PROPOSAL FOR PRELIMINARY EXPLORATION (G-3 STAGE) FOR LIMESTONE AND MANGANESE IN HATHIGHAT BLOCK (11.28 SQ. KM), DISTRICT- ADILABAD, TELANGANA

Commodity: Limestone and Manganese

MINERAL EXPLORATION & CONSULTANCY LIMITED

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SEMINARY HILLS

Place: Nagpur
Date: 10.01.2026

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

GENERAL INFORMATION ABOUT THE BLOCK

	Features	**Details**
	Features	**Details**
	Block ID	Hathighat G-3
	Exploration Agency	Mineral Exploration and Consultancy Limited (MECL)
	Previous Exploration Agency	GSI
	Commodity	Limestone and Manganese
	Objectives	i) To delineate the spatial distribution and grade variation of limestone and associated manganese mineralization within the block through drilling of seventeen (17) boreholes.
		ii) To assess and estimate grade-wise Inferred Mineral Resources of limestone and Inferred Mineral Resources of manganese within the block area in accordance with UNFC classification (333) at G- 3 level of exploration).
		iii) To undertake systematic exploration in compliance with the provisions of the Minerals (Evidence of Mineral Contents) Rules, 2015 (as amended up to 2024) and the Mineral (Auction) Rules, 2015, with the objective of facilitating the Government of Telangana in the auctioning of the mineral block.
	Whether the work will be carried out by the proposed agency or through outsourcing and details of the outsource agency	Geological mapping, drilling and chemical analysis will be carried out by the proposed agency. Drilling will be outsourced.
	Name/ Number of Geoscientists	Two nos. of Geoscientist (1 Field + 1 HQ)
	Expected Field days (Geology, Geophysics, Surveyor) Party days	Geologist Party Days: 150 Days (Field) Geologist Party Days: 60 Days (HQ) Surveyor Party Days : 45 Days
1	**Location**	

The coordinates of the corner points of the proposed Hathighat G-3 Block are as follows:

Block Boundary Co-ordinates of Hathighat G-3 Block, District - Adilabad, Telangana, Area 11.28 sq km, (Toposheet No. 56I05 and 56I09)

Points	DD MM SS.SS		UTM (44N)	
	Lattitude (N)	Longitude (E)	Easting (m)	Northing (m)
A	19° 47′ 27.57″ N	078° 29′ 23.8″ E	237024.9107	2190303.963
B	19° 47′ 39.38″ N	078° 30′ 50.37″ E	239550.9647	2190630.033
C	19° 45′ 36.27″ N	078° 31′ 58.62″ E	241482.9952	2186813.956
D	19° 45′ 00.0″ N	078° 30′ 45.63″ E	239340.8501	2185729.427

	Villages	Hathighat, Rampurtaraf, Guda, Sirsona
	Tehsil	Jainad, Tamsi

	District	Adilabad
	State	Telangana
2.	**Area (hectares/ square kilometers)**	
	Block Area	11.28 sq. km
	Forest Area	Block area is free from forest land
	Government Land Area	Data Not Available
	Private Land Area	Data Not Available
3.	**Accessibility**	
	Nearest Rail Head	The nearest railhead from the proposed block is Adilabad Railway Station (ADB) of South Central zone (SCR) which is located 10km south from the block.
	Road	The proposed Hathighat block is well connected by road network. The block is approachable through NH-44, which is the main arterial highway connecting Nagpur and Hyderabad. From NH-44, the area is accessed via all-weather state and district roads leading to Adilabad town, followed by motorable village roads up to Rampur village and the block area.
	Airport	Nagpur (Maharashtra) 170 km in NNE, Hyderabad (Telangana)-270 km in Southern direction.
4	**Hydrography**	
	Local Surface Drainage Pattern (Channels)	Proposed block area exhibits a sub-dendritic to dendritic drainage pattern, developed mainly under the influence of lithology and gentle regional slope. The area is drained by numerous seasonal nalas and first- to second-order streams, which remain dry for most of the year and become active during the monsoon season.
	Rivers/ Streams	The Penganga River, a major perennial river and an important tributary of the Godavari River system, flows above the northern margin of the block near Hathighat. Several minor seasonal streams originating within and around the block drain northwards and northeastwards to join the Penganga River. The presence of this river system significantly influences local drainage, geomorphology and surface runoff characteristics in the northern part of the block.
5	**Climate**	
	Mean Annual Rainfall	Average annual rainfall is 1000-1100 mm The climate of the area is mainly semi-arid to sub-humid with characterized by hot summers, moderate winters and a monsoon-dominated rainfall regime
	Temperatures (December)	Minimum temperatures 10-14°C

	(Minimum) Temperatures (June) (Maximum)	Maximum temperatures up to 40-45°C
6	**Topography**	
	Toposheet Number	Part of SoI Topo sheet no. 56I05 and 56I09.
	Physiography of the Area	The proposed Hathighat Limestone and Manganese block lies in a moderately dissected terrain of northern Telangana, characterized by low hillocks, shallow valleys and broad interfluves formed due to prolonged weathering and erosion. The relief is generally low to moderate, with a gradual slope towards the east and northern part of the block, where regional drainage is controlled by the Penganga River Maximum Elevation 270m in the SW Minimum Elevation 230m in the North
7	**Availability of baseline geosciences data**	
	Geological Map (1:50K/ 25K)	1:12,500 (LSM map, GSI, 2017-18) 1: 50,000 (LSM Map, Bhukosh)
	Geochemical Map	NGCM Data is available in NGDR. Previous geochemical sample analysis, BH data were used to plan G3 level exploration in the area.
	Geophysical Map	Geophysical exploration during G-4 investigation of GSI during 2017-18 was carried out to assess the subsurface continuity and depth persistence of manganese mineralisation beneath soil cover. The investigation comprised gravity, magnetic and limited Induced Polarisation (IP) surveys. Gravity data revealed weak residual linear anomalies attributable to the relatively higher density of manganiferous horizons compared to the host limestone. Magnetic surveying, conducted in place of SP due to field constraints, delineated subtle NW–SE–trending linear features and structural controls favourable for mineralisation. Limited IP profiling supported the presence of concealed mineralised zones.
8.	**Justification for taking up Preliminary Exploration G-3 stage**	1) **Established Surface Evidence of Mineralisation** Detailed geological mapping and surface investigations have confirmed the presence of stratabound manganese mineralisation associated with Penganga Limestone, along with cement-grade limestone, indicating favourable conditions for subsurface continuity. 2) **Favourable Geological Setting** The block forms part of the Pranhita–Godavari Basin, where

manganese mineralisation is known to occur within well-defined stratigraphic horizons of massive limestone. The regional litho-structural framework supports lateral and depth persistence of mineralised zones.

3) **Positive Geophysical Indications**
   Integrated gravity, magnetic and limited IP surveys have delineated linear subsurface anomalies consistent with concealed manganiferous horizons, suggesting continuity of mineralisation beneath soil-covered areas.
4) **Limited Exposure Due to Soil Cover**
   Large parts of the block are masked by thick soil and alluvial cover, restricting direct surface evaluation. Preliminary drilling at G-3 stage is therefore essential to establish the subsurface geometry, thickness and grade continuity of the mineralised horizons.
5) **Encouraging Scout Drilling Results in the Area**
   Scout drilling in the Guda–Rampur area has intersected manganese mineralisation and cement-grade limestone. G-4 stage investigations carried out by GSI during 2017–18 established reconnaissance-level resources of approximately *2.514 million tonnes of manganese* and *77.16 million tonnes of cement-grade limestone* in the Guda–Rampur block.Three boreholes, namely TAG-01, TAG-02 and TAG-03, fall in Guda-Rampur auctioned block (Auctioned in September 2025) in the west of presently proposed Tamsi G-3 block.
6) **Need for Resource Delineation as per UNFC Norms**
   At present, mineralisation is established only qualitatively. Preliminary exploration (G-3 stage) is required to generate sufficient subsurface data to estimate inferred resources (UNFC 333) in compliance with MEMC Rules, 2015.
7) **Economic Potential of Dual Commodities**
   The coexistence of substantial cement-grade limestone with stratabound manganese mineralisation and encouraging manganese grades in the ore zones clearly demonstrates the mineral potential of the block, warranting its upgradation to detailed (G-3) exploration for further evaluation and resource delineation.
8) **Facilitation of Future Mineral Development**
   Completion of G-3 stage exploration will provide a reliable geological database necessary for decision-making related to block appraisal, mine planning and possible auctioning by the State Government.

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1.1.0 INTRODUCTION:

1.1.1 Limestone is a sedimentary rock composed mainly of calcium carbonate ($CaCO_3$) in the form of the mineral calcite. About 10% of sedimentary rocks are limestone and most cave systems are through limestone bedrock. The two most important constituents of limestone are calcite and dolomite. Limestone often contains magnesium carbonate, either as dolomite $CaMg(CO_3)_2$ or magnesite ($MgCO_3$) mixed with calcite.

1.1.2 The total reserves/resources of limestone of all categories and grades as per NMI database based on UNFC system as on 1.4.2015 has been estimated at 2,03,224 million tonnes, of which 16,336 million tonnes (8%) are placed under Reserves category and 1,86,889 million tonnes (92%) are under Remaining Resources category. Karnataka is the leading State having 27% of the total resources followed by Andhra Pradesh & Rajasthan (12% each), Gujarat (10%), Meghalaya (9%), Telangana (8%) and Chhattisgarh & Madhya Pradesh (5% each). The remaining 12% is shared by other st ates. Grade-wise, Cement grade (Portland) has leading share of about 70% followed by Unclassified grades (12%) and BF grade (7%).

1.1.3 Limestone comprises 95% of core raw material for cement production. As per report of Mines & Minerals-CMA India, around 180-250 kg of coal and about 1.5 tonnes of limestone is required to produce one tonne of cement. Most of the limestone deposits in India vary in grade. Silica and MgO in limestone play an important role towards chemical parameters of raw feed for cement manufacturing. In sedimentary limestones, the said radicals along with CaO vary consistently in lateral and vertical direction, in a small area. Estimation of quantity and quality based on the interpretation from nearby data is not possible especially for important factors like silica, MgO and others, which have a key role in the quality of the limestone to be used by cement and other.

1.1.4 Demand for cement in construction industry will increase in coming years that will further increase the demand for limestone. The infrastructural projects like rail, water, transport, electricity, telecom, etc. will have increased investments and that also arise the need of limestone. In the union budget 2021 it was announced for “Housing for all”and “Smart Cities” which is steadily increasing the demand for cement and subsequently limestone.

1.1.5 On the other hand, Manganese is a strategically important industrial mineral, primarily used in the manufacture of steel and ferro-manganese alloys, where it acts as an essential de-oxidizing and desulphurizing agent. Nearly 90–95% of manganese consumption is linked to the iron and steel industry, making its availability critical for infrastructure development, construction, and manufacturing growth. With India pursuing rapid industrialization and expansion of domestic steel capacity, ensuring a sustained supply of manganese ore has become a national priority.

1.1.6 India possesses substantial manganese resources; however, a significant proportion of these are low to medium grade and confined to shallow depths, having been extensively worked over decades. Major manganese-producing states such as Odisha, Karnataka, Madhya Pradesh, Maharashtra, Andhra Pradesh and Telangana host numerous deposits, many of which are either depleted or approaching exhaustion at surface and near-surface levels. As a result, the availability of easily mineable, high-grade manganese ore has progressively declined, creating a growing gap between domestic production and industrial demand.

1.1.7 At present, manganese exploration in India is largely focused on augmenting resources through deeper and systematic exploration, upgrading existing G-3 and G-4 level resources to higher confidence categories, and identifying new concealed or sub-surface deposits. Government agencies such as GSI, MECL and State Directorates of Geology & Mining, along with private exploration agencies, are actively engaged in detailed mapping, trenching and drilling programmes under the framework of UNFC norms and Minerals (Evidence of Mineral Contents) Rules, 2015 (as amended). Particular emphasis is being laid on exploration of manganese associated with carbonate sequences, schist belts and BIF-related horizons, which have demonstrated potential for continuity at depth.

1.1.8 In the present scenario, auction-based mineral concession regimes and increased participation of private players have further underscored the importance of reliable and scientifically validated resource estimation. Exploration at G-3 and G-2 levels plays a crucial role in generating confidence for mine planning and investment decisions. Additionally, with increasing emphasis on self-reliance, value addition, and sustainable mining, systematic manganese exploration has assumed greater significance to secure long-term raw material supply for the steel and alloy industries.

1.1.9 Both limestone and manganese are strategically important minerals that play a pivotal role in the infrastructure and industrial development of the country. Limestone is the primary raw material for the cement industry, which forms the backbone of infrastructure sectors such as housing, roads, bridges, dams and urban development. In addition, limestone is extensively used in steel making, power generation, chemical industries, and environmental applications, thereby directly supporting national growth initiatives.

1.1.10 Manganese, on the other hand, is an indispensable input for the iron and steel industry, where it is used as a de-oxidizing, desulphurizing and alloying element. The expanding steel production capacity in India, driven by large-scale infrastructure projects, has resulted in a sustained and growing demand for manganese ore. However, the availability of easily accessible, high-grade deposits is gradually diminishing, underscoring the need for systematic exploration to augment resources and establish continuity at depth.

1.1.11 In view of the increasing demand for cement and steel, coupled with depletion of near-surface deposits, systematic and scientific exploration of limestone and manganese has become the need of the hour. Such exploration is essential to assess the remaining resource potential, upgrade geological confidence levels in accordance with UNFC norms, and ensure long-term availability of these critical minerals to support sustainable infrastructure development and economic growth.

1.1.12 On enactment of MMDR Amendment Act 2015, Minerals (Evidence of Mineral Contents) Rules 2015 and 2021 and Mineral Auction Rules 2015, Govt. of India directed State Governments to speed up exploration work for different Mineral Commodities in the respective states and put them for auction.

1.1.13 MECL in association with DMG, Telangana is vastly looking up the gap areas where exploration of different commodities can be done. Subsequently, after receipt of consent from DMG, Telangana to take up exploration work, MECL has prepared an exploration proposal for Preliminary Exploration (G-3 Stage) for Limestone and Manganese etc in Hathighat Block in Adilabad District of Telangana and submitted to NMET for taking up for discussion in the upcoming TCC.

1.2.0 LOCATION AND ACCESSIBILITY

1.2.1 The proposed Hathighat G-3 Block for limestone and manganese exploration is located in Adilabad District, Telangana State and covers an area of 11.28 sq. km. The block lies within Survey of India Toposheet Nos. 56I/05 and 56I/09. Administratively, the block area falls in and around the villages of Hathighat, Rampurtaraf, Guda, Sirsona under Jainad and Tamsi tehsils of Adilabad district.

1.2.2 The proposed Hathighat G-3 block is well connected by road and rail network, facilitating easy movement of exploration personnel and logistics. The nearest railhead is Adilabad Railway Station (ADB), falling under the South Central Railway (SCR) zone. The railway station is located at an approximate distance of 10 km south of the block area, providing convenient access for transportation of manpower and materials.

1.2.3 The block is approachable through NH-44, which is the main arterial highway connecting Nagpur and Hyderabad. From NH-44, the area is accessed via all-weather state and district roads leading to Adilabad town, followed by motorable village roads up to Rampur village and the block area. The existing road infrastructure is adequate for carrying out G-3 stage exploration activities. The block is located at a distance of approximately 170 km from Nagpur (Maharashtra) in the SSW direction, and about 270 km from Hyderabad (Telangana) towards northern direction.

1.2.4 Within the block, access is facilitated through existing village roads, agricultural tracks and footpaths. Most parts of the block are accessible during fair weather conditions, and minor improvement of internal tracks, if required, can support exploration activities.

1.3.0 PHYSIOGRAPHY & DRAINAGE

1.3.1 The proposed Hathighat Limestone and Manganese G-3 block is situated in the northern part of Telangana and exhibits a gently undulating to moderately dissected physiographic terrain. The area is characterized by low hillocks, shallow valleys and broad interfluves, which have developed as a result of prolonged weathering and erosional processes acting on the underlying lithological units. The overall relief of the block is low to moderate, with surface elevations ranging from about 230 m above mean sea level in the northern part to a maximum of approximately 270 m in the south-western part of the block. A general gentle regional slope towards the north is observed, which largely governs the surface drainage pattern.

1.3.2 The drainage pattern within the block is predominantly sub-dendritic to dendritic, developed under the combined influence of lithological variation and gentle regional gradient. Drainage is mainly represented by numerous seasonal nalas and first- to second-order streams, which originate within and around the block area. These streams remain dry for most of the year and become active during the south-west monsoon period, facilitating surface runoff and sediment transport.

1.3.3 The Penganga River, a major perennial river and an important tributary of the Godavari River system, flows along and beyond the northern margin of the block near Hathighat village. Several minor seasonal streams from the block drain northwards and northeastwards to ultimately join the Penganga River. This river system plays a significant role in controlling the regional drainage, geomorphology and runoff characteristics, particularly in the northern part of the block area.

1.4.0 CLIMATE

1.4.1 The proposed Hathighat Limestone and Manganese G-3 block, located in Adilabad district of northern Telangana, experiences a tropical semi-arid to sub-humid climate, typical of the Deccan plateau region. The climate is characterized by distinct summer, monsoon and winter seasons, which collectively influence field accessibility and exploration activities.

1.4.2 Summer extends from March to June and is generally hot and dry, with maximum temperatures often ranging between 40°C and 45°C, particularly during May. Winter, from November to February, is mild and pleasant, with minimum temperatures occasionally dropping to around 10–15°C, making it the most suitable period for detailed fieldwork.

1.4.3 The area receives the bulk of its rainfall during the south-west monsoon season (June to September). The average annual rainfall in the region is moderate and sufficient to activate seasonal nalas and streams, although they remain dry for most of the year. Occasional rainfall during the north-east monsoon may also occur in the post-monsoon months.

1.5.0 FLORA FAUNA :

1.5.1 The flora of the area mainly comprises dry deciduous forest species, interspersed with open scrub and agricultural land. Tree cover is moderate and discontinuous, occurring mainly along drainage courses, village boundaries and patches of uncultivated land. Common tree species observed or reported from the region include Teak (Tectona grandis), Terminalia species, Neem (Azadirachta indica), Mahua (Madhuca indica), Palas (Butea monosperma), Bamboo (Dendrocalamus sp.) and Tamarind (Tamarindus indica). Shrubs and bushes such as Lantana, Zizyphus and Carissa are commonly present, along with seasonal grasses.

1.5.2 Agricultural land supports crops such as cotton, soybean, pulses and cereals, depending on the season. The block area is reported to be free from notified forest land, and vegetation within the block is largely secondary growth and cultivated land.

1.5.3 The faunal assemblage of the area is typical of dry deciduous and agricultural landscapes. Wildlife presence is generally limited to small mammals, reptiles, birds and insects. Commonly observed fauna include hare, jackal, fox, mongoose, rodents, and reptiles such as lizards and snakes. Avifauna is represented by species such as peafowl, partridge, pigeons, doves, crows, mynas and various migratory and resident birds, particularly around water bodies and agricultural fields.

1.5.4 No endangered or protected wildlife species have been reported from within the block area, and the region does not fall within any national park, wildlife sanctuary or eco-sensitive zone. Human habitation and agricultural activities have further limited the presence of large wild animals.

2.0.0 REGIONAL GEOLOGY

2.0.1 The Hathighat Limestone and Manganese block forms part of the Pranhita–Godavari (PG) Basin, a major NW–SE trending Proterozoic rift basin in central India, extending from the Eastern Ghats Mobile Belt in the southeast to the Central Indian Tectonic Zone in the northwest. In the Adilabad region, the basin hosts a thick succession of Mesoproterozoic to Neoproterozoic sedimentary rocks, deposited over an Archean to Paleoproterozoic crystalline basement.

2.0.2 In the northern part of Adilabad district, the sedimentary succession is represented predominantly by the Penganga Group, which unconformably overlies the Peninsular Gneissic Complex (PGC-II). The Penganga Group is well developed north of the Godavari River and constitutes one of the most important lithostratigraphic units of the PG Basin in Telangana. The succession broadly follows a tripartite stratigraphy, comprising (from bottom to top) Pranhita Sandstone, Penganga Limestone and Satnala Shale .

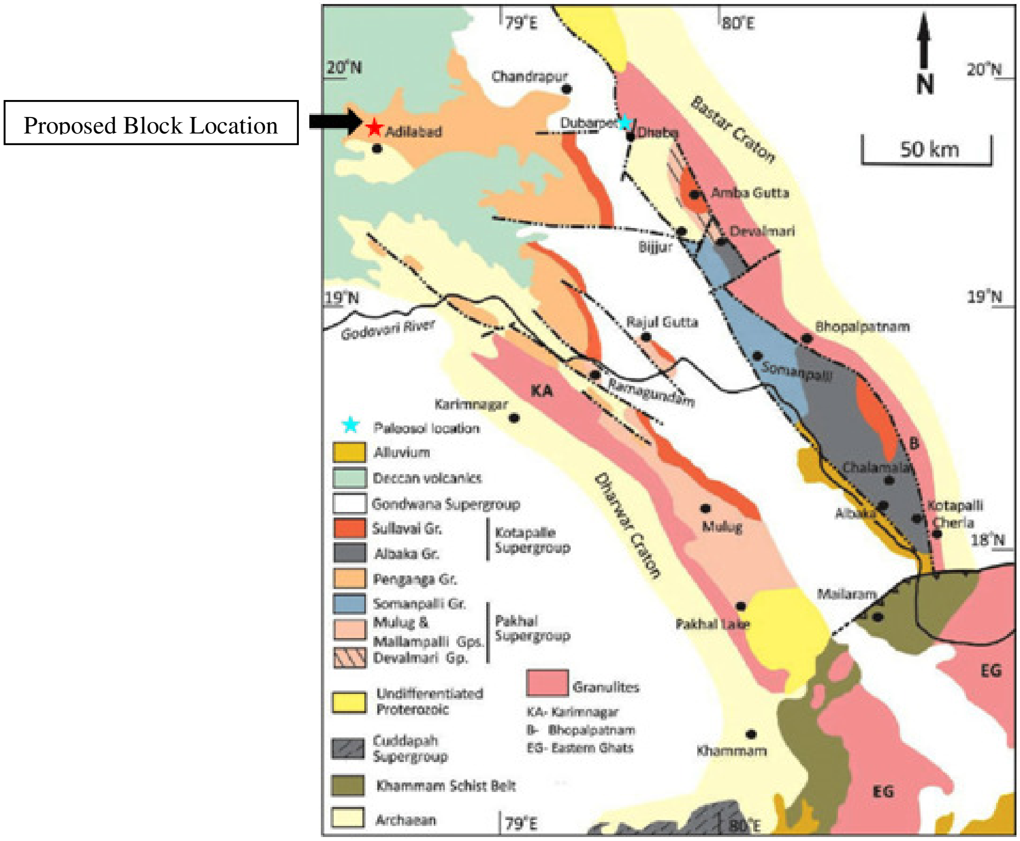

Fig 1.1 Geological Map of Pranhita-Godavari valley showing proposed Hathighat G-3 block (after U. Amarasinghe et al., 2015).

2.0.3 The Pranhita Sandstone, forming the basal unit, consists of cross-bedded, well-sorted quartzose to sub-arkosic sandstone with local conglomeratic and gritty horizons, representing foreshore to shallow-marine depositional environments. This unit is conformably overlain by the Penganga Limestone, which is the most extensive lithounit in the area and hosts the manganese mineralisation. The limestone occurs in two informal members: a lower massive limestone and an upper flaggy limestone, deposited in a shallow- to deep-marine ramp setting. The Satnala Shale, comprising purple to brown laminated shale with carbonaceous interbeds, caps the Penganga succession and represents deeper marine sedimentation.

2.0.4 Regionally, the Penganga Group rocks are undeformed to mildly deformed, exhibiting horizontal to sub-horizontal bedding with gentle dips (5°–20°), generally towards the northeast. The basin architecture is controlled by NW–SE trending faults and lineaments, many of which are interpreted as reactivated rift-related structures. These structures have played a significant role in controlling sedimentation as well as localization of manganese mineralisation. The rocks of the Penganga Group show no regional metamorphism, preserving their original sedimentary features

2.0.5 The area has been known for stratiform manganese mineralisation since the early 1960s, with manganese occurring as chert–jasper–associated horizons within the massive Penganga Limestone. The regional geological setting, characterised by a stable carbonate platform influenced by basin-controlled faults, is considered favourable for the development and lateral persistence of manganese-bearing horizons in the Adilabad sector of the Pranhita–Godavari Basin

2.0.6 Penganga Group of rock is studied by different workers and they have proposed different classification like Heron (1949) and Johnson (1965), proposed tripartite classification of the Penganga succession into sandstone, limestone and shale unit. Sreenivasa Rao (1987) subdividedthe Penganga Group into the Taklapalli Arkose and Putnur Limestone around the Ramgundam area. To avoid the multiple nomenclature problems, Chaudhari et al, 1989 suggested a tripartite classification of Penganga succession.

2.0.7 The stratigraphic succession of the area is given below in Table 1.1. Regional Geology Map of the area on1:50,000 scale is given as Plate –II.

Table - 2.1
Stratigraphic Classification of Penganga Group (After Chaudhari et al., 1989)

	Formation	**Adilabad**		**Mancherial**	
		Facies Depositional	Setting	Facies Depositional	Setting
Unconformity					
PENGANGA GROUP	**Satnala Shale (>2000m)**	Thinly laminated red to brown shale	Deep basin	Thinly laminated red to brown shale	Deep basin
	Chanda Limestone (300 m)	Mostly micritic limestone with laterally persistent medium to thick bedding. Colour varies from brown, pink, grey, steel-grey and black. Locally, dolomitic. One thick interval of siliceous grey	Distally steepened ramp to deep-water homoclinal ramp	Mostly micritic limestone and siliceous limestone with laterally persistent medium to thick bedding. Colour varies from brown, grey, steel-grey	Shallow to deep ramp

	Formation	Adilabad		Mancherial	
		limestone that hosts interstratified bedded chert manganese ores. A number of intervals with limestone conglomerates and calcarenites of mass flow origin.		and black. Locally includes lenses of crossstratified sandstone in the lower parts.	
	Pranhita Sandstone (25–400 m)	Cross-stratified, well-sorted quartzose sandstone grading upwards to thin laminated khaki mudstone to brown shale	Foreshore – shore-face to muddy shelf	Conglomerate, pebbly-gritty red arkose. Crossstratified, wellsorted subarkose grading upwards to thin laminated khaki mudstone to brown shale	Alluvial fanbraid plain to foreshore – shore-face and muddy shelf
Unconformity					
Basement complex					

2.1.0 REGIONAL STRUCTURE AND REGIONAL METAMORPHISM

2.1.1 The Hathighat block forms part of the Pranhita–Godavari Basin, a major NW–SE trending rift-related sedimentary basin developed along the contact between the Dharwar and Bastar cratons. The regional structural framework is dominated by basin-parallel NW–SE trending lineaments and faults, which have played a significant role in basin development, sedimentation and localisation of mineralisation.

2.1.2 The sedimentary rocks of the Penganga Group are generally gently dipping to sub-horizontal, with regional dips varying from near horizontal to about 15°–20°, locally increasing near basin margins. In the deeper parts of the basin, including the Rampur area, beds are largely horizontal to gently dipping towards the northeast, reflecting deposition in a relatively stable basin interior. Minor variations in dip and local flexures are observed, attributed to basin-related tectonic adjustments and reactivation of basement lineaments.

2.1.3 Broad open folds, monoclines and gentle warping are developed at a regional scale, while intense folding is absent. The NW–SE structural grain is persistent and controls the alignment of lithological units as well as the stratabound manganese mineralisation, which follows the same regional trend. No major through-going faults are exposed within the Rampur block itself, although regional faults and fractures are inferred from geophysical data and geomorphic expressions.

2.2.0 REGIONAL METAMORPHISM

2.2.1 The sedimentary sequence of the Penganga Group, including the rocks exposed in the Rampur block, shows no evidence of regional or thermal metamorphism. The rocks have largely retained their primary sedimentary textures and structures, such as bedding, lamination and sedimentary fabrics, indicating deposition and preservation under low-temperature, low-pressure conditions.

2.2.2 Metamorphism in the broader Pranhita–Godavari Valley is restricted mainly to the older Pakhal Group and basement complexes, where low-grade greenschist to amphibolite facies metamorphism has been reported in areas closer to major tectonic zones and the Eastern Ghats Mobile Belt. However, the Penganga Group sediments occurring in the Adilabad region remain essentially unmetamorphosed, having escaped regional metamorphic overprinting.

2.2.3 The absence of metamorphism in the Hathighat block is significant, as it favours the preservation of primary sedimentary manganese mineralisation, including carbonate and oxide phases, and supports a sedimentary to hydrothermal-exhalative origin for the manganese horizons.

2.3.0 REGIONAL MINERALISATION

2.3.1 The Pranhita–Godavari Basin, a region known for stratabound sedimentary mineralisation, particularly manganese and limestone, hosted by the Neoproterozoic Penganga Group. Regional mineralisation is dominantly controlled by lithostratigraphy and basin architecture, rather than by localized structural traps.

2.3.2 Manganese mineralisation in the region occurs as laterally persistent, stratiform horizons within the massive limestone member of the Penganga Limestone Formation. The mineralisation is closely associated with bedded chert and jasper, and occurs along a NW–SE trending belt extending from areas north of Adilabad towards Kanpa and adjoining sectors.

Two distinct manganiferous horizons are recognised regionally: a lower, thicker and economically significant horizon, and an upper, thinner and jasper-rich horizon.

2.3.3 The manganese occurs mainly as oxide and carbonate phases, with common ore minerals including todorokite, pyrolusite and rhodochrosite, often showing fine lamination and banding. The stratigraphic confinement, textural characteristics and geochemical signatures indicate a sedimentary to hydrothermal-exhalative origin, related to basin-scale extensional tectonics.

2.3.4 Extensive development of cement-grade limestone is a prominent regional feature of the Penganga Limestone. The limestone is thick-bedded to massive, micritic in nature, and laterally persistent over large areas of the basin. Regional exploration and drilling have confirmed substantial limestone resources, making it a significant associated commodity in the area.

2.3.5 Minor occurrences of siliceous bands, chert and jasper are widespread within the limestone sequence and are genetically linked with manganese deposition. Trace occurrences of sulphide minerals and rare earth element enrichment have been reported locally, supporting a hydrothermal contribution to mineralisation.

3.0.0 BLOCK GEOLOGY:

3.0.1 The Hathighat G-3 block is underlain by sedimentary rocks of the Neoproterozoic Penganga Group, belonging to the Pranhita–Godavari Basin. The lithological succession within the block comprises, from bottom to top, Penganga Limestone followed by Satnala Shale, with local capping by Deccan Trap basalts in adjoining areas. The basement granite (PGC-II) is not exposed within the block area.

3.0.2 The Penganga Limestone forms the principal lithounit exposed in the block and is developed predominantly as thick-bedded to massive limestone, locally grading into flaggy limestone towards the upper part. The limestone is generally light grey to buff in colour, with local pinkish to purplish hues and occasional siliceous bands. Bedding thickness varies from medium to thick, and the limestone is mostly micritic in nature. This unit hosts the manganese mineralisation, which occurs as stratabound horizons associated with chert and jasper, confined mainly to the massive limestone member.

3.0.3 The manganese mineralisation is developed in two distinct stratigraphic horizons, of which the lower horizon is thicker and economically more significant, comprising alternate laminae of manganese oxide/carbonate and siliceous material. The upper horizon is comparatively thin and jasper-rich. The mineralisation is laterally persistent and follows the regional NW–SE structural trend of the basin.

3.0.4 Overlying the limestone, the Satnala Shale consists of thinly laminated purple to reddish-brown shale, locally carbonaceous, representing deep-basin sedimentation. This unit is exposed mainly along drainage sections and at the northern margin of the block near the Penganga River.

3.0.5 Structurally, the rocks within the block are gently dipping to sub-horizontal, generally dipping towards the northeast. Minor variations in dip are observed locally due to gentle warping and basin-related structural disturbances. No major folds or faults are exposed within the block, although regional NW–SE trending lineaments exert control on mineralisation.

3.0.6 Overall, the geological setting of the Hathighat block, marked by favourable stratigraphy, proven manganiferous horizons and limestone host rocks, is conducive for Preliminary Exploration (G-3 stage) aimed at establishing subsurface continuity and resource potential.

3.0.7 The tentative srtratigraphic sequence of litho units exposed in the block area (After GSI is given in Table 3.1 .LSM Map showing showing proposed G-3 block on 1:12,500 scale is given as Plate-III

Table - 3.1
Stratigraphic Succession of the block area (After GSI)

Group	Supergroup	Formation	Lithounits Characteristics	Age
Penganga Group	**Penganga Limestone**	Flaggy limestone	Dark grey coloured carbonaceous flaggy.	Meso- to Neo-Proterozoic
		Massive limestone	Purple coloured siliceous at the base and light grey to buff coloured thickly bedded to massive, along with buff coloured fine grained tuffaceous	

Group	Supergroup	Formation	Lithounits Characteristics	Age
			material(?) with admixture of chert jasper rich manganese mineralization.	

3.1.0 MINERALISATION IN THE BLOCK

3.1.1 The proposed Hathighat G-3 Block is underlain predominantly by Penganga Limestone of Neoproterozoic age, forming part of the Pranhita–Godavari Basin, which is regionally known for stratabound manganese mineralisation. Within the block, manganese mineralisation occurs as laterally persistent, stratabound horizons confined mainly to the massive limestone member. Two distinct manganiferous horizons are recognized in the area: a lower, relatively thicker and more continuous horizon, and an upper, thinner horizon enriched in chert and jasper. The mineralisation is developed along a regional NW–SE trend and displays fine lamination and banding, indicating strong stratigraphic control. The ore occurs in both oxide and carbonate forms, with minerals such as todorokite, pyrolusite and rhodochrosite, suggesting a sedimentary to hydrothermal-exhalative origin.

3.1.2 In addition to manganese, the Penganga Limestone within the Hathighat block is thick-bedded to massive, micritic and laterally extensive, and is largely of cement-grade quality. The limestone exhibits good lateral continuity and constitutes an important associated mineral resource. Mineralisation within the block is not confined to isolated surface exposures but persists along continuous stratigraphic horizons, including areas masked by soil cover. The coexistence of stratabound manganese mineralisation and extensive limestone, together with favourable geological and structural conditions, establishes the Hathighat block as a promising target for Preliminary Exploration (G-3 stage) aimed at delineating subsurface continuity and estimating UNFC-compliant inferred resources (333).

4.0.0 **PREVIOUS WORK**

4.1.0 Exploration for limestone and manganese in the Pranhita–Godavari Basin, including the Rampur area, has a long history. Early regional geological mapping by Hughes (1877) and King (1881) identified extensive limestone–shale sequences in the Adilabad region and grouped them with Vindhyan–Purana successions. Subsequent studies by Heron (1949) and later workers recognized these sediments as part of the Penganga Group, forming an important carbonate–argillaceous sequence in the basin.

4.2.0 Systematic exploration for manganese began in the 1960s, following the first report of manganese mineralisation in Penganga Limestone by J.S.R. Krishna Rao (1967). This was followed by investigations by the Mines and Geological Survey Department and other agencies, which confirmed stratabound manganese occurrences associated with chert and jasper bands.

4.3.0 During 1974–75, V. Natarajan and B.S.R. Reddy carried out detailed regional geological mapping and delineated a NW–SE trending manganiferous belt extending across parts of the Adilabad district, including the present Rampur sector. Their work established the stratigraphic control, lateral continuity and sedimentary nature of manganese mineralisation and recommended further subsurface exploration.

4.4.0 Based on these recommendations, the Geological Survey of India (GSI) undertook a Reconnaissance Survey (G-4 stage) during Field Season 2017–18 in the Pranhita–Godavari Basin, covering the Guda–Rampur and Kanpa–Junapani blocks. This work involved large-scale geological mapping, surface sampling, limited pitting and trenching, geophysical surveys (gravity, magnetic and IP) and scout drilling. The investigation confirmed the presence of two manganiferous horizons within Penganga Limestone, along with extensive cement-grade limestone, and demonstrated subsurface continuity in parts of the Rampur area. However, due to reconnaissance-level data density, resources were broadly inferred and recommended for upgradation through systematic exploration.

4.5.0 Quantum of Work carried out in the Reconnaissance Survey (G-4 Stage) work by GSI during 2017-18 includes :

- Large-scale geological mapping: 100 sq km (1:12,500 scale)
- Surface sampling, limited pitting/trenching
- Geophysical surveys: Gravity (~30 Lkm), Magnetic (~31 Lkm), IP (~8 Lkm)
- Scout drilling: ~200 m (4 boreholes)

4.6.0 During the reconnaissance stage investigation, a comprehensive multi-disciplinary sampling programme was undertaken to evaluate the nature, grade and continuity of manganese and limestone mineralisation.

4.6.1 Bedrock Samples (BRS)

- Number collected: ~100 samples

- Purpose: To assess lithological variations and grade of manganese and associated limestone
- Lithology sampled:
  - ✓ Manganiferous Penganga Limestone
  - ✓ Chert–jasper bands
  - ✓ Massive and flaggy limestone
- Analysis carried out: Major oxides (Mn, Fe, SiO_2, Al_2O_3, CaO, MgO, P_2O_5) and selected trace elements
- Outcome: Confirmed stratabound manganese mineralisation and cement-grade limestone horizons

4.6.2 Pit / Trench Samples (PT)

- Number collected: 48 samples
- Quantum of excavation: ~108 cubic metres
- Purpose: To evaluate mineralisation beneath soil cover and near-surface continuity
- Sampling method: Channel and grab sampling from pit walls
- Outcome: Established vertical persistence of manganiferous horizons at shallow depth

4.6.3 Petrographic Samples (PS)

- Number collected: 10 samples
- Purpose: Petrographic and textural studies of host rocks
- Outcome: Confirmed micritic nature of limestone and sedimentary fabric supporting stratiform mineralisation

4.6.4 Ore Microscopic / Mineralographic Samples (ORM)

- Number collected: 20 samples
- Purpose: Identification of ore minerals and textures
- Outcome: Identified manganese minerals (oxide and carbonate phases) and their association with chert and jasper

4.6.5 Petro-Chemical Samples (PCS)

- Number collected: 20 samples
- Purpose: Major oxide analysis, Trace elements and REE studies

- Outcome: Geochemical signatures indicated sedimentary–hydrothermal (exhalative) origin of manganese mineralisation

4.6.6 Borehole Core Samples (Scout Drilling)

- Number of boreholes: 4
- Total drilling: ~200 m
- Core samples generated: ~98 samples
- Purpose: To verify subsurface continuity and grade
- Outcome:
  - ✓ Manganese mineralisation intersected in Guda–Rampur block
  - ✓ Cement-grade limestone encountered in upper portions of boreholes

4.7.0 Manganese mineralisation in the study area is confined to the Penganga Limestone, and chemical analyses were carried out on samples collected from the lower manganese horizon, upper manganese horizon, and from the massive and flaggy limestone units of the Penganga Limestone.

4.8.0 Massive limestone shows wide compositional variation. Out of 65 samples, only 21 samples record CaO values between 41–49%, while the remaining samples are dominantly siliceous, with SiO_2 ranging from 9.53% to 77.63%, Fe_2O_3 from 0.25% to 2.42%, and Al_2O_3 from 0.55% to 4.71%. As per IBM cement-grade specifications, only about 27% of the samples qualify as marginally cement-grade to cement-grade limestone, while the rest fall under siliceous limestone.

4.9.0 In flaggy limestone, CaO values range from 20.29% to 48.25%, with SiO_2 between 10.37% and 56.28%, Al_2O_3 from 0.82% to 7.49%, and Fe_2O_3 from 0.42% to 4.17%. Nearly 43% of the flaggy limestone samples fall within the cement-grade category, indicating comparatively better quality than the massive limestone unit.

4.10.0 The lower manganese horizon exhibits economically significant manganese enrichment. The oxidised zone shows Mn content ranging from 22% to 33.19%, with generally low Fe_2O_3 (<1–4%), except for two samples recording elevated Fe_2O_3 values of 19% and 29%. Al_2O_3 and TiO_2 contents are consistently low. In the carbonate manganese ore, Mn values range from 16.48% to 26.40%, again associated with low Fe_2O_3, Al_2O_3 and TiO_2 contents.

4.11.0 In contrast, the upper manganese horizon is poorly mineralised, with Mn content <1%, very low Fe_2O_3, Al_2O_3 and TiO_2, and high SiO_2 values ranging from 57% to 88%, indicating a predominantly siliceous nature.

4.12.0 Geochemical data have been utilised to infer the origin of manganese mineralisation. Based on elemental associations and compositional characteristics, the mineralisation is interpreted to have a sedimentary–hydrothermal (exhalative) affinity, consistent with manganese oxides deposited from geothermal fluids in continental or marine settings, as described by Nicholson (1992). Hydrogenous processes, involving slow precipitation from seawater as proposed by Bonatti et al. (1972) and Crerar et al. (1982), appear to have played a subordinate role.

4.13.0 Recommendation by C., Raghupathi and M. Chakraborty, F.S. 2017-18(GSI) –'G-4 stage investigations carried out by GSI during 2017–18 established reconnaissance-level resources of approximately *2.514 million tonnes of manganese* and *77.16 million tonnes of cement-grade limestone* in the Guda–Rampur block. The coexistence of substantial cement-grade limestone with stratabound manganese mineralisation and encouraging manganese grades in the ore zones clearly demonstrates the mineral potential of the block, warranting its upgradation to detailed (G-3) exploration for further evaluation and resource delineation.'

5.0.0 BLOCK DESCRIPTION

5.1.0 The proposed Hathighat G-3 block for Limestone and Manganese falls in Survey of India Toposheet No. 56I05 and 56I09 and covers an area of 11.28 sq. km in and around the villages of Hathighat, Rampurtaraf, Guda, Sirsona, under Jainad and Tamsi mandals of Adilabad district, State Telangana. The block location 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.-5.1

Table 5.1 Block Boundary Co-ordinates of Hathighat G-3 Block, District - Adilabad, Telangana, Area 11.28 sq km, (Toposheet No. 56I05 and 56I09)

Points	DD MM SS.SS		UTM (44N)	
	Lattitude (N)	Longitude (E)	Easting (m)	Northing (m)
A	19° 47′ 27.57″ N	078° 29′ 23.8″ E	237024.9107	2190303.963
B	19° 47′ 39.38″ N	078° 30′ 50.37″ E	239550.9647	2190630.033
C	19° 45′ 36.27″ N	078° 31′ 58.62″ E	241482.9952	2186813.956
D	19° 45′ 00.0″ N	078° 30′ 45.63″ E	239340.8501	2185729.427

6.0.0 PLANNED METHODOLOGY

6.1.0 OBJECTIVE

Based on the evaluation of geological data available, the present exploration program has been formulated to fulfill the following objectives:

I. To delineate the spatial distribution and grade variation of limestone and associated manganese mineralization within the block through drilling of seventeen (17) boreholes.

II. To assess and estimate grade-wise Inferred Mineral Resources of limestone and Inferred Mineral Resources of manganese within the block area in accordance with UNFC classification (333) at G- 3 level of exploration).

III. To undertake systematic exploration in compliance with the provisions of the Minerals (Evidence of Mineral Contents) Rules, 2015 (as amended up to 2021) and the Mineral (Auction) Rules, 2015, with the objective of facilitating the Government of Telangana in the auctioning of the mineral block.

6.2.0 COMPONENTS OF EXPORATION WORK

In present exploration scheme for proposed Hathighat G-3 block, geological mapping, topographical survey and exploratory drilling at an overall grid interval of 800m interval is planned. The proposed activities are described below.

6.2.1 SURVEY WORK

6.2.1.1 Boundary Survey and Control Network

The boundary of the proposed Hathighat G-3 Block (11.28 sq km) shall be surveyed using Differential Global Positioning System (DGPS) in WGS-84 datum for precise demarcation of block limits and corner points. A triangulation/control network will be established within the block area to provide a reliable spatial framework for all subsequent survey, geological and exploration activities.

6.2.1.2 Topographical Survey

A detailed topographical survey will be carried out over the entire block area on a 1:4000 scale, with a 2 m contour interval, to generate an accurate terrain model. The survey will capture surface relief, slope variations, drainage features, existing tracks and accessibility, which are essential for planning drilling locations, movement of equipment and overall exploration logistics.

6.2.1.3 Survey of Borehole Locations

A total of 17 boreholes proposed for G-3 level exploration will be fixed accurately on the ground. The coordinates and Reduced Levels (RLs) of all borehole collar points will be determined using DGPS. This will ensure high positional accuracy and proper integration of subsurface data with surface maps.

6.2.2 GEOLOGICALMAPPING

6.2.2.1 Objective of Geological Mapping

Detailed geological mapping will be undertaken over the entire 11.28 sq km area of the proposed Hathighat G-3 block on a 1:4000 scale to establish lithological distribution, stratigraphic relationships, structural framework and surface expression of manganese and limestone mineralization, and to provide a reliable geological base for planning exploration activities including drilling.

6.2.2.2 Delineation of litho units

Systematic mapping will be carried out to delineate various litho-units, including massive and flaggy Penganga Limestone, manganiferous horizons, chert–jasper bands, shale, lateritic cover and soil cover. The nature of contacts (gradational or sharp) between litho-units will be recorded and plotted.

6.2.2.3 Structural data acquisition

All observable structural features such as bedding attitude (strike and dip), joints, fractures, minor faults, folds and lineaments will be measured and documented. Particular emphasis will be placed on identifying NW–SE trending structural controls that influence the disposition of mineralised horizons.

6.2.2.4 Mineralisation Mapping

Surface expressions of manganese mineralisation, including float, boulders, staining, chert–jasper bands and different limestone bands, will be mapped in detail. The continuity, thickness variation and spatial relationship of mineralised horizons with host lithology will be recorded to aid subsurface correlation.

6.2.3 EXPLORATORY DRILLING

6.2.3.1 In order to establish the subsurface continuity, thickness, grade variation and geometry of limestone and associated manganese mineralisation in the proposed Hathighat G-3 Block, a programme of systematic exploratory drilling has been planned. A total of seventeen (17) vertical boreholes, designated as PBH-01 to PBH-17, are proposed to be drilled using HQ core size ranging between 60-80m of depth.

6.2.3.2 The boreholes have been planned in a systematic grid pattern at an average spacing of about 800 m, keeping in view the areal extent of the block (11.28 sq km), regional strike of mineralisation, geological disposition of litho-units and surface indications of mineralisation. The drilling pattern is designed to adequately cover the block and to intersect the anticipated manganiferous horizons within the Penganga Limestone at shallow to moderate depths, consistent with regional geological understanding.

6.2.3.3 During the earlier G-4 stage investigations carried out by the Geological Survey of India (GSI) during 2017–18, exploratory drilling was undertaken in parts of the area. Three boreholes, namely TAG-01, TAG-02 and TAG-03, fall in Guda-Rampur auctioned block (Auctioned in September 2025) in the west of presently proposed Hathighat G-3 block. The geological, lithological and analytical data generated from these boreholes are critically reviewed and accordingly served as present exploration database.

6.2.3.4 All proposed boreholes will be vertically drilled to ensure proper intersection of near-horizontal to gently dipping limestone and manganiferous horizons. Continuous core recovery will be ensured, and core logging will include detailed recording of lithology, mineralisation, structures, alteration and recovery parameters. The drilling data generated will be used for preparation of geological sections, lithological logs and grade distribution models, and will form the basis for estimation of inferred mineral resources (UNFC 333) at the G-3 stage.

6.2.3.5 The borehole location map is enclosed as PLATE -IV and the details of proposed boreholes at G-3 level are listed below in Table No.-6.1. tentative

Table No.-6.1
Details of Proposed Boreholes in proposed Rampur G-3 Block

Sl. No.	Borehole No.	Inclination (°)	Total Depth (m)	Level of Exploration
1	PBH-01	90	80.00	G-3
2	PBH-02	90	60.00	
3	PBH-03	90	80.00	
4	PBH-04	90	60.00	
5	PBH-05	90	60.00	
6	PBH-06	90	80.00	
7	PBH-07	90	60.00	
8	PBH-08	90	60.00	
9	PBH-09	90	60.00	
10	PBH-10	90	60.00	

Sl. No.	Borehole No.	Inclination (^{o})	Total Depth (m)	Level of Exploration
11	PBH-11	90	60.00	
12	PBH-12	90	60.00	
13	PBH-13	90	60.00	
14	PBH-14	90	60.00	
15	PBH-15	90	60.00	
16	PBH-16	90	60.00	
17	PBH-17	90	60.00	
			1080.00	

6.2.4 DRILL CORE LOGGING AND SAMPLING

6.2.4.1 Detailed drill core logging will be done with consideration of weathering, grain size, color of various formations, intercalation / parting and structure. On the basis of these parameters, grade of limestone and manganesee can be broadly presented and it will also be helpful in sampling.

6.2.4.2 Primary samples will be drawn at 1m interval subject to change in lithology and core recovery. The following parameters shall be considered while sampling the drill cores.

1.Colour, grain size.
2.Fossil variation.
3.Thin intercalations of shale/siltstone.
4.Presence of Manganese horizons
5.Partially weathered zone.
6. Details of mineralization for Limestone and Bauxite and Fireclay.

6.2.4.3 For preparation of samples the borehole core will be longitudinally split into two equal halves by using core splitter. One half will be powdered to -200 mesh size and the other half will be kept for future studies. The powdered material will be mixed thoroughly and about 100 gm of samples will be taken for chemical analysis by successive coning and quartering as primary samples and rest of the material will be kept as duplicate half for future reference.

6.2.4.4 Total number of primary samples likely to be generated would be 1050 nos. for Limestone. 106 External check samples (10% of primary samples) will be sent to NABL accredited Labs for analysis.

6.2.4.5 Total number of primary samples likely to be generated would be 100 nos. for Manganese. 10 External check samples 10% of primary samples will be sent to NABL accredited Labs for analysis of 6 radicals.

6.2.5 Laboratory Studies

6.2.6 Chemical Analysis:

6.2.6.1 **Chemical Analysis for Limestone:**

Primary BH samples for Limestone (1060 Nos.) will be analyzed for 10 radicals, CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3, SO_3, P_2O_5, K_2O, Na_2O and LOI by XRF method. 10% of primary samples (106 Nos.) will be sent to NABL external labs as external check samples for analysis of 10 radicals CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3, SO_3, TiO2, P_2O_5, K_2O, Na_2O and LOI. Partial analysis for dolomite/ limestone (R203, Ca, Mg Acid insoluble & LOI) may be carried out for 1060 samples. Also 24 trace element studies will be carried out.

6.2.6.2 **Chemical Analysis for Manganese:**

Primary BH samples for Manganese (100 Nos.) will be analyzed for 6 radicals, i.e. Total Mn, SiO_2, Fe_2O_3, P_2O_5, MnO_2 and acid insolubles. 10% of primary samples (10 Nos.) will be sent to NABL external labs as external check samples for analysis of 6 radicals, i.e. Total Mn, MnO_2, Fe_2O_3, P_2O_5, SiO_2 and acid insolubles. Also 8 (Cu, Ni, Co, Cr, Pb, Zn, Ba, Nb) trace elemental analysis will be carried out.

6.2.6.3 **Petrological Studies**:

Petrological studies will be done on 10 nos. of drill core samples.

6.2.6.4 **Mineragraphic Studies**:

05 samples will be collected for mineragraphic studies.

6.2.6.5 **XRD Study**

To know the different mineral phases, 05 samples may be studied through XRD.

6.2.6.6 **Bulk Density Determination:**

On 10 nos. of borehole core samples, bulk density studies will be carried out.

7.0.0 THE QUANTUM OF WORK PROPOSED

The Quantum of work proposed is given in **Table No. 7.1**

Table No. 7.1
Quantum of Work for Proposed Hathighat G-3 Block, Adilabad, Telangana

Sl.No.	Description and Nature of Work	Unit	Target
A	**GEOLOGICAL WORK AND SURVEYING**		
1	Geological Mapping (1:4000 scale)	Sq. km	11.28

Sl.No.	Description and Nature of Work	Unit	Target
2	Survey Work		
	i) Topographical Survey (1:4000 scale)	Sq. km	11.28
	ii) Bore Hole Fixation	Nos	17
	iii) RL & Coordinate Determination of block boundary co-ordinates by DGPS	Nos	4
B	**EXPLORATORY DRILLING**		
1	Drilling up to 300m (Soft Rock)	m	1080
2	Drill Core Preservation	m	1060
C	**LABORATORY STUDIES**		
1	**Chemical Analysis for Limestone (BH)**		
	i) Primary BH Samples (10 radicals CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3, SO_3, P_2O_5, K_2O, TiO2, Na_2O and LOI) by XRF	Nos	1060
	ii) Partial analysis of dolomite/ limestone samples (R203, Ca, Mg Acid insoluble & LOI)	Nos	1060
	iii) BH Check Samples External 10% (10 radicals CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3, SO_3, P_2O_5, K_2O, Na_2O and LOI)	Nos	106
2	**Chemical Analysis for Manganese (BH)**		
	i) Primary BH Samples (6 radicals i.e. Total Mn, MnO_2, Fe_2O_3, P_2O_5, SiO_2 and acid insolubles.) and 8 trace elements	Nos	100
	ii) BH Check Samples External 10%	Nos	10
3	**Petrographic studies**	Nos	10
4	**Mineragraphic studies**	Nos	5
5	**XRD Mineral phase analysis**	Nos	5
6	**Bulk Density studies**	Nos	10
E	**Report Preparation (5 Hard copies with a soft copy)**	Nos	1
F	**Preparation of Exploration Proposal (5 Hard copies with a soft copy)**	Nos	1

7.1.0 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. 15/12/2025. The total estimated cost is **Rs. 260.38 Lakhs.** The summary of cost estimates for preliminary exploration (G-3) is given in **Table No. – 7.2.** The detailed cost sheet is given as Annexure-I.

Table No. 7.2
Summary of cost estimates for Preliminary Exploration (G-3) in Hathighat Block, District-Adilabad, Telangana

Sl. No.	Item	Total
1	Geological Work	**5,448,204**
2	Survey work	**569,880**
3	Drilling	**7,481,200**
4	Laboratory Studies	**7,369,800**
5	**Sub total**	**20,869,084**
6	Report	**750,000**
7	Proposal Prepration	**417,382**
8	Peer reviwer cost	**30,000.00**
9	**Total**	**22,066,466**
10	GST (18%)	**3,971,963.82**
Total cost including 18% GST		**26,038,430**
SAY, in Lakhs		**260.38**

7.2.0 TIMELINE

The entire project is planned tentatively for 12 months.

Table No. 7.3
Tentative Time schedule / Action plan

S. No.	Particulars	Months/Days	1	2	3	4	5		6	7	8	9	10	11	12
1	Camp Setting	months	■												
2	Geological Mapping	months		■	■	■									
3	Survey days	days			■	■	■	R							
6	Drilling (1 rig)	m				■	■	E	■	■	■				
7	Geologist days	days		■	■		■	V	■		■				
8	Sampling days, Core Sampling	days						I	■	■	■	■			
9	Camp winding	months						E				■			
10	Laboratory Studies	months						W		■	■	■	■		
11	Geologist days, HQ	days									■	■	■	■	
12	Report Writing with Peer Review	months													■

List of Plates:

Annexure

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