Proposal for 'Hurungdah Gold Block' situated in Tamar Block, Ranchi, Arki Block, Khunti & Kuchai Block, Saraikela - Kharsawan District, Jharkhand for Reconnaissance Survey (G4 Stage) under NMET

Gold and Associated Minerals

By

Jharkhand Exploration and Mining Corporation Limited, Ranchi

Place: Ranchi
Date: 17.02.2025

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Summary of the Block for Reconnaissance Survey (G4 Stage)

General Information About the Block

	Features	Details
	Block ID	JEMCL/NMET/09/2025
	Exploration Agency	Jharkhand Exploration and Mining Corporation Limited
	Commodity	Gold
	Mineral Belt	Tamar Porapahar Shear Zone (TPSZ)
	Completion Period with the entire Time schedule to complete the project	20 Months
	Objectives	JEMCL, Ranchi has proposed exploration for gold in the Hurungdah area of Ranchi, Khunti & Saraikela - Kharsawan district based on previously available baseline geoscience data supported with preliminary field investigation and sampling. **The exploration programme was then submitted to the "27th Jharkhand State Geological Programming Board Meeting" held on 29.09.2023 in which the exploration programme in the proposed area was unanimously approved by the programming board consisting of members such as GSI, DMG, GoJ, MECL, CMPDI, etc.** Hence, the objectives of the current exploration program would be: **i)** Surface Geological mapping in 1:12,500 scale. **ii)** Topographical survey for preparing contour & topographical map. **iii)** Block boundary demarcation through DGPS or Total Station. **iv)** Exploratory scout drilling as per **G4** level of exploration to know the vertical &

		lateral extent of ore bodies and resource estimation [as per UNFC norms & the Minerals (Evidence of Mineral Contents) Rules 2015 & its amendments]. **v)** Laboratory studies including petrological studies and chemical analysis of samples for grade estimation. **vi)** To facilitate the Jharkhand government for auctioning of the block.
	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	**i)** Surface geological Mapping, Sampling, Trenching, and Geological report preparation will be done by JEMCL. **ii)** However, works such as Drilling and Laboratory studies (petrographic studies and chemical analysis) will be carried out by the empaneled agencies.
	Name/ Number of Geoscientists	Monitoring of project will be done by a team of **04** numbers of Geologists (Geoscientists)
	Expected field days (Geology, geophysics, surveyor)	**i)** Geologist party days: 420 **ii)** Survey party Days: 325
1.	**Location**	
	Latitude	22° 52' 50.30" N to 22° 56' 43.28"N
	Longitude	85° 34' 15.00" E to 85° 35' 39.14" E
	Villages	Hurungdah Villages
	Tehsil/Taluk	Tamar (Ranchi), Arki (Khunti) & Kuchai (Saraikela – Kharsawan)
	District	Ranchi, Khunti & Saraikela - Kharsawan
	State	Jharkhand
2.	**Area (hectares/ square kilometres)**	
	Block Area	16.57 Km^2
	Forest Area	16.57 Km^2
	Government Land Area	-
	Private Land Area	-

3.	**Accessibility**	
	Nearest Rail Head	Ranchi Railway Station (situated at about 85 km from the area).
	Road	NH-143AG is situated about 10 km from the area under investigation.
	Airport	Birsa Munda Airport, Ranchi situated at about 90 km from the area.
4.	**Hydrography**	
	Local Surface Drainage Pattern (Channels)	Dendritic pattern controlled by local topography
	Rivers/ Streams	Karkari river & Bada Nadi
5.	**Climate**	
	Mean Annual Rainfall	About 900 mm of average annual rainfall
	Temperatures (December) (Minimum) Temperatures June) (Maximum)	Maximum temperature: ~ 40°C Minimum temperature: ~10°c
6.	**Topography**	
	Toposheet Number	OSM no.: F45H9 / Toposheet No. 73F/9
	Morphology of the Area	Undulating topography
7	**Availability of baseline geoscience data**	
	Geological Map (1:50K/ 25K)	Regional geological map of GSI in 1:50, 000 (Source: Bhukosh portal of GSI)
	Geochemical Map	-
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	-
8.	**Justification for taking up Reconnaissance Survey / Regional Exploration**	**i)** A regional geological map of GSI showing the distribution of various lithologies favorable for the mineralization of gold is available. **ii)** Gold panning by the local residents along the Karkari River can be seen which gives a clue for occurrence of gold mineralization in and around the area.

		iii) Exploration for gold by GSI has been carried out in Pundidiri-Puntru block which is situated at about ~9 km from the proposed area. **iv)** As per analytical data of collected surface samples (including those from small old pits) from the Pundidiri block total gold (**Au**) contents range from **0.05 ppm** to **1.84 ppm** (source: geological memorandum of GSI). **v)** In addition, gold mines such as Lawa Gold Mines (ex-lessee M/s. Manmohan Industries Pvt. Ltd.) and Parasi Gold Block are situated at about 50 km and 13 km respectively from the proposed area. **vi)** Hence, the **geological set-up** and the previous **analytical data** indicate that the proposed area can be prospective in terms of gold deposits. **vii)** G4 level of exploration will help in making a strategy for the next levels of exploration (G3/G2 level) which in turn will facilitate the State Government for the auction of block. **viii)** In view of the above, investigation of gold and associated minerals under **G-4** level of exploration through **NMET** has been proposed in the area by JEMCL, Ranchi.

1. Block Summary

1.1 Physiography:

The area is characterized by undulating topography. The average elevation is about 337 meters above Mean Sea Level.

1.2 Geology:

1.2.1 **Regional Geology:**

The investigation area comprises of volcano meta-sedimentary sequences between the Singhbhum Craton in the south and the Chhotanagpur Gneissic Complex (CGC) in the north, which has undergone low to medium grade metamorphism and belongs to Paleo to Meso-Proterozoic age (**Table-1**). This is an important litho-stratigraphic domain within the North Singhbhum Mobile Belt (NSMB) which is about 50 km wide and 200 km long and has an average EW trend with a convexity towards north (Plate III). The northern contact of volcano sedimentary sequence of Singhbhum Group (SG) with CGC is marked by Tamar Porapahar Shear Zone (TPSZ). The TPSZ extends from Tamar in Ranchi district of Jharkhand to Porapahar in Bankura district of West Bengal through Saraikela Kharsawan district of Jharkhand and Purulia district of West Bengal. The TPSZ trends EW and is located at about 40 km north of Singhbhum Shear Zone (SSZ). At places, this shear zone passes either through the SG of rocks or the rocks of CGC.

The TPSZ shows intermingling of various types of rocks which are accompanied by extensive silicification, brecciation, ferruginisation, stretching of mineral grains, mylonitisation and alkaline carbonate intrusions. Several parallel (sympathetic) shears are developed between the Dalma volcanics and the TPSZ. Sporadic sulphide mineralization of copper, lead and gold mineralization are found along these shear zones.

The area under investigation forms a part of Chhotanagpur plateau and Singbhum Group which is composed of granite gneiss suite with bands of phyllite, schist, homblende schist and quartzite. Pegmatites, vein quartz and aplites traverse the granitic country. The metamorphites comprising meta-sediments such as pelitic schist, quartzite, calc-silicate rock, hornblende schist and amphibolite occur as bands and are pre-granitic in age. They represent highly meta-morphosed argillaceous and arenaceous sediments and associated basic rocks. The argillaceous type is more predominant than the other two. Granite gneiss and the associated migmatites are by far the most common rock types of the area under investigation. Granites, in general, are foliated showing gneissose fabric. Thin bands of amphibolites have intrusive contact with granite gneiss, as also with schist and phyllite.

The meta-volcano sedimentary sequences exposed in the investigated area is a part of Chandil formation of Singbhum Group. Establishment of stratigraphic succession of the study area by the Page 10 of 57 Geological Survey of India, State Unit Jharkhand, Ranchi, Government of India Page 11 of 57

Geological Survey of India, State Unit Jharkhand, Ranchi, Government of India pre-existing rocks in the area poses a problem. Though bedding dip is established by compositional variation, colour banding, grain size variation in different lamellae as discernible in a quite few place. It is not easy to establish direction of younging in the absence of definite top and bottom criteria, lack of continuity of lithological units and their gradual change from original pelitic and psammitic rocks.

The granite gneiss and granite appear to be younger than the meta-sediments. Pegmatites, aplites and quartz veins are observed cutting across all rock types in the area. They are guided by joint planes and foliation. Pegmatite veins, varying from a few centimeters to a couple of metres across at a few places, are mostly thin and are composed of quartz and feldspar. At a few localities, however, tourmaline crystals are noted in pegmatites. Aplite veins are more common in the granitic country of the investigated area. A regional geological map with the proposed Block is given in **PLATE-3**.

Table-1: Generalized stratigraphic succession of Archean-Proterozoic of Singhbhum Province *(modified by GSI after Saha et al., 1988).*

Group/Formation		Lithology	Age
Arkasani Granophyre, Soda Granite KolhanGroup, Gangpur Group		Granophyre Sandstone, Shale, Limestone Quartzite, dolomite, phyllite, conglomerate	c.2.1 Ga
Dalma/ Dhanjhori/ Ongarbira Group		Mafics, ultramafic, quartzites	
Singhbhum Group (Bonai Group?)		**Dhalbhum Fm:** Carbonaceous phyllite, quartzites,cherts, epidiorites, acid volcanics	
		Chaibasa Fm: Mica schist, quartzites, hornblende schist	c. 2.4.2.3 Ga
Newer Dolerite dykes and sills (Undifferentiated) Singhbhum Granite (SBG-B) phase-III			c.3.1 Ga
Iron Ore Super group	Iron Ore Group (Lower Bonai Group) Gorumahishani Group	Tuffaceous shale, phyllite, tuffs, BIF, Ferrugenous chert, local dolomite, acid-intermediate, basic- ultrabasic volcanics, quartzites and conglomerate, quartzite, BIF, metamorphosed mafic and ultramafic volcanics	
Singhbhum Granite (SBG-A) (Phase I & II)/Chakradharpur Granite		Granite/Granite gneiss	c.3.3 Ga
Older Metamorphic Tonalite Gneiss (OMTG)		Tonalite Gneiss	c.3.4-3.5 Ga
Older Metamorphic Group (OMG)		Pelitic schist, quartzites, para-andortho-amphibolites	(folding & metamorphism of OMG and OMTG)

1.2.2 Geology of the Block:

1.2.2.1 Rock Types and Petrography:

a) Quartzite and quartz sericite schist: It is exposed as isolated outcrops and elevated hillocks. linearly arranged along a general E-W to ENE-WSW trend. Bands and lensoidal bodies of quartzite occur in the area within mica schist country rock. The rock is compact, massive to moderately foliated and white and black in color and fine to medium grained. At places primary bedding is folded giving rise Fl folds. At places, bedding is well preserved which is characterized by color and compositional variations. In hand specimen, the rock consists entirely of quartz grain and little opaques. Quartz sericite schist is composed of quartz, sericite and opaques.

b) Mica schist: This is the most dominant rock type of the area. Mappable units are exposed near Hurungdah villages with ENE WSW trend. The litho-unit is exposed as linear outcrops or bands in low lying areas like nala section, valley portion small mound and hills. It is mostly grey in color, well foliated and medium grained in nature. Foliation plane is defined by preferred orientation of millimeter to centimeter thick muscovite and biotite layer. Mica content varies from place to place with gradational change. At places foliation planes are crenulated. General strike of this litho-unit is ENE-WSW with sub vertical dip in the southern side. The rock is fine grained, foliated and deformed. It is composed of quartz, biotite. garnet and opaque minerals.

c) Phyllite: It is exposed as isolated outcrops and in low-lying areas. This rock is also wide spread in the study area. This is fine grained, well foliated and grey to yellowish grey in colour. Phyllitic sheen and fissility is observed. It has fine alternating laminae of white quartzose and black phyllosillicate rich layer. This litho-unit is very friable in nature. This rock unit is exposed near road section and foothills of hillocks near Jojobera village.

d) Chert: It is also exposed in elevated parallel hillocks with E-W trend. This unit is fine grained, tough and dark in colour and mainly consists of quartz. At places they grade into black chert. It is jointed, fractured and massive in nature. They are intruded by different generation of quartz veins and veinlets.

e) Granite gneiss: It is exposed as isolated outcrops and elevated hillocks, mostly linearly

arranged along a general ENE WSW trend. This rock is part of CGGC. This litho-unit is composed alternately of medium course leucocratic felsic (quartz +feldspar) band and medium to coarse grained melanocratic band with quartz +amphibole+ biotite. Different varieties of granite gneiss such as massive granite/granite gneiss, porphyritic & porphyroblastic granite/granite gneiss and augen gneiss have been identified depending on petrological character in the study area. The multiple phases of deformations in the form of secondary structures like folds, boudins, local faults etc. can also be seen in these rock units. Massive granite and granite gneiss is by far the most predominating granitic rock occurring in the area. The rock is hard, compact and light grey colored, fine to coarse grained with mineral constituents as quartz, feldspar, biotite muscovite, garnet and iron oxides.

f) <u>Amphibolites:</u> It is exposed as isolated outcrops and boulder in ground level exposure. The rocks are noticed as intrusive in metasedimentary and granite gneiss as concordant to the general strike of the foliation. It consists mainly of amphiboles and altered plagioclase. This unit is coarse grained and dark green in color. This litho-unit is well foliated in nature. Thin bands of amphibolites have intrusive contact with granite gneiss, as also with schist and phyllite.

g) <u>Pegmatite:</u> Pegmatite veins have intruded the metasedimentary unit as well as CGGC in the area. These are mostly concordant to the foliation. This body is not laterally persistent, somewhere it gets tapered and shows pinch and swell structure. Different generation of pegmatite veins are recorded along S_1 and S_2 foliation and joint planes at places. Veins are manifested by joints and cross fractures. Medium and very coarse-grained veins are observed. The grain size of the pegmatite veins is varying. It is composed of quartz, feldspar, biotite, muscovite and tourmaline.

h) <u>Quartz tourmaline veins:</u> Quartz tourmaline veins (thickness varies about 10 cm to 01 meter) are noticed as bouldery granular mass in clots near Arangi. Lembatoll. Jaranga Pundidiri, Naurhi. Pitupars, Berapara Sodag villages etc. They are concordant to the foliation of meta sedimentary rock striking ENE WSW. At places, this lithounit is weathered and ferruginized.

i) <u>Quartz veins:</u> Different generations of quartz veins (trending E- W and NE-SW mostly) are

present in the study area. It is present along foliation plane of meta sediments and deformed granites. Some veins are also intruded along joints and fracture plane. Smoky quartz veins (~ 50 cm wide) have been observed near Jojobera village cross cutting general strike of quartzite and quartz-sericite schist. At places they are ferruginised in character.

j) <u>Alluvium and Soil:</u> Along the river courses, alluvium is developed to some extent. Light-colored granitic soil is most prevalent. It is formed from the weathering of granitic rocks. Phyllites and schists give rise to loamy fertile soil.

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

Geologically, the area comprises of volcano-meta sedimentary sequences between the Singhbhum craton in the south and the Chhotanagpur Gneissic Complex in the north, which has undergone low to medium grade metamorphism and belongs to Paleo to Meso-Proterozoic age. This is an important litho-stratigraphic domain within the North Singhbhum Mobile Belt (NSMB) which is about 50 km wide and 200 km long and has an average E-W trend with a convexity towards north. The northern contact of volcano-sedimentary sequence of Singhbhum Group (SG) with Chhotanagpur Gneissic Complex (CGC) is marked by Tamar Porapahar Shear Zone (TPSZ). Previously, numerous geoscientists of GSI, as well as geologists from Singhbhum regions, have reported occurrences of gold in association with sulphide mineralization where mineralization has been observed in quartz veins, brecciated quartzite and tuffaceous phyllite (Gupta and Basu, 1984; Bose and Prasad, 1986; Chandra and Mukherjee, 1993; Chandra and Nim, 1993; Chandra, 1993 and Sahoo et al., 2010).

The TPSZ trends ENE-WSW and is located at about 40 km north of Singhbhum Shear Zone. The mineralization of gold and associated sulfides is found along these shear zones. Lithological sequences of these areas are represented by mica schist, chlorite schist, quartz-sericite-schist, phyllite, granites, mafic rocks, quartz veins (smoky quartz), pegmatite veins and sub-ordinate chert bands. The chemical data of samples collected during the previous exploration work done by various geoscientists from the adjoining areas such as Parasi and Pundidiri areas shows concentrations of gold contents from **0.5 ppm** to **10.27 ppm**. Hence, the **geological setup** and the **analytical data** from the adjoining areas indicate that the proposed area can also be a potential geological site for gold mineralization.

1.4 Scope for proposed exploration:

The proposed exploration program at G-4 stage (Reconnaissance survey) comprises geological mapping (1:12,500 scale), topographic survey and boundary demarcation through DGPS, sampling (bedrock, channel, soil, stream sediment), pitting-trenching, scout drilling, chemical analysis, petrographic studies, and report preparation. The outcome of this exploration program will pave the way for carrying out the next levels of exploration (G3/G2 level) and/or will possibly facilitate the State Government for the auction of the block.

1.5 Observation and Recommendations of previous work:

No previous exploration works have been carried out in the proposed mineral block.

2. Previous Work

2.1 Previous Exploration in the adjoining area (Regional area):

2.1.1 In Jharkhand, commercial extraction of gold was carried out from Kunderkocha, Lawa, Maysera, Pahardia and Sonapet areas for long. These areas are also famous for having numerous gold panning sites from ancient times and the locals are engaged in panning activities, especially during the rainy seasons in the local river and nalas.

2.1.2 As per available information, the Maysera area, Saraikela-Kharsawan district was under the leasehold of "**Garadih Properties Development Limited**" and "**Maysera Mining and Development Limited**" under British management in 1934. The property extended over 44 sq. km. It represents large old workings with a length of 243 m. The auriferous quartz occurs in the form of a lens over a length of 30 m down to a depth of 23 m.

2.1.3 Dunn (**1924**) cited some of the important gold occurrences in Manbhum and Singhbhum districts.

2.1.4 Previously, numerous geoscientists of GSI, as well as geologists from Singhbhum regions, have reported occurrences of gold in association with sulphide mineralization hosted with smoky quartz veins, brecciated quartzite, schists, and phyllites (*Gupta and Basu, 1984; Bose and Prasad, 1986; Chandra and Mukherjee, 1993; Chandra and Nim, 1993; Chandra, 1993 and Sahoo et*

al., 2010).

2.1.5 Several geoscientists from the Geological Survey of India have mapped parts of Ranchi district. Systematic geological mapping was carried out by Thiagarajan (**1965-66**) in Toposheet No 73 A/15, Jha and Sarkar (**1966- 67**) in Toposheet 73 E/7, Chakrabarty and Sarkar (**1967- 68**) in 73 E/3, Verma and Dutta (**1969- 70** and **1970-71**) in toposheets 73 E/2 and 73 A/16.

2.1.6 Mukherjee et al., 1969 reported that the mineralization in the Lawa area is confined to a shear zone of intense shearing along with the contact of intercalated bands of phyllite and schist with the quartzite. Gold is associated with grey to pale blue-colored quartz veins occurring mainly within the quartzite along the zone of shearing. The total mineral resource estimate is 601673 Mt@ 3.2 g/t of gold.

2.1.7 Ziauddin and Narayanaswamy (**1974**) described gold occurrences in parts of Chhotanagpur.

2.1.8 Gupta and Basu (**1984**) mapped the areas in and around Sonapet valley and brought out the stratigraphy, petrography and structural details in view of gold and associated sulphide mineralization.

2.1.9 Preliminary search for gold by Chandra et al., (**1998**) followed by the search for gold to the north of Sonapet valley by Sharan et al., (**2000**) led to the identification of phyllite intercalated with quartzite and associated quartz reef around Parasi.

2.1.10 GSI has explored for gold in Lawa area (**D. Lahiri et al., 1971**).

2.1.11 Also, investigations for gold in parts of Sonapet valley, erstwhile Paschimi Singhbhum and Ranchi districts, Jharkhand were carried out during F.S.1999-2000 by R. R. Sharan and in F.S. 2000-2001 by Sharan and Kurien. This led to identification of ferruginous quartzite, phyllitic quartzite, tuff and associated pyritiferous quartz veins as the prospective host rocks for gold

mineralization in the areas around Parasi. Analysis of geochemical samples showed anomalous gold values (1.66 ppm to 10.27 ppm). This investigation also brought out a shear zone (120 m to 150 m in width and about 700 m in length near Parasi) having some positive indications of gold mineralization in the area.

2.1.12 Similarly, anomalous gold content was also found in the Singhbhum Group of meta-sedimentary rocks/volcano sedimentaries and associated quartz/quartz carbonate veins in Sinduari (975 ppb Au) and Lungtu (100 ppb to 340 ppb Au) areas. During FSP: 2008-10, the exploration work was done by Sri Shashi Ranjan and S.K. Das, in which anomalous values of Au, ranging from 50 ppb to 612 ppb, were recorded in mica schist, quartz-chlorite schist, ferruginous-phyllite, banded magnetite quartzite and vein quartz.

2.1.13 Significant gold values were recorded during the investigation for gold carried out at the Parasi area by M/s. MECL in the field season 2007-2009 & 2013 - 2014. Surface manifestations of mineralization can be observed in the form of sulphides (arsenopyrite, pyrite and pyrrhotite) disseminated in quartzite and quartz veins.

2.1.14 During STM mapping in the Field Season: 2012-14, in "Nauhri-Rasuri-Sereng areas" by GSI, gold values of 60 ppb to 1.85 ppm have been reported from 5 samples of quartz veins and brecciated quartzite.

2.1.15 Further, based on findings of the previous investigation works, a multidisciplinary approach (G4 level exploration) has been attempted during FS: **2015-16** by **GSI** in and around Pundidiri village and the chemical analysis data of analyzed samples collected from this area shows gold values ranging from **0.05 ppm to 1.84 ppm**.

2.2 Previous Exploration in the Proposed Block Area:

No previous exploration works have been carried out in the proposed mineral block. Keeping this view in mind, JEMCL, Ranchi has proposed exploration for gold in the area based on previously available baseline geoscience data supported with

preliminary field investigation and sampling. The exploration programme was then submitted to the **"27th Jharkhand State Geological Programming Board Meeting"** held on 29.09.2023 in which the exploration programme in the proposed area was unanimously approved by the programming board.

3. Block Description

The proposed G-4 block for gold falls in Survey of India OSM number: F45H9/ Toposheet No. F73/9. It covers an area of about 16.57 sq. km in and around villages Hurungdah villages of Ranchi, Khunti & Saraikela - Kharsawan District, Jharkhand. The location of the proposed mineral block is given in PLATES-1 to 2. The Co-ordinates of the corner points of the block area are as under:

GEO-COORDINATES OF THE CORNER POINTS OF THE BLOCK, WGS 84		
Corner Points	Latitude	Longitude
A	22° 55' 27.33" N	85° 33' 34.47" E
B	22° 56' 43.28" N	85° 35' 39.14" E
C	22° 53' 12.41" N	85° 35' 34.09" E
D	22° 52' 50.30" N	85° 35' 1.51" E
E	22° 53' 18.25" N	85° 34' 15.00" E

4. Planned Methodology

The exploration shall be carried out as per the **Minerals (Evidence of Mineral Content) Rule-2015** and its subsequent amendments. Accordingly, the following scheme of exploration has been formulated to achieve the set objectives:

4.1 Geological Mapping: Geological mapping of entire 16.57 sq.km area will be done on 1:12,500 scale. Broad lithological units will be mapped and litho-contacts will be marked with the help of DGPS / hand held GPS. Major litho-units will be plotted ignoring the minor variations. Attitude and structural features of rocks like strike, dip of bedding plane, foliation, lineation, joints, faults and folds will be recorded. Trenches & pits dug during the course of exploration will also be made part of geological map.

4. 2 Sampling: During the course of geological mapping bedrock samples shall be collected from the outcrops along with soil and stream sediment samples

(**PLATES-4** and **5)**. It will generate about **2168** nos. of **Primary Samples** and **86** nos. of **Internal Check Samples** (5% of Primary samples). In addition to this, 10% of primary samples i.e., **172** nos. of samples will be prepared as **External Check samples.** All these samples will be analyzed for gold, trace, and rare elements and petrographic studies.

Utmost care will be taken up during collection of different types of samples and contamination of sample will be minimized to zero level. Four types of samples viz, bed rock samples, channel samples, soil samples & stream sediments sample will be collected. The location of samples will also be marked and noted down in field book.

4.2.1. Bed Rock Samples: A total of **265** bed rock & soil sample provision has been made in the proposal. Before collecting the in-situ sample the rock surfaces will be thoroughly cleaned with wire brush and then a sample of 15cmx10cmx5cm dimension will be collected to make it proper representation of particular litho-unit. Location of samples will be recorded with hand held GPS and megascopic character will be noted down.

4.2.2. Soil Sample: Provision of soil sample collection are made in proposal. Soil samples will be collected from B&C horizons of soil discarding top regolith and plant humous. The hole excavated material will be taken out and stacked over plastic sheet. Representative sample weighing about 5kg will be collected and will be packed with proper labeling and location will be recorded by hand held GPS.

4.2.3. Stream Sediment Sample: A total **30** stream sediment samples provision has been made in the proposal. The sample will be collected mainly from Ist order & IInd order Stream to know the metal content and to demarcate the probable provenance of mineralization. After drying sediments will be subjected to sieving using 30 mesh sieve. Material thus obtained will be reduced in quantity by progressive conning & quartering and representative sample weighing 5kg will be drawn and labeled properly. The location of sample will be recovered with the help of hand held GPS.

4.2.4. Channel Samples (Trench Sample): There is a provision of **424** channel samples from the trench to be excavated in the field. The channel will be cut in the bed as well as wall of trench of 10cmx5cmx5cm and samples will be collected keeping samples lithological variation in mind. All trenches will be

recorded and plotted on geological map.

4.3 Surveying: Geological traverses, geological features, and location of surface samples will be marked with hand-held GPS. During exploratory drilling of scout borehole, fixation and determination of reduced level and co-ordinates of the boreholes and trench locations only will be undertaken by DGPS/Total station. The borehole will be fixed on the ground at a specified grid interval/borehole spacing. The contour map will be prepared on **1:12,500** scales at **2m** contour intervals.

4.4 Trenching: Trenching (excavation) shall be carried out in the potential zones identified based on the results of geological mapping and geochemical sampling. A provision of shallow trenching of 848.80 cubic meter (L= 5m, W= 2m, Depth= 1m) which is around 86 nos. of trenches has been planned. Trenching shall be done for correlation of mineralized zones on the surface up to a depth of 1 m after removal of soil/weathered column in the area. Locations of trenches will be decided by field geologists based on field observations. The trench walls will be mapped on a **1:200** scale. A provision of 64 nos. of primary and check (5% internal + 10% external) trench samples have been kept for analysis of gold, trace, and rare element analysis and petrographic studies.

4.5 Core Drilling: The extent of the mineralized zones (ore bodies) will be identified and marked on the basis of geological mapping, sampling, trenching and chemical analysis. The scout boreholes will be drilled along the section line laid down on the basis of mapping. The borehole will be drilled for at least two levels intersection in up dip and down dip directions in mineralized zones to establish the persistence of gold mineralization. To find out the potentiality of mineralized zones in strike and dip, **05 (Five)** nos. scout boreholes involving **1000m** of drilling (*each bore-hole of 200m depth*) will be carried out for the intersection of mineralized zones.

4.6 Drill Core-Logging and Sampling: Detailed drill-core logging will be done with consideration for weathering, grain size, colour and nature of various rock formations, structural features, presence of ore/mineral grains and rock quality

determination (RQD). The mineralized core shall be sampled at 0.50 m interval by splitting it into two equal halve (Vertically) by core splitter. The length of sample may change according to the core recovery intensity of mineralization and change in lithology. The cores of immediate hanging wall and foot wall will be sampled at 1.00 m interval (3m each i.e. H/W & F/W side).

One half splitted core will be powdered to 100 mesh size and the other half will be kept for future studies. The powdered material will be mixed thoroughly and about 100 grams of samples will be taken for chemical analysis by successive coning and quartering as primary samples and rest of the material (-100 mesh size) will be kept as a duplicate sample for future reference.

It will generate about **1000** Nos. of **Primary Samples** and **50** Nos. of **Internal Check Samples** (5% of Primary samples). In addition to this, 10% of primary samples i.e., **100** nos. of samples will be prepared as **External Check samples** that will be sent to NABL Lab for analysis. These samples will be analyzed for gold, trace, and rare element analysis and petrographic studies.

4.7 Laboratory Studies:

a) *Primary and Check Samples:* All the primary samples including Internal and External Check Samples would be analyzed for gold by AAS method and 2.5% of the total primary samples would be analyzed for the trace and REE through 34 elements package analysis by the ICP-MS method.

b) *Petrological/mineragraphic Studies*: Thin/polish section studies will be done to determine petrological characteristics/ore mineral assemblages and their distribution, textural pattern, alteration, enrichment etc., of different lithounits. About 34 best representative samples will be collected from drill core as well as outcrop of different lithounits for such studies.

5. Nature, Quantum and Target of Work

The details of proposed exploration work in the Hurungdah gold block can be summarized as below in **Table 3**:

Table-3: Quantum of work for G4 level of Exploration for gold at Hurungdahg Villages, Ranchi, Khunti & Saraikela - Kharsawan District, Jharkhand.

Sl. No.	Item of Work	Unit	Target
1	Geological Mapping (1:12,500 scale)	Km2	16.57
2	Surveying: **a)** Topographic survey for contour map preparation (1:12,500 scale)	Km2	16.57
	b) Fixation and determination of reduced level and co-ordinates of the boreholes (scout bore-holes)	Nos.	5
	c) Fixation and determination of reduced level and co-ordinates of the trench locations	Nos.	665
3	Sampling: **a)** Bed rock/soil samples- 415 **b)** Trench samples- 663 **c)** Stream sediment samples-90 **d)** Drill core samples-1000	Nos.	2168 (*)
4	Trenching	Cu. m.	1326
5	Drilling (coring)	m.	1000
6	Laboratory Studies		
	a) Chemical Analysis:		
	i) 5% of **total bore-hole samples** for trace and REE analysis under 34 element package analysis through ICP-MS for bed rock, drill core, soil and stream sediment samples.	Nos.	50
	ii) Check samples Internal (5%) and External (10%)- Trace and REE analysis under 34 element package analysis by ICP-MS for bedrock, drill core, soil, and stream sediment samples.	Nos.	8
	iii) Gold analysis by AAS (Atomic Absorption Spectrometry) method for bed rock, drill core, soil, trench and stream sediment samples.	Nos.	2168
	iv) Check samples Internal (5%) and External (10%)- for Gold analysis by AAS method of bed rock, drill core, soil, trench and stream sediment samples.		325
	b) Petrographic Studies		34
	i) Preparation of **thin** section **ii)** Study of thin section **iii)** Preparation of polish section **iv)** Study of Polish section **v)** Digital photomicrography	Nos.	
7	**Report Preparation**	Nos.	1

* The provision of 1000 drill core samples are made in the proposal which may vary depending upon the no. of load intersection, lithology, intensity of mineralization.

6. Manpower deployment

Manpower deployment list will be provided later.

7. Break-up of expenditure

The tentative cost has been estimated based on the Schedule of Charges (SoC) of projects funded by National Mineral Exploration Trust (NMET) w.e.f. 01/04/2020. The total estimated cost is Rs. 575 Lakhs. The summary of tentative cost estimates for Reconnaissance Survey (G-4 Level) is given in **Table-4** and details of tentative cost estimates are given in **Table –5.** The tentative schedule/action plan for the proposed Reconnaissance Survey (G-4) is given in **Table-6**.

8. PLATES

Plate 1: Location map of the area under investigation

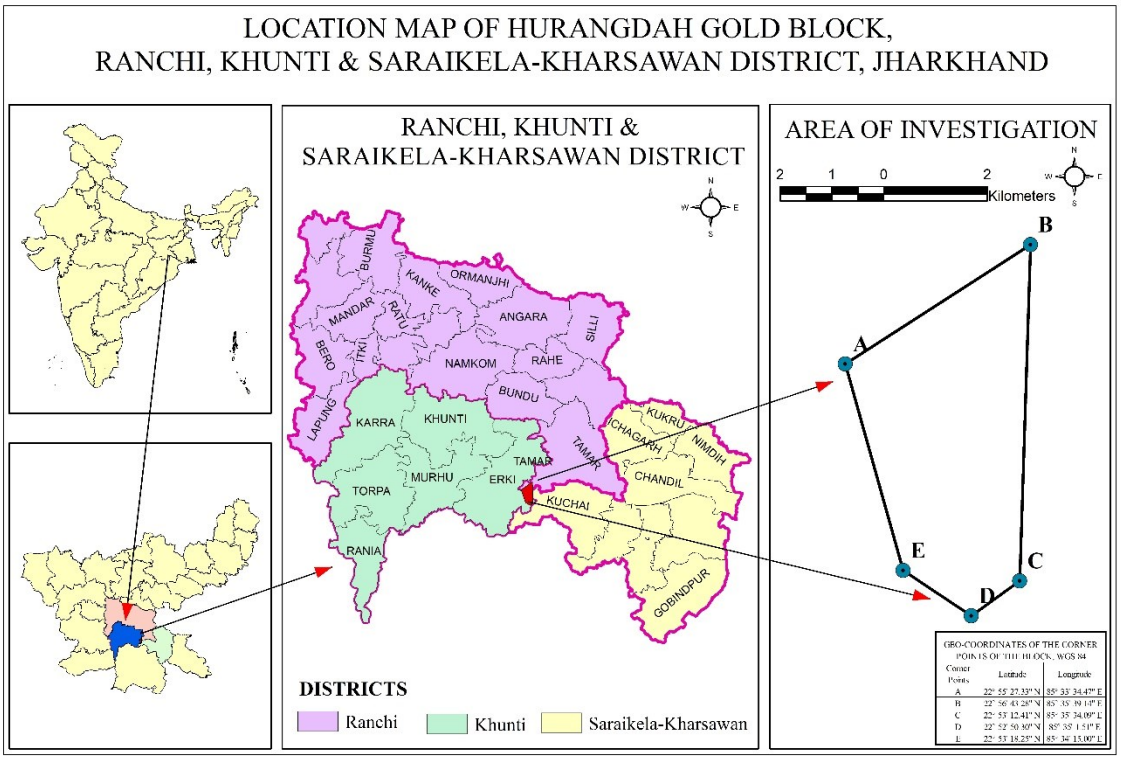


Plate 2: Overview of area

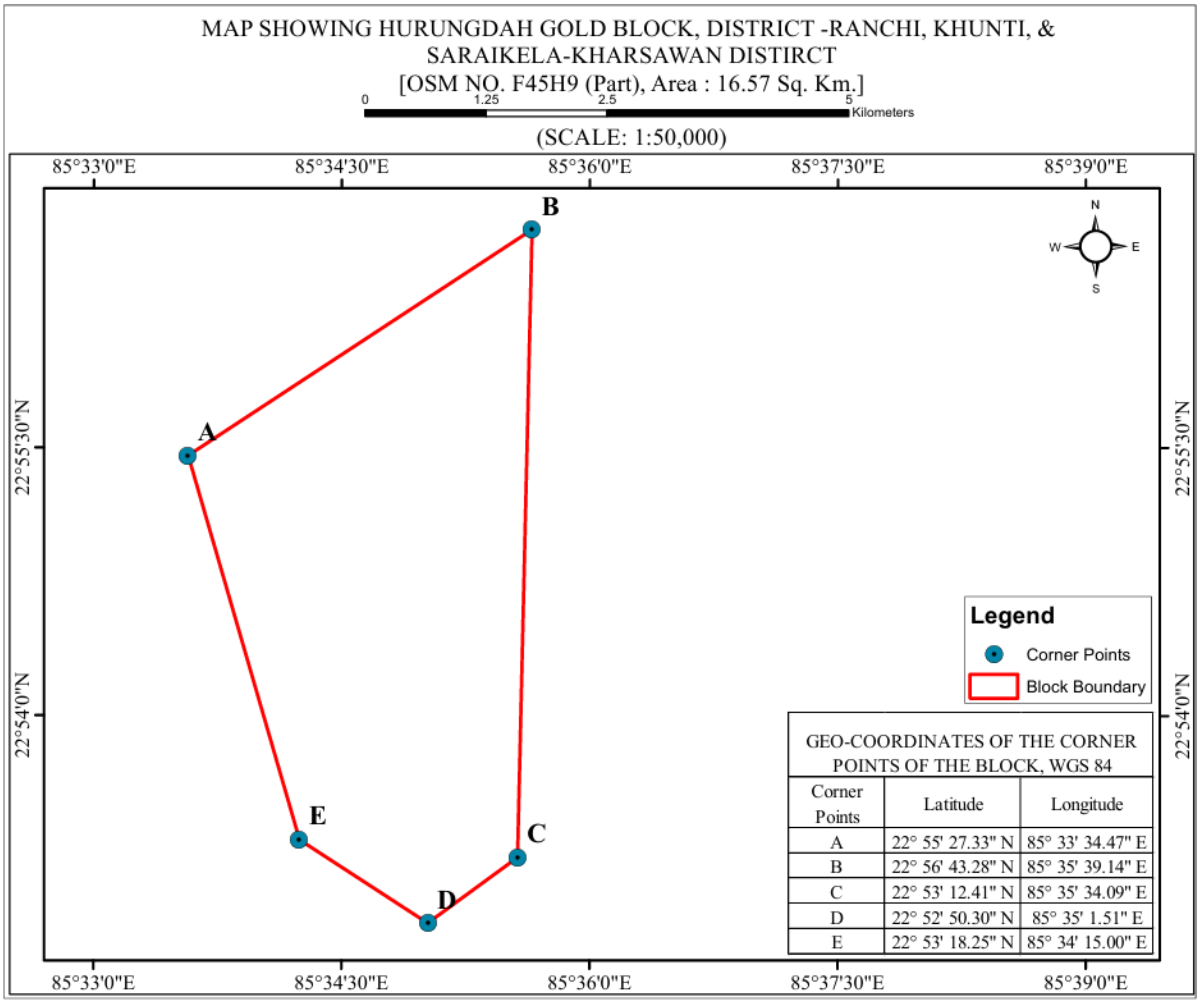


Plate 3 : The regional geological map of the Area

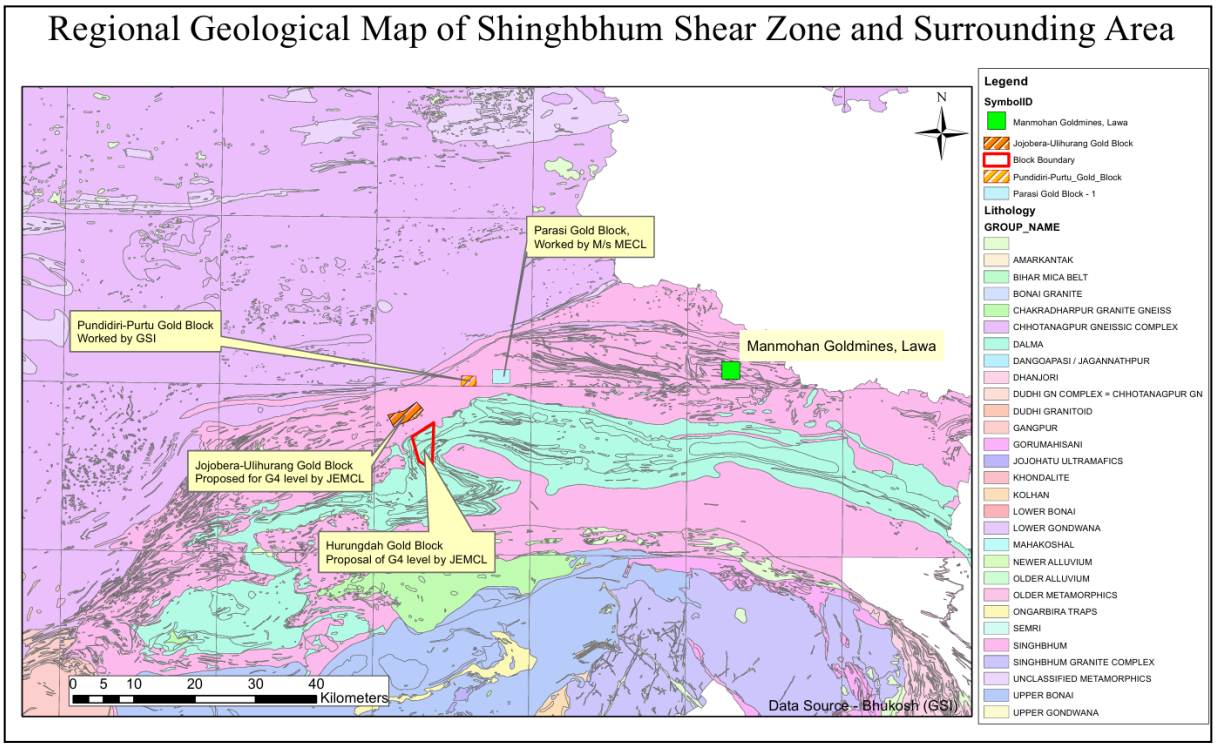


Plate 3: The area under investigation on regional geological map

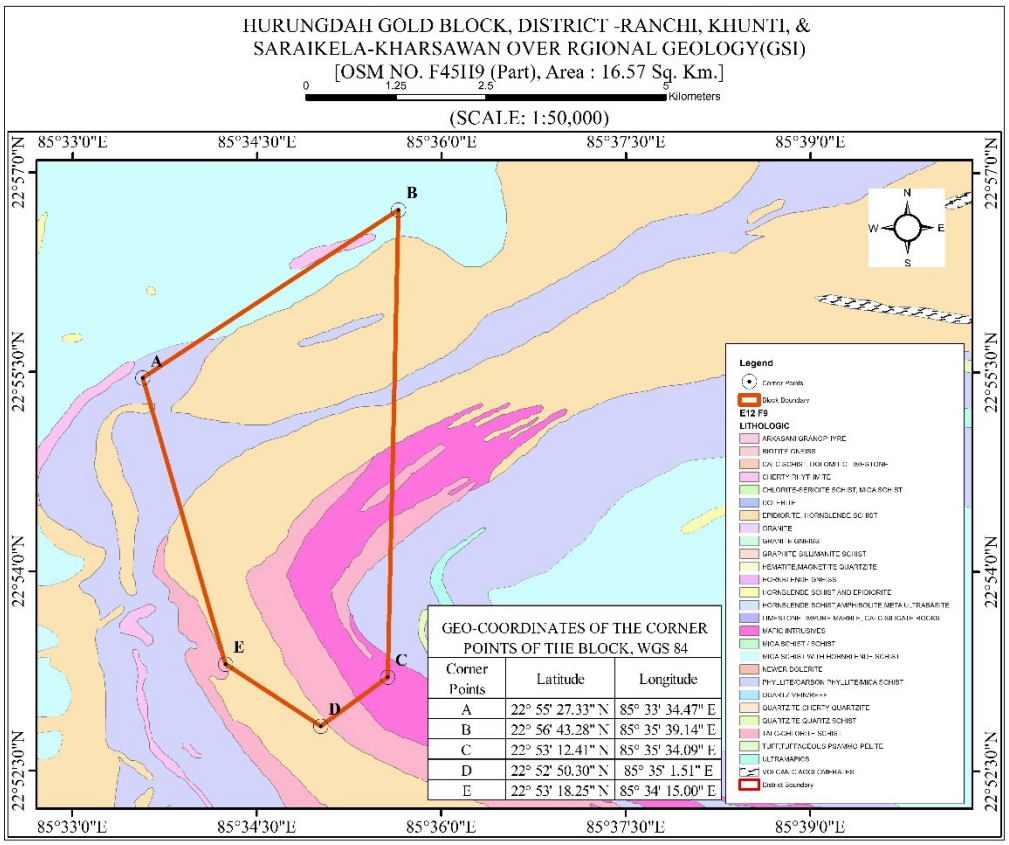


Plate 4: Map showing proposed Sample locations at Hurungdah Gold Block.

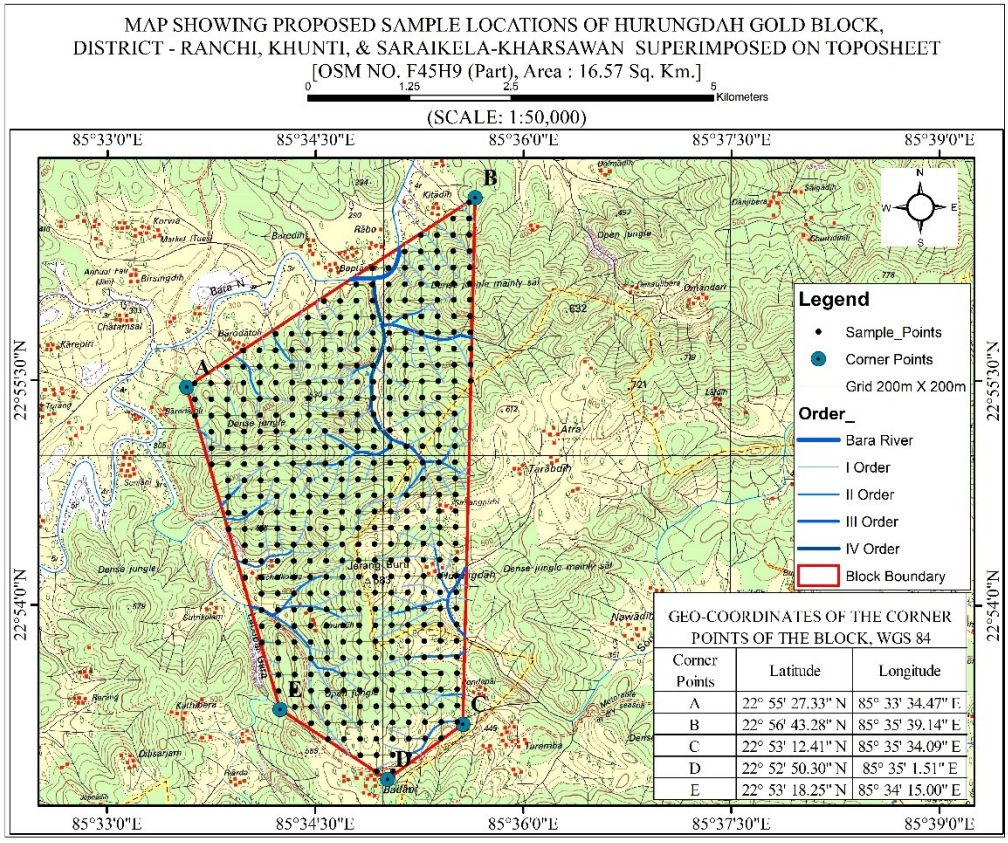
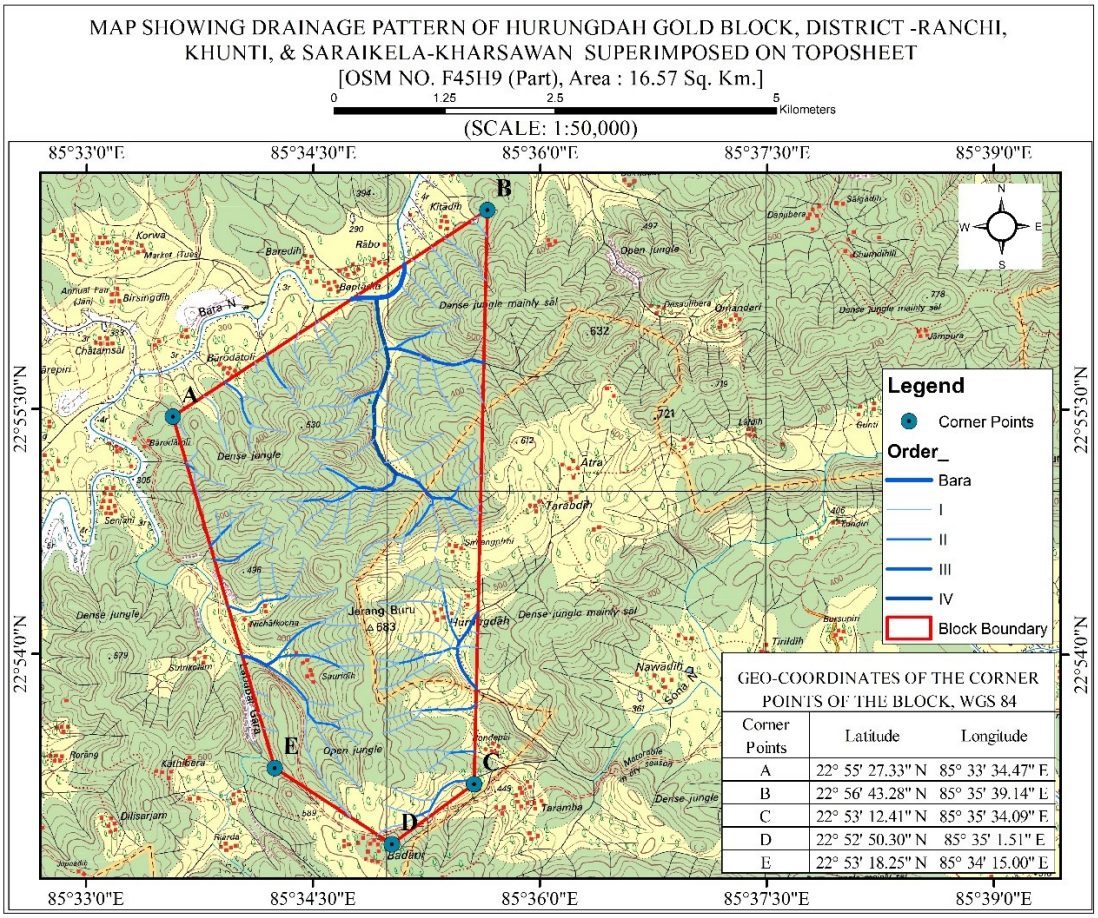


Plate 5: Map showing drainage pattern and proposed stream sediment sample locations at Hurungdah Gold Block.



9. References:

i) Agenda paper published in various meetings of the Jharkhand State Geological Programming Board.

ii) Bhukosh portal of Geological Survey of India, MoM, GoI.

iii) Official website of Survey of India, GoI.

iv) Geological memorandums of Pundidiri, Rampur and Bitapur Gold Blocks submitted by GSI.

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