Proposal for Bijawar-Imiliya Phosphorite Block, District Chhatarpur, Madhya Pradesh for Reconnaissance Survey (G-4 stage) under NMET

(Fertilizer Mineral)

By

The MP State Mining Corporation Ltd, Madhya Pradesh

Place- Bhopal

Date- 28th September, 2023.

List of Annexure

Summary of the Block for Reconnaissance Survey (G4Stage)

GENERAL INFORMATION ABOUT THE BLOCK

	Features	Details
1	Block ID	Bijawar Imiliya Phosphorite Block
2	Exploration Agency	The MP State Mining Corporation Ltd
3	Commodity	Phosphorite
4	Mineral Belt	Hirapur Phosphorite Formation
5	Completion Period with entire Time schedule to complete the project	12 months (Anx-1)
6	Objectives	The proposed block fall in Chhatarpr district of Madhya Pradesh (Anx-2 Location Plan). The Hirapur-Mardeora phosphorite deposits are found to occur in Bijawar group of Gangau iron formations over the basement of Bundelkhand granite complex in the Archean period. There are four distinct units of phosphorites which include shale-phosphorite, secondary-phosphorite, ironstone-phosphorite and quartz-breccia phosphorite. The block area falls in where Hirapur Phosphorite Formation, Bajno Dolomite Formation occurs. Bajno Dolomite is well developed on the western part of the Bijawar basin from the place about seven kilometers south of Malehra. Hirapur Phosphorite Formation underlies Karri Ferruginous Formation and consist economic valuable phosphorite deposits which is presently mined by Madhya Pradesh State Mining Corporation. Previous work done by GSI, MECL & NMDC also indicates presence of phosphorite deposits. The presence of supporting lithology, dolomite adds further positive sign & encourages to take up the G4 Exploration in the area. The geological map (Anx-3) & lithological map (Anx-4) are attached for ready reference.

		On the basis of these evidences of mineralization, the present exploration program has been formulated to fulfill the following objectives. i) To carry out Geological mapping on 1:12,500 scale for demarcation of rocks & mineralization with the structural features to identify the surface manifestations and lateral disposition of the mineralized zones. ii) To collect Surface grab samples, Channel samples and Trench samples & analyze for Phosphorite for further course of Exploration program. iii) Shallow pitting / trenching will be done to expose the concealed host rock and minerals. This will guide for localization of the presence of ore bodies. The exploration will be helpful in estimation reconnaissance resources of Phosphorite in the block area. iv) In case the results of the reconnaissance survey are positive, it will help in planning of general exploration programme, which in turn will facilitate the state govt. for auctioning of block.
7	Whether the work will be carried out by the proposed agency or through outsourcing and details thereof.	Will be carried out by MPSMCL & few components through outsourcing.
8	Name/ Number of Geoscientists	Geologist:- 02
9	Expected Field days (Geology)	Geologist:- 120 field + 60 HQ
1	**Location**	
	Latitude	Anx-5
	Longitude	Anx-5
	Villages	Anx-6
	Tehsil/ Taluk	Bada Malehara & Bijawar
	District	Chhatarpur
	State	Madhya Pradesh

2	**Area (hectares/ square kilometres)**	
	Block Area	95.67 sq km
	Forest Area	73.23 Sq Km Forest map prepared based on the toposheet is attached as Anx- 7
	Government Land Area	Data not available.
	Private Land Area	Data not available.
3	**Accessibility**	Anx-8
	Nearest Rail Head	Khajuraho Railway Stationed is 46 km away.
	Road	State Highway connecting Bada Malhera & Bijawar passes East West in the northern part of the block. NH 34 passes Bijawar which is around 3 Km East of the proposed block.
	Airport	Khajuraho airport is 50 km
4	**Hydrography**	
	Local Surface Drainage Pattern (Channels)	Drainage in the Bijawar is mainly lithologically controlled and the streams have their courses through shales and limestone.
	Rivers/ Streams	No major river flows within the proposed exploration block.
5	**Climate**	
	Mean Annual Rainfall	Chhatarpur typically receives about 88.27 millimeters (3.48 inches) of precipitation and has 90.73 rainy days (24.86% of the time) annually.
	Temperatures (December) (Minimum) Temperatures (June) (Maximum)	Minimum – 10.00 degree Celsius Maximum – 41.11 degree Celsius
6	**Topography**	
	Toposheet Number	54 P/6 & 54 P/10 Anx-9
	Morphology of the Area	The block area in general is of undulating terrain. The highest elevation is 530 in southern part (Anx-10) while the lowest elevation is 340 at the center of the proposed block (Anx-11).
7	**Availability of baseline data**	

	Geological Map (1:50K/ 25K)	1:50K Geological Map available
	Geochemical Map	Available
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	Available
8	**Justification for taking up Reconnaissance Survey / Regional Exploration**	In view of MMDR Amendments & Mineral Auction Rule, 2015, we have identified this block for exploration of Phosphorite to take up the work under NMET funding. In the proposed study area, there are geological stratigraphical indications, like presence of Bajno Dolomite & Gangau Formation which are host rock for Phosphorite in the nearby areas. The present proposed Bijawar Phosphorite Block almost covers these lithology & formations. Please refer Anx-4 for the same. Plus there are several studies including core drilling carried out by GSI & MECL for Phosphorite in nearby area. Both GSI & MECL are confirming of phosphorite in the area & have recommended for further detailed study for delineating the prospective zones for mineralization. The Gangau formation occupied a very large area in this part which is to be closely checked for further phosphorite occurrences. Additional trenching and pitting work has to be resorted to, for deciphering the shape of the different bands. As this sector holds the promise of high grade ore, drilling has to initiated in this area immediately. The details of the same are discussed in "Previous Work", each case wise. Different studies carried out for Phosphorite are shown as Anx 10.

		Several Phosphorite mines are running in the nearby area. Anx 11 These 3 points are guiding for the presence of Phosphorite in the area. The exploration will be helpful in estimation of Reconnaissance mineral resources (334) of Phosphorite & other accessory minerals in the block area. In case the results of the reconnaissance survey are positive, it will help in planning of general exploration programme, which in turn will facilitate the state govt. for auctioning of block.

1.0 Detailed description of the block

1.1 Block summary:

1.2 Physiography:

The block area in general is of undulating terrain.
The highest elevation is 530 in central part (Anx-12) while the lowest elevation is 340 at the NE of the proposed block (Anx-13).

Geomorphology Map of the block area is attached as Anx-14.

2.0 Background Geology

2.1 Regional Geology

The proposed block area falls in the Bijawar Group, covering Malhera Chert Breccia, Gangau Ferruginous Formation & Vindhyan Super Group of rocks at the south edges, while at North Bundelkhand Granitoid Complex is found. Anx-4.

The Bijawar Group rocks are exposed forming a broad major shallow synclinorium with its exposed closure towards WSW where it comprises three main phosphorite horizons each of different physical character viz. brecciated/massive phosphorite laminated phosphorite and phosphorite with chert nodules inter-bedded with shales, sandstone, quartzite, and dolomite in the Gangu Formation of the Bijawar Group. The phosphorite horizons extend as lenses and fairly persistent bands in a distance of 10 kms from 1kms. northeast of Basai(Basia) to .5km east of Surajpura through Mardeora, Hirapur and Kachhar sector named after adjoining villages. Individual phosphorite lenses vary in length from 200 to 1400m. in width from 50 to 250m. and in thickness from 1 to 35m with P205 from less than 15% to more than 35%.
The Bijawar Group rests upon the uneven weathered surface of the Bundelkhand Granite and is unconformably overlain by Semri sandstone (Vindhyan Super Group). The Bijawar Group extends along ENE-WSW direction (54P) for about 80 km width varying from few metres to 18 km between latitudes 24°20’27” and 24°35’27" and longitudes 79°9’ and 79°52’30". It represents a broad major shallow synclinorium with its exposed closure in WSW side.

The regional stratigraphy of the area is presented under Table below.

Stratigraphic Succession of the Block Area (Source: Rau, 2007 & GSI)

Quaternary			Diamondiferous alluvial gravels of Baghain, Ranj and Ken river systems
----------Unconformity----------			
Vindhyan Super Group	Rewa Group	Ghadhara sandstone Formation	Sandstone with diamondiferous conglomerate
		Jhiri Shale Formation	Shale with diamondiferous conglomerate
		Itwa Sandstone Formation	Sandstone with diamondiferous conglomerate
		Panna Shale Formation	Shale with limestone
	----------Kimberlite / Lamproite Pipes (1100 Ma approx.)----------		
	Kaimur Group	Baghain Sandstone Formation	Sandstone with shale
		Pipartola Conglomerate Formation	Conglomerate rich in pebbles of chert and jasper
	Semri Group	Palkawan Shale Formation	Porcellinic shale
		Ken Limestone Formation	Limestone
		Pandwafall Sandstone Formation	Glauconitic sandstone
----------Unconformity----------			
Bijawar Super Group		**Gangau Formation**	Ferrugenous Sst, Shale, breccia **(Phosphorite)**
		Bajana Formation	Dolomite **(Phosphorite)**
		Amronia Formation	Sandstone (Phosphorite)
		Pundwar Formation	Chert Breccia
		Lava Flows	Basic Lava flows
----------Unconformity----------			
Bundelkhand Gneissic Complex		Intrusives	Dykes, dolerite, quartz vein
		Granitoids	Granite intrusive, tonalite, diorite
		Older Metamorphics	Enclaves of gneisses, migmatites, schist, quartzite and amphibolites

Bundelkhand Gneissic Complex (BGC):

BGC comprising a variety of medium to course grained granites, porphyritic granite migmatites, syenites gneisses etc. BGC covers middle & upper part of the block. Medium to coarse grained granite constituting batholitic mass occur at several places i.e. near Nayagaon, Bhelda. Aplitic granite occurs as small plutons and dykes.

Amphibolite and Chlorite schist:Amphibolite and chlorite schist rocks are exposed as small dimensional bodies in the form of enclaves within the granites. Amphibolite is a dark coloured hard and compact rock comprising hornblende, chlorite with little plagioclase, while chlorite schist essentially comprises saussuritised plagioclase and chlorite (partly altered augite).

Granite Gneiss: Two types of granite gneisses are found in the area. These are fine-grained granite gneiss and coarse-grained hornblende gneiss. Fine-grained gneiss comprises quartzo-feldspathic minerals along with biotite. Coarse grained comprises hornblende and chlorite minerals. Gneissosity or gneissic foliation is a characteristic feature of gneiss, having alternate bands of Ferro-magnesium and quartzo-feldspathic minerals. These are deformed due to injection of acidic, basic materials.

Granites:Granites characterized by variations in colour, grain size and content of ferro-magnesium minerals. The different varieties of granites observed in study area are pink, medium to coarse-grained porphyritic and non-porphyritic granite and grey granite. All the granites are affected by deformations and some metamorphism. Quartz reefs, pegmatite veins and basic dykes occur as injections within these granites.

Coarse-Grained Non-Porphyritic Granite:The coarse-grained granite comprises pinkish grey feldspar, quartz, hornblende, biotite and epidote and occurs at few places in the area.

***Pink Medium Grained Granite*:** Pink medium grained granite comprises quartz, feldspar, biotite, hornblende and epidote. The percentage of ferromagnesian mineral is comparatively high in this type of granite. Plagioclase is seen to be sassuritised.

Porphyritic Granite: Pink coloured, coarse-grained rock consisting phenocryst of pink feldspar. The feldspar phenocrysts are tabular, and size varies from 0.5cm to 5cm. The groundmass shows mainly smaller white color feldspar, quartz and clots of biotite. The rock is commonly pinkish red on fresh surfaces and becomes deeper red on weathering. It weathers easily and forms hillocks with gentle slopes.

Grey or Medium Grained Granite: Grey granite is medium to coarse-grained rock comprising quartz, feldspar and biotite. It has very few xenoliths and enclaves.

Intrusive: Post Granitic intrusives found in the area are both acidic and basic in nature. These are quartz reefs/vein, pegmatite veins, doleritic / basaltic and gabbroic dykes.

Dolerite, Basalt and Gabbro Dykes: Dolerite/basalt and gabbro dykes represent the basic igneous activity in the area and occur within meta-sedimentary and granitic rocks. These are fine to medium grained rocks and consists opaque minerals at places.

Gabbroic dykes are coarse grained and the general trend of dykes in area varies from NW-SE, N-S and NE-SW.

Pegmatite and Quartz Veins: Granites are seen to be intruded by a number of thin pegmatite and quartz veins aligned along the direction of joints. These pegmatites generally have diffused margin with host granites and comprise mostly of coarse-grained potash feldspar and quartz with minor amount of plagioclase feldspar. Quartz veins in granite are observed throughout the area.

Quartz Reef: Long ridges of quartz reefs are unique feature in this area and have intrusive relation with Bundelkhand granite and trend mainly in NNE-SSW and N-S directions. These are intruded into BGC as result of shearing due to extensive fracturing within the plutonic massif. These quartz reefs are emplaced along the preexisting tensional zones. Some prominent Quartz reefs of several km length occur near Ghuwara, Chaundali, Banna, Sujara, kunaita, Badagaon, Darguwan Lamera villages.

Bijawar Group:

The rocks of the Bijawar. Group were deposited on an uneven floor of the Bundelkhand Granite which is exposed at the central & southern part of the block. They are overlain by the Semri Sandstone of the Vindhyan System to the south.The Bijawars are gently warped and show ENE-WSW trends while Vindhyan rocks show broad shallow synclinal folds. The rocks of the basin represent both clastic and chemical sediments, which include conglomerate, chert-jasper breccia, quartzite and dolomite with interbedded trap flows, ferruginous conglomerate and breccia intercalated at many places with ferruginous sandstone and shale carrying scattered pockets of hematite, and a prominent tillite.

***Malehra Chert Breccia*:** Forming the lowest formation of the Bijawar Group, the Malehra Breccia is traceable all along the central part of the block. It rises abruptly above the Bundelkhand Granite plain. This breccia is named after Malehra (24°34': 79°18') where the hill ranges immediately south of the village expose this rock type. The typical member of this formation is a breccia of angular chert with varying colours embedded in a cherty and jaspilitic matrix. The fragments and the matrix are almost identical in composition. They have been cemented together so thoroughly that they cannot be separated by breaking. At many places, they carry egg-sized pebbles of quartz and sometimes pink feldspars. The thickness of the breccia varies from 2 to 15 meters.

Bajno Dolomite Formation*:** The name “Bajno Dolomite Formation” was derived from ***“Bajna” village, located 22 km NE of Hirapur. Bajno dolomite underlies Gangau subgroup of Hirapur Phosphorite Formation near Hirapur. Light grey, greyish brown, pinkish grey to off greyish white dolomite associated with thin milky white-grey chert bands are the common characteristic features of the Bajno dolomite. Bajno Dolomite is well developed on the western part of the Bijawar basin from the place about seven kilometres south of Malehra. Exhibiting intense folding, it is met with further south for a distance of about 20 kilometres up to Hirapur (24°22': 79°13') and eastwards for about ten kilometres uptoBajna. The rock strikes mostly E-W and dips generally to the south at 10° to 15°. The dolomite is mostly underlain by the malehraChert Breccia and

overlain by Karri ferruginous sandstone. Extensive development of stromatolites is noticed in the dolomite. It exhibits colours varying from pale grey to deep blue, and the high silica content has imparted to it a subconchoidal fracture. Numerous thin veinlets of calcite traverse the dolomite in all directions. Criss-cross and circular fracture patterns are also seen in the rock. In composition, it varies from cherty, shaly dolomite to pure dolomite. The solubility of the rock has given rise to a big sink hole and cave at Bhimkund near Bajna where development of stalactites and stalagmites is also noticed. The dolomite dies out about three kilometres east of SurajpuraKhurd.

Dargawan Trap: Flows of dark coloured medium grained trap rock are developed in force in the eastern and south-western parts of the area. They vary in width from about 100 metres to two kilometres. In the eastern part, the trap occurs above the basal conglomerate and underlies the quartzite. The formation is named after Dargawan (24°26'00": 79°16'00") where it is very well developed. Here the trap underlies mostly the Bajna Dolomite, though about two kilometres south of Dargawan, it is noticed to underlie the quartzite, which, in turn, underlies the dolomite. All along the northern side of the road between Dargawan and Bajna (24°26'00": 79°22'00"), the trap is seen to underlie ferruginous breccia. It had been observed that the trap exhibits uniform structural conformity with the other Bijawar formations. It occupies the anticlinal crests of dolomite, and thus a concordant structural relationship is seen between the trap and the overlying rock. This would indicate that the trap is a flow. The Dargawan Meta Basalt is equivalent to the trap flow of Lower Bijawar described by Mathur (1960). The thickness of the flow varies from 1.5 metres to 3.0 metres. In the south-western part of the basin, the trap is well developed from about three kilometres north of Dargawan. Here the trap formation is arcuate in shape occupying the valleys.. From the mineralogical composition, the trap rock appears to be epidiorite. At some places, the trap is sheared nearer its contact with the Bajna Dolomite, for example, at Bhujpura and Bhimarwan (24°26'00": 79°20'00"). The shearing has given a schistose appearance to the trap. The sheared trap is composed of quartz, talc and chlorite.

Hirapur Phosphorite Formation: HirapurPhosphorite Formation underlies Karri Ferruginous Formation and consist economic valuable phosphorite deposits which is presently mining by Madhya Pradesh State Mining Corporation. The phosphorite rock is dull cherry red to light pinkish brown in color, hard and compact, massive or in brecciated form.

Karri Ferruginous Sandstone: Reddish brown, medium to fine-grained ferruginous sandstone, occurs as numerous intercalated beds within the ferruginous conglomerate and ferruginous breccia, as near Tighora (24°23'00: 79°11').

Vindhyan Super Group:

The entire Vindhyan succession is one of the thickest sedimentary basin with maximum thickness estimated to be around 3 km, and comprising mainly sandstone, shale and limestone is assigned as the VindhyanSupergroup. The Vindhyan have been separated into 2 division which, though of very unequal proportions, have been determined by important physical considerations. They are separable as much by an unconformable junction between the two divisions as by the sharp lithological contrast between them.

The lower division consists of one group and upper divisions have three groups. The Supergroup is divisible into four groups:

1. Semri Group,
2. Kaimur Group,
3. Rewa Group and
4. Bhander Group,

The Vindhyan Super Group is composed mostly of low dipping formations of sandstone, shale and carbonate, with a few conglomerate and volcanoclastic beds, separated by a major regional and several local unconformities. The regional unconformity occurs at the base of the Kaimur Group and divides the sequence into two units: the Lower Vindhyans (Semri Group) and the Upper Vindhyans (Kaimur, Rewa and Bhander Groups). The outcrop pattern of the Super Group resembles a simple saucer shaped syncline. It is generally believed that the Vindhyan basin was a vast intra-cratonic basin formed in response to intraplate stresses.
The different depositional systems recognized in the Vindhyan succession are: alluvial fan, fan delta, braid delta, braid plain, eolian sand sheet, tidal flat (carbonate as well as siliciclastic), shoreface (tide and storm dominated), storm dominated shelf, homoclinal carbonate ramp, distally steepened carbonate ramp and epeiricperitidal flat (siliciclastic).

Semri Group:

The Semri Group overlies the Bundelkand Granite Gneisses and Bijawar Group of metamorphics. Three major rock formations of Semri group are exposed.

Chorhat Sandstone - It is a major rock formation of Semri group and occurs in the central part of the block in NNE-SSW direction. Chorhat Sandstone formation is represented by gluconitic sandstone & minor shale, pebbly grit, siltstone conglomerate & breccia and thin limestone bands. Ripple marks, small scale cross bedding, mud cracks are abundantly recorded.

Rohtasgarh limestone – This formation overlies Chorhat sandstone in form of thin band and it is exposed near Malar village to near Majora village. Rohtasgarh limestone comprises greyish to greyish black limestone and shales. Dominantly it shows parallel lamination.

Suket Shale- Suket shale overlies Rohtasgarh limestone and underlain by Dhandraul (baghain) sandstone and Ghaghar sandstone of Kaimur group. Suket shale trending NNE-SSW occurs on escarpments of ridges.
A sequence of Chorhat sandstone, Rohtasgarh limestone and Suket shale of semri group is well exposed along the road in Ghat section on SH-51 from Bajana to Shoba villages.

Kaimur Group:

It is an extensively developed argillo- arneceous succession. Lithological formations of kaimur group in are as follows:

Ghaghar sandstone - Ghaghar Sandstone is the lower unit of the Kaimur group. It overlies on Suket shale. Its thickness is 15 m.it is mainly made up of sandstone intercalated with shale. It shows mega ripple bedding, herringbone cross bedding, flaser and lenticular cross bedding, minor channels current and wave ripples. In the lower part of the unit, the current produced structures dominate and in the upper part wave produced structure are more common. It shows good development of mud cracks.

Bijagarh Shale – Bijagarh shale overlies on Ghaghar sandstone. It is made up of greyish black shale, siltstone and sandstone. It is divided into three units. The lower and upper parts are sandy, and the middle part is made up of black shales which is occasionally pyritiferous. Parallel lamination with low angle discordances, lenticular bedding, ripple marks, wrinkle marks, spring pits, incomplete mud cracks, modified ripples, load structures have been recorded.

Dhandraul Sandstone- this is the upper most unit of Kaimur. It is dominantly made up of white sandstone. It also shows purple staining. The Baghain sandstone carries well preserved cross-bedding and ripple marks, the latter being more prevalent in its upper part. The cross-bedding is of both the types, tabular and trough. These are also mainly developed in the topmost part of the formation. The best cross bedded sections are exposed in the nala gorge sections about 2 km east of Hardua and in the Chakra nala NW of Naipar. Ripples are of also very well preserved in this formation. Both oscillation and interference types of ripples are present. In the nala section east of Rajaphar (665m) and in the nala course south of Sagoria - Jara road bypass on the main nala, mega ripples have been found in this quartzite. The sandstone is highly jointed. The joints are mainly vertical or sometimes show a dip of 70° to 80° south westerly. The common and most persistent joints are N20°W and N50°E both being vertical.

Rewa Group:

This group comprises Jhiri shale & Govindgarh sandstone formation. Details of lithological formations of kaimur group in are as follows-

Jhiri Shale – Jhiri shale is occupying the slopes below the Gahadra Quartzites scarps. This formation lies over the Baghain (Dhandraul) Quartzite of the Kaimur Group. Its contact with the underlying Baghain Quartzite is quite gradational throughout, which is an indication of the slow change of facies in the course of deposition of these formations and no break in sedimentation. This formation is composed of shale with intercalated bands of siltstone and sandstone. The shale is generally of green and chocolate brown colour, the latter is due to oxidation. It is quite compact when fresh and highly fragmented and soft where exposed to weathering. The intercalated bands of siltstone

and sandstone vary in thickness from 5 cm to 35 cm and are more frequent in the lower part of the formation. The rocks of this formation have been seen exposed almost all along the strike length of the area mapped except the area near Bakshwaha where its outcrops are covered by trap and calcareous sandstone of post-Vindhyan age (Lametas?).

The Jhiri Shale carries near its basal part thin, discontinuous and most impersistent bands of conglomerates. The linear outcrops of this conglomerate ranging in thickness between 5 cm to 20 cm are exposed in the nala NE of Matipura; along the Mantra nala, north of Nagda; in the main nala N60°E of Banoli; in the Chakra nala near the Rajpura-Sadpur road crossing; in the Chachi-Semranala NE of Semra and around Pararia. The maximum thickness of upto 20 cm is noticed only in the Chakra nala and Chachi – Semranala outcrops. The conglomerate consists of sub-rounded to well rounded pebbles of red jasper, white vein quartz, blue and brown quartzite, chert along with a few pebbles of porcellanious and shale pellets. The shale pellets are mostly green coloured. The matrix is mainly quartzitic but in certain cases particularly in the upper horizon, it is shaly also. In general, the size of the pebbles varies from a pin-head to as large as 5 cm across. Generally, the large sized pebbles are of quartzite and vein quartz and jasper. A general decrease in the size of the pebbles especially in case of the large size pebbles is noticed westward. Beyond Rajpura, as seen in the Chakra nala and Chachi-Semranala sections, the conglomerate is composed homogeneously of small sized gravels. The size of which is mainly 2 mm across. Jasper is rarely present and the bulk of the rock is made up of the quartzite and vein quartz gravels/pebbles. The matrix is mainly quartzite.

Govingarh Sandstone - Overlying the Jhiri Shale, this formation is ranging in thickness between 45 m and 50 m it is exposed in the scarp and on the main plateau all along the strike length of the area. However, in the area around Jujarpura, Garhi-Semra; south of Sodpur and Northwest of Bari, it is covered by isolated patches of calcareous sandstone (Wilson's lametas) of pre-trap age and basalts of the Deccan Trap. Its southern limit is marked by a thick cover of alluvium. The quartzite is white to light pink in colour, medium to finegrained in texture and thinly bedded. On its weathered surfaces, it is brown to dark brown and at places as seen in the areas near Phurtal , south of Semra, south of Kusmar and SW of Bakshwaha, it is flaggy in nature due to which these are quarried for slabs and sheets for roofing and flooring purposes.

The quartzite is highly cross bedded (both tabular and trough types) as seen in the sections exposed in the scarp, these are more frequently found in the thinly bedded (flaggy) portion of the quartzites. Number of measurements have been taken of these directional structures and after grouping into 30° class interval were plotted, to form a rose diagram in order to deduce the paleocurrent direction. channels on this plateau are aligned in a NW-SE direction. All these above discussed characters of this formation go to recognize this quartzite a typical blanket sand deposit.

Lameta Beds:

The brownish to buff coloured, medium to coarse-grained, friable sandstone, calcareous at places forming limestone belongs to Lameta group of rocks. These are exposed to the north of Bakaswaha. Its thickness is more than 15m. Lameta group of rocks are

overlying the Jhiri Shale formation. Small outcrops of limestone are exposed near Bagaroha village.

Deccan Trap:

Malwa Group: In south eastern corner, dark grey, fine to medium grained, non-porphyritic to sparsely porphyritic rocks belong to Malwa Traps are unconformably resting over the Dhandraul Sandstone. It is above 480m contour, but it has low ground slope towards south.

2.2 Geology of the Block:

The proterozoic phosphorite deposits of Hirapur-Mardeora area in Sagar and Chhatarpur districts of Madhya Pradesh (Lat. 24°19'N and 24°23'N and Long. 79°9'E and 79°14'E) belongs to the Gangau ferruginous and phosphatic formations of the Bijawar group of rocks (Mathur and Mani, 1978; Banerjee et al., 1982). The megascopic, microscopic, scanning and X-Ray studies of the phosphatic rocks of the study area revealed that there are two distinct types of phosphorites, viz., primary and secondary. Mineralogically, the primary phosphorites being associated with shales, ironstones and quartz-breccia are mainly composed of collophane (a carbonate fluorapatite phase), whereas the secondary phosphorites contain crandallite (calc-aluminium phosphate).

According to Krishnan (1942, 1968) and Dubey (1952), the quarzites and sandstones and sometimes conglomerates form the basal member of the series resting unconformably on the Bundelkhand gneissic complex. Siliceous-limestone and hornstone-breccia are also associated with the quartzites. These are rather irregularly distributed and are less than 60 m in thickness.

They are overlain in turn by ferruginous sandstone containing pockets of hematite. The rocks are either horizontal or have a south easterly dips, though at few places in the south, they were subjected to crushing and disturbances before the Vindhyans were deposited. In the Hirapur-Bassia area, the Bundelkhnad granites are either directly overlain by Bajna dolomite or juxtaposed against the 'Gangau Ferruginous Formations' made up of conglomeratic-breccia and shales. There is no tillite in the vicinity of the phosphorite horizon, but it has been recorded in the adjacent regions (Mathur and Mani, 1978).

Stratigraphic sucession of the Hirapur Mardeora Area

Lower Vindhayan System		Semri Group (Late/Upper Precambrian)	
		.-------Unconformity ------	
		II	
	Bijawar Group	Gangue	Quartz-Breccia Phosphotic Ironstone-Phosphorites Shale-Phosphorites, at places weathered / leached formed secondary phosphorites
	(Early to middle Precambrian)	Ferruginous & Phosphatic Formations	
Cuddapah System		I	
		Non-Phosphatic Formation	
		.-------Unconformity ------	
	Archean	Bundelkhand Complex	

3.0 Mineral Potentiality

The list of nearby mines is as follows:-

Sr No	Mine Owner	Mine Name	Mineral	Area (Hect)	District
1	M/s MP State Mining Corporation Ltd, Bhopal, MP.	Tigoda Rock Phosphate Mine	Rock Phosphate	48.75	Chhatarpur
2	M/s MP State Mining Corporation Ltd, Bhopal, MP.	Tigoda Rock Phosphate Mine	Rock Phosphate	52.8	Sagar
3	M/s Khajuraho Stones (India) Pvt Ltd, Chhatarpur, MP.	Luhani Rock Phosphate Mine	Rock Phosphate	13.2	Chhatarpur

Plus Geochemistry of Phosphorite Deposits around Hirapur – Mardeora Area in Chhatarpur & Sagar Districts, MP, by KF Khan, Saif A Khan, Shamim A Dar & Z Husain, & NMDC reports indicates presence of Phosphorite in the region, so this project is proposed.

4.0 Scope for Proposed Exploration

The proposed block fall in Chhatarpr district of Madhya Pradesh (Anx-2 Location Plan).

i. Geological mapping in the said block in 1:12500 scale.
ii. To expose the concealed ore body at shallow depth by trenching/pitting.
iii. To check the extension of orebody in the Gap area as well as below ground level, by drilling scout boreholes.
iv. Sampling & their analysis.
v. To estimate the Reconnaissance Mineral Resources and grade for orebody in the block as per UNFC and MEMC-2015

5.0 Observation and recommendations of previous work

Previous Works

A number of explorations were carried by GSI & GSI, some of them are listed below:-

Sr No	Report Details	Field Season	Agency	Authors
1	An Interim Report On Assessment of Phosphorite Occurrences in Bijawar Group, District Sagar and Chhatarpur (MP)	1977-1982	GSI	Arun Sonakia & Binod Kumar
2	Interim Report On Geochemical Mapping In Toposheets Of 54p/5 And Part Of 54p/6 In Parts Of Chhatarpur And Tikamgarh Districts, Madhya Pradesh	2013 - 2014	GSI	Vikash Chandra & R. Balamurali
3	Regional Assesment of Phosphorite in Lukri-Akrotha-Raipura-Surajpura Area, Chhatarpur & Sagar District	2010-2012	GSI	Anil Kumar Dawande & Suresh Kumar
4	A Note on Preliminary Appraisal of phosphorite Bodies in Bijawar Group of Rocks around Hirapur in parts of Chhattarpur and Sagar Districts, MP	1977	GSI	H.H. Khan & N. Dalasubrarmanian
5	Assessment Of Phosphorite Occurrences In Bijawar Group, Mardeora And Hirapur South 'B' Sectors, Sagar And Chhatarpur Districts, M. P.	1976-1977	GSI	N. Balasubramanian
6	Exploration Report - Hirapuur Phosphorite Deposit (Mardeora Block), Chhatarpur & Sagar Districts, MP	1984-1987	MECL	

(a) An Interim Report On Assessment of Phosphorite Occurrences in Bijawar Group, District Sagar and Chhatarpur (MP)

Field Secession:- 1977-1982

Agency:- GSI

Geologist:- Arun Sonakia & Binod Kumar

Drilling Meterage :- 9378.3

Total Area covered :- 731 Sq Km

Survey Scale:- From 1: 63360 to 1:1000

Samples:- 3601

Grade:- 15 to 35% P_2O_5

Reserve:- 8.45 Million MT

Recommendations

The Gangau Ferruginous Formation, the youngest formation of the Bijawar Group, contains the phosphorite.

(b) Regional Assesment of Phosphorite in Lukri-Akrotha-Raipura-Surajpura Area, Chhatarpur & Sagar District

Field Sessions:- 2010-2012

Agency:- GSI

Geologist:- Anil Kumar Dawande & Suresh Kumar

Recommendations

The main object of exploration was to assess the extent & grade of phosphorite. Phosphorite is associated with ferruginous sandstone and ferruginous shale as irregular bands and lenses varying in thickness from 3 m to 20 m chemical analysis indicate P_2O_5% value ranging from 10.15% to 33.15% in Surajpura Block. 19.32% to 30.50% in Raipura-Akrotha Block and 20.75% in Lukri Block. The dimension of the ore bodies and analytical results are very much encouraging.

(c) A Note on Preliminary Appraisal of phosphorite Bodies in Bijawar Group of Rocks around Hirapur in parts of Chhattarpur and Sagar Districts, MP.

Field Sections :- 1977

Agency:- GSI

Geologist:- H.H. Khan & N. Dalasubrarmanian

Recommendations

The other similar formations, especially with chemical sediments are appreciable, such as Mehdikhera chert breccia formation in the Nimar plains require intensive checking for phosphorite. **In Hirapur south 'B' sector, though the trenching work was done in the part of the area, additional trenching and pitting work has to be resorted to, for deciphering the shape of the different bands. As this sector holds the promise of high grade ore, drilling has to initiated in this area immediately**.

(d) Assessment of Phosphorite Occurrences in Bijawar Group, Mardeora And Hirapur South 'B' Sectors, Sagar and Chhatarpur Districts, M. P.

Field Sessions:- 1976 to 1977

Geologist:- N. Balasubramanian

Total Meterage:- 648.1 / 9 BH

Number of BH:- 9

Area:- 300 Sq Km

Survey Scale:- 1:1000

Recommendations

In Hirapur south 'B' sector, though the trenching work was done in the part of the area, additional trenching and pitting work has to be resorted to, for deciphering the shape of the different bands. **As this sector holds the promise of high grade ore, drilling has to initiated in this area immediately.**

(e) Exploration Report - Hirapur Phosphorite Deposit (Mardeora Block), Chhatarpur & Sagar Districts, MP

Field Sessions:- 1984-1987

Area:- 1.5 Sq Km

Total Meterage:- 7141.65

Number of BH:- 93

Survey Scale:- 1:2000

Number of samples:- 4242

Grade:- 10 to 24% P2O5 & 11.8 to 52.4% P2O5

Reserve:- 18.38 Million MT

Recommendations

Part of the mineral can be directly used. Part can be used after blending. Centralized beneficiation plant can be set up for beneficiation of low grade phosphorite. A comprehensive plan for large scale mining, pre-concentration & beneficiation plant.

Part of GSI Report - Chemical analysis results of samples of Hirapur Region are given as below:-

Chemical Anaysis of Hirapur Region						
Bore Hole No.	**Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**Lithology**	**% P_2O_5 (average)**
1	**2**	**3**	**4**	**5**	**6**	**12**
HSB-2	I	6.70	11.40	4.70	Reworked phosphorite	25.29
HSB-3	I	2.50	10.20	7.70	Reworked phosphorite	18.62
HSB-4	II	12.00	20.20	8.20	Brecciated phosphorite	18.57
HSB-4	II	13.80	16.45	2.65	Reworked phosphorite	17.90
	II	16.45	20.30	3.85	Brecciated massive phosphorite	22.21
	III	20.30	22.75	2.45	Brecciated massive phosphorite	17.82
	IV	22.75	25.95	3.20	Brecciated massive phosphorite	28.86
	V	27.15	31.80	4.65	Brecciated massive phosphorite	29.42
	VI	31.80	35.50	3.70	Brecciated massive phosphorite	21.60
HSB-5	I	33.15	34.15	1.00	Phosphatic shale	21.38
	II	34.15	45.25	11.10	Massive brecciated phosphorite	24.46
HSB-6	I	0.50	14.20	13.70	Massive phosphorite	34.74
	II	14.20	19.20	5.00	Massive phosphorite with shale intercalation	20.60
	III	19.20	21.00	1.80	Massive phosphorite with shale intercalation	31.55
	IV	21.00	25.30	4.30	Massive phosphorite with shale intercalation	21.70

	V	28.75	35.10	6.35	Massive phosphorite with shale intercalation	31.70
HSB-7	I	1.20	2.70	1.50	Reworked phosphorite	21.31
	II	2.70	3.70	1.00	Reworked phosphorite	31.80
	III	3.70	11.75	7.45	Massive phosphorite	35.96
	IV	14.10	17.30	3.20	Massive phosphorite with shale intercalation	21.40
	V	19.60	29.95	10.35	Brecciated phosphorite	28.87
HSB-8	I	10.25	13.45	3.20	Reworked phosphorite	27.72
	II	13.45	17.50	4.05	Brecciated/massive phosphorite	23.34
	III	17.50	24.85	7.35	Brecciated phosphorite	15.00
	IV	24.85	26.60	1.75	Brecciated phosphorite	21.15
	V	39.92	43.90	2.98	phosphatic shale	18.03
HSB-9	I	12.65	15.00	2.65	Massive phosphorite with shale intercalation	15.34
	II	22.75	25.70	2.95	Reworked phosphorite	27.80
	III	37.15	39.95	2.80	Brecciated phosphorite	24.60
	IV	39.95	44.70	4.75	phosphatic shale	15.80
HSB-10	I	73.40	77.35	3.95	Brecciated phosphorite	20.94
	II	77.35	85.95	8.60	Brecciated phosphorite	29.66
HSB-13	I	30.00	34.40	4.40	Brecciated phosphorite	23.30
HSB-17	I	27.05	34.90	7.85	Massive phosphorite	33.00
HSB-18	I	13.00	23.65	10.65	Reworked phosphorite	23.30
	II	23.65	41.65	18.00	Massive phosphorite	31.50
HSB-19	I	57.30	58.35	1.55	Massive phosphorite	15.00
HSB-20	I	64.85	66.95	2.10	Massive phosphorite	15.00

6.0 Planned Methodology

Work will start with geological mapping of the block on 1:12,500 scale.

Toposheet 54 P/6 which covers most of the block part is not available at Survey of India website.

Scout core drilling will be carried out at G4 level of exploration as per "The Minerals (Evidence of Mineral Contents) Rule 2015.

From the past exploration data carried out in nearby area by GSI, the maximum depth upto which phosphorite is encountered is 85.95 Mts & the minimum is 2.7 Mts.

Phosphorite Zones Summary

Data from earlier Exploration

Zone No	Count	From	To	Thickness (Mts)
I	13	25.58	30.52	4.94
II	10	23.05	29.59	6.54
III	5	19.57	24.06	4.49
IV	5	24.53	27.97	3.44
V	4	28.86	35.19	6.33
VI	1	31.8	35.5	3.7

Considering the general feasibility & environmental restrictions, a depth of 30 Mts is adopted for scout core drilling.

Surface sampling along with Groove sampling will be done during the course of mapping.

Scout pitting & trenching will carried out at G4 level of exploration as per "The Minerals (Evidence of Mineral Contents) Rule 2015.

Chemical analysis (P_2O_5, CaO, MgO, Fe_2O_3, Al_2O_3, SiO_2, LOI, Na_2O, K_2O, Cl, F, TiO_2, V_2O_5 & atomic mineral) of all the samples will be done from departmental laboratory as well as NABL accredited laboratories.

5% of the sample will taken as check samples to be analyzed at different lab.

Physical & Bulk Density test will also be carried out.

2% of the samples will be mineralogical analyzed under microscope, as low grade ore are proposed to be beneficiated.

These activities will be followed by data interpretation and report writing work.

7.0 Nature Quantum and Target

Components	G4 Stage	Proposed Quantum
Aerial reconnaissance	Remote sensing, airborne geophysical survey etc.	76.54% of the area is covered under forest, so remote sensing may not be very helpful.
Geological Survey	i 1.25K/ 12.5K ii Assessment of lithology, structure, surface mineralisation and analysis of old history of mining, if any.	Detailed mapping on 12.5K scale – 95.67 Sq Km
Geochemical Survey	i Regional Grab / chip / Stream Sediment / Soil Sampling ii Recording of broad geomorphology, drainage, etc.	NIL
Geophysical Survey	Aero-geophysical / Regional ground geophysical survey (Refer another table below)	NIL
Pitting/ Trenching	Five to ten to expose mineralised zone. The location of Pitting and trenching should be judiciously planned to cover the entire mineralised body, to delineate the strike extension and also for planning scout boreholes. Sample length to be specified (m3)	5 (800m3)
Scout drilling / Systematic drilling	Few boreholes if required along the positive profiles delineated by surface sampling/pitting trenching (Mts)	5 (250 meterage)
Groove Sampling /Grab and Chip Sampling	A few samples from bed rock (few representative samples from all the exposed rocks in the area for first-hand information and more samples from rocks which host the mineralization).	150
Core sample	Sample from mineralised zones as well as hanging wall/footwall Side to be collected. Sample length to be specified (Mts)	125
Petrographic and mineragraphic studies	Principal rock types, mineral assemblage, identification of minerals of interest (Numbers)	3
Synthesis of all available data	i) Integration of regional geophysical, geological and geochemical data. ii) Synthesis of all available data and Report writing	As required

Time Schedule (in month) for exploration programme

Anx-1

Time schedule

Sr No	Activities	Unit	Months											
			1	2	3	4	Review	5	6	7	8	9	10	11	12
1	Camp Mobilization & Setting	Months													
2	Geological Survey Work	Months													
3	Pitting & Trenching	Months													
4	Core Drilling, Core Logging,	Months													
5	Sample Preparation & Analysis	Months													
6	Geological Report preparation	Months													
7	Report Study, enlisting of various modification & Final Copy of the report	Months													

Note:-

Commencement of Project may be reworked from the day of exploration area is available with all Statutory Clearance.

Time loss due to monsoon / agricultural activity / forest clearance / local law & order problem(s) may be additional to the above time line.

8.00 Manpower Deployment

For Geologist (nos)	
Area (Sq Km)	95.6657
Field Work Days	120
HQ Work Days	60
Labour for Geologist	240
Core Drilling (Meters)	
Meterage	300
Drill Core Preservation	160
Pitting & Trenching	
Total Volume (M3)	200
Number of Samples & Analysis (nos)	
Number of samples	300
Check samples	30
For Preparation (nos)	
Labour for sampler	165
Petrological Study (nos)	
Preparation of standard thin section of rocks	10
Digital photomicrograph of thin polished section	10
Complete Petrographic / Ore Microscopic Study / Mineragraphic report of rock samples	10

9.0 Break-up of Expenditure

Cost Estimate for G4 Exploration - Bijawar Imiliya Phosphorite Project

Sr No	Work / Activity	SoC Para	Unit	Charges / Cost (Rs)	Qunatity	Amount (Rs)	%
1	Large scale Geoloical mapping (1:12500)		Charges for one Geologist per day				
a	Geologist (Field) per day	1.2a	Field	11000	120	1320000	13.64
b	Labour for Geologist	5.7		494	240	118560	1.22
c	Geologist (HQ) per day	1.2b	HQ	9000	60	540000	5.58
2	Pitting & Trenching	2.1					
	Excavation of Pit / Trench upto 2m depth	2.1.1	per Cu. M	3330	200	666000	6.88
3	Drilling in medium hard rock, depth up to 300 m (Outsourced)	2.2.1.3a	per m	10100	300	3030000	31.30
4	Sampler	1.5.2	Charges for one sample per day	5100	41	210375	2.17
5	Labour for sampler	5.7		494	165	81510	0.84
13	Laboratory Studies	4.0					
a	Chemical analysis of phosphate rock (Wet)	4.1.3	per sample	9805	300	2941500	30.39
	Check Sample (External:10%)	4.1.3	per sample	9805	30	294150	3.04
b	Petrological Studies	4.3					
(i)	Preparation of standard thin section of rock	4.3.1	per sample	2353	10	23530	0.24
(ii)	Digital photomicrograph of thin polished section	4.3.7	per sample	280	10	2800	0.03
(iv)	Complete Petrographic / Ore Microscopic Study / Mineragraphic report of rock samples	4.3.4	per sample	4232	10	42320	0.44
c	Geochronology Studies	4.6					
(i)	ICPMS (34 elements)	4.1.14	per sample	7731	20	154620	1.60
14	Drill Core Preservation	5.3	per m	1590	160	254400	2.63
	Sub Total					**9679765**	**100.00**
16	Preparation of Exploration Proposal	5.1	One Number (5 Hard Copies) alon with soft copy	2% or 380000, whichever is low	1	193595	
17	Geological Report Preparation	5.2	Cost per 5 hard copies of report along with soft copy	1.5 lakh or 5% of the work, whichever is more & Rs 3000/- per each additional copy	1	483988	
19	Tendering Process (2% or 5 lakhs, whichever is less)	2.3				**60600**	
20	Operational Charges	6.0				**303000**	
21	Peer Review		**As per EC decision**			**30000**	
	Sub Total					**10750948**	
	GST @ 18%					1935171	
	Total					**12686119**	
						126.86	Lakhs
						1.27	Cr

10.0 Reference

A number of explorations were carried by GSI & MECL, some of them are listed below:-

Sr No	Report Details	Field Season	Agency	Authors	Anx No
1	An Interim Report On Assessment of Phosphorite Occurrences in Bijawar Group, District Sagar and Chhatarpur (MP)	1977-1982	GSI	Arun Sonakia & Binod Kumar	15
2	Interim Report On Geochemical Mapping In Toposheets Of 54p/5 And Part Of 54p/6 In Parts Of Chhatarpur And Tikamgarh Districts, Madhya Pradesh	2013 - 2014	GSI	Vikash Chandra & R. Balamurali	16
3	Regional Assesment of Phosphorite in Lukri-Akrotha-Raipura-Surajpura Area, Chhatarpur & Sagar District	2010-2012	GSI	Anil Kumar Dawande & Suresh Kumar	17
4	A Note on Preliminary Appraisal of phosphorite Bodies in Bijawar Group of Rocks around Hirapur in parts of Chhattarpur and Sagar Districts, MP	1977	GSI	H.H. Khan & N. Dalasubrarmanian	18
5	Assessment Of Phosphorite Occurrences In Bijawar Group, Mardeora And Hirapur South 'B' Sectors, Sagar And Chhatarpur Districts, M. P.	1976-1977	GSI	N. Balasubramanian	19
6	Exploration Report - Hirapuur Phosphorite Deposit (Mardeora Block), Chhatarpur & Sagar Districts, MP	1984-1987	MECL		

Anx-1

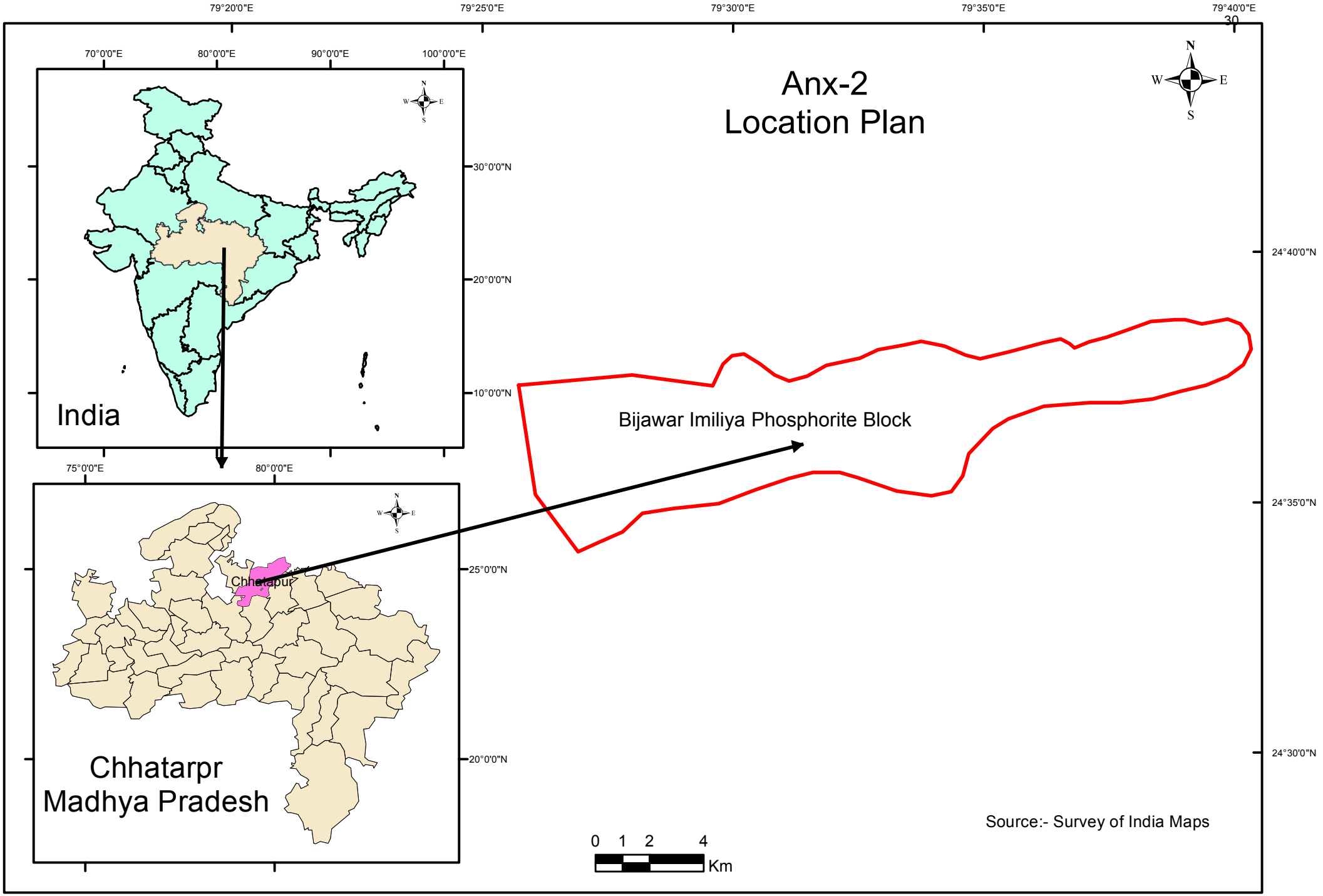
Time schedule

Sr No	Activities	Unit	Months												
			1	2	3	4	Review	5	6	7	8	9	10	11	12
1	Camp Mobilization & Setting	Months													
2	Geological Survey Work	Months													
3	Pitting & Trenching	Months													
4	Core Drilling, Core Logging,	Months													
5	Sample Preparation & Analysis	Months													
6	Geological Report preparation	Months													
7	Report Study, enlisting of various modification & Final Copy of the report	Months													

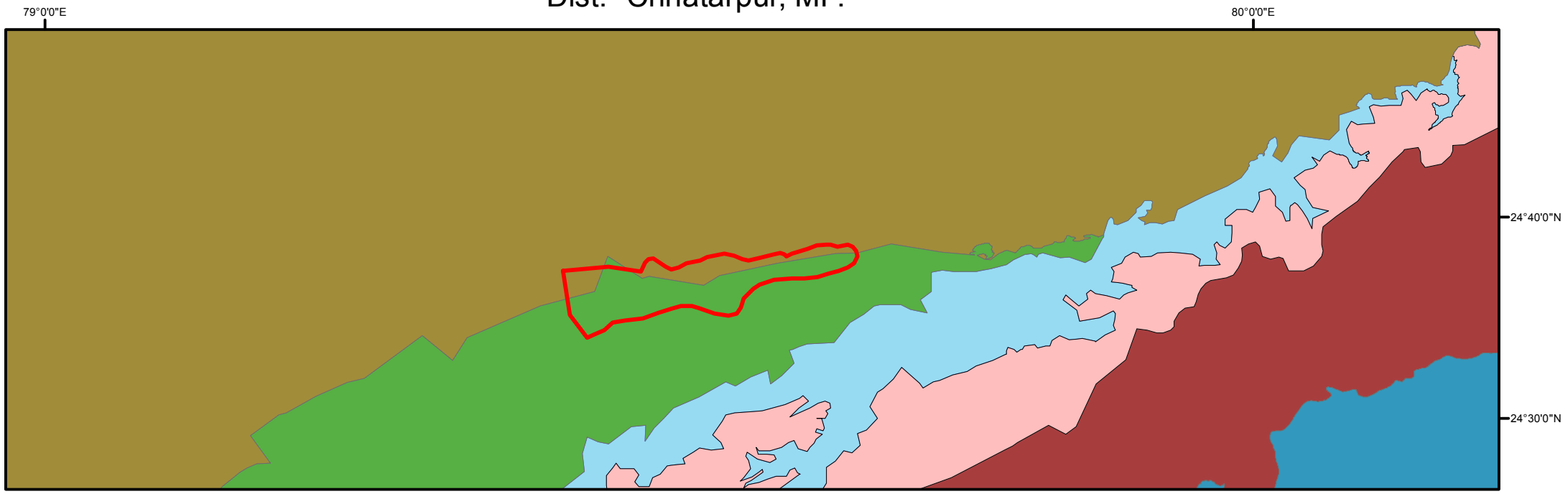
Note:-

Commencement of Project may be reworked from the day of exploration area is available with all Statutory Clearance.

Time loss due to monsoon / agricultural activity / forest clearance / local law & order problem(s) may be additional to the above time line.


79°20'0"E
79°25'0"E
79°30'0"E
79°35'0"E
79°40'0"E
30
70°0'0"E
80°0'0"E
90°0'0"E
100°0'0"E
30°0'0"N
20°0'0"N
10°0'0"N
India
Anx-2
Location Plan
N
W
E
S
24°40'0"N
24°35'0"N
24°30'0"N
Bijawar Imiliya Phosphorite Block
75°0'0"E
80°0'0"E
25°0'0"N
20°0'0"N
Chhetapur
Chhatarpr
Madhya Pradesh
0 1 2 4
Km
Source:- Survey of India Maps

Anx-3
Geological Map
Bijawar Imiliya Phosphorite
Block Area:- 95.67 Sq Km
Dist:- Chhatarpur, MP.



Source:- Bhukosh, GSI.

Legend

Bijawar

Imiliya_Phosphorite_Block **Geology**

2M

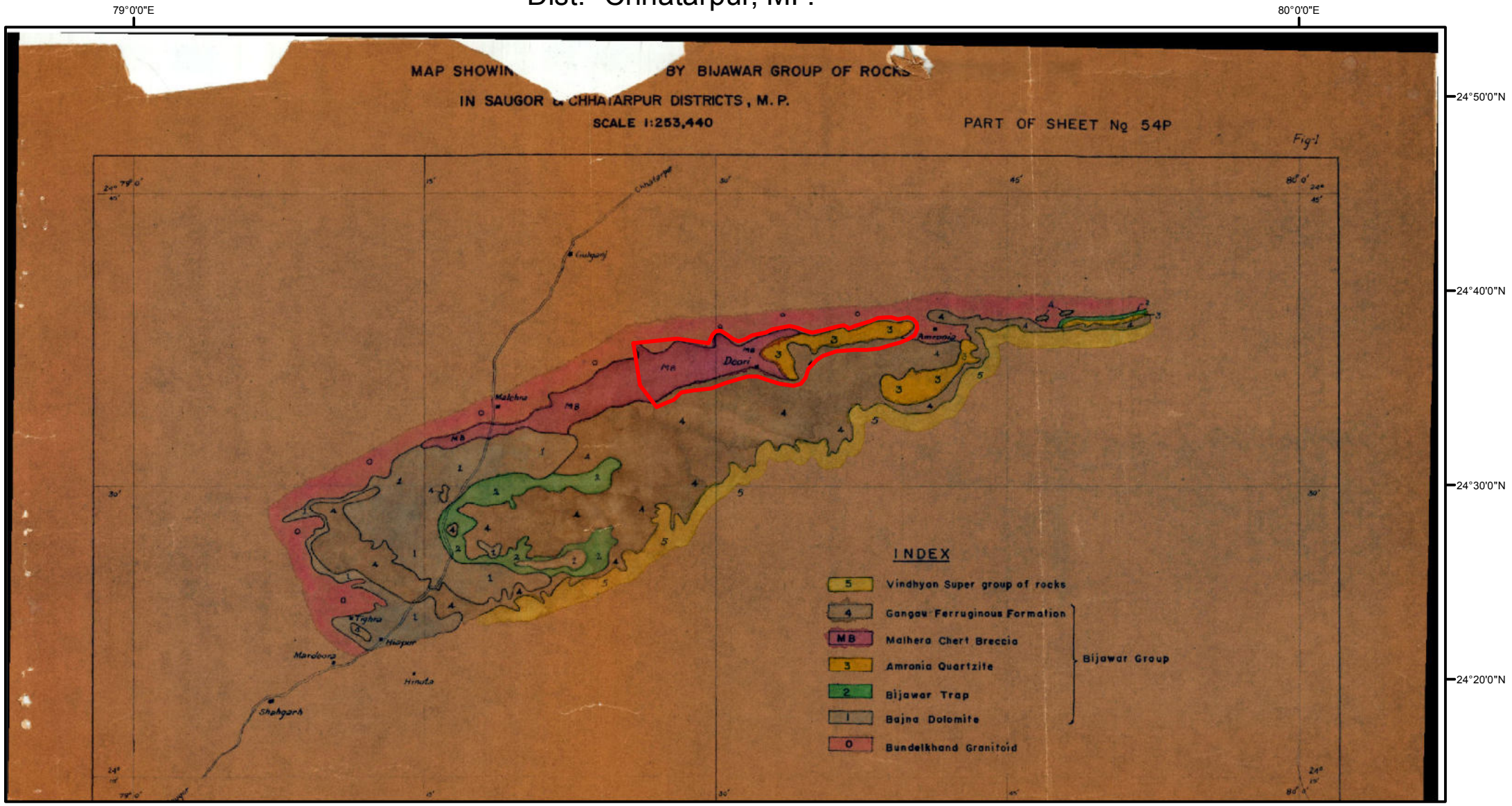
INDEX_

- BHANDER Gp. (VINDHYAN SGp.)
- BIJAWAR Gp.
- BUNDELKHAND GRANITOID COMPLEX
- KAIMUR Gp. (VINDHYAN SGp)
- REWA Gp (VINDHYAN SGp.)
- SEMRI Gp. (VINDHYAN SGp.)

0 3.75 7.5 15 22.5 30 Km

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Area:- 95.67 Sq Km
Dist:- Chhatarpur, MP.



Legend

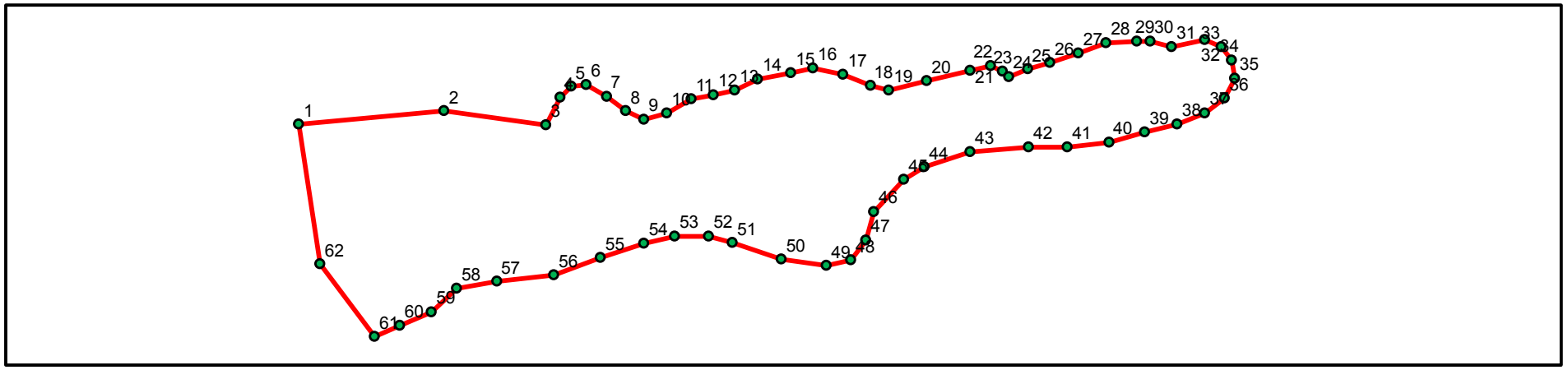
Devri-Pathar_Phosphorite_Block

Source:- GSI Report no 9658 – A note on Preliminary Appraisal of Phosphorite ..... by HH Khan & N Dalasubrarmanian - 1977

0 3.75 7.5 15 22.5 30 Km

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Anx-5
Block Coordinates
Bijawar Imiliya Phosphorite
Block Area:- 95.67 Sq Km
Dist:- Chhatarpur, MP.



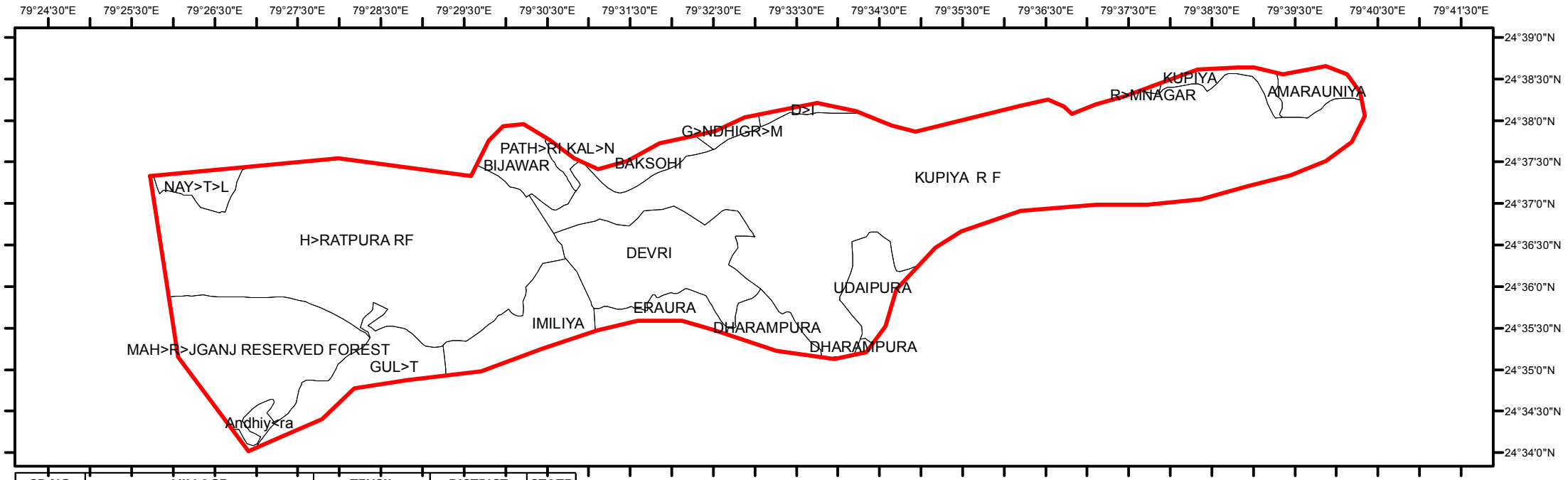
BP_No	Longitude	Latitude	BP_No	Longitude	Latitude	BP_No	Longitude	Latitude
1	79.42863	24.62217	23	79.611902	24.636079	45	79.586204	24.607763
2	79.466398	24.625657	24	79.613568	24.634651	46	79.578352	24.599435
3	79.493048	24.622087	25	79.618327	24.636555	47	79.57621	24.592059
4	79.496617	24.629226	26	79.624275	24.63822	48	79.572403	24.586824
5	79.499473	24.632081	27	79.631652	24.640838	49	79.565979	24.585396
6	79.503518	24.632557	28	79.63879	24.643455	50	79.554319	24.587062
7	79.508753	24.629464	29	79.64688	24.643931	51	79.54147	24.591345
8	79.513749	24.625657	30	79.650212	24.643931	52	79.535331	24.593129
9	79.518508	24.623515	31	79.655922	24.642503	53	79.526527	24.593129
10	79.524457	24.625181	32	79.664488	24.644169	54	79.518437	24.591226
11	79.530882	24.62875	33	79.668771	24.642503	55	79.507254	24.587419
12	79.536592	24.62994	34	79.671389	24.638934	56	79.495128	24.5829
13	79.542065	24.631129	35	79.672341	24.634175	57	79.480128	24.581232
14	79.548014	24.633985	36	79.669723	24.62894	58	79.469658	24.579566
15	79.556818	24.63565	37	79.664488	24.625133	59	79.463234	24.57338
16	79.562528	24.63684	38	79.65735	24.622278	60	79.454905	24.569811
17	79.570262	24.635127	39	79.648784	24.620136	61	79.4484	24.566894
18	79.5774	24.632272	40	79.639504	24.617519	62	79.434212	24.585792
19	79.582159	24.631082	41	79.628796	24.616329			
20	79.592153	24.633461	42	79.618565	24.616329			
21	79.603336	24.636317	43	79.603336	24.615139			
22	79.608809	24.637506	44	79.591439	24.611094			

Legend

- Bijawar_Phosphorite_BP
- Bijawar_Phosphorite_7

0 1.25 2.5 5 7.5 10 Km

Anx-6
Villages within the Block
Bijawar Imiliya Phosphorite
Block Area:- 95.67 Sq Km
Dist:- Chhatarpur, MP.



SR NO	VILLAGE	TEHSIL	DISTRICT	STATE
1	AMARAUNIYA	Bijawar	Chhatarpur	MP
2	Andhiy<ra	Bara Malehara	Chhatarpur	MP
3	BAKSOHI	Bijawar	Chhatarpur	MP
4	BIJAWAR	Bijawar	Chhatarpur	MP
5	D>I	Bijawar	Chhatarpur	MP
6	DEVRI	Bijawar	Chhatarpur	MP
7	DHARAMPURA	Bijawar	Chhatarpur	MP
8	ERAURA	Bijawar	Chhatarpur	MP
9	G>NDHIGR>M	Bijawar	Chhatarpur	MP
10	GUL>T	Bijawar	Chhatarpur	MP
11	H>RATPURA RF	Bijawar	Chhatarpur	MP
12	IMILIYA	Bijawar	Chhatarpur	MP
13	KUPIYA	Bijawar	Chhatarpur	MP
14	KUPIYA R F	Bijawar	Chhatarpur	MP
15	MAH>R>JGANJ RESERVED FOREST	Bara Malehara	Chhatarpur	MP
16	NAY>T>L	Bijawar	Chhatarpur	MP
17	PATH>RI KAL>N	Bijawar	Chhatarpur	MP
18	R>MNAGAR	Bijawar	Chhatarpur	MP
19	UDAIPURA	Bijawar	Chhatarpur	MP

Source:- Village Boundary Map from Survey of India website.

Legend

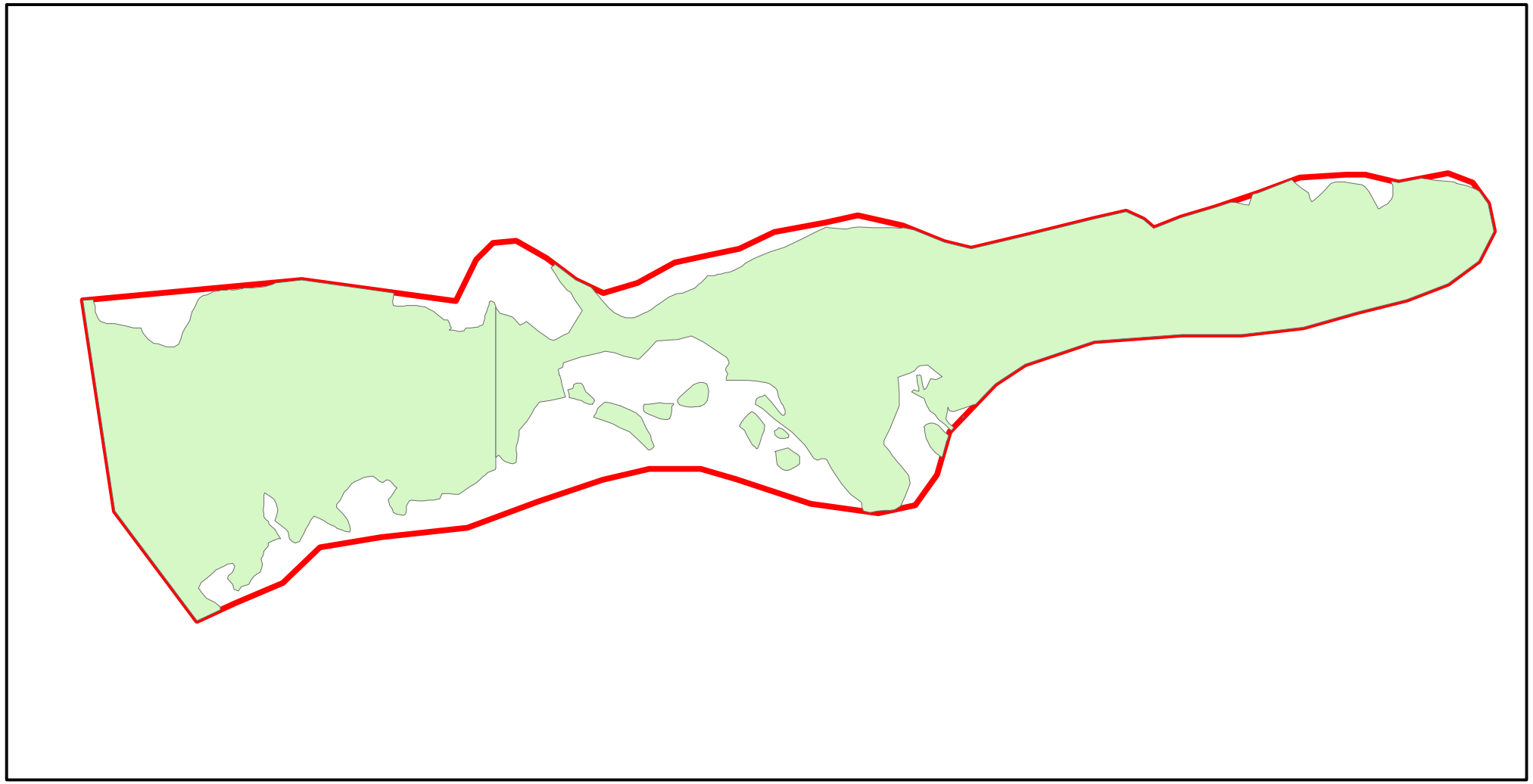
Bijawar Imiliya_Phosphorite_Block

Villages_within_Bijawar_Phosphorite_Block

0 0.75 1.5 3 4.5 6 Km

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Anx-7
Forest Map
Bijawar Imiliya Phosphorite
Block Area:- 95.67 Sq Km
Dist:- Chhatarpur, MP.



Source:- Forest Map taken from Survey of India Toposheet nos 54P/06 & 54P/10

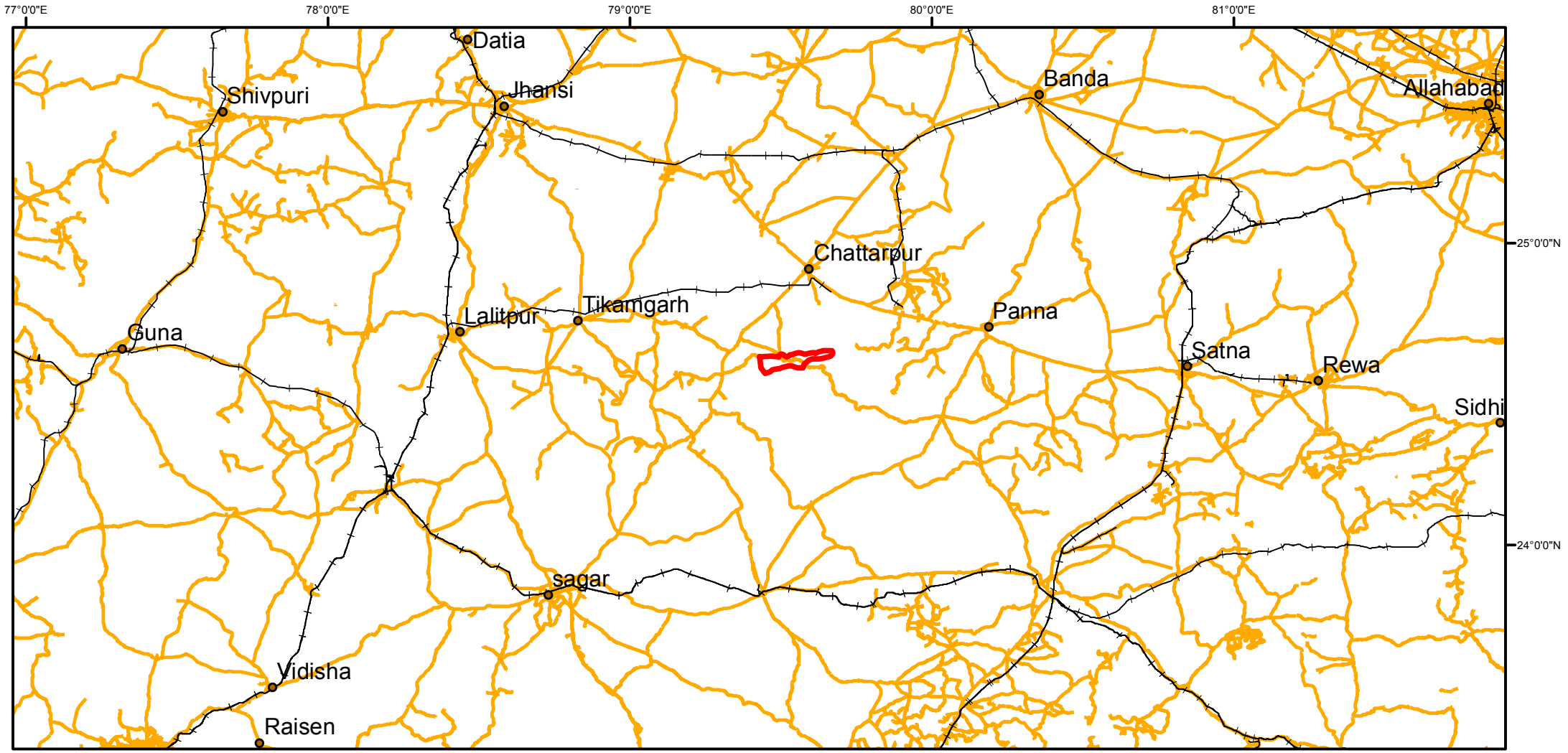
Legend

- Forest_Bijawar Imiliya_Phosphorite_Block
- Bijawar Imiliya_Phosphorite_Block

0 0.75 1.5 3 4.5 6 Km

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Anx-8
Accessibility Map
Bijawar ImiliyaPhosphorite
Block Area:- 95.67 Sq Km
Dist:- Chhatarpur, MP.



Legend

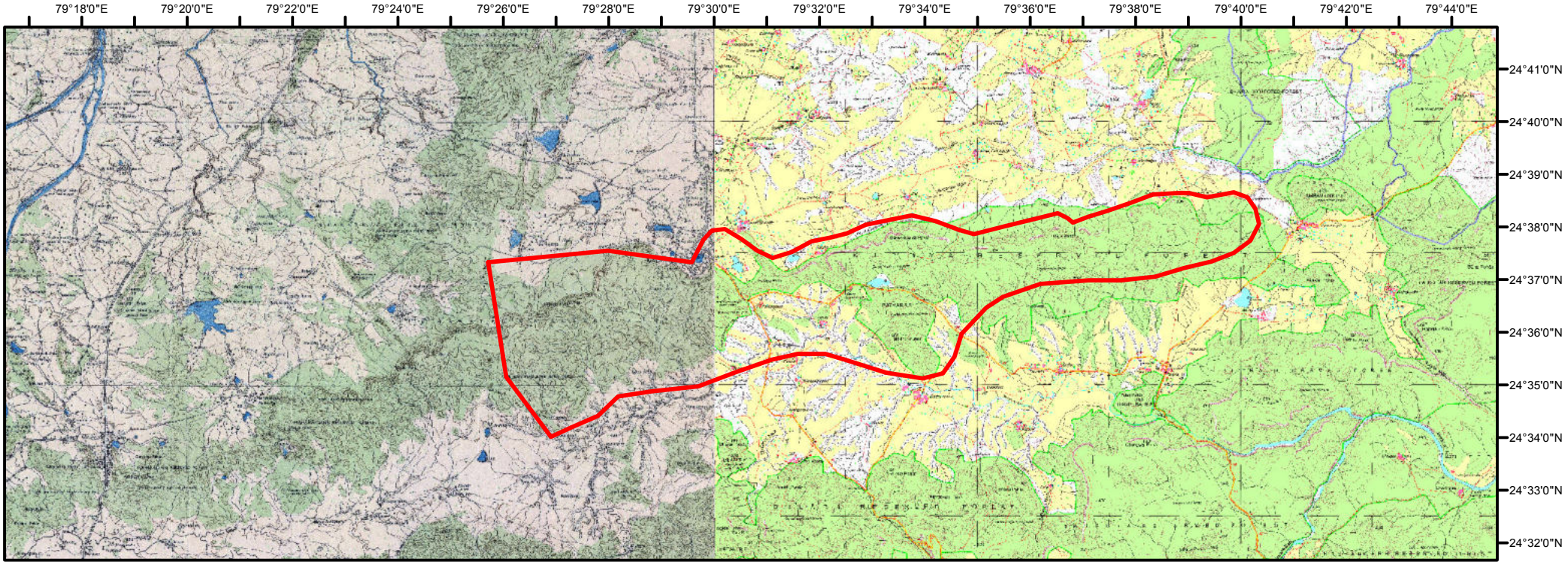
- Bijawar
- Imiliya_Phosphorite_Block Towns
- Railways
- Roads

Source:- Bhukosh, GSI.

0 15 30 60 90 120 Km

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Anx-9
Block Shown over Toposheets 54P/6 & 54P/10
Bijawar Imiliya Phosphorite Block
Area:- 95.67 Sq Km
Dist:- Chhatarpur, MP.



Legend

Bijawar Imiliya_Phosphorite_Block

Topo_54P06_Clip

Topo_54P10_Clip

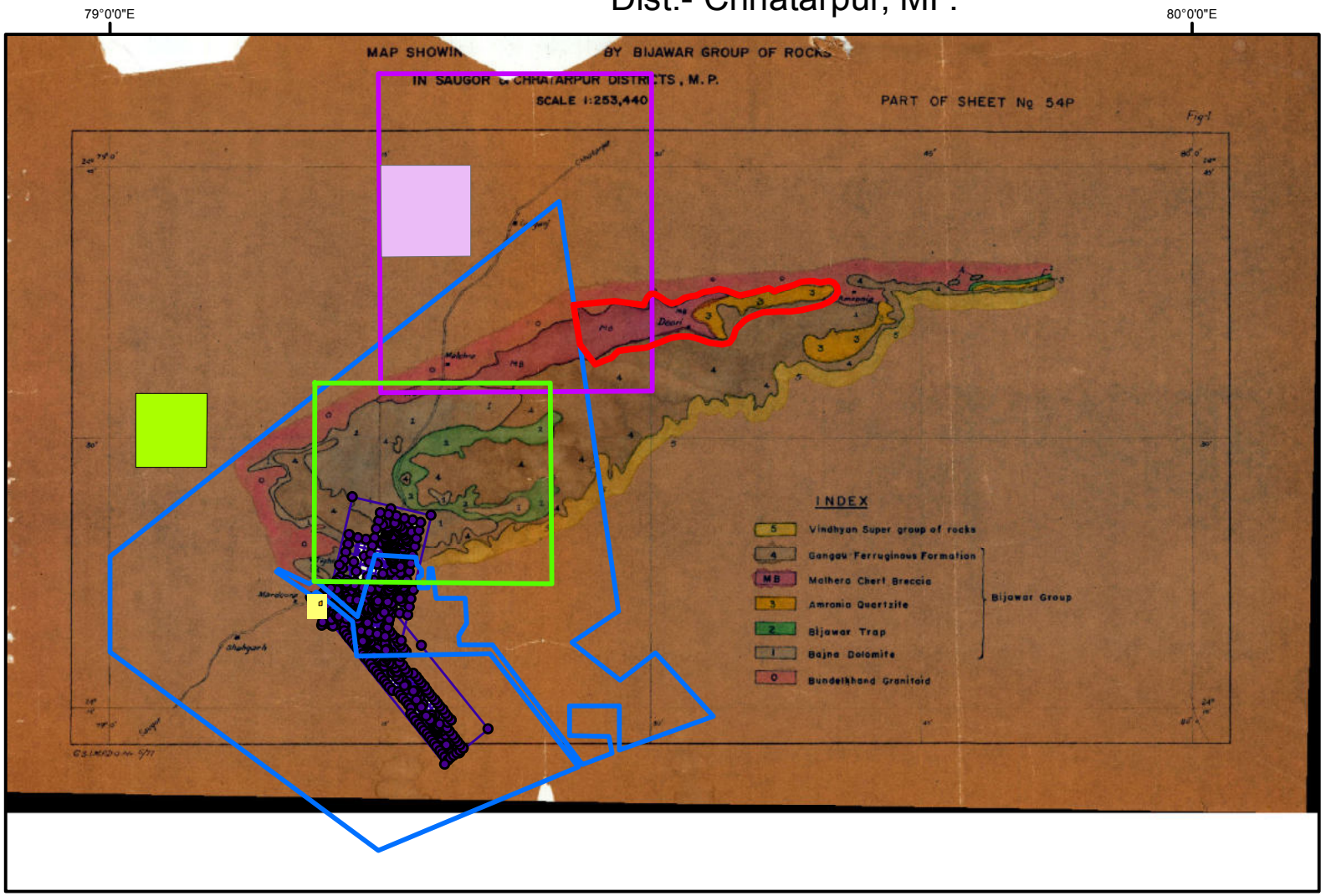
Source:- Survey of India toposheets.

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

0 2 4 8 12 16 Kilometers

Anx-10 (a)
Previous Studies Carried out near Block

Area:- 95.67 Sq Km
Dist:- Chhatarpur, MP.



Legend

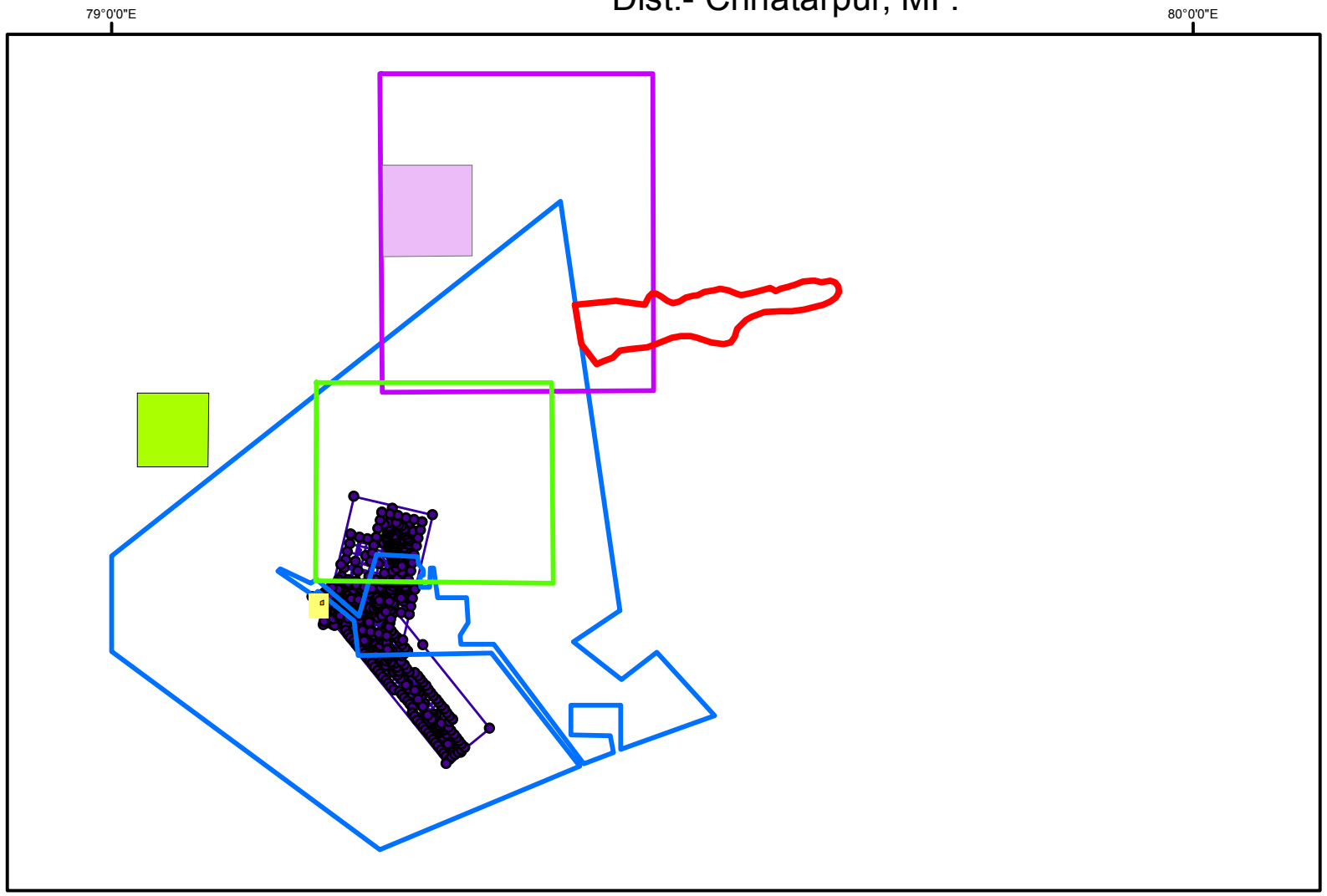
- Devri-Pathar_Phosphorite_Block
- Sarkana_Malguwan_Gairwar_REE
- AMD_Block
- Lukri_Akrotha_Raipura_Phosphorite
- Diamond_Blocks
- MECL_Explored_Area_Phosphorite
- Area_Retained_by_NMDC
- Haripur_Polygone
- Suwara_Dharampura_G4

Base Map Source:- GSI Report no 9658 – A note on Preliminary Appraisal of Phosphorite ..... by HH Khan & N Dalasubrarmanian - 1977

0 4.75 9.5 19 28.5 38 Km

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Anx-10 (b)
Previous Studies Carried out near Block
Bijawar Imiliya Phosphorite Block
Area:- 95.67 Sq Km
Dist:- Chhatarpur, MP.



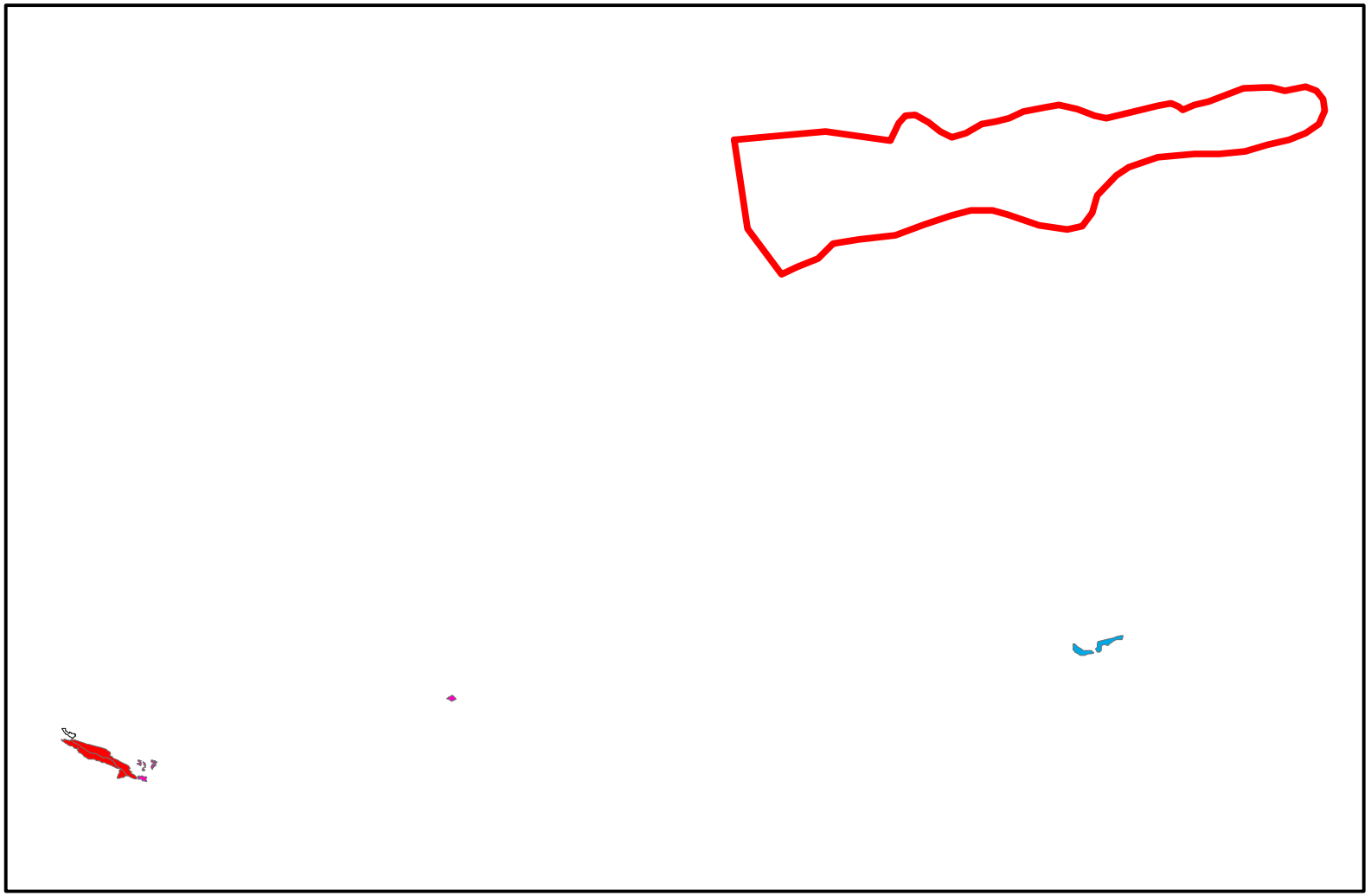
Legend

- Bijawar Imiliya_Phosphorite_Block
- Sarkana_Malguwan_Gairwar_REE
- AMD_Block
- Lukri_Akrotha_Raipura_Phosphorite
- Diamond_Blocks
- MECL_Explored_Area_Phosphorite
- Area_Retained_by_NMDC
- Haripur_Polygone
- Suwara_Dharampura_G4

0 4.75 9.5 19 28.5 38 Km

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Anx-11
Nearby Mines
Bijawar Imiliya Phosphorite
Block Area:- 95.67 Sq Km
Dist:- Chhatarpur, MP.



N
W E
S

40

Legend

Bijawar Imiliya_Phosphorite_Block

MP_Major_Mines

mineral_na

Iron Ore

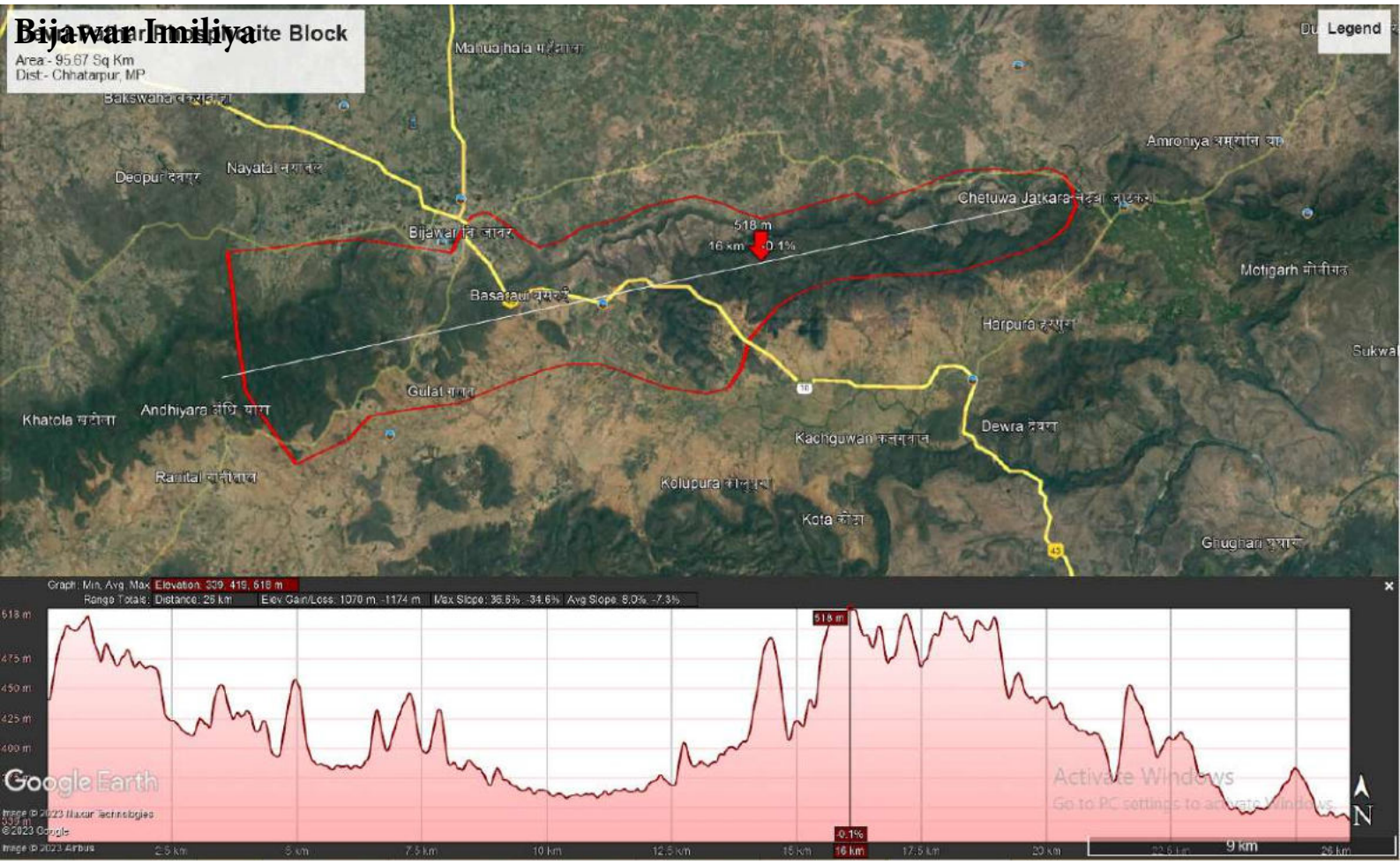
Limestone

ROCK PHOSPHATE

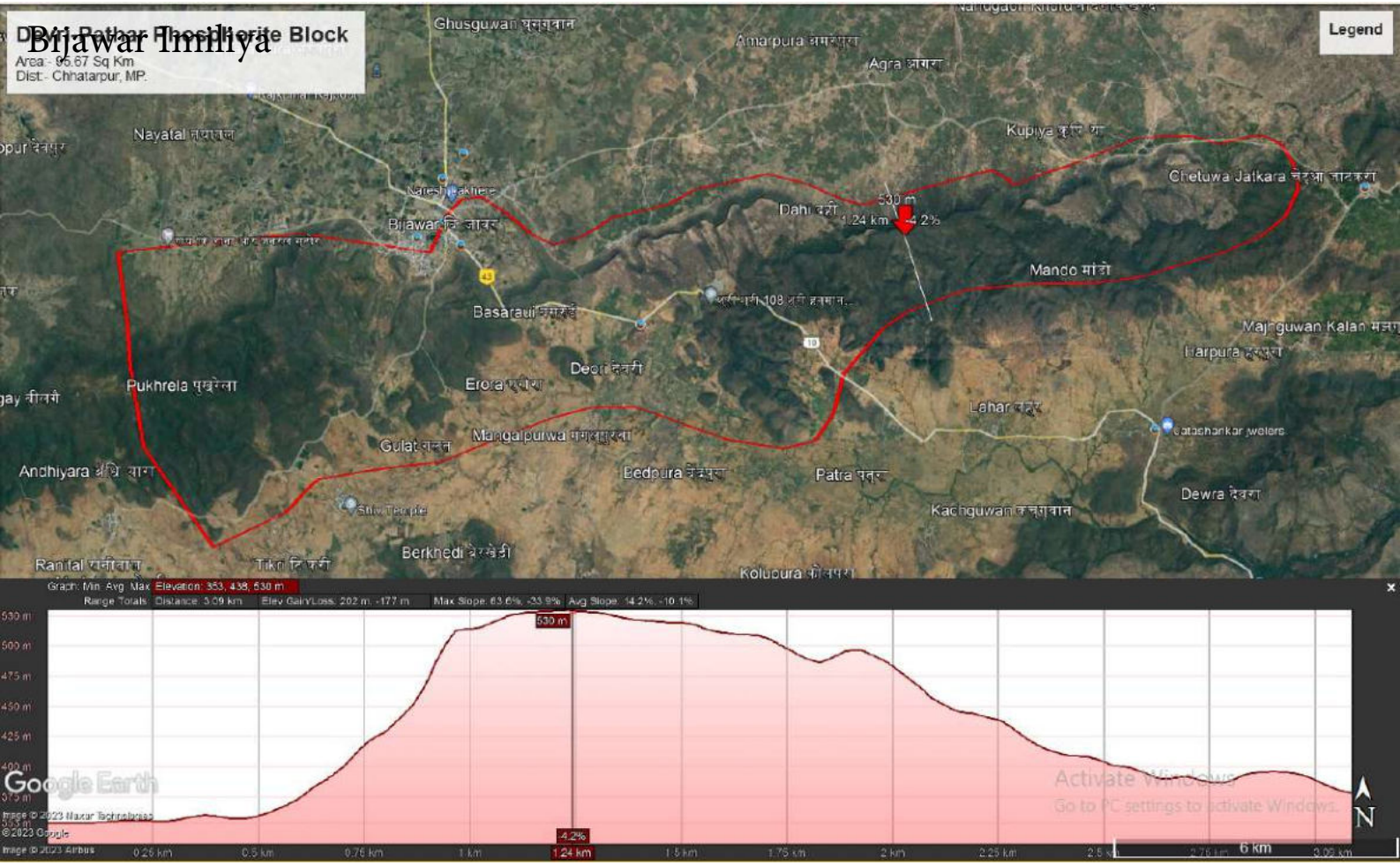
0 2.25 4.5 9 13.5 18 Km

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

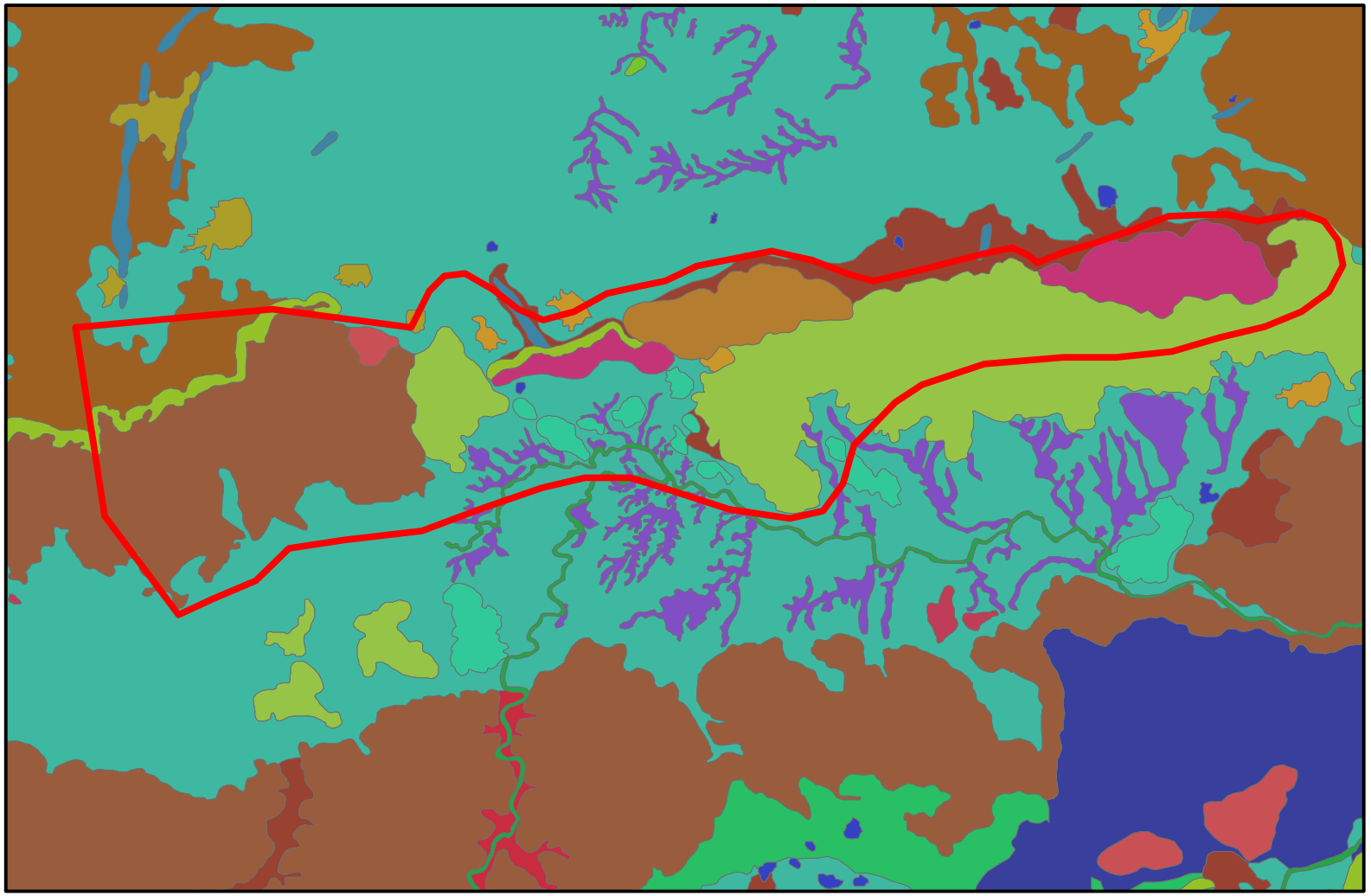
Anx- 12


Bijawar Imiliya
Area - 95.67 Sq Km
Dist - Chhatarpur, MP
Legend
Malhajhala
Bakswaha
Deopur
Nayatal
Amroniya
Chetuwa Jatkara
Bijawar
518 m
16 km -0.1%
Motigarh
Basarau
Harpura
Sukwa
Gulat
Khatola
Andhiyara
Kachguwan
Dewra
Ranital
Kolupura
Kota
Ghughari
Graph: Min, Avg, Max Elevation: 339, 419, 518 m
Range Totals: Distance: 25 km Elev Gain/Loss: 1070 m, -1174 m Max Slope: 36.6%, -34.6% Avg Slope: 8.0%, -7.3%
518 m
475 m
450 m
425 m
400 m
339 m
-0.1%
16 km
9 km
2.5 km
5 km
7.5 km
10 km
12.5 km
15 km
17.5 km
20 km
22.5 km
25 km
Google Earth
Image © 2023 Maxar Technologies
© 2023 Google
Image © 2023 Airbus
Activate Windows
Go to PC settings to activate Windows.
N

Anx- 13


Bijawar Imliya
Area:- 96.67 Sq Km
Dist:- Chhatarpur, MP.
Legend
Ghusguwan घुसगुवान
Amarpura अमरपुरा
Agra आगरा
Nayatal नयाताल
Kupiya कुपिया
Chetuwa Jatkara चेटुआ जातकरा
Bijawar बिजावर
530 m
Dahi दही
1.24 km
4.2%
Mando मांडो
Basarauli बसरौली
Majhguwan Kalan मझगुवां
Harpura हरपुरा
Deori देवरी
Pukhrela पुखरेला
Erora एरोरा
Lahar लहर
Gulat गुलट
Mangalpurwa मंगलपुरवा
Andhiyara अंधियारा
Bedpura बेदपुरा
Patra पत्रा
Dewra देवरा
Kachguwan कचगुवान
Berkhedi बरखेड़ी
Rantal रनीवाना
Tikri टिकरी
Kolupura कोलपुरा
Graph: Min, Avg, Max Elevation: 353, 438, 530 m
Range Totals: Distance: 3.09 km Elev Gain/Loss: 202 m, -177 m Max Slope: 63.6%, -33.9% Avg Slope: 14.2%, -10.1%
530 m
500 m
475 m
450 m
425 m
400 m
4.2%
1.24 km
0.25 km
0.5 km
0.75 km
1 km
1.5 km
1.75 km
2 km
2.25 km
2.5 km
2.75 km
3.00 km
6 km
Google Earth
Activate Windows
Go to PC settings to activate Windows.
N

Anx-14
Geomarphological Map
Bijawar Imiliya Phosphorite
Block Area:- 95.67 Sq Km
Dist:- Chhatarpur, MP.



Legend

Devri-Pathar_Phosphorite_Block

Geomorphology Landform

GEOMORPHOL

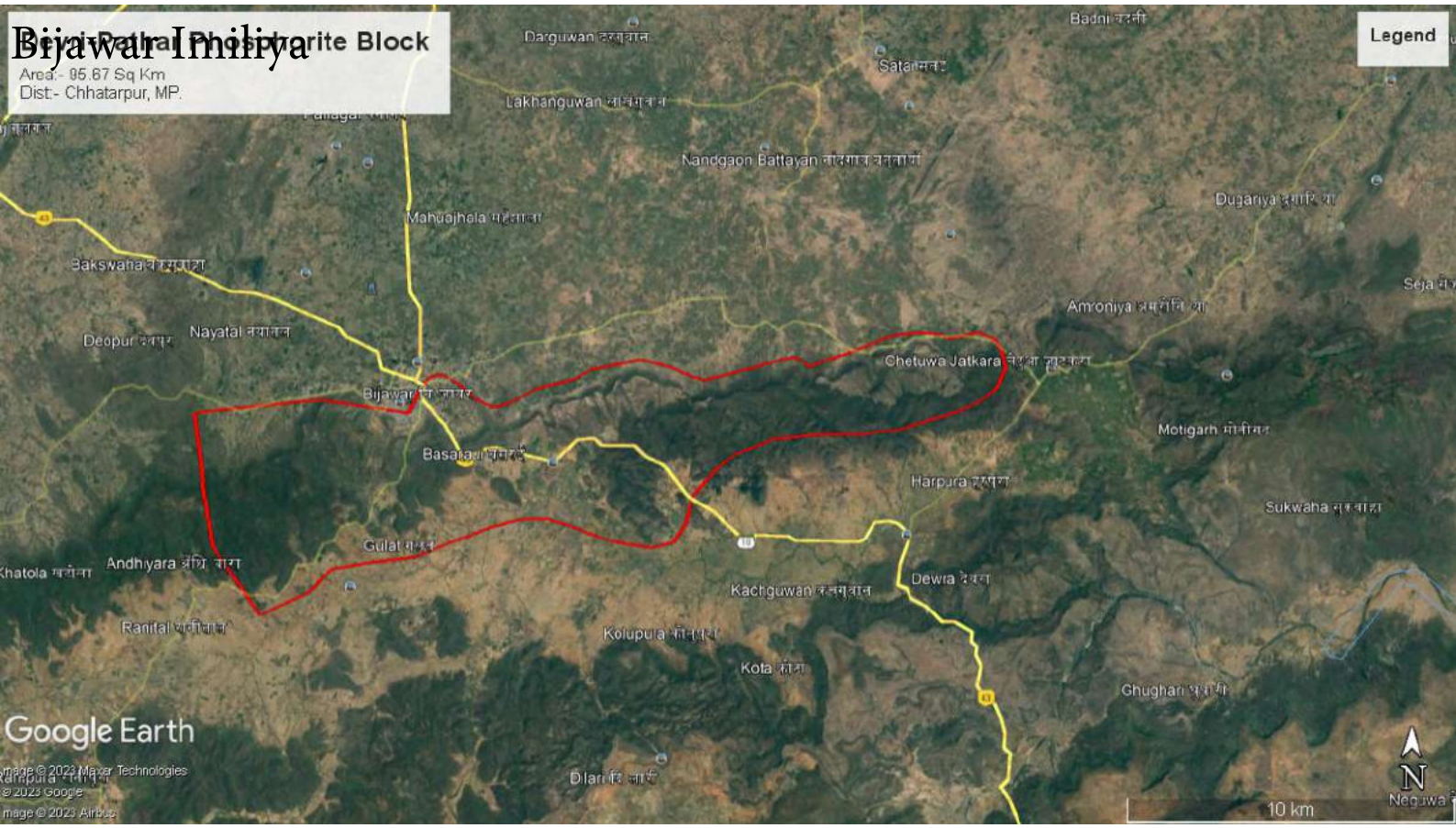
- Butte
- Cuesta
- Dam and Reservoir
- Gullied Tract
- Inselberg
- Mesa
- Pediment
- Pediment-Corestone-Tor Composite
- Pediplain
- Plateau Remnant
- Plateau Top
- Residual Hill
- Residual Mound
- Ridge
- Scarp
- StrOri - Low Dissected Hills and Valleys
- StrOri - Low Dissected Lower Plateau
- StrOri - Moderately Dissected Hills and Valleys
- StrOri - Moderately Dissected Lower Plateau
- Valley
- WatBod - Lake
- WatBod - Pond
- WatBod - River

Source:- Bhukosh, GSI.

0 1 2 4 6 8 Km

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Anx- 15


Bijawar Imiliya
Area:- 95.67 Sq Km
Dist:- Chhatarpur, MP.
Legend
Darguwan
Lakhanguwan
Nandgaon Battayan
Mahuajhela
Bakswaha
Nayatal
Deopur
Bijawar
Basaha
Chetuwa Jatkara
Amroniya
Dugariya
Motigarh
Harpura
Sukwaha
Gulat
Andhiyara
Ranital
Kachguwan
Dewra
Kolupura
Kota
Ghughari
Google Earth
10 km
N

Anx - 16

रजिस्ट्री सं० डी० एल०-33004/99 REGD. NO. D. L.-33004/99

भारत का राजपत्र
The Gazette of India

असाधारण
EXTRAORDINARY
भाग II—खण्ड 3—उप-खण्ड (i)
PART II—Section 3—Sub-section (i)
प्राधिकार से प्रकाशित
PUBLISHED BY AUTHORITY

सं. 431] नई दिल्ली, सोमवार, जुलाई 6, 2015/ आषाढ़ 15, 1937
No. 431] NEW DELHI, MONDAY, JULY 6, 2015/ ASHADHA 15, 1937

खान मंत्रालय

अधिसूचना

नई दिल्ली, 6 जुलाई , 2015

सा.का. नि. 538(अ).—केंद्रीय सरकार खान और खनिज (विकास और विनियमन) अधिनियम, 1957 की धारा 4 की उपधारा (1) के दूसरे परंतुक के अनुसरण में, खान और खनिज (विकास और विनियमन) अधिनियम, 1957 की धारा 4 की उपधारा (1) के दूसरे परंतुक के प्रयोजनों के लिए निम्नलिखित संस्थाओं को अधिसूचित करती है, अर्थात्:—

(i) राष्ट्रीय इस्पात निगम लिमिटेड;

(ii) स्टील ऑथोरिटी ऑफ इंडिया लिमिटेड;

(iii) एनएमडीसी लिमिटेड;

(iv) केआईओसीएल लिमिटेड;

(v) एमओआईएल लिमिटेड;

(vi) छत्तीसगढ़ खनिज विकास निगम लिमिटेड; और

(vii) मध्य प्रदेश राज्य खनन निगम लिमिटेड।

2. यह अधिसूचना इस शर्त के अधीन होगी कि पूर्वेक्षण कार्य द्वारा सृजित डाटा राज्य सरकार को दे दिया जाएगा।

3. यह अधिसूचना : (i) राष्ट्रीय इस्पात निगम लिमिटेड; (ii) स्टील ऑथोरिटी ऑफ इंडिया लिमिटेड; (iii) एनएमडीसी लिमिटेड; (iv) केआईओसीएल लिमिटेड; और (v) एमओआईएल लिमिटेड के संबंध में 16 फरवरी, 2015 से लागू होगी, तथा (i) छत्तीसगढ़ खनिज विकास निगम ; और (ii) मध्य प्रदेश राज्य खनन निगम लिमिटेड के संबध में राजपत्र में प्रकाशन की तारीख से लागू होगी ।

[फा. सं. 16/08/2015-खान-VI]
निरंजन के. सिंह, संयुक्त सचिव

MINISTRY OF MINES

NOTIFICATION

New Delhi, the 6th July, 2015

G.S.R. 538(E).— In pursuance of the second proviso to sub-section (1) of section 4 of the Mines and Minerals (Development and Regulation) Act, 1957, the Central Government hereby notifies the following entities for the purposes of the second proviso to sub-section (1) of section 4 of the Mines and Minerals (Development and Regulation) Act, 1957, namely:–

(i) Rashtriya Ispat Nigam Limited;
(ii) Steel Authority of India Limited;
(iii) NMDC Limited;
(iv) KIOCL Limited;
(v) MOIL Limited;
(vi) Chhattisgarh Mineral Development Corporation Limited; and
(vii) Madhya Pradesh State Mining Corporation Limited.

2. This notification shall be subject to the condition that the data generated by the prospecting operations be made over to the State Government.

3. This notification shall come into force with effect from 16th February, 2015 with respect to: (i) Rashtriya Ispat Nigam Limited; (ii) Steel Authority of India Limited; (iii) NMDC Limited; (iv) KIOCL Limited; and (v) MOIL Limited, and shall come into force with effect from the date of its publication in the Official Gazette with respect to: (i) Chhattisgarh Mineral Development Corporation Limited; and (ii) Madhya Pradesh State Mining Corporation Limited.

[F. No.16/08/2015-M.VI]
NIRANJAN K. SINGH, Jt. Secy.

Printed by the Manager, Government of India Press, Ring Road, Mayapuri, New Delhi-110064
and Published by the Controller of Publications, Delhi-110054.