OMC | ODISHA NEW OPPORTUNITIES

Mining Happiness

Letter No. 18340 /OMC/Expl/2025
Date. 24/11/2025

To

**The Director,**
**National Mineral Exploration and Development Trust Secretariat,**
**Ministry of Mines,**
**Room No. 325 & 326, Wing-F,**
**Udyog Bhawan,**
**Rafi Ahmed Kidwai Marg,**
**Rajpath Area, Central Secretariat,**
**New Delhi-110011**

Sub: Proposal for approval of Betajhar Block in Sundargarh District, Odisha, for Preliminary Exploration (G3-Stage) under NMEDT.

Ref: Notification No. 4326/S&M, Bhubaneswar, dtd. 21.05.2024

Sir,

In inviting a reference to the subject cited above, the Department of Steel & Mines, Government of Odisha, in exercise of the power conferred under the Rule 67 of Mineral Concession Rules 2016, has allotted Betajhar Block in favour of Odisha Mining Corporation Ltd. for the exploration of Iron and Manganese Ore over an area of 1.367 sq.km (136.70 ha.) in Sundargarh district, Odisha, vide its Notification No. 4326/S&M, Bhubaneswar, dtd. 21.05.2024.

In this regard, the proposal for Preliminary Exploration (G3 Stage) for Iron and Manganese Ore in Betajhar Block has been prepared as per NMEDT format and enclosed herewith for kind consideration for NMEDT funding.

Encl: As above.

Yours faithfully,

24-11-2025

**Chief General Manager**
**(Geology)**

**Odisha Mining Corporation Ltd.**
(A Gold Category State PSU)
Registered Office : OMC House, Bhubaneswar - 751001, India
Tel : 0674-2377400/2377401, Fax: 0674-2396889, 2391629, www.omcltd.in
**CIN : U13100OR1956SGC000313**

Memo No. 18341 /OMC/Expl/2025 Date: 24/11/2025

Copy along with the enclosures forwarded to the Deputy Director General (Dy.DG), Geological Survey of India, Bhubaneswar, State Unit - Odisha, for kind information and necessary action.

24-11-2025

**Chief General Manager**
**(Geology)**

Memo No. 18342 /OMC/Expl/2025 Date: 24/11/2025

Copy along with the enclosures forwarded to Pr. P.S. to Additional Chief Secretary, Steel & Mines Department, for kind information of Additional Chief Secretary, Steel & Mines Department.

24-11-2025

**Chief General Manager**
**(Geology)**

Memo No. 18343 /OMC/Expl/2025 Date: 24/11/2025

Copy along with the enclosures forwarded to the Director, Directorate of Mines and Geology, Govt. of Odisha, Bhubaneswar, for kind information and necessary action.

24-11-2025

**Chief General Manager**
**(Geology)**

# Proposal for Betajhar Block over an area of 1.367 Sq. Km, in Sundargarh District, Odisha for Preliminary Exploration (G3 -Stage) under NMEDT

## Commodity: Iron and Manganese

By

OMC | ODISHA NEW OPPORTUNITIES

Mining Happiness

## Odisha Mining Corporation Limited
## (A Gold Category State PSU)

Place : Bhubaneswar
Date : 13.11.2025

# Summary of the Block for G3 stage Exploration

| Features | Details |
|---|---|
| Block ID | Betajhar Block (1.367 Sq.Km) |
| Current Exploration Agency | Odisha Mining Corporation Limited (OMC Ltd.), Bhubaneswar, Odisha |
| Previous Exploration Agency | Nil |
| G4 stage Geological Report (Previous stage Geological Report) | Nil |
| Commodity | Iron and Manganese Ore |
| Mineral Belt | Bonai-Keonjhar belt of Sundargarh & Keonjhar District, Odisha |
| Completion Period with entire time schedule to complete the project | 12 months |
| Objectives | Objectives of the Preliminary Exploration (G3) over an area of 1.367 Sq. Km are as follows:<br>1. To carry out geological mapping on a 1:4000 scale for demarcating iron and manganese-bearing formations along with associated structural features such as strike, dip, lineation, and foliation.<br>2. To undertake core drilling of 4140 m through 46 boreholes (average depth: 90 m) for assessing sub-surface occurrences and their vertical continuity.<br>3. To conduct chemical analysis of both core and surface samples.<br>4. To establish the presence of iron and manganese ore bodies, and to estimate their tonnage, grade, and mineral content at the G3 level in line with UNFC guidelines and the Minerals (Evidence of Mineral Contents) Amendment Rules, 2021. The findings will facilitate the State Government in auctioning the block. |
| Whether the work will be carried out by the proposed agency or through outsourcing and details thereof.<br>Components to be outsourced and name of the outsource agency | The core drilling, topographical survey, sampling, and laboratory analysis will be executed through outsourced agency with requisite expertise.<br>The activities like geological mapping, core logging, data interpretation, resource/reserve estimation and geological report preparation will be undertaken directly by OMC Ltd. |
| Name/Number of Geoscientists | OMC Ltd./Three Geologists |
| Expected Field days (Geology,Surveyor) | 10 months (300 days) |

| | | |
|---|---|---|
| 1. | **Location** | |
| | Latitude | 21°53'35.327" N to 21°54'39.716"N |
| | Longitude | 85°19'05.296" E to 85°19'41.484"E |
| | Villages | Risibenua, Sanarisibenua, Sanapatuli |
| | Tehsil/Taluk | Koira |
| | District | Sundargarh |
| | State | Odisha |
| 2. | **Area(hectares/square kilometres)** | |
| | Block Area | 136.700 Ha |
| | Forest Area | 39.344 Ha |
| | Government Land Area | 87.139 Ha |
| | Private Land Area | 10.216 Ha |
| 3. | **Accessibility** | |
| | Nearest Rail Head | Barbil Railway Station |
| | Road | NH- 20 (Old NH- 215) connects Panikoili -Rimuli-Rajamunda passing through Koira, Joda and Keonjhar. |
| | Airport | Rourkela & Jharsuguda Domestic Airport and Biju Patnaik International Airport, Bhubaneswar. |
| 4. | **Hydrography** | |
| | Local Surface Drainage Pattern (Channels) | The regional drainage pattern of the area exhibits a dendritic nature. |
| | Rivers/Streams | The nearest river within the block is the Sunanadi, which flows northward. |
| 5. | **Climate** | |
| | Mean Annual Rainfall | 1200 to 1500 mm, average 1230 mm |
| | Temperatures (December) (Minimum) Temperatures (June) (Maximum) | The region experiences a humid tropical climate, with January being the coldest month when temperatures fall to nearly 5°C, and May being the hottest month, with average temperatures reaching up to 45°C. |
| 6. | **Topography** | |
| | Toposheet Number | Toposheet No. F45N5 (73G/5)<br>The block area has been shown on part of the SOI Toposheet No. F45N5 (Annexure - A) |
| | Morphology of the Area | The area lies along the eastern limb of the Horse-Shoe synclinorium (B-K Belt). The terrain is gently undulating towards the north, while the southern part is relatively flat. The elevation varies between 593 m and 687 m above mean sea level. |
| 7 | **Availability of baseline geosciences data** | |
| | Geological Map (1:50K/25K) | The proposed block is illustrated on (1:50K) map of GSI (Annexure-B), on District Resource Map (1:250K) of Sundargarh District (Annexure-C) and on the Regional |

| | | |
|---|---|---|
| | | Map of the Horse-Shoe synclinorium belt (1:250K) (Annexure - D).<br>It is further represented on the Google Earth image (Annexure - E) and in the 1:10,000 scale geological map with Proposed Boreholes prepared by OMC Ltd (Annexure – F). |
| | Geochemical Map | Not Available |
| | Geophysical Map (Aero geophysical, Ground geophysical, Regional as well as local scale GP maps) | Not Available |
| 8. | **Justification for taking up G3 stage mineral exploration** | The Department of Steel & Mines, Government of Odisha, through Notification No. 4326/S&M dated 21.05.2024, has allotted the Betajhar Block to OMC for exploration under the UNFC classification.<br><br>The Betajhar block is integral part of the **Bonai-Keonjhar (B-K) belt**, which represents a horseshoe-shaped synclinorium hosting significant iron and manganese ore deposits. The lithological sequence of the region comprises Banded Iron Formation (BIF), Shales, and manganese-bearing horizons, which are structurally controlled and regionally persistent. The Betajhar Block covers an area of 1.367 Sq. Km. A total of 10 bedrock samples from this block were collected preliminarily and sent to M/s IGI for chemical analysis, which reported maximum values of Fe at 58.35% and Mn at 48.06%. The adjoining Patamunda West Block, explored by GSI, has reported resource potential of 12.40 MT of manganese ore and 9.21 MT of iron ore. In view of these geological attributes, the Betajhar Block warrants Preliminary Exploration (G3 stage) under UNFC guidelines. The G3 stage will help:<br><br>• To establish the lateral and vertical continuity of ore-bearing formations.<br>• To assess the quality and grade variation of iron and manganese mineralization.<br>• To provide baseline data for upgrading the block to a higher level of exploration (G2 stage).<br>• To facilitate resource estimation to make the block auctionable. |

# DETAILED DESCRIPTION

## 1. Block Summary

### 1.1 Physiography.

The area forms part of the eastern limb of the Horse-Shoe synclinorium (B-K Belt). The terrain is characterized by gently undulating topography in the northern part, while the southern part is relatively flat. The elevation within the block varies between 593 m and 687 m above mean sea level. The drainage pattern is predominantly dendritic, with the Suna Nadi flowing northward along the eastern boundary of the area.

### 1.2 Background Geology (Regional Geology & Geology of the Block).

The Iron Ore Supergroup (IOSG) comprises three stratigraphic horizons of banded iron formations (BIFs) i.e. BIF-I, BIF-II, and BIF-III, which differ significantly in their structural, stratigraphic, mineralogical, petrological, metamorphic, and ore-deposit characteristics (Acharya, 2005). Among these, BIF-III, the Horseshoe Basin, represents the youngest horizon, hosting high-grade and large-sized ore bodies.

The IOSG is represented by thick volcano-sedimentary successions, geologically confined between two major granite batholiths - the Bonai Granite to the west and the Keonjhar Granite to the east, together forming the Bonai - Keonjhar (B-K) Belt. The belt is U-shaped and is regionally referred to as the Horse-Shoe synclinorium. Structurally, the B-K Belt consists of two distinct limbs: the eastern and the western. Iron formations of the eastern limb are largely concentrated in the Noamundi, Thakurani, Joda, Jaribahal, Malangtoli, Jilling, Jajang, and Gurubeda sectors, whereas the western limb encompasses major deposits at Kiriburu, Bolani, Kalta-Barsuan, and whereas the Khandadhar is situated at the hinge zone.

The Horse-Shoe synclinorium trends NNE–SSE, with a gentle plunge towards the NNE. The study area forms part of a volcano-clastic-terrigenous sedimentary sequence containing extensive iron ore deposits (Annexure - C). Stratigraphically, the Singhbhum Granite and the Iron Ore Group are overlain by meta-sedimentary and metavolcanic successions belonging to the Singhbhum, Dhanjori, and Kolhan Groups. The Iron Ore Group in the B-K Belt comprises shales, tuffaceous shales, BIFs, volcanics, and cherts.

The generalized stratigraphic succession of the region is as follows:

| | |
|---|---|
| Kolhan Group | Sandstone, Conglomerate, Breccia |
| .....Unconformity..... | |
| Koira Group | Younger (Upper) Shales |
| Youngest Iron Ore group (BIF-III) | Banded Iron Formations |
| | Older (Lower) Shales |
| Dhanjori Volcanics | Tuffaceous shale<br>Lower basic lava |
| Basal sandstone, Gritty sandstone, Quartzite | |
| .....Unconformity..... | |
| Singhbhum Granite with enclaves of Metasedimentary and Metabasicrocks. | |

The **Betajhar Block**, proposed for preliminary exploration, is situated in the eastern part of the Bonai-Keonjhar Belt, Sundargarh district. The area is extensively lateritised; however, reconnaissance visits to the block has recorded both floats and in-situ occurrences of lithounits such as iron ore, laterite, manganese-bearing laterite and shale.

Shale is well exposed in nala sections with an average strike of NNE-SSW and gently dipping towards NW, while manganese-bearing quarries are recorded in the western part of the block. The eastern sector is predominantly covered with shale & soil, and small patches of manganese-bearing laterite sporadically exposed throughout the block. Evidence of Iron ore is noted mainly in the central portion of the block with a very limited occurrence of outcrops.

Soil cover is extensive throughout the block, particularly in the southern sector. The shale, occurring predominantly in the eastern part, is easily recognized by its distinctive red to brown coloration.

| | |
|---|---|
| Local Stratigraphy of Betajhar Block | Float ore<br>Soil cover<br>Laterite<br>Mn Laterite / Lateritoid<br>Ferruginous Shale / Shale |

### 1.3 Mineral potentiality based on geology, geophysics, ground geochemistry, etc.

The Betajhar Block, covering an area of 1.367 Sq. Km in Koira Tahasil, Sundargarh district, falls within Survey of India Toposheet No. F45N5 (73G/5) (Annexure-A). Preliminary visits have been carried out in the block. The area exposes lithounits belonging to the Iron and Manganese Ore, comprising soil, iron ore floats, laterite, Manganese bearing laterite, ferruginous shale and shale.

Structurally, the block is located on the eastern limb of an NNE-plunging synclinorium within the Bonai-Keonjhar Belt. The general strike of the formations is NNE–SSW, with gentle dips of 25°–30° towards the NW.

Intense lateritisation has been observed on the shale and also forms as cap rock above the iron and manganese ore horizons. A total of 10 bedrock samples from the block have been collected and sent to M/s IGI for chemical analysis, which reported maximum values of Fe at 58.35% and Mn at 48.06%.

Table: Chemical analysis results of 10 nos. of bedrock samples from Betajhar Block.

| Sl. No. | Sample ID | Easting | Northing | Lithology | Fe (%) | $SiO_2$ (%) | $Al_2O_3$ (%) | Mn (%) |
|---|---|---|---|---|---|---|---|---|
| 1 | BR/L- 15 | 326788 | 2423122 | Ferruginous Shale | 58.35 | 6.01 | 3.29 | 0.15 |
| 2 | BR/L- 20 | 326955 | 2423340 | Manganiferous Laterite | 36.09 | 1.05 | 10.01 | 17.44 |
| 3 | BR/L- 61 | 326318 | 2423318 | Manganiferous Laterite | 25.42 | 1.8 | 1.14 | 35.52 |
| 4 | BR/L- 64 | 326335 | 2423640 | Manganese bearing Chert | 43.53 | 16.24 | 1.17 | 6.42 |
| 5 | BR/L- 85 | 326828 | 2423623 | Laterite | 34.24 | 12.09 | 17.89 | 4.04 |
| 6 | BR/L- 91 | 326519 | 2422646 | Laterite | 22.00 | 16.03 | 29.63 | 1.84 |
| 7 | BR/L- 103 | 326650 | 2422649 | Manganiferous Laterite | 38.25 | 2.34 | 7.34 | 17.41 |
| 8 | BR/L- 110 | 326599 | 2422292 | Manganiferous Laterite | 24.16 | 4.6 | 4.64 | 29.38 |
| 9 | BR/L- 122 | 326662 | 2422988 | Manganiferous Laterite | 10.51 | 0.99 | 2.09 | 48.06 |
| 10 | BR/L- 170 | 326491 | 2423430 | Manganese bearing Shale | 36.63 | 6.68 | 5.47 | 17.66 |

### 1.4 Scope for proposed exploration

In view of above, there is scope for preliminary exploration (G3 level of exploration) in the block to prove the sub-surficial existence of manganese ore & potentiality of the block with a higher confidence level.

## 2. Previous Exploration in adjoining area:

The adjoining Patamunda (West) Block, previously explored by GSI, has indicated a manganese ore potential of 12.40 MT and an iron ore potential of 9.21 MT. Considering its close proximity, the present block is also expected to hold substantial manganese and iron ore resources, thereby justifying the need for detailed exploration to delineate its mineral potential.

## 3. Block Description

| Block Boundary Coordinates of Betajhar Block, Sundargarh District, Odisha | | |
|---|---|---|
| **Pillar ID** | **Longitude** | **Latitude** |
| 1 | 85°19'10.800" E | 21°53'37.050" N |
| 2 | 85°19'11.616" E | 21°54'01.834" N |
| 3 | 85°19'06.787" E | 21°54'16.631" N |
| 4 | 85°19'05.296" E | 21°54'31.295" N |
| 5 | 85°19'41.484" E | 21°54'39.716" N |
| 6 | 85°19'38.858" E | 21°54'25.144" N |
| 7 | 85°19'36.505" E | 21°54'12.087" N |
| 8 | 85°19'33.977" E | 21°54'02.476" N |
| 9 | 85°19'31.529" E | 21°53'53.168" N |
| 10 | 85°19'31.644" E | 21°53'35.327" N |

## 4. Planned Methodology:

In accordance with the objectives set for preliminary exploration (G3 level of exploration) in Betajhar Block, Sundargarh district, Odisha, geological mapping, core drilling, core sampling, chemical studies, petrographical and mineralographical studies are proposed in the block. The exploration will be carried out as per Minerals (Evidence of Mineral contents) Amendment Rules-2021 Accordingly, the details of different activities to be carried out are presented in subsequent paragraphs.

### 4.1 Topographic Surveying

Topography survey will be carried in the area (1.367 Sq.Km) and all the surface features will be marked in the 1:4000 scale plans. The block boundary will be surveyed by DGPS / total station in WGS-84 Datum and demarcation of the boundary pillars to make the block auctionable. The reduced level and coordinate of the boreholes would be surveyed by DGPS/ total station.

### 4.2 Geological Mapping

Geological mapping at 1:4000 scale will be undertaken over the area of 1.367 Sq. Km through systematic geological traverses. Detailed observations will be recorded on lithological variations, formation contacts, surficial characteristics, and structural features. Based on the field data thus collected, a geological map at 1:4000 scales will be prepared to delineate the litho-units and structural framework of the block. The final geological map is prepared after interpreting all the data from the outcrop map.

### 4.3 Core Drilling

Based on the outcome of the geological mapping, 46 nos. of boreholes with meterage of 4140 m (90m each) depth of core drilling is being proposed over the area 1.367 Sq.Km to intersect the mineralized zone. The map showing the borehole proposal is attached as Annexure - E.

### 4.4 Core Logging

The drill cores would be logged systematically viz. details of lithounits, colour, structural feature, texture, mineralization, beside the recovery, rock quality designation and Iron & Manganese ore type would be recorded.

### 4.5 Core Sampling

The drill core will be split into two equal halves and one part would be preserved in the core box for future reference. The other half will be powdered to -100 /-200 mesh sizes and the same would be divided into four parts (50gm each) through coning and quartering. One part of 50gm sample will be sent to chemical laboratory for analysis, second part to be preserved in the camp as duplicate sample, third part to be utilized for preparing composite sample for individual ore band and the fourth part would be kept as either check sample or sample to be used for any other specific purpose.

The length of each sample will be kept 0.5 m-1.0m depending upon the width of particular types of ore and its physical character. The primary core samples will be analyzed for seven radicals i.e., Fe%, Mn%, $Al_2O_3$%, $SiO_2$%, P%, S%, Insolubles and LOI.

The mineralized zone including the cores of immediate footwall and hanging wall rocks (5 m length each) would be sampled at 1.0 m interval, as far as possible depending upon the intensity of mineralization, change in lithologs and core recovery etc. It is envisaged that:

a) Around 3362 nos. of primary samples would be generated, which includes 3312 drill core samples, and 50 nos. of surface samples. Around 10% of primary samples will be checked and will be called as check samples.

b) Composite samples would be prepared from different mineralised zones of primary drill samples from the boreholes. As proposed, 70 nos. of composite samples would be generated and will be analyzed for complete chemical analysis.

c) 10 nos. of samples would be analyzed by X-ray diffraction (XRD) to ascertain the presence of any uncommon minerals.

d) 10 nos. of samples would be analyzed for trace elements and REE by ICPMS.

e) 20 nos. of samples would be analyzed for quantitative REE analysis.

### 4.6 Petrographic & Mineralographic Studies

Thin and polished section studies of the out-crop samples and the core samples will be studied for detailed petrographic and mineralographic characteristics. These samples will be drawn from ore zones and associated rocks. A provision of 10 nos. specimens for petrographic and 10 nos. specimens for mineralographic studies has been kept for the proposed area.

### 4.7 Bulk Density Determination

In addition, bulk density determination of 20 nos. of samples will be carried out for the proposed block.

## 5. Nature Quantum and Target

The proposed quantum of work for the Block for G3 stage of exploration over an area of 1.367 Sq. Km in Sundargarh district is as below.

| Quantum of Work for Betajhar block (1.367 Sq. Km) | | | |
|---|---|---|---|
| **Sl. No.** | **Item of work** | **Unit** | **Quantity** |
| **A.** | **Detailed Geological Mapping** | | |
| **1.** | At 1:4000 Scale | Sq. Km | 1.367 |
| **B.** | **Survey Work** | | |
| **1.** | Demarcation of lease boundary, Fixation of Borehole and determination of co-ordinates & Reduced Level (RL) of the boreholes by DGPS | Per point of observation | 56 (46 nos. of BHs + 10 nos. of Boundary Pillar) |
| **2.** | Topographic Survey and surface contouring | Sq. Km | 1.367 |
| **C.** | **Drilling** | | |
| **1.** | Core drilling | m | 4140 |

| | | | |
|---|---|---|---|
| 2. | Borehole Pillaring (12"x12"x30") | Nos. | 46 |
| D. | **Chemical Analysis** | | |
| i) | ***Primary Samples*** (Surface Samples + Core Samples + Check Samples) | | |
| 1. | Samples preparation | Nos. | 3362 |
| 2. | Chemical analysis for seven radicals (Fe%, Mn%, $Al_2O_3$%, $SiO_2$%, P%, S%, Insolubles) & LOI | Nos. | 3693 |
| ii) | ***Composite samples*** | | |
| 1. | Sample preparation | Nos. | 70 |
| 2. | Chemical analysis for nine radicals (Fe%, Mn%, $SiO_2$%, $Al_2O_3$%, P%, S%, $K_2O$, $Na_2O$, Insolubles) & LOI | Nos. | 70 |
| E. | **Physical Analysis** | | |
| 1. | Preparation of standard thin section of rock | Nos. | 10 |
| 2. | Complete Petrographic Studies | Nos. | 10 |
| 3. | Digital photomicrograph of thin section | Nos. | 10 |
| 4. | Preparation of polished thin section of rock/ wafer | Nos. | 10 |
| 5. | Complete Mineralographic Studies | Nos. | 10 |
| 6. | Digital photomicrograph of polished section | Nos. | 10 |
| F. | **XRD analysis** | Nos. | 10 |
| G. | **Analysis of rock sample for determination of a package by 34 elements by ICPMS** | Nos. | 10 |
| H. | **Analysis of rock sample for quantitative REE analysis** | Nos. | 20 |
| I. | **Bulk Density Determination** | Nos. | 20 |
| J. | **Report Preparation (as per MEMC Amendment Rule 2021/UNFC)** | Nos. | 1 |

| Estimated Cost for Preliminary Exploration (G3 level of exploration) for Iron and Manganese Ore in Betajhar Block, Sundargarh district, Odisha | | | | | | | |
|---|---|---|---|---|---|---|---|
| [Block Area: 1.367 sq.km, Nos. of Borehole: 46 Nos., Borehole Depth Range: 90 mtr, Time Schedule: 12 Months] | | | | | | | |
| Sl No. | Item of work | Unit | Rate as per NMET SOC 2020-21 | | Estimated cost of proposal | | Remarks |
| | | | SOC item Sl. No. | Rate as per SOC in Rs. | Quantum of Work | Total Amount (in Rs.) | |
| A | **Geological Work** | | | | | | |
| | Charges for one Geologist per day at Field | Per day | 1.3 | 11,000 | 270 | 29,70,000.00 | Two geologists/day (without labour) |
| | Charges for one Geologist per day at HQ | Per day | 1.3 | 9,000 | 90 | 8,10,000.00 | |
| | Labour (2 Nos.) per party (Rs. 674/day/labour) | Per day | 5.7 | 674 | 540 | 3,63,960.00 | Amount will be reimbursed as per the notified rates by the Central Labour Commission rates or respective State Govt. whichever is higher. |
| | Charges for one Surveyor per day (Topography Survey) | Per day | 1.6.1a | 8,300 | 120 | 9,96,000.00 | |
| | Labour (4 Nos.) per party (Rs. 674/day/labour) | Per day | 5.7 | 674 | 480 | 3,23,520.00 | Amount will be reimbursed as per the notified rates by the Central Labour Commission rates |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | or respective State Govt. whichever is higher. |
| | Charges for One Sampler per day | Per day | 1.5.2 | 5,100 | 120 | 6,12,000.00 | |
| | Labour (4 Nos.) per party (Rs. 674/day/labour) | Per day | 5.7 | 674 | 480 | 3,23,520.00 | Amount will be reimbursed as per the notified rates by the Central Labour Commission rates or respective State Govt. whichever is higher. |
| | Demarcation of lease boundary, Fixation of Borehole and determination of co-ordinates & Reduced Level (RL) of the boreholes by DGPS | Per point of observation | 1.6.2 | 19,200 | 56 | 10,75,200.00 | 10 Boundary Pillar & 46 PBH |
| | | | | | **Sub - Total - A** | **74,74,200.00** | |
| **B** | **Drilling Work (Out Source)** | | | | | | |
| | Drilling - Hard rock | Per m | 2.2.1.4a | 11,500 | 4140 | 4,76,10,000.00 | Reimbursement of Outsource component will be made as per Para 3 of NMET-SOC |
| | Drill core preservation | per m | 5.3 | 1,590 | 2898 | 46,07,820.00 | |
| | | | | | **Sub- Total - B** | **5,22,17,820.00** | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **C** | **Laboratory Studies (Out Source)** | | | | | | |
| **i** | **Chemical Analysis** | | | | | | |
| | ***Primary Samples*** (Surface Samples + Core Samples + Check Samples) | | | | | | |
| | Chemical analysis for seven radicals (Fe%,Mn%, $Al_2O_3$%, $SiO_2$%, P%, S% & Insolubles) & LOI | per Nos. | 4.1.15a | 4,200 | 3362 | 1,41,20,400.00 | 50 nos. Surface samples, 3312 nos. Core samples (80%) |
| | Chemical analysis for seven radicals (Fe%,Mn%, $Al_2O_3$%, $SiO_2$%, P%, S% & Insolubles) & LOI | per Nos. | 4.1.15a | 4,200 | 331 | 13,90,200.00 | 10% Check Samples |
| | ***Composite samples*** | | | | | | |
| | Chemical analysis for nine radicals (Fe%, Mn%, $SiO_2$%, $Al_2O_3$%, P%, S%, $K_2O$%, $Na_2O$%, | per Nos. | 4.1.15a & 4.1.15b | 5,042 | 70 | 3,52,940.00 | |

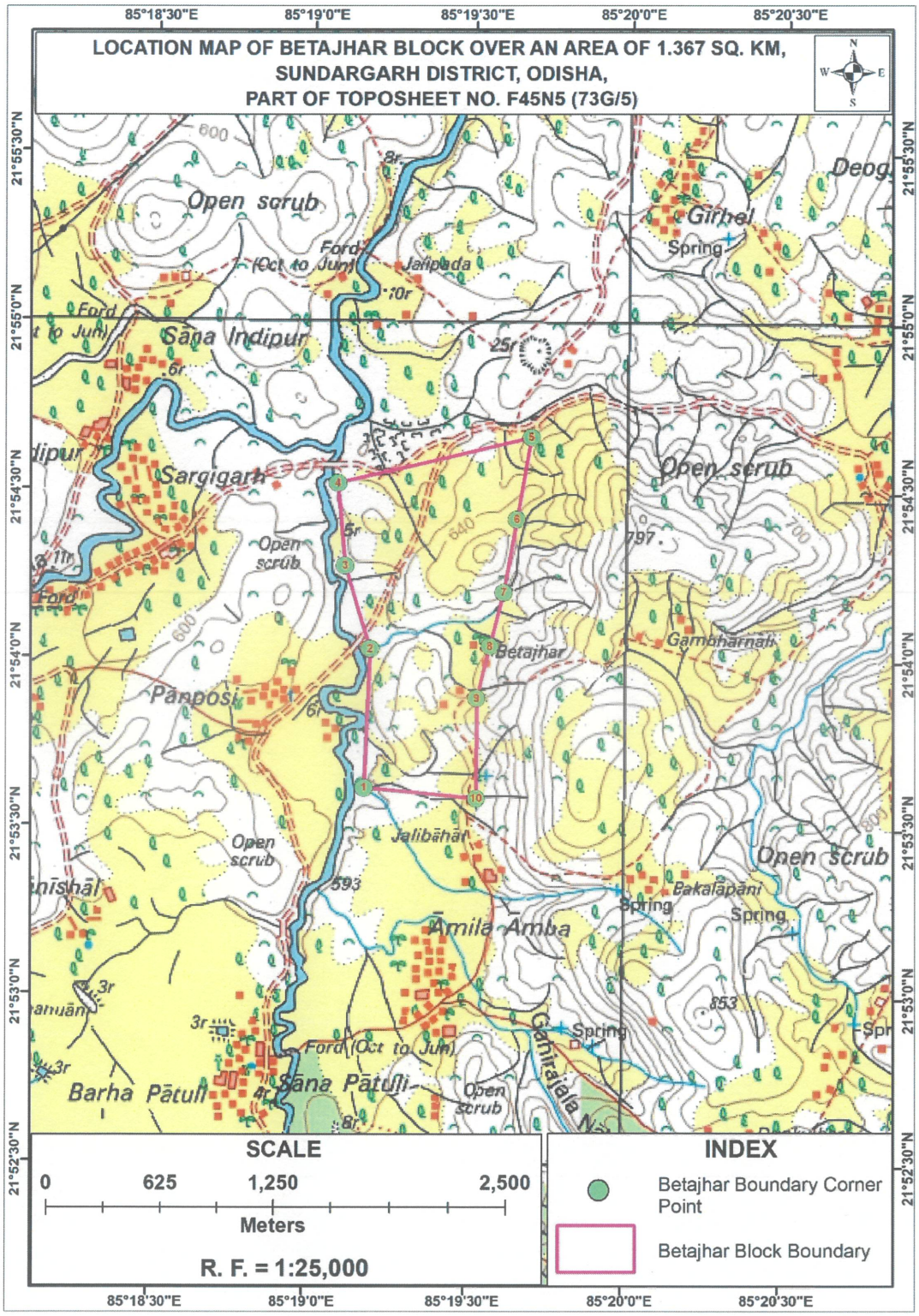
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Insolubles) & LOI | | | | | | |
| ii | **Physical Analysis** | | | | | | |
| | Preparation of standard thin section of rock | per Nos. | 4.3.1 | 2,353 | 10 | 23,530.00 | |
| | Complete Petrographic Studies | per Nos. | 4.3.4 | 4,232 | 10 | 42,320.00 | |
| | Preparation of polished thin section of rock/ wafer | per Nos. | 4.3.2 | 1,549 | 10 | 15,490.00 | |
| | Complete Mineragraphic Studies | per Nos. | 4.3.4 | 4,232 | 10 | 42,320.00 | |
| | Digital photomicrograph of thin section | per Nos. | 4.3.7 | 280 | 10 | 2,800.00 | |
| | Digital photomicrograph of thin polished section | per Nos. | 4.3.7 | 280 | 10 | 2,800.00 | |
| iii | **XRD analysis** | per Nos. | 4.5.1 | 4,000 | 10 | 40,000.00 | |
| iv | **Analysis of rock sample for determination of a package by 34 elements by ICPMS** | per Nos. | 4.1.14 | 7,731 | 10 | 77,310.00 | (20 Trace elements + 14 REE) |
| v | **Analysis of rock samples for quantitative REE analysis** | per Nos. | 4.1.13 | 5,380 | 20 | 1,07,600.00 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| vi | **Bulk Density Determination** | per Nos. | 4.10 | 3,540 | 20 | 70,800.00 | |
| | | | | | **Sub - Total - C** | **1,62,88,510.00** | |
| D | | | | | **Sub - Total - D (A+B+C)** | **7,59,80,530.00** | |
| E | Preparation of Exploration Proposal | One Number (5 Hard copies) along with soft copy | 5.1 | 2% of approved project cost subject to a maximum of ₹5 lakh | | 5,00,000.00 | |
| F | Geological Report Preparation | Cost per 5 Hard copies of report along with soft copy | 5.2 | **Project exceeding ₹300 lakh:** Minimum of ₹9 Lakh or 3% of the work which ever is more subject to maximum of ₹20 Lakh and ₹10,000/ each additional copy. | | 20,00,000.00 | |
| G | Tendering Process Cost | One time, in case of outsourced component | 2.3 | 2% of the approved project cost or 5 Lakh whichever is lower will be paid one time to EA | | 5,00,000.00 | |

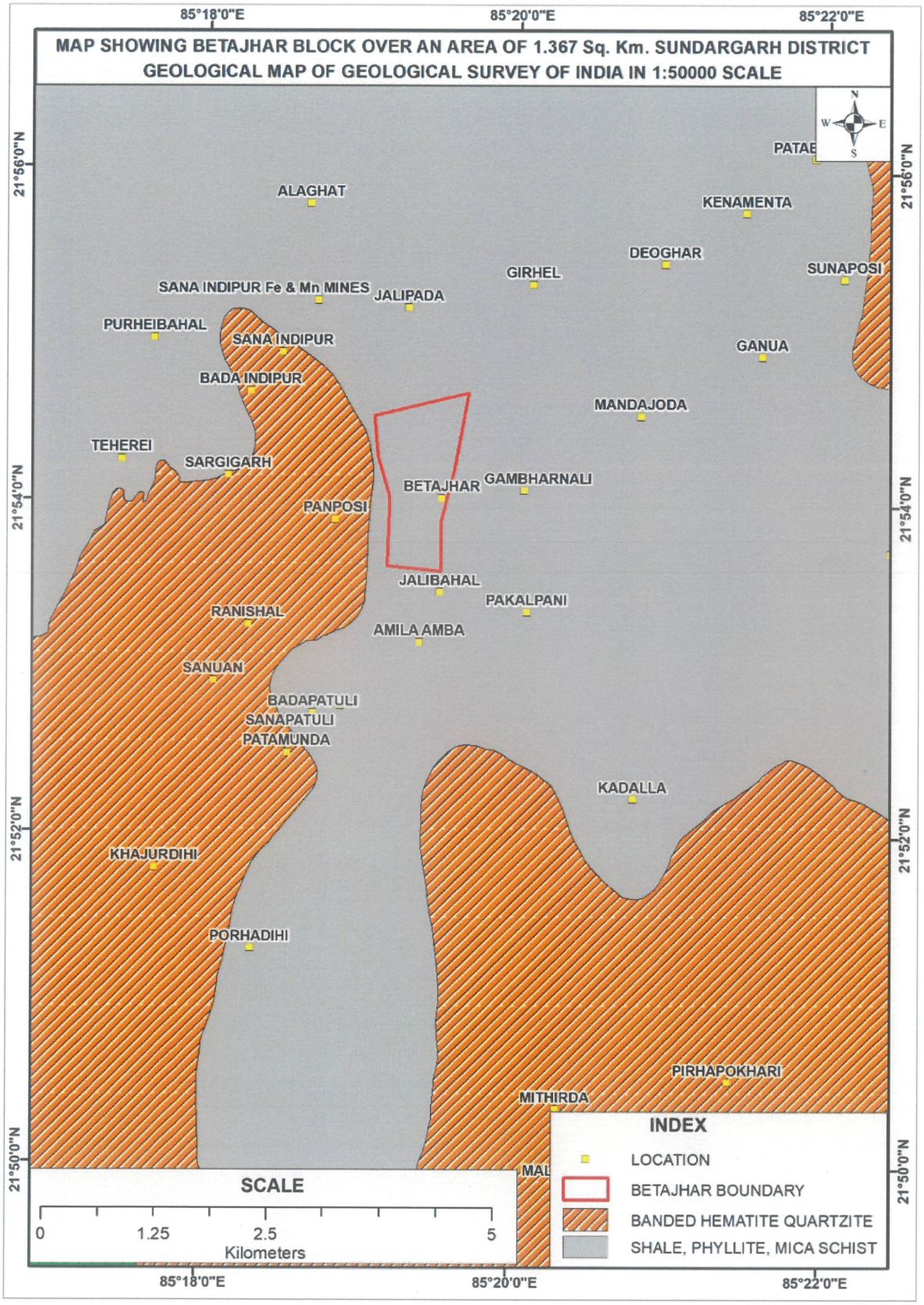
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| H | Operational Charges | | 6.0.iii | In case of total outsourced cost more than ₹ 1 Crore | | 15,00,000.00 | Reimbursement of cost in case of outsource components of Project Work |
| I | Peer Review | | As per EC decision | | | 30,000.00 | |
| J | Additional Expenses for obtaining Forest Clearance (Procurement of Village Sheets, Pillars for PBH and Boundary Corner Points, Preparation of Cadastral Map, Land Details, Authentication of Maps & Land schedules, Preparation of FC Proposal, etc.) | | As per Clause 2.VI of the SoC | | | 2,18,000.00 | |
| K | Total Estimated cost without GST (18%) (D+E+F+G+H+I+J) | | | | | 8,07,28,530.00 | |
| L | GST (18%) | | | | | 1,45,31,135.40 | |
| M | **Grand Total (K+L)** | | | | | **9,52,59,665.40** | ***952.60 Lakhs*** |

| Time Schedule for Preliminary Exploration of Betajhar Block (1.367 Sq. Km) in Sundargarh district | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Activities | Unit | Months | | | | | | | | | | | Quantity |
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| 1 | Geological Mapping (Scale-1:4000) | Sq. Km | | | | | | | | | | | | | 1.367 |
| 2 | Core Drilling | m | | | | | | | | | | | | | 4140 |
| 3 | Borehole and Topographic Survey | Nos. / Sq. Km | | | | | | | | | | | | | Total No. of BHs - 46<br>Total Area - 1.367 Sq. Km |
| 4 | Sampling and Chemical Analysis | Nos. | | | | | | | | | | | | | 3763 |
| 5 | Laboratory Studies | Nos. | | | | | | | | | | | | | 120 |
| 6 | Geological Report Writing and Peer Review | Months | | | | | | | | | | | | | 3 |
| Note 1: Commencement of project may be reckoned from the day the exploration acreage is available along with all statutory clearance. | | | | | | | | | | | | | | |
| 2. Time loss on account of monsoon/ agriculture activity/ forest clearance/ local law & order problem/ lockdown etc. will be additional to above timeline. | | | | | | | | | | | | | | |

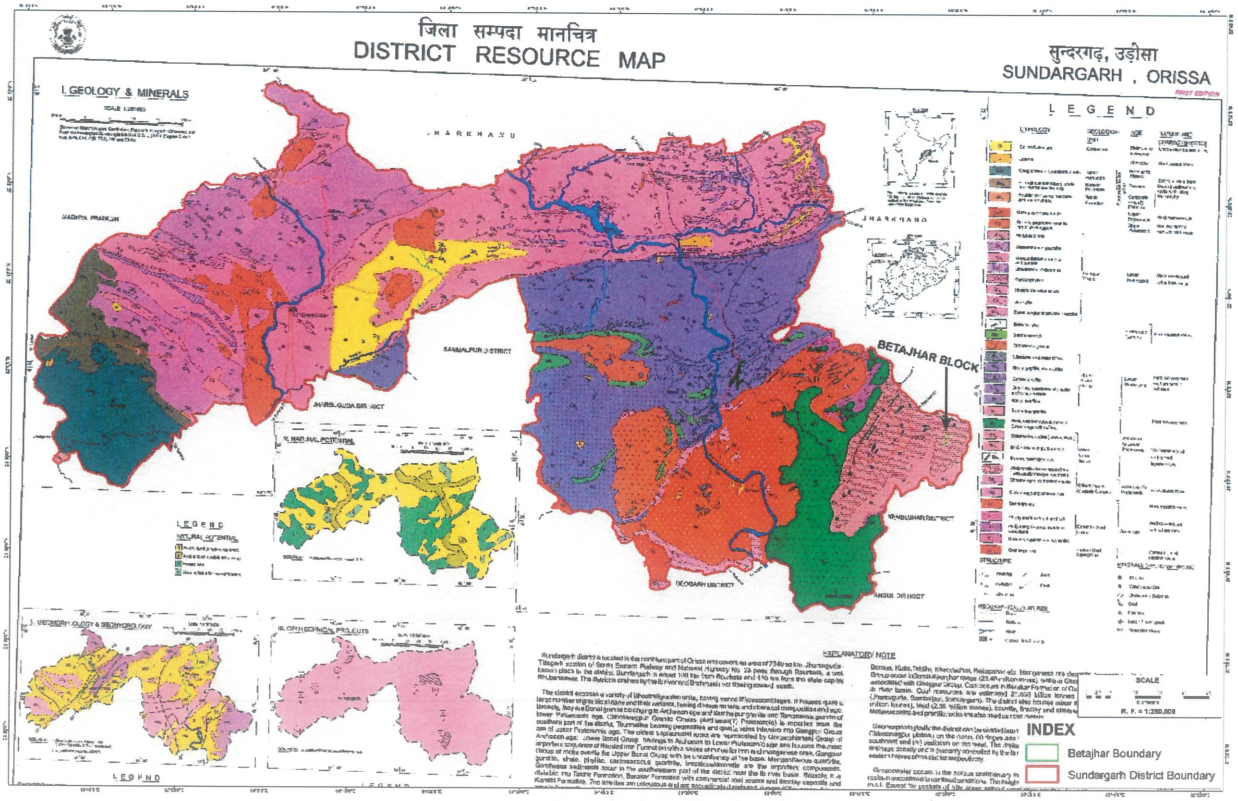
## Annexure - A:

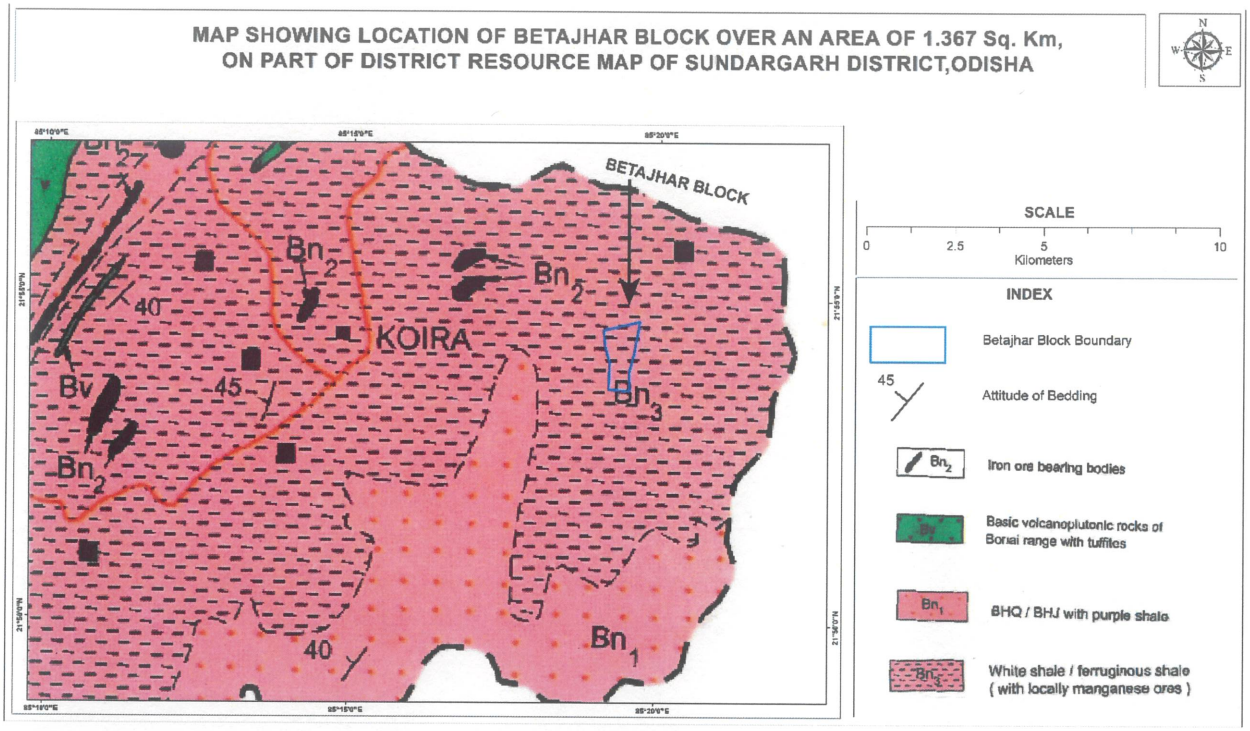

LOCATION MAP OF BETAJHAR BLOCK OVER AN AREA OF 1.367 SQ. KM,
SUNDARGARH DISTRICT, ODISHA,
PART OF TOPOSHEET NO. F45N5 (73G/5)
85°18'30"E
85°19'0"E
85°19'30"E
85°20'0"E
85°20'30"E
21°55'30"N
21°55'0"N
21°54'30"N
21°54'0"N
21°53'30"N
21°53'0"N
21°52'30"N
Open scrub
Ford (Oct to Jun)
Jaripada
Girhol
Spring
Deog
Sāna Indipur
Sargigarh
Pānposi
Betajhar
Gambharnali
Jalibāhāl
Amila Amba
Pakalāpāni
Barha Pātuli
Sāna Pātuli
Gahirajala
SCALE
0 625 1,250 2,500
Meters
R. F. = 1:25,000
INDEX
Betajhar Boundary Corner Point
Betajhar Block Boundary

## Annexure- B:

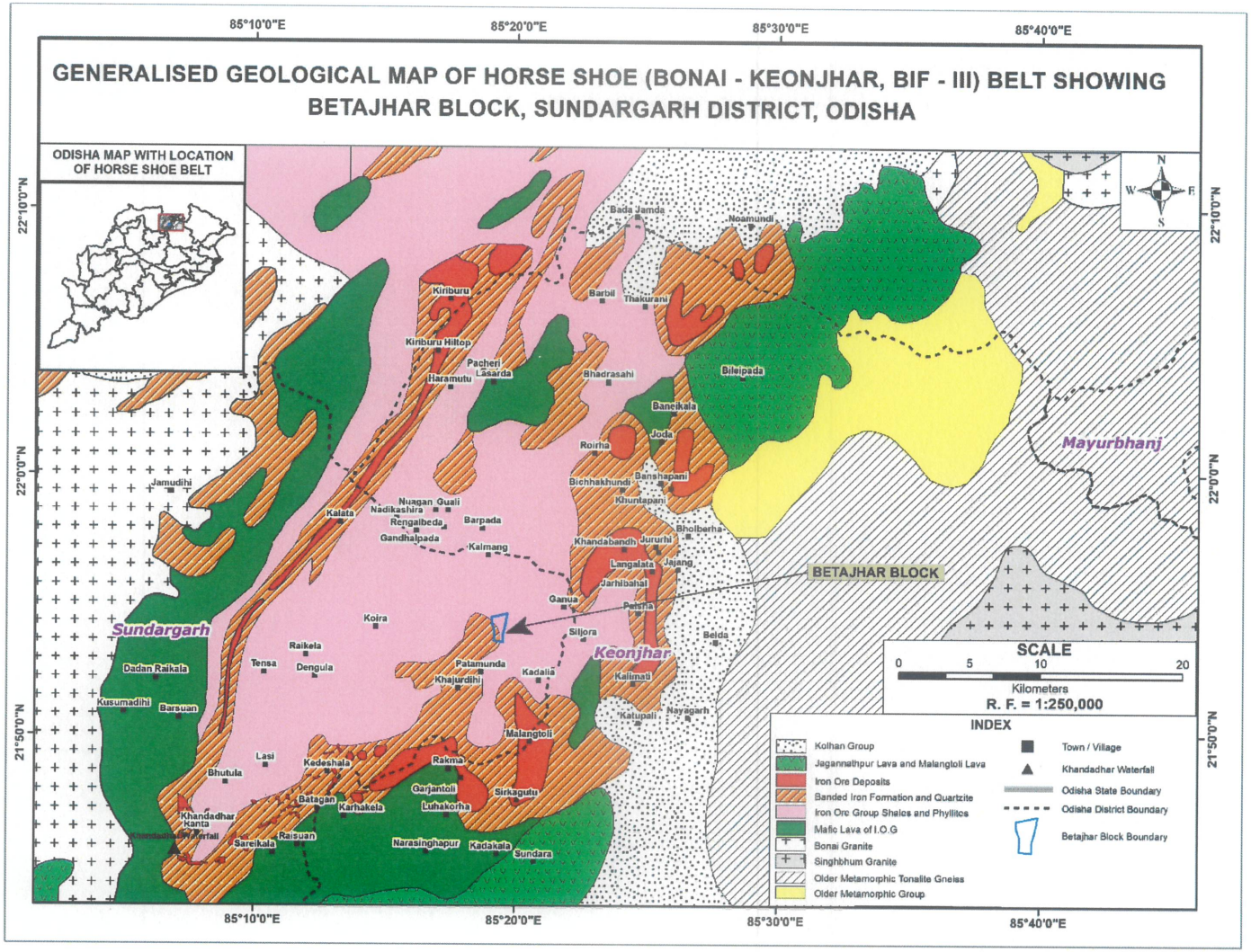

MAP SHOWING BETAJHAR BLOCK OVER AN AREA OF 1.367 Sq. Km. SUNDARGARH DISTRICT
GEOLOGICAL MAP OF GEOLOGICAL SURVEY OF INDIA IN 1:50000 SCALE
85°18'0"E
85°20'0"E
85°22'0"E
21°56'0"N
21°54'0"N
21°52'0"N
21°50'0"N
N
W
E
S
PATAE
ALAGHAT
KENAMENTA
DEOGHAR
SUNAPOSI
GIRHEL
SANA INDIPUR Fe & Mn MINES
JALIPADA
PURHEIBAHAL
SANA INDIPUR
GANUA
BADA INDIPUR
MANDAJODA
TEHEREI
SARGIGARH
BETAJHAR
GAMBHARNALI
PANPOSI
JALIBAHAL
PAKALPANI
RANISHAL
AMILA AMBA
SANUAN
BADAPATULI
SANAPATULI
PATAMUNDA
KADALLA
KHAJURDIHI
PORHADIHI
PIRHAPOKHARI
MITHIRDA
INDEX
LOCATION
BETAJHAR BOUNDARY
BANDED HEMATITE QUARTZITE
SHALE, PHYLLITE, MICA SCHIST
SCALE
0
1.25
2.5
5
Kilometers

## Annexure- C:

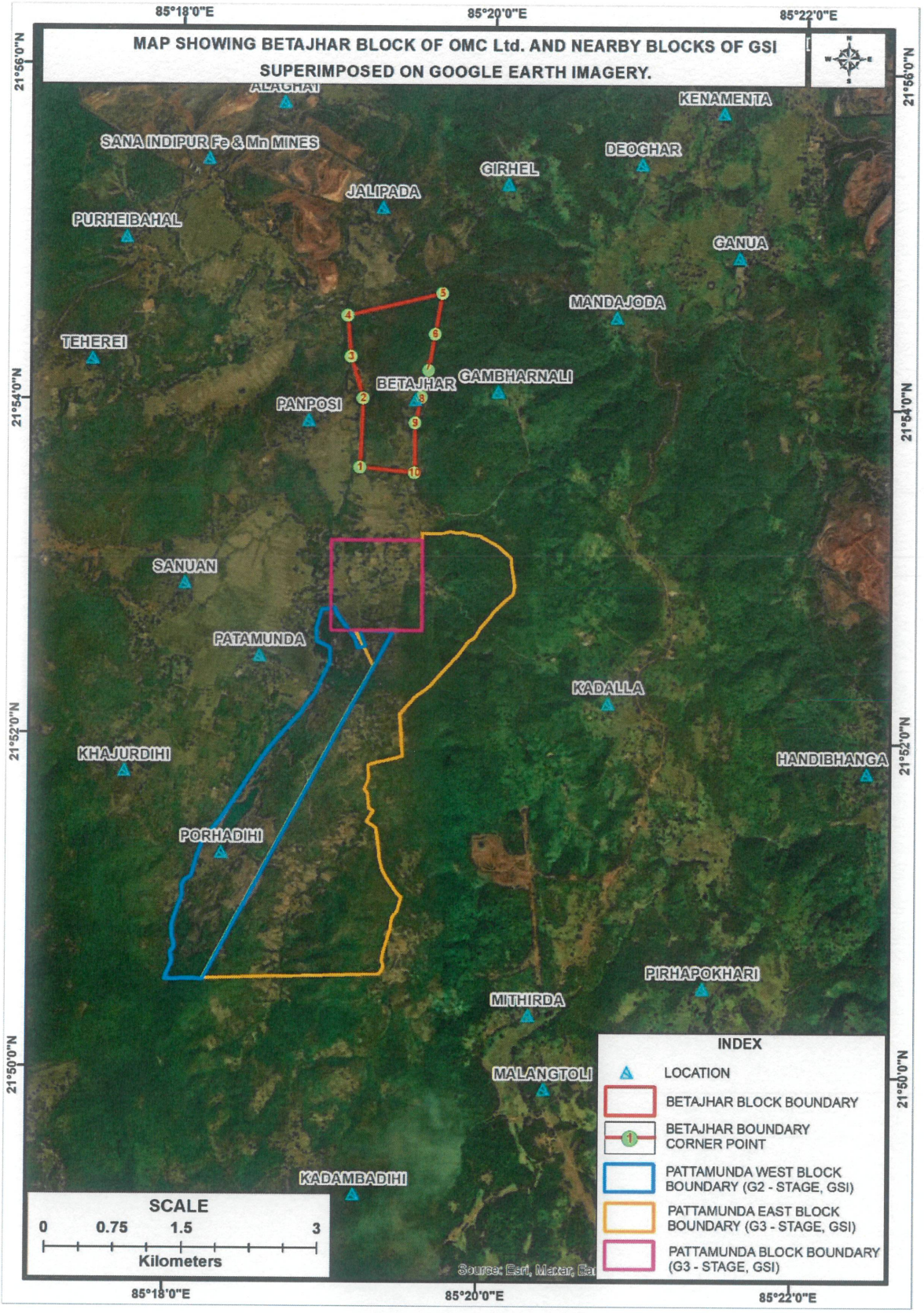

जिला सम्पदा मानचित्र
DISTRICT RESOURCE MAP
सुन्दरगढ़, उड़ीसा
SUNDARGARH , ORISSA
I. GEOLOGY & MINERALS
L E G E N D
BETAJHAR BLOCK
JHARKHAND
ODISHA
SAMBALPUR DISTRICT
JHARSUGUDA DIST.
DEOGARH DISTRICT
ANGUL DISTRICT
KENDUJHAR DIST.
EXPLANATORY NOTE
INDEX
Betajhar Boundary
Sundargarh District Boundary


MAP SHOWING LOCATION OF BETAJHAR BLOCK OVER AN AREA OF 1.367 Sq. Km,
ON PART OF DISTRICT RESOURCE MAP OF SUNDARGARH DISTRICT,ODISHA
BETAJHAR BLOCK
KOIRA
Bn2
Bn3
Bn1
Bv
40
45
SCALE
0
2.5
5
10
Kilometers
INDEX
Betajhar Block Boundary
Attitude of Bedding
Iron ore bearing bodies
Basic volcanoplutonic rocks of Bonai range with tuffites
BHQ / BHJ with purple shale
White shale / ferruginous shale ( with locally manganese ores )

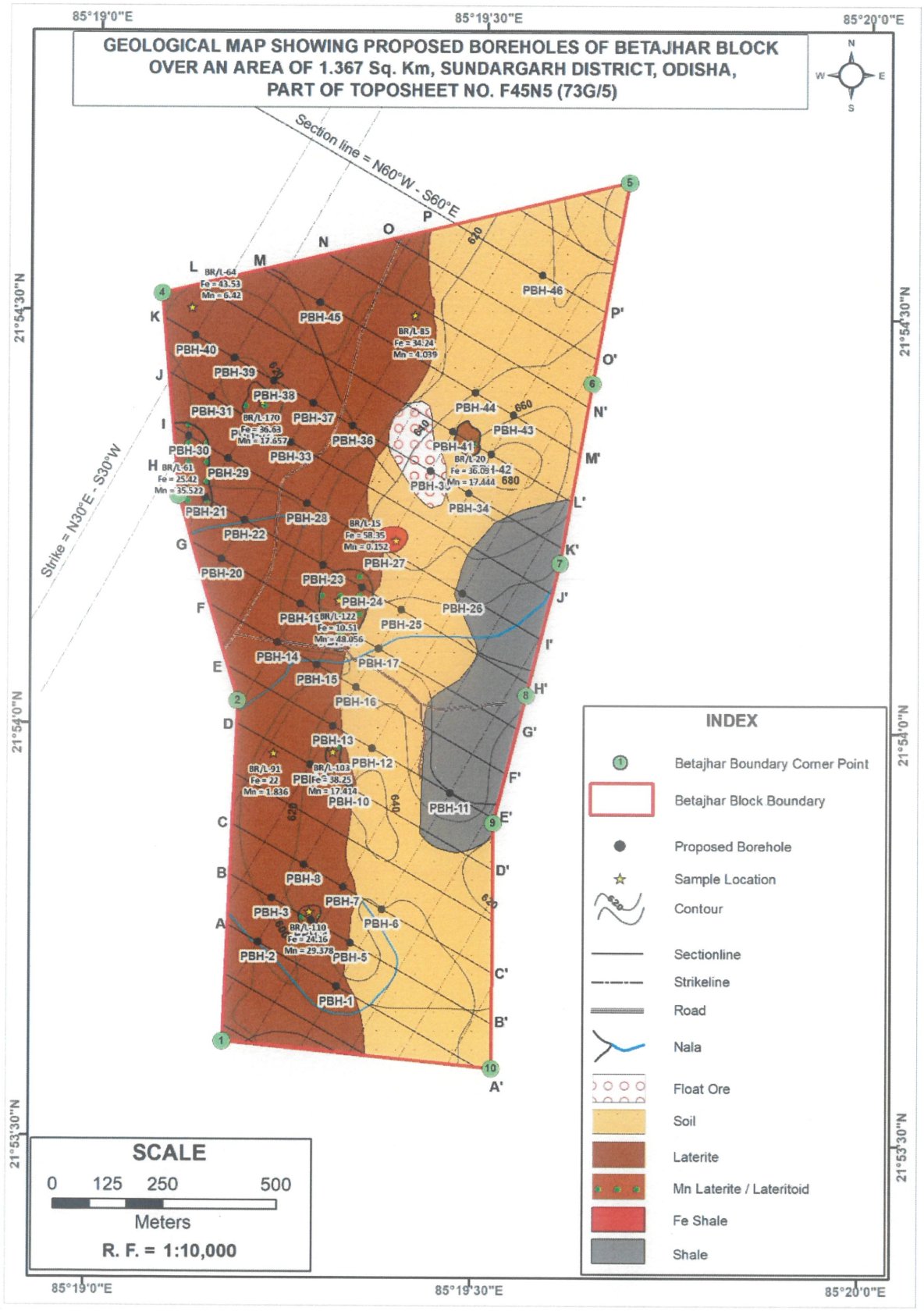
## Annexure- D:


GENERALISED GEOLOGICAL MAP OF HORSE SHOE (BONAI - KEONJHAR, BIF - III) BELT SHOWING BETAJHAR BLOCK, SUNDARGARH DISTRICT, ODISHA
ODISHA MAP WITH LOCATION OF HORSE SHOE BELT
85°10'0"E
85°20'0"E
85°30'0"E
85°40'0"E
22°10'0"N
22°0'0"N
21°50'0"N
N
S
E
W
Bada Jamda
Noamundi
Kiriburu
Barbil
Thakurani
Kiriburu Hilltop
Pacheri Lasarda
Haramutu
Bhadrasahi
Bileipada
Baneikala
Joda
Roirha
Mayurbhanj
Bichhakhundi
Banshapani
Khuntapani
Jamudihi
Kalata
Nuagan Guali
Nadikashira
Rengalbeda
Barpada
Gandhalpada
Kalmang
Bholberha
Khandabandh
Jururhi
Jajang
Langalata
Jarhibahal
BETAJHAR BLOCK
Ganua
Pelsha
Koira
Sundargarh
Siljora
Keonjhar
Raikela
Tensa
Dengula
Patamunda
Khajurdihi
Kadaliz
Kalimati
Beida
Dadan Raikala
Kusumadihi
Barsuan
Nayagarh
Katupali
Malangtoli
Lasi
Kedeshala
Rakma
Bhutula
Garjantoli
Sirkagutu
Batagan
Karhakela
Luhakorha
Khandadhar Hanta
Khandadhar Waterfall
Raisuan
Sareikala
Narasinghapur
Kadakala
Sundara
SCALE
0 5 10 20
Kilometers
R. F. = 1:250,000
INDEX
Kolhan Group
Jagannathpur Lava and Malangtoli Lava
Iron Ore Deposits
Banded Iron Formation and Quartzite
Iron Ore Group Shales and Phyllites
Mafic Lava of I.O.G
Bonai Granite
Singhbhum Granite
Older Metamorphic Tonalite Gneiss
Older Metamorphic Group
Town / Village
Khandadhar Waterfall
Odisha State Boundary
Odisha District Boundary
Betajhar Block Boundary

## Annexure- E:


MAP SHOWING BETAJHAR BLOCK OF OMC Ltd. AND NEARBY BLOCKS OF GSI
SUPERIMPOSED ON GOOGLE EARTH IMAGERY.
85°18'0"E
85°20'0"E
85°22'0"E
21°56'0"N
21°54'0"N
21°52'0"N
21°50'0"N
ALAGHAT
KENAMENTA
SANA INDIPUR Fe & Mn MINES
DEOGHAR
GIRHEL
JALIPADA
PURHEIBAHAL
GANUA
MANDAJODA
TEHEREI
BETAJHAR
GAMBHARNALI
PANPOSI
SANUAN
PATAMUNDA
KADALLA
KHAJURDIHI
HANDIBHANGA
PORHADIHI
PIRHAPOKHARI
MITHIRDA
MALANGTOLI
KADAMBADIHI
SCALE
0 0.75 1.5 3
Kilometers
INDEX
LOCATION
BETAJHAR BLOCK BOUNDARY
BETAJHAR BOUNDARY CORNER POINT
PATTAMUNDA WEST BLOCK BOUNDARY (G2 - STAGE, GSI)
PATTAMUNDA EAST BLOCK BOUNDARY (G3 - STAGE, GSI)
PATTAMUNDA BLOCK BOUNDARY (G3 - STAGE, GSI)
Source: Esri, Maxar, Ear

## Annexure- F:


GEOLOGICAL MAP SHOWING PROPOSED BOREHOLES OF BETAJHAR BLOCK
OVER AN AREA OF 1.367 Sq. Km, SUNDARGARH DISTRICT, ODISHA,
PART OF TOPOSHEET NO. F45N5 (73G/5)
85°19'0"E
85°19'30"E
85°20'0"E
21°54'30"N
21°54'0"N
21°53'30"N
N
S
E
W
Section line = N60°W - S60°E
Strike = N30°E - S30°W
PBH-1
PBH-2
PBH-3
PBH-4
PBH-5
PBH-6
PBH-7
PBH-8
PBH-10
PBH-11
PBH-12
PBH-13
PBH-14
PBH-15
PBH-16
PBH-17
PBH-18
PBH-19
PBH-20
PBH-21
PBH-22
PBH-23
PBH-24
PBH-25
PBH-26
PBH-27
PBH-28
PBH-29
PBH-30
PBH-31
PBH-33
PBH-34
PBH-36
PBH-37
PBH-38
PBH-39
PBH-40
PBH-41
PBH-42
PBH-43
PBH-44
PBH-45
PBH-46
BR/L-64
Fe = 43.53
Mn = 6.42
BR/L-85
Fe = 34.24
Mn = 4.039
BR/L-170
Fe = 36.63
Mn = 17.657
BR/L-61
Fe = 25.42
Mn = 35.522
BR/L-15
Fe = 58.35
Mn = 0.152
BR/L-122
Fe = 10.51
Mn = 49.056
BR/L-91
Fe = 22
Mn = 1.836
BR/L-103
Fe = 38.25
Mn = 17.414
BR/L-110
Fe = 24.16
Mn = 29.378
BR/L-20
Fe = 36.08
Mn = 17.444
INDEX
Betajhar Boundary Corner Point
Betajhar Block Boundary
Proposed Borehole
Sample Location
Contour
Sectionline
Strikeline
Road
Nala
Float Ore
Soil
Laterite
Mn Laterite / Lateritoid
Fe Shale
Shale
SCALE
0 125 250 500
Meters
R. F. = 1:10,000