



Dr. Dhaval Patel, IAS
Commissioner of Geology & Mining
Industries & Mines Department
Government of Gujarat



No: CGM/Expl./Jodhapur-NMET /862/23-24/ **797**

Date- **06/07/2023**

To,
Director,
National Mineral Exploration Trust
Ministry of Mines,
F-114, Shastri Bhawan,
New Delhi-110001

Subject: **Allocation of funds ₹3,65,47,457 (Rupees Three crores sixty-Five lakhs Forty-seven thousand Four hundred fifty-seven only) for Limestone and Bauxite in Jodhpur-Satapar Block, Devbhumi Dwarka District, Gujarat State for G3 Stage Mineral Exploration under NMET.**

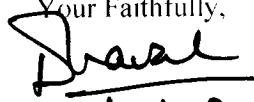
Respected Sir,

With respect to above mentioned subject, we are submitting proposal for Limestone and Bauxite in Jodhpur-Satapar Block, Devbhumi Dwarka District, Gujarat State for G3 Stage Mineral Exploration.

It is requested to NMET to allot the fund of Rs. 3,65,47,457 (Rupees Three crores sixty-Five lakhs Forty-seven thousand Four hundred fifty-seven only) for Limestone and Bauxite in Jodhpur-Satapar Block, Devbhumi Dwarka District, Gujarat State for G3 Stage Mineral Exploration.

We would like to submit the same under sub-section 5 of section -9C of the MMDR Act-2021 for NMET funding.

Thank you.

Your Faithfully,

6/7/23
(Dr. Dhaval Patel, IAS)
Commissioner
Geology and mining,
Gujarat State, Gandhinagar

Enclosed: As above

Copy to: Joint secretary, Industry and mine department, New Sachivalay, Gandhinagar

**Proposal for Limestone and Bauxite in Jodhpur-Satapar Block,
Devbhumi Dwarka District, Gujarat State for G3 Stage Mineral
Exploration under NMET**



Commodity: Limestone and Bauxite

By

**Commissioner of Geology and Mining
Gujarat**

Place: Gandhinagar

Date: 05 July, 2023

Summary of the Block for G3 stage exploration

	Features	Details
	Block ID	CGM/NMET/BP/2023/07
	Current Exploration Agency	CGM, Gujarat
	Previous Exploration Agency	CGM, Gujarat
	G4 stage Geological Report (Previous stage Geological Report)	G4 stage: CGM Report no.47 and 703
	Commodity	Limestone and Bauxite
	Mineral Belt	Gaj Formation
	Completion Period with entire Time schedule to complete the project	6 Months
	Objectives	To assess the mineral resource of Limestone and Bauxite mineral at G3 stage in 1387 hectares area 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	The work will be carried out through outsourcing.
	Name/ Number of Geoscientists	Geologist: 1 (Field) + 1(HQ)
	Expected Field days (Geology, Geophysics, Surveyor)	200 days: Field Geologist 60 days: HQ Geologist 60 days: Surveyor
1.	Location	
	Latitude	21°56'27.45"N to 21°59'17.13"N
	Longitude	69°15'43.40"E to 69°18'31.60"E
	Villages	Jodhpur, Satapar, Navadra, Bhogat
	Tehsil/ Taluk	Kalyanpur
	District	Devbhumi Dwarka
	State	Gujarat
2.	Area (hectares/ square kilometres)	
	Block Area	1387 hectares
	Forest Area	No forest area
	Government Land Area	NA
	Private Land Area	NA
3.	Accessibility	
	Nearest Rail Head	Bhatiya railway station – 10.6 km
	Road	NH 51 – adjacent to block area
	Airport	Porbandar airport – 50 km
4.	Hydrography	

	Local Surface Drainage Pattern (Channels)	Sub-dendritic
	Rivers/ Streams	No perennial river/stream present in the proposed block area.
5.	Climate	
	Mean Annual Rainfall	1002 mm
	Temperatures (December) (Minimum) Temperatures (June) (Maximum)	Minimum – 7° C Maximum – 44° C
6.	Topography	
	Toposheet Number	41G05
	Morphology of the Area	Gently undulating with small hillocks
7	Availability of baseline geoscience data	

	Geological Map	Plate-1
	Geochemical Map	Not available
	Geophysical Map (Aerogeophysical, Ground geophysical, Regional as well as local scale GP maps)	Not available
8.	Justification for taking up G3 stage mineral exploration	The proposed region was previously explored by CGM, 1966-67 by means of pitting and estimated resource for bauxite of about 0.37 Mt. The block is also surrounded by a number of bauxite leases. A part of the proposed area was previously explored by drilling in Jodhpur village which proved positive results of Limestone. Lithology of the target area comprises of Gaj Formation. Reported CaO% of Limestone varies from 40 to 52%. Leases of Limestone are also present within and surrounding the block. According to the CGM report the estimated resource for Limestone is 8.05 MT. Exploration increases the level of confidence on quantity and quality of reserve/resource which will attract the investors. Hence, based on lithology and previous exploration report, the block is suggested for G3 level of exploration for Bauxite and Limestone.

Detailed description:

1. Block Summary

Physiography

The proposed block area is located in the Kalyanpur taluka, Devbhumi Dwarka district in the western part of Gujarat. The area is characterized by more or less flat, undulating topography with very few mounds and parallel ridges. There are no perennial rivers present in the block. The area is usually dry the whole year except during monsoon when few seasonal streams flow which forms sub-dendritic drainage pattern. Moreover, the topography of the whole area is flat with some undulations. The highest msl is

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

Laterite is the oldest rock exposed in the area and is unconformably overlain by Tertiary sediments. The Tertiary rocks were deposited in shallow marine to beach environment and is represented by rocks of the Gaj Formation and the Dwarka Formation (Lower Miocene to Pliocene). The rocks of Dwarka Formation are well-exposed around Kalyanpur and Dwarka, the Gaj Formation is seen around Jodhpur and surrounding area. The Milliolite Formation occurs along the sea-coast.

The general stratigraphic succession of the region is as follows:

Age	Formation	Lithounits
Pleistocene to Holocene	Recent to sub recent	Alluvium / Soil, clay, mud
Lower Miocene	Gaj formation	Yellowish to cream coloured clayey Limestone. Hard, fine grained calcareous clay and Marl
Palaeocene to Eocene	Laterite and Bauxite	Hard and compact Laterite, Clay and Bauxite
-----Deccan Trap-----		

The stratigraphic sequence of the proposed block area is as follows:

The uppermost formation in the block is of alluvium/soil which varies in colour from blackish to brownish red.

Limestone:

The limestone found in the block belongs to Gaj formation of Lower Miocene age. Freshly broken limestone is yellowish and brownish in colour. Generally, it is medium grained but at some places it is courser in grain size and contains fossilized fragments and occasionally sand grains. At some places it is highly compact in nature. Fractured limestone is also observed. The thickness of the limestone varies in different part of the block.

Clay:

Clay found in the block also belongs to Gaj formation. The clay is brownish, greyish, greenish and yellowish in colour. It is called variegated clay. It is soft and fine to coarse grained. At places, it is intermixed with gritty material and also contains gypsum. At some places calcareous and carbonaceous clay is also found.

Laterite and Bauxite:

Laterite forms almost a continuous zone between the Gaj beds and the underlying traps. They have been subjected to a considerable amount of denudation prior to deposition of Gaj beds. Laterite and Bauxite of Palaeocene to Eocene age are found in the block. Laterite is hard and compact in nature. Bauxite is mostly ferruginous and found in reddish colour. Below the laterite and bauxite trap is encountered.

Deccan Trap:

Trap found in block is mostly blackish in colour. It is generally fine to medium grain in nature. It is hard and compact. Fractured and weathered trap is found at some places in block. These trap rocks are commonly in form of varying thickness.

Mineral potentiality based on geology, geophysics, ground geochemistry etc.**Mineralization potential of Bauxite**

It was reported by Shri H. R. Vyas (1966-67) that bauxite occurs as small segregations in the ferruginous laterite. They are hard compact and ferruginous in nature and occur as boulders and nodules, having shade of pink and brown colour. This bouldary zone overlies the earthy clayey bauxite as the bauxite boulders are found embedded in clayey matrix. The deposits near Navadra village shows scattered horizons of bauxite in ferruginous laterite. Five patches of bauxite were demarcated covering an area of about 39,960 square meters and fifteen pits were dug up to know extend and thickness of bauxite. The bauxite is a hard compact, bouldary and nodular in nature. The ore is ferruginous in appearance. It is red to brown in colour with shades of yellow colour the estimated reserves of bauxite comes to 58,176 tonnes.

Mineralization potential of Limestone

During the exploration carried out by drilling in Jodhpur village in 2018-19, on a grid of 200 meters, 13 boreholes were drilled and limestone was found to be encountered in each borehole. It was noted that the limestone deposit found in the area is of bedded type which adds up to potential of limestone occurring in the proposed block area. Besides, the limestone upto cement grade is reported to be present in the area as per the analysis of the samples.

Several existing mines of bauxite and limestone are present surrounding the proposed block which adds up to evidence of mineral potentiality and need for further exploration in the area.

Scope for proposed exploration

1. Location: Village: Jodhpur, Satapar, Navadra, Bhogat, Taluka: Kalyanpur District: Devbhumi Dwarka, Gujarat State
2. Quantum of work: The approximate core drilling work is 3,320 meters.
3. Rock formations to be drilled: Various types of soil, sub-soil, Bauxite, Laterite, Limestone, etc.
4. The boreholes shall be in depth range of approximately 40m. However, this is indicative only and may vary as per actual geological conditions.
5. Type of Drilling: Core drilling by Hydraulic Drilling Rigs.
6. Borehole size: The holes shall be derived in NQ size.
7. The core recovery in all the formation should be at least 90% except in fault zone, weathered zone, soil, sand and structurally disturbed area
8. CGM will provide proposed borehole location plan of all the areas to be covered under exploration.
9. Sampling: There will be one mineral/rock sample for every 1-meter run from mineralized zone. Each sample should be cut by core splitter. Each run shall be marked properly by plastic cards and the core boxes shall be numbered properly. Each sample shall be reduced to an approximate quantity by following the standard sampling procedures such as homogenizing, coning, quartering and pulverizing into 100/200 mesh and be prepared into two packets of 100-200 gm each. The final sample pockets shall be properly labelled with BH number, sample run.

Recommendations of G4 Stage Mineral Exploration Report.

Shri H. R. Vyas (1968) recommended the further prospecting by putting drill holes on the Gaj laterite margin as the bauxite deposit is of pocket type and samples recovered show good proportion of Al_2O_3 concentration.

The exploration carried out by CGM in 2018-19 in the Jodhpur village by drilling 13 boreholes on a grid of 200 x 200 meters in which each borehole was found to be positive with limestone. Further the lithology of the proposed block area comprises of Gaj formation which consists of fossiliferous limestones, shelly limestones along with marl and clay.

As a result, further exploration in the proposed block area is suggested for establishing the potential resources of Bauxite and Limestone in the area.

Objectives of Exploration

- To know the continuity of the mineral body both along the strike and dip.
- To map the extent of the ore body.
- To ascertain the grade of bauxite and limestone deposit.
- Ore resource/reserve estimation in accordance with MEMC Rule-2015.

2. Previous Work

Previous Exploration in the proposed block area as well as adjoining: All the sample (bed rock/trench/ groove/soil), borehole location should be plotted on the geological map and analytical data should be discussed briefly

In the proposed block area previous exploration was carried out by Vinayak Engimech Pvt. Ltd. On behalf of CGM in Jodhpur village in 2018-19. The exploration was carried out in 36.097 hectares by drilling to understand subsurface mineralisation of limestone. The exploration was carried out by drilling 13 boreholes on the grid of 200 x 200 meters. It was noted that limestone was encountered in all boreholes, so it was interpreted that limestone is of bedded type deposit. The exploratory drilling work was done with help of 1 number of Hydraulic core drilling rig. All boreholes were drilled vertically. NQ size core recoveries of minimum 85% was maintained throughout and properly recorded. Geological Core logging was done on all boreholes which included reporting details of lithology, thickness, grain size, colour and megascopic characters. The resource estimation was done for cement grade limestone, limestone and marl and was found to be 8.05 MT.

In the proposed study area, the exploration was carried out by Shri H. R. Vyas (1968), N. V. Shah and J. V. Bhatt (1975). During the exploration programme out by Shri H. R. Vyas (1968), the mapping was carried out on scale of 1:15840, covering an area of about 300 km² and prospecting was done by pitting. Eighty pits were dug up, few of which were part of the proposed area varying in depth between 1 and 3 meters of bauxite. The average analysis of Al₂O₃ concentration in the reserve was found to be 51.39 %.

3. Block description

Block corner points	Latitude	Longitude
1	21°58'17.64"N	69°15'43.40"E
2	21°59'3.48"N	69°17'10.94"E
3	21°59'17.13"N	69°17'56.13"E
4	21°58'58.36"N	69°17'56.58"E
5	21°58'57.82"N	69°17'50.79"E
6	21°58'45.92"N	69°17'50.52"E
7	21°58'47.16"N	69°18'4.89"E
8	21°57'8.56"N	69°18'31.60"E
9	21°56'27.45"N	69°17'18.40"E
10	21°57'6.21"N	69°16'50.52"E
11	21°57'19.28"N	69°16'32.07"E
12	21°57'21.69"N	69°16'28.80"E
13	21°57'50.71"N	69°16'6.99"E

4. Planned Methodology

- The drilling for Limestone and Bauxite is to be carried out on the grid pattern of 400 x 400 meters as the deposit is of irregular habit, for G3 stage as per MEMC, 2015.
- The drilling will be carried out with the help of hydraulic drilling rigs.
- The depth for each borehole is set to be 40 meters or depending on the encountered mineralized zone.
- As it is bedded deposit so the drilling will be vertical.
- The Blocks boundary shall be surveyed by DGPS in WGS-84 datum for demarcation of block boundary/corner points.
- Boreholes will be fixed on the ground whose RL's and co-ordinates of survey and exploration points will be determined.

5. Nature Quantum and Target

Nature and Quantum of work proposed

Components	G3
Aerial reconnaissance	NA
Geological Survey	NA
Scout drilling / Systematic drilling Only Systematic drilling	Refer below point no. 6
Petrographic and mineral- graphic studies	Bulk density/Specific Gravity studies
Synthesis of all available data	i) Integration of regional/ detailed geophysical, geological and geochemical data, if not done earlier. ii) Synthesis of all available data and Report writing

Borehole spacing (As per MEMC, 2015)

Type of deposit	Bedded Stratiform and Tabular deposit of regular habit (Minerals to be identified)	Bedded stratiform and tabular deposits of irregular habit (Minerals to be identified)	Lenticular bodies occurring en echelon Lenses, pockets. (Different minerals)
G3 Stage	Not applicable	400 m	Not applicable
	(Vertical depth of intersection of mineralised zone for different level boreholes should be specified, number of boreholes (first, second, third), borehole spacing, approximate length of different level of boreholes may also be specified)		

6. Exploratory Drilling

- The boreholes shall be in depth range of approximately 40 m. However, this is indicative only and may vary as per actual geological conditions.
- Type of Drilling: Core drilling by Hydraulic Drilling Rigs.
- Borehole size: The holes shall be derived in NQ sizes.
- While drilling, wherever water table is encountered, depth of the water table should be recorded and to be mentioned in the driller logs.
- The core recovery in all the formation should be at least 90% except in fault zone, weathered zone, soil, sand and structurally disturbed area.

7. Manpower deployment

Sl. No.	Activities	Unit	MONTHS					
			1	2	3	4	5	6
1	Camp Setting	Month						
2	Surface Drilling (3 rigs)	m.						
3	Survey Party days (1 Party)	day						
4	Geologist Party days in field (1 Party)	day						
5	Sampling Party days, Core Sampling (1 party)	day						
6	Laboratory Studies	Nos.						
7	Camp Winding	Month						
8	Geologist Party days in HQ (1 Party)	day						
9	Geological Report Writing with Peer Review	Month						

Note: 1. Commencement of project may be reckoned from the day the exploration acreage is available along with all statutory clearances.

2. Time loss on account of monsoon/agricultural activity/forest clearance/local law & order problem may be additional to above time line.

8. Break-up of expenditure

The cost has been estimated based on actual schedule of rates mandated in the circular OM No. 61/1/2018/NMET dated 31st March 2020 for NMET funded projects which is **Rs. 365.47 Lakhs**. The detailed cost sheet for G-3 exploration for Limestone and Bauxite in proposed Jodhpur-Satapar Block is given below:

SL. NO.	Item	Estimated Cost (Rs.)
1	Drilling	1,79,78,440
2	Geology and Survey	29,02,000
3	Laboratory	82,55,200
	Sub Total (1 to 3)	2,91,35,640
4	Exploration Report	14,56,782
5	Proposal Preparation	3,80,000
	Total	3,09,72,422
	GST 18%	55,75,035
	Grand Total (including GST)	3,65,47,457
	Say Rs. In Lakhs	365.47

9. References

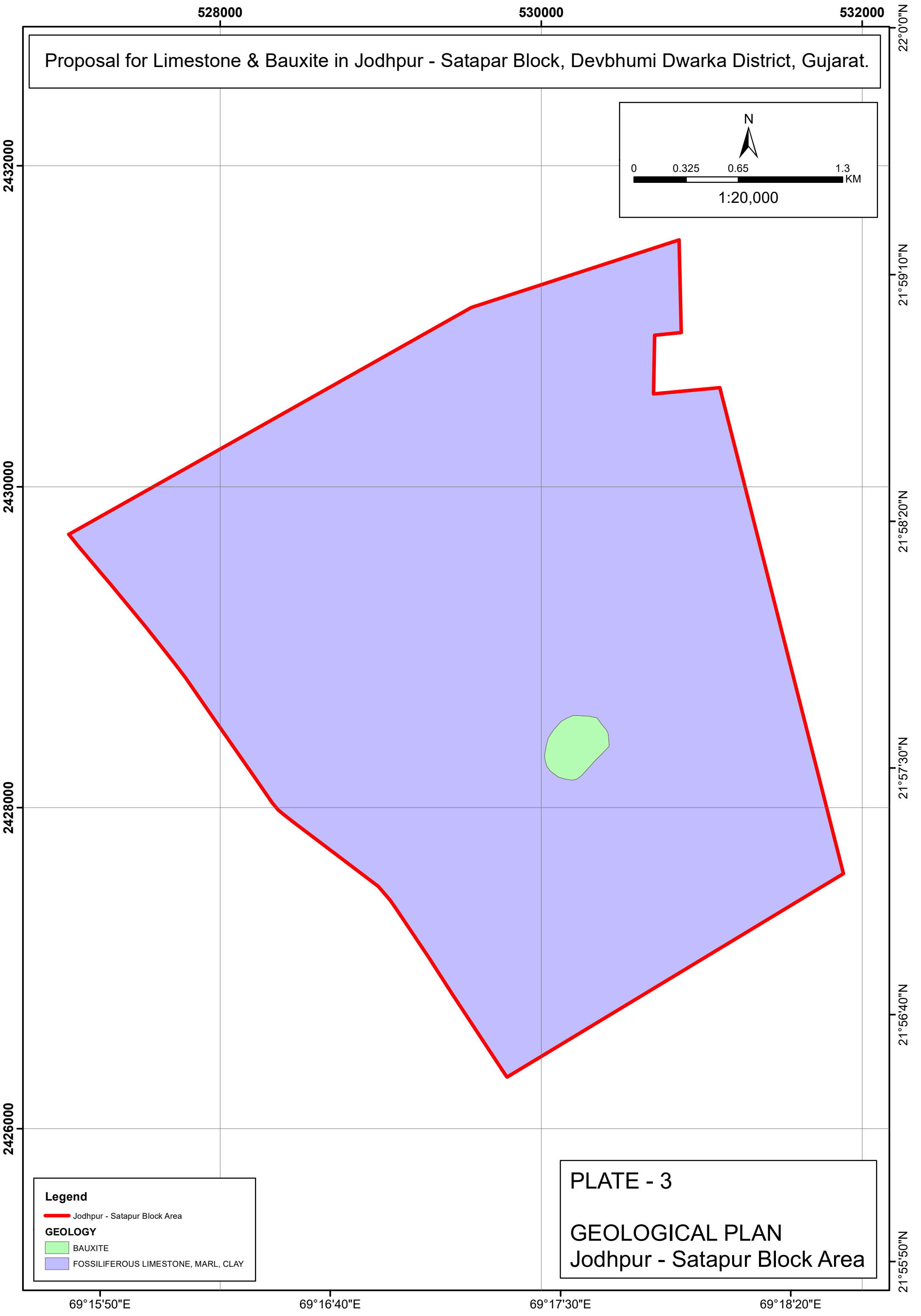
- “Report on the Bauxite deposits in some of the village of Kalyanpur Mahal Jamanagar district” by Shri H. R. Vyas (1966-67), CGM, Gujarat State.
- “Geological report of Jodhpur Block, Kalyanpur taluka of Devbhumi Dwarka district, Gujarat of Devbhumi Dwarka limestone drilling scheme (field season-2018-19) by CGM, Gujarat State.
- Bhukosh (www.gsi.gov.in)

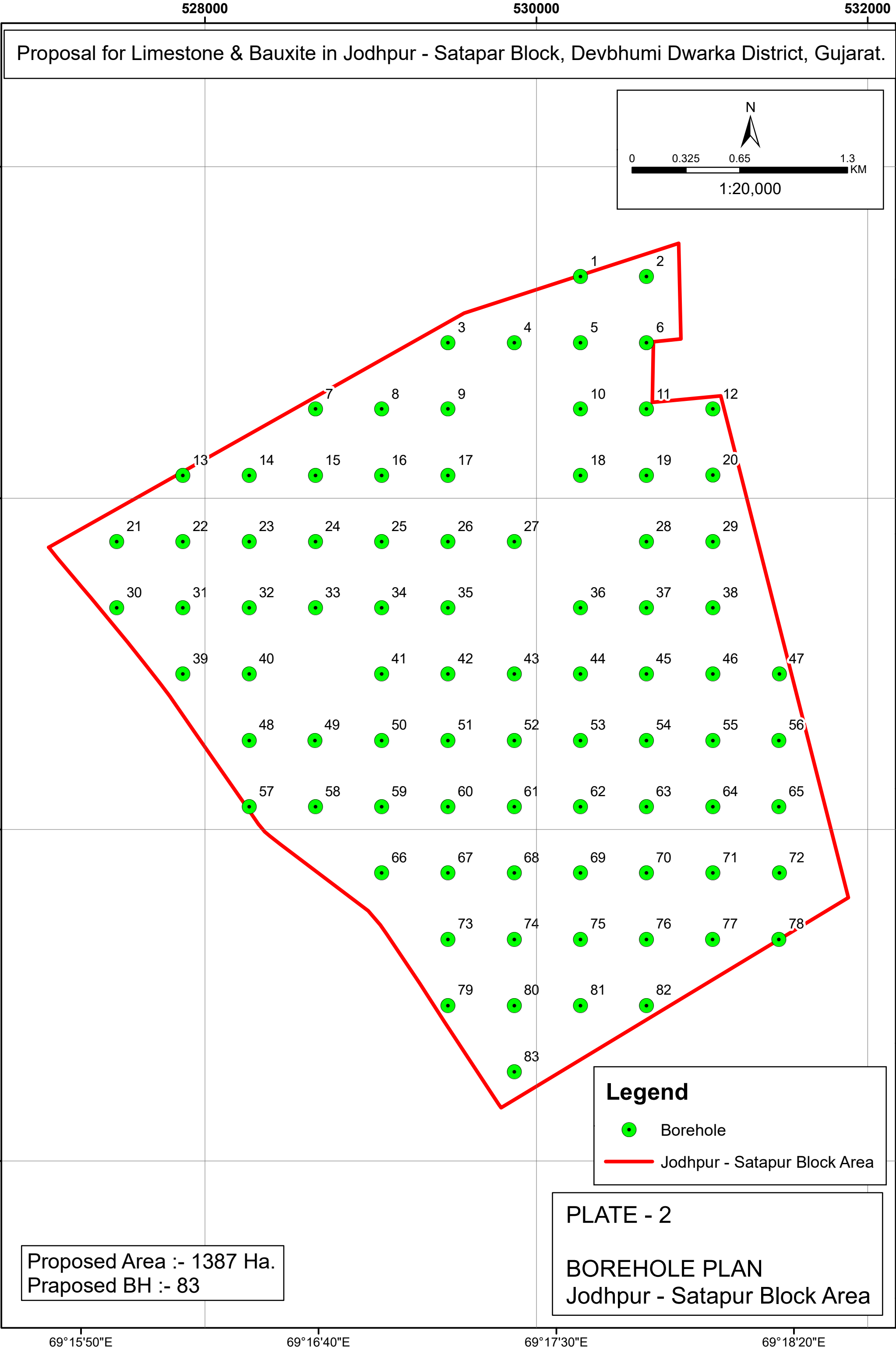
List of Plates

Plate 1: Proposed block boundary over existing Geological map.

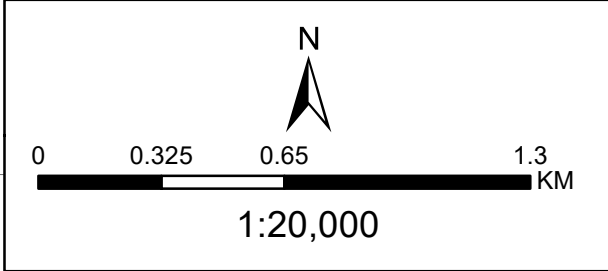
Plate 2: Proposed Borehole Location Map.

Plate 3: Proposed block boundary over topographic map.





Proposal for Limestone & Bauxite in Jodhpur - Satapur Block, Devbhumi Dwarka District, Gujarat.



Legend

- Borehole
- Jodhpur - Satapur Block Area

PLATE - 2

BOREHOLE PLAN

Jodhpur - Satapur Block Area

Proposed Area :- 1387 Ha.

Praposed BH :- 83

Proposal for Limestone & Bauxite in Jodhpur - Satapur Block, Devbhumi Dwarka District, Gujarat.

Legend

Jodhpur - Satapur Block Area

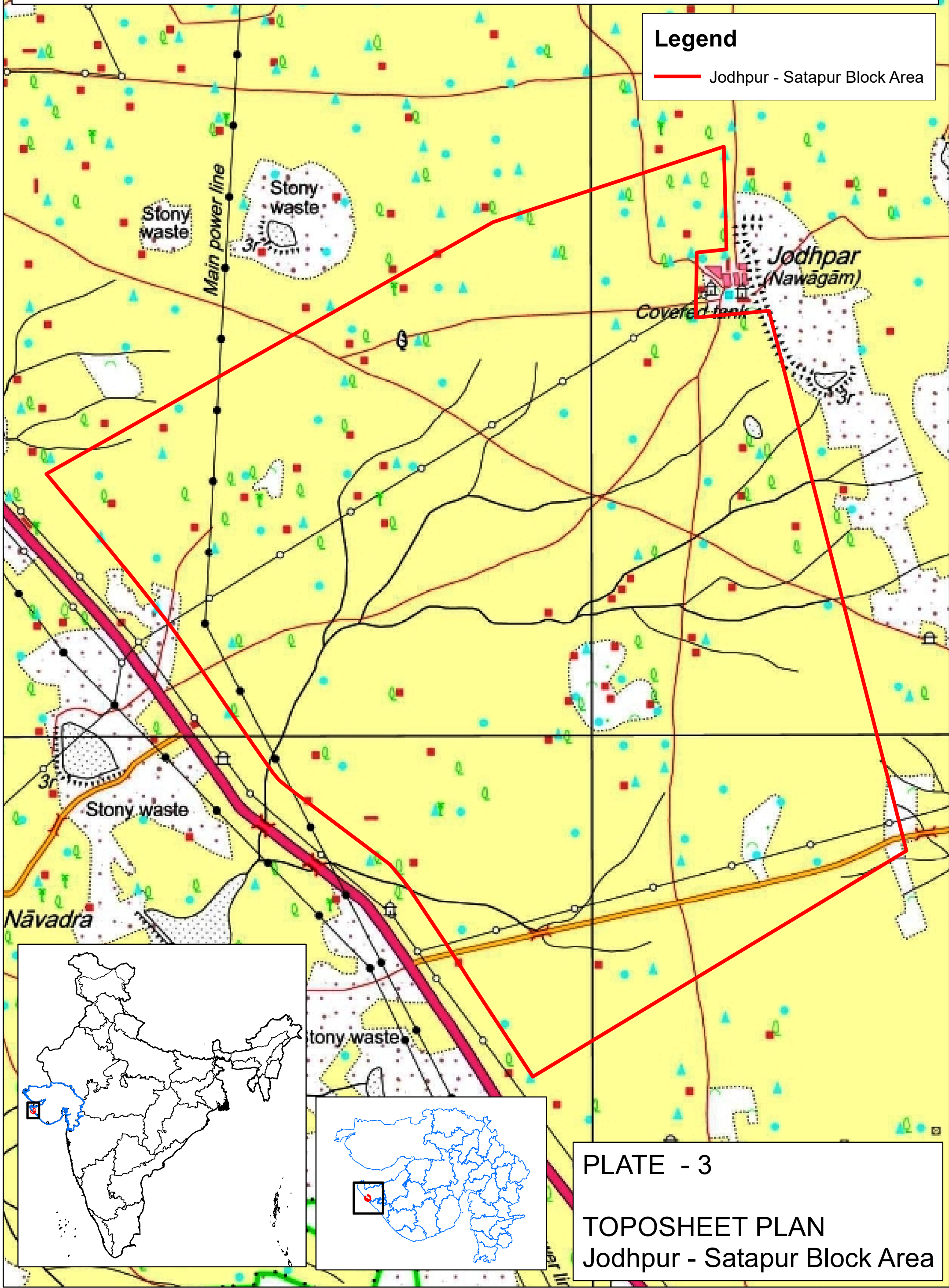


PLATE - 3

TOPOSHEET PLAN
Jodhpur - Satapur Block Area

Cost Estimate for Exploration of Limestone and Bauxite in Jodhpur-Satapar Block											
SL. NO.	Item of Work	Unit	Base	Financial Year (2023-24)			Financial Year (24-25)			Total	
			Rate	Esc.Rate	Qty.	Amount	Esc.Rate	Qty.	Amount	Qty	Amount
			1.4.90	(Rs)		(Rs)					(Rs)
A	DRILLING										
1	Surface Drilling (3 Rigs)	m.		5242	3320	17403440	0	0	0	3320	17403440
2	Transportation	Km.		36	0	0	0	0	0	0	0
3	Accommodation	One time / Drill		75000	1	75000	0	0	0	1	75000
4	Camp Setting / Winding	Drill/ month		500000	1	500000	0	0	0	1	500000
5	Road Making (Hilly Terrain)	Km		22020	0	0	0	0	0	0	0
	Sub Total A					17978440			0		17978440
B	GEOLOGICAL WORK										
1	Survey Party Days (1 party)	day		8300	60	498000	0	0	0	60	498000
2	Geologist Party days (1 party)	day		11000	200	2200000	0	0	0	200	2200000
3	Core Sampling Party days(1 party)	day		5100	40	204000	0	0	0	40	204000
	Sub-Total B					2902000			0		2902000
C	LABORATORY STUDIES										
a	Chemical Analysis										
1	<u>Primary + Check Samples</u>										
	i) for 6 radicals (CaO,MgO,Al ₂ O ₃ ,SiO ₂ ,Fe ₂ O ₃ & LOI)	Nos		2841	1500	4261500	0	0	0	1500	4261500
	ii) External Check Samples for 6 radicals (CaO,MgO,Al ₂ O ₃ ,SiO ₂ ,Fe ₂ O ₃ & LOI)	Nos		2841	50	142050	0	0	0	50	142050
	iii) For additional 2 Radicals SO ₃ & P ₂ O ₅	Nos		670	120	80400	0	0	0	120	80400
2	<u>Composite Samples</u>										
	i) for 12 radicals (CaO, MgO, Al ₂ O ₃ , SiO ₂ , Fe ₂ O ₃ , SO ₃ , P ₂ O ₅ , Mn ₂ O ₃ , TiO ₂ , K ₂ O, Na ₂ O & LOI.)	Nos		4851	250	1212750	0	0	0	250	1212750
b	Physical Analysis										
1	X-RD Studies on composite	Nos		4000	70	280000	0	0	0	70	280000
2	Spectroscopic Studies	Nos		24360	70	1705200	0	0	0	70	1705200
3	Preparation of thin section	Nos		2353	70	164710	0	0	0	70	164710
4	Petrographic Studies	Nos		4232	70	296240	0	0	0	70	296240
5	Specific Gravity determination	Nos		1605	70	112350	0	0	0	70	112350
	Sub-Total C					8255200			0		8255200
	Total A+B+C					29135640			0		29135640
D	EXPLORATION REPORT - 5% of								1456782		1456782
E	PROPOSAL PREPARATION - 2% of approved project cost or 3.8 lakh whichever is lower					380000			380000		380000
	GRAND TOTAL A to D					29135640			1456782		30972422
						Total				Say 309.72 Lakhs	