS		Block Name
		Longitude	Latitude	
1	A	71° 51' 04.6186" E	25° 46' 27.9768" N	South of Nauser
2	B	71° 52' 53.6503" E	25° 46' 27.9768" N	
3	C	71° 52' 55.0173" E	25° 44' 50.5816" N	
4	D	71° 51' 04.9603" E	25° 44' 50.5816" N	
1	A1	71° 53' 30.8823" E	25° 43' 43.0029" N	Bamni Dhani
2	B1	71° 54' 41.2803" E	25° 43' 43.6864" N	
3	C1	71° 54' 40.2551" E	25° 42' 42.1736" N	
4	D1	71° 53' 29.5360" E	25° 42' 42.6144" N	
1	A2	71° 54' 54.5706" E	25° 41' 46.7620" N	South of Dandali
2	B2	71° 55' 36.2627" E	25° 41' 46.4202" N	
3	C2	71° 55' 24.0238" E	25° 40' 11.3632" N	
4	D2	71° 54' 43.3359" E	25° 40' 11.8147" N	
1	A3	71° 46' 17.1663" E	25° 39' 03.2308" N	South of Sarnu
2	B3	71° 47' 23.0078" E	25° 39' 03.4587" N	
3	C3	71° 47' 23.0078" E	25° 38' 33.3857" N	
4	D3	71° 46' 16.4828" E	25° 38' 33.6136" N	

	Villages	Nauser, Dandali, Bamni Dhani, GirliKitpal and Sarnu.
	Tehsil/ Taluk	Sindhari
	District	Barmer
	State	Rajasthan
2.	**Area (hectares/ square kilometers)**	
	Block Area	South of Nauser (9.18 Sq. Km), Bamni Dhani (3.70 Sq. Km), South of Dandali(3.37 Sq. Km) andSouth of Sarnu (1.70 Sq. Km)
	Forest Area	No forest area

	Government Land Area	Data Not Available
	Private Land Area	Data Not Available
3.	**Accessibility**	
	Nearest Rail Head	Barmer and Balotra are the nearest railway station which is about 45 km and 35 km away from the block.
	Road	The area is well connected with Jaipur by National Highway (NH 48, 58, 162, 62, 25 and SH 28).
	Airport	Nearest airport is Jodhpur domestic airport, about 130 km away and Jaipur international airport is about 400 km away. Nearest port is Kandla, located 700 km away from block area.
4.	**Hydrography**	
	Local Surface Drainage Pattern (Channels)	The area exhibits a dendritic drainage pattern, with drainage density influenced by varying lithologies and the presence of Quaternary sediments. Higher drainage density is observed in the eastern part, particularly along the Luni River, the region's main watercourse, which flows generally from north to south. Rainfall is the primary water source, with residents storing rainwater in concrete tanks for year-round use. Groundwater, accessed through bore wells and tube wells, is the main source of irrigation. Additionally, stream water is effectively utilized through reservoirs.
	Rivers/ Streams	LuniRiver
5.	**Climate**	
	Mean Annual Rainfall	The average annual rainfall in the past decade was in the range of 277 to 310 mm with the highest precipitation in the month of August when about 80 % of the rainfall is received in the area during SW monsoon every year.
	Temperature	Average temperature in summer is more than 35□ and during winter it ranges in between 12□ to 16□.
6.	**Topography**	
	Toposheet Number	Part of Toposheet Nos. 40O/14

	Morphology of the Area	The area is predominantly covered by aeolian sediments, with moderately dissected hills trending NE-SW located in the northern and western parts. Anthropogenic activities, primarily stone quarries, are scattered outside the study area. The Thar Desert's aeolian sediments dominate the region, while alluvial sediments are found along the Luni River.
7	**Availability of baseline geosciences data**	
	Geological Map (1:50K/ 25K)	1:12500
	Geochemical Map	Geochemical map of G-4 Sarnu Block is available
	Geophysical Map	Not Available
8.	**Justification for taking up Reconnaissance Survey / Regional Exploration**	i. From 2005 to 2010, Ramgarh Minerals and Mining Limited (RMML) of the Baldota Group conducted a reconnaissance survey in the Kamthai area, approximately 2.5 km southeast of the Sarnu Block, and identified a reserve of 5.41 million tonnes (Proved + Probable) with an average grade of 1.9% Rare Earth Elements (REE). The Kamthai area, adjacent to the Sarnu-Dandali prospects explored by the Geological Survey of India (GSI) during FSP 2018-19, revealed an average ΣREE content of 0.8% across various lithologies, with carbonatite rocks showing the highest ΣREE values, up to 16%. Six mineralized dykes of carbonatite were identified in the field, with ΣREE concentrations varying from 0.06% to 16%. Further exploration, covering 2 sq. km in Kamthai, was recommended. ii. During FS 2018-19, GSI conducted geochemical mapping in Barmer district, Rajasthan, as part of the National Geochemical Mapping Program (NGCM). Alkaline rocks, including carbonatites from the Sarnu-Dandali complex, were identified as having potential REE mineralization. Further investigations were recommended to explore the source and trace element distribution. iii. In FS 2023-24, MECL conducted large-scale geological mapping and geochemical sampling in the Sarnu Block, covering 118.10 sq. km. The mapping identified four key sectors with significant REE mineralization: 1. **Sector-I (3.34 sq. km)**: Phonolite dykes near Noser yielded ΣREE+Sc+Y concentrations from 341.98 to 618.20 ppm. One samples of carbonatite veins showing 1120.00ppm situated further west of the sector. 2. **Sector-II (4.03 sq. km)**: Nepheline Syenite in Bamni Dhani yielded

		5010.93 ppm ΣREE+Sc+Y (LREE > HREE). 3. **Sector-III (1.76 sq. km)**: Phonolite in the southwestern block yielded ΣREE+Sc+Y values from 901.19 to 1215.93 ppm. 4. **Sector-IV (0.42 sq. km)**: Carbonatite samples from the north of Dandali and Jharoka Dhani yielded ΣREE concentrations from 115.92 to 1169.98 ppm. The REE mineralization across these sectors was found to be disseminated, with promising potential for further exploration.

PROPOSAL FOR RECONNAISSANCE SURVEY (G-4 STAGE EXPLORATION) FOR, REE & ASSOCIATED MINERALS IN AND AROUND NELLIE AREA (51.37 SQ. KM), PART OF DISTRICTS: MORIGOAN & WEST KARBI ANGLONG, STATE: ASSAM

1.1.0 INTRODUCTION

1.1.1 Rare earth elements are characterized by high density, high melting point, high conductivity and high thermal conductance with distinctive electrical, metallurgical, catalytic, nuclear, magnetic and luminescent properties make them indispensable for a variety of emerging high end and critical technology applications which are relevant to India's energy security i.e., clean energy, defense, civilian application, environment and economic areas. REE demand is expected to continue its growth, especially for their use in low carbon technology. The ever-increasing demand for these REE necessitates a concerted effort to augment the resource position of our country.

1.1.2 The Rare earth elements (REE) are a collection of 17elements in the periodic table , namely scandium, yttrium and lanthanides (15 elements in the periodic table with atomic numbers 57 to 71 namely: lanthanum (La), cerium (Ce), praseodymium(Pr), neodymium (Nd), promethium (Pm), samarium (Sm), europium (Eu), gadolinium (Gd), terbium (Tb), dysprosium (Dy), holmium (Ho), erbium (Er), thulium (Tm), ytterbium (Yb) and lutetium (Lu). In spite of its low atomic weight Yttrium (atomic no. 39) has properties more similar to the heavy lanthanides and is included with this group. Scandium (atomic no. 21) is found in a number of minerals although it may also occur with other rare earth elements (REE).

1.1.3 Although these elements tend to occur together, the lanthanide elements are divided into two groups. The light rare earth elements (LREE) are those with atomic numbers 57 through 62(La, Ce, Pr, Nd, Pm, Sm) and the heavy rare earth elements (HREE) are those with atomicnumbers from 63 to 71 (Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu) and Y, Sc. However, because of their geochemicalproperties, rare earth elements are typically dispersed and not often found concentrated as rareearth minerals in economically exploitable ore deposits.

1.1.4 Generally, the light rare earth elements (LREE) are more abundant in the earth's crustand easily extracted than heavy rare earth elements (HREE). It was the very scarcity of these minerals (previously called "earths") that led to the term "rare earth". The first such mineral discovered was gadolinite, a compound of cerium, yttrium, iron, silicon and other elements. This mineral was extracted from a mine in the village of Ytterby in Sweden; several of the rare earth elements bear names derived from this location.

1.1.5 In the other hand, critical minerals are those minerals that are essential for economic development and national security. The lack of availability of these minerals or concentration of extraction or processing in a few geographical locations may lead to supply chain vulnerabilities and even disruption of supplies. The future global economy will be underpinned by technologies that depend on minerals such as lithium, graphite, cobalt, titanium, and rare earth elements. These are essential for the advancement of many sectors, including high-tech electronics, telecommunications, transport, and defence. They are also vital to power the global transition to a low carbon emissions economy, and the renewable energy technologies that will be required to meet the 'Net Zero' commitments of an increasing number of countries around the world. Hence, it has become imperative to identify and develop value chains for the minerals which are critical to our country.

1.1.6 Taking into account key factors such as the country's resource and reserve status, production levels, import dependency, future technology and clean energy needs, as well as the demand for fertilizer minerals in an agrarian economy, the Committee has identified 30 critical minerals. These include Antimony, Beryllium, Bismuth, Cobalt, Copper, Gallium, Germanium, Graphite, Hafnium, Indium, Lithium, Molybdenum, Niobium, Nickel, PGE, Phosphorus, Potash, REE, Rhenium, Silicon, Strontium, Tantalum, Tellurium, Tin, Titanium, Tungsten, Vanadium, Zirconium, Selenium, and Cadmium (Critical Minerals for India, Report of the Committee on Identification of Critical Minerals, Ministry of Mines, June 2023). This emphasizes the need for increased exploration of strategic minerals, precious metals, and Platinum Group Elements by the Government of India.

1.2.0 BACKGROUND

1.2.1 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 stage exploration) for REE mineralisationin and around Nauser, Bamni Dhani, Dandali and Sarnu areas, part of districts: Barmer, Rajasthan under NMET funding and execution.

1.3.0 LOCATION AND ACCESSIBILITY

1.3.1 The Sarnu Block having an area of 118.10 sq. km is bounded by latitude 25°38'11.136"N to 25°44'40.041"N and longitude 71°46'12.44"E to 71°58'21.325"E, lies under the jurisdiction of Sindhari tehsil, Barmer district of Rajasthan.

1.3.2 The Block is located in the southwestern part of Survey of India Toposheet No 40O/13 and 40O/14. The coordinates of the cardinal points of the block boundary are given in Table No. 1.1

1.3.3 Barmer and Balotra are the nearest railway station which is about 45 km and 35 km away from the block. Barmer railway station is falling under North Western Railway. Apart from railway, road transport services are good to Sindhari, tehsil head quarter from Barmer. The study area is well traversed with metalled, semi-metalled and fair-weather roads. The area is well connected with Jaipur by National Highway (NH 48, 58, 162, 62, 25 and SH 28). On the whole, the area is easily accessible by vehicle. Nearest airport is Jodhpur domestic airport, about 130 km away and Jaipur international airport is about 400 km away. Nearest port is Kandla, located 700 km away from block area.

1.4.0 PHYSIOGRAPHY, DRAINAGEAND CLIMATE:

1.4.1 The study area, part of the Great Indian Desert, features a predominantly sandy landscape with low undulating relief, with elevations ranging from 90 m to 219 m above mean sea level. The area has a north-to-south slope, with sand dunes forming the dominant physiographical feature. Geomorphologically, the region is largely covered with aeolian and alluvial sediments, with a dendritic drainage pattern that is poorly developed due to the presence of the Thar Desert. The ephemeral Luni River is the only significant drainage, flowing in response to heavy precipitation. Anthropogenic activities, such as stone quarrying, are present mainly outside the study area.

1.4.2 The area lies within the Thar Desert and experiences a very dry climate, even during the southwest monsoon season. It is characterized by arid conditions, with long, hot summers and little to no rainfall. The dry summer months typically last from March to June, sometimes extending into mid-July. The monsoon season lasts for about two months, from mid-July to mid-September, followed by a post-monsoon period that extends until November, with winter lasting from then until February. Winters are dry and chilly. Average summer temperatures exceed 35°C, while winter temperatures range between 12°C and 16°C. Over the past decade, annual rainfall has ranged between 277 mm and 310 mm, with August receiving the highest precipitation, accounting for about 80% of the annual rainfall during the southwest monsoon. Groundwater in this region is generally deep and saline.

1.5.0 FLORA & FAUNA:

The natural vegetation in the area is predominantly xerophytic, with species such as Neem, Desi Babul, Gum Arabic, Kair, Khejri, Banyan, Peepal, Jaal, Ber, Rohida, Hingota, and Kaner. Various shrubs like Aakado, Siniya, Phogadu, Kheemp, and Bui are also present.

Dune-covered regions lack vegetation. Agriculture depends on groundwater, with crops like Jawar, Bajra, Wheat, Moong Dal, and Moth Bean, as well as cash crops like Jeera, Ajwain, Castor, Mustard, and Pomegranate. Hills have sparse thorny vegetation. The fauna includes domestic animals (cows, camels, buffaloes, sheep, goats) and wildlife such as peacocks, teetars, rabbits, sambhars, chinkaras, nilgai, monitor lizards, kraits, vipers, and desert foxes.

1.6.0 REGIONAL GEOLOGYAND STRUCTURE

1.6.1 The Malani Igneous Suite is a geologically significant area characterized by scattered outcrops stretching from east of Jodhpur to the Thar Desert's edge, with its boundaries marked by the Aravalli Super Group and the Marwar Supergroup. It is divided into three igneous activity phases:

1. Mafic and felsic volcanics.
2. Extensive plutonic activity, leading to the intrusion of Siwana, Jalor, and Malani Granites.
3. The last phase marked by mafic and felsic dyke swarms.

1.7.2 Acidic volcanic flows and tuffs dominate, while basic and intermediate volcanics constitute less than 5%. Alkaline rocks intruded near Kamthai and the Sarnu-Dandali complex show two distinct emplacement periods in the Late Cretaceous.Regional Geological Map showing proposed blocks furnished in **Plate-II.**

1.7.0 GEOLOGY AND STRUCTUREOF THE BLOCK AREA

1.7.1 The Malani Igneous Suite is characterized by scattered outcrops extending from east of Jodhpur to the Thar Desert, and from Pokaran in the north to south of Sirohi. The suite is divided into three phases of igneous activity: an initial phase of mafic and felsic volcanics, followed by extensive plutonic activity that resulted in the intrusion of granites (Siwana, Jalor, and Malani), and a final phase marked by mafic and felsic dyke swarms. The suite is primarily composed of acidic volcanic flows and tuffs, with basic and intermediate volcanics comprising less than 5% of the total. The area also features Lower Cretaceous sedimentary rocks of the Fatehgarh Formation in the northwest, and alkaline intrusions near Kamthai, Sanpa, Dandali, and the Chibar Nadi area. Recent studies indicate that the Sarnu-Dandali alkaline complex was emplaced during two distinct periods in the Late Cretaceous, separated by 20 million years.

1.7.3 The study area features a diverse range of intrusive and extrusive rocks from various geological periods. These include the Neo-Proterozoic Malani Igneous Suite (ca. 750 Ma), two alkaline suites from the Cretaceous and Tertiary periods (ca. 120 Ma and ca. 55 Ma), and the Tertiary Fatehgarh Formation, which separates the two alkaline suites. Quaternary sediments, consisting of aeolian, fluvial, and fluvio-lacustrine deposits, cover much of the area. While earlier studies suggested a single phase of igneous activity in the Malani Province during the Late Proterozoic era, more recent findings reveal the presence of younger alkaline and mildly alkaline rocks intruding into the Malani volcanics and Lower Cretaceous sedimentary rocks. Detailed studies have identified younger igneous activity in the Sarnu-Dandali area, including trachyandesite, andesite, and highly alkaline rocks like syenite associated with carbonatite.

1.7.4 Structurally, the area is very less deformed. The area has not undergone any major deformation and is structurally undisturbed. Alkaline rocks, rhyolite and Andesite shows few primary structural features viz. magmatic layering, flow layers, vesicles and amygdules. Joint is very prominent structural feature in this locality. Columnar joints are formed in rhyolite flows. Large scale Geological Map showing proposed blocks furnished in **Plate-III.**

The stratigraphic sequence of the lithounits exposed in the block area (after GSI) is given in Table 1.2.

Table -1.2
Stratigraphic Succession of the proposed area (After GSI)

LITHOLOGY	FORMATION	GROUP	SUPERGROUP	AGE
Fine aeolian sand and silt	Thar Desert			Holocene
a. Phonolite b.Trachy andesite and Andesite c. Alkali pyroxenite d. Nepheline syenite e. Melteigite f. Foidite h. Carbonatite	Sarnu-Dandali	Sarnu-Dandali Alkaline Complex		Upper Cretaceous to Eocene
Orthoquartzite	Fatehgarh			Lower Cretaceous

LITHOLOGY	FORMATION	GROUP	SUPERGROUP	AGE
Rhyolite	Kailana Felsic Volcanics	Jodhpur volcanics	Malani Igneous Suite	Neoproterozoic
-------- Base not exposed --------				

1.8.0 PREVIOUS WORK - OBSERVATION AND RECOMMENDATIONS

1.8.1 W.T. Blanford (1877) introduced the term 'Malani Bed' for a series of volcanic rocks in western (the then) Rajputana. La Touche (1902) extensively mapped the rhyolitic lavas and tuffs from east of Jodhpur to the edge of desert between Barmer and Sind and coined the name 'the Malani Volcanic series' for them. A.L. Coulson (1933) mapped a considerable part of erstwhile Sirohi State and proposed the term 'Malani System'. The present term 'Malani Igneous Suite' was introduced by M.S. Krishnan (1968).

1.8.2 La Touche (1902) also took traverses in the area under discussion and mentioned about the rhyolites of Kamthai, Khatu and Nausar, the sandstones of Sarnu and Sanpa, the "granites" of south of Dandali and the alkaline intrusives east of Sarnu. He has correlated the sandstones of Sarnu and Nausar with that of Barmer on close resemblance, though he could not find any fossils in these rocks. Das Gupta (1975) named the sandstones of Sarnu as "Sarnu Hill Formation" in his regional stratigraphic correlation chart and assigned a Lower Cretaceous age for the formation. Bakshi and Naskar (1981) reported a few fossil plants from these Sarnu hills and on that basis summarised that "Sarnu Hill Formation" may be anything in age between Upper Jurassic to Lower Cretaceous.

1.8.3 Narayan Das (1973), Chaube et al. (1974) carried out investigations for rare earth metals in the alkaline rocks of' Sarnu-Dandali areas. They have also given a note on the petrological studies, geochemistry and age relation of the alkaline suite. Deshmukh and Misra (1970-71), Bhushan and Sengupta (1975-76.), M.P. Chawade and V. Chandrasekaran (1985) systematically mapped the surrounding areas lying adjacent to the present area under discussion and brought out the inter relationship between the different members of the Malani Igneous Suite. B. Chattopadhyay et.al. (1986-87) gave account on petrology of the carbonatites of Rajasthan. Bhushan and Chandrasekharan (2002) gave detailed account of geology and geochemistry of the tertiary alkaline complex (TAC) rocks. Bhushan and Kumar (2013) reported the first carbonatite hosted LREE deposit from India.

1.8.4 During the exploration work carried out by RMMPL, Baldota Group in the year 2005-2010, total nine 9 boreholes (1609.40m) has been drilled in Kamthai area in south east

block and total five boreholes drilled (805.65m) in Kamthai East Block. The detailed subsurface exploration in Kamthai carbonatite plug area indicated the length of about 765m and width 350m. The area is usually covered by the soil and thick bed (1 to 3m) of calcrete with very few exposures of carbonatite seen prominently in South Eastern part of the Kamthai carbonatite. The systematic test pits were made in all the parts wherever exposures are not present. Based on the geophysical anomaly (high magnetic), geochemical patterns based on the REE analysis of the samples from the exposures and test pits, two major areas were demarcated. These are South East and Eastern part of the plug. It shows that there are number of carbonatite veins/dykes particularly in the south eastern part and the few in the eastern quadrant.

1.8.5 The thicker carbonatite dykes have been observed in South Eastern part of the Kamthai showing indications of sub solidus alteration leading to enhancement of Fe and REE within calciocarbonatite. Locally these bands are referred as Panther skin type owing to the texture with minerals of dark brown and yellowish colour minerals. The yellowish part is bastnasite rich REE phase with barite and Fe enriched carbonate minerals shows dark brown colour. This Fe rich part is also substantially rich in REE. The EPMA study of the samples from this part has shown bastnasite, carbocernaite, synchisite, parasite etc. All these REE minerals are devoid of U and Th. Other than Panther type the ferrocabonatite and calciocarbonatite is also exposed in this area. Based on the data from G2 level exploration this block has been explored by drilling nine boreholes.

1.8.6 In the eastern part of the plug several small E-W trending calcio-carbonatite veins are exposed. These veins were also confirmed below soil/calcrete cover wherever not exposed. The veins are vertical to sub-vertical and thin with few cm to occasionally a meter in width. Interestingly these veins are bastnasite bearing and show very high REE (up to 20% REE). They are usually yellow in appearance. These veins also contain barite and strontium minerals. This part of the plug was explored by drilling five boreholes and the area is known as East block.

1.8.7 On the basis of above work, Bhusan (2015) reported the first carbonatite hosted LREE deposit from India, the geological, major, trace and REE geochemistry along with resource estimation has been carried out. A revised resource of 7.36 mt with average grade 1.62% REO, were estimated from Kamthai carbonatite.

1.8.8 During FS 2018-19 (Kushwaha et. al, 2020 and Qamar Hayat, 2020) geochemical mapping was carried out by GSI in toposheet no. 40O/13 and 40O/14 falling in parts of Barmer district of Rajasthan as a part of National Geochemical Mapping Program (NGCM).

A total of 695 sq. km area in toposheet no. 40O/13 was geochemically mapped with collection of 182 nos. of composite stream sediment/slopewash samples. Similarly, in toposheet No. 40O/14, a total of 696 sq km area was covered and 182 nos. of composite stream sediment/slope wash samples. The stream sediments/slopewash samples were made to pass through a -80-mesh size sieve so as to prepare 500 grams of unit cell sample. A total 364 nos. of composite samples were prepared by coning and quartering of four adjacent unit cell samples.

The following recommendations were made based on the analytical results:

1. Complex near Dandali and other villages, La (99.34 ppm),Ce(186.48ppm), Pr(21.19ppm), Nd(81.69ppm),Sm(14.19ppm), Eu (1.97ppm), Gd (12.55ppm), Dy (9.72ppm), Er (5.72ppm), Yb (5.83ppm), Hf (42.22ppm), Th (34.79ppm),U (5.81ppm) in stream sediment slope wash samples is analysed along the alkaline rocks of Sarnu Dandali alkaline Complex and Rhyolite exposure of Kailana felsic volcanics near Kamthai, Dandali and western part of Sindhari villages. Alkaline rocks of Sarnu-Dandali alkaline complex have been studied and Carbonatite present in this area also found as potential in REE point of view. Hence, it was recommended to take up this area for further investigation to establish the source and geochemical precipitation of the trace elements and rare earth elements in the given area.

1.8.9 On the basis of NGCM and encouraging outcome of adjoining areas explored by GSI, MECL during FS 202324 carried out Large Scale Geological Mapping and geochemical sampling in Sarnu Block in toposheet no. 40O/13 and 40O/14 falling in parts of Barmer district of Rajasthan as a part of NMET project.During the LSM mapping and geochemical sampling campaign in the northwestern part of the block, particularly over the Phonolite dykes and carbonatite veins, six bedrock chip samples revealed anomalously high concentrations of ΣREE+Y+Sc, ranging from 503.98 ppm to 1150.92 ppm. The magnesium (Mg) values ranged from 1261.12 ppm to 2302.72 ppm, Barium (Ba) from 1432.50 ppm to 2416.17 ppm, and Vanadium (V) from 41.82 ppm to 137.02 ppm. In the north-central part of the block, two pit and soil samples collected from the C horizon showed anomalously high concentrations of ΣREE+Y+Sc, ranging from 1852.08 ppm to 5010.93 ppm. Seven bedrock chip samples from the foidite exposure in the southwestern part of the block yielded anomalous ΣREE+Y+Sc values ranging from 901.19 ppm to 1215.93 ppm, with magnesium (Mg) values between 2286.16 ppm and 3041.92 ppm, Barium (Ba) between 3928.40 ppm and 4671.64 ppm, and Vanadium (V) between 75.78 ppm and 107.42 ppm. Additionally, one sample from a carbonatite dyke located just outside the southeastern

corner of the block showed an anomalous ΣREE+Y+Sc value of 883.57 ppm. Based on these anomalously high ΣREE+Y+Sc concentrations in the bedrock and pit samples, four potential sectors/areas (Plate No.- VI) around Noser, Dandali, Kangra, and Sarnu villages have been identified for further exploration at the G-3 level.

Large scale geological mapping, along with petrographic and geochemical studies, MECL identified four potential sectors namely Sector-1, 2, 3 and 4. Due to limited surface exposure, MECL recommended soil sampling through pits on a regular grid (200m x 100m) is suggested to identify potential REE zones. Additionally, a close-spaced grid geophysical survey, including gravity, magnetic and radiometric methods, could provide detailed insights behaviour of alkaline dykes and carbonatite veins.

1.9.0 JUSTIFICATION

1.9.1 Ramgarh Minerals and Mining Limited (RMML), Baldota group in ther 2005 to 2010 carried out reconnaissance survey in Kamthai area situated around 2.5 km south east of the block. RMML, in which total **5.41mt** (Proved+Probable) reserve with average grade of 1.9% REE has been established.

1.9.2 The Sarnu block is adjacent to the Sarnu-Dandali prospects, which was explored by Geological Survey of India during FSP 2018-19 (Bhardwaz, 2019), in which it has been concluded that Average ΣREE in all lithologies from Kamthai area is 0.8%. They reported that carbonatite rocks are showing highest values of ΣREE upto 16%. In Kamthai area, total six number of mineralized dykes of carbonatite were identified in field. ΣREE in carbonatite from Kamthai area varies from 0.06 to 16%. Average ΣREE value in phonolite/tephriphonolite is 0.06%. Foidite rock in Kamthai area is showing comparatively high values of ΣREE ranging from 0.03% to 0.35%) and an area of 2Km^2 in Kamthai is recommended for further stage of G3 exploration and establishment of reserve by drilling.

1.9.3 During FS 2018-19 (Kushwaha et. al, 2020 and Qamar Hayat, 2020) geochemical mapping was carried out by GSI in toposheet no. 40O/13 and 40O/14 falling in parts of Barmer district of Rajasthan as a part of National Geochemical Mapping Program (NGCM). Alkaline rocks of Sarnu-Dandali alkaline complex have been studied and Carbonatite present in this area also found as potential in REE point of view. Hence, it was recommended to take up this area for further investigation to establish the source and geochemical precipitation of the trace elements and rare earth elements in the given area.

1.9.4 During the FS2023-24, MECL carried out Large Scale Geological Mapping and Geochemical Sampling covering area of 118.10 sq. km of Sarnu Block. During the mapping a total of 152 surface samples, including 52 pit samples, 98 bedrock samples, and

2 water samples, were analysed for REE mineralisation. During LSM mapping rhyolite, phonolite, nepheline Syenite, foidite and carbonatite were mapped at various locations. Alkaline rocks which act as host for REE mineralization is intrusive in nature and found to be having cross-cutting relationship with basement rock. From the overall observations by LSM and geochemical survey on the exposures of carbonatite, Nepheline Syenite and Foidite, it appears that the REE mineralization is disseminated in nature. Four prominent areas of REE mineralisation have been identified in the northern, north central and south western part of the block and proposed for further upgradation in G-3. The potentiality of the proposed blocks are summarized below:

i. South of Nauser Block (9.18 sq. km) – The phonolite and aegirine bearing phonolite dykes exposed south of Noser yielded more than 500ppm ∑REE+Sc+Y. These bodies are trending NNW-SSE direction. 18 nos. BRS samples from carbonatite veins, Phonolite and aegirine bearing phonolite dykes showing TREE +Sc+Yvalues from 310.59 ppm to 1150.92 ppm with average value of 482.81ppm.

ii. Bamni DhaniBlock (3.70 sq. km) - One pit sample of Nepheline Syenite from east of Bamni Dhani area yielded 5010.93 ppm of ∑REE+Sc+Y (LREE>HREE). This is exposed in the pit.13 nos. BRS samples from Phonolitedykes and nepheline syenite showing TREE +Sc+Yvalues from 272.71 ppm to 610.96 ppm with average value of 440.34ppm.

iii. South of Dandali Block (3.37 sq. km) - Three bedrock sample of exposure of carbonatite veins at the south of the block yielded from 40.20ppm to 1169.98 ppm of ∑REE+Sc+Y (LREE>HREE) with average value of 697.92ppm. Dimension of cabonatite veins bodies cumulatively is 150m x 10m and 25mx5m. There is a prospect of getting more numbers of carbonatite veins. The detail mapping may be helpful.

iv. South of Sarnu Block (1.70 sq. km)–8 nos. bedrock samples fromfoiditeat south of Sarnu area yielded from 774.90 ppm to 1215.93 ppm of ∑REE (LREE>HREE) with average value of 977.57ppm. This body is trending ENE-WSW direction. Dimension of exposed body is 650m x 100m.

Due to limited surface exposure in identified sectors, MECL recommended soil sampling through pits on a regular grid (200m x 100m) is suggested to identify potential REE zones. Additionally, a close-spaced grid geophysical survey, including gravity, magnetic and radiometric methods, could provide detailed insights behaviour of alkaline dykes and carbonatite veins.

1.9.5 During progress review of Sarnu block in 65th TCC held on 28th, 30th and 31st May 2024, **committee opined that a separate G-3 proposal with auger drilling or pit sampling at 200 x 100 m grid may be proposed in the positive blocks**.

1.10.0 BLOCK DESCRIPTION

1.10.1 South of Nauser (9.18 Sq. Km), Bamni Dhani (3.70 Sq. Km), South of Dandali (3.37 Sq. Km) and South of Sarnu (1.70 Sq. Km) Areaslies under the jurisdiction of Sindhari tehsil, Barmer district of Rajasthan.

1.10.2 The Blocksare located in the part of Survey of India Toposheet No 40O/13 and 40O/14. The location map of the block area 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.-1.4**.

1.10.3

Table- 1.4

Co-ordinates of the Corner points of the Blocks

Sl. No.	Cardinal Point	Datum: WGS-1984 Geographic Coordinate System, Unit: DMS	
		Longitude	Latitude
South of Nauser (9.18 sq. km)			
1	A	71° 51' 04.6186" E	25° 46' 27.9768" N
2	B	71° 52' 53.6503" E	25° 46' 27.9768" N
3	C	71° 52' 55.0173" E	25° 44' 50.5816" N
4	D	71° 51' 04.9603" E	25° 44' 50.5816" N
Bamni Dhani (3.70 sq. km)			
1	A1	71° 53' 30.8823" E	25° 43' 43.0029" N
2	B1	71° 54' 41.2803" E	25° 43' 43.6864" N
3	C1	71° 54' 40.2551" E	25° 42' 42.1736" N
4	D1	71° 53' 29.5360" E	25° 42' 42.6144" N
Soth of Dandali (3.37 sq. km)			
1	A2	71° 54' 54.5706" E	25° 41' 46.7620" N
2	B2	71° 55' 36.2627" E	25° 41' 46.4202" N
3	C2	71° 55' 24.0238" E	25° 40' 11.3632" N
4	D2	71° 54' 43.3359" E	25° 40' 11.8147" N
South of Sarnu (1.70 sq. km)			
1	A3	71° 46' 17.1663" E	25° 39' 03.2308" N
2	B3	71° 47' 23.0078" E	25° 39' 03.4587" N
3	C3	71° 47' 23.0078" E	25° 38' 33.3857" N
4	D3	71° 46' 16.4828" E	25° 38' 33.6136" N

1.11.0 SCOPE FOR PROPOSED EXPLORATION.

1.11.1 The proposed Preliminary Exploration at G-3 stage exploration program for REE mineralization will comprise of DetailedGeological mapping (1:2000 scale), Surface Sampling (Bedrock), Soil profile sampling through Pitting, chemical analysis, physical analysis and geological report preparation. 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

1.12.0 GEOLOGICAL MAPPING

Geological mapping will be done in the South of Nauser (9.18 Sq. Km), Bamni Dhani (3.70 Sq. Km), South of Dandali (3.37 Sq. Km) and South of Sarnu (1.70 Sq. Km)on 1:2000 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.

1.13.0 GEOCHEMICAL SAMPLING

Soil samples shall be collected from 100m X 200m grid by means of pitting about >2m depth. Hence around 450nos of pit in South of Nauser block, 175nos. in Bamni Dhani block, 150nos. pit in South of Dandali Block and 84 nos. of pit in South of Sarnu block with average 2.5m depth may be dug with cumulative 2160cu.m of excavation. Around 1848nos of Samples shall be collected B and C soil profile wise to observe the dispersion pattern.

Further around 130 Nos Bed Rock samples by means of chip sampling and channel sampling shall be collected from suitable litho units to identify the primary source of mineralisation and to identify its distribution pattern.

1.14.0 Ground Geophysical Survey

It is proposed to conduct geophysical surveys, specifically Magnetics, Gravity, and Radiometry, to analyze the response of alkaline rocks and carbonatite dykes, as well as to identify the extension of alkaline/carbonatite bodies in areas covered by soil. A detailed investigation of the proposed block will be carried out using Magnetic, Gravity, and Radiometry surveys to delineate the target mineralization. The survey will be organized in a grid pattern, with 50-meter traverse intervals across the potential zones and a 25-meter station interval. Approximately 14511 stations each are planned for both Magnetic and Gravity surveys, as well as for the Radiometry survey, to map the subsurface alkaline bodies. The traverses will be oriented in the east-west direction with 50-meter traverse intervals across the potential zones and a 25-meter station interval.

Proposed quantum of Geophysical Survey (G-3 level)			
Sl. No.	**Particulars**	**Unit**	**Qty.**
Sector - I (9.18 sq. km)-South of Nauser			
1	Magnetic & Gravity Survey (50mx50m)	Station	7357
2	Radiometry Survey (50mx50m)	Station	7357
Sector - II (3.70 sq. km)- Bamni Dhani			
1	Magnetic & Gravity Survey (50mx50m)	Station	3040
2	Radiometry Survey (50mx50m)	Station	3040
Sector - III (3.37 sq. km)- South of Dandali			
1	Magnetic & Gravity Survey (50mx50m)	Station	2745
2	Radiometry Survey	Station	2745
Sector - IV (1.70 sq. km)- South of Sarnu			
1	Magnetic & Gravity Survey (50mx50m)	Station	1369
2	Radiometry Survey(50mx50m)	Station	1369

1.15.0 Chemical Analysis

A total around 155nos of samples from bedrock, and 1850 nos. of Pit sample (For B and C Soil Profile) shall be generated and be analysed for 34 elements, i.e., REE and associated trace elements (Mg, Ba,Be, Ge, Mo, Sn,Zr, Rb, Hf, Ta, Nb, U, Th,W, Ni, Ga, V, Li, Sc, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu) through ICPMS.

10% of the primary samples, i.e., 201 nos. samples shall be subjected as external check samples and analyzed for the same elements by ICPMS.

1.16.0 PETROLOGICAL STUDIES:

During the course of Geological mapping and bedrock sampling, 20 samples from various litho units from surface and intersected in boreholes will be subjected to petrographic study.

1.17.0 Mineragraphic Study, XRD & EPMA Study

Ten samples from mineralized zones will undergo Mineragraphic studies, while forty samples will be analyzed using XRD. Additionally, twenty samples will be subjected to EPMA study.

Table No 1.5

Summarized Details of the proposed quantum of work

Sl. No.	Item of Work	Unit	Target
1	**DetailedGeological Mapping** (on 1:2000 Scale)	sq.km	17.95
2	**Geochemical Sampling**		
	BRS Samples for REE	Nos	155
3	**Pitting**		
	a) Excavation (>2m depth)	cu.m	2160
	b) Collection of different horizon soil sample	Nos	1850
4	**Geophysical Survey**		
	a) Magnetic and Gravity	No. of Station	14511
	b) Radiometry	No. of Station	14511
5	**Laboratory Studies**		
	a)REE associated Trace Elements(Mg, Ba,Be, Ge, Mo, Sn,Zr, Rb, Hf, Ta, Nb, U, Th,W, Ni, Ga, V, Li, Sc, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu) (34 Element)by ICPMS	Nos	2005
	b) External Check Samples(34 Element)	Nos	201
6	**Physical Study**		
	a) Petrological Study	Nos	20
	c) Mineragraphic	Nos	10
	d) EPMA Study	Hours	8
	e) XRD Study	Nos	40
7	**Report Preparation (5 Hard copies with a soft copy)**	Nos.	1

1.18.0 BREAK-UP OF EXPENDITURE

1.18.1 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.1193.56Lakhs.** The summary of tentative cost estimates for Preliminary Exploration (G-3 Level) is given in **Table – 1.6.**Detailed cost sheet for proposed Reconnaissance Survey (G-3) for REEmineralization is given as Annexure No.I.

Table-1.6
Summary of Cost Estimates for Preliminary Exploration (G-3 Level)

Sl. No.	Item	Total Estimated Cost (Rs.)
1	Geological Work	4,330,488.00
2	Pitting & Trenching	8,208,000.00
3	Geophysical survey	68,606,700.00
4	**Sub total**	**81,145,188.00**
7	Laboratory Studies	17,474,150.50
8	**Sub total**	**98,619,338.50**
10	Report	2,000,000.00
11	Peer Review	30,000.00
12	Proposal Preparation	500,000.00
13	**Total**	**101,149,338.50**
14	GST (18%)	18,206,880.93
Total cost including 18% GST		**119,356,219.43**
SAY, in Lakhs		**1,193.56**

1.19.0 TIME SCHEDULE

1.19.1 The proposed exploration programme envisages geological mapping, geochemical sampling, pitting, Geophysical survey, sample preparation and laboratory studies, which will be completed within 10 months, geological report preparation and peer review will consume 4 more months with one month overlapping with laboratory study. Therefore, a total of 14 months is planned for completion of the entire program.

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LIST OF PLATES

1. Plate-I: Location Map of Proposed Blocks, DistrictBarmer, State Rajasthan
2. Plate-II: Regional Geological Map showingProposed Blocks, District Barmer, State Rajasthan(Source: Bhukosh, GSI)
3. Plate-III: Large Scale Geological Map showing Proposed Blocks, District Barmer, State Rajasthan (Source: Bhukosh, GSI)

Cost Estimate of Preliminary Exploration (G-3 Stage Exploration) for REE mineralisation in South of Nauser (9.18 Sq. Km), Bamni Dhani (3.70 Sq. Km), South of Dandali (3.37 Sq. Km) and South of Sarnu (1.70 Sq. Km) Areas, part of districts: Barmer, State: Rajasthan

Total Area - 17.95 sq km; Completion Time -14 Months, Review after 8th Months

S.N	Item of Work	Unit	Rates as per NMET SoC 2020-21		Estimated Cost of the Proposal		Remarks
			SoC-Item -Sl No.	Rates as per SoC	Qty.	Total Amount (Rs)	
A	**GEOLOGICAL WORK**						
a	Charges for Geologist at field for detailed mapping (1: 2000), pitting, sampling etc	day	1.2	11,000	150	16,50,000	
b	Labour Charges for Geologist;	day	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	Charges for Geologist at HQrs for data processing	day	1.3	9,000	60	5,40,000	
d	Charges for Sampler for geochemical, channel samples	one sampler per day	1.5.2	5,100	276	14,07,600	
e	Labour Charges for Sampling Work	day	5.7	522	1,104	5,76,288	Amount will be reimburse as per the notified rates by the Central Labour Commissioner or respective State Govt. whichever is higher
	Sub-Total A					**43,30,488**	
B	**PITTING AND TRENCHING**						
a	Pitting	Cu m	2.1.2	3,800	2,160	82,08,000	
	Sub-Total B					**82,08,000**	
C	**Geophysical Survey**						
1	Gravity - Magnetic Method - Regional / Detailed (0.5 to 200 sq.km depending on the objective)	Per station	3.1b	4,500	14,511	6,52,99,500	
2	Radiometric survey*	Per station		200	14,511	29,02,200	
3	Charges for Geophysicist party days at HQ for data processing & interpretation	day	3.18	9,000	45	4,05,000	
	Sub-Total C					**6,86,06,700**	
D	**LABORATORY STUDIES**						
1	**Chemical Analysis**						
	Primary Samples Surface + Pit)						
i)	**Primary samples**						
	a. REE , RM and associated Trace Elements (34 Element)by ICPMS	Nos	4.1.14	7,731	2,005	1,55,00,655	Surface samples-100, Pit sample- 50 and Heavy Minerals - 20 from collovial wash and BH Core 50
iii)	**External check samples (10%)**						
	a. REE , RM and associated Trace Elements (34 Element)by ICPMS	Nos	4.1.14	7,731	201	15,50,066	
2	**Physical & Petrological Stusies**						
i)	Preparation of thin section	Nos	4.3.1	2,353	20	47,060	
ii)	Complete petrographic study report	Nos	4.3.4	4,232	20	84,640	
iii)	Preparation of polish section	Nos	4.3.2	1,549	10	15,490	
iv)	Complete mineragraphic study report	Nos	4.3.4	4,232	10	42,320	
v)	Digital Photographs	Nos	4.3.7	280	20	5,600	
vi)	XRD Study	Nos	4.5.1	4,000	40	1,60,000	
vii)	EPMA Study	Hour	4.4.1	8,540	8	68,320	
	Sub-Total -D					**1,74,74,151**	
E	**Total A+B+C+D**					**9,86,19,339**	
F	**Geological Report Preparation**	**5 Hard copies with a soft copy**	**5.2**	A minimum of ₹ 9 lakh or 3% of the value of work whichever is more subject to a maximum amount of ₹ 20 lakh and ₹ 10,000/- per each additional copy		**20,00,000**	EA has to submit the final Geological Report in Hard Copies (5 Nos) and the soft copy to NMET.
G	**Peer review Charges**		**As per EC decision**			**30,000**	
H	**Preparation of Exploration Proposal (5 Hard copies with a soft copy)**	**5 Hard copies with a soft copy**	**5.1**	**2% of the Cost or Rs. 5.00 Lakhs whichever is lower**		**5,00,000**	
I	**Total Estimated Cost without GST**					**10,11,49,339**	
J	**Provision for GST (18% of L)**	**%**				**1,82,06,881**	GST will be reimburse as per actual and as per notified prescribed rate
K	**Total Estimated Cost with GST**					**11,93,56,219**	
					or Say Rs. , In Lakhs:	***1,193.56***	
Note:							
*	Taking rate from OM of Sarnu Block, Barmer, Rajasthan; OM No 23/332/2023-NMET/05 dated 03.04.2023						

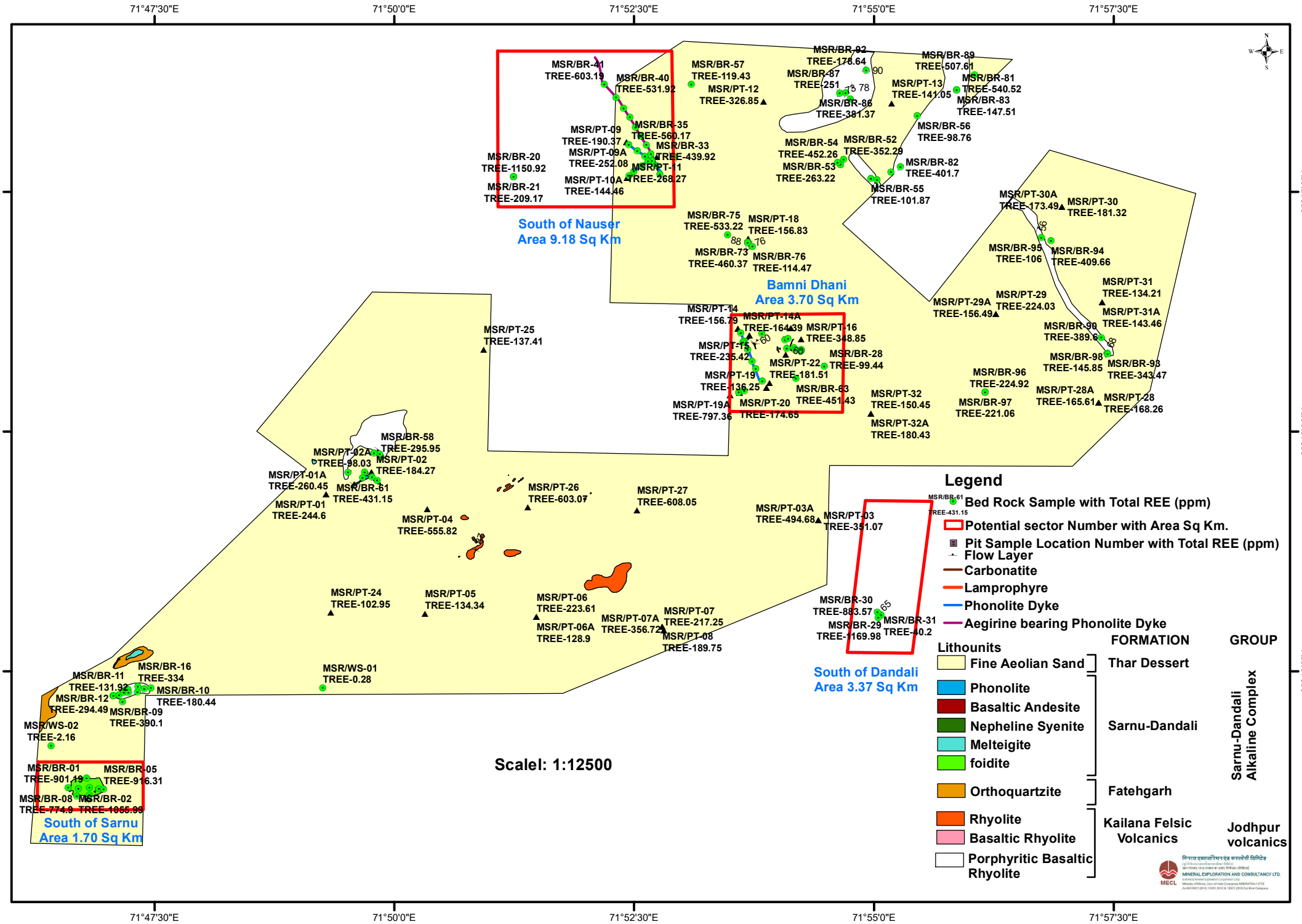
Note - If any part of the project is outsourced, the amount will be reimbursed as per the Paragraph 3 of NMET SoC and Item no. 6 of NMET SoC. In case of execusion of the project by NEA on its own, a Certifiate regarding non outsourcing of any component/project is required.

Time Schedule for Preliminary Exploration (G-3 Stage Exploration) for REE mineralisation in South of Nauser (9.18 Sq. Km), Bamni Dhani (3.70 Sq. Km), South of Dandali (3.37 Sq. Km) and South of Sarnu (1.70 Sq. Km) Areas, part of districts: Barmer, State: Rajasthan

		1	2	3	4	5	6	7	8	9	10		11	12	13	14
1	Camp Setting															
2	Geological Party Days															
3	Pitting & Sampling															
4	Laboratory Studies															
5	Geophysical survey															
6	Geophysical data interpretation											Review				
7	Core Sample Preparation															
8	Camp Winding															
9	Geologist Party days, HQ															
10	Geological Report Writing															
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 and order problems will be addition to above time line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MSR/BR-40 TREE-531.92
MSR/BR-57 TREE-119.43
MSR/PT-12 TREE-326.85
MSR/BR-92 TREE-178.64
MSR/BR-87 TREE-251
MSR/BR-86 TREE-381.37
MSR/BR-89 TREE-507.61
MSR/BR-81 TREE-540.52
MSR/PT-13 TREE-141.05
MSR/BR-83 TREE-147.51
MSR/BR-56 TREE-98.76
MSR/BR-35 TREE-560.17
MSR/PT-09 TREE-190.37
MSR/BR-33 TREE-439.92
MSR/PT-09A TREE-252.08
MSR/PT-11 TREE-268.27
MSR/PT-10A TREE-144.46
MSR/BR-20 TREE-1150.92
MSR/BR-21 TREE-209.17
MSR/BR-54 TREE-452.26
MSR/BR-52 TREE-352.29
MSR/BR-53 TREE-263.22
MSR/BR-82 TREE-401.7
MSR/BR-55 TREE-101.87
South of Nauser Area 9.18 Sq Km
MSR/BR-75 TREE-533.22
MSR/PT-18 TREE-156.83
MSR/BR-73 TREE-460.37
MSR/BR-76 TREE-114.47
Bamni Dhani Area 3.70 Sq Km
MSR/PT-30A TREE-173.49
MSR/PT-30 TREE-181.32
MSR/BR-95 TREE-106
MSR/BR-94 TREE-409.66
MSR/PT-31 TREE-134.21
MSR/PT-29A TREE-156.49
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MSR/PT-04 TREE-555.82
MSR/PT-26 TREE-603.07
MSR/PT-27 TREE-608.05
MSR/PT-03A TREE-494.68
MSR/PT-03 TREE-351.07
MSR/PT-24 TREE-102.95
MSR/PT-05 TREE-134.34
MSR/PT-06 TREE-223.61
MSR/PT-06A TREE-128.9
MSR/PT-07A TREE-356.72
MSR/PT-07 TREE-217.25
MSR/PT-08 TREE-189.75
MSR/WS-01 TREE-0.28
MSR/BR-30 TREE-883.57
MSR/BR-29 TREE-1169.98
MSR/BR-31 TREE-40.2
South of Dandali Area 3.37 Sq Km
MSR/BR-16 TREE-334
MSR/BR-11 TREE-131.92
MSR/BR-10 TREE-180.44
MSR/BR-12 TREE-294.49
MSR/BR-09 TREE-390.1
MSR/WS-02 TREE-2.16
MSR/BR-01 TREE-901.19
MSR/BR-05 TREE-916.31
MSR/BR-08 TREE-774.9
MSR/BR-02 TREE-1055.99
South of Sarnu Area 1.70 Sq Km
Scale1: 1:12500
Legend
Bed Rock Sample with Total REE (ppm)
Potential sector Number with Area Sq Km.
Pit Sample Location Number with Total REE (ppm)
Flow Layer
Carbonatite
Lamprophyre
Phonolite Dyke
Aegirine bearing Phonolite Dyke
Lithounits
FORMATION
GROUP
Fine Aeolian Sand
Thar Dessert
Phonolite
Basaltic Andesite
Nepheline Syenite
Melteigite
foidite
Sarnu-Dandali
Sarnu-Dandali Alkaline Complex
Orthoquartzite
Fatehgarh
Rhyolite
Basaltic Rhyolite
Kailana Felsic Volcanics
Porphyritic Basaltic Rhyolite
Jodhpur volcanics
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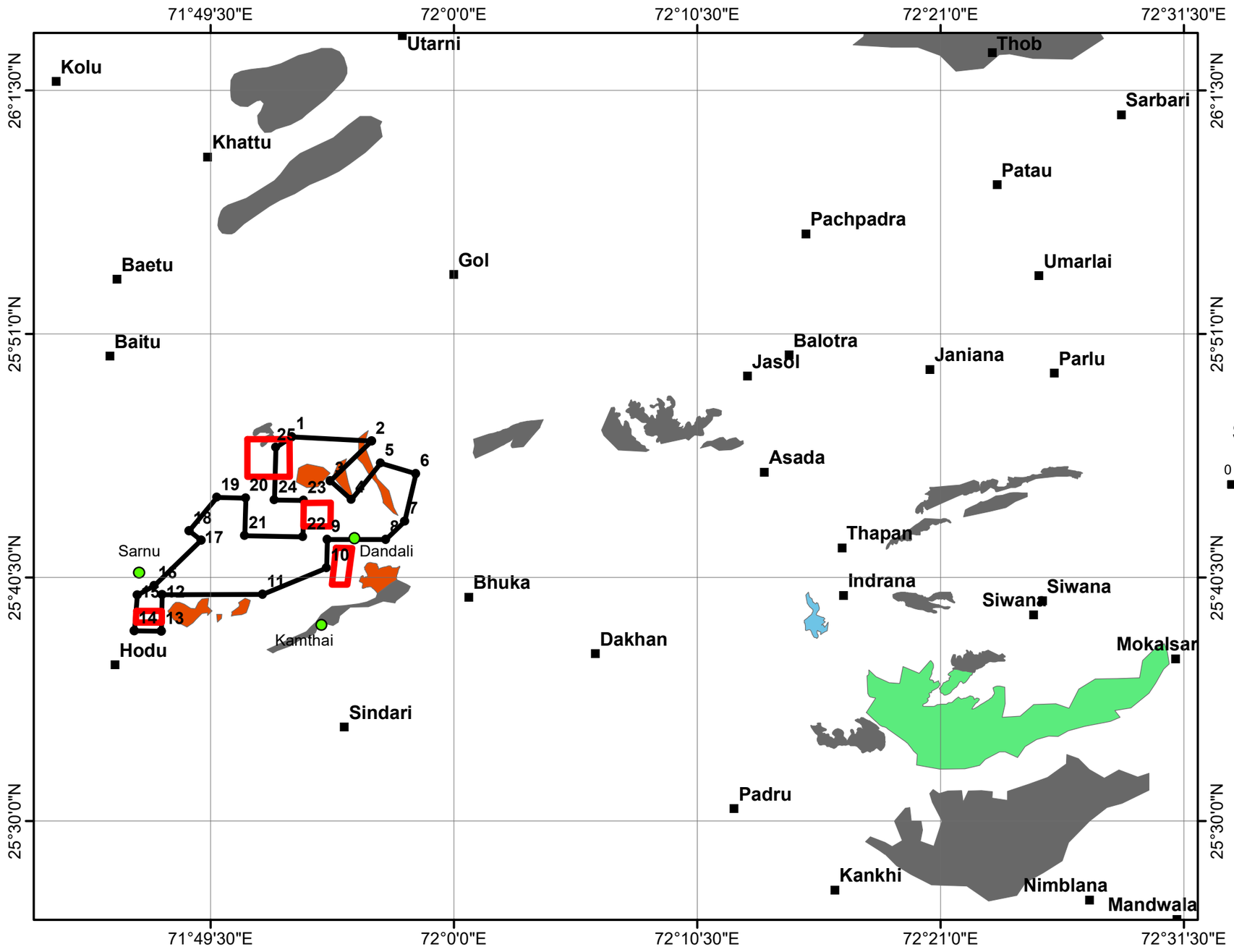
REGIONAL MAP OF PROPOSED BLOCKS (G3 STAGE)
DISTRICT- BARMER, STATE-RAJASTHAN (TS No. 40 O/14)



Legend

- BB_of_Proposed_Sarnu_Block
- B_POINTS_UTM
- places
- Luni River

SOURCE: BHUKOSH_GEOLOGY 2M

0 3,600 7,200 14,400 21,600 28,800 Meters

Legend

- Potential Blocks

STRATIGRAPHY

- DYKE
- 449,SARNU-DANDALI ALKALINE COMPLEX,LATE CRETACEOUS - EOCENE
- 919,JALORE PLUTONICS Gp. (JALOR GRANITE),NEOPROTEROZOIC
- 919,JALORE PLUTONICS Gp. (SIWANA GRANITE),NEOPROTEROZOIC
- 919,JODHPUR VOLCANICS Gp.,NEOPROTEROZOIC

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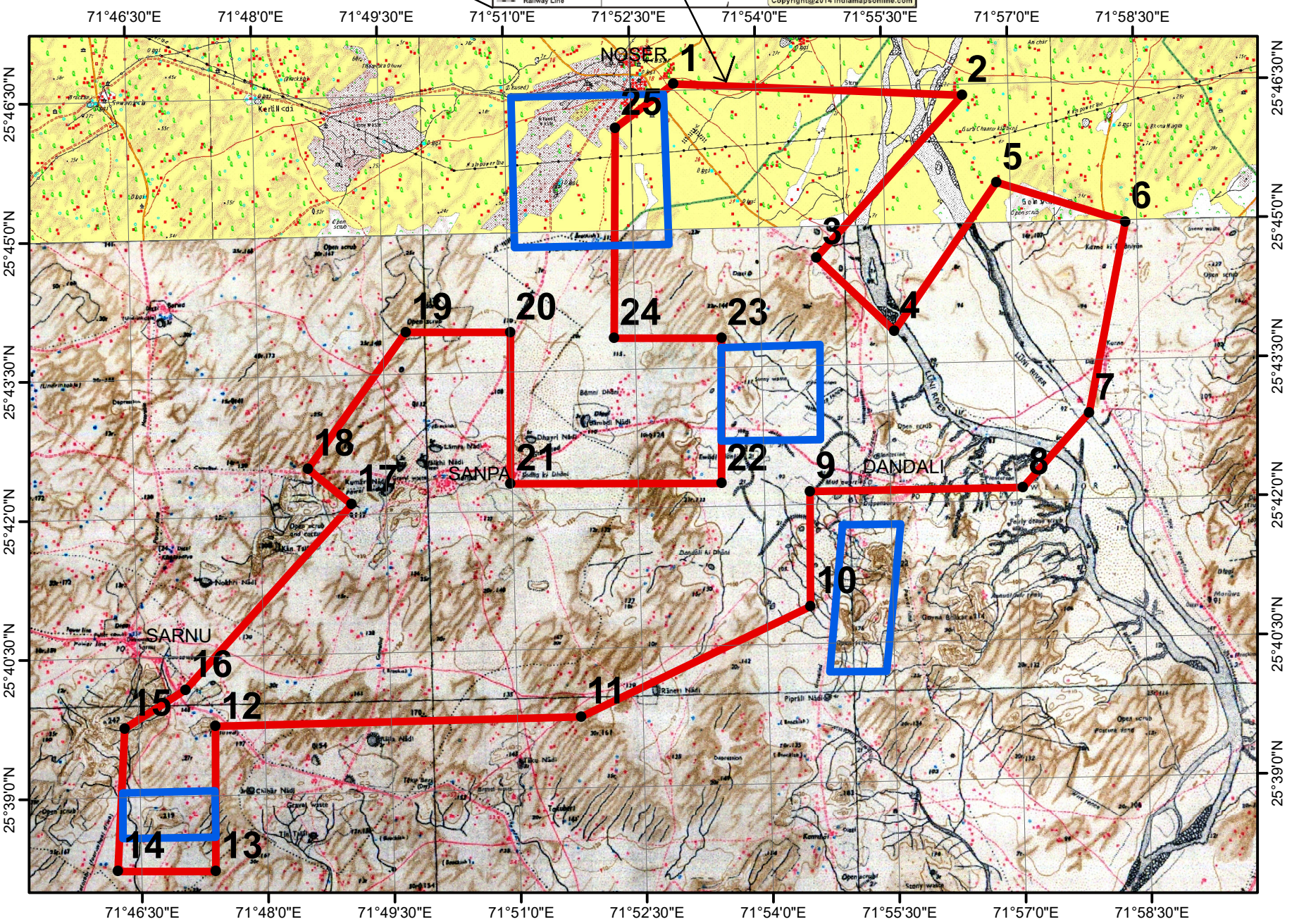
PLATE NO. 2

LOCATION MAP OF PROPOSED BLOCK (G-3 STAGE)
DISTRICT- BARMER, STATE-RAJASTHAN (TS No. 40 O/14)
[South of Nauser (9.18 Sq. Km), Bamni Dhani (3.70 Sq. Km), South of Dandali (3.37 Sq. Km) and South of Sarnu (1.70 Sq. Km)]

N



Sl. No.	Cardinal Point	Datum: WGS-1984 Geographic Coordinate System, Unit: DMS	
		Longitude	Latitude
South of Nauser			
1	A	71° 51' 04.6186" E	25° 46' 27.9768" N
2	B	71° 52' 53.6503" E	25° 46' 27.9768" N
3	C	71° 52' 55.0173" E	25° 44' 50.5816" N
4	D	71° 51' 04.9603" E	25° 44' 50.5816" N
Bamni Dhani			
1	A1	71° 53' 30.8823" E	25° 43' 43.0029" N
2	B1	71° 54' 41.2803" E	25° 43' 43.6864" N
3	C1	71° 54' 40.2551" E	25° 42' 42.1736" N
4	D1	71° 53' 29.5360" E	25° 42' 42.6144" N
Soth of Dandali			
1	A2	71° 54' 54.5706" E	25° 41' 46.7620" N
2	B2	71° 55' 36.2627" E	25° 41' 46.4202" N
3	C2	71° 55' 24.0238" E	25° 40' 11.3632" N
4	D2	71° 54' 43.3359" E	25° 40' 11.8147" N
South of Sarnu			
1	A3	71° 46' 17.1663" E	25° 39' 03.2308" N
2	B3	71° 47' 23.0078" E	25° 39' 03.4587" N
3	C3	71° 47' 23.0078" E	25° 38' 33.3857" N
4	D3	71° 46' 16.4828" E	25° 38' 33.6136" N

0 1,700 3,400 6,800 10,200 13,600 Meters

Legend

- BOUNDARY POINTS
- BLOCK BOUNDARY OF SARNU BLOCK
- PROPOSED BLOCKS

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PLATE NO. 1