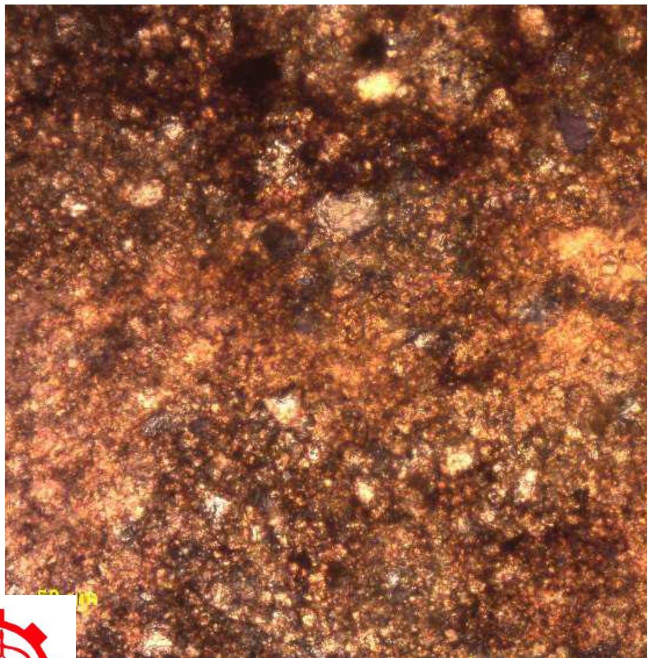
GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION (G3)

FOR LIMESTONE IN BHATURA BLOCK

(National Mineral Exploration and Development Trust)

DISTRICT: MAIHAR AND KATNI, MADHYA PRADESH

TEXT, ANNEXURES AND PLATES



MADHYA PRADESH STATE MINING CORPORATION LIMITED

A GOVERNMENT OF MADHYA PRADESH UNDERTAKING

HEAD OFFICE, BHOPAL

NOTIFIED EXPLORATION AGENCY

JANUARY-2025

GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION (G3) FOR LIMESTONE IN BHATURA BLOCK,

DISTRICT: MAIHAR AND KATNI, MADHYA PRADESH

CONTENTS

GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION (G3) FOR LIMESTONE IN BHATURA BLOCK, DISTRICT: MAIHAR AND KATNI, MADHYA PRADESH

LIST OF ANNEXURES

GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION (G3) FOR LIMESTONE IN BHATURA BLOCK, DISTRICT: MAIHAR AND KATNI, MADHYA PRADESH

LIST OF PLATES

LIST OF TABLES

GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION (G3) FOR LIMESTONE IN BHATURA BLOCK, DISTRICT: MAIHAR AND KATNI, MADHYA PRADESH

SALIENT FEATURES

<table>
<tr><td>1.</td><td>Name of the block</td><td>Bhatura block,
Tehsil – Maihar and Vijayraghavagarh
District – Maihar and Katni,
State – Madhya Pradesh</td></tr>
<tr><td>2.</td><td>Mineral</td><td>Limestone</td></tr>
<tr><td>3.</td><td>Total Area</td><td>1.38 sq.km.</td></tr>
<tr><td>4.</td><td>Area covered under present scheme</td><td>1.38 sq.km.</td></tr>
<tr><td>5.</td><td>Period of Exploration</td><td>December 2023 to September 2024.</td></tr>
<tr><td>6.</td><td>Meterage drilled by MPSMCL</td><td>Total 170 m at G-3 level</td></tr>
<tr><td>7.</td><td>No. of Boreholes drilled by MPSMCL</td><td>Total 05 Nos. at G-3 Level</td></tr>
<tr><td>8.</td><td>Thickness of Different Grade Limestone</td><td>3 meters to 5 meters</td></tr>
<tr><td>9.</td><td>Cut-off grade</td><td><table>
<tr><th>Grade</th><th>CaO % (Min)</th><th>MgCO3 %</th></tr>
<tr><td>Blendable/ Threshold</td><td>≥ 34.00</td><td></td></tr>
<tr><td>Dolomitic Limestone</td><td>>34.00</td><td>10% to 40%</td></tr>
</table></td></tr>
<tr><td>10.</td><td>Resources</td><td>A total of 8.74 million tonnes of Dolomitic Limestone net geological resources with average grade of 33.47% CaO, 8.04% MgO, 5.85 million tonnes of blendable grade limestone estimated with average grade of 38.37% CaO, 5.66% MgO</td></tr>
<tr><td>11</td><td>Grade</td><td>Dolomitic Limestone, Blendable Threshold Grade</td></tr>
<tr><td>12.</td><td>Average Grades</td><td>Dolomitic Limestone-33.47% CaO, 8.04% MgO
Blendable Grade Limestone- 38.37% CaO, 5.66% MgO</td></tr>
<tr><td>13.</td><td>UNFC Category</td><td>Inferred Category (333)</td></tr>
<tr><td>14.</td><td>Report Submission</td><td>March 2025</td></tr>
</table>

भतूरा ब्लॉक में चूनापत्थर हेतु
प्रारंभिक गवेषण पर भूवैज्ञानिक रिपोर्ट (जी3)
जिला: मैहर–कटनी, मध्य प्रदेश

अध्याय 1 कार्यकारी सारांश

1.1 भतूरा चूना पत्थर ब्लॉक, जिसका क्षेत्रफल 1.38 वर्ग किलोमीटर है, मध्य प्रदेश के सतना ज़िले के मैहर-कटनी सेक्टर में कैमूर श्रेणी की उत्तर-पूर्वी ढाल पर स्थित है। खनन पट्टा सीमा एवं कोने के निर्देशांक परिशिष्ट-1 में संलग्न हैं। यह ब्लॉक विजय राघवगढ़-मैहर सड़क से आसानी से पहुँचा जा सकता है, जबकि निकटतम रेलवे स्टेशन काइमोर (~9 किमी) तथा हवाई अड्डा जबलपुर (~160 किमी) पर स्थित है। यह क्षेत्र एक स्थापित चूना पत्थर-सीमेंट बेल्ट का हिस्सा है, जहाँ एसीसी काइमोर, बिरला मैहर, सतना सीमेंट वर्क्स और प्रिज़्म सीमेंट जैसे प्रमुख संयंत्र संभावित औद्योगिक उपभोक्ता हैं। भूमि उपयोग मुख्यतः कृषि है और ब्लॉक की सीमा में न तो कोई बड़ा वन क्षेत्र है और न ही कोई प्रमुख आबादी।

1.2 भू-आकृतिक दृष्टि से ब्लॉक विंध्य पठारी परिदृश्य का हिस्सा है, जिसमें कैमूर एस्केपमेंट से सटी हल्की ढलान वाली भूमि पाई जाती है। भू-आकृति अपेक्षाकृत समतल है, जहाँ स्थानीय राहत उथली घाटियों और उत्तर दिशा में टोंस बेसिन में प्रवाहित अस्थायी नालों द्वारा परिभाषित होती है। जलवायु आर्द्र उपोष्णकटिबंधीय है – ग्रीष्म ऋतु में तापमान 42°C तक पहुँचता है, औसत वार्षिक वर्षा 1100–1150 मिमी है, तथा शीत ऋतु में औसत तापमान 10–20°C के बीच रहता है। क्षेत्र का भूमि उपयोग कृषि प्रधान है और इसमें कोई संवेदनशील पारिस्थितिक अथवा संरक्षित वन क्षेत्र उपस्थित नहीं है।

1.3 ब्लॉक विंध्य बेसिन में आता है, जो भारत की सबसे व्यापक प्रोटेरोज़ोइक तलछटी श्रेणियों में से एक है। क्षेत्रीय स्तर पर विंध्यन को सेमरी, कैमूर, रीवा और भांडेर समूहों में विभाजित किया गया है। प्रस्तुत ब्लॉक में भांडेर समूह की नागौद चूना पत्थर परतें उजागर होती हैं, जिनके नीचे गणुरगढ़ शेल विद्यमान है। चूना पत्थर क्षैतिज से हल्की (~5–7°) ढाल वाली परतदार रूप में मिलता है। शैलविज्ञान के अनुसार यह सघन, माइक्राइटिक से लेकर स्पैरिक चूना पत्थर है, जिसमें डोलोमाइटिक बैंड्स और कभी-कभी शेल/चर्ट की परतें उपस्थित हैं। ये लक्षण सतना-मैहर-कटनी बेल्ट के अन्य नागौद चूना पत्थर निक्षेपों के अनुरूप हैं।

1.4 अन्वेषण कार्य मध्य प्रदेश स्टेट माइनिंग कॉर्पोरेशन लिमिटेड (MPSMCL) द्वारा किया गया। कुल 5 बोरहोल ड्रिल किए गए, जिनमें PBH-01 और PBH-02 को 40 मीटर तथा PBH-03, PBH-04 और PBH-05 को 30 मीटर की गहराई तक ड्रिल किया गया, जिससे कुल 170 मीटर ड्रिलिंग हुई। इनसे 110 नमूने (ब्लैंक, डुप्लीकेट और डोलोमाइटिक बैंड्स सहित) 1 मीटर अंतराल पर संकलित किए गए। सभी विश्लेषण JNARDDC, नागपुर (NABL मान्यता प्राप्त प्रयोगशाला) में XRF और वेट-केमिकल विधियों से किए गए। गुणवत्ता आश्वासन हेतु डोलोमाइट ब्लैंक और डुप्लीकेट नमूनों का उपयोग किया गया, तथा चेक एनालिसिस ने परिणामों की विश्वसनीयता की पुष्टि की। दो बोरहोल नमूनों पर वैक्स-कोटेड इमर्शन विधि द्वारा बल्क डेंसिटी परीक्षण किया गया, जिसका औसत 2.35 टन/मी^{3} प्राप्त हुआ।

1.5 भू-रासायनिक परिणामों में CaO 16.6% से 44.4%, MgO 3.4% से 14.05%, तथा SiO_2 14.5–34.2% तक पाया गया, जो शेल और चर्ट की परतों की उपस्थिति को दर्शाता है। इसके आधार पर दो विशिष्ट लिथोलॉजिकल डोमेन पहचाने गए – डोलोमाइटिक चूना पत्थर (औसत CaO ~33.5%, MgO ~8%) तथा ब्लेंडेबल चूना पत्थर (औसत CaO ~38.4%, MgO ~5.7%)। संसाधन आकलन दो भूवैज्ञानिक क्रॉस-सेक्शन (A–A' और B–B') के आधार

पर क्रॉस-सेक्शनल विधि से किया गया। कुल अनुमानित इन-सीटू संसाधन 8.74 मिलियन टन डोलोमाइटिक चूना पत्थर तथा 5.85 मिलियन टन चूना पत्थर रहा। सभी संसाधन UNFC कोड 333 (Inferred) श्रेणी में वर्गीकृत किए गए हैं, क्योंकि ड्रिलिंग ग्रिड 800 मीटर से अधिक है तथा डाटा घनत्व सीमित है।

1.6 वर्तमान अध्ययन से यह पुष्टि होती है कि ब्लॉक में पर्याप्त मात्रा में **चूना पत्थर और डोलोमाइटिक चूना पत्थर संसाधन** उपलब्ध हैं, जो मुख्यतः सीमेंट उद्योग के मिश्रण योग्य कच्चे माल के रूप में उपयुक्त हैं तथा डोलोमाइट आधारित अन्य औद्योगिक उपयोगों की भी संभावना रखते हैं। उत्कृष्ट अवसंरचना और प्रमुख सीमेंट संयंत्रों की निकटता इस ब्लॉक को आर्थिक दृष्टि से आकर्षक बनाती है। संसाधनों की विश्वसनीयता को "संकेतित (332)" अथवा "मापा गया (331)" स्तर तक बढ़ाने हेतु 400 मीटर ग्रिड पर अतिरिक्त ड्रिलिंग, सभी लिथोलॉजी पर बल्क डेंसिटी परीक्षण, तथा प्रमाणित संदर्भ सामग्री (CRM) के साथ सुदृढ़ QA/QC अपनाने की अनुशंसा की जाती है। अतिरिक्त भू-रासायनिक विश्लेषण से ब्लॉक की गैर-सीमेंट औद्योगिक उपयोगिता का भी आकलन किया जा सकता है।

GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION (G3) FOR LIMESTONE IN BHATURA BLOCK, DISTRICT: MAIHAR AND KATNI, MADHYA PRADESH

Chapter 1: Executive Summary

1.1 The Bhatura Limestone Block, covering an area of **1.38** sq km, lies on the north-eastern flank of the Kaimur range in the Maihar–Katni sector of Satna district, Madhya Pradesh. Cadastral details and corner coordinates are enclosed **as Annexure 1**. The block is easily accessible via the Vijayraghavgarh–Maihar road, with the nearest railhead at Kymore (~9 km) and air connectivity from Jabalpur Airport (~160 km). The region is part of an established limestone - cement belt, with nearby cement plants such as ACC Kymore, Birla Maihar, Satna Cement Works, and Prism Cement providing a strong industrial consumer base. Land use is primarily agricultural, with no major forest cover or habitations within the block boundary.

1.2 Physiographically, the block forms a part of the Vindhyan plateau landscape, marked by gently rolling surfaces adjoining the Kaimur escarpment. The terrain is subdued, with local relief defined by shallow valleys and ephemeral streams draining northward into the Tons basin. The climate is humid subtropical, with hot summers reaching 42 °C, monsoonal rainfall averaging 1100–1150 mm annually, and cool winters with mean temperatures between 10–20 °C. The area is largely under agricultural use with scattered tree cover; no sensitive ecological or forest zones are present.

1.3 The block falls within the Vindhyan Basin, one of the most extensive Proterozoic sedimentary successions in India. Regionally, the basin is divided into the Semri, Kaimur, Rewa, and Bhander Groups. The present block exposes **Nagod Limestone of the Bhander Group**, underlain by the Ganurgarh Shale. The limestone occurs as laterally continuous, bedded horizons with a gentle dip of 5–7°. Lithologically, it is compact, micritic to sparry limestone, with interbands of dolomitic limestone and occasional shale/chert partings. These characteristics are consistent with other Nagod limestone exposures in the Satna–Maihar–Katni corridor that host cement-grade deposits.

1.4 Exploration was carried out by the **Madhya Pradesh State Mining Corporation Limited (MPSMCL)**. A total **of five boreholes** were drilled PBH-01 and PBH-02 to depths of 40 m and PBH-03, PBH-04 and PBH-05 to 30 m giving a cumulative meterage of **170 m**. From these, **110 samples** (including blanks, duplicates, and dolomitic bands) were collected at 1 m intervals. All analyses were performed at **JNARDDC, Nagpur (NABL-accredited**) using XRF and wet-chemical methods. QA/QC protocols included insertion of dolomite blanks and duplicates, with check analyses confirming analytical reliability. Bulk density was determined on two borehole samples yielding an average of **2.35 t/m^3**.

1.5 Geochemical results indicate **CaO values ranging from 16.6% to 44.4%, MgO from 3.4% to 14.05%**, and variable SiO_2 (14.5–34.2%) reflecting shale and chert interbands. Two distinct lithological domains were recognized: dolomitic limestone horizons (CaO ~33.5%, MgO ~8%) and blendable limestone horizons (CaO ~38.4%, MgO ~5.7%). Resource estimation was carried out using the cross-sectional method along two geological sections (A–A′ and B–B′), with correlation of borehole intersections. A total in-situ resource of **8.74 million tonnes of dolomitic limestone and 5.85 million tonnes of limestone**. All resources are classified as Inferred (UNFC Code 333) in accordance with MEMC rules, owing less than the 800 m borehole spacing and limited data density.

1.6 The present study confirms that the block hosts significant limestone and dolomitic limestone resources, suitable primarily for blendable cement feedstock with potential additional applications in dolomite-based industries. The block benefits from excellent infrastructure and proximity to major cement plants, making it economically attractive. For upgrading confidence levels to Indicated (332) or Measured (331), it is recommended to conduct further drilling on a 400 m grid, expand bulk density testing across lithological types, and strengthen QA/QC protocols with certified reference materials. Additional geochemical characterization may also help evaluate the block's suitability for non-cement industrial applications

Chapter 2: Details of Qualified Person(s) / Exploration Agency

(a)	**Name of Exploration Agency**	**:**	**The Madhya Pradesh State Mining Corporation Limited**
	Name of Qualified Person	:	Sneha Bagdey
(b)	Address:	:	The Madhya Pradesh State Mining Corporation Ltd Paryawas Bhawan, Block 'A', 2nd floor, Jail Road, Arera Hills, Bhopal, Madhya Pradesh Pin Code: 462027
(c)	Contact Number	:	0755 276 3341
(d)	E-mail ID	:	info.mpsmc@mp.gov.in
(e)	Qualification	:	M.Sc. Geology
(f)	Experience	:	63 years for the organisation and 5 years as for the QP as Field Geologist
(g)	Affiliation	:	Madhya Pradesh State Mining Corporation Limited, Notified Exploration Agency

Chapter 3: Title and Ownership

(i)	**Name of Owner**	**:**	**Madhya Pradesh State Government, (Director) Directorate of Geology and Mining**
	Address:	:	29-A , Khanij Bhavan, Arera Hills, Bhopal, Madhya Pradesh Pin Code: 462027
	Contact Number	:	0755 255 1795
	E-mail ID	:	dirgeomn@nic.in
(ii)	**Details of Period of Prospecting/mineral right if any:**		
	Date of Grant (through NMET)	:	12th December, 2023
	Period of exploration	:	December 2023 – September 2024
	Year of Completion	:	January 2025

Chapter 4: Details of the Area

4.1 Location of the block

The block of Bhatura is located on the boundary of two districts. The details of its location are as follows:

a. Name of Major Village(s): Bhatura,
b. Name of Tehsil(s): Maihar and Vijayraghavgarh
c. Name of the District(s): Maihar and Katni
d. Name of State: Madhya Pradesh

4.2 Accessibility

The block area falls in SOI Toposheet no 63D/12. The block area covers an area of 137500 m^2 or 137.50 Ha or 1.376 Km^2. The area comes within the administrative jurisdiction of Maihar and Katni District, Madhya Pradesh and is situated 38 km south of the Maihar District Headquarters and 49 km north of the Katni Headquarters. Vijayraghavgarh- Maihar road passes 4 Kilometers north of the block area. Besides the Maihar tehsil, the block is also very well connected with Kymore, Vijayraghavgarh, Katni, Satna and Rewa.

- Nearest Railways Station: Kymore Railway Station, 09 kms away
- Nearest Airport(s) : Rewa Domestic Airport, 90 kms away and Jabalpur Domestic Airport, 160 Kms away

4.3 Block Boundary Co-ordinates

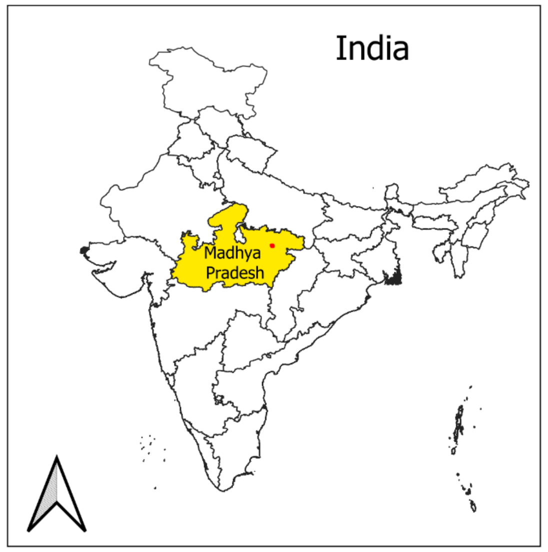
The block boundary co-ordinates are as follows, in Latitude and Longitude in Degree Minute Seconds and Easting and Northing:

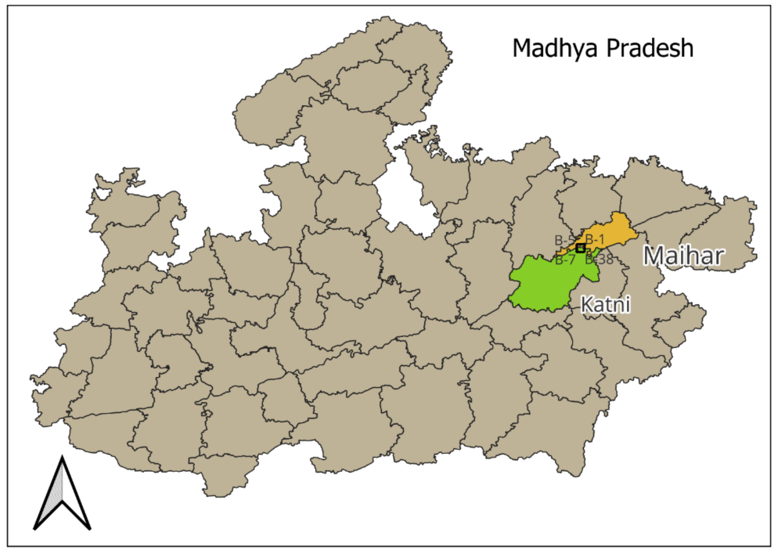
Table-4.1: Boundary co-ordinates of LSM block				
Coordinate System: WGS 1984 / UTM Zone 44 N				
Cardinal Points	Latitude (DMS)	Longitude (DMS)	Easting (E)	Northing (N)
B-1	24° 5' 9.929" N	80° 40' 21.823" E	466734.936	2663796.879
B-2	24° 4' 38.496" N	80° 40' 14.522" E	466526.528	2662830.654
B-3	24° 4' 33.052" N	80° 39' 59.160" E	466092.362	2662664.25
B-4	24° 4' 31.145" N	80° 39' 59.692" E	466107.244	2662605.565
B-5	24° 4' 28.285" N	80° 40' 1.458" E	466156.902	2662517.489
B-6	24° 4' 27.300" N	80° 40' 3.427" E	466212.429	2662487.064
B-7	24° 4' 25.909" N	80° 40' 6.991" E	466312.966	2662444.047
B-8	24° 4' 23.909" N	80° 40' 8.741" E	466362.236	2662382.422
B-9	24° 4' 23.143" N	80° 40' 9.913" E	466395.275	2662358.786
B-10	24° 4' 22.893" N	80° 40' 10.398" E	466408.952	2662351.065
B-11	24° 4' 23.033" N	80° 40' 10.695" E	466417.349	2662355.351
B-12	24° 4' 23.455" N	80° 40' 10.773" E	466419.582	2662368.324
B-13	24° 4' 23.924" N	80° 40' 11.086" E	466428.454	2662382.727
B-14	24° 4' 24.143" N	80° 40' 11.367" E	466436.404	2662389.444
B-15	24° 4' 24.534" N	80° 40' 12.289" E	466462.467	2662401.407
B-16	24° 4' 24.799" N	80° 40' 12.617" E	466471.748	2662409.536
B-17	24° 4' 26.081" N	80° 40' 12.914" E	466480.227	2662448.943
B-18	24° 4' 26.972" N	80° 40' 13.289" E	466490.881	2662476.321
B-19	24° 4' 27.785" N	80° 40' 14.790" E	466533.323	2662501.225
B-20	24° 4' 28.269" N	80° 40' 15.634" E	466557.19	2662516.054
B-21	24° 4' 28.535" N	80° 40' 15.525" E	466554.132	2662524.242
B-22	24° 4' 28.754" N	80° 40' 14.899" E	466536.471	2662531.019
B-23	24° 4' 28.973" N	80° 40' 14.149" E	466515.309	2662537.803
B-24	24° 4' 29.207" N	80° 40' 13.993" E	466510.921	2662545.01
B-25	24° 4' 29.926" N	80° 40' 14.259" E	466518.484	2662567.105
B-26	24° 4' 30.426" N	80° 40' 16.431" E	466579.851	2662582.339
B-27	24° 4' 30.207" N	80° 40' 16.728" E	466588.221	2662575.584
B-28	24° 4' 29.379" N	80° 40' 16.962" E	466594.769	2662550.104
B-29	24° 4' 29.316" N	80° 40' 17.463" E	466608.911	2662548.133
B-30	24° 4' 30.145" N	80° 40' 18.041" E	466625.292	2662573.59
B-31	24° 4' 30.843" N	80° 40' 18.935" E	466650.586	2662594.998
B-32	24° 4' 31.802" N	80° 40' 19.854" E	466676.604	2662624.431
B-33	24° 4' 31.989" N	80° 40' 20.401" E	466692.063	2662630.146
B-34	24° 4' 32.020" N	80° 40' 20.917" E	466706.636	2662631.065
B-35	24° 4' 32.552" N	80° 40' 21.901" E	466734.459	2662647.362
B-36	24° 4' 32.786" N	80° 40' 22.808" E	466760.087	2662654.499
B-37	24° 4' 32.552" N	80° 40' 24.293" E	466802.002	2662647.205
B-38	24° 4' 34.193" N	80° 40' 25.903" E	466847.58	2662697.567
B-39	24° 4' 35.068" N	80° 40' 26.840" E	466874.1	2662724.416
B-40	24° 4' 35.975" N	80° 40' 28.231" E	466913.442	2662752.219
B-41	24° 4' 36.490" N	80° 40' 29.169" E	466939.965	2662767.997
B-42	24° 4' 37.710" N	80° 40' 31.998" E	467019.933	2662805.332
B-43	24° 4' 38.382" N	80° 40' 32.373" E	467030.569	2662825.975
B-44	24° 4' 38.429" N	80° 40' 34.483" E	467090.152	2662827.283

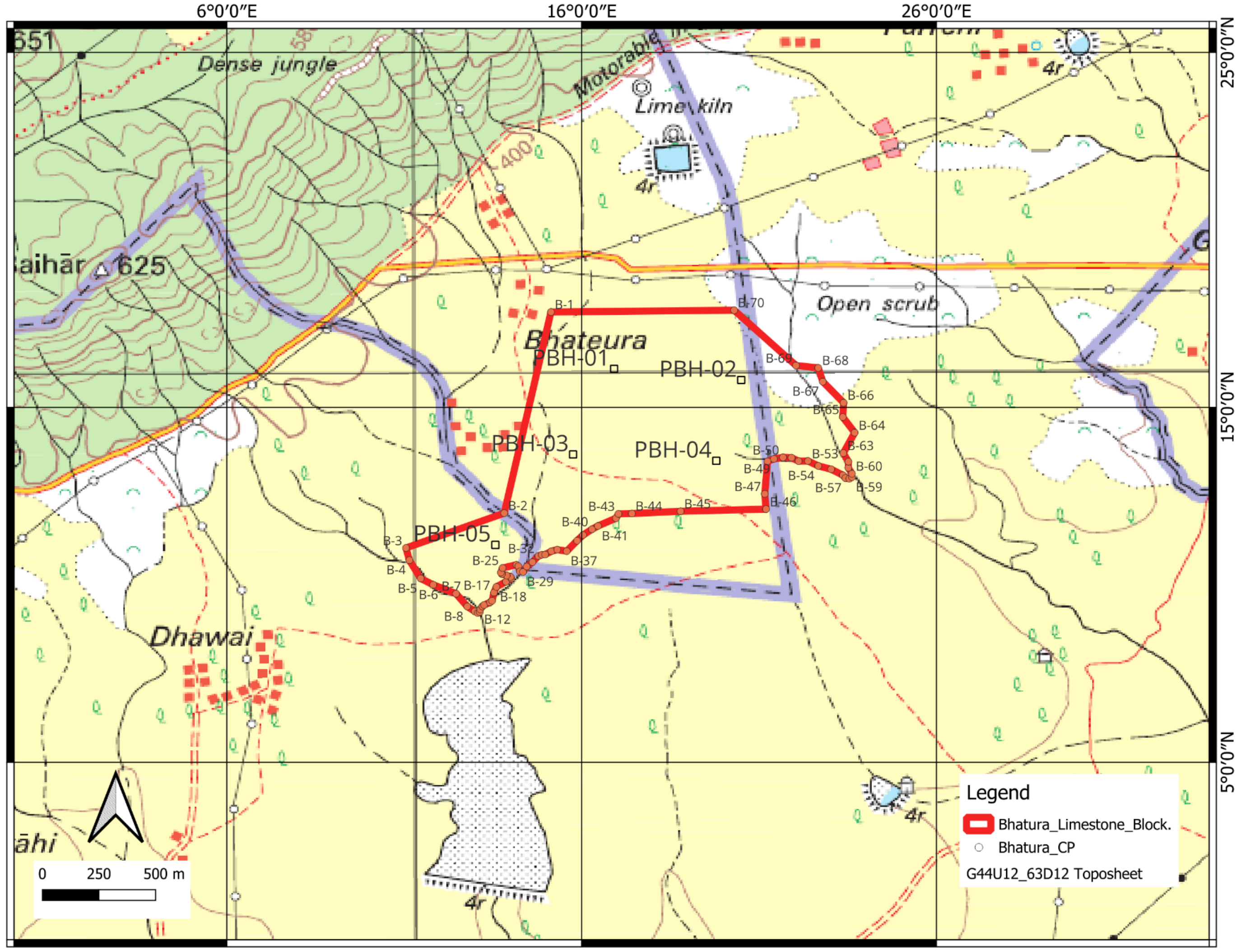
Cardinal Points	Latitude (DMS)	Longitude (DMS)	Easting (E)	Northing (N)
B-45	24° 4' 38.788" N	80° 40' 42.095" E	467305.113	2662837.83
B-46	24° 4' 39.119" N	80° 40' 55.451" E	467682.262	2662847.151
B-47	24° 4' 41.505" N	80° 40' 55.248" E	467676.696	2662920.544
B-48	24° 4' 46.593" N	80° 40' 55.685" E	467689.389	2663076.995
B-49	24° 4' 46.979" N	80° 40' 56.688" E	467717.737	2663088.802
B-50	24° 4' 47.210" N	80° 40' 58.101" E	467757.65	2663095.816
B-51	24° 4' 47.159" N	80° 40' 59.437" E	467795.37	2663094.163
B-52	24° 4' 46.619" N	80° 41' 0.542" E	467826.533	2663077.485
B-53	24° 4' 46.645" N	80° 41' 2.007" E	467867.901	2663078.191
B-54	24° 4' 45.878" N	80° 41' 3.613" E	467913.195	2663054.501
B-55	24° 4' 45.352" N	80° 41' 5.634" E	467970.223	2663038.196
B-56	24° 4' 44.422" N	80° 41' 7.468" E	468021.944	2663009.478
B-57	24° 4' 43.972" N	80° 41' 7.853" E	468032.784	2662995.614
B-58	24° 4' 43.887" N	80° 41' 8.474" E	468050.313	2662992.961
B-59	24° 4' 44.122" N	80° 41' 8.881" E	468061.821	2663000.162
B-60	24° 4' 44.657" N	80° 41' 8.881" E	468061.858	2663016.616
B-61	24° 4' 45.578" N	80° 41' 8.303" E	468045.601	2663044.977
B-62	24° 4' 46.542" N	80° 41' 8.325" E	468046.288	2663074.623
B-63	24° 4' 47.870" N	80° 41' 7.532" E	468023.989	2663115.515
B-64	24° 4' 51.082" N	80° 41' 9.310" E	468074.413	2663214.186
B-65	24° 4' 53.502" N	80° 41' 7.447" E	468021.977	2663288.73
B-66	24° 4' 55.751" N	80° 41' 7.575" E	468025.746	2663357.889
B-67	24° 4' 59.048" N	80° 41' 4.320" E	467934.067	2663459.493
B-68	24° 5' 1.193" N	80° 41' 3.613" E	467914.253	2663525.506
B-69	24° 5' 1.572" N	80° 41' 0.132" E	467815.993	2663537.383
B-70	24° 5' 10.201" N	80° 40' 50.468" E	467543.733	2663803.382

4.4 Topographic /Cadastral Details of the area

The block area is characterised by predominantly agricultural land with minor undulations corresponding to local drainage patterns. Cadastral records indicate well-defined farm plot boundaries interspersed with irrigation infrastructure, farm paths, and small water bodies. Tree cover is minimal and largely restricted to avenue plantations and field bunds. Habitation is scattered, with rural roads providing internal connectivity between villages and farmland. No notified forest land was found during field survey Within the block; the nearest natural forest is situated beyond the Kaimur Range, 5-10 kilometres away from the block boundary on the North-Eastern side of the block.







CARDINAL POINT DETAILS OF BHATURA BLOCK (G-3 STAGE), MAIHAR AND KATNI, M.P.
DATUM: WGS 84

Cardinal Points	LATITUDE	LONGITUDE	Cardinal Points	LATITUDE	LONGITUDE
B-1	24° 5' 9.929" N	80° 40' 21.823" E	B-36	24° 4' 32.786" N	80° 40' 22.808" E
B-2	24° 4' 38.496" N	80° 40' 14.522" E	B-37	24° 4' 32.552" N	80° 40' 24.293" E
B-3	24° 4' 33.052" N	80° 39' 59.160" E	B-38	24° 4' 34.193" N	80° 40' 25.903" E
B-4	24° 4' 31.145" N	80° 39' 59.692" E	B-39	24° 4' 35.068" N	80° 40' 26.840" E
B-5	24° 4' 28.285" N	80° 40' 1.458" E	B-40	24° 4' 35.975" N	80° 40' 28.231" E
B-6	24° 4' 27.300" N	80° 40' 3.427" E	B-41	24° 4' 36.490" N	80° 40' 29.169" E
B-7	24° 4' 25.909" N	80° 40' 6.991" E	B-42	24° 4' 37.710" N	80° 40' 31.998" E
B-8	24° 4' 23.909" N	80° 40' 8.741" E	B-43	24° 4' 38.382" N	80° 40' 32.373" E
B-9	24° 4' 23.143" N	80° 40' 9.913" E	B-44	24° 4' 38.429" N	80° 40' 34.483" E
B-10	24° 4' 22.893" N	80° 40' 10.398" E	B-45	24° 4' 38.788" N	80° 40' 42.095" E
B-11	24° 4' 23.033" N	80° 40' 10.695" E	B-46	24° 4' 39.119" N	80° 40' 55.451" E
B-12	24° 4' 23.455" N	80° 40' 10.773" E	B-47	24° 4' 41.505" N	80° 40' 55.248" E
B-13	24° 4' 23.924" N	80° 40' 11.086" E	B-48	24° 4' 46.593" N	80° 40' 55.685" E
B-14	24° 4' 24.143" N	80° 40' 11.367" E	B-49	24° 4' 46.979" N	80° 40' 56.688" E
B-15	24° 4' 24.534" N	80° 40' 12.289" E	B-50	24° 4' 47.210" N	80° 40' 58.101" E
B-16	24° 4' 24.799" N	80° 40' 12.617" E	B-51	24° 4' 47.159" N	80° 40' 59.437" E
B-17	24° 4' 26.081" N	80° 40' 12.914" E	B-52	24° 4' 46.619" N	80° 41' 0.542" E
B-18	24° 4' 26.972" N	80° 40' 13.289" E	B-53	24° 4' 46.645" N	80° 41' 2.007" E
B-19	24° 4' 27.785" N	80° 40' 14.790" E	B-54	24° 4' 45.878" N	80° 41' 3.613" E
B-20	24° 4' 28.269" N	80° 40' 15.634" E	B-55	24° 4' 45.352" N	80° 41' 5.634" E
B-21	24° 4' 28.535" N	80° 40' 15.525" E	B-56	24° 4' 44.422" N	80° 41' 7.468" E
B-22	24° 4' 28.754" N	80° 40' 14.899" E	B-57	24° 4' 43.972" N	80° 41' 7.853" E
B-23	24° 4' 28.973" N	80° 40' 14.149" E	B-58	24° 4' 43.887" N	80° 41' 8.474" E
B-24	24° 4' 29.207" N	80° 40' 13.993" E	B-59	24° 4' 44.122" N	80° 41' 8.881" E
B-25	24° 4' 29.926" N	80° 40' 14.259" E	B-60	24° 4' 44.657" N	80° 41' 8.881" E
B-26	24° 4' 30.426" N	80° 40' 16.431" E	B-61	24° 4' 45.578" N	80° 41' 8.303" E
B-27	24° 4' 30.207" N	80° 40' 16.728" E	B-62	24° 4' 46.542" N	80° 41' 8.325" E
B-28	24° 4' 29.379" N	80° 40' 16.962" E	B-63	24° 4' 47.870" N	80° 41' 7.532" E
B-29	24° 4' 29.316" N	80° 40' 17.463" E	B-64	24° 4' 51.082" N	80° 41' 9.310" E
B-30	24° 4' 30.145" N	80° 40' 18.041" E	B-65	24° 4' 53.502" N	80° 41' 7.447" E
B-31	24° 4' 30.843" N	80° 40' 18.935" E	B-66	24° 4' 55.751" N	80° 41' 7.575" E
B-32	24° 4' 31.802" N	80° 40' 19.854" E	B-67	24° 4' 59.048" N	80° 41' 4.320" E
B-33	24° 4' 31.989" N	80° 40' 20.401" E	B-68	24° 5' 1.193" N	80° 41' 3.613" E
B-34	24° 4' 32.020" N	80° 40' 20.917" E	B-69	24° 5' 1.572" N	80° 41' 0.132" E
B-35	24° 4' 32.552" N	80° 40' 21.901" E	B-70	24° 5' 10.201" N	80° 40' 50.468" E

Madhya Pradesh State Mining Corporation Ltd.

PLATE I: LOCATION MAP

PRELIMINARY EXPLORATION (G-3 STAGE) FOR LIMESTONE
IN BHATURA BLOCK

DISTRICT: MAIHAR AND KATNI   STATE: MADHYA PRADESH

AREA: 1.38 Sq.Km   TOPOSHEET: 63D/12

R.F.: 1:12,500

PREPARED BY: SNEHA BAGDEY
CHECKED BY: SNEHA BAGDEY

PROCESSED AT: MPSMPC HEAD OFFICE, BHOPAL

Figure 1: Location of Bhatura Block in Maihar and Katni District, Madhya Pradesh

Chapter 5: Physiography and Environment

The limestone block under study lies on the eastern and north-eastern slopes of Kaimur range. This part of the kaimur range is often marked with a very distinctive physiographic transition from the rugged sandstone – limestone escarpments of the Vindhyan highlands to the gentler plateau lands that spread northwards into the plains. The block area falls in vindhayan supergroup rocks, which form an almost horizontal, near unbroken, well-known sequence of limestones, sandstones and shales.

5.1 Physiography

The Kaimur range forms the eastern continuation of the Vindhya Hills, extending in an east northeasterly direction from Katangi in Madhya Pradesh to Sarsam in Bihar. The block area is part of the prominent escarpment which shows the elevation range from 150m MSL and upto 450 m MSL above the adjoining plans. The block area shows a range from 390 m to 412 m MSL. The ridge on the whole forms a natural divide between the **Son-Narmada Valley system of the south and the Ganga basin to the north.** The terrain is dominated by a series of flat-topped plateaus and intervening shallow valleys, characteristic of horizontally bedded sedimentary strata. The lithology, largely comprising Vindhyan limestone and associated arenaceous units, imparts stability to slopes and creates stepped profiles in hill faces.

The physiographic setting is part of the **Rewa Plateau sub-region**, which is bounded to the south by the Kaimur scarp and is known to merge northward into the gently undulating alluvial plains. The plateau surface is dissected by seasonal streams, with occasional residual hills marking erosion-resistant rock outcrops.

The structural control of the terrain is evident in the rectilinear valley patterns, determined by joint and fracture systems in the sedimentary bedrock.

5.2 Drainage

The Kaimur Range acts as an important watershed divide. Streams from its northern slopes, including those draining the block area, generally find their way into the Tamsa (Tons) River system, which in turn joins the Ganga. The Tamsa's headwaters rise not far from Maihar, flowing north through a series of plateaus and escarpments before reaching the plains.

The block area however is devoid of any major channels or streams, there are some season short streams. These channels tend to run in a dendritic to sub-dendritic pattern, reflecting the uniform lithology, but some are subtly guided by the fracture lines and bedding planes in the limestone. Rainfall is significant during the monsoon months, when heavy rainfall sends water cascading down the slopes; but by late winter most of these channels carry only trickles or are reduced to dry beds. Where groundwater emerges along bedding planes, small perennial springs may sustain flow for a few months longer.

5.3 Climate

The Limestone block lies within the Satna-Katni area of eastern Madhya Pradesh, where the climate follows a **humid subtropical pattern.** It follows the three distinct season patterns typically found in the entirety of Indo Gangetic plains of the region.

- **Summer** begins in late March with peak heat in May, when during the daytime, the temperature records the 40-42 ^{0}C range and night time records around 29 ^{0}C. The air becomes notably dry and parched, especially in later months of April and May, where humidity may average at around 18% relative humidity. These hot months expose the bare terrain, and dust from the plateau and escarpment areas is common. Summer conditions generally extend into June.

- **Monsoon** starts from Mid to late June, where in early showers are reported. The monsoon season bring most of the region's annual rainfall. The months of July and August are typically the wettest months of the year. The district of Katni averages around 1100-1150 mm per year. Maihar also experiences rainfall within this range. While the main rivers in the area maintain modest flow, seasonal streams often carry hillside runoff during this period. The monsoon usually lasts until September, rarely extending into early October.
- **Winter** start from Early Novembers with temperatures starting to cool in mid to late October. Winters are **cool and occasionally foggy,** typical of the region. The daytime records temperature in the range of 15-20 ^{0}C and nighttime records temperature closer to 10-12 ^{0}C. Fog formation is more frequent in low-lying areas, where it can temporarily soften the appearance of nearby escarpments and plateau margins. Winter conditions generally extend into February.

5.4 Flora and Fauna

The limestone block area, located within the Maihar - Katni region, is predominantly under agricultural use, with croplands covering most of the terrain. Common cultivated crops include wheat, paddy, gram, and seasonal vegetables, interspersed with patches of fallow land. Natural vegetation is sparse and largely restricted to field boundaries and small village groves, consisting mainly of species such as neem (Azadirachta indica), babul (Vachellia nilotica), and banyan (Ficus benghalensis). Faunal presence is typical of human-dominated rural landscapes, with domesticated cattle, goats, and poultry being common. Wild fauna is limited, though small mammals such as hares and rodents occur, along with reptiles like common garden lizards and snakes. Avifauna includes species adapted to open farmland habitats, such as mynas, pigeons, egrets, and parakeets. No rare, endangered, or protected species have been reported within the immediate block area.

Table-5.1: List of category, species and its occurrences

Category	Common Species	Notes on Occurrence
Flora – Cultivated	Wheat (*Triticum aestivum*), Paddy (*Oryza sativa*), Gram (*Cicer arietinum*), Seasonal vegetables	Occupies most of the land during respective crop seasons
Flora – Natural/Scattered	Neem (*Azadirachta indica*), Babul (*Vachellia nilotica*), Banyan (*Ficus benghalensis*)	Found along field boundaries, roadsides, and small village groves
Fauna – Domesticated	Cattle, Goats, Poultry	Integral to local agriculture and rural livelihood
Fauna – Wild (Common)	Indian hare (*Lepus nigricollis*), Common garden lizard (*Calotes versicolor*), Field rodents	Scattered presence, generally in fallow lands or vegetation patches
Avifauna	Common myna (*Acridotheres tristis*), Rose-ringed parakeet (*Psittacula krameri*), Cattle egret (*Bubulcus ibis*), Rock pigeon (*Columba livia*)	Seen frequently in farmlands and near settlements

Chapter 6: Infrastructure

6.1 The block under consideration has well connected infrastructure. The block is located near kymore range which is well developed around limestone mining and associated cement industry. The nearest major urban centre is Kymore roughly 8 kilometres, which also serves the associated ACC Cement mines and plant. Kymore serves as a commercial and administrative hub for the region. The block is accessible via Vijayraghavgarh - Maihar road which later connects to Madhya Pradesh State Highway 11 connecting it to important industrial corridors and facilitating the movement of heavy vehicles and mining equipment. Internal approach roads within the vicinity are primarily unpaved with scope for improvement if sustained mineral transportation occurs.

6.2 In terms of rail connectivity, as mentioned in earlier section is Kymore railways station, 9 kilometres south of the block, providing direct freight handling capacity and connection to major cement plants and mineral processing units in the state. Air connectivity is available through two airports, Rewa Domestic Airport, 90 kms away and Jabalpur Domestic Airport, 160 Kms away offering regular flights to metropolitan centers, thereby facilitating the movement of technical staff, contractors, and administrative personnel.

6.3 Power supply in the area is consistent due to Madhya Pradesh being a power surplus state, ensuring reliable electricity for drilling, excavation, and processing operations. Cement plants often contain and operate their own power supply, and with technologies like WHRS, renewable integration, consistent power supply could be made easily available for the plant.

6.4 The region also hosts several industrial establishments, including cement manufacturing units such as ACC Cement's Kymore Cement works which could serve as potential consumers of the block's output. Ancillary services, including mechanical workshops, fuel depots, and contractor facilities, are available within 9 kms.

6.5 Overall, the block's proximity to established transport networks, industrial consumers, and utility infrastructure positions it favourably for commercial mining. Targeted upgrades in internal haul roads, water management systems, and onsite support facilities will be essential for optimizing production efficiency and meeting statutory compliance requirements.

Chapter 7: Geology

7.1 Regional Geology

The Block under consideration is part of the Kaimur range in the Maihar (earlier part of Satna) – Katni Sector of the Eastern Madhya Pradesh. The area is part of Vindhyan Supergroup, the Proterozoic basin in India covering almost 1,04,000 km2 across the states of Madhya Pradesh, Uttar Pradesh, Bihar and Rajasthan.

7.1.1 Geological Setting of the basin

The Vindhyan Supergroup represents one of the most extensive and best-preserved Proterozoic sedimentary successions in India. It occupies an intra-cratonic basin developed between the Bundelkhand craton and its granite complex to the north and the Mahakoshal–Satpura fold belt to the south.

The Vindhyan rocks record deposition from the early Mesoproterozoic to the early Neoproterozoic, with a cumulative preserved thickness of more than 4.5 km in the Son Valley sector. Their lateral persistence, simple structure, and relatively unmetamorphosed state have made the Vindhyan Supergroup a key reference for basin evolution studies as well as for mineral exploration

Structurally, the Vindhyan Basin is remarkably stable. The strata are generally horizontal to gently dipping, with dips rarely exceeding 5–10°. The northern margin rests unconformably on the Bundelkhand granite and associated rocks, with a gentle southerly to south-southeasterly dip. The southern margin, adjoining the Mahakoshal Group, is locally faulted and shows moderate dips, sometimes steepening near structural contacts. The Son Valley sector, where the present block is located, forms part of the southern homocline of the basin and is dominated by well-preserved platform carbonates, sandstones, and shales.

Stratigraphically, the Vindhyan Supergroup is subdivided into the Lower Vindhyan (Semri Group) and the Upper Vindhyan (Kaimur, Rewa, and Bhander Groups). The Semri Group comprises shales, siltstones, and thin limestones that crop out along basin margins. The Upper Vindhyan succession forms concentric outcrop belts with the Kaimur sandstones along the outer escarpments, succeeded inward by the Rewa sandstones and shales, and culminating in the Bhander Group with its limestones and sandstones toward the basin interior.

The area under present consideration lies within this southern sector, adjoining the Kaimur escarpment, and forms part of the Son Valley succession. Here, the structural simplicity, continuity of carbonate horizons, and proximity to industrial infrastructure provide a favourable setting for limestone exploration.

7.1.2 Regional Framework

The Satna – Maihar – Katni – Kaimur region provides some of the classic exposures of the Vindhyan Supergroup. In this tract, the Vindhyan succession is nearly flat-lying, exposed in a step-like topography where resistant sandstones form scarps and softer limestones and shales underlie plateaus and valleys. This geology has not only shaped the landscape but also influenced the location of mineral resources, settlements, and industries in the area.

The region is best described as a concentric outcrop pattern. From the escarpment outward, one encounters the **Kaimur Group sandstones**, forming the prominent cliffs of the Kaimur Range. Moving northward, the **Rewa Group** builds the broad plateau surface dissected by seasonal streams, and finally, the **Bhander Group** dominates the interior, with its limestones and sandstones forming gently rolling surfaces. The Nagod Limestone within the Bhander is the most important economic unit for the cement industry.

7.1.3 Regional Stratigraphy

	Group	**Formation**	**Equivalent Formation**	**Lithology**
Upper Vindhyan	**Bhander Group**	Shikoda Formation		Sandstone, limestone, shale interbeds
		Sirbu Shale		Shale, siltstone, subordinate sandstone
		Bundi Hill Sandstone	Lower Bhander Sandstone	Fine- to medium-grained sandstone
		Lakheri Formation	Bhander Limestone / Nagod Limestone	Thick-bedded limestone with shale partings
		Ganurgarh Shale	Simrawal Shale	Purple to maroon shale
	---- Disconformity / Gradational Contact ----			
	Rewa Group	Govindgarh Sandstone	Upper Rewa Sandstone	Cross-bedded sandstone
		Drummondganj Sandstone		Medium- to coarse-grained sandstone
		Jhiri Shale	Variegated Shale	Shale with basal conglomerate; locally diamondiferous
		Asan Sandstone	Lower Rewa Sandstone	Sandstone with limestone and chert interbeds
		Panna Shale		Calcareous shale with limestone interbeds
	---- Normal Contact / Facies Change ----			
	Kaimur Group	Dhandraul Sandstone	Upper Kaimur Sandstone	Coarse sandstone, cross-bedded
		Mangesar Sandstone		Sandstone with shale and siltstone interbeds

		Bijaygarh Shale		Shale with glauconitic siltstone
		Ghaghar Sandstone	Markundi Sandstone	Massive sandstone
		Susnai Formation	Ghurma Shale	Breccia, conglomerate, gritty sandstone
		Sasaram Sandstone	Lower Kaimur Sandstone	Sandstone
	---- Unconformity / Normal Contact ----			
Lower Vindhyan	**Semri Group**	Bhagwar Shale	Suket Shale	Shale and porcellanite
		Rohtas Limestone	Nimbahera Limestone	Bedded limestone with shale partings
		Rampur Sandstone	Chorhat Sandstone	Glauconitic sandstone, minor shale
		Salkhan Limestone	Bargawan Limestone	Siliceous/cherty limestone
		Koldaha Shale	Khenjua Shale	Olive-green shale
		Deonar Porcellanite	Chopan Porcellanite	Porcellanite, thin tuffaceous beds
		Kajrahat Limestone	Kuteshwar Limestone	Compact limestone
		Arangi Shale		Shale
		Deoland Sandstone	Khardeol Sandstone	Sandstone with basal conglomerate
	---- Non-Conformity ----			
	--- Granite and Supracrustal ----			

Table 7.1: Generalized Stratigraphic Column of the Vindhyan Supergroup

Semri Group (Lower Vindhyan)

The Semri Group forms the basal succession of the Vindhyan Supergroup and unconformably overlies the Bundelkhand Granite to the north and the Mahakoshal Group to the south. Its deposition began during the early Mesoproterozoic, around 1.7–1.6 Ga, and it represents the initial stabilization of the basin. The lithological assemblage includes olive-green and purple shales, porcellanite, glauconitic sandstones, and several important limestone horizons. Notable formations are the Kajrahat Limestone, Rohtas Limestone, Chorhat Sandstone, and Salkhan Limestone, which are laterally persistent and well exposed in the Son Valley. The limestones often show siliceous and cherty bands, while the sandstones are commonly glauconitic, pointing to deposition in a shallow marine to tidal flat environment with intermittent volcanic input reflected in the porcellanite units. Economically, the limestones of the Semri Group, such as the Kuteshwar–Kajrahat limestones, have been quarried for cement and flux purposes. Structurally, the group dips gently and provides the foundation for the overlying Upper Vindhyan succession. Its overall character reflects a stable but slowly subsiding intracratonic basin margin, gradually giving way to the widespread siliciclastic influx that marks the onset of the Kaimur Group

Kaimur Group (Lower Upper Vindhyan)

The Kaimur Group overlies the Semri with a marked unconformity and signals a major shift in depositional style. Dated to around 1.2–1.1 Ga, it consists predominantly of medium- to coarse-grained sandstones with minor interbeds of shale and siltstone. Key formations include the Dhandraul Sandstone, Mangesar Sandstone, Ghaghar (Markundi) Sandstone, Bijaygarh Shale, and the Sasaram Sandstone. The Kaimur sandstones are petrographically mature, often quartz-rich with subordinate feldspar and lithic grains, and exhibit crossbedding and ripple marks indicative of high-energy braided fluvial to shallow marine depositional settings. The Bijaygarh Shale provides a fine-grained interval within the otherwise arenaceous sequence, sometimes enriched with glauconite, marking marine transgressions. Regionally, the Kaimur forms the prominent escarpment that defines the physiography of the Son Valley and Kaimur ranges. Its resistant nature leads to steep cliffs and mesa topography, controlling drainage and providing structural traps for later deposits. While it is not a major source of industrial minerals, the Kaimur sandstones are significant as aquifers and as marker horizons for regional stratigraphy.

The group’s large thickness and lateral persistence reflect a stable tectonic regime but with active sediment supply from the Bundelkhand craton and the Central Indian Tectonic Zone.

Rewa Group (Middle Upper Vindhyan)

The Rewa Group succeeds the Kaimur conformably and represents a more balanced alternation of sandstones, shales, and subordinate carbonate beds. Its age is generally placed between 1.1–0.9 Ga. The group includes formations such as the Govindgarh Sandstone, Drummondganj Sandstone, Jhiri Shale, Asan Sandstone, and the Panna Shale. These units are characterized by rhythmic alternations of fluvial sandstones and finer shale intervals, reflecting fluctuating depositional environments ranging from deltaic plains to shallow marine shelves. The presence of basal conglomerates and occasional diamondiferous horizons within the Jhiri Shale adds both stratigraphic and economic interest. In the Satna–Katni–Maihar region, the Rewa succession forms broad, gently rolling plateaus dissected by drainage systems like the Tons and Tamsa rivers. Sedimentary structures such as ripple marks, mud cracks, and current lineation’s are common, pointing to periodic subaerial exposure and tidal influences. The sandstones, typically cross-bedded and quartz-dominated, are of good quality and have been locally quarried for building stone. From an exploration standpoint, the Rewa Group is less important for limestone but is a significant marker sequence separating the dominantly arenaceous Kaimur below from the carbonate-rich Bhander above. Its wide aerial spread and distinctive lithological features make it a reliable stratigraphic division for mapping and correlation.

Bhander Group (Uppermost Vindhyan)

The Bhander Group forms the uppermost succession of the Vindhyan Supergroup, deposited during the late Mesoproterozoic to early Neoproterozoic (~0.9–0.6 Ga). It is of economic significance due to its thick and laterally continuous limestone horizons, especially the Nagod Limestone (also called Bhander or Lakheri Limestone), which is widely quarried for cement production. Stratigraphically, the group includes the Shikoda Formation, Sirbu Shale, Bundi Hill Sandstone, Lakheri/Nagod Limestone, and the Ganurgarh Shale. Lithologies are varied, comprising thick-bedded limestones, maroon and purple shales, and fine- to medium-grained sandstones. The limestones are typically compact, occasionally micritic, and interbedded with thin shale partings; they have consistently shown cement- and flux-grade chemistry in regional studies. The shales are ferruginous to argillaceous, often imparting a reddish colour to weathered surfaces. In physiography, the Bhander Group caps much of the plateau country in Satna and Katni, giving rise to subdued relief compared to the rugged Kaimur escarpments. Economically, it has been the backbone of the cement industry in Madhya Pradesh, with major plants at Satna, Maihar, and Katni drawing raw material from its outcrops. Its wide lateral persistence and relatively uniform dip make it a predictable and reliable exploration target. For the present block near the Kymore Range, the Bhander Nagod limestone represents the most prospective horizon for resource evaluation under MEMC norms.

Economic aspects of the area

The Satna – Maihar – Katni corridor has long been recognized as a major limestone bearing tract, Exploration by GSI, DGM, MPSMCL and NMET has confirmed multiple cement grade limestone deposits in this belt. These associations are also applicable to our current block which lies adjacent to the Kaimur escarpment and further justifies detailed exploration entailed in current study.

7.2 Local Geology

The block under consideration lies on the southern sector of the Vindhyan Basin, adjoining the Kaimur escarpment in the Maihar–Katni region of eastern Madhya Pradesh. Geologically, the area forms part of the Son Valley succession and is underlain by rocks of the **Upper Vindhyan sequence**, particularly the **Bhander Group**, which is the principal limestone-bearing horizon of economic interest. The local exposures are consistent with the regional pattern of nearly flat-lying to gently dipping strata (3–8°), with beds striking broadly ENE–WSW and dipping towards the north and northeast.

Surface conditions in the block are dominated by agricultural soils with limited rock exposures. However, scattered weathered limestone and cherty nodules on the surface, as well as the lithological character of surrounding outcrops, suggest continuity of the Nagod (Bhander) Limestone within shallow depth below the soil cover. This limestone unit is regionally persistent, with thickness ranging from 8 to 13 m, and is interbedded with thin partings of shale. Borehole intersections and previous district-level exploration in comparable tracts confirm its compact, micritic nature, with minor recrystallisation and occasional silica bands

Underlying the limestone horizon, maroon to purple shales of the Ganurgarh Formation is expected. These shales act as a marker horizon across Satna–Katni, separating the carbonate bench from the arenaceous Rewa succession below. Locally, the Ganurgarh shales are poorly exposed but can be identified in stream cuts and low-lying depressions. Above the limestone, thin bands of Sirbu Shale and overlying Bhander sandstone may occur in isolated patches depending on the preservation of the sequence near the escarpment margin. Structurally, the block shows no evidence of major folding or faulting, and the Vindhyan succession here retains its characteristic stability. Local jointing, often vertical to sub-vertical, is common in limestone exposures and may influence quarrying and block extraction. Minor undulations and weathered zones are expected near the surface but are unlikely to significantly affect deposit continuity. From an economic standpoint, the most important unit in the local geology is the **Nagod (Bhander) Limestone**, which is laterally continuous across the Satna–Maihar–Katni corridor and has long supplied raw material to nearby cement plants. Regional chemical analyses suggest good CaO contents and MgO typically within reasonable limits, suitable for cement manufacture. Within the block, future exploration by pitting and drilling will be required to confirm thickness, grade, and lateral persistence.

In summary, the local geology of the block is dominated by **Bhander Group lithologies**, chiefly the Nagod Limestone underlain by Ganurgarh Shale, with younger Bhander sandstones and shales preserved in patches. The strata are essentially horizontal, with only gentle northerly dips, and no significant tectonic disturbance. This setting is favourable for establishing a consistent limestone resource, with minor variation arising from shale partings, cherty interbeds, and surface weathering.

7.2.1 Local Stratigraphy

Table-7.2: Local Stratigraphy over the area

Group	Formation	Equivalent Formation	Lithology
Bhander Group	Lakheri Formation	Bhander Limestone / Nagod Limestone	Thick-bedded limestone with shale partings

Chapter 8: Previous Exploration

Systematic geological studies of the Vindhyan Basin, including the Satna–Maihar–Katni sector, have been carried out since the mid-19th century. Early workers such as Oldham (1851), Medlicott (1860), and Mallet (1869) described the succession, identified major subdivisions, and established the threefold division of the Upper Vindhyan into the Kaimur, Rewa, and Bhander Groups. These pioneering works laid the foundation for understanding the stratigraphic framework of the basin and provided the first descriptions of the region's limestone horizons. By the early 20th century, further refinements by Vredenburg (1906) and others consolidated the nomenclature and correlated the Vindhyan successions across central India.

In the post-independence period, Exploration focused on reconnaissance mapping, pitting, and trenching programs across Satna (inclusive of Maihar) and Katni districts. Special emphasis was placed on locating flux- and cement-grade limestone horizons within the Nagod (Bhander) Limestone. Reports from the 1970s, including the work of S.S. Mishra (1974-75), identified promising tracts around Rampur, Ramasthan, and Nagod, where limestone horizons were proved to be 8–13 m thick with CaO contents typically above 44%. Investigations at that time demonstrated ~17 million tonnes of flux- and cement-grade limestone in the Ramasthan block alone. These early findings established the industrial potential of the Satna–Maihar belt and supported the expansion of the regional cement industry.

Subsequent decades saw more systematic exploration by state agencies and central undertakings to explore the area through various levels of detailed exploration. MPSMCL carried out G-4 to G-2 level exploration in the different regions of Satna district, employing detailed geological mapping, pitting, trenching, and drilling. Their reports confirmed multiple mineable limestone bands of 4–8 m thickness, with total resources exceeding million tonnes of cement-grade limestone. Parallel efforts were also supported under the National Mineral Exploration Trust (NMET), which funded advanced work in select blocks to upgrade resource categories in compliance with MEMC Rules. Together, these programs demonstrated that the Nagod Limestone maintains lateral persistence, predictable thickness, and suitable quality across the Satna–Maihar–Katni corridor.

Despite this wealth of regional information, the present block adjoining the Kaimur escarpment has not been subjected to detailed investigation beyond reconnaissance mapping. No systematic drilling, sampling, or resource estimation specific to the block has been recorded in earlier reports. However, given its stratigraphic position within the Bhander Group and proximity to explored deposits, it can reasonably be correlated with the limestone horizons proved elsewhere. The present study therefore builds on this legacy of exploration while addressing the data gaps through focused geological work in compliance with MEMC requirements.

Chapter 9: Geophysical and Geo Chemical Data

9.1 Geophysical Data Analysis

No geophysical surveys were undertaken in the present block as part of the exploration program. The block lies within the well-established Vindhyan Basin, where the geology is simple, stable, and laterally continuous. Stratigraphy is regionally well constrained by surface exposures and confirmed through boreholes, pits, and trenching within and around the area. As a result, geophysical methods were not considered essential at this stage. If the need arises in future, limited geophysical work such as electrical resistivity tomography or ground-penetrating radar may be employed for hydrogeological assessments, subsurface continuity checks, or mine planning studies for mining related feasibility studies at later stages of exploration

9.2 Geochemical Data Analysis

Geochemical studies were carried out on representative samples obtained from boreholes, pitting and trenching across the block. The samples were analysed for major oxides, including CaO, MgO, SiO_2, Al_2O_3, Fe_2O_3, and Loss on Ignition (LOI). The results indicate CaO values typically in the range of 24% to 40%, MgO in the range of 2 to 18%, and variable SiO_2 values corresponding to shale or chert partings within the limestone. These values are lower than typical cement-grade limestone, but they correspond to blendable grade to dolomitic limestone, comparable to values reported from certain tracts in the Satna–Maihar–Katni belt. This suggests the block contains mixed limestone–dolomite Lithologies, with potential applications in cement blending and allied industries and outside standard cement-grade specification under IBM guidelines.

To supplement chemical analyses, petrographic studies of thin sections were carried out on borehole and pit samples. The limestone is dominantly micritic calcite, but several thin sections show dolomitic textures, including cloudy calcite rhombs and Mg-rich replacement features. These petrographic observations are consistent with the higher MgO values reported in chemical assays, confirming the presence of dolomitic limestone horizons interbedded with purer carbonate bands.

The check analysis also forms a reliable source of accuracy of our results, which are analysed and reported separately in upcoming sections.

Together, the chemical and petrographic studies confirm that the limestone within the block is relatively low grade, laterally continuous, and of a grade suitable for blending in the cement industry applications. These results from the geochemical foundation for resource estimation presented in subsequent chapters. The high value of Mg% also gives rise to dolomitic limestone and part of the block exhibits dolomitic character, which may have potential industrial applications, subject to further detailed investigation which may give rise to a separate set of applications, which are discussed in the recommendations and conclusion section of the report.

Chapter 10: Exploration undertaken in present investigation

10.1 Introduction

The Bhatura Blocks fall in Survey of India Toposheet No 63D/12. Bhatura, Bhatewara, Ghorbai, Padrehi, Harraiya are the villages within and around the block area, and the block lies in the tehsils of Maihar and Vijayraghavagarh in the districts of Maihar and Katni

Bhatura Block is the prospective limestone block identified by Madhya Pradesh State Mining Corporation Limited (MPSMCL) for which MPSMCL formulated exploration proposal involving 170m drilling in 05 boreholes at G-3 level of exploration in the block

Exploration Proposal (G-3) for the block were submitted and discussed in 58th TCC meeting. After technical deliberation, with Sanction order 375 dated 11th December, 2023, MPSMCL was awarded the project proposal. titled as "Preliminary Exploration (G-3) for Limestone in Bhatura Block over an area of 1.5 sq km (proposed area), District - Satna,(then called Satna, now split into Satna and Maihar), Madhya Pradesh.

On recommendation of 58th TCC, 32nd Executive committee (EC), NMET meeting held on 6th December 2023 approved the project with cost of INR 62.71 lakhs. (Annexure-VI).

10.2 Objectives of current investigation

The preliminary exploration was proposed with following objectives in Bhatura Block are as follows:

a) To carry out detailed Topographical Survey and Geological mapping on1:4000 scale over an extent of 1.5 Sq. Km (proposed).
b) To delineate the strike and depth continuity of the limestone by drilling of boreholes of 05 numbers on roughly 800m or less interval, in the Block.

c) To carry out exploration as per Minerals (Evidence of Mineral Contents) Rule-2015 & Mineral (Auction) Rules-2015 (Amendments).

d) The proposed exploration programme will be helpful in demarcating zone of various grades of limestone in the block as per UNFC norms and estimation of limestone resources which in turn will facilitate the State Govt. for auctioning of the block.

10.3 Quantum of work done

To mee the above objectives, activities mentioned in the following table were planned. The table also shows a comparison between approved and achieved quantum in the block.

Sl. No.	Item of Work	Unit	Target	Achieved
1	Geological Mapping (1:4000)	sq. km	1.5	1.38
2	Topographical Survey (1:4000)	sq. km	1.5	1.38
3	Core Drilling a) Surface Exploration – Pitting / trenching b) Sub Surface Exploration – Drilling	Cum. M	Pitting: 10 Drilling: 170	Pitting: Nil Drilling: 170
4	**Sample Preparation & Chemical Analysis**			
	Primary samples for Limestone (Borehole)			
	i) Primary samples (Limestone and Dolomite) – (Borehole samples)	Nos.	100	100
	ii) Check sample including Blanks	Nos.	10	10
6	Petrographic Studies	Nos	05	05
7	Mineragraphic Studies (XRD)	Nos	05	05
8	ICPMS 34 elements	Nos.	05	Nil
9	Digital Photomicrograph of thin sections	Nos.	10	10
10	Bulk Density	Nos	02	02
11	Report Preparation (Digital format)	Nos.	01	01

Table-10.1: Quantum of work achieved in Bhatura Block, Maihar and Katni District, Madhya Pradesh

10.4 Topographic Survey and Geological Mapping

The Geological Mapping and Topographical Survey work has been carried out by MPSMCL. Triangulation network was laid down in the proposed study area. Surface contouring was done on 1:4000 scale at 2 m contour intervals. The elevation in the block area ranges from 386 mRL to 412.5 mRL. However, no outcrop was visible within the block area. Mostly the block area consists of farmland and a thick soil cover. However, the presence of numerous limestone mines surrounding the Bhatura limestone block were identified. The block boundary was surveyed by DGPS in WGS-84 Datum by DGM, Madhya Pradesh.

10.5 Pitting / Trenching

Since no outcrops were visible, no pitting or trenching has been carried out in the block,

10.6 Exploration by Drilling

MPSMCL has taken up G-3 level investigation during 2023-24 which involved 170m drilling apart from detailed mapping on 1:4000 scale. Five nos. of boreholes were marked on the plan at 800m x 800m grid interval (Figure 4 & Plate-I). Based on nearby available mining data, the borehole depth was planned up to 40m for two nos. boreholes & upto 30m. for remaining 3 nos. The boreholes were closed as per plan post intersecting the soil zone underlying the shaly limestone.

The entire core drilling has been done by wire line method in NQ borehole size using diamond bits. The polymer was used as drilling fluid to flush out the cuttings and to stabilize the borehole wall. The drilling fluid also works as a coolant to avoid burning of drilling bits. Core recovery of more than 90% was maintained in limestone, however, in case of weathered, loose & fractured formation and in solution cavities filled with clay the core recovery was low.

10.7 Petrographic Studies and Mineragraphic studies

5 nos. of thin sections were prepared, one from each borehole for detailed petrological analysis. The results of these studies are presented in Annexure- IV A and IV B

The details of the sample collected from the Boreholes are mentioned below

Table-10.2: The details of samples collected from the boreholes drilled for Petrographic and Mineragraphic studies

Sr. No.	Sample ID	BH No.	Depth of BH
1	JNA/24-25/Nov/321	PBH 1	14.80-14.85 mtr
2	JNA/24-25/Nov/322	PBH 2	22.50-22.55 mtr
3	JNA/24-25/Nov/323	PBH 3	21.96-22.00 mtr
4	JNA/24-25/Nov/324	PBH 4	15.98-16.00 mtr
5	JNA/24-25/Nov/325	PBH 5	23.80-23.83 mtr

In addition to above, a total of 5 primary core samples have been prepared and sent to Lab for analysis of 34 elements through ICPMS

Topographical survey work and exploratory drilling, borehole core sampling was carried out concurrently. The analytical / laboratory studies were carried out in laboratories of JNARDDC, Nagpur (NABL accredited laboratory).

The results of petrographic studies are attached in Annexure IV A, IV B

Chapter 11: Location of Data Points, Sampling and Sub sampling techniques.

11.1 Location of Data Points

All Exploration data points generated during the present study including boreholes, were recorded using hand-held GPS in WGS 84 Datum, UTM Zone 44 N, the accuracy of position is within +- 2m, which is sufficient for resource estimation at the current G-3 Level. Elevation data were recorded simultaneously to provide RL level. The distribution of borehole and surface points was designed to ensure that sampling adequately represents the lithological variations of the block. Borehole locations were selected along traverses oriented as per regional geological map and near limestone beds, maximizing geological coverage and reducing bias

The coordinates of all data points are compiled **in Annexure IB** and plotted on the **Location Map Plate 1**.

11.2 Sampling Methods

Systematic sampling was carried out from both surface and subsurface exploration points:

Pits and Trenches: Since Limestone exposures were not found on surface, there are no pitting and trenching reported, and boreholes are chosen as the only method of exploration

Boreholes: Core Recovery was satisfactory (>85%). Samples were collected as half core at regular 1m intervals as adjusted based on lithological changes. The remaining half cores were preserved in core-boxes for reference and preservation.

11.3 Sub-sampling techniques

Collected bulk samples were reduced to laboratory-size quantities using standard techniques:

(a) **Core Samples**: For borehole core, half-core was submitted for laboratory analysis. The other half-core was retained for reference and future validation. The images of core boxes are in Annexure-04.

(b) **Sample Preparation:** Sub-samples were packed in labelled polythene bags with unique IDs, sealed, and stored under controlled conditions before dispatch to the laboratory.

Chapter 12: Quality of Assay Test and Laboratory Tests

12.1 Introduction

Assay and laboratory test quality is critical to ensure that chemical data used for resource estimation is reliable and representative. In the present exploration program, all primary samples collected from boreholes were analyzed for major oxides relevant to limestone and dolomitic limestone, including CaO, MgO, SiO_2, Al_2O_3, Fe_2O_3, and Loss on Ignition (LOI). In addition to routine laboratory analyses, quality checks were performed through duplicates, check analyses, and insertion of blanks to monitor assay precision and accuracy.

12.2 Primary Analysis

Primary sample analyses were carried out at JNARDDC, Nagpur using standard Wet Chemical Analysis for LOI and XRF method for major oxides. Analytical precision for major oxides is generally within ±0.5% absolute, which is adequate for limestone resource evaluation at G-3 level. Results from the primary analyses formed the basis for grade assessment and resource calculation presented in this report.

12.3 Check Analysis

To verify the accuracy of primary assay results, a set of check analyses were performed on selected duplicate samples. These were analysed in the same laboratory. A comparative evaluation of the primary and check results was made, and the outcome is presented in Annexure III B (Graphs of Primary vs. Check Analyses).

The comparative plots show that primary and check assays correlate well, with variations generally within the expected analytical limits. Occasional deviations are observed in SiO_2 and

MgO values, which are attributed to lithological heterogeneity (presence of shale partings and dolomitic bands). Overall, the check analyses confirm the reliability of the primary dataset.

12.4 Blank Sample Analysis

Dolomite blanks were inserted at intervals to monitor potential contamination during sample preparation and analysis. Results confirm negligible contamination, as CaO and MgO values in blanks remained within expected trace levels.

12.5 QA/QC Evaluation

The comparative graphs of primary vs. check analyses indicate good correlation for CaO, MgO, and SiO_2 values. Deviations beyond expected analytical limits are rare and are attributed to natural heterogeneity of limestone and dolomitic bands rather than laboratory error. Duplicate and blank results further support the accuracy of the dataset, with no evidence of systematic bias or contamination.

Table-12.1:

BOREHOLE WISE INTERSECTION OF DIFFERENT GRADE LIMESTONE IN BOREHOLES DRILLED BY MPSMCL IN BHATURA, DISTRICT- SATNA, MADHYA PRADESH

Zone based on cut-off CaO of 34%

BHID	From	To	Thickness	Cao	MgO	Al2O3	SiO2	Grade
PBH 01	14.00	18.00	4.00	36.90	7.14	3.39	16.10	Blendable
PBH 03	8.00	10.00	2.00	38.39	5.47	3.05	16.53	Blendable
PBH 04	11.00	16.00	5.00	39.35	4.78	2.99	15.86	Blendable

Chapter 13: Moisture and Bulk Density

13.1 Moisture

Moisture determination is a necessary parameter in mineral resource reporting, to ensure clarity in differentiating between wet and dry tonnages. For limestone, chemical analyses are performed on dry samples and the effect of natural moisture is limited to handling and transport characteristics rather than chemical grade.

In the present investigation, samples were collected from pits, trenches, and surface exposures. The material was naturally dry at the time of collection, and no procedures were applied to preserve in-situ moisture. Accordingly, no separate determination of natural moisture content was carried out.

All resources in this report are therefore presented on a **Dry Metric Tonne (DMT) basis**, in line with MEMC reporting requirements. Based on lithological characteristics and regional experience, in-situ moisture content in fresh Nagod limestone is expected to be very low (typically 1–3%) and does not materially affect grade or tonnage estimations.

If required for end-use or beneficiation studies, moisture determination may be incorporated in future work following BIS/ASTM standard methods.

13.2 Bulk Density

Bulk density is a key parameter in mineral resource estimation, as it allows conversion of geological volumes into tonnages. Determination of bulk density was carried out for two representative limestone samples obtained during exploration drilling in the block. Both samples were collected from fresh limestone intersections within boreholes at depths of 15.00 m to 15.20 m from borehole PBH-01 and at depth of 13.00 m to 13.25 m from borehole PBH-04.

Field measurements were made using the wax-coated immersion method, where the volume of the sample is determined by water displacement after sealing the specimen in wax to prevent absorption. The weights were recorded in air and in water, and density was calculated as per standard procedure.

The results of the two tests indicated an **average bulk density of 2.35 t/m³**, consistent with values typically reported for compact Nagod/Bhander limestone in the Satna–Katni region (generally 2.30–2.50 t/m³). On this basis, a bulk density of 2.35 t/m³ has been adopted for tonnage estimation in the present report.

All tonnages in this report are therefore expressed on a **dry bulk density basis**. It is recommended that additional confirmatory measurements, including laboratory tests on core samples, be carried out during future detailed exploration (G-2 / G-1) to further validate this parameter.

13.3 Beneficiation Studies

Beneficiation studies have not been carried out in the present level of exploration Bulk density

Chapter 14: Resource estimation and Reporting

14.1 Basic Assumptions

Estimation of resources and grades of limestone is based on following parameters.

- Resources have been estimated for limestone with a minimum of 34% CaO.
- Zones of different grades have been demarcated based on primary sample analysis values.
- Five boreholes were drilled and evaluated.
- Considering the overall geological setting and interpretation, the zones intersected in the boreholes were correlated and established.
- Two geological cross-sections (A-A' and B-B') have been drawn along the dip direction. Limestone zones from boreholes have been correlated for resource estimation.
- Resource estimation has been carried out using the Cross-Sectional Method, based on the intersection and correlation of different lithological units in the drilled boreholes. The strike and dip continuity of limestone have been established. This is a bedded sedimentary deposit with regular habit throughout the block. A total of five boreholes (PBH 01 - 05) have been drilled with a grid spacing of approximately 800 m. As per exploration norms for limestone, enumerated in the Mineral (Evidence of Mineral Content) Rules 2015—i.e., 800 m for Inferred Mineral Resources—the entire limestone resource has been classified under the Inferred category (333).
- The average specific gravity of limestone has been taken as 2.35 deduced from mean of specific gravity determined for two limestone samples

14.2 Methodology

The resource estimation of the Bhatura Limestone block has been done by Cross-sectional Method.

Two cross section lines have been drawn along the dip direction in the block across all five boreholes. Since the beds are generally horizontal with very low dip of 5 to 7 degree and boreholes drilled are all vertical, hence true thickness will be the same as thickness intersected in the boreholes. Geological cross sections are generated by GDM software. Cross sectional area on each section has been measured with the help of Auto CAD map 2016 software and recorded systematically. Influence section line A-A' has been taken 490.00 m; B-B' has been taken 520.00 m on the basis of the block boundary variation in size and resources estimated at inferred category (333).

Each of these areas has been multiplied with sectional influence / strike influence of the section lines to give volume. The volume is then multiplied with average Sp. Gravity to calculate gross resources.

$$R = Sv \times T \times \text{Avg Sp. Gravity}$$

Where:

- R = Resources/Tonnage
- Sv = Sectional area of limestone
- T = Influence of 490.00 m / 520.00 m between successive section lines
- $Sp.gr.$ = Specific gravity of limestone

Efforts were made to calculate the average grade for 5 radicals CaO, MgO, SiO2, Al2O3, & Fe2O3 borehole wise along section line. Thus, average grade of the block is calculated.

14.3 Categorisation of Resources

Resources of limestone have been categorized under "Inferred Mineral Resources (333)" as per the United Nations Framework Classification (UNFC). These parameters & assumptions for resources estimation have already been defined in Para 14.1

14.4 Resources

The resources of Dolomitic Limestone and Limestone have been estimated category-wise, thickness-wise, grade-wise as per specifications for different grades given in Table IV and Table V and basic assumptions enumerated para no.5.1.

A total of 8.74 million tonnes of net in-situ Dolomitic Limestone resources, with an average grade of 33.47% CaO, 8.04% MgO, 19.46% SiO_2, and 3.53% Al_2O_3, have been estimated by the cross-sectional method over an area of 1.5 sq. km. Similarly, 5.85 million tonnes of net in-situ limestone resources, with an average grade of 38.37% CaO, 5.66% MgO, 16.12% SiO_2, and 3.12% Al_2O_3, have been estimated by the same method over the same area.

Table-14.1: Resource estimation of the Dolomitic Limestone

Sl no	Section	Area in sq.m	Section influence in m	Volume	Specific Gravity	Tonnage	CaO%	SiO_2%	Al_2O_3%	MgO%
1	A-A'	4840.60	490	2371894	2.35	5573951	32.02	20.53	3.77	8.75
2	B-B'	2587.84	520	1345677	2.35	3162340	36.02	17.58	3.1	6.78
						8736291	33.47	19.46	3.53	8.04
					In MT	**8.74**	**33.47**	**19.46**	**3.53**	**8.04**

Table-14.2: Resource estimation of the Limestone

Sl no	Section	Area in sq.m	Section influence in m	Volume	Specific Gravity	Tonnage	CaO%	SiO_2%	Al_2O_3%	MgO%
1	A-A'	2920.08	490	1430840	2.35	3362475	37.64	16.31	3.22	6.31
2	B-B'	2037.61	520	1059556	2.35	2489957	39.35	15.86	2.99	4.78
						5852432	38.37	16.12	3.12	5.66
					In MT	**5.85**	**38.37**	**16.12**	**3.12**	**5.66**

All resources belong to the "Inferred category" (333) as exploration was conducted at the G3 level by drilling five boreholes in the block. The limestone resources, due to high magnesium content, belong to the blendable grade

Chapter 15: Summary and Recommendations

The Bhatura Limestone Block, spread over 1.38 sq. km on the north-eastern flank of the Kaimur Range in Satna district, Madhya Pradesh, represents a strategically located mineral asset within the established Satna–Maihar–Katni limestone–cement corridor. The block is part of the Vindhyan Supergroup, specifically exposing the Nagod Limestone of the Bhander Group, underlain by the Ganurgarh Shale.

Physiographically, the terrain is subdued, with gentle dips of 5–7° and agricultural land use, providing favourable surface conditions for exploration and potential mining. Infrastructure is robust: the block is connected by road to Kymore (~9 km), which also provides rail connectivity, and lies within 50 km of multiple major cement plants. Electricity and industrial services are readily available in the vicinity.

Exploration was undertaken by Madhya Pradesh State Mining Corporation Limited (MPSMCL). Five boreholes (total meterage 170 m) were drilled on a reconnaissance grid, and 110 samples, including blanks, duplicates, and dolomitic bands, were analyzed at NABL-accredited JNARDDC, Nagpur.

Geochemical assays reveal two distinct lithological domains within the block: (i) dolomitic limestone horizons with average values of 33.5% CaO and 8.0% MgO, and (ii) blendable limestone horizons averaging 38.4% CaO and 5.7% MgO. Silica (SiO_2) values vary between 14% and 34%, largely due to shale/chert interbands. Resource estimation, carried out by the cross-sectional method across two geological sections (A–A′ and B–B′), yielded a total of **8.74 million tonnes of dolomitic limestone and 5.85 million tonnes of limestone**, all classified under the “Inferred” category (UNFC 333) due to wide borehole spacing and limited drilling density.

These results place the block in a favourable position to be considered for commercial development, subject to additional exploration to increase the confidence level to Indicated (332) or Measured (331).

The Bhatura Limestone Block has demonstrated significant potential in two respects:

1. **Dolomitic Limestone Potential:** With MgO values averaging 8%, the block is particularly suitable for industries or companies specializing in dolomitic limestone utilization. This includes refractory, steel flux, and niche chemical applications, in addition to limited cement blending. Given the growing demand for dolomite-rich inputs in both metallurgical and industrial sectors, this block represents an attractive medium-term supply source.
2. **Blendable Limestone Supply:** The identified limestone horizons, though lower in grade compared to premium cement feedstock, still meet threshold requirements for cement blending. With nearby cement plants at Satna, Maihar, and Kymore, the block could serve as a **low-grade, easy-to-access supply source to complement higher-grade deposits already in operation**. This proximity reduces logistical costs and enhances its economic viability.
3. **Further Exploration and Upgrading:** To maximize the block’s commercial attractiveness, it is recommended to:
    a. Undertake detailed drilling at 400 m spacing to upgrade resources to the Indicated category.
    b. Explore beneficiation potential of the limestone to improve its blending characteristics.

In conclusion, the Bhatura Limestone Block holds notable promise for companies seeking to secure dolomitic limestone resources or supplement cement operations with a steady supply of blendable limestone. Its location within a mature industrial belt, coupled with clear evidence of resource continuity, positions it as a viable and strategically important block for allocation.'

The current situation however isn't favourable for a new cement player or a standalone supply of limestone for cement, chemical or associated industries

Chapter 16: List of Plates

The report includes all the relevant plates required for the current exploration activity and the lists are provided before the start of the text part of the Geological Report

Chapter 17: Annexures/ Enclosures to the report

The report includes all the relevant annexures including Block Coordinates, Boreholes Data, Chemichal analysis, photographs & photomicrograph etc. List of annexures are provided before the start of the text part of the Geological Report.

Chapter 18: Certificate from Qualified Person

CERTIFICATE FROM THE QUALIFIED PERSON WITH NAME, DATE AND SIGNATURE

This is to certify that geological report has been prepared in respect of Bhatura Block, District: Maihar and Katni, Madhya Pradesh at (G3 Level) for exploration of Limestone by Madhya Pradesh State Mineral Corporation Limited (MPSMCL) on behalf of National Mineral Exploration Trust. The report has been prepared in accordance with the Minerals (Evidence of Mineral Contents) Rule 2015 specified under Mineral Auction Rule, 2015 and amended up to 2021.

NAME: **SNEHA BAGDEY**
DESIGNATION: **GEOLOGIST**

DATE:

Chapter 19: References

Auden, J.B. *Vindhyan Sedimentation and Its Bearing on the Geotectonics of India*. Memoirs of the Geological Survey of India, vol. 76, 1933, pp. 121–251.

Dunn, J.A. “The Vindhyan System and Its Bearing on the Geology of India.” *Memoirs of the Geological Survey of India*, vol. 85, 1942, pp. 1–121.

Geological Survey of India. *Geology and Mineral Resources of Madhya Pradesh*. Miscellaneous Publication No. 30, Part IV, 2011.

Mandal, A., et al. “Revised Stratigraphy and Basin Evolution of the Vindhyan Supergroup, Central India.” *Journal of Earth System Science*, vol. 133, no. 66, 2024, Springer. https://doi.org/10.1007/s12040-024-02267-3.

Mehta, D.R.S., and P.K. Raman. *Investigation of Flux Grade Limestone in Rewa–Satna Area*. Geological Survey of India Report, 1975.

Mineral Exploration Corporation Limited (MPSMCL). *Geological Report on Naubasta–Kolard Limestone Block, Satna District, Madhya Pradesh (G-2 Stage)*. Submitted to Govt. of M.P. and NMET, 2018.

National Mineral Exploration Trust (NMET). *Geological Report on Jamodi–Mahanna Limestone Block, Satna District, Madhya Pradesh (G-3/G-2 Stage)*. Govt. of India, 2019.

Soni, M.K., S. Chakrabarty, and V.K. Jain. “Vindhyan Supergroup—A Review.” *Memoirs of the Geological Survey of India*, vol. 6, 1987, pp. 87–138.

Vredenburg, E.W. *The Classification of the Vindhyan System*. Records of the Geological Survey of India, vol. 35, 1906, pp. 121–166.

Directorate General of Hydrocarbons (DGH). *The Vindhyan Basin: Geology and Hydrocarbon Prospectivity*. Government of India, 2016. https://dghindia.gov.in.

Government of India. *Mineral (Evidence of Mineral Contents) Rules, 2015, and Subsequent Amendments*. Ministry of Mines, 2015.