# Proposal for Sangmania Limestone Block, District Satna, Madhya Pradesh for G_3 Stage Mineral Exploration under NMET

# (Bulk Mineral)

# By

# The MP State Mining Corporation Ltd, Madhya Pradesh

**Summary of the Block for G3 stage exploration**

| | Features | Details |
|---|---|---|
| | Block ID | Sangmania Limestone Block |
| | Current Exploration Agency | The MP State Mining Corporation Ltd |
| | Previous Exploration Agency | The MP State Mining Corporation Ltd |
| | G4 stage Geological Report (Previous stage Geological Report) | Report is attached. |
| | Commodity | Limestone |
| | Mineral Belt | Nagod Limestone |
| | Completion Period with entire Time schedule to complete the project | 12 months |
| | Objectives | To enhance the exploration level of this 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 | Will be carried out by MPSMCL & few components through outsourcing. |
| | Name/ Number of Geoscientists | 01 |
| | Expected Field days (Geology, Geophysics, Surveyor) | 80 |
| 1. | Location | |
| | Latitude | |
| | Longitude | |
| | Villages | Pureni, Bari Kalan, Nimi, Baraj & Poindha Kurd |
| | Tehsil/ Taluk | Raghurajnagar |
| | District | Satna |
| | State | Madhya Pradesh |
| 2 | Area (hectares/ square kilometers) | 407.52 Hect |
| | Block Area | 407.52 Hect |
| | Forest Land | Nil |
| | Government Land Area | N/A |
| | Private Land Area | N/A |
| 3 | Accessibility | |
| | Nearest Rail Head | Satna Railway Station is 20 Km |
| | Road | Satna Semaria Raod |
| | Airport | Khajuraho Airport is 113 Km |
| 4 | Hydrography | |
| | Local Surface Drainage Pattern (Channels) | Dendritic |
| | Rivers/ Streams | The area is an almost flat terrain with a general slope towards NE direction,the topography of the area is simple with a plain land. The district is mainly drained by Tamas river and their tributaries. There are numerous nalas traversing the area and which provide drainage to the area. All the small nalas gets dry during the summer season. |

| | | |
|---|---|---|
| 5 | Climate | |
| | Mean Annual Rainfall | 1100 mm |
| | Temperatures (December)<br>(Minimum) Temperatures (June)<br>(Maximum) | Up to $4^0$C (Dec., Jan.)<br><br>Up to $47^0$C (May, June.) |
| 6 | Topography | |
| | Toposheet Number | 63D/14 |
| | Morphology of the Area | Moderately Undulating |
| 7 | Availability of baseline geoscience data | |
| | Geological Map (1:50K/ 25K) | Available |
| | Geochemical Map | Available |
| | Geophysical Map (Aerogeophysical, Ground geophysical, Regional as well as local scale GP maps) | NA |
| 8 | Justification for taking up G3 ~~or G2~~ stage mineral exploration | ➢ The proposed area belongs to Nagod Limestone of the Bhander Series.The Nagod Limestone of Bhander limestone formation exhibits a thickness ranging from approximately 35 to 45 meters, as observed in the nearby limestone mines operated by Birla Corporation Cement & SAIL Mines<br>➢ Three separate limestone layers have been identified: the Upper limestone, the lower limestone, and the purple to grey argillaceous limestone. The highest quality limestone is found exclusively within the Lower grey limestone stratum<br>➢ Maps prepared by all earlier GSI exploration have already established the presence of limestone in the region.<br>➢ G4 exploration carried out by MPSMC also confirmed the presence of Limestone of cement grade in the block.<br>Hereby, after considering all the data MPSMC is proposing the block for G3 exploration to auction the block as ML. |

**1. Block Summary**

**REGIONAL GEOLOGY:**

Lithostratigraphically, Vindhyan Supergroup has been subdivided into four successive groups namely the Semri Group (Lower Vindhyan), Kaimur, Rewa and Bhander groups (Upper

Vindhyan) in ascending order and detailed work on geology and its allied disciplines given by pioneer earth. The Semri and Bhander groups include a heterogeneous assemblage (sandstone, shale and limestone) whereas the Kaimur and Rewa groups are predominantly arenaceous in nature.

| | Group | Subgroup | Formation |
|---|---|---|---|
| **Vindhayan Supergroup** | Bhander | | Maihar Sandstone |
| | | | Sirbu Shale |
| | | | Nagod Limestone |
| | | | Ganurgarh Shale |
| | Rewa | | Govindgarh Sandstone |
| | | | Jhiri Shale |
| | | | Assam Sandstone |
| | | | Panna Shale |
| | Kaimur | | Dhandraul Quartzite |
| | | | Scarp Sandstone & Conglomerate |
| | | | Bijaigarh Shale |
| | | | Susnai Breccia |
| | | | Upper Quartzite |
| | | | Lower Quartzite |
| | Semri | Rohtas Subgroup | Bhagawar Shale |
| | | | Rohtas Limestone |
| | | Kheinjua Subgroup | Rampur Sandstone |
| | | | Salkhan Limestone |
| | | | Koldaha Shale |
| | | Deonar (Chopan Porcellanite) | |
| | | Mirjapur Subgroup | Kajrahat Limestone |
| | | | Arangi |
| | | | Deoland |
| **Mahakoshal / Bijawar Group** | | | |

After Journal of Evolutionary Biology Research Vol. 1 (1), pp. 001-017, December, 2009 Available online at http://www.academicjournals.org/jebr © 2009 Academic Journals:Discovery of carbonaceous remains from the
Neoproterozoic shales of Vindhyan Supergroup, India"Singh V. K. et. al. (2009).

## Structural Set up:

The Lithounits trend in NE-SW direction with very low northerly dipping to almost horizontal strata. Local warping and slumps in shaly horizons are common features noted in the area. Shales are highly weathered and the limestone is capped by varyingly thick soil cover. The limestone is exposed in small pits, at places. The sandy horizons in shales exhibit higher contours.

**GEOLOGY OF THE AREA:**

An area of about 943.178Hect.has been covered by reconnaissance survey, along with collection of outcrop samples and marking of outcrop on 1: 12500 on SOI Toposheet No. 63D/14.
An area of about 943.178 Hect. was surveyed along with recording of stratigraphic units given in lithology. The rock formation of Limestone (Nagod) belong to the Bhander group of upper Vindhyan is exposed in the area. The main lithological formation, which were encountered in the area are Nagod Limestone and Sirbu shales in patches at places. They are mostly capped by varyingly thick soil and calcareous shaly horizons. These rock formations are almost horizontally bedded, howeverat places northerly dips varing from $2_0$ to $4_0$ due North were observed. Thegrey to bluish grey limestone was seen as forming a sickle within Sirbu and Ganurgarhshale. (Plate 2)

**Sirbu Shale:-**

This shale is purple in colour. Below this shale occurs another horizon of olive green shale. The prominent outcrops of the Sirbu shales are encountered on the high land area around villages Bhati that is on the half way between Cement factory and Sagmania Limestone mines. Also another prominent exposure of Sirbu shales within surrendered area is encountered in North-Western part both in Puraini, Barikala and Baraj villages. Olive green shale area also found at places superimposed by purple shale. Small isolated occurrences of Sirbu shales with sandy partings were also seen.

**Bhander (Nagod) limestone:–**

It is light to dark grey in colour, fine grained, massive to bedded. At places, it shows stromatolitic structure.The limestone deposits in the area show fairly frequent variation in quality and thickness both laterally and vertically. In several localities, the good quality limestone beds are inter-bedded by low grade limestone and shale. Therefore at some places, it is highly siliceous and argillaceous in nature.

The limestone is well bedded, fine to medium grained, grey to dark grey in colour. Overall, it is heterogeneous with lateral end vertical variation in respect of lithology and chemical content.

**Mode of occurrence: -**

In the investigated area, the limestone is erratic in nature. It doesn't exhibit a homogenous nature. The relief of limestone area is undulating. It is stratified with a very gentle dip due north at places. The local warp was also seen. In the area limestone beds are generally found to be covered by varying thick black cotton soil. The limestone is horizontal with dip varying from $2^0$ to $5^0$ in the direction varying from $N10^0E$ to $SN10^0W$.

The area was proposed for G-4 level prospecting in Puraini, Barai, Nimi, Bathia and Naina area in the field season 2019-20,and 2020-21. The Reconnaissance survey was done in an around the block area. Major geographical feature and litho logical units were marked. The area is ubiquitous Vindhyan terrain. The outcrops are far and few and mostly covered by varying thick soil. These are briefed in previous chapter. The assigned block area was mapped in detail mapping on 12500 scale. All the geographical features (road, nalla, habited, tank, high-tension line, pit, school etc.) and outcrops were marked on the map. The general geological succession can be represented as below:

| Age | Supergroup | Group | Lithology |
|---|---|---|---|
| Recent to Sub Recent | | | Soil / Alluvium |
| Proterozoic | Vindhyan | Bhander | Sirbu Shale |
| | | | Nagod Limestone |

The area is cultivated land and lithounits area covered with varyingly thick soil. Soil is generally black cotton type. Thin capping of brown to grey shale was observed in pits and nalla cuttings. In the adjoining area, large pits of mining lease of M/s Birla corp. exhibit presence of limestone beneath shales. Limestone generally trends NE-SW direction with a minute dip of 20 to 50 towards North. Local warping was also observed.

## 2. Previous work

The area was surrendered by M/s Birla Corporation limited. As per information available, initial prospecting and exploration by diamond core drilling was carried out during the year from 1957 to 1959 uptoa depth of 20M at grid interval of 800M in the area. Total 6 numbers of boreholes were drilled in the area. Since long, The DGM is actively engaged in the regular field programmes of survey and prospecting various mineral deposits of the state. The DGM had already undertaken and completed preliminary and detailed assessment of high grade Limestone block in the nearby area. Pandey and Dhopeshwar (2016) investigated Cement grade limestone in the Nagod area. Bajpai and Parmar(2016) investigated Cement grade limestone in Ramsthan area. These areas were handed over to MECL for further prospecting. Subsequently these areas are put on auction in year 2021.

MPSMCL have carried out G4 level of exploration of the area. The Geological Report of the same area has been attached.

**Summary**

(i) Detailed Mapping has been carried out on 1:12500 scale.
(ii) A total of 239m drilling has been carried out in six boreholes.
(iii) A total of 125 core samples are analyzed
(iv) Limestone resource of cement grade is 116.33 Million MT + blendable grade is 158.31 Million MT is estimated,
(v) A total of 274.64 Million MT resources is estimated.

## 3. Block description

The Sangmania Limestone Block is situated in Satna district of Madhya Pradesh and falling under toposheet No.63D/14. The co-ordinates of corner points of block are attached.

## 4. Planned Methodology

Work will start with geological mapping of the block on 1:4000 scale.

Core drilling will be carried out at G3 level of exploration as per "The Minerals (Evidence of Mineral Contents) Rule 2015.

Surface sampling along with Groove sampling will be done during the course of mapping. Pitting & trenching will carried out at G3 level of exploration as per "The Minerals (Evidence of Mineral Contents) Rule 2015.

Chemical analysis (CaO, MgO, $Fe_2O_3$, $Al_2O_3$, $SiO_2$ & LOI) of all the samples will be done from departmental laboratory as well as NABL accredited laboratories.

10% 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, estimation of the Mineral Resources (G3) and grade for limestone in the block as per UNFC and MEMC-2015 and report writing work.

**5.0 Nature Quantum and Target**

| Components | G3 Stage | Proposed Quantum |
|---|---|---|
| **Aerial reconnaissance** | Remote sensing, airborne geophysical survey etc. | Not needed |
| **Geological Survey** | i 1.25K/ 12.5K<br><br>ii Assessment of lithology, structure, surface mineralisation and analysis of old history of mining, if any. | Detailed mapping on 1:4000 scale – 4.07 Sq Km |
| **Geochemical Survey** | i Regional Grab / chip / Stream Sediment / Soil Sampling<br>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) | 20 |
| **Drilling /**<br><br>**Systematic drilling** | Few boreholes if required along the positive profiles delineated by surface sampling/pitting trenching (Mts) | 19 (760 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). | |
| **Core sample** | Sample from mineralized zones as well as hanging wall/footwall Side to be collected. Sample length to be specified (Mts) | 600 |
| **Petrographic and mineragraphic studies** | Principal rock types, mineral assemblage, identification of minerals of interest (Numbers) | 10 |
| **Synthesis of all**<br><br>**available data** | i) Integration of regional geophysical, geological and geochemical data.<br>ii) Synthesis of all available data and Report writing | As required |

## 6. Exploratory Drilling

A total of 15 more bore holes are proposed in the area with average depth of 40 meters.

The proposed bore hole location plan is given in the attached anx.

## 7. Manpower Deployment

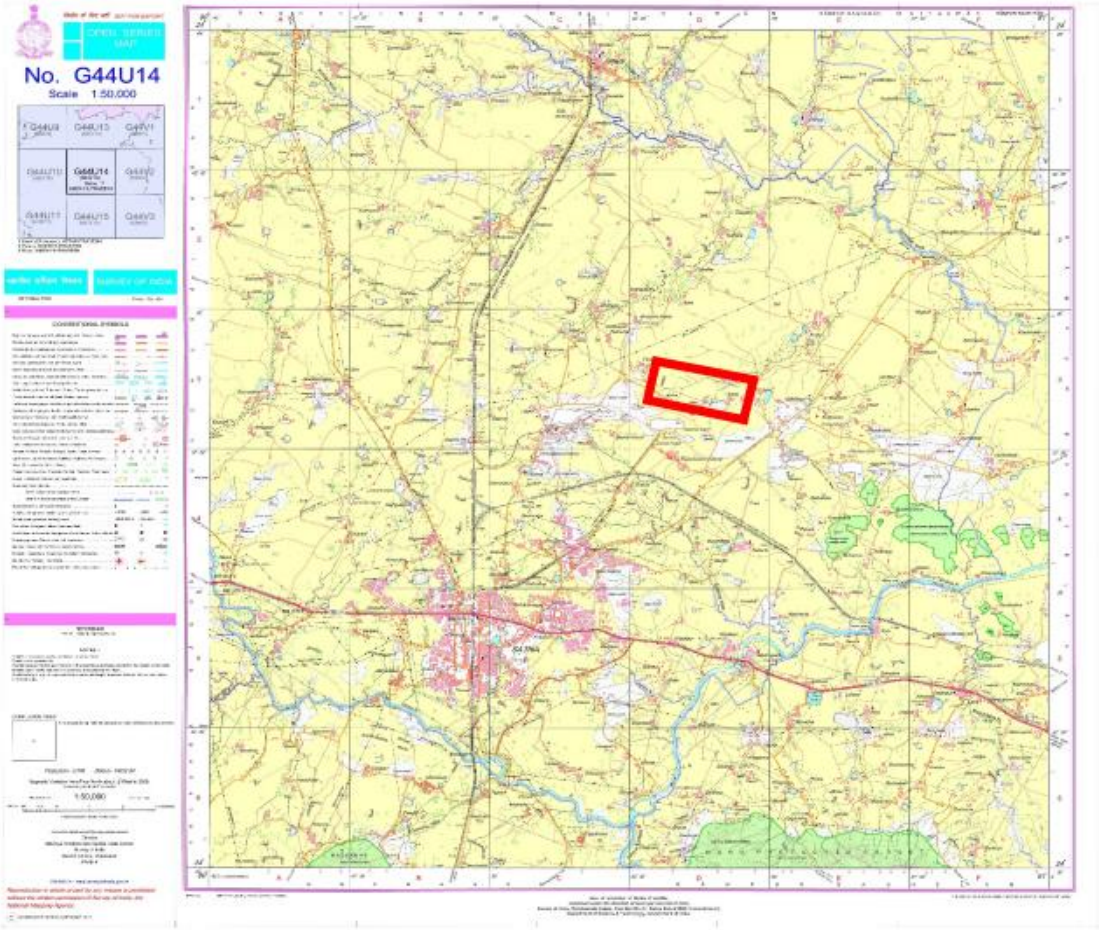
| For Geologist | |
|---|---|
| Area (Sq Km) | 4.07 |
| Field Work Days | 80 |
| HQ Work Days | 50 |
| Labour | 160 |
| Core Drilling | |
| No of Boreholes | 19 |
| Drilling Depth | 40 |
| Meterage | 760 |
| Let 75% be analyzed (Numbers) | 600 |
| Pitting & Trenching | |
| Numbers of pits / Trenching | 10 |
| Length (Mts) | 1 |
| Breath (Mts) | 1 |
| Depth (Mts) | 2 |
| Total Volume (M3) | 20 |
| Number of Samples & Analysis | |
| From BH | 600 |
| Surface Sample numbers | 0 |
| Total Samples | 620 |
| Internal Check @ 5% | 0 |
| External Check @ 10% | 62 |
| Composit Samples @ 10% | 0 |
| Total Samples | **682** |

**9.00 Reference**

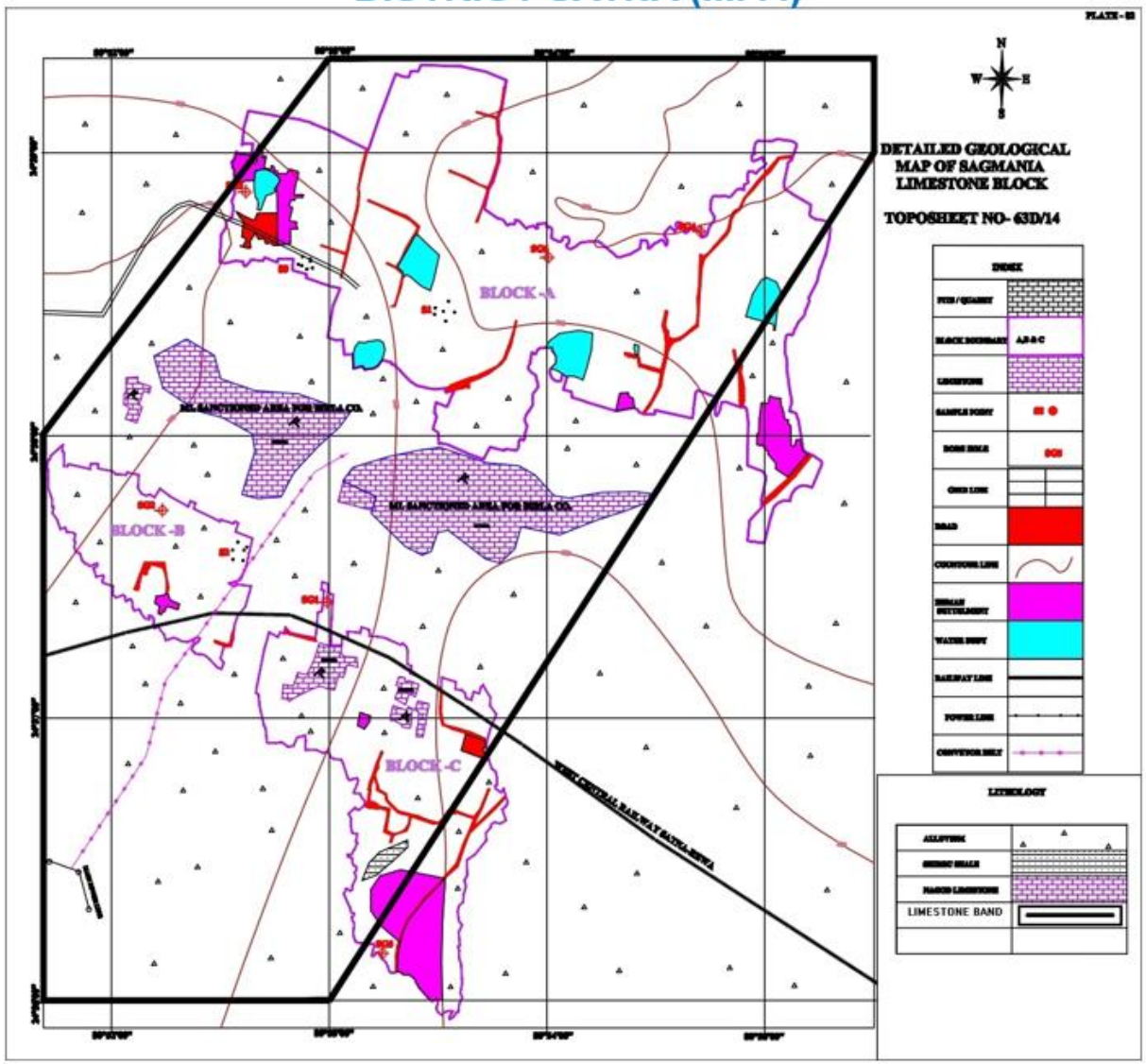
| Sr No | Report Number | Report Detail | Author | Mision | Theme | Toposheet No | FS From | FS To |
|---|---|---|---|---|---|---|---|---|
| 1 | CR-005041 | REPORT OF INVESTIGATION OF THE LIMESTONE DEPOSITS NEAR SATNA, MADHYA PRADESH | S.M. MATHUR ,H.N. SINGH | Mineral Assessment-Strategic Minerals, Industrial and Fertilizer Minerals | Industrial Mineral | 63D10, 63D14 | 1956 | 1957 |
| 2 | CRO-11766 | Report On The Study And Preliminary Assessment Of The Bauxite Occurrences Of Nougam Area And Naru Hill, Satna District, Madhya Pradesh. | K.Srinivasa Rao, Chaman Lal | Mineral Assessment-Ferrous Group and Base Metal | Non Ferrous Minerals (Bauxite,etc.) | 63D14, 63D13, 63D15 | 1972 | 1973 |
| 3 | CR-015129 | Interim Report On The Study Of Stromatolites From The Vindhyan Supergroup Of Rocks Of Satna, Rewa And Panna Districts Of Madhya Pradesh | SUMANT GUPTA | Fundamental Geosciences and Research | Palaeontological Studies | 63D14, 63H02, 63D06, 54P13, 63D11, 63H06, 63D09, 63D10, 63D15, 63D01, 63D05, 63D03 | 1981 | 1982 |
| 4 | | MPSMCL Report on Sangmania (NMET) | Pramod Dhoke & SV Dhopeshwar | Mineral Assessment-Limestone | Bulk Mineral | 63D14 | 2019 | 2021 |

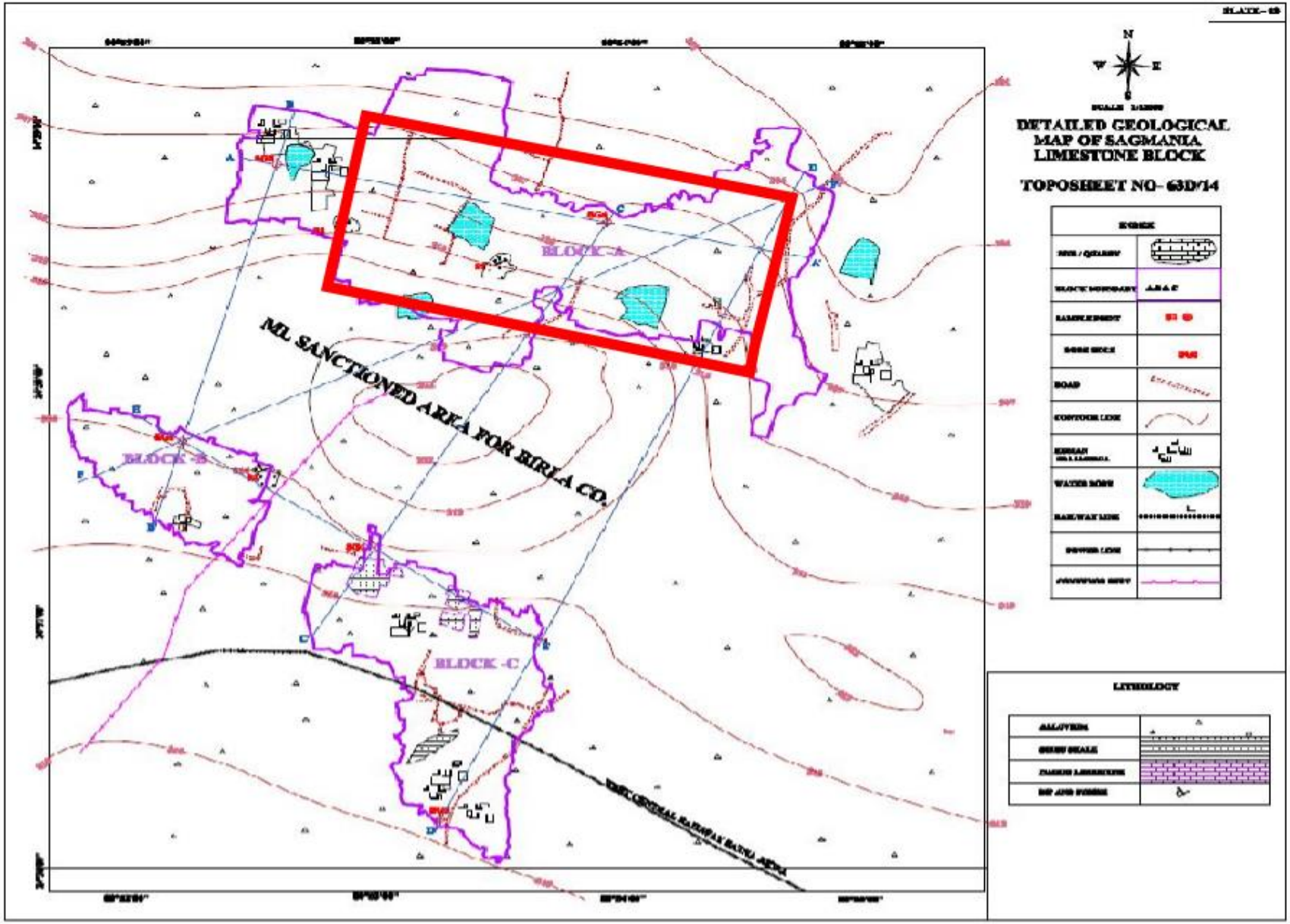
Location map of Sangmania Limestone Block
Area-4.07 sq.km
District- Satna, MP


Sangmania Limestone Block
Toposheet No- 63D/14
Area-407.52 Ha
District-Satna, MP



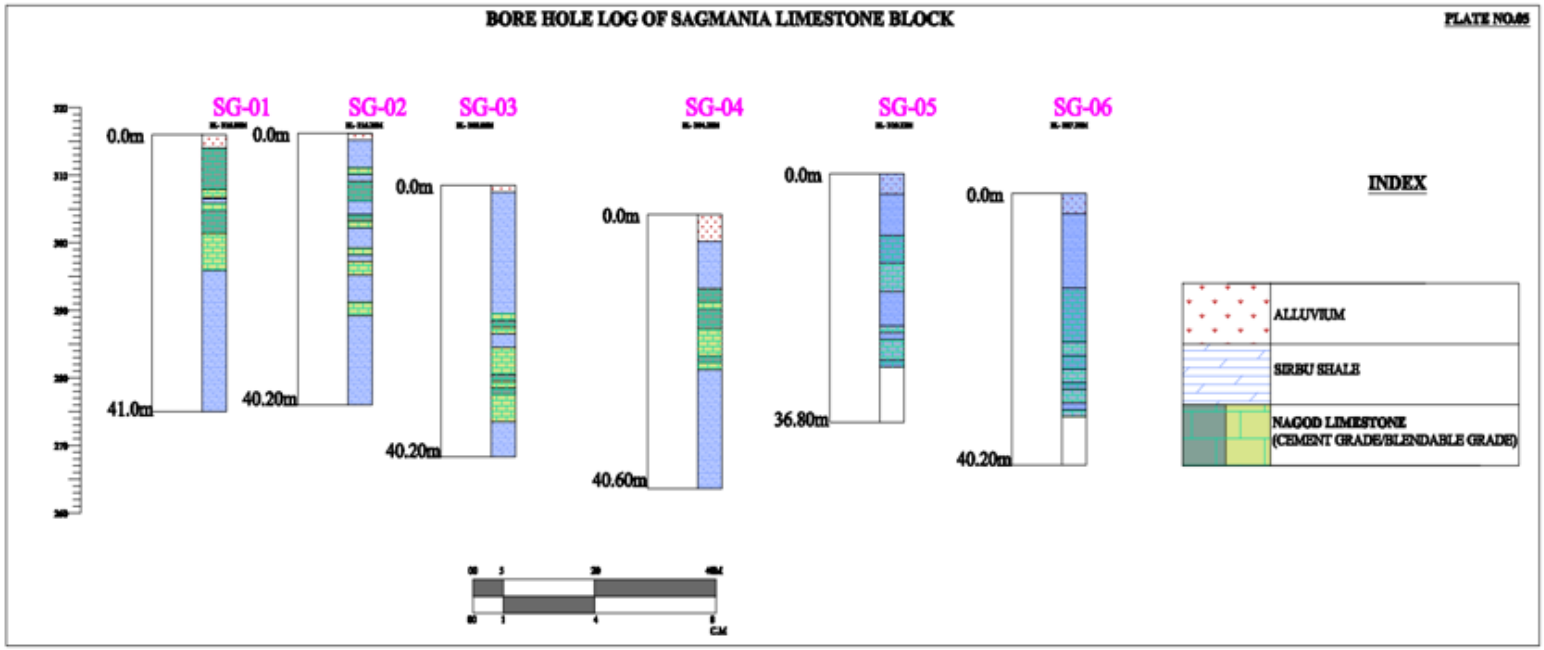
# DETAILED GEOLOGICAL MAP OF SAGMANIA LIMESTONE BLOCK, DISTRICT SATNA (M. P.)




DETAILED GEOLOGICAL
MAP OF SAGMANIA
LIMESTONE BLOCK
TOPOSHEET NO- 63D/14
ML SANCTIONED AREA FOR BIRLA CO.
BLOCK -A
BLOCK -B
BLOCK -C
LITHOLOGY


| Sangmania block boundary points | | |
|---|---|---|
| **Point ID** | **Longitude** | **Latitude** |
| A | 80°52'59.07"E | 24°39'4.32"N |
| B | 80°54'43.74"E | 24°38'44.43"N |
| C | 80°54'33.60"E | 24°38'1.70"N |
| D | 80°52'49.69"E | 24°38'22.49"N |

# Lithological section of SG3, SG4 and SG6



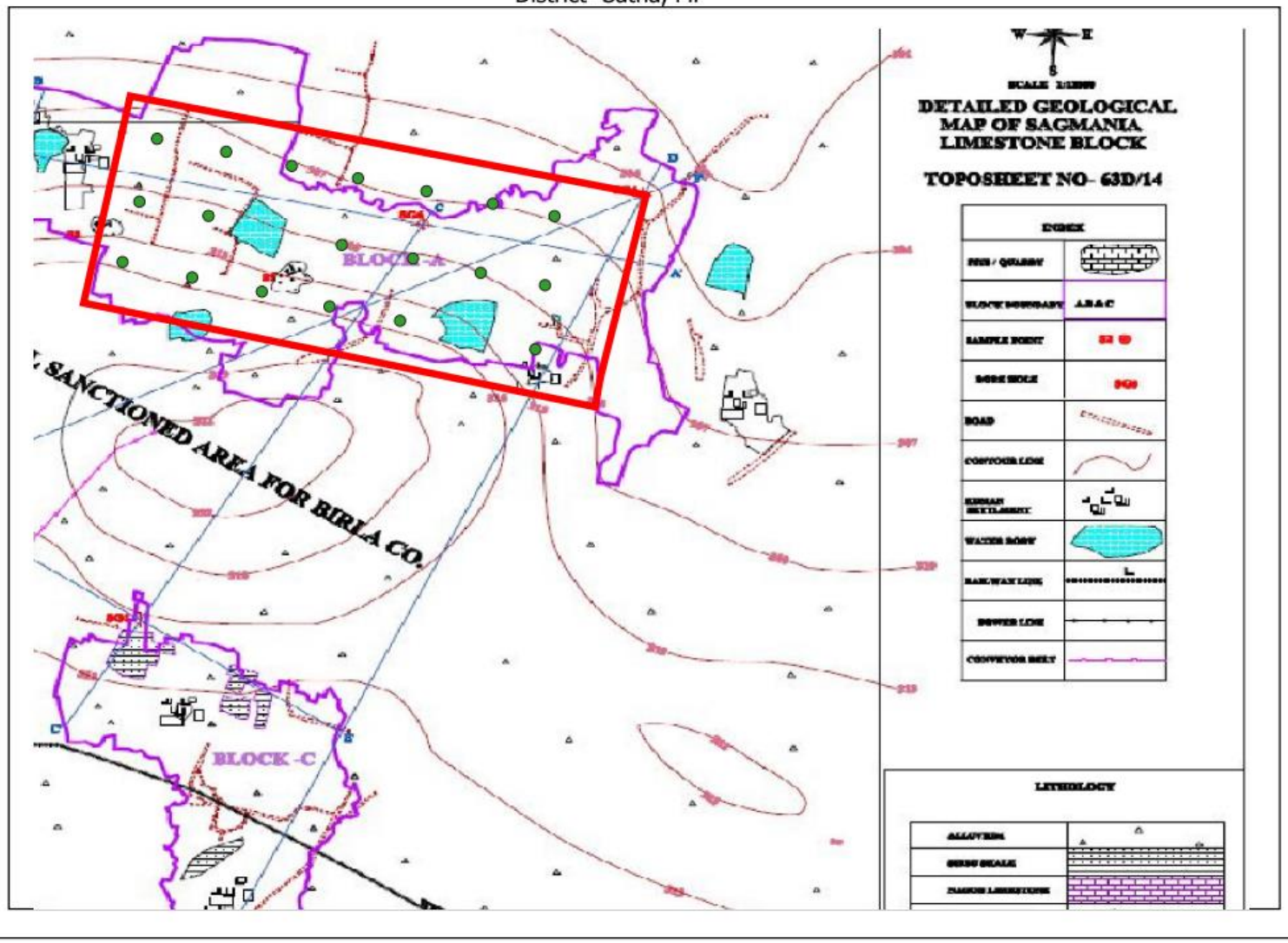
**Boreholes Showing cement grade Limestone bands (+42 % CaO)**

| S. NO. | BH No. | Run | | Total | Core | Chemical Analysis | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | from | to | | | $SiO_2$% | $Fe_2O_3$% | $Al_2O_3$% | CaO% | MgO% |
| 1 | SG-01 | 2.00 | 7.60 | 5.60 | 5.15 | 5.27 | 0.58 | 0.76 | 47.89 | 1.77 |
| | | 11.60 | 14.00 | 2.40 | 2.05 | 14.49 | 0.83 | 1.34 | 44.71 | 1.55 |
| 2 | SG-02 | 7.10 | 14.00 | 6.90 | 4.15 | 21.33 | 0.80 | 1.86 | 42.02 | 2.53 |
| 3 | SG-03 | 20.00 | 21.00 | 1.00 | 0.80 | 8.28 | 0.80 | 0.80 | 49.13 | 0.97 |
| | | 28.00 | 29.00 | 1.00 | 0.90 | 11.22 | 0.80 | 0.96 | 43.07 | 5.48 |
| | | 30.00 | 31.00 | 1.00 | 0.60 | 5.12 | 0.60 | 0.54 | 48.90 | 3.90 |
| 4 | SG-04 | 11.00 | 17.00 | 6.00 | 2.20 | 12.93 | 0.60 | 0.94 | 45.94 | 1.50 |
| | | 21.00 | 22.00 | 1.00 | 0.80 | 14.00 | 1.20 | 1.14 | 42.40 | 3.87 |
| 5 | SG-05 | 9.15 | 13.20 | 4.05 | 3.70 | 4.22 | 0.60 | 1.08 | 50.92 | 1.33 |
| 6 | SG-06 | 14.00 | 22.00 | 8.00 | 3.90 | 10.53 | 0.66 | 3.60 | 45.05 | 1.97 |
| | | 24.00 | 26.00 | 2.00 | 1.40 | 10.35 | 1.20 | 4.01 | 43.18 | 3.14 |
| | | 28.00 | 29.00 | 1.00 | 0.95 | 11.10 | 1.00 | 4.70 | 43.07 | 2.60 |

**Boreholes Showing Blendable grade Limestone bands (+34 to -42% CaO)**

| S. NO. | BH No. | Run | | Total | Core | Chemical Analysis | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | from | to | | | $SiO_2$% | $Fe_2O_3$% | $Al_2O_3$% | CaO% | MgO% |
| 1 | SG-01 | 8.10 | 9.10 | 1.00 | .1.00 | 28.24 | 1.00 | 1.60 | 35.89 | 2.26 |
| | | 10.15 | 11.20 | 1.05 | 1.00 | 21.26 | 1.50 | 2.36 | 37.01 | 4.19 |
| | | 14.60 | 20.10 | 5.50 | 4.80 | 22.24 | 1.12 | 2.15 | 39.95 | 1.54 |
| 2 | SG-02 | 5.10 | 6.10 | 1.00 | 0.80 | 12.48 | 1.70 | 1.28 | 39.26 | 6.77 |
| | | 17.00 | 18.00 | 1.00 | 0.75 | 20.30 | 0.40 | 2.94 | 39.93 | 2.10 |
| | | 19.00 | 21.00 | 2.00 | 1.45 | 21.04 | 0.50 | 3.02 | 38.22 | 3.10 |
| | | 25.00 | 27.00 | 2.00 | 1.60 | 17.56 | 0.25 | 3.54 | 39.37 | 3.79 |
| 3 | SG-03 | 19.00 | 20.00 | 1.00 | 0.70 | 27.98 | 2.00 | 2.20 | 37.46 | 0.16 |
| | | 21.00 | 22.00 | 1.00 | 0.90 | 32.12 | 2.00 | 2.34 | 34.55 | 0.81 |
| | | 26.00 | 28.00 | 2.00 | 1.40 | 10.74 | 0.95 | 1.21 | 40.82 | 6.45 |
| | | 29.00 | 30.00 | 1.00 | 0.90 | 15.54 | 1.00 | 1.30 | 41.05 | 4.52 |
| | | 31.00 | 35.00 | 4.00 | 2.40 | 20.73 | 1.22 | 1.86 | 37.01 | 4.95 |
| 4 | SG-04 | 13.00 | 14.00 | 1.00 | 0.50 | 20.10 | 0.80 | 1.38 | 40.83 | 2.42 |
| | | 17.00 | 21.00 | 4.00 | 3.40 | 13.28 | 1.00 | 1.43 | 40.49 | 6.21 |
| | | 22.00 | 23.00 | 1.00 | 0.80 | 17.48 | 1.30 | 2.08 | 39.26 | 5.00 |

Borehole Plan for G3 exploration
Sangmania Limestone block
Area- 4.07 sq.km
District- Satna, MP



| S. No. | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | Camp Setting | **Months** | | | | | | | | | | | | |
| **2** | Geological Mapping & Sampling | **Months** | | | | | | | | | | | | |
| **3** | Geophysical survey | **Months** | | | | | | | | | | | | |
| **5** | Pitting/Trenching | **Months** | | | | | | | | | | | | |
| **6** | Surface Drilling (1 rigs) | **Months** | | | | | | | | | | | | |
| **7** | Survey Party days | **Months** | | | | | | | | | | | | |
| **8** | Geologst Man days | **Months** | | | | | | | | | | | | |
| **9** | Geophysict man days | **Months** | | | | | | | | | | | | |
| **9** | Sampler Man days | **Months** | | | | | | | | | | | | |
| **10** | Camp Winding | **Months** | | | | | | | | | | | | |
| **11** | Laboratory Studies | **Months** | | | | | | | | | | | | |
| **12** | Report Writing with Peer Review | **Months** | | | | | | | | | | | | |