# DETAILED PROPOSAL REPORT (DPR)

## FOR RECONNAISSANCE SURVEY(G4-STAGE) FOR VANADIUM & TITANIUM IN ALUMINOUS LATERITE, KOTTUR BLOCK (66 SQ.KM), SANGAREDDY DISTRICT, TELANGANA.

**COMMODITY: Vanadium, Titanium in Aluminous Laterite**

**By**

**M/S GMMCO Technology Services Ltd (GTS)**
**Hyderabad, Telangana**

CKA Birla Group | GTS

**FOR SUBMITTING DPR FORUNDERTAKING 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 - 500032 | 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 - 500032 |
| (c) | Telephone No(Office) | +91-7032711678 |
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| (e) | Mobile No | +91-7032711678 |
| (f) | Telephone No(Res.) | |
| (g) | E- Mail address | pundarikarao.d@gts-india.com |

| 2) Details 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 toSection4(1) of the MMDR Act. | 13th Sept - 2024 |
| (d) | Date of expiry of notification | 12th Sept- 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) | Sangareddy |
| (c) | Nearby village(s) | Burdipahad, Sathwar, Didgi, Kotturu and Buchneilli |
| (d) | Survey of India Toposheet No(s) | 56G/10 |
| (e) | Area in Sq.Km | 66 Sq. Km |
| (f) | Boundary co-ordinates of the Proposed Block (in Decimal Degree) | |

| Corner points | Latitude (DD) | Longitude (DD) |
|---|---|---|
| A | 17.681264° N | 77.516836° E |
| B | 17.721833° N | 77.521914° E |
| C | 17.745753° N | 77.573967° E |
| D | 17.745581° N | 77.631014° E |
| E | 17.686038° N | 77.634168° E |

| | | |
|---|---|---|
| **4) Mineral Potential of the area** | | |
| (a) | Name of Mineral(s) identified/expected in thearea/block | Vanadium &Titanium in Aluminous Laterite |
| (b) | Title of the Project | Kottur Block |
| (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.56G/10 | |
| (ii) | Documents mentioned in item 4(d) above. | |

**Signature of the aplicant**

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

Place: Hyderabad

Date: 06.08.2026

# Summary of the Block

## Reconnaissance Survey (G4-stage) for Vanadium & Titanium in Aluminous Laterite, Kottur Block (66Sq.Km), Sangareddy District, Telangana

<table>
<tr><th>S.No</th><th>Features</th><th>Details</th></tr>
<tr><td></td><td>Block ID</td><td>Kottur Block</td></tr>
<tr><td></td><td>Exploration Agency</td><td>M/s GMMCO Technology Services Limited<br>Hyderabad, India.</td></tr>
<tr><td></td><td>Commodity</td><td>Vanadium & Titanium in Aluminous Laterite</td></tr>
<tr><td></td><td>Mineral Belt</td><td>Deccan trap volcanism</td></tr>
<tr><td></td><td>Completion Period with entire Time schedule to complete the project</td><td>Ten (10) months</td></tr>
<tr><td></td><td>Objectives</td><td>1) To target the aluminous laterite for V, Ti, and Ga mineralization over Deccan Trap provenance.<br>2) To carry out detailed geological mapping of the 66 sq km block on 1:12,500 scale for delineating potential zones for V, Ti, and Ga mineralization.<br>3) To undertake systematic grab, channel, and groove sampling of bedrock from identified favorable and mineralized zones.<br>4) To assess and establish G-4 category (UNFC code 334) reconnaissance-level prospects for Vanadium, Titanium, and Gallium within the block, in accordance with UNFC norms and the Minerals (Evidence of Mineral Contents) Rules.</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<br>Hyderabad, India</td></tr>
<tr><td></td><td>Name/Number of Geoscientists</td><td>Two Senior Geologists</td></tr>
<tr><td></td><td>Expected Field days(Geology)Geological Party Days</td><td>Two Senior Geologists-60 days (2x60 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 (DD)</th><th>Longitude (DD)</th></tr>
<tr><td>A</td><td>17.681264° N</td><td>77.516836° E</td></tr>
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</table>
</td></tr>
<tr><td></td><td>Villages</td><td>Burdipahad, Sathwar, Didgi, Kotturu and Buchneilli</td></tr>
<tr><td></td><td>Tehsil /Taluk</td><td>Kohir Mandal</td></tr>
<tr><td></td><td>District</td><td>Sangareddy</td></tr>
<tr><td></td><td>State</td><td>Telangana</td></tr>
<tr><td>2.</td><td colspan="2">Area (hectares/square kilometers)</td></tr>
<tr><td></td><td>Block Area (Sq.Km)</td><td>66</td></tr>
<tr><td></td><td>Forest Area</td><td>Nil</td></tr>
<tr><td></td><td>Government Land Area</td><td>Nil</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>Medak Railway station</td></tr>
<tr><td></td><td>Road</td><td>The village Kotturis located in Kohir Mandal of Sangareddy District in the State of Telangana in India. The nearest town is</td></tr>
</table>

| | | |
|---|---|---|
| | | Zahirabad, which is about 22 kilometers away. |
| | Airport | The nearest airport is Rajiv Gandhi International Airport (RGIA), Hyderabad |
| **4.** | **Hydrography** | |
| | Local Surface Drainage Pattern (Channels) | The proposed area represents a plateau geomorphic settingcharacterized by an undulating terrain, with a moderately to highly dissected upper plateau developed in the north-western part of Toposheet No. 56G/10. The regional physiography and drainage pattern, governed by prevailing tropical climatic conditions, have played a significant role in the development of laterite cover and the residual enrichment of alumina, primarily through prolonged processes of chemical weathering, oxidation, and leaching. |
| | Rivers/Streams | |
| **5.** | **Climate** | |
| | Mean Annual Rainfall | Sangareddy district, part of Telangana's Central Telangana Zone, receives an average annual rainfall of around 978 mm |
| | Temperatures (December) (Minimum) Temperatures(June) (Maximum) | Tropical climate with hot summers, mild winters, and southwest monsoon rainfall. |
| **6.** | **Topography** | |
| | Toposheet Number | 56G/10 |
| | Morphology of the Area | The proposed area is gentle undulations and low-lying areas |
| **7** | **Availability of baseline geosciences data** | |
| | Geological Map (1:50K/25K) | Regional Geological Map - GSI (1:50,000 scale) |
| | Geochemical Map | NGCM data available |
| | Geophysical Map | NGDR (Aeromagnetic, ground geophysical) |
| **8.** | **Justification for taking up Reconnaissance Survey / Regional Exploration** | The proposed block falling in Toposheet No. 56G/10 has been identified as a promising area for reconnaissance-level (G-4) exploration based on both geochemical evidence and field observations. As reported by Geological Survey of India (2024), lateritic profiles in the region exhibit significant geochemical variability, with $Al_2O_3$ values reaching up to 34.63%, $Fe_2O_3$ up to 37.24%, $TiO_2$ up to 8.55%, and vanadium enrichment up to 2023 ppm. These elevated concentrations indicate intense lateritisation processes and residual enrichment of alumina and iron along with associated critical elements.The mineralisation in the proposed block is genetically linked to the intense lateritisation of Deccan Trap basalts, which has resulted in the residual concentration of aluminium-bearing phases and enrichment of vanadium, titanium, and gallium. Reconnaissance field traverses have also recorded surface manifestations of well-developed lateritic profiles, further supporting the geochemical data.<br><br>The occurrence of aluminous laterite, coupled with elevated concentrations of V, Ti, and Ga, indicates favourable conditions for hosting critical mineralisation within the block. However, the current level of investigation remains preliminary, with limited sampling and broad-scale observations. Therefore, systematic G-4 stage exploration is justified to establish reconnaissance-level prospects, involving detailed geological mapping, systematic sampling, and geochemical evaluation in accordance with UNFC guidelines. |

# Detailed Summary of the Block

## Contents

## 1. Detailed Block Summary

### Introduction

Laterite and bauxite deposits formed through prolonged tropical weathering are important repositories of aluminium and several critical minerals, notably vanadium (V), titanium (Ti), gallium (Ga), scandium (Sc), and rare earth elements (REEs). With the increasing demand for critical minerals in renewable energy, advanced electronics, aerospace, and defence sectors, the exploration of laterite-hosted critical mineral resources has gained strategic importance in India.

Extensive laterite and bauxite deposits occur across the Deccan Traps, Eastern Ghats, Western Ghats, and other cratonic regions of India. Investigations by GSI and other agencies have demonstrated significant enrichment of critical minerals within lateritic profiles due to prolonged weathering and residual concentration processes. Recent studies in the Zaheerabad-Sangareddy region of Telangana have established substantial resources of bauxite and aluminous laterite developed over Deccan Trap basalts, along with encouraging concentrations of vanadium and titanium. These findings highlight the critical mineral potential of basalt-derived lateritic terrains in the Deccan Volcanic Province.

The proposed block in Toposheet No. 56G/10 exhibits geological, geomorphological, and geochemical characteristics comparable to the resource-bearing lateritic terrains of western Telangana. The area is characterized by extensive lateritic cappings developed over Deccan Trap basalts and well-preserved weathering profiles. Preliminary investigations have indicated elevated concentrations of $Al_2O_3$, $Fe_2O_3$, $TiO_2$, and vanadium, suggesting favourable conditions for the development of aluminous laterite, bauxite, and associated critical mineral enrichment.

Considering the strategic importance of critical minerals, the proven potential of lateritic terrains in India, and the encouraging geological and geochemical indicators within the proposed area, a systematic G-4 stage reconnaissance survey is warranted. The proposed investigation comprising geological mapping, geochemical sampling, pitting/trenching, and exploratory drilling will generate baseline data for assessing the Al-V-Ti-Ga potential of the area and identifying targets for subsequent detailed exploration. The study will contribute to strengthening India's critical mineral resource base and support the objectives of the National Critical Mineral Mission.

### Location and details of the area

The proposed block falls within Survey of India Toposheet No. 56G/10 and is located in the administrative jurisdiction of Sangareddy District, Telangana (Plate-1). The area forms part of Khoir Mandal, where extensive laterite exposures are observed. Geomorphologically, the region is characterized by laterite-capped uplands developed over the Deccan Trap basaltic terrain. The nearest major town is Zaheerabad, situated approximately 22 km from the proposed block. The area is well connected by a network of roads linking it to Zaheerabad and other nearby settlements, facilitating access for exploration activities.

## Physiography

Toposheet No. 56G/10 is characterised by a plateau-dominated physiography with gently to moderately undulating terrain, developed as part of the Deccan plateau region. The area comprises laterite-capped uplands, intervening shallow valleys, and locally dissected plateau remnants, reflecting prolonged subaerial exposure and tropical weathering.

Elevation varies moderately across the toposheet, with higher ground forming subdued plateaus and lower elevations marked by seasonal nalas and minor drainage channels. The drainage pattern is predominantly dendritic to sub dendritic, controlled by regional slope and structural weaknesses, and exhibits a moderate to high degree of dissection in places. The combined influence of physiography, drainage, and tropical climatic conditions has favoured intense lateritisation and residual concentration of alumina and associated elements, making the area conducive for aluminous laterite bauxite and allied critical mineral occurrences.

## Regional Geological set-up

The proposed block falls within the eastern part of the Deccan Traps, one of the world's largest continental flood basalt provinces, emplaced during the Late Cretaceous period (~67-65 Ma). The Deccan volcanism comprises a thick succession of sub-horizontal basaltic lava flows covering large parts of western and central India. The volcanic sequence was emplaced through multiple eruptive episodes, producing extensive plateau-forming basalt flows that now constitute the characteristic physiography of the Deccan Plateau. Studies by Chenet et al. (2007, 2008) have recognized three principal phases of volcanism, with the most voluminous eruptive phase occurring close to the Cretaceous-Tertiary Boundary (KTB), underscoring the global geological significance of the Deccan volcanic event.

The proposed area is underlain by Deccan Trap basalts consisting predominantly of massive and vesicular basalt flows, locally exhibiting amygdaloidal textures. These basaltic rocks have undergone prolonged subaerial exposure under tropical to subtropical climatic conditions, resulting in intense chemical weathering and the development of thick lateritic profiles. Lateritisation has led to extensive leaching of silica and alkalis, accompanied by residual enrichment of iron and aluminium, thereby forming ferruginous and aluminous laterites over the basaltic parent rocks.

In the study area, the weathering profile typically comprises a sequence of soil, ferruginous laterite, aluminous laterite, mottled zone, saprolite, and weathered basalt, grading downward into fresh basalt. Core-stone horizons are locally observed within the saprolitic zone, indicating differential weathering of the parent basalt. Fresh basalt is generally expected at depths exceeding 30-40 m, depending on topography and intensity of weathering. The lateritic duricrust is well preserved over plateau tops and gently sloping surfaces, reflecting prolonged geomorphic stability.

The prolonged weathering history of the Deccan basalts has facilitated the residual concentration of alumina, iron, titanium, vanadium, gallium, and other trace elements within the lateritic profile. Preliminary geochemical data indicating elevated $Al_2O_3$,

$Fe_2O_3$, $TiO_2$, and vanadium values further support the prospectivity of the area. Owing to its favourable geological setting, well-developed lateritic profiles, and encouraging geochemical signatures, the proposed block constitutes a promising target for exploration of aluminous laterite, bauxite, and associated critical minerals. Therefore, systematic G-4 stage reconnaissance investigations are warranted to assess the extent and economic potential of AV-Ti-Ga mineralization in accordance with UNFC guidelines and the Minerals (Evidence of Mineral Contents) Rules, 2015.

## Regional Stratigraphy

The regional geological framework is dominated by Archaean granitoid-gneissic assemblages, comprising granite, adamellite, granodiorite, quartz-monzonite, alkali feldspar granite, quartz syenite, and alkali feldspar granite, collectively forming a composite batholith with diapiric emplacement (Condie, 1981). These granitoids constitute more than 80% of the area and enclose enclaves of amphibolite and banded gneiss, referred to as Gneiss-I, derived from tonalite, granodiorite, diorite, and amphibolite protoliths and metamorphosed under amphibolite facies conditions (Sarvothaman et al., 1983).Subsequent deformation and metamorphism of quartz-monzonite, adamellite, and granite under greenschistfacies conditions led to the development of Gneiss-II assemblages (Sarvothaman et al., 1983). Alkali feldspar granites, representing the youngest phase of granitic intrusion, transect all earlier litho-units. The basement complex is intruded by multiple generations of basic dykes, including amphibolitic, doleritic, and pyroxenitic dykes, emplaced both prior to and subsequent to alkali feldspar granite intrusion. Pegmatite and quartz veins/reefs cut across all lithological units.

The Deccan Trap volcanic sequence, comprising five basaltic flows, unconformably overlies the Archaean gneiss-granite complex, with conglomeratic horizons marking the basal unconformity. Intertrappean beds, predominantly chert with subordinate marl, occur between the lower basalt flows, notably between Flows I-II and III-IV. The volcanic sequence is capped by laterite, formed due to prolonged subaerial weathering under tropical climatic conditions.

**Table.1Regional stratigraphy of the proposed area (Source - GSI)**

| Group | Lithology |
|---|---|
| **DECCAN TRAP** | **Laterite**<br>Basalt flow No. V<br>Intertrappean bed-D: Chert<br>Basalt flow No. IV<br>Intertrappean bed-C: Chert with marl<br>Basalt flow no. III<br>Intertrappean bed-B: Chert with marl<br>Basalt flow no. II<br>Intertrappean bed-A: Chert with marl<br>Basalt flow no. I<br>Infratrappean bed: Conglomerate |
| -------- Unconformity-------- | |
| **ARCHAEAN GNEISSGRANITE COMPLEX** | Granitiods |

## Geology of the Block

The proposed block is underlain by Cenozoic laterite formations developed over Late Cretaceous-Palaeocene basaltic flows of the Deccan Traps (Sahyadri Group), along with associated intertrappean beds comprising chert and chert with marl. The laterites represent the products of intense chemical weathering of basalt under tropical climatic conditions, leading to residual enrichment of iron, alumina, and associated elements. Consequently, the lithological assemblage within Toposheet No. 56G/10 is dominated by Deccan Trap basalts, intertrappean sediments, and lateritic caps (Plat-4).

Four younger basalt flows, designated Flows II, III, IV, and V (Table 1), are recognised in the area. These flows are sub-horizontal to horizontal, laterally extensive, and exhibit typical 'Aa' type basaltic characteristics, including thick massive cores, locally developed columnar jointing, rough and rubbly upper surfaces, and highly vesicular flow tops. Vesicles, ranging in size from 1 mm to 10 mm, are commonly infilled with secondary minerals such as calcite, zeolite, drusy quartz, and chalcedony. Individual flows are distinguished on the basis of their fragmental and vesicular flow tops, weathering characteristics, joint patterns, and intervening intertrappean horizons. Laterite occurs both as isolated cappings and as extensive blanket deposits over the trap flows, with profile thickness varying from 1 m to 30 m. Parts of Flows II and III have undergone advanced lateritisation, producing vermicular, hard, massive, and concretionary laterite. The laterite exhibits colour variations from brick red and reddish-brown to dark greyish red, reflecting differences in degree of weathering and iron enrichment.

## Scope for proposed exploration

The proposed exploration programme aims to undertake G-4 stage reconnaissance investigation to assess the aluminous laterite bauxite potential and associated critical minerals (V, Ti, and Ga) within the block. The scope includes systematic geological and structural mapping to delineate laterite cover, basalt flows, intertrappean horizons, and favourable geomorphic domains controlling lateritisation and mineral enrichment.

Detailed surface sampling (grab, channel, and groove) will be carried out from laterite profiles, bauxite horizons, and mineralised zones to evaluate the spatial and vertical variation of $Al_2O_3$, $Fe_2O_3$, $TiO_2$, V, and Ga. Limited shallow subsurface investigations, wherever feasible, will be undertaken to understand laterite thickness, profile development, and grade continuity.The exploration will generate baseline geological, geochemical, mineralogical, and analytical data to identify promising zones, establish G-4 category (UNFC code 334) prospects, and provide a scientific basis for subsequent G-3 stage detailed exploration.

## Mineral Potentiality based on Geology

Mineralisation within the proposed block is closely associated with intense lateritisation of Deccan Trap basalts, which has resulted in the residual concentration of aluminium and iron, along with enrichment of vanadium, titanium, and gallium. During prolonged tropical weathering, silica and alkalis were leached, while relatively immobile elements such as Al, Fe, Ti, and V became progressively concentrated within the lateritic profile. Vanadium is preferentially enriched through adsorption and substitution within iron oxides and hydroxides, whereas titanium occurs largely as resistant Ti-bearing phases and as lattice-bound components within the weathered basalt. Gallium, owing to its geochemical affinity with aluminium, is commonly incorporated within aluminous laterite and bauxite horizons. The development of thick, mature lateritic profiles, particularly overflows II and III, thus provides favourable conditions for the formation of Al-V-Ti-Ga bearing laterite and bauxite, warranting systematic G-4 stage reconnaissance evaluation.

## 4. Planned Methodology

The proposed investigation will be carried out at the G-4 (Reconnaissance) stage through an integrated programme of surface mapping, sampling, and laboratory studies, aimed at generating UNFC-compliant baseline data in accordance with the Minerals (Evidence of Mineral Contents) Rules.

### i) Geological and Structural Mapping

Detailed geological and geomorphological mapping on 1:12,500 scale will be undertaken to delineate laterite cover, basalt flows (II-V), Intertrappean horizons, and associated structural features such as fractures, joints, lineaments, and flow contacts that influence lateritisation and mineral enrichment.

### ii) Surface Sampling

Systematic grab, channel, and groove sampling will be carried out from laterite profiles, bauxite horizons, vesicular flow tops, and other favourable zones. Sampling will be designed to assess lateral and vertical variation in $Al_2O_3$, $Fe_2O_3$, $TiO_2$, V, and Ga content.

### iii) Subsurface Investigation

Subsurface investigations will be carried out to understand the thickness, lateral continuity, and vertical variation of the laterite profile. Limited shallow pits and trenches, wherever feasible, will be excavated to study laterite thickness, profile development, weathering characteristics, and grade variation with depth. Representative samples will be collected from different horizons for chemical and mineralogical analyses. In addition, five exploratory boreholes, each of approximately 35 m depth (total drilling: 175 m), are proposed to assess the subsurface disposition of the laterite and aluminous laterite horizons, establish the bedrock interface, evaluate vertical grade distribution, and generate geological data for resource estimation and

future exploration planning. Core samples obtained from drilling will be systematically logged, sampled, and analyzed to delineate the mineralized zones and understand their continuity.

### iv) Laboratory Analysis

Selected samples will be analysed for major oxides by XRF and trace and critical elements by ICPMS. Petrographic, ore microscopic, SEM-EDX, and XRD studies will be carried out to characterise mineralogy, textural relationships, and host rock-mineral associations.

### v) Data Integration and Assessment

All geological, geochemical, and mineralogical data will be integrated to delineate favourable zones and assess the G-4 category (UNFC code 334) potential of aluminous laterite-bauxite and associated V-Ti-Ga mineralisation, providing a scientific basis for recommending G-3 stage detailed exploration.

## 5. Nature Quantum and Target

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

**Table.5 Proposed works in Kottur Block**

| S. No | Activities | Unit | Proposed Target |
|---|---|---|---|
| 1 | Geological Mapping (on 1:12,500 Scale) | Sq. Km | 66 |
| 2 | Pitting | Cu m | 50 |
| 3 | Drilling (5 boreholes - 30 m each) | Meters | 150 |
| | **Chemical Analysis** | | |
| 4 | a) Major oxides (WD XRF)- (oxides+ traces -24 elements) | Nos. | 248 |
| 5 | b) 14 REE elements + 9 trace element (U, Ta, Ge, Be, Hf, Sn, As, Rb,Th) by ICP-MS | Nos. | 33 |
| | Laboratory studies | | |
| 6 | a) Preparation of polished thin section | Nos. | 10 |
| 7 | b) Study of polished thin section | Nos. | 10 |
| 8 | c) SEM-EDX Studies | Nos | 2 |
| 9 | Report Preparation (5 Hard copies with a soft copy) | Nos. | 1 |
| 10 | Preparation of Exploration Proposal | No's | 1 |

## 6. Manpower deployment

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

**Table .6 Proposed manpower deployment**

| S.No | Category | Number | Role / Responsibility |
|---|---|---|---|
| 1 | Geologists | 2 | Overall supervision, planning and execution of geological mapping, structural studies, and data integration |
| 2 | Field Labour | 2 | Collection, labelling, preparation, and dispatch of bedrock, trench and pit |
| 3 | Sampler | 1 | Collection, labelling, preparation, and dispatch of bedrock, trench, pit, and core samples. |
| 4 | Supporting Labour for sample collection | 2 | Assist sampler in sample collection, handling, and processing. |

## 7. Time Schedule for Reconnaissance survey

The proposed Reconnaissance survey (G4-stage) for Vanadium & Titanium in Aluminous Laterite, Kottur Block (66 Sq.Km), Sangareddy District, Telangana; Schedule timeline: Ten (10) months. The work schedule has been designed to ensure systematic progression from surface investigations to limited sub-surface evaluation and data integration.

**Table .7 Proposed time schedule**

| Timeline for Reconnaissance Survey for (G4) Vanadium &Titanium in Aluminous Laterite in Kottur Area, Sangareddy District, Telangana. Total Block Area- 66 sq.km, Drilling: 150 m; BH: 5 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Activity | Unit | Months | | | | | | | | | | | | |
| | | | 1 | 2 | 3 | 4 | | 5 | 6 | 7 | 8 | | 9 | 10 |
| 1 | Camp Establishment | Months | | | | | Review-1 | | | | | Review-2 | | |
| 2 | Geological mapping | Months | | | | | | | | | | | | |
| 3 | Sampling (Pitting) | Months | | | | | | | | | | | | |
| 4 | Sampling analysis (Pitting) | Months | | | | | | | | | | | | |
| 5 | Survey | 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

| Reconnaissance Survey for (G4) Vanadium &Titanium in Aluminous Laterite in Kottur Area, Sangareddy District, Telangana. Area- 66 sq.km, Completion time- 10 months, Review 4 & 8 months; Drilling 150 m in 5 BHs (30 m each)<br>Implementing Agency: GMMCO Technology Services Limited | | | | | | |
|---|---|---|---|---|---|---|
| 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** | | | | | |
| i | Geological Mapping (on 1:12,500 Scale) | Sq.km | 1.1 | 18,300 | 66 | 12,07,800 |
| ii | Charges for Geologist per day (Field) for geological mapping & trenching work | day | 1.2.1a | 14,500 | 120 | 17,40,000 |
| iii | Charges for Geologist per day (HQ) | day | 1.2.1a | 10,500 | 30 | 3,15,000 |
| iv | Labours (Field) per one Geologist | | 5.8 | 556 | 240 | 1,33,440 |
| v | Charges for one Sampler per day (1 Party) | day | 1.1.1b | 7,850 | 32 | 2,51,200 |
| vi | Labour (field) for sampler | Per day | 5.8 | 556 | 128 | 71,168 |
| | **Sub Total-A** | | | | | **37,18,608** |
| **B** | **Survey Work** | | | | | |
| i | DGPS Survey and for BH fixation & RL determination (5 BH's) | Per Point of observation | 1.3.2 | 24,000 | 5 | 1,20,000 |
| | **Sub Total- B** | | | | | **1,20,000** |
| **C** | **Pitting/Trenching** | | | | | |
| i | Pitting | per cu.m | 2.1.2 | 4,725 | 50 | 2,36,250 |
| | **Sub Total- C** | | | | | **2,36,250** |
| **D** | **Drilling** | | | | | |
| i | Drilling (In-house) | per m | 2.2.1.1c | 5,500 | 150 | 8,25,000 |
| ii | Land / Crop Compensation (in case the BH falls in agricultural Land) | per BH | 5.6 | 30,000 | 5 | 1,50,000 |
| iii | Construction of concrete Pillar (12"x12"x30") | Per borehole | 2.2.7 | 2,000 | 5 | 10,000 |
| iv | Borehole plugging by cement | Lum sum per borehole | 2.2.8 | 10,000 | 5 | 50,000 |
| v | Miscellaneous Charges (Transportation of Drilling Rig, Accommodation for Drill Camp, Camp setting and winding, construction of Approach Road) | Drilling cost | 2.2.9 | 0.25 | | 2,06,250 |
| vi | Core preservation | m | 5.3 | 1,590 | 70 | 1,11,300 |
| | **Sub Total- D** | | | | | **13,52,550** |
| **E** | **LABORATORY STUDIES** | | | | | |
| **1** | **Chemical Analysis** | | | | | |
| i | Major oxides (WD XRF)- (oxides+ traces -24 elements) | Per Sample | 4.1.17a | 4,200 | 225 | 9,45,000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ii | 10% External Check Samples | Per Sample | 4.1.17a | 4,200 | 23 | 96,600 |
| iii | Analysis of one rock/ soil sample for quantitative analysis of 14 REE elements + 9 trace element(sequential technique) including Ga and Sc | Per Sample | 4.1.15 | 7,400 | 30 | 2,22,000 |
| iv | 10% External Check Samples | Per Sample | 4.1.15 | 7,400 | 3 | 22,200 |
| **2** | **Physical & Petrological Studies** | | | | | |
| i | Preparation of polished thin section | Per sample | 4.3.2 | 800 | 10 | 8,000 |
| ii | Study of thin polished section | Per sample | 4.3.4 | 2,800 | 10 | 28,000 |
| iii | SEM Studies | Per day | 4.4.1a | 8,800 | 2 | 17,600 |
| | **Sub Total E** | | | | | **13,39,400** |
| | **Total A to E** | | | | | **67,66,808** |
| **F** | Geological Report Preparation | One time | 5.2 | Lumpsum | | 2,50,000 |
| **G** | Peer review Charges | As per EC decision | | | | 30,000 |
| **H** | Preparation of Exploration Proposal (Soft copy) | One time | 5.1 | 2% of the Cost or Rs. 5.0 Lakhs whichever is less | | 1,35,941 |
| **I** | **Total Estimated Cost without GST** | | | | | **71,82,144** |
| **J** | **Provision for GST (18% of I)** | | | | | **12,92,786** |
| **K** | **Total Estimated Cost with GST** | | | | | **84,74,930** |
| | | | | **Say Rs. In Lakhs** | | **84.75** |

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## Plates

Plate -1: Location map of the proposed block

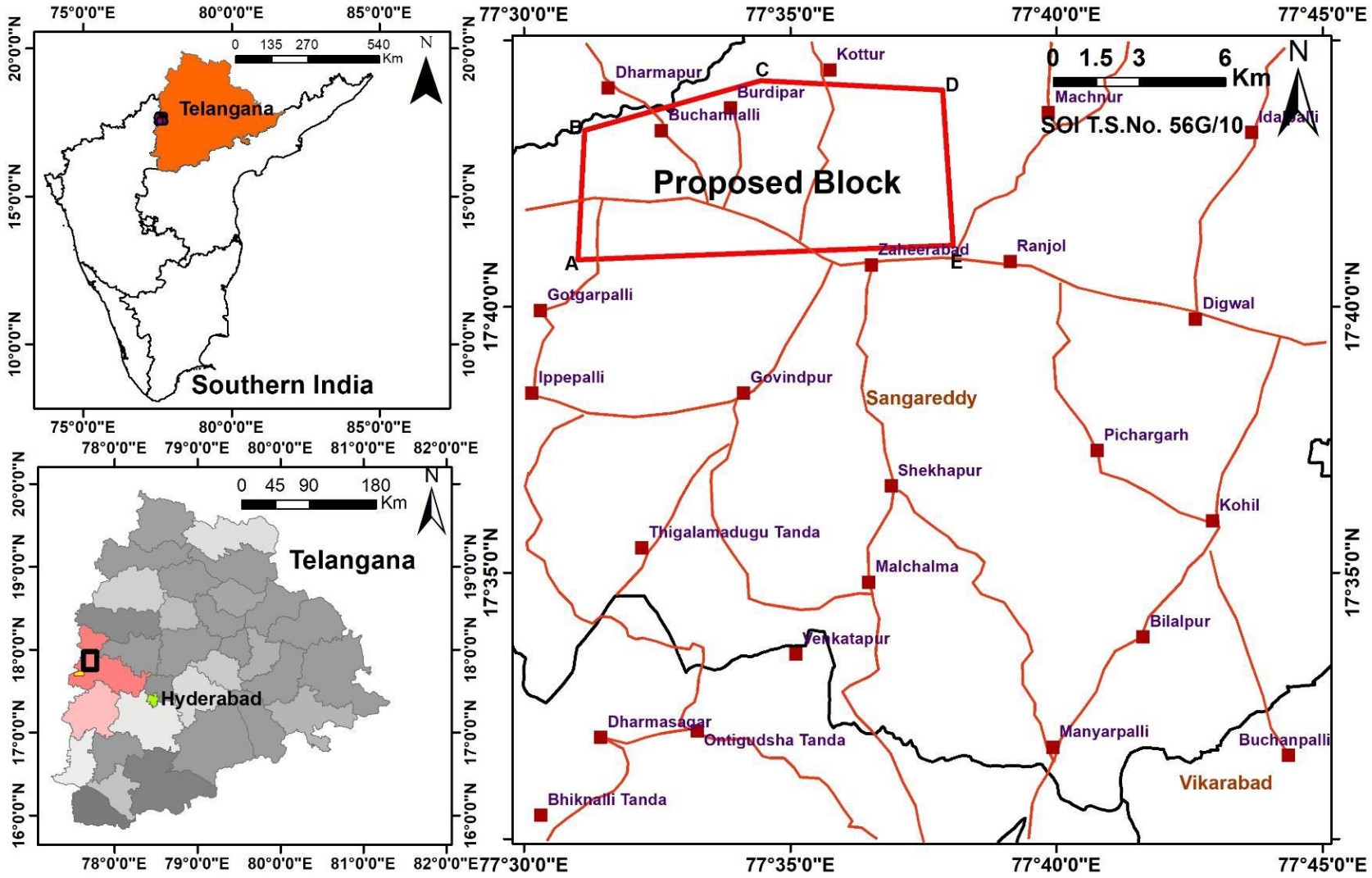

Plate-2: Survey of toposheet No. 56G/10 showing the Kottur proposed block

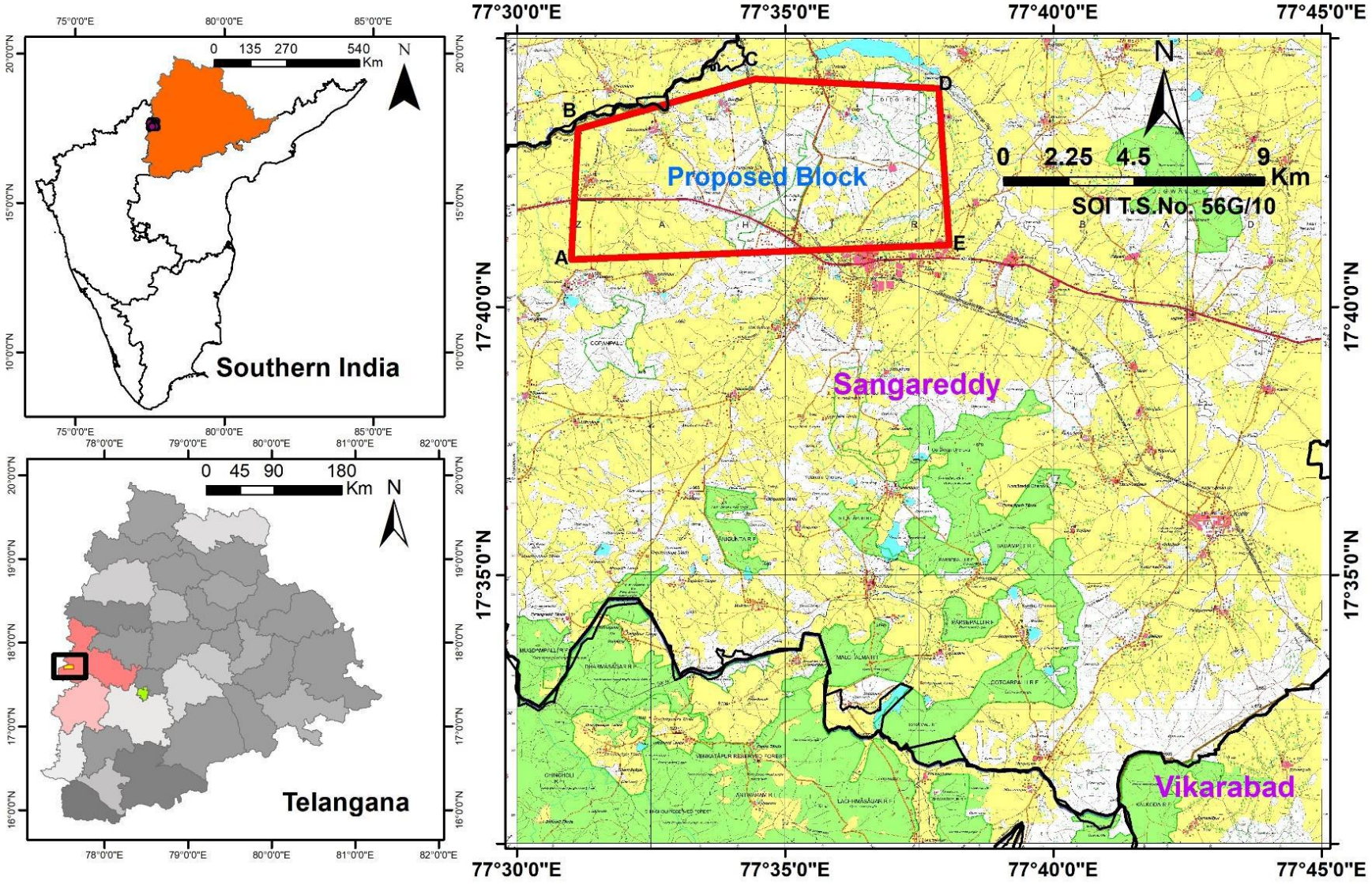

Plate-3: Google earth image map with proposed block (Source. Google earth)

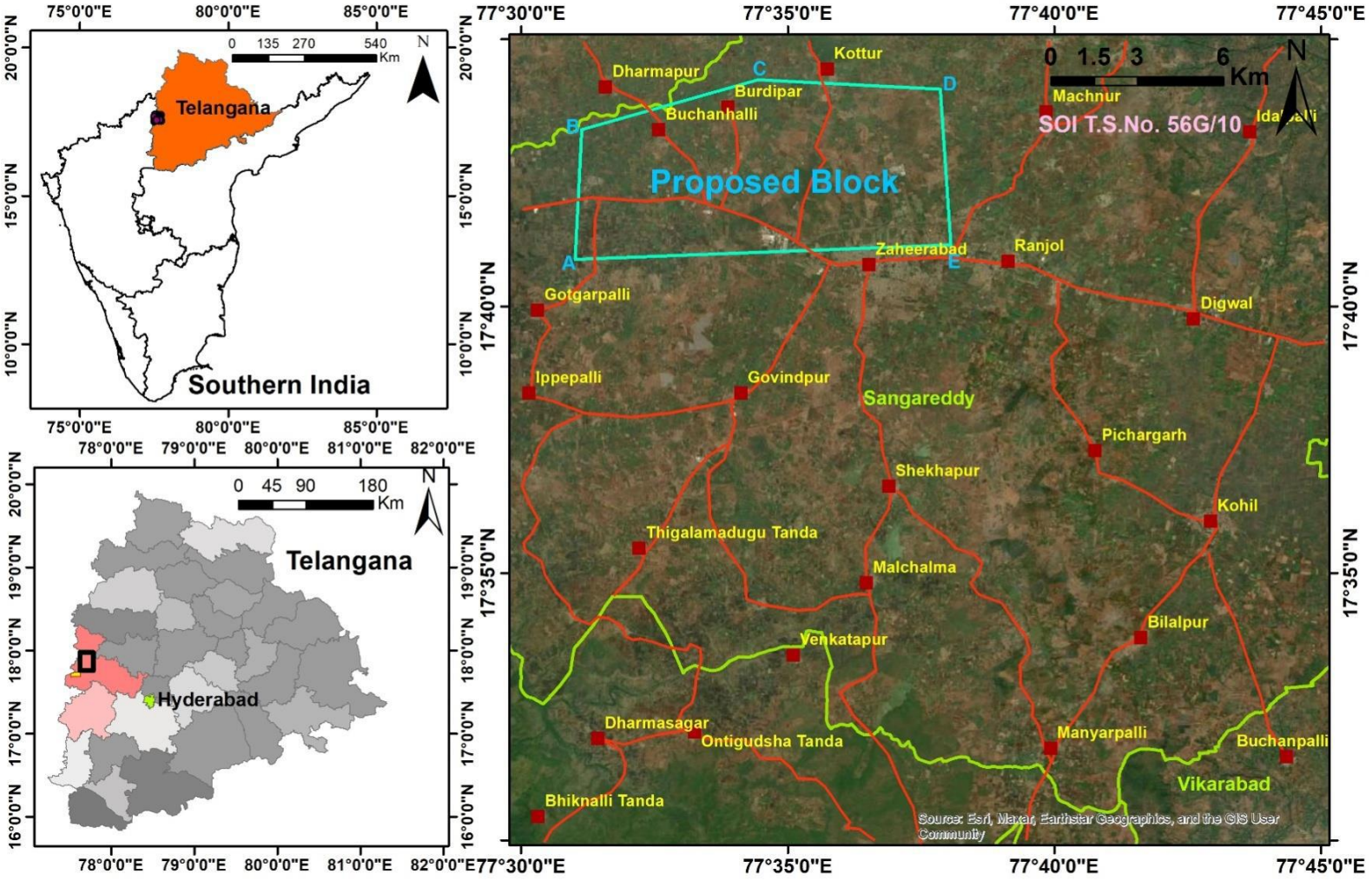

Plate-4: Geological map of toposheet no.56G/10 (1:50,000 scale) (Source. GSI, NGDR)

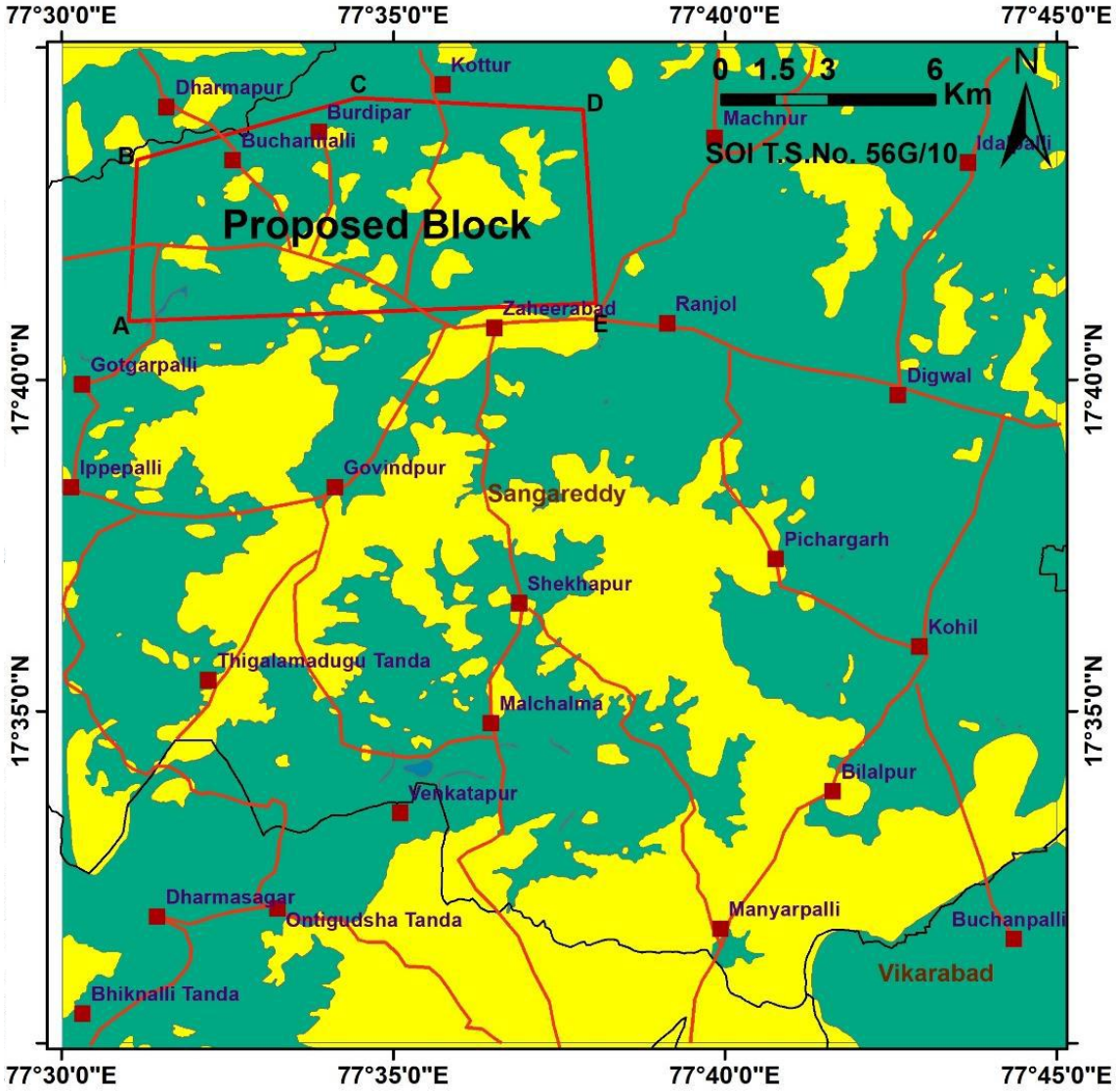

Plate-5: Tentative bore hole locations on Geological map of toposheet no.56G/10 (1:50,000 scale) (Source. GSI, NGDR)