PROPOSAL FOR PRELIMINARY EXPLORATION (G-3)
FOR TITANIFEROUS MAGNETITE IN
KHURSIPAR BLOCK
(2.1 SQ. KM AREA)
DISTRICT- GONDIA, MAHARASHTRA

COMMODITY: TITANIFEROUS MAGNETITE

BY

MINERAL EXPLORATION AND CONSULTANCY LIMITED

DR. BABASAHAB AMBEDKAR BHAWAN

SEMINARY HILLS

PLACE: NAGPUR

DATE: FEBRUARY 2025

Summary for Preliminary Exploration (G-3 Stage) for Titaniferous Magnetite in Khursipar Block (2.1 sq.km area), District- Gondia, Maharashtra

	Features	**Details**
	Block ID	**Khursipar Block**
	Exploration Agency	Mineral Exploration and Consultancy Limited (MECL)
	Commodity	**Titaniferous Magnetite**
	Mineral Belt	Amgaon Gneissic Complex
	Budget & Time schedule to complete the project	210.60 lakhs & 12 months
	Objectives	Based on the geological data of 10(A) 2(B) cases, provided by DGM, Maharashtra in and around Khursipar Block, Dist- Gondia, Maharashtra, the present exploration programme for Preliminary Exploration (G-3) has been formulated. The objectives of the present Preliminary Exploration (G-3) are as follows: i) To carry out Geological & Structural mapping on 1:4000 scale for identification of Titaniferous magnetite bearing formation (host rock) with the structural features to identify the surface manifestation and lateral disposition of the Titaniferous magnetite zones. ii) To prepare the detailed surface map of the area by means of surface contouring at 2m interval in 1:4000 scale. iii) Trenching/pitting will be carried out in the mineralized zone identified by geological mapping and bedrock sampling to establish the continuity of the mineralization along strike direction, which is covered by soil. iv) To establish three dimensional dispositions of the earlier reported Titaniferous magnetite zones by means of drilling. v) To assess the quality and quantity of the resources (333) as per UNFC norms & Minerals (Evidence of Mineral Contents) Rules- 2021.
	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	
	Expected Field days (Geology, Geophysics, Surveyor)	Geologist Party days: Field -150 days & HQ-45 days Survey Party days: 30 days (for topographic survey) Sampling Party days: 30 days

<table>
<tr><td>1.</td><td>Location</td><td>The proposed exploration block is located in Amgaon Tehsil of Gondia district. The block lies about 12km WSW of tehsil headquarter and about 15km SSE of district headquarter. The area falls under the parts of Survey of India Toposheet No 64C/07 and is bounded by latitude 21° 21' 43.20" N to 21° 23' 09.96" N and longitude 80° 17' 10.32"E to 80° 18' 10.80" E (Plate No I).</td></tr>
<tr><td></td><td>Latitude and Longitude</td><td>
<table>
<tr><th rowspan="2">Cardinal points</th><th colspan="2">WGS 84 (DMS)</th><th colspan="2">UTM Zone-44N</th></tr>
<tr><th>Latitude</th><th>Longitude</th><th>Northing (m)</th><th>Easting (m)</th></tr>
<tr><td>A</td><td>21° 23' 09.96ò N</td><td>80° 17' 41.64ò E</td><td>2365047.524</td><td>426908.115</td></tr>
<tr><td>B</td><td>21° 23' 01.32ò N</td><td>80° 18' 10.80ò E</td><td>2364770.080</td><td>427742.042</td></tr>
<tr><td>C</td><td>21° 21' 43.20ò N</td><td>80° 17' 42.36ò E</td><td>2362376.512</td><td>426918.004</td></tr>
<tr><td>D</td><td>21° 22' 10.56ò N</td><td>80° 17' 20.04ò E</td><td>2363221.128</td><td>426283.003</td></tr>
<tr><td>E</td><td>21° 22' 18.84ò N</td><td>80° 17' 10.32ò E</td><td>2363476.762</td><td>425995.355</td></tr>
<tr><td>F</td><td>21° 22' 36.84ò N</td><td>80° 17' 18.60ò E</td><td>2364033.178</td><td>426242.710</td></tr>
<tr><td>G</td><td>21° 22' 32.88ò N</td><td>80° 17' 33.36ò E</td><td>2363906.645</td><td>426663.993</td></tr>
</table>
</td></tr>
<tr><td></td><td>Villages</td><td>Khursipar, Kubitola, Dahegaon, Powaritola, Khursipartola</td></tr>
<tr><td></td><td>Tehsil/Taluk</td><td>Amgaon</td></tr>
<tr><td></td><td>District</td><td>Gondia</td></tr>
<tr><td></td><td>State</td><td>Maharashtra</td></tr>
<tr><td>2.</td><td>Area (hectares/ square kilometres)</td><td></td></tr>
<tr><td></td><td>Block Area</td><td>2.1 sq. km</td></tr>
<tr><td></td><td>Forest Area</td><td>Forest and Non-Forest area</td></tr>
<tr><td></td><td>Government Land Area</td><td>Data not available</td></tr>
<tr><td></td><td>Charagaha</td><td>Data not available</td></tr>
<tr><td></td><td>Private Land Area</td><td>Data not available</td></tr>
<tr><td>3.</td><td>Accessibility</td><td></td></tr>
<tr><td></td><td>Nearest Rail Head</td><td>The nearest railhead is Gondia in Central Region which is about 15 km NNW of the block.</td></tr>
<tr><td></td><td>Road</td><td>The block area is well connected to district headquarters Gondia, by all weather metalled road (NH-543).</td></tr>
<tr><td></td><td>Airport</td><td>The nearest Airport is Gondia which is about 25km from the block.</td></tr>
<tr><td>4.</td><td>Hydrography</td><td></td></tr>
<tr><td></td><td>Local Surface Drainage Pattern (Channels)</td><td>The drainage pattern in the area is of dentritic type forming seasonal nalas. Most of the drainage (dentritic pattern) channels drain into northernly flowing nalas.</td></tr>
<tr><td></td><td>Rivers/ Streams</td><td>-</td></tr>
<tr><td>5.</td><td>Climate</td><td></td></tr>
</table>

	Mean Annual Rainfall	Average annual rainfall is 1300mm to 1600mm
	Temperature:	Minimum temperatures: below 10°C (December-January), Maximum temperatures: up to 47°C (April-May)
6.	**Topography**	
	Toposheet Number	64C/07
	Morphology of the Area	The study area forms a flat land (peneplain) with some isolated low rising hilloks in western part. The peneplain covering cultivated land and fairly dense mixed jungle/forest land at the hillocks. The altitude of the study area varies between 355m and 380 m.
7.	**Availability of baseline geoscience data**	
	Geological Map (1:50K/25K)	1:25,000 (Bhukosh, Geological Survey of India)
	Geochemical Map	Not available.
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	Not available.
8.	**Justification for taking up Preliminary Exploration**	i) The vanadiferous titanomagnetite of AGC complex is one of the most important loci for the magnetite deposit in Gondia district, Maharashtra. The state-owned mines are operating in the area for vanadiferous titanomagnetite. ii) During F.S.P. 2006-07, Dhanvijay S.P. and Chattopadhyay S. have carried out P-1 stage exploration for PGE within titaniferous magnetite bearing metapyroxenites of Khursipar-Manegaon area, District Gondia. They have carried out whole rock analysis for 27 samples. Out of which 15 samples having TiO2>1.5% with maximum value upto 15.1%. iii) During 27-11-2006 to 27-11-2008, M/s R.R. Shende has carried out the prospecting for Iron Ore in Khursipar area (0.03 sq.km.). They have carried out sinking of 6 trial pits of 1.8 to 4m depth in the lapsed lease area and established 0.026 MT iron ore resource. However, analysis of samples is not available. iv) There are two mining leases of state-owned Maharashtra State Mining Corporation Ltd, are present at the north-western boundary of the proposed block area.

		v) State Government of Maharashtra, requested to MECL to take up exploration through National Mineral Exploration Trust (NMET) funding mechanism in the lapsed lease areas by state govt. granted as per section 10(A) 2(B) of the MMDR Act-15 in and around Khursipar village vide letter no. Tech/1848/2023/3938, dated 22/12/2023. The lapsed lease was granted to M/s R.R. Shende during 27-11-2006 to 27-11-2008 for 2 years. M/s R.R. Shende has carried out the prospecting for Iron Ore in Khursipar area (0.03 sq.km.). They have carried out sinking of 6 trial pits of 1.8 to 4m depth in the lapsed lease area and established 0.026 MT iron ore resource in the lapsed lease hold area. vi) The proposed Khursipar Titaniferous magnetite block is formulated on the basis of lapsed ease area in Khursipar and available data in and around the area. MECL has proposed Preliminary Exploration (G-3 stage) in Khursipar Block to assess the quality and quantity of the resources (333) as per UNFC norms & Minerals (Evidence of Mineral Contents) Rules- 2021, which will facilitate state government to auction the block.

PROPOSAL FOR PRELIMINARY EXPLORATION (G-3 STAGE) FOR TITANIFEROUS MAGNETITE IN KHURSIPAR BLOCK (2.1 SQ.KM AREA) DISTRICT- GONDIA, MAHARASHTRA

1.0.0 INTRODUCTION

1.1.0 Preamble

1.1.1. Iron ore is the basic raw material in iron & steel industry. Magnetite is one of the principal minerals of iron ore occurring in the form of oxides (Fe_3O_4). Magnetite is a mineral whose primary component is an iron oxide that contains equal amounts of iron (II) and iron (III). Its empirical formula is Fe_3O_4, and it is often expressed as iron (II, III) oxide. Magnetite is found in igneous, metamorphic, and sedimentary rocks. As its name implies, it is magnetic; it and other inherently magnetic iron-containing minerals are described as being ferrimagnetic.

1.1.2 The total resources of iron ore (magnetite) in the country as on 1.4.2015 are estimated at 10,789 million tonnes, of these about 53 million tonnes (0.5%) fall under 'reserve' category and the balance about 10,736 million tonnes (99.5%) under 'remaining resources' category. About 98% magnetite reserves/resources of India are located in five States, namely, Karnataka (7,802 million tonnes or 72%) followed by Andhra Pradesh (1,392 million tonnes or 13%), Rajasthan (617 million tonnes or 6%), Tamil Nadu (507 million tonnes or 5%) and Goa (266 million tonnes or 2%). Assam, Bihar, Chhattisgarh, Jharkhand, Kerala, Maharashtra, Meghalaya, Nagaland, Odisha and Telangana together account for the remaining 2% resources. About 94% resources are in freehold areas and 6 % resources are in leasehold areas. Classification on the basis of grades shows that 20% resources are of Metallurgical grade while 80% resources belong to grades that are categorised as Unclassified, Not-known and Coal Washery. The resources of Others and Foundry grades constitute meagre proportions.

1.1.3 Magnetiteôs greatest use is as an important iron ore for steel manufacture. Other applications are as a catalyst in the Haber process for making ammonia, as a

pigment for paints and ceramics, and as magnetic micro- and nanoparticles for a variety of processes and materials. Demand for magnetite is increasing in the steel, electronics, and medical industries, which makes it one of the important mineral of the country.

1.1.4 Titaniferous magnetite refers to a type of magnetite (Fe O), a mineral that contains both iron and titanium. The term "titaniferous" indicates that the magnetite has significant amounts of titanium incorporated into its structure, typically in the form of titanium oxide (TiO). Thus, titaniferous magnetite is also a source of titanium, which is a versatile and highly durable metal with a wide range of uses due to its excellent strength-to-weight ratio, corrosion resistance, and biocompatibility. The titanium alloys are used in aerospace, military, industrial processes, automotive, agriculture, sporting goods, jewelry, and consumer electronics. It is also considered one of the most biocompatible metals, leading to a range of medical applications including prostheses, orthopedic implants, dental implants and surgical instruments.

1.1.5 On enactment of MMDR Amendment Act 2015, Minerals (Evidence of Mineral Contents) Rules 2015 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. Recently, some rules in the MMDR Act-15 have been amended which facilitates the state Govt. to auction the blocks with lower confidence level of exploration and put more and more blocks on auction. Accordingly, State Government of Maharashtra, requested to MECL to take up exploration through National Mineral Exploration Trust (NMET) funding mechanism in the lapsed lease areas by state govt. granted as per section 10(A) 2(B) of the MMDR Act-15 in and around Khursipar village vide letter no. Tech/1848/2023/3938, dated 22/12/2023.

1.1.5 Considering the request of DGM, Maharashtra, available data and demand of magnetite as well as titanium, MECL has proposed Preliminary Exploration (G-3

stage) for Titaniferous magnetite in Khursipar Block to fulfil the demand of magnetite as well as titanium in the country.

1.2.0 Background

1.2.1 In view of the enactment of the MMDR Amendment Act, 2015 and Mineral Auction Rule, 2015 by the Govt. of India, the State administration of Maharashtra desired that some mineral prospects of the state be explored on priority basis through National Mineral Exploration Trust (NMET) fund so that those could be auctioned and thereby earn revenue for the state along with the augmentation of reserve and resource of the country. The occurrence of Titaniferous magnetite in Gondia district of Maharashtra is among them.

1.2.2 The Directorate of Geology and Mining (DGM), Government of Maharashtra, Nagpur requested to MECL to take up the exploration in Khursipar lapsed 10(A) 2(B) mining lease area vide letter no. Tech/1848/2023/3938, dated 22/12/2023. The Khursipar lapsed lease area covers an area of 0.03 sq.km near Khursipar village of Amgaon Tehsil of Gondia district, Maharashtra.

1.2.3 Subsequently, MECL studied the available geological data in and around Khursipar area and has selected an area of 2.1 sq.km. area to take up the further exploration. MECL has formulated a proposal for Preliminary Exploration (G-3) exploration for titaniferous magnetite in Khursipar Block, Dist.- Gondia, Maharashtra.

1.3.0 Location & Accessibility of the Area

1.3.1 The proposed exploration block is located in Amgaon Tehsil of Gondia district. The block lies about 12km WSW of tehsil headquarter and about 15km SSE of district headquarter. The area falls under the parts of Survey of India Toposheet No 64C/07 and is bounded by latitude 21° 21' 43.20" N to 21° 23' 09.96" N and longitude 80° 17' 10.32"E to 80° 18' 10.80" E (Plate No I).

The coordinate of cardinal points of block boundary are as follows:

Cardinal points	WGS 84 (DMS)		UTM Zone-44N	
	Latitude	Longitude	Northing (m)	Easting (m)
A	21° 23' 09.96ò N	80° 17' 41.64ò E	2365047.524	426908.115
B	21° 23' 01.32ò N	80° 18' 10.80ò E	2364770.080	427742.042
C	21° 21' 43.20ò N	80° 17' 42.36ò E	2362376.512	426918.004
D	21° 22' 10.56ò N	80° 17' 20.04ò E	2363221.128	426283.003
E	21° 22' 18.84ò N	80° 17' 10.32ò E	2363476.762	425995.355
F	21° 22' 36.84ò N	80° 17' 18.60ò E	2364033.178	426242.710
G	21° 22' 32.88ò N	80° 17' 33.36ò E	2363906.645	426663.993

1.3.2 The block area is well connected to district headquarters Gondia, by all weather metalled road (NH-543). The nearest railhead is Gondia in Central Region which is about 15 km NNW of the block. The nearest Airport is Gondia which is about 25km from the block.

1.4.0 Physiography, Drainage, Climate and Vegetation

1.4.1. The study area forms a flat land (peneplain) with some isolated low rising hilloks in western part. The peneplain covering cultivated land and fairly dense mixed jungle/forest land at the hillocks. The altitude of the study area varies between 355m and 380 m.

1.4.2 The drainage pattern in the area is of dentritic type forming seasonal nalas. Most of the drainage (dentritic pattern) channels drain into northernly flowing nalas.

1.4.3 The average rainfall is 1300mm to 1600mm (Jun-Sep). The area comes within the semi-arid zone with temperature ranging from 10^0C to 47^0C.

1.4.4 The larger trees include Sal, Babul, Tendu (Diospyros tomentosa), Imli (Taqmarindus indica), Mahua (Madhuca latifolia) etc, a thick undergrowth covers the floor of the forest and is constituted of various categories of long grasses and shrubby and thorny vegetations. The plains are cultivated for paddy and other kharif crops and peanut, tur etc in winter. The later is also grown in profusion in the lower hill slopes. The fauna includes bear and boar which are very common. Occasionally small deer, jackal, snakes can be encountered.

1.5.0 Previous Work

1.5.1 Detail geology of the Khursipar area have been described by A.K. Dey (1983) in ñState government geological exploration work for magnetite and titanium minerals from the area.

1.5.2 Dhanvijay S.P. and Chattopadhyay S. (F.S.P. 2006-07) have carried out P-1 stage exploration for PGE within titaniferous magnetite bearing metapyroxenites of Khursipar-Manegaon area, District Gondia. They have carried out geological mapping on 1:12500 scale over 75 sq. km. area and collected a total of 235 nos. of samples for examining potentiality of PGE through thin section, chemical, SEM/EDX, EPMA, ore mineralography and polished section studies. They have not found any potential mineralisation for PGE. However, they have analysed 27 no. of samples for whole rock and reported TiO_2 upto 15.1%.

1.5.3 During 27-11-2006 to 27-11-2008, M/s R.R. Shende has carried out the prospecting for Iron Ore in Khursipar area (0.03 sq.km.). They have carried out sinking of 6 trial pits of 1.8 to 4m depth in the lapsed lease area and established 0.026 MT iron ore resource. However, analysis of samples is not available in report.

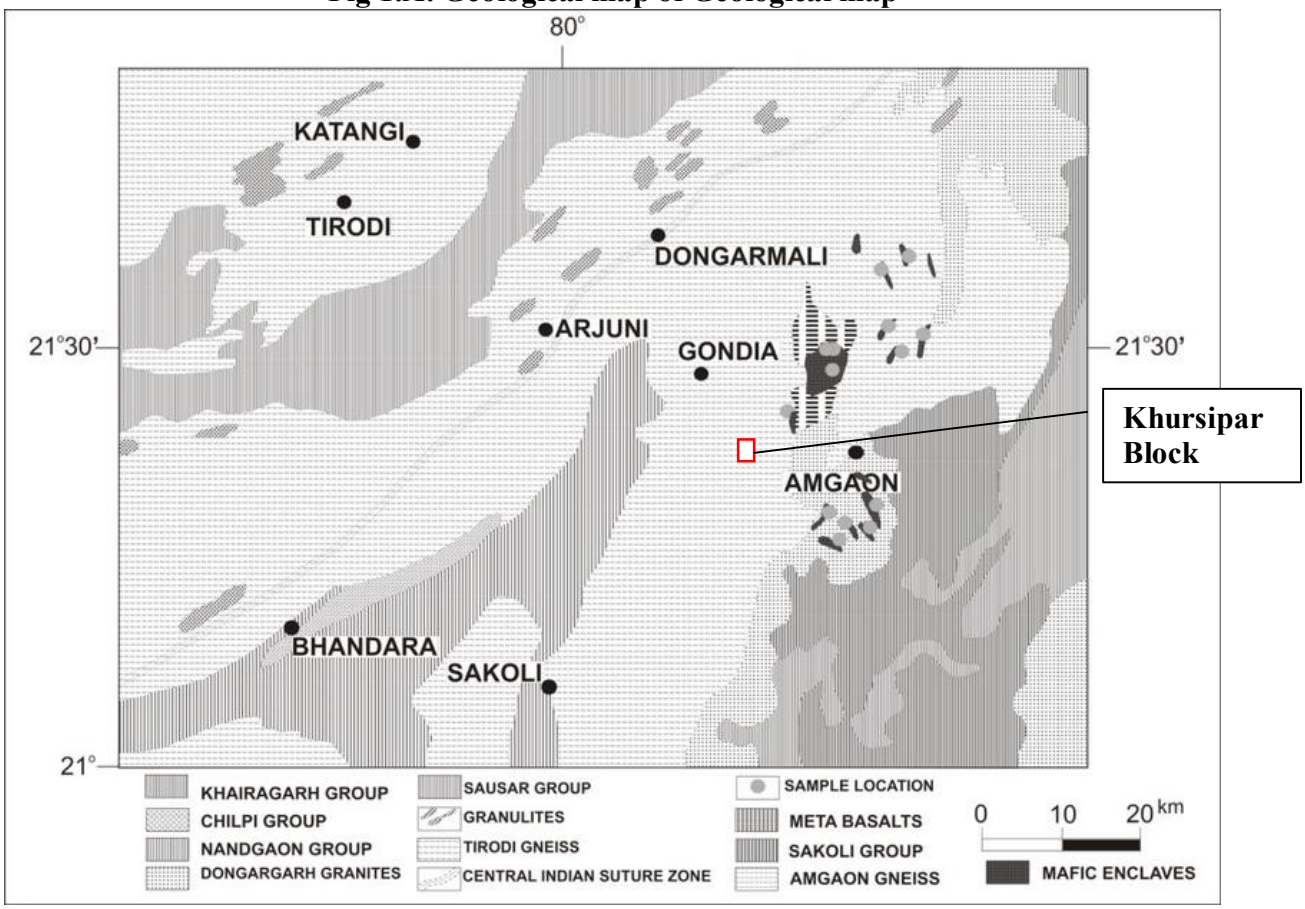
2.0.0 Geology

2.1.0 Regional Geology

2.1.1 The proposed area Central Indian Tectonic Zone (CITZ) is a significant continental scale tectonic zone of Proterozoic age. It divides the Indian shield into two tectono magmatic provinces, the northern crustal province comprising Bundelkhand craton and the southern peninsular crustal province comprising Bastar, Dharwar and eastern Singhbhum. The Central Indian Suture zone (Yedekar et al., 2003, 1990) is a major ENEWSW trending ductile mylonite zone separating the Bundelkhand and Bastar cratons.

2.1.2 The proposed area forms part of the region covering rocks of the Precambrian Amgaon Group and the overlying Dongargarh super group. The litho units exposed in and around the region belong to the Amagaon Gnessic Complex (AGC) of Archaean-Paleoproterozic age, Dongargarh granite of Palaeoproterozoic age and laterite outcrops of Cainozoic age. Regionally the area consists of Granite genies, calc silicates, quartzites, amphibolites and hornblede schists belonging to Amagaon Gneissic Complex (AGC), granodiorite and granite of Dohgargarh granite and Laterite occurrences of Cainozoic age observed at places and followed by recent Quarternary sediments i.e. alluvium. Geological map of Geological map around Amgaon area (after Yedekar et.al., 2003 and Alam et.al., 2014) is given in **Fig 1.A.**

Fig 1.A: Geological map of Geological map



2.2.0. Geology of the Block

2.2.1. The lithounits exposed in the block area mainly belongs to Archaean-Paleoproterozic AGC, Palaeoproterozoic Dongargarh granite followed by Cainozoic (Laterite) and Quaternary sediments. The Vanadiferous titanomagnetite associated with metagabbro and metapyroxenites belongs to AGC and granodiorite and granite gneisses belong to Dongargarh granite.

2.2.2 Vanadiferous titanomagnetite bands associated with metagabbro and metapyroxenites are exposed intermittently in NNE-SSW trend. The magnetite bodies in most instances are weathered in their upper parts. The rubble of lateritic magnetite covers the hill slopes including mound tops. The unweathered magnetite is mostly massive, granular with green to altered white to brown intergranular matrix. High content of vanadium and titanium oxide and their association with gabbro and pyroxenite suggest that magnetite is genetically related to gabbro and ultramafic rocks are deformed.

2.2.3 The granitic rocks are distinctly gneissic buff coloured and highly weathered containing quartz, feldspars, muscovite and biotite. The rock contains, plagioclase feldspar (albite-oligoclase, microcline, microperthite), muscovite, biotite with accessories of apatite, sphene, zircon and opaque ores. Visual estimation of the constituents shows rock type falling within the field of quartz granodiorite. Feldspar attains coarse grain size in a medium grained matrix. Twinning patterns observed in plagioclase feldspar albite-carlsbad and pericline laws. Biotite is of green variety and muscovite is in general dirty semi translucent white.

2.2.4 The general trend of formation in the block is NS to NNE-SSW with subvertical to inclined dips. The compositional laminations in Khursipar gabbro complex trend roughly NS with moderate dip. The Amgaon gneissic rocks are strongly deformed. The foliation is well defined on NNE-SSW-N-S with subvertical dip in the Amgaon gneissic rock. The prominent joint set is N-S -NNE-SSW. Other joint sets are WNW-ESE and NNE SSW.

3.0.0 Mineral Potentiality based on geology, geophysics, ground geochemistry etc.

3.1.1 The vanadiferous titanomagnetite of AGC complex is one of the most important loci for the magnetite deposit in Gondia district, Maharashtra. The state-owned mines are operating in the area for vanadiferous titanomagnetite.

3.1.3 During F.S.P. 2006-07, Dhanvijay S.P. and Chattopadhyay S. have carried out P-1 stage exploration for PGE within titaniferous magnetite bearing metapyroxenites of Khursipar-Manegaon area, District Gondia. They have carried out whole rock analysis for 27 samples. Out of which 15 samples having TiO_2>1.5% with maximum value upto 15.1%.

3.1.4 During 27-11-2006 to 27-11-2008, M/s R.R. Shende has carried out the prospecting for Iron Ore in Khursipar area (0.03 sq.km.). They have carried out sinking of 6 trial pits of 1.8 to 4m depth in the lapsed lease area and established 0.026 MT iron ore resource. However, analysis of samples is not available.

3.1.5 There are two mining leases of state-owned Maharashtra State Mining Corporation Ltd, are present at the north-western boundary of the proposed block area.

3.2.0. Scope of Proposed Exploration

3.2.1 The proposed Preliminary Exploration (G-3 stage) program comprises topographical survey (1:4,000 scale), geological mapping (1:4,000 scale), trenching, pitting and drilling of about 800m with associated survey, laboratory studies including chemical analysis & physical analysis and geological report preparation.

3.3.0 Observation and Recommendations of previous work

1.8.1 The Khursipar Titaniferous magnetite block is formulated on the basis of previous work carried by GSI and lapsed lease areas by State Government of Maharashtra in and around Khursipar village of Amgaon Tehsil, Gondia district, Maharashtra,

which was granted as per section 10(A) 2(B) of the MMDR Act-15. The area was earlier explored by the lessees and they have reported potential iron ore deposit.

4.0.0 Previous Work / Background information

4.0.1 The background information and previous works have been described in para 1.2.0 and 1.5.0 respectively.

5.0.0 Block description

5.0.1 The proposed block details are given in para 1.3.0.

6.0.0 Objective of the proposed Preliminary Exploration (G-3):

6.1.0 Based on the geological data of 10(A) 2(B) cases, provided by DGM, Maharashtra in and around Khursipar Block, Dist- Gondia, Maharashtra, the present exploration programme for Preliminary Exploration (G-3) has been formulated.

6.2.0 The objectives of the present Preliminary Exploration (G-3) are as follows:

i) To carry out Geological & Structural mapping on 1:4000 scale for identification of Titaniferous magnetite bearing formation (host rock) with the structural features to identify the surface manifestation and lateral disposition of the Titaniferous magnetite zones.

ii) To prepare the detailed surface map of the area by means of surface contouring at 2m interval in 1:4000 scale.

iii) Trenching/pitting will be carried out in the mineralized zone identified by geological mapping and bedrock sampling to establish the continuity of the mineralization along strike direction, which is covered by soil.

iv) To establish three dimensional dispositions of the earlier reported Titaniferous magnetite zones by means of drilling.

v) To assess the quality and quantity of the resources (333) as per UNFC norms & Minerals (Evidence of Mineral Contents) Rules- 2021.

7.0.0 Planned Methodology

7.1.0 In accordance to the objective set for Preliminary Exploration (G-3) of the block, the exploration programme is proposed. The Exploration shall be carried out as per Minerals (Evidence of Mineral Contents) Rule-2015. Accordingly, the following scheme of exploration is formulated in order to achieve the objectives. The details of different activities to be carried out are presented in subsequent paragraphs.

7.2.0 Surveying

7.2.1 The block area would be tied up with the triangulation network and contouring/ topographical survey will be updated in the entire block area of 2.1 sq.km. The surface features in the block area will be picked up and marked on the map on 1:4,000 scale. The reduced levels and co-ordinates of boreholes, trenches and boundary coordinates would be determined. The contouring will be carried out at 2m interval. The exploratory boreholes and block boundary (total 17 points) shall be surveyed by DGPS and total station in WGS-84 datum, for demarcation of block boundary/corner points.

7.3.0 Geological Mapping

7.3.1 Detailed Geological mapping on 1:4,000 scale will be carried out in the entire block area. The rock types, their contact, structural features, mineralisations etc. will be mapped by taking traverses and will be marked on the map. Surface manifestations of the Titaniferous magnetite zones available along with their surface disposition will also be marked on the map.

7.4.0 Exploratory Mining (Trenching / Pitting):

7.4.1 During the exploration, shallow trenching/ pitting (excavation) work will be carried out by cutting trenches of 1m width and 2m depth and by pitting 1m width

and 2m depth directly on the fresh outcrop/rock exposures across the Titaniferous magnetite bearing formations involving 150 cubic meter excavation. The trench walls will be mapped on 1:200 scale.

7.5.0 Geochemical/Trench Sampling

7.5.1 Surface sampling (Bedrock/Trench/Channel):

During the course of Geochemical Sampling the bedrock / trench / channel samples shall be collected from the outcrops or outcrops exposed by trenching. A total of 100 no of primary and 10 no of external check channel samples will be analyzed for total Fe, FeO, SiO_2, Al_2O_3, P, S, TiO_2, MnO, MgO, V, Sc.

7.5.2 A provision of 10 samples from granitic rocks has been kept for the analysis of REE.

7.6.0 Exploratory Drilling

7.6.1 Based on Geological Mapping and Trenching/ Pitting, the extension of the Titaniferous magnetite zones will be marked. To confirm the potentiality of Titaniferous magnetite zones in strike & dip direction, approximately 800.00 m of drilling (10 BHs) will be carried out for upper (first) level (30m vertical depth) of intersection of Titaniferous magnetite zones. The azimuth and angle of inclination of the proposed boreholes will be decided by the field geologist once the Titaniferous magnetite zones is deciphered after geological mapping and trenching/pitting.

7.7.0 Drill Core Logging

5.7.1 The borehole cores would be logged systematically; viz. details of the litho units, colour, structural feature, texture, mineralization, besides the recovery, rock quality designation (RQD) and Titaniferous magnetite zone would be recorded.

7.8.0 Drill Core Sampling

7.8.1 The mineralized part of drill core will be sampled as primary sample. The length of each sample will be kept 1.00 m within the mineralized zone depending upon the thickness of particular type of mineralisation and its physical characters such as intensity of mineralization, change in lithology and core recovery etc. The primary core samples will be analysed for total Fe, FeO, SiO_2, Al_2O_3, P, S, TiO_2, MnO, MgO, V, Sc.

a) A total of 100 no of primary core samples will be analysed for total Fe, FeO, SiO_2, Al_2O_3, P, S, TiO_2, MnO, MgO, V, Sc.

b) Around 10% of Primary samples (10 numbers) will be sent to NABL External Labs for analysis of total Fe, FeO, SiO_2, Al_2O_3, P, S, TiO_2, MnO, MgO, V, Sc as external check samples.

4.9.0 XRD studies

4.9.1 A total of 10 samples are kept for XRD analysis to determine the phase of iron bearing minerals.

7.10.0 Petrological & Mineralogical Studies

7.10.1. Thin section study on drill cores samples would be done for ascertaining the petrographic characteristics. These samples would be drawn from Titaniferous magnetite zones and host rocks. A provision of 10 specimens for petrographic and mineragraphic studies each has been kept.

4.11.0 ICP-MS studies (34 Trace elements)

4.11.1 A total of 10 Nos of composite samples shall be subjected for the study of trace elements (34 elements) by ICP-AES/ICP-MS method

7.12.0 Bulk Density Determination

7.12.1. A provision of 05 samples for bulk density determination has been kept.

7.13.0 Proposed Nature Quantum and Target of Work

7.13.1. The quantum of work proposed by MECL for Titaniferous magnetite in Khursipar Block (G-3) is given in Table-7.1.

Table-7.1: Proposed Quantum of Exploratory Work in Khursipar Block District- Gondia, Maharashtra

Sl. No.	Item of Work	Unit	Proposed Quantum of work
1	Topographical Survey (1:4000)	sq. km	2.1
2	Geological Mapping (1:4000)	sq. km	2.1
3	Exploratory Mining (Trenching/Pitting) (1m x 2m x75m)	Cu. m	150
4	Core Drilling	m.	800
5	Sample Preparation & Chemical Analysis		
A.	**Bedrock / Trench / Pit Samples**		
	i) Primary samples for total Fe, FeO, SiO_2, AL_2O_3, P, S, TiO_2, MnO, MgO, V, Sc	Nos.	100
	ii) External Check sample (10% of Primary samples) for total Fe, FeO, SiO_2, AL_2O_3, P, S, TiO_2, MnO, MgO, V, Sc	Nos.	10
	iii) Primary samples for REE	Nos.	10
B.	**Borehole Core Samples**		
	i) Primary samples for total Fe, FeO, SiO_2, AL_2O_3, P, S, TiO_2, MnO, MgO, V, Sc	Nos.	100
	ii) External Check sample (10% of Primary samples) for total Fe, FeO, SiO_2, AL_2O_3, P, S, TiO_2, MnO, MgO, V, Sc	Nos.	10
	iii) Spectroscopic Studies (34 elements) By ICP-MS	Nos.	10
6	XRD studies	Nos.	10
7	Petrographic Studies	Nos	10
8	Mineragraphic Studies	Nos	10
9	Bulk Density Determination	Nos	5
10	Pitting for Lumps to fine ratio (1m x 1m x 1m)	Cu. m	5
11	Lumps to fine ratio determination	Nos.	5
12	Report Preparation (Digital format)	Nos.	1

8.0.0 Manpower Deployment

86.1.0 Manpower deployment List may be provided later.

9.0.0 Break-up of Expenditure

9.1.0 The proposed exploration programme is planned for Preliminary Exploration (G-3). The work activities like camp setting, geological work, survey work, drilling

& laboratory work, report writing will be completed within 12 monthsô time. The bar chart showing activities wise time schedule is placed at Table-9.1.

Table-9.1

Estimated time schedule for reliminary Exploration (G-3 Stage) for Titaniferous Magnetite in Khursipar Block, District- Gondia, Maharashtra [Block area-2.1 sq. km; Schedule timeline- 12 months]

S. No.	Particulars	Months	1	2	3	4	5		6	7	8	9	10	11	12	
1	Camp Setting	Months														1 month
2	Survey Party days (1 Party)	days														30 Days
3	Trenching / Pitting	cu.m														150 cu. m.
4	Drilling (1 rig)	m														800m
5	Geologist Party days (1 Party)	days														150 Days
6	Sampling days for Trench & Core Sampling (1 Party)	days														30 Days
7	Camp winding	Months														1 month
8	Laboratory Studies	days														5 months (280 samples)
9	Geologist days, HQ	days														45 days
10	Report Writing with Peer Review	days														4 months

Review

9.2.0 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 and the total estimated cost is Rs. 213.95 Lakh. The summary of tentative cost estimates for Preliminary Exploration is given in Table No.-9.2 and details of tentative cost estimates are given as Annexure-I.

Sl. No.	Item	Total
1	Geological Work	30,67,440
2	Pitting & Trenching	5,16,150
3	Laboratory Studies	15,73,255
4	Drilling	1,18,54,100
	Sub total	**1,70,10,945**
5	Report	7,50,000
6	Peer Review	30,000
7	Proposal Preparation	3,40,218.90
	Total	**1,81,31,164**
8	GST (18%)	32,63,609.50
Total cost including 18% GST		**2,13,94,773**
SAY, in Lakhs		**213.95**

8.0.0 Justification

8.1.1 The vanadiferous titanomagnetite of AGC complex is one of the most important loci for the magnetite deposit in Gondia district, Maharashtra. The state-owned mines are operating in the area for vanadiferous titanomagnetite.

8.1.2 During F.S.P. 2006-07, Dhanvijay S.P. and Chattopadhyay S. have carried out P-1 stage exploration for PGE within titaniferous magnetite bearing metapyroxenites of Khursipar-Manegaon area, District Gondia. They have carried out whole rock analysis for 27 samples. Out of which 15 samples having TiO_2>1.5% with maximum value upto 15.1%.

8.1.3 During 27-11-2006 to 27-11-2008, M/s R.R. Shende has carried out the prospecting for Iron Ore in Khursipar area (0.03 sq.km.). They have carried out sinking of 6 trial pits of 1.8 to 4m depth in the lapsed lease area and established 0.026 MT iron ore resource. However, analysis of samples is not available.

8.1.4 There are two mining leases of state-owned Maharashtra State Mining Corporation Ltd, are present at the north-western boundary of the proposed block area.

8.1.5 State Government of Maharashtra, requested to MECL to take up exploration through National Mineral Exploration Trust (NMET) funding mechanism in the lapsed lease areas by state govt. granted as per section 10(A) 2(B) of the MMDR Act-15 in and around Khursipar village vide letter no. Tech/1848/2023/3938, dated 22/12/2023. The lapsed lease was granted to M/s R.R. Shende during 27-11-2006 to 27-11-2008 for 2 years. M/s R.R. Shende has carried out the prospecting for Iron Ore in Khursipar area (0.03 sq.km.). They have carried out sinking of 6 trial pits of 1.8 to 4m depth in the lapsed lease area and established 0.026 MT iron ore resource in the lapsed lease hold area.

8.1.6 The proposed Khursipar Titaniferous magnetite block is formulated on the basis of lapsed ease area in Khursipar and available data in and around the area. MECL has proposed Preliminary Exploration (G-3 stage) in Khursipar Block to assess the

quality and quantity of the resources (333) as per UNFC norms & Minerals (Evidence of Mineral Contents) Rules- 2021, which will facilitate state government to auction the block.

8.0.0 References:

Alam M, Naushad M, Wanjari N. and Ahmad T. (2009): Geochemical characterizations of mafic magmatic rocks of the Central Indian Shield: Implication for Precambrian crustal evolution; Journal of the Virtual Explorer, Electronic Edition, ISSN 1441-8142, volume 32, paper 8.

Chetna K. A. and Khan A (2017): Environmental Impact Assessment of Mining at Khursipar Iron Ore Mine (MH), International Journal for Scientific Research & Development| Vol. 5, Issue 02, 2017 | ISSN (online): 2321-0613.

Dhanvijay S.P. and Chattopadhyay S. (F.S.P. 2006-07): Report on ñSearch for Platinum group of elements within titaniferous magnetite bearing metapyroxenites of Khursipar-Manegaon area, District Gondia, Maharashtra (Stage P-I) (Progress Report for the Field Season 2006-2007).

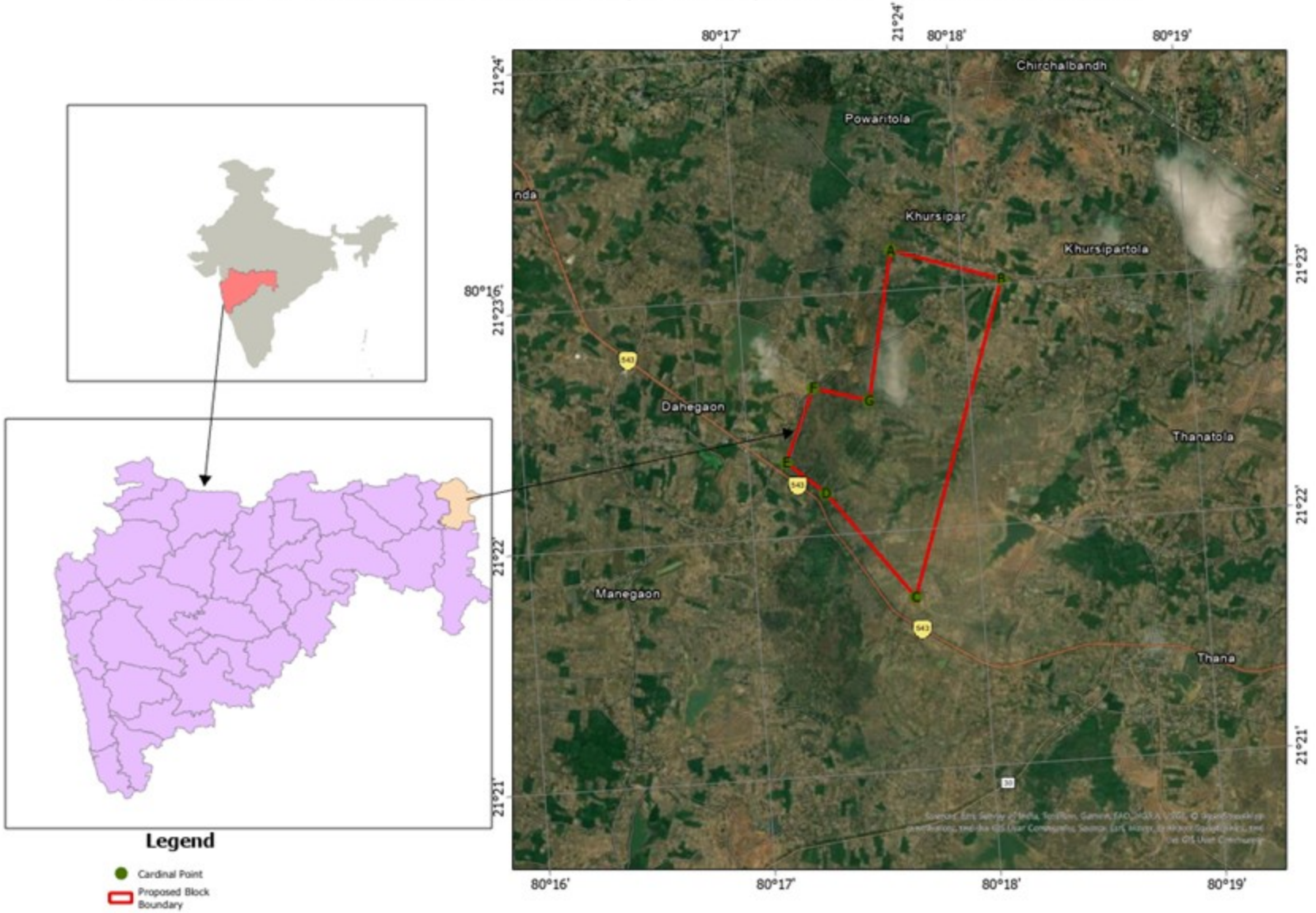
Maharashtra State Mining cop. A report on vanadiferous Titano magnetite Deposit, Khursipar, Maharashtra.

M/s R. R. Shende (2006-07): Geological and Prospecting Report on iron Ore deposit of Prospecting License area (3.32 Ha) in Village- Khursipar, Tahsil-Amgaon, Dist.- Gondia, Maharashtra.

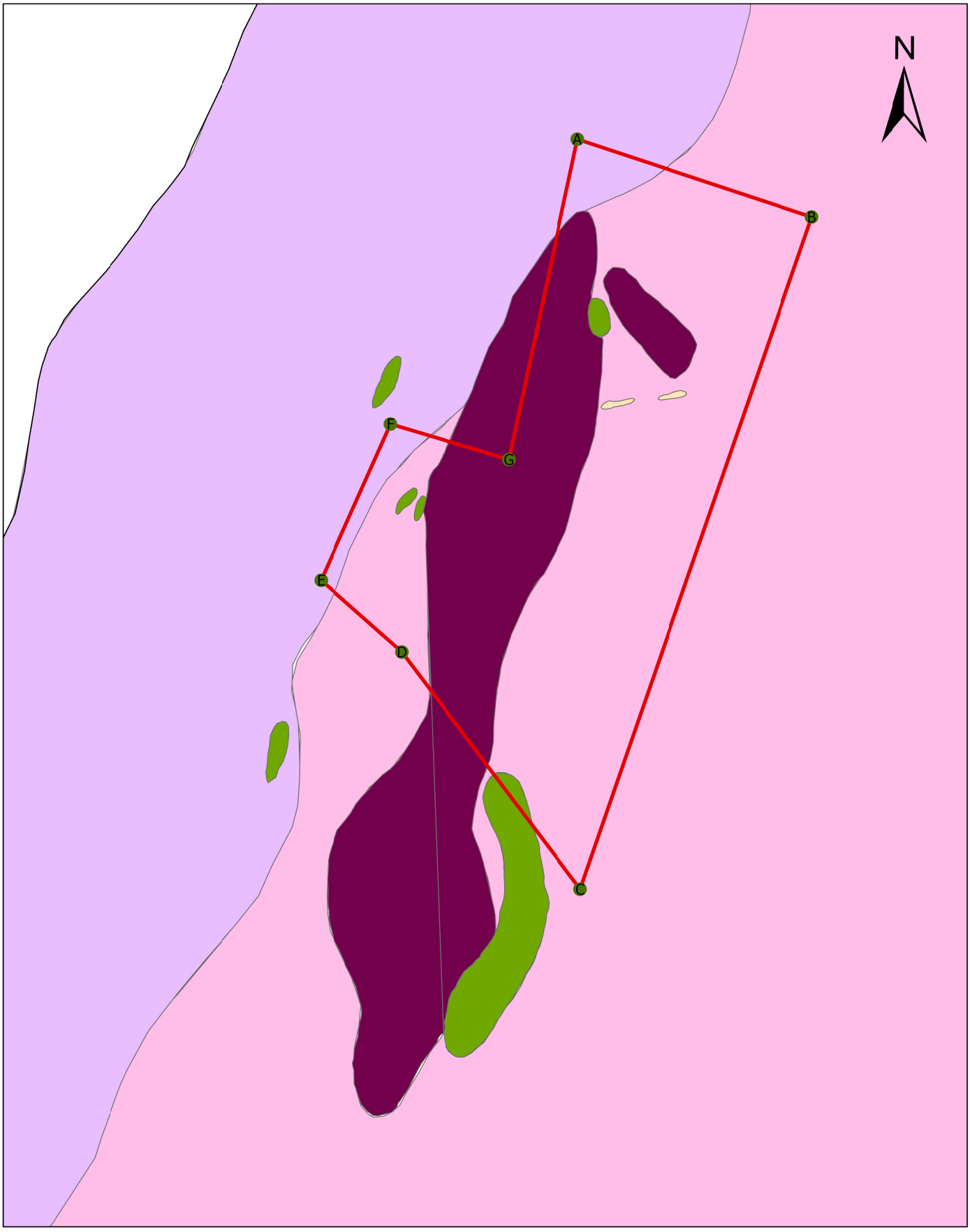
List of Plates

1. Plate-I: Block Location Map of Khursipar Block, District-Gondia. Maharashtra.
2. Plate-II: Regional Geological Map with Located of Khursipar Block, District-Gondia. Maharashtra.
3. Plate-III.A: Geological map of Khursipar Block, District-Gondia. Maharashtra.

LOCATION MAP OF PROPOSED KHURSIPAR BLOCK (2.10 SQ.KM.), DISTRICT- GONDIA, MAHARASHTRA



Geological Map of Khursipar Block (2.1 sq.km.), Amgaon Tehsil, Gondia district, Maharashtra



Legend

- Cardinal Point
- Proposed Block Boundary
- Quartz Vein
- Amphibolite
- Ti-Magnetite with metapyroxenite
- Alluvium
- Mylonite
- quartzofeldspathic gneiss

200 100 0 200 400 600 800 Meters