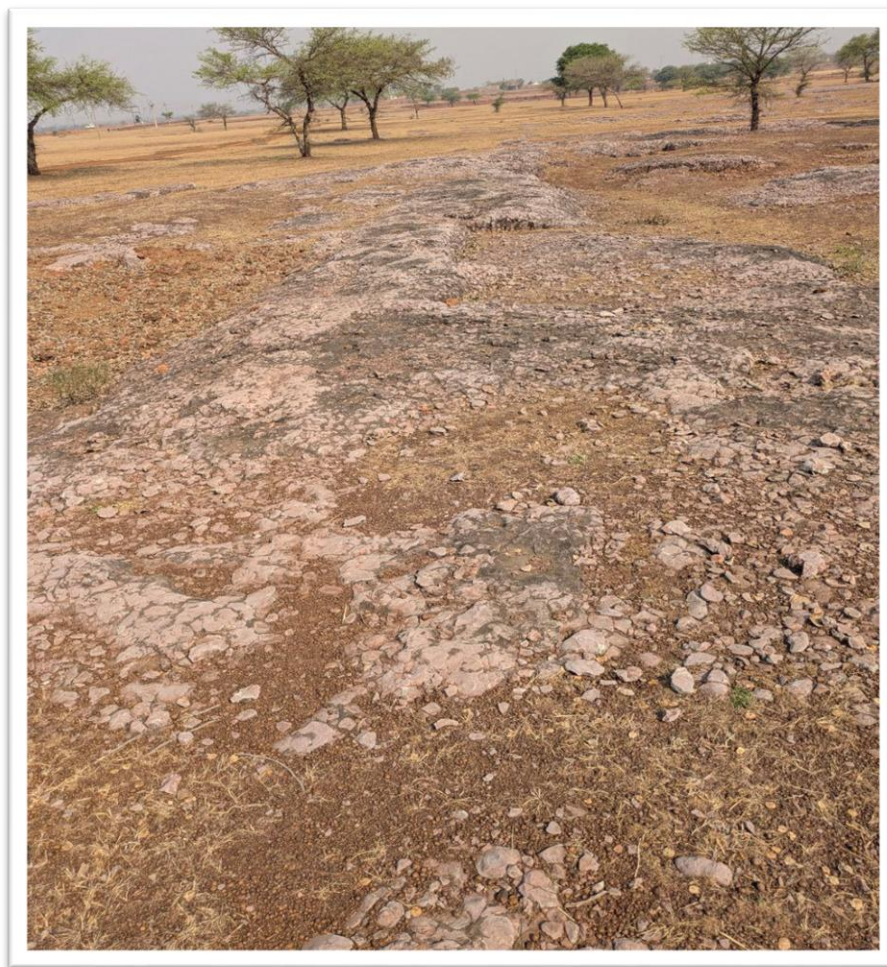




**GEOLOGICAL REPORT
ON
PRELIMINARY EXPLORATION (G-3) FOR LIMESTONE
IN ALDA BLOCK DISTRICT: RAIPUR & BALODABAZAR-BHATAPARA
CHHATTISGARH
(NMET FUNDED)**



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Authors

CHAPTER -1

सारांश

चूना पत्थर अपनी बहुमुखी प्रतिभा, स्थायित्व और आर्थिक तथा पर्यावरणीय दोनों संदर्भों में महत्व के लिए जाना जाता है। चूना पत्थर मुख्य रूप से कैल्शियम कार्बोनेट (CaCO_3) से बना एक तलछटी चट्टान है। यह एक प्राकृतिक रूप से पाया जाने वाला खनिज संसाधन है जिसका निर्माण, सीमेंट उत्पादन, कागज निर्माण और अन्य सहित विभिन्न उद्योगों में व्यापक रूप से उपयोग किया जाता है।

चूना पत्थर के दो सबसे महत्वपूर्ण घटक कैल्साइट और डोलोमाइट हैं। चूना पत्थर में अक्सर मैग्नीशियम कार्बोनेट होता है, या तो डोलोमाइट $\text{CaMg}(\text{CO}_3)_2$ या मैग्नेसाइट (MgCO_3) कैल्साइट के साथ मिलाया जाता है, जिसकी बनावट बारीक दाने से लेकर मोटे दाने तक होती है, इसका रंग सफेद, ग्रे, बैंगनी और अपेक्षाकृत नरम होता है, जिसकी मोहस कठोरता लगभग 3 होती है।

छत्तीसगढ़ लगातार औद्योगिक विकास केंद्र में तब्दील हो रहा है, खासकर सीमेंट उद्योग क्षेत्र में। इसे भारत का चावल का कटोरा कहा जाता है। राज्य प्राकृतिक संसाधनों से भरपूर है और अपनी रणनीतिक स्थिति के साथ मिलकर सीमेंट निर्माण और बुनियादी ढांचे के विकास के लिए पसंदीदा विकल्प बन गया है।

भारत में सीमेंट उत्पादन के लिए प्राथमिक कच्चा माल, चूना पत्थर के भंडार में सबसे समृद्ध छत्तीसगढ़, देश के चूना पत्थर भंडार का एक बड़ा हिस्सा है। इसकी प्रचुरता ने इसे सीमेंट संयंत्रों के लिए एक आदर्श स्थान बना दिया है। इस प्रकार, छत्तीसगढ़ में सीमेंट उद्योग के विकास ने अल्ट्राटेक सीमेंट, अंबुजा सीमेंट और एसीसी जैसे प्रमुख खिलाड़ियों को आकर्षित किया है।

प्रमुख बाजारों की निकटता और अत्यधिक केंद्रीय स्थिति ने भारत को कनेक्टिविटी के सभी पहलुओं में महान बना दिया है। कच्चे माल और तैयार माल की डिलीवरी के लिए बंदरगाहों के साथ खुद को जोड़ते हुए, पूरे देश में फैले सड़क नेटवर्क और रेलवे का एक अच्छा मिश्रण है। छत्तीसगढ़ में सीमेंट उद्योग के विकास में आर्थिक और रसद लाभ इसके परिणाम हैं।

सब्सिडी के साथ-साथ कर और भूमि अधिग्रहण लाभ दिए जाने पर, छत्तीसगढ़ गतिशील औद्योगीकरण का समर्थन करने और छत्तीसगढ़ में सीमेंट उद्योग के विकास को बढ़ाने के लिए एक बहुत ही अनुकूल वातावरण के रूप में काम करता है। घरेलू और विदेशी निवेश को आकर्षित करने के संबंध में यह बहुत महत्वपूर्ण हिस्सा है।

सड़क, पुल विकास और यहां तक कि शहरी विकास परियोजनाओं ने सीमेंट की अभूतपूर्व आवश्यकता पैदा की है, जिन्होंने छत्तीसगढ़ में सीमेंट उद्योग के विकास में प्रत्यक्ष भूमिका निभाई है।

इन कारकों के अलावा, छत्तीसगढ़ में तेजी से शहरीकरण के कारण कई निर्माण गतिविधियाँ, आवासीय, वाणिज्यिक और औद्योगिक, बढ़ी हैं, जिसके परिणामस्वरूप छत्तीसगढ़ में सीमेंट उद्योग की वृद्धि को बढ़ावा मिला है। ऐसा इसलिए है क्योंकि अधिक मांग की प्रत्याशा में, निर्माता अपनी उत्पादन क्षमता बढ़ा रहे हैं, जिससे सीमेंट की बढ़ती हुई ज़रूरतों को पूरा करने के लिए सीमेंट की आपूर्ति में वृद्धि होगी।

सीमेंट उद्योग की वृद्धि का भविष्य उज्ज्वल प्रतीत होता है, क्योंकि नए संयंत्र चालू किए जा रहे हैं, प्रौद्योगिकी को बढ़ाया जा रहा है और ग्रीन सीमेंट के विकास पर ध्यान दिया जा रहा है। उपर्युक्त सभी कारक उद्योग के बढ़ते वक्र की रक्षा करने के साथ-साथ पर्यावरण के लिए इसे न्यूनतम बनाने में मदद करेंगे।

30 और 31 जनवरी 2024 को आयोजित तकनीकीसहलागत समिति .टीसीसी, राष्ट्रीय खनिज अन्वेषण ट्रस्ट .एनएमईटी. की 61वीं बैठक में एल्डा ब्लॉक में जी:3 चरण के अन्वेषण के प्रस्ताव पर चर्चा की गई। समिति ने प्रारंभिक अन्वेषण जी:3) के अनुमोदन के लिए 19 फरवरी 2024 को आयोजित अपनी 33वीं ईसी बैठक में कार्यकारी समिति ईसी. को प्रस्ताव की सिफारिश की, जिसमें 1: 4,000 पैमाने पर भूवैज्ञानिक मानचित्रण, 16 बोरहोल के साथ 800 मीटर की ड्रिलिंग, ड्रिलिंग के माध्यम से उत्पन्न कोर नमूनों का पेट्रोलॉजिकल अध्ययन और रासायनिक विश्लेषण शामिल है। इसके अलावा 20-21 फरवरी 2025 को आयोजित 74वीं तकनीकीसहलागत समिति .टीसीसी. में खेत में खड़ी फसलों के कारण परियोजना की स्वीकृत मात्रा से 4 सीमा बोरहोल को बाहर करने को मंजूरी दी इसलिए, 12 बोरहोल के साथ 630 मीटर की कुल ड्रिलिंग को मंजूरी दी गई, साथ ही 142.74 लाख रुपये की अनुमानित लागत के साथ 30 मीटर अतिरिक्त ड्रिलिंग को भी मंजूरी दी गई।

उपर्युक्त अनुमोदित प्रस्ताव के अनुसार लगभग 10.25 किमी² का क्षेत्र भूवैज्ञानिक रूप से 1:4000 पैमाने पर मैप किया गया है जो अक्षांश 21° 35' 14.932" उत्तर से 21° 37' 25.622" उत्तर और देशांतर 81° 53' 06.978" पूर्व से 81° 54' 58.426" पूर्व के बीच स्थित है, जो सर्वे ऑफ इंडिया टोपोगीट संख्या 64जी14 में स्थित है।

विस्तृत भूवैज्ञानिक मानचित्रण के तहत कवर किए गए क्षेत्र से पता चलता है कि ब्लॉक का अधिकांश क्षेत्र मोटी मिट्टी से ढका हुआ है विस्तृत भूवैज्ञानिक मानचित्रण के दौरान, कुल 20 सतही नमूने लिए गए और 20 का रासायनिक विश्लेषण किया गया, 05 बीआरएस को पेट्रोलॉजिकल अध्ययन के लिए तैयार किया गया। कुल 480 कोर नमूने एकत्र किए गए और 7 रेडिकल्स CaO, MgO, SiO₂, Fe₂O₃, Al₂O₃, P₂O₅, और LOI के लिए सेंट्रल लैब DGM में XRF द्वारा विश्लेषण किया गया। क्षेत्रीय कार्यालय रायपुर लैब से 50 चेक नमूने प्राथमिक नमूनों का 10%) का रासायनिक विश्लेषण किया गया।

यह क्षेत्र उत्तरपूर्वी दिशा की ओर ऊंचाई में कमी दर्शाता है। यह क्षेत्र भूगर्भीय रूप से चंडी संरचना के चूना पत्थर के बहिर्गमन, साथ ही तरंगा शेल और गुंडरदेही शेल संरचना से बना है। क्षेत्र के चूना पत्थर बारीक दाने वाले, विशाल और सघन भूरे से गुलाबी भूरे रंग के होते हैं और रंग में स्ट्रोमेटोलिटिक प्रकृति के होते हैं। चूना पत्थर के जमाव क्षैतिज से उपक्षैतिज रूप से बिछे हुए हैं, जिनमें पश्चिम की ओर 02° से 05° तक का ढलान है। विस्तृत भूवैज्ञानिक मानचित्रण के दौरान एकत्र किए गए 20 बेड रॉक नमूनों में से 19 नमूनों में CaO % IBM सीमा मूल्य से अधिक यानी 34% CaO%) और 1 BRS में CaO % IBM सीमा मूल्य से कम दर्शाया गया है। बेड रॉक नमूनों BRS) का लिथो इकाईवार रासायनिक विश्लेषण अनुलग्नक III-A में दिया गया है। क्षेत्र में पिछले अध्ययनों के अनुसार, चंडी संरचना की मोटाई 300 मीटर से अधिक है और किसी भी एक बोरहोल द्वारा 300 मीटर तक प्रवेश नहीं किया जा सकता है।

डीजीएम द्वारा ड्रिल किए गए 12 बोरहोल में चूना पत्थर की प्रतिच्छेदित मोटाई 50.00 मीटर से 79.00 मीटर तक भिन्न होती है। चूना पत्थर (ALD-02) 79.00 मीटर बोरहोल की अधिकतम मोटाई के साथ एक विस्तर जमा के रूप में होता है। सभी 12 बोरहोल ने ब्लॉक में चूना पत्थर को प्रतिच्छेदित किया। चूना पत्थर क्षितिज मैक्रोस्कोपिक और रासायनिक रूप से सहसंबंधित हैं। कोर नमूने के विश्लेषणात्मक परिणाम बताते हैं कि CaO सामग्री 34.09% से अधिकतम 51.158% तक भिन्न होती है, MgO% 0.172 से 3.70 है, और सिलिका SiO₂% 9.32% से 23.79% तक है।

ब्लॉक में ड्रिल किए गए बोरहोल में पाए गए चूना पत्थर के क्षेत्र और ग्रेड का मूल्यांकन उनके अंतिम उपयोग वर्गीकरण के अनुसार किया गया था। सभी बारह बोरहोल में चूना पत्थर पाया गया है। चूना पत्थर ग्रेड को मोटे तौर पर तीन श्रेणियों में विभाजित किया गया है, i) सीमेंट ग्रेड $\geq 44\%$ CaO, $<3\%$ MgO और $<16\%$ SiO₂) ii) सीमेंट मिश्रण योग्य लाभकारी. ग्रेड ≥ 38 से $<44\%$ CaO, $<5\%$ MgO और $<18\%$ SiO₂) और iii)

मिश्रण योग्य ग्रेड ≥ 34 से $<38\%$ CaO)। जहां तक सीमेंट ग्रेड चूना पत्थर का संबंध है, यह 4 बोरहोल, ALD-01, ALD-03, ALD-04 और ALD-06 में पाया गया है, सीमेंट ग्रेड चूना पत्थर की मोटाई क्रमशः 44.0 मीटर, 46.0 मीटर, 48.20 मीटर और 44.30 मीटर है। जबकि सीमेंट ग्रेड आंशिक रूप से 8 बोरहोल ALD-02, ALD-05, ALD-09, ALD-10, , ALD-12, ALD-13, ALD-15 और ALD-16 में पाया गया। मोटाई क्रमशः 34.0 मीटर, 12.0 मीटर, 12.50 मीटर, 38.0 मीटर, 5.00 मीटर, 27.0 मीटर, 5.50 मीटर और 9.0 मीटर है। सीमेंट मिश्रण योग्य लाभकारी। ग्रेड चूना पत्थर केवल 07 बोरहोल में पाया जाता है, अर्थात् ALD-02, ALD-05, ALD-09, ALD-12, ALD-13, ALD-15, और ALD-16 सीबीबी ग्रेड चूना पत्थर की मोटाई क्रमशः 16.0 मीटर, 34.0 मीटर, 5.0 मीटर, 35.0 मीटर, 17.90 मीटर, 16.0 मीटर और 21.0 मीटर है।

ब्लेंडेबल ग्रेड चूना पत्थर की बात करें तो यह कुछ बोरहोल्स यानी ALD-02, ALD-09, ALD-10 और ALD-16 में पाया गया है। ब्लेंडेबल ग्रेड की मोटाई क्रमशः 23.0 मीटर, 14.0 मीटर, 4.0 मीटर और 11.0 मीटर है। खनिज साक्ष्य और खनिज सामग्री। नियम 2015 के अनुसार एल्डा ब्लॉक का खनिज संसाधन अनुमानित खनिज संसाधन (333) में **554.291** मिलियन टन और अनंतिम टोही खनिज संसाधन (334) **211.95** है, कुल अनुमानित खनिज संसाधन (333) + अनंतिम टोही खनिज संसाधन (334) **766.241** मिलियन टन है।

SUMMARY

Limestone is known for its versatility, durability, and importance in both economic and environmental contexts. Limestone is a sedimentary rock primarily composed of calcium carbonate (CaCO_3). It's a naturally occurring mineral resource that's widely used in various industries, including construction, cement production, paper manufacturing, and more.

The two most important constituents of limestone are calcite and dolomite. Limestone often contains magnesium carbonate, either as dolomite $\text{CaMg}(\text{CO}_3)_2$ or magnesite (MgCO_3) mixed with calcite, varying texture from fine-grained to coarse-grained, typical colors of white, gray, purple and relatively soft nature with a Mohs hardness of around 3.

Chhattisgarh has steadily transformed into an Industrial growth hub, especially in the Cement Industry sector. It is known as the “Rice Bowl of India.” The state is abundant with natural resources and, combined with its strategic location, has become the preferred choice for developing cement manufacturing and infrastructure.

The state is richest in limestone reserves, the primary raw material of cement production within India, such as Chhattisgarh, accounts for a considerable share of the country's limestone deposits. Its abundance made it an ideal place to locate cement plants. Thus, the development of the Cement Industry Growth in Chhattisgarh has attracted major players like Ultratech Cement, Ambuja Cement and ACC.

Proximity to major markets and highly central positioning have made India great in all aspects of connectivity. Conveys a good mix from the road networks and railways spread out throughout the country while combining itself with ports for the delivery of raw materials and finished goods. Economic and logistical advantages are the results of this in Cement Industry Growth in Chhattisgarh.

Given tax and land acquisition benefits along with subsidies, Chhattisgarh works as a very conducive environment to support dynamic industrialization and increase the Cement Industry Growth in Chhattisgarh. This very important piece is at play with respect to attracting domestic and foreign investments.

Road, bridge development and even urban development projects that have generated a phenomenal requirement for cement have played direct roles in the Cement Industry Growth in Chhattisgarh.

Apart from these factors, rapid urbanization in Chhattisgarh has resulted in a number of construction activities, residential, commercial and industrial, all of which have in turn spurred the Cement Industry Growth in Chhattisgarh. This is because, in anticipation of greater demand, manufacturers have been increasing their production capacities, which will lead to further cement supply for the ever-growing tons of cement needed.

The future of the Cement Industry Growth appears to be bright concerning new plant commissioning, enhancing technology, and giving focus on developing green cement. All the above-mentioned factors would help in protecting the growing curve of the industry as well as making it minimal to the environment.

The proposal for G-3 stage exploration in Alda block was discussed in the 61th meeting of Technical-cum-Cost Committee (TCC), National Mineral Exploration Trust (NMET) held on 30th & 31st January 2024, The committee recommended the proposal to Executive Committee (EC) in its 33rd EC meeting held on 19th February 2024 for approval of Preliminary Exploration (G-3) includes, Geological Mapping at 1: 4,000 scale, 800m of drilling with 16 boreholes, Petrological study and chemical analysis of core samples generated through drilling. Further in 74th Technical-cum-Cost Committee (TCC), held on 20th -21st February 2025, approved exclusion of 4 nos. of boundary boreholes from the approved quantum of the project due to standing crops in the field and revised the cost of the project as ₹ 142.74 Lakhs.

Hence, the total drilling of 630m was approved with 12 Nos. boreholes, as well as 30m additional drilling with the estimated cost of Rs. 142.74 Lakhs, also approved.

As per above approved proposal an area of about 10.25 km² is Geologically mapped on a 1:4000 scale lying between Latitude 21° 35' 14.932" N to 21° 37' 25.622" N and longitude 81° 53' 06.978" E to 81° 54' 58.426" E lies in the Survey of India Toposheet no. 64G/14.

Under the detailed geological mapping the covered area shows that the most of the area of the block is covered by thick soil and the outcrops of limestone are demarcated along the nala section and gradational slopes. During the Detailed Geological Mapping, a total of 20 Nos. surface samples were drawn and 20 Nos. were chemically analysed, 05 Nos. of the BRS were drawn for petrological study. Total of 480 core samples were collected and analysed for 7 radicals CaO, MgO, SiO₂, Fe₂O₃, Al₂O₃, P₂O₅, & LOI by XRF in Central Lab DGM. 50 Nos.(10% of primary samples) check samples were chemically analysed from the Regional Office Raipur Lab.

The area shows a decrease in elevation towards the north-eastern direction. The area is geologically composed of limestone outcrops of the Chandi Formation, along with Tarenga shale and Gunderdehi shale formation. The limestone of the area are fine grained, massive & compact greyish to pinkish grey in colour with stromatolitic nature in colour. The limestone deposits are horizontal to subhorizontally bedded with dips varying from 02° to 05° towards the west. Out of 20 Nos. of Bed Rock Samples collected during detailed geological mapping, 19 samples have shown the CaO % more than the IBM threshold value i.e. (34% CaO %) and 1 Nos. of BRS indicates CaO % less than IBM Threshold value. Litho unit-wise chemical analysis of Bed Rock Samples (BRS) is provided in Annexure III-A.

The previous studies in the area, the thickness of Chandi Formation is more than 300m and could not be penetrated up to 300m by any single borehole. The intersected thickness of the limestone in 12 boreholes drilled by DGM varies from 50.00m to 79.00m.

The limestone (ALDA) occurs as a bedded deposit with a maximum thickness of 79.00m (Borehole ALD-02). All 12 boreholes intersected the Limestone in the block. The Limestone horizons are both macroscopically and chemically correlatable. The analytical results of the core sample show that the CaO content varies from 34.09 % to a maximum of 51.158%, MgO% is 0.172 to 3.70, and silica SiO₂ % ranges from 9.32% to 23.79%.

The limestone zones and grades encountered in the boreholes drilled in the block were assessed according to their end-use classification. Limestone has been encountered in all the twelve boreholes. Limestone grade is broadly divided into three categories, i) Cement grade (≥ 44% CaO, <3 % MgO and <16% SiO₂). ii) Cement Blendable (beneficiable) grade (≥38 to <44% CaO, <5% MgO and <18% SiO₂) and iii) Blendable grade (≥34 to <38% CaO). As far as Cement grade limestone is concerned, it has been encountered in 4 boreholes, ALD-01, ALD-03, ALD-04 and ALD-06 the thickness of cement grade limestone is 44.0m, 46.0m, 48.20m and 44.30m respectively.

Whereas Cement Grade partially encountered in 8 borehole ALD-02, ALD- 05, ALD-09, ALD-10, , ALD-12, ALD-13, ALD-15 and ALD- 16. The thickness are 34.0m, 12.0m, 12.50m, 38.0m, 5.00m, 27.0m, 5.50m, and 9.0m respectively.

Cement Blendable(beneficiable) grade limestone is encountered in 07 boreholes only, namely ALD-02, ALD- 05, ALD-09, ALD-12, ALD-13, ALD-15, and ALD- 16. The thickness of CBB grade limestone are 16.0m, 34.0m, 5.0m, 35.0m, 17.90m, 16.0m, and 21.0m respectively.

Blendable grade limestone is concerned, it has been encountered in few boreholes i.e. ALD-02, ALD-09, ALD-10, and ALD-16. The thickness of Blendable grade are 23.0m, 14.0m, 4.0m, and 11.0m respectively.

The Mineral Resource of the Alda block in accordance with the Mineral (Evidence and Mineral Contents) Rule 2015 in Inferred Mineral Resource (333) is 554.291 million tonnes & Tentative Reconnaissance Mineral Resource (334) is 211.95, Total Inferred Mineral Resource (333) + Tentative Reconnaissance Mineral Resource (334) is 766.241 million tonnes

CHAPTER 2

INTRODUCTION

2.1 INTRODUCTION

2.1.0 The Alda exploration block covers an area of 10.25 sq. km. lies in the south-western part of the Balodabazar-Bhatapara district, it falls in the part of Survey of India Toposheet No. 64G/14. In the surrounding area of the present explored block there are several mining leases for limestone & several cement plant i.e. Raipur Shree Cement plant. Therefore, the current investigation was aimed to find out the potentiality of limestone mineral commodities in the present exploration block.

2.1.1 The proposal of the Alda block was discussed in the 61th meeting of Technical-cum-Cost Committee (TCC), National Mineral Exploration Trust (NMET) held on 30th & 31st January 2024, through video conferencing at Geological Survey of India, Ministry of Mines Wing-F, Room No. 325 & 326, Udyog Bhawan, Rafi Ahmed Kidwai Marg, Rajpath Area, Central Secretariat New Delhi-110011.

2.1.2 The exploration proposal for the block was technically evaluated by the TCC for its various geological components and their suitability in the G-3 stage of exploration.

The committee recommended the proposal to Executive Committee (EC) in its 33rd EC meeting held on 19th February 2024 for approval of Preliminary Exploration (G-3) with component of Geological Mapping at 1: 4,000 scale, drilling 800m with 16 boreholes, Petrological study and chemical analysis of bed rock sample & borehole core samples. The TCC committee of NMET initially recommended the proposal for approval of Preliminary Exploration (G-3) with estimated cost of Rs. 159.775 Lakhs, including GST in a schedule of 10 months. vide Office Memorandum . F.No**23/427/2024-NMET/ New Delhi, dated 28th February 2024.**

2.1.3 The 72nd Technical-cum-Cost Committee (TCC), held on 23rd -24th December 2024 has approved Time line extension for submission of GR report up to 30th March 2025, Further in 74th Technical-cum-Cost Committee (TCC), held on 20th -21st February 2025, approved exclusion of 4 Nos. of southern boundary boreholes from the approved quantum of the project due to standing crops in the field and revised cost of the project as ₹ 142.74 Lakhs.

Hence, the total drilling of 630m was approved with 12 boreholes, includes 30m additional drilling (increase depth) with the estimated cost of Rs. 142.74 Lakhs.

2.1.4 In compliance to the order of the Directorate of Geology and Mining vide order No. 2551/Geology-I(NMET)/F.No. 01/Alda/2024 Nava Raipur dated 26/06/2024 and order No. 3609/Geology-I/F.No.17/F. Pro.2024-25/2024 Nava Raipur dated 18/10/2024 “Preliminary Exploration (G-3) for limestone has been carried out in Alda block, district Raipur & Balodabazar-Bhatapara, Chhattisgarh under NMET”.

2.1.5 Limestone-producing states in India are instrumental in backing the country’s infrastructure development. Limestone is a primary raw material for cement production, which in turn is essential for building houses, roads, dams and bridges. In recent years, limestone production has seen remarkable growth in several Indian states, thanks to globalisation and effective government policies that promote private sector engagement in mineral exploration.

India ranks as the third-largest producer of limestone in the world, with a production level of 450 million metric tonnes in FY 2023-2024. Limestone is among the nation’s most valuable mineral resources, and India is highly self-sufficient in producing it, along with iron ore and aluminium.

2.1.6 Chhattisgarh is an important contributor to India’s limestone production, accounting for 11% of the total output in 2023-2024. During this period, the state’s limestone production stood at 49,278,535 tonnes. Districts such as Bilaspur, Bastar, Baloda Bazar, Durg, Kawardha, Raipur, and Raigarh have key limestone deposits. Most of the state’s limestone is used for cement production.

Additionally, the limestone from Raipur and Durg districts is also suitable for iron and steel production. The state is home to 19 Cement Plants, with notable companies including Ambuja Cements Ltd, ACC Cements, Shree Cement, and UltraTech.

2.2 DETAILS OF PROJECT: -

Preliminary Exploration (G-3) for limestone in Alda block , district Raipur & Balodabazar-Bhatapara was approved by NMET through order No. F.No**23/427/2024-NMET/ New Delhi, dated 28th February 2024**. As per the approved project, two work components were assigned in the area, viz, Detailed mapping (1:4000 scale) for 10.25 km² and 10 boreholes to be drilled up to a depth of 50 meters, and 01 borehole drilled up to the depth of 79 meters.

2.3 INVESTIGATING AGENCY: - DIRECTORATE OF GEOLOGY AND MINING, CHHATTISGARH

Indravati Bhavan, 4th Block, 2nd Floor Naya
Raipur (CG)

Phone No. - 0771-2412840, 2412844

E-mail: dgm.cg@nic.in

2.4 OBJECTIVES OF INVESTIGATION: -

To carry out the Preliminary Exploration (G-3) for Limestone in the area as per UNFC guidelines, MEMC Rules 2015(as amended) and other existing laws framed for governing exploration works.

1. To demarcate the limestone occurrence in the study area by drilling boreholes at 800 m x 800 m (regular body) grid interval under G-3 level of exploration.
2. To find out the quantity, quality and grade-wise assessment of Limestone resources.
3. To carry out exploration as per Mineral (Evidence of Mineral Contents) Rule-2015, Mineral Auction Rule-2015 and the MMDR Amendment Act-2015, in turn to facilitate the State Government of Chhattisgarh in the auctioning of the block.

2.5 BASIS FOR TAKING UP INVESTIGATION: -

During various field seasons, i.e. 2017-18, 2021-22, and 2023-24, DGM Chhattisgarh has carried out the reconnaissance survey in and around the proposed area. During the course of traverses, numerous samples were collected from the reconnaissance area out of which 17 Nos. of samples have been taken into consideration to prepare the present project proposal.

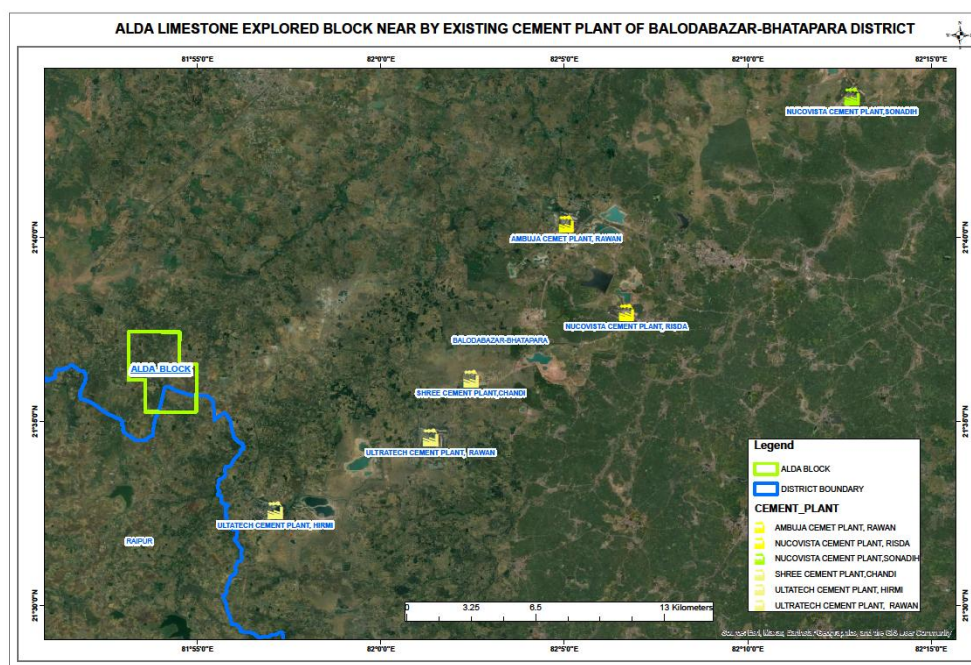
The analytical data of the collected samples were very encouraging. The limestone contents CaO%, MgO% and SiO₂% are ranges from **(39.25 to 52.04)**, **(0.16 to 3.22)** and **(1.43 to 14.96)** respectively.

In the adjoining area, department has also carried out detailed exploration for Cement grade limestone in Ameri-Pendri, Basin block, Nawapara-Bhatbhera-Sarponga block and Rani-Jarod block during field season 1990-91, 1991-92 and 1992-93 by DGM, MP.

Presently, DGM Chhattisgarh is also carrying out G-3 stage exploration in Saklor-Kuthrod and Nawapara (North) area which are adjoining to proposed block and much prospective for Cement grade limestone.

The proposed area is located in the south-western part of ongoing project Nawapara(North) block District Balodabazar-Bhatapara by DGM Chhattisgarh 2023-24.

On the encouraging results of G-4 level exploration work, Alda was proposed for G-3 level of exploration by DGM Chhattisgarh to make the block auctionable. In an around area of Alda , DGM, Chhattisgarh executed the G-4 level exploration work during the field season 2023-24. Based on the G-4 level exploration work area was very promising and highly potential for limestone deposit. Finally, it was proposed for next level of exploration.



Text Figure 2.1 Map showing the Explored Alda Limestone block and the nearby existing Cement Plant

2.6 DETAILS, NATURE AND QUANTUM OF WORK PROPOSED V/S ACHIEVEMENT

2.6.1 After receipt of approval from NMET, DGM has carried out exploration activities in Alda Block. The details, nature and quantum of work proposed Vs achievements are given below:

TABLE – 2.1
Quantum of Work: Target Vs Achieved in Alda Block

S. No.	Item of Work	Unit	Target	Achieved
1	Topographic Survey & Geological Mapping on 1:4000 scale (km ²)	sq.km	10.25	10.25
3	Exploratory Drilling (One conditional BH to confirm the total thickness of dolomitic limestone)	m.	630.00m 12 Bhs	630.00m 12 Bhs
4	Laboratory Studies			
	i) Chemical Analysis; Primary samples for 7 radicals, CaO, MgO, SiO ₂ , Fe ₂ O ₃ , Al ₂ O ₃ , P ₂ O ₅ & LOI by XRF.	Nos.	480 Core 20 BRS	480Core 20 BRS
	ii) Check sample (10% of Primary samples) for analysis of 7 radicals, CaO, MgO, SiO ₂ , Fe ₂ O ₃ , Al ₂ O ₃ , P ₂ O ₅ & LOI .	Nos.	50	50
5	Physical Studies			
	a) Petrological Studies	Nos.	5	5
	b) Bulk Density Determinations	Nos.	5	4
6	Report Preparation (5 Hard copies with one soft copy)	Nos.	1	1

2.7 PERSONNEL INVOLVED:

TABLE – 2.2

The following field personnel were engaged in the project.

Name & Designation	Aspect of work
A. <u>Supervising Officer</u> SHRI KAILASH DONGRE Joint Director (Geology)	Supervising Officer of the project
B. <u>Field Officer</u> SHRI PARMANAND KHUTE (Assistant Geologist)	Geological mapping, Borehole logging, Sampling, Supervision of Drilling, Resource estimation and preparation of final report
SHRI NIKHIL KUMAR VERMA (Assistant Geologist)	Geological mapping, Borehole logging, Sampling, Supervision of Drilling and preparation of final report
C. <u>Surveyor</u> Shri Rome Singh Dhruw Topo Surveyor	Contouring of the area
D. <u>Drilling Supervision</u> Shri K.S. Dhruw Assistant Director (Drilling)	Supervision of Drilling Work
E. <u>Drilling Staff</u> 1. Shri D.S. Dhruw(Driller Mechanic) 2. Shri R.R.Tandekar (Driller Mechanic) 3. Shri Rohit Kunjam (Driller Mechanic) 4. Shri D.S. Thakur (Driller Mechanic) 5. Shri Kishore Sahu(Truck driver) 6. Shri Tejkumar Jangde (Tractor Driver) 7. Sushil Kumar (Jeep Driver)	Drilling work
F. <u>Chemical Analysis</u> 1. Central Lab, DGM 2. Regional Office Raipur	1. BRS sample and Core samples 2. Cross-check samples
G. Report Preparation	Regional Office Raipur

2.8 MODE OF OPERATION OF DIFFERENT WORK COMPONENTS AND ASSOCIATED AGENCY: -

D.G.M. Chhattisgarh has systematically executed the exploration work since the last 50 years, particularly in limestone deposits. Directorate of Geology and Mining, State of Chhattisgarh, has its own separate mineral exploration wing and it is well established and equipped with drill machine and manpower. In the Alda Limestone block, it covers all the components of work by the systematic approach.

In the assigned area, exploration work started by the detailed geological mapping. During the course, marks the outcrop of limestone as well as various exposures of different rock units are present in the assigned area are demarcated properly and representative samples were drawn. Simultaneously, through topographical survey, the area was mapped and marked a baseline for the reference of another related topographical survey. The topographical survey work has been carried out by Theodolite, Total Station, and DGPS. For the preparation of the borehole plan, grid line surveys were conducted at a regular interval of 800 x 800 meters. As per the proposal for the G-3 stage of exploration, a total of 16 boreholes were planned in the area, 10.25 km² area for detailed geological mapping on a 1:4000 scale. DGM requested in the 74th meeting of TCC of NMET to exclude 4 bordering boreholes due to standing crops, which was accepted by TCC and revised proposal along with the cost estimate. For the timely achievements the target of drilling, the department deployed 02 Nos. heavy drill machine and 02 Nos. Calyx drill machine.

CHAPTER 3

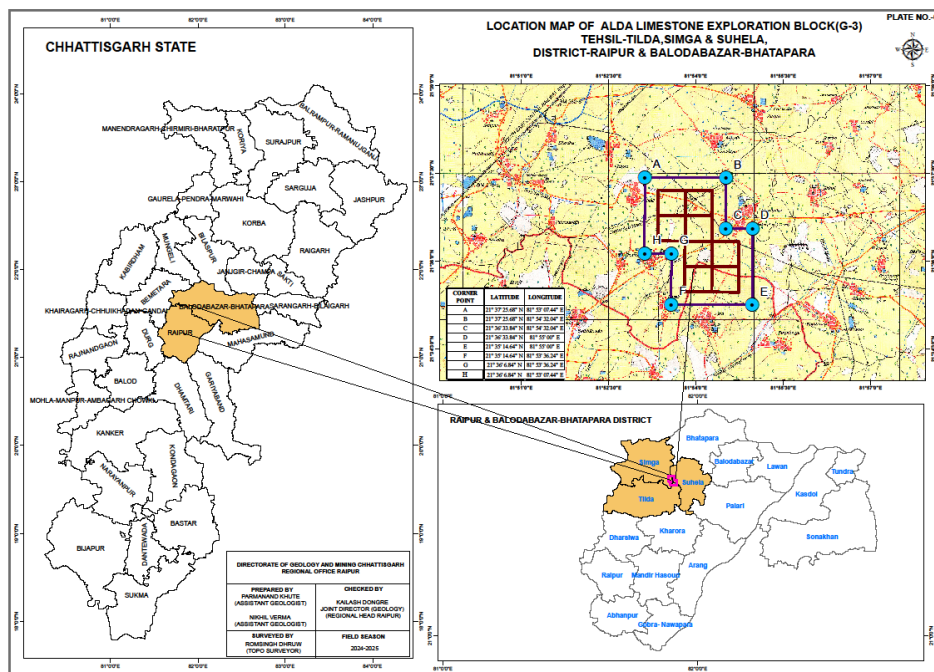
PROPERTY DESCRIPTION

3.1. DETAILS OF THE AREA (village name, district, state, toposheet)

3.1.1 Village name, District, State:

The villages falling under the explored area are tabulated as under:

S.No.	Features	Details
(i)	Villages	Alda, Kareli, Bhainsa, Nawapara, Mudhpar, Khilora
(ii)	District	Raipur & Balodabazar-Bhatapara
(iii)	State	Chhattisgarh
(iv)	Toposheet No.	64 G/14



Text figure. 3.1 Location Map of Alda Limestone explored Block
Tahsil- Tilda ,Simga & Suhela, District – Raipur & Balodabazar-Bhatapara, Chhattisgarh

3.1.2 Geo-coordinate with the corner points of the investigated area:

TABLE – 3.1

S. NO.	CORNER POINT	GEOGRAPHICAL COORDINATES		UTM COORDINATES	
		Latitude	Longitude	Northing	Easting
1.	A	21° 37' 25.622" N	81° 53' 7.453" E	2391446.991	591633.8843
2.	B	21° 37' 25.172" N	81° 54' 30.929" E	2391446.991	594033.8843
3.	C	21° 36' 33.137" N	81° 54' 30.603" E	2389846.991	594033.8843
4.	D	21° 36' 32.984" N	81° 54' 58.426" E	2389846.991	594833.8843
5.	E	21° 35' 14.932" N	81° 54' 57.934" E	2387446.991	594833.8843
6.	F	21° 35' 15.385" N	81° 53' 34.480" E	2387446.991	592433.8843
7.	G	21° 36' 7.421" N	81° 53' 34.799" E	2389046.991	592433.8843
8.	H	21° 36' 7.569" N	81° 53' 6.978" E	2389046.991	591633.8843

3.1.3 Land use/Land cover:

The block area falls under revenue & Private land.

3.1.4 Forest type/free hold/lease hold details:

No National Park and Wild Life Sanctuaries exists within the 50 kms radius area from the explored block. Nearest Wild Life Sanctuaries is Bar Navapara Wild Life Sanctuaries, which is situated in Baloda bazar District at an aerial distance of about 70 kms from the SW direction of the block.

3.1.5 Location & Accessibility:

The area is strategically located in the central Basin part of Chhattisgarh Supergroup. The limestone belongs to Chandi formation of Raipur Group. The area comes under Raipur & Balodabazar-Bhatapara, district of Chhattisgarh.

The explored area is located 29 Km from, the headquarters of Balodabazar-Bhatapara district and 55 Km from the headquarters of Raipur district, easily accessible by all-weather road.

The block is also well connected through railway line by Hathbandh section of South-East railway nearest railway station is Hathbandh which is approximately 15 km from the block. The nearest airport is Swami Vivekanand Raipur Airport which is approximately 115 km from the block.

The explored area is bounded by latitude $21^{\circ} 35' 14.932''$ N to $21^{\circ} 37' 25.622''$ N and longitude $81^{\circ} 53' 06.978''$ E to $81^{\circ} 54' 58.426''$ E lies in the Survey of India Toposheet No. 64G/14.

3.1.6 Climate:

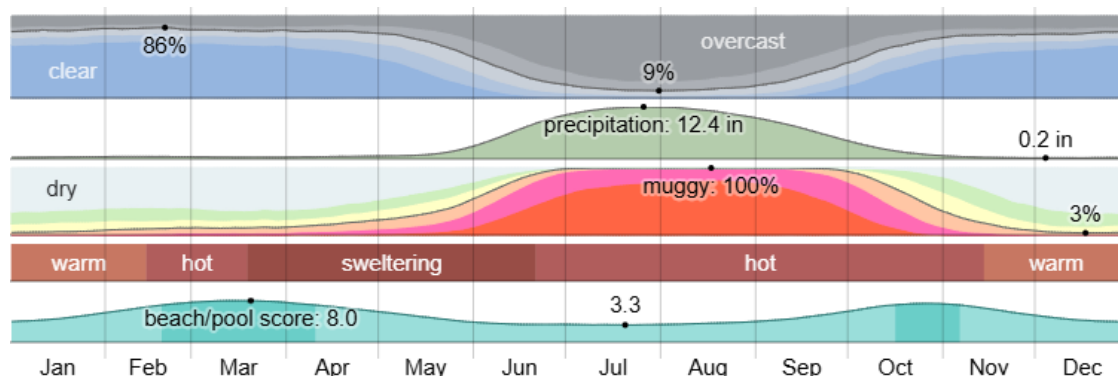
The climate of the area is sub-tropical to tropical. In Baloda Bazar, the wet season is oppressive and overcast, the dry season is mostly clear, and it is hot year round. Over the course of the year, the temperature typically varies from 13°C to 42°C and is rarely below 10°C or above 45°C .

The *hot season* lasts for *2.0 months*, from *April 10* to *June 9*, with an average daily high temperature above 38°C . The hottest month of the year in Baloda Bazar is *May*, with an average high of 41°C and low of 29°C .

The *cool season* lasts for *2.6 months*, from *November 21* to *February 9*, with an average daily high temperature below 28°C . The coldest month of the year in Baloda Bazar is *December*, with an average low of 13°C and high of 26°C .

The *wetter season* lasts *3.6 months*, from *June 8* to *September 25*, with a greater than 34% chance of a given day being a wet day. The month with the most wet days in Baloda Bazar is *July*, with an average of *20.1 days* with at least *0.04 inches* of precipitation.

The *drier season* lasts *8.4 months*, from *September 25* to *June 8*. The month with the fewest wet days in Baloda Bazar is *December*, with an average of *1.0 days* with at least *0.04 inches* of precipitation.



Source: <https://weatherspark.com/v/110551/Average-Weather-in-Baloda-Bāzār-Chhattisgarh-India-Year-Round>

Text Figure- 3.2: Pictorial representation of monthwise weather in Balodabazar- Bhatapara

3.1.7 Flora/fauna:

The area is covered by the mainly Neem (*Azadirachta indica*), Banyan (*Ficus benghalensis*), Mango (*Mangifera indica*) and occasionally Mahua (*Madhuela latifolia*), Tendu (*Diospyros malanoxylon*) and Bahera (*Tharminalia belerica*).

Agriculture is practiced in the area during Kharif and Rabi seasons every year. During the Kharif, cultivation is done through rainfall while during the Rabi season, it is done through groundwater as well as partly through surface water like ponds and other sources. The groundwater abstraction structures are generally dugwells, borewells/tubewells. The principal crops in the block are Paddy, Wheat and Gram. In some areas, double cropping is also practiced.

The most abundant fauna in the area are monkeys (*Semipithecus entellus*). Besides, a rich variety of wildlife is also present. They are jackal (*Canis aureus*), fox (*Vulpes vulpes*), wild boar (*Sus cristatus*), spotted deer (*Cervus axis*) and rabbit (*Oryctolagus cuniculus*). A variety of insects thrive in the area. Occasionally, snake species like python (*Pythonidae*), cobra (*Ophiophagus Hannah*) and krait (*Bungarus caeruleus*) are also found.

3.1.8 Geomorphology & Drainage

The study area exhibits flat, gently undulating topography. Physiographically, the area is almost plain land with an average elevation of 240m above mean sea level. The highest

elevation in the explored area is about 281m above MSL. The general slope of the area is due north. Most of the area of the block falls under the revenue category, cultivated land for paddy and other crops in the season.

The Seonath River and its tributaries control the principal drainage of the study area. The Seonath River flows in an E-W direction in the northern part of the study area. The drainage pattern of the area is dendritic to sub dendritic. A network of constructed canal is laid down by the state government within the block area under exploration.

3.1.9 Local Infrastructure

The Alda is connected by all-weather road. Details of other infrastructure are as follows:

- Electricity:- Suhela sub-station is located about 7 Km from Alda village Power station has 33 KV main power line which is again fed from Balodabazar Power station. The power line is divided into 11 KV each among three sub-feeders, for three areas.
- Road:- The block area can be approached by own conveyance by the Simga-hathbandh-Kareli road via Nawapara. The local network of roads is very good.
- Railway:- The nearest Railway station is Hathbandh at a distance of about 15 Km.
- Airport:- The nearest airport is Swami Vivekanand Airport Raipur is about 115 Km and Raipur is the national airport.
- Rest House:- The local rest house is in Balodabazar, about 29 km from the study area.
- Post office:- Suhela is the nearest post office, which is about 07 km from the Alda block.
- Police station:- Suhela is the nearest police station.
- Primary Health Centre:- Suhela is the nearest government health centre.
- Education centre:- Educational centre up to higher secondary school at Suhela. The higher education centre is the District headquarters of Balodabazar.

3.1.10 Population:

Table – 3.2: Data as per Census 2011 of Raipur & Balodabazar- Bhatapara.

S.NO.	VILLAGES	DIRECTION	POPULATION
01	Alda	SW	1497
02	Kareli	SW	919
03	Bhainsa	SW	1427
04	Nawapara	NE	2634
05	Mudhpar	NE	843
06	Khilora	NW	2282

3.1.11 Archaeological, historical sites within or nearby area

In Archaeological site, the Ancient Mawali Mata temple is situated in Singarpur tehsil of Bhatapara, which is 36 Km from the district headquarter, Balodabazar.

3.1.12 National Park, Sanctuaries etc.

No National Park and Wild Life Sanctuaries exists within the 50kms radius area from the explored block. Nearest Wild Life Sanctuaries is Bar Navapara Wild Life Sanctuaries, which is situated in Baloda bazar District at an aerial distance of about 70 kms from the SE direction of the block.

3.1.13 Environment

The area under consideration has no Ecologically Sensitive Zone. The socio-democratic profile reveals a moderate population density, with a significant presence of Scheduled Castes (22.75%) and tribes (13.18%). Economically, the local population relies heavily on agriculture, while some individuals are employed in limestone mines and in cement plant.

In terms of geography, the area's main drainage system is the Seonath river, which is fed by various water courses originating from the surrounding area. The region is also home to several water reservoirs, including the Chhuiha Dam, Kursinala Dam, and Dharchula Dam.

Industrial activities in the area nearby area is Cement Hub ,where is many

cement plant established.i.e. Ambuja Cement Plant Rawan, Nucovista Cement Plant Risda, Nucovista Cement Plant Sonadih , Shree Cement Plant Chandi, Ultratech Cement Plant Hirni, Ultratech Cement Plant Rawan.

Groundwater is the primary source of drinking water, accessed through tube wells with hand pumps. The water table in the area is recorded at 25-30 meters below the surface.

CHAPTER 4

PREVIOUS WORK

4.1 Details of Previous Exploration/Investigation carried out by other Agencies /Parties

4.1.0 The Chhattisgarh basin was first mapped by V. Ball in 1879. This has subsequently been described. (Records, Geological Survey of India, Vol XVIII, 1934). According to Ball the rocks of the Chhattisgarh basin are of Lower Vindhyan. W. King (Rec. Geol. Survey of Ind. XVIII, 1885) made some traverses in the area and referred this rock as Lower Vindhyan. W.T. Blanford and Lewis Ferrier were also of the opinion that the Chandrapur sandstones and Raipur limestones are of Lower Vindhyan age. F.H. Smith (Rec. Geol. Survey of Ind. Vol. X, 1877), basing his interpretation on the thickness of the sediments, attributed them to belong to the Kurnools, which are equivalent to Lower Vindhyan. According to Pascoe (A manual of the Geology of India and Burma, Vol. I 1950 pp. 375) the rocks of the Chhattisgarh basin are grouped under the Cuddapahs, thereby attributing an older age. Krishnan is also of the same opinion as Pascoe.

4.1.1. The Chhattisgarh Basin, like any other Peninsular Proterozoic basin of India, has drawn continuous attention of geologists since early 19th century. The pioneering works of Ball (1877), King (1885), Smith (1898) and Schnitzer (1969) had made basic contributions in understanding the geo-tectonic development of the Chhattisgarh Basin in time and space. P.K. Chatterjee carried out preliminary investigation of limestone and dolomite deposits of Chhattisgarh basin lying in Raipur and Bilaspur Districts, M.P. during 1948-49 field seasons. Subsequently, Kale (1991), Naqvi and Rogers (1987), Sarkar et al., (1990), Prasad (1990) and Thorat et al. (1990) addressed this aspect in further details. Pascoe (1973), Dutt (1964), Murti (1987) and Das et al., (1992) provided stratigraphic subdivisions of the Chhattisgarh sequence.

4.1.2. Depositional environments, volcanic episodes, sedimentary processes and sedimentary petrology of the Chhattisgarh rocks have been discussed by Jairam and Banerjee (1980), Mukherjee and Khan (1996), Mishra and Babu Rao (1990), Dutta

et al., (1990), Dutta and Dutta (1990), Gupta (1996, 1998), Chakraborti (1997), Murti (1996), Das et al., (2001) and many others. Moitra (1986, 1990, 1995 and 1999), Moitra and Pal (1984) and Srivastava (1977) described a few forms of microfossils and erected stromatolite biozones from the Raipur Group, but none of them has bio-stratigraphic connotation. Because of the lack of precise radiometric age data and bio-stratigraphically significant Fossils findings the age status of the Chhattisgarh rocks remained highly speculative.

4.2 PREVIOUS WORK BY D.G.M. CHHATTISGARH

The Directorate of Geology and Mining, Chhattisgarh, in the regular programmed of various level of exploration for limestone mineral deposits in the state had already been undertaken preliminary assessment of limestone of Chandi formation in the adjoining area.

4.2.1 Tiwari S.B., Sankhala V.K., Kankane S. (F.S.1991 to 1993) Report on Prospecting of Cement grade limestone in Karmadih, Maldi-Mopar area, Tahsil-Balodabazar, District-Raipur (M.P.),

4.2.2 Padlamwar - P.K. (F.S. 1994 to 1998) Report on Prospecting of Cement grade limestone in Pharsabhader Area, Tahsil-Balodabazar, District- Raipur (M.P.),

4.2.3. Padlamwar, P.K. (F.S.1993-94) Report on Prospecting of Cement Grade Limestone in Sonpuri-Suklabhatha area Tahsil-Baloda Bazar, District- Raipur (M.P.),

4.2.4. Padlamwar, P.K. & Saxena, V.K. (F.S.2002-2004) Report on Prospecting of Cement Grade Limestone in Chuchrangpur-Amlidih Area, Tahsil-Palari, District-Raipur (C.G.),

4.2.5. Tiwari S.K. (F.S.2008-09 to F.S.2011-12) Report on Exploration of Limestone in Deogaon-Kurra area, Tahsil-Tilda, District-Raipur (C.G.),

4.2.6. Tiwari S.K., Chaubey Seema (F.S.2011 to 2013) Report on exploration of Limestone in KESLA-I, District Raipur (C.G.)

4.2.7. Tiwari S.K., Chaubey Seema, Manjhi Prafful (F.S.2013 to 2016) Report on exploration of Limestone in KESLA-II District-Raipur (C.G.)

- 4.2.8. Seema Chaubey, Renuka Nag and Manjhi Prafful (F.S.2016 to 2017) Report on exploration of Limestone in Guma-II District-Balodabazar-Bhatapara (C.G.)
- 4.2.9. Seema Chaubey, Renuka Nag, Manjhi Prafful (F.S.2016 to 2017) Report on exploration of Limestone in Kukurdih--II District-Balodabazar-Bhatapara (C.G.)
- 4.2.10. Seema Chaubey, Manjhi Prafful (F.S.2017 to 2018) Report on exploration of Limestone in Kathiya-Pachari-Bharuadih District-Raipur (C.G.)

CHAPTER 5

GEOLOGY OF THE AREA

5.1 Aerial Reconnaissance - Not Applicable

5.2 Regional Geological set up of the area with Stratigraphy, Structure and Metamorphism:

The rock formation of the Balodabazar-Bhatapara districts ranges in age from Archaean to Recent and is regionally exposed. It includes granites, gneisses and older metamorphic rocks of the Precambrian age, rocks of the Chhattisgarh Super-group of upper Proterozoic age.

The Chhattisgarh Super-group shows extensive lateral and vertical litho-facies variations. The limestone of Chandi formation of Raipur group have two members are Pendri (Deodonger) and Nipania are generally purple to grey coloured argillaceous and somewhere dolomitic with stromatolitic nature. At places, the limestones also showed phosphatic and cherty nature.

The Gunderdehi Formation is dominated by shales. The Charmuria- Gunderdehi limestone-shale package represents the first cycle of sedimentation in the Raipur Group. Chandi formation represents the second cycle.

Each cycle of deposition is thought to be initiated by a marine transgression and culminated by a marine regression (Das et al., 2001). Stromatolites in varied forms are omnipresent in limestone developed all along the sequence.

The Regional stratigraphic sequence of litho-units in the area (Based on District Resource Map of Geological Survey of India) is furnished below.

Table-5.1

The Regional stratigraphic sequence of the area

Super Group	Group	Formation	Member	Lithology
Chhattisgarh Super Group		Intrusives		Dolerite dykes
	RAIPUR GROUP	Maniari Formation (70m+)		Purple shale with dolomite, dolomitic limestone and gypsum
		Hirri Formation (70m+)		Grey dolomite, argillaceous dolomite
		Tarenga Formation (180m?)	Bilha Member	Purple dolomitic argillite
			Dagauri Member	Green clay, chert and shale intercalation (tuffaceous?)
			Kusmi Member	Pink to purple calcareous shale
		Chandi Formation (67m)	Nipania Member	Purple and bedded limestone Purple argillaceous stromatolitic dolomite
			Pendri/Deodong er Member	Purple and grey stromatolitic limestone and dolomite with flaggy limestone-shale intercalation/ferruginous glauconitic arenite and Shale
		Gunderdehi Formation	Newari Member	Pink and buff Shale with Flaggy Limestone.
			Andha/Dotopar Member	Predominantly pink, purple and grey shale with limestone intercalations/ arenite/ buff to green shale member in the middle
		Charmuria Formation (490m)	Bagbura Member	Purple limestone (phosphatic)
			Kasdol Member	Dark grey bedded limestone/ argillaceous limestone with minor shale intrecalations
			Ranidhar Member	Cherty limestone and dolomite (phosphatic at places)
			Sirpur Member	Chert and clay intercalation
	CHANDARPUR GROUP	Kansapathar Formation (20-200m)		White to pinkish, glauconitic quartz arenite
		Chaporadih Formation (20-200m)		Purple, green, grey and black shale with fine quartz arenite intercalation
		Lohardih Formation (20m)	--Unconformity---	Ferruginous purple arkose and gritty wacke arenite with shale partings and conglomerate at the base
	SINGHORA GROUP	Chhuipali Formation (300m?)		Stromatolitic limestone and dolomite at the upper part Variegated shale with minor bedded limestone, chert, siltstone intercalations
		Bhalukona Formation (20m)		Quartz arenite/siltstone and minor shale
		Saraipali Formation (60m)		Variegated shale with minor siltstone and limestone Porcellanite, tuff/tuffite
		Rehatikhoh Formation (20m+)	-- Unconformity	Feldspathic arenite, arkose and conglomerate at the base

5.2.1 Local Geology:-

The Raipur group comprises three cycle of argillite-carbonate sequence, each cycle starting with a carbonate followed by argillite denoted by regressive phase of the sea.

Chandi formation comprises a major stromatolitic limestone sequence. Chandi formation again sub divided into two members based on dominant carbonate facies, Nipania member and Pendri (Deodonger) member.

The rock formation occurring in the study area comprises Shale, shaly Limestone/Dolomitic Limestone and Limestone of Raipur Group. The major Limestone of this area belongs to the Chandi Formation of Raipur Group under Chhattisgarh Super-group. These rock formations are almost sub- horizontal having general strike NE-SW and dips 2° to 5° towards West. The limestone exposures are found as patches in the area.

The stratigraphic sequence is as below:

Table-5.2

Stratigraphic succession of the area around Alda Block

Age	Supergroup	Group	Formation	Lithology
Recent to Quaternary				Soil / laterite
Meso-Neo Proterozoic	Chhattisgarh Super-group	Raipur Group	Chandi Formation	Pink to Greyish Pink Stromatolitic Limestone with intercalation of Shale
			Gunderdehi Formation	Pink and Grey Shale

(After District Resource Map, GSI)

5.3 MINERALISATION IN THE BLOCK

In the present exploration block, extensive limestone mineralisation has been observed on the surface and in boreholes. On the surface, limestone occurs throughout the block (Photo 5.1) Limestone is present in all the boreholes in intercalation with shaly limestone. Most of the limestone is of stromatolitic limestone and are of compact and massive type.

Limestone horizon is continuing up to 79 m as observed in borehole No. ALD-02. These limestones are known to be deposited normally in tidal swept shallow sea, mainly in tidal flats, near-shore, marine or low energy environments.



Photo. 5.1 Stromatolitic Limestone

5.4 ROCK TYPES FOUND IN THE AREA

5.4.1 SHALE

The Shale is also litho-stratigraphically the basal formation of the Raipur Group. This rock type is not exposed in the area, as observed in borehole cores, it is fine-grained, Pink and Grey Shale in colour. Out of 12 boreholes drilled, in which BH Nos. ALD-9, ALD-15, ALD-16 shale bands (2.00m – 15.00m) are found.



Photo. -5.2 : Shale of BH No. Ald -15 (34.10m To 40.10m)

5.4.2 LIMESTONE/ STROMATOLITIC LIMESTONE

The Limestone is grey to pinkish grey in colour with stromatolitic nature. Outcrops of this limestone in the area are marked within the block, occurring in patches along the general trend NE-SW. The limestone deposits are subhorizontally bedded with dips varying from 02° to 05° towards the west. At places where limestone bands are seen, they are concealed below the soil and alluvium cover, varying in thickness from a fraction of a meter to as much as 1 meter, observed in nala cutting. Limestone are well exposed along the Seonath River section and around village Kareli, Bhainsa, Nawapara and Alda. Further, these limestones show considerable variations in quality and thickness, both laterally as well as vertically. Again, in several localities the rich quality limestone beds are overlain and also interlayered with limestone which is of inferior grade. Another feature which is quite widespread in the stratigraphic sequence of this tract is inter-bedding of the rich quality of limestone strata with shale.



Photo.- 5.3: Limestone Of BH No. ALD- 12

5. 4.3 SHALY LIMESTONE

The Shaly Limestone is red to reddish pink in colour and sometimes with stromatolitic rings. The outcrops of this shaly limestone in the area are scanty, occurring in patches along west bank of Seonath River Section. The rock is bedded, friable with argillaceous intercalations. The general dip varying from 5° to 10° due east trending of NE-SW.



Photo.- 5.4 : Shaly Limestone of BH No. - ALD – 13 (39.00m To 40.00m)

5.4.4 DOLOMITIC LIMESTONE

The Dolomitic Limestone is grey in colour. The outcrops of this dolomitic limestone in the area are scanty, occurring in patches along Seonath River Section, around Rajpur Khaira Chamarguda and Pathariya village. The rock occurs as a capping over the Limestone deposits. The rock is well bedded, hard & compact with thin argillaceous intercalations. The general dip varying from 02° to 05° due west trending of NE-SW.



Photo.- 5.5 : Dolomitic Limestone in South eastern side

5.4.5 SOIL/LATERITE

Soil within the block is grey to yellowish brown in colour, sandy, lateritic and clayey in variety. Soil with humus content is mostly observed in the agricultural field. It forms thick capping over the limestone. Soil cover varies from 1.80 m (ALD-04) to 13.60 m (ALD-15). Most part of the block is under soil cover, which supports agricultural activities throughout the year.



Photo.- 5.6: Soil/Laterite of BH No ALD – 13 (0.00m To 5.10m)

CHAPTER 6

ACTIVITY DURING THE PERIOD (Geoscience Investigation)

6.1 Geological Mapping

6.1.1 DETAILED GEOLOGICAL MAPPING (1:4000):-

In Alda Block a total of 10.25 Km² area covered by detailed Geological Mapping on 1:4000 scale, during the period of G-3 level of exploration. The total area of 10.25 km² is bounded by latitude 21° 35' 14.932" N to 21° 37' 25.622" N and longitude 81° 53' 06.978" E to 81° 54' 58.426"E and it falls under the Survey of India Toposheet No. 64G/14. The area is in general undulated flat terrain sloping towards the north.

Geologically, most of the area of the block is covered by thick soil and the outcrops of limestone are demarcated along the nala section and gradational slopes. A total of 20 Nos. samples of limestone were collected from the mapped area. Sample locations are shown in the geological map (Plate No III).

During the course of the detailed geological mapping, litho-units encountered in the area have been tabulated below-

TABLE – 6.1

Age	Supergroup	Group	Formation	Lithology
Recent to Quaternary				Soil / Laterite
Meso-Neo Proterozoic	Chhattisgarh Super-group	Raipur Group	Chandi Formation	Pink to Greyish Pink Stromatolitic Limestone with intercalation of Shale
			Gunderdehi Formation	Pink and Grey Shale

(After District Resource Map, GSI)

6.1.2 DESCRIPTION OF ROCK TYPES

A. Chandi Formation

Limestone: The stromatolitic dolomitic limestone unit belonging to Chandi Formation was observed in the central, northwestern and southeastern part of the study area as few scattered bouldery outcrops near Nawapara (Photograph-5.1), village. The limestone is dominantly grey in colour, stromatolitic in nature and gives mild to strong effervescence when reacting with hydrochloric acid. It shows stromatolitic rings on planar sections as well as tubes on vertical sections. Both branching and non-branching stromatolitic columns are observed, which vary in size from 3cm to more than 10cm, and the size of the concentric stromatolitic rings varies from 2 cm to about 5 cm. The inter columnar spaces are filled with very fine-grained silty and shaly material. At places calcite and silica aggregates are also noted as vugs and fracture fillings. Bedding data is not recorded from surface samples being unbedded; however, in the drilled core, limestone and shale intercalation show horizontal to subhorizontal bedding with low dips up to 2°.



Photo.- 6.1: Stromatolitic limestone

Soil and Laterite: The study area is almost covered by greyish black clayey soil and brown soil with high moisture retention capacity, which conceals the stromatolitic limestone present in the area. The thickness of the soil varies from place to place and it is 1.80 m in BH No. ALD-

4 to 13.60 m in BH No. ALD-15. The laterite (Photograph-5.6) and lateritic soil developed over the limestone at Places and was observed to the north of Alda village.

6.1.3 Petrological study

A total of 05 nos of specimens of litho-units collected from the drilled core samples during Preliminary Exploration (G-3 level) in Alda block, were subjected to petrographic studies at Petrology Laboratory, of DGM Raipur. The results are furnished as Annexure-V.

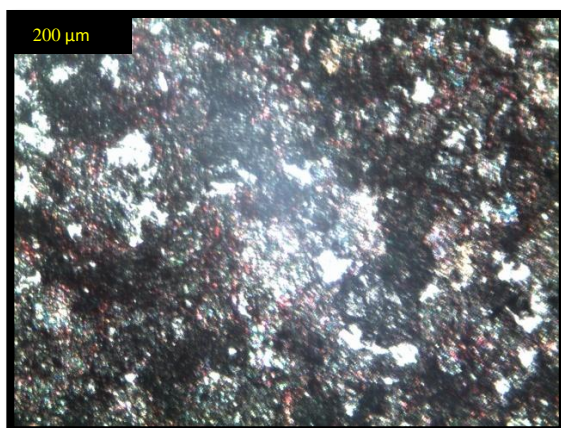
Broadly, the lithology identified during borehole core logging is confirmed with petrological studies. Almost all the samples belongs to limestone variants observed in different boreholes. Summary of the petrographic study done by Petrology, Lab is given below:-

6.1.3.1 Sample No. ALD/1:-

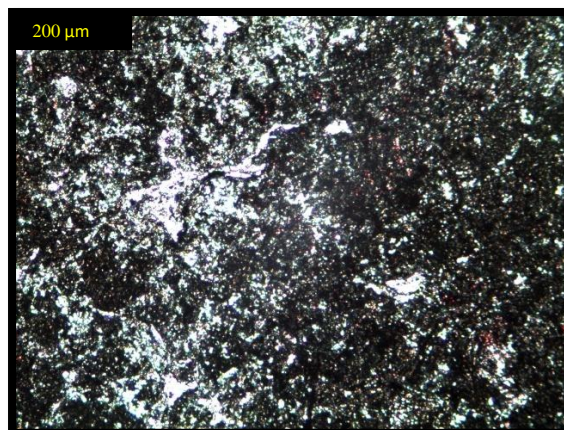
Megascopically, the rock is fine-grained, hard, compact, pinkish grey and gives good effervescence with dilute HCl.

Under microscope, the rock consists of about 90 % of carbonate minerals, 10% argillaceous material (Clay minerals). Out of total carbonate, the rock contains about 63.00 % calcite micro spar size (size 0.005 to 0.05 mm)grains to Sparry calcite grains (Size 0.1mm-0.2mm, grains showing well developed grain boundaries and cleavage traces)and about 27.00 % dolomite microspar to sparry dolomite grains.. On staining calcite grains give red staining while dolomite grains does not give any color.

Rock name - Limestone (Dolomitic limestone)



ALD -1 (PPL)



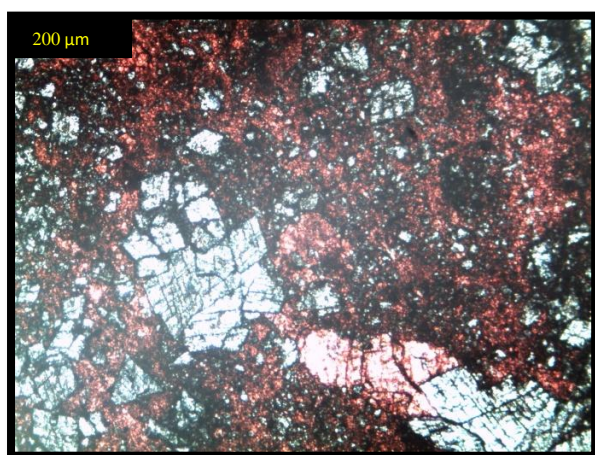
ALD – 1(UCN)

6.1.3.2. Sample No. ALD/2:-

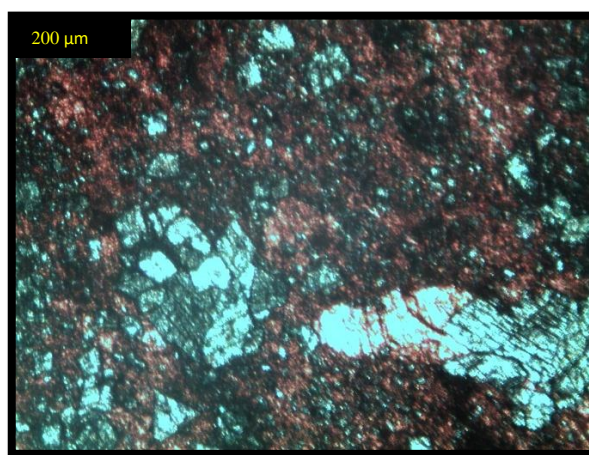
Megascopically, the rock is fine grained, hard compact, pink and gives good effervescence with dilute HCl.

Under microscope, the rock consists about 80 % of micrite size calcite (0.002- 0.004mm) and about 15% Sparry dolomite (Size 0.1mm-0.2mm) grains showing well developed grain boundaries and cleavage traces. About 5% argillaceous material (Clay minerals) are also present. Calcite grains give pale red staining while dolomite grains does not give any color on staining.

Rock name - Limestone



ALD -2 (PPL)



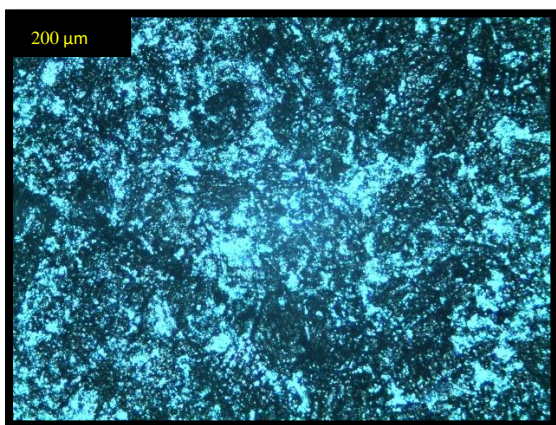
ALD – 2 (UCN)

6.1.3.3 Sample No. ALD/3:-

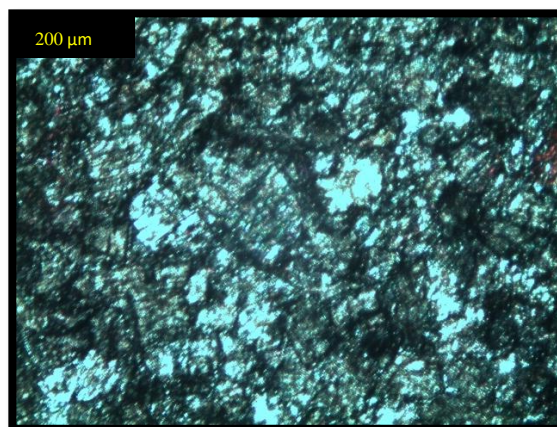
Megascopically, the rock is fine grained, hard compact, pinkish grey and gives moderate effervescence with dilute HCl.

Under microscope, the rock consists about 95 % of carbonate minerals, 5% argillaceous material (Clay minerals). Out of total carbonate, the rock contains about 85.50 % dolomite micro spar size (size 0.005 to 0.05 mm) grains to Sparry dolomite grains (Size 0.1mm-0.2mm, grains showing well developed grain boundaries and cleavage traces) and about 9.50 % calcite microspar to sparry calcite grains.. On staining calcite grains give red staining while dolomite grains does not give any color.

Rock name – Dolomite



ALD -3 (PPL)



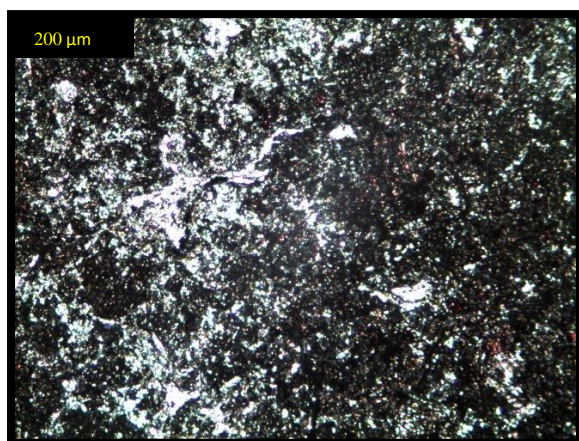
ALD – 3 (UCN)

6.1.3.4 Sample No. ALD/4:-

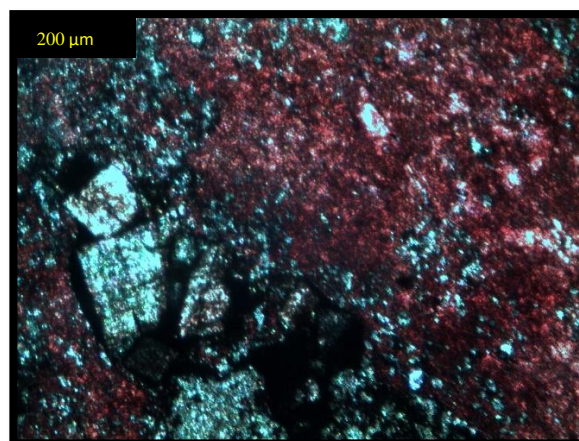
Megascopically, the rock is fine grained, hard compact, pinkish grey and gives moderate effervescence with dilute HCl.

Under microscope, the rock consists about 95 % of carbonate minerals, 5% argillaceous material (Clay minerals). Out of total carbonate, the rock contains about 85.50 % calcite micrite(0.002- 0.004mm) and about 9.50 % dolomite microspar to sparry dolomite grains.. On staining calcite grains give red staining while dolomite grains does not give any color.

Rock name - Limestone



ALD - 4 (PPL)



ALD – 4 (UCN)

6.1.3.5 Sample No. ALD/5:-

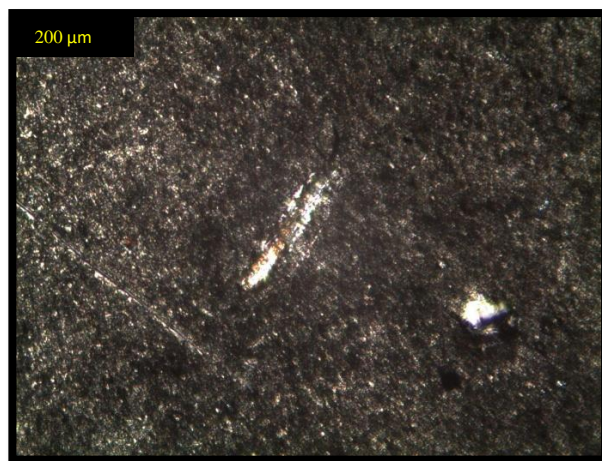
Megascopically, the rock is fine grained, hard compact, pink and gives good effervescence with dilute HCl.

Under microscope, the rock consists about 80 % of micrite size calcite (0.002- 0.004mm) grains. About 20% argillaceous material (Clay minerals) are also present. Calcite grains give pale red staining .

Rock name - Limestone



ALD - 4 (PPL)



ALD – 4 (UCN)

6.1.4 Structure

The study area i.e., Alda block comprises only sedimentary rocks comprising limestone and shale belonging to Chandi Formation of Raipur Group of Chhattisgarh Supergroup of rocks. The outcrop density is scanty and only few exposures are available, otherwise it is mostly soil covered and cultivated land. The only primary structure, observed in the drilled boreholes is bedding plane. The other primary structures such as cross bedding, ripple marks etc. could not be observed in the rocks. As area has suffered no deformation, no secondary structures have been observed except fracture planes and joints.

Primary structures

Bedding plane: Compositional variation and lamination are the identifying criteria for bedding in the study area. The present area is mostly occupied by soil and rare outcrops of stromatolitic dolomitic limestone/stromatolitic limestone are observed that are devoid of compositional

banding/bedding plane in the study area. The contact of limestone and shale also define as bedding plane which was observed in core samples of boreholes. The bedding is nearly horizontal to sub-horizontal with very low dip of 2° as measured from core samples.

Fractures: The study area is mostly covered by soil, only few exposures are present in which fracture planes are prominent. Fracture planes are well observed in core samples in the boreholes. These fractures are filled with mostly calcite and silica.

6.1. 5 Metamorphism

The rocks of the study area are unmetamorphosed

6.1. 6 Mineralogy of the Ore Zones and Ore Textures

However, in present G-3 level of exploration, under the project, mineralogical studies of samples could not been done but as per reports of adjoining limestone bearing areas, specially, in Chandi formation the brief account of mineralogy is given.

Mineralogically, Limestone is a bedded type calcareous sedimentary rock mainly composed of carbonates of calcium and magnesia in limestone. **The prime constituent mineral is calcite or aragonite and dolostone (dolomite). Limestone consist mainly of calcite (56% CaO) while dolomites (30.4% CaO and 21.9% MgO).** Limestone consists primarily of calcium carbonate, but it may also contain variable amounts of impurities such as clay, silt, and organic material. The presence of impurities can affect its color and texture. It can have a variety of textures, from fine-grained to coarsely crystalline.

Limestone which is observed to be the mineral commodity in current block is seen as fine grained dark grey to grey colour beds with fine laminations and striations with thickness varying from 5mm to 20mm.

12 Nos. boreholes drilled in the area have intersected the limestone horizon at collar RL's varying from 280.833mRL (ALD-13) ended at RL's of 261.549mRL (ALD-03) However, the boreholes are drilled upto a vertical depth of 50.00m to 79.00m as the stratigraphy (GSI- (Das et al. 1992).) indicates Whole thickness of Chandi Formation could not be penetrated by any single borehole, the limit of which is 300 m. The thickness of Chandi Formation is no less than 300 m and is reportedly >650 m (Das et al. 1992) The intersected thickness of the limestone in 12 boreholes drilled by DGM are varying from 50m to 79.00m.

6.1.7 Pitting and Trenching:

As per NQT of the present exploration, no pitting and trenching work was sanctioned in the area.

6.1.8 Sampling:

As per NQT, bed rock samples and core samples were collected for chemical analysis, petrological and minerographical studies. Primary sample were collected in less number owing to low variation in lithology. A total of 20 BRS and 480 core samples were systematically collected, representing all the variants of limestone.

The surface and subsurface samples drawn from the area were processed and analysed to assess the grade of limestone. All the core samples were processed for chemical analyses through sieve powdered to -100 mesh by steel pestle and mortar followed by coning and quartering. A total of 05 representative rock samples were selected for petrological study involving identification of minerals, texture, crystallization and deformation/metamorphism history of the litho-unit.

6.1.9 DISCUSSION:

Detailed geological mapping in the area has brought out that, most of the area of the block is covered by thick soil and the outcrops of limestone are demarcated along the nala section and gradational slopes. A total of 20 Nos. surface samples of limestone were collected from the mapped area. The area shows a decrease in elevation towards the north-eastern directions. The lithounits exposed in the area are Limestone outcrops of Chandi formation, Tarenga shale, Gunderdahi shale. The beds are fine grained, massive & compact Greyish to Pinkish grey in colour with stromatolitic nature in colour. The limestone deposits are subhorizontally bedded with dips varying from 02° to 05° towards the west, Out of 20 Nos. of Bed Rock Samples collected during detailed geological mapping, 19 samples have been showed that the CaO % more than IBM threshold value i.e. (34% CaO %) and 1 Nos. of BRS indicates CaO % less than IBM Threshold value, Lithounit-wise chemical analysis of Bed Rock Samples (BRS) is provided in Annexure III-A.

The previous studies in the area, Whole thickness of Chandi Formation could not be penetrated by any single borehole, the limit of which is 300 m. The thickness of Chandi Formation is no less than 300 m and is reportedly >650 m (Das et al. 1992) The intersected thickness of the limestone in 12 Nos. of boreholes drilled by DGM are varying from 50m to 79.00m.

The Limestone (ALDA) occurs as a bedded deposit having a maximum thickness of 79.00m (BH No. ALD-02). All 12 boreholes have intersected the Limestone in the block and in some borehole encountered the shale horizon below the limestone (BH No. ALD-15). The contact between the limestone and shale is gradational, there is a zone of transition as calcareous shale / siliceous limestone varying with the thickness of 3.0 m to 5.0 m across the boreholes. The limestone horizons are both megascopically as well chemically correclatable. CaO content in various borehole run meter samples varies from 34.09 % to a maximum of 51.158%.

6.1.10 ORE ZONE

In Limestone deposit of Balodabazar area, in general comes under Chandi Formation of Raipur Group. In the area of investigation, a single ore zone is found. The analytical data of the surface samples of the area reveals that significant litho-units are developed like limestone, shaly limestone, dolomitic limestone and shale makes single cyclic succession of deposition. Repetitive succession has not been marked. The lower and basal horizon is Shale. The limestone of the area, the CaO % is ranges from 34.09 to 51.15, MgO% is 0.172 to 3.70 and silica (SiO₂)% ranges from 9.52 to 23.79.

6.2 Geophysical Exploration

DGM has not carried out any geophysical exploration.

6.3 Geochemical Exploration

DGM has not carried out any geochemical exploration.

CHAPTER 7

MINERAL PROSPECT

7.1 Surface indication of mineralisation

The limestone bearing area shows a clayey horizon with red lateritic soil. Somewhere, the colour of the soil is changed to grey or yellowish grey. The limestone bearing area shows flat terrain with a gentle slope. The vegetation pattern is dense because of the muddy surface.

Limestone is known for its role in forming of unique landscapes through chemical weathering processes, such as sinkholes, caves, and underground river systems, known as karst topography.

Limestone is hard, compact & massive in nature and steel grey to brownish colour with metallic lustre.

In general, the outcrops of Limestone are traced at a minimum and maximum elevation of 261.549 m and 275.094 m respectively in the mapped area.

7.2 Mode of Occurrence

The limestone within the study area is scanty and exposed as boulder outcrops. However, horizontal to sub-horizontal bedded exposure having a very shallow dip of 2° to 5° dipping westerly was observed in Kareli, west of Alda Block. The limestone exposed in the study area is mainly compact, fine-grained, hard, crystalline and stromatolitic in nature. It is intercalated with thin to thick shale bands, as evidenced by the boreholes. The exposures of stromatolitic limestone showing cavity structures/vug fillings are present towards the central and western part of the block. No evidence of metamorphism and structural deformation is observed.

7.3 Strike length and width of anomalies identified on the basis of Geological Exploration

The mineral prospect of limestone generally occurs as bedded deposits and its areal extension is so wide. The depth limitation is depends upon various factors like geological

environment of formation, process of deposition and climatic condition during the detailed geological mapping (1:4000) occurrences of limestone have been noticed.

The Alda Limestone deposit exhibits a significant footprint, with a strike length of 2400 meters and a corresponding width of 2400 meters. The average thickness of the deposit is 14.57 meters. Notably, the deposit occurs at a relatively shallow depth, ranging from 0.70 meters to 35.00 meters beneath the surface.

7.4 EXPLORATION

The G-3 level exploration activity of Alda Limestone block starts from November 2024 and completed on April 2025. The exploration activities started by detailed geological mapping in the area. After a while systematic drilling work started. All the boreholes were drilled by 2 Nos. heavy drill machines and 2 Nos. of Calyx machine through adopted wet and coring method and used single tube barrel for achieving 89 % core recovery.

During the G-3 level exploration, a total of 16 boreholes were planned at 800x800m grid interval to cover the entire area of the block. Due to the Double field peddy crop season, only 12 numbers of boreholes were completed.

A total 12 Nos. of boreholes were drilled within the block with meterage of 630m. The outcome of these explorations was come into focus as a Alda Limestone block is good potential limestone bearing area. The maximum depth of borehole of the block is 79.00m (BH No. ALD-02) and minimum is 50.00m (Rest of the eleven boreholes except ALD -10)from the surface.

The resources of the block estimated with present norm are a total of **608.516** million tonnes. The cut of grade of limestone was taken 34% CaO. During the course, out of 12 numbers of drilled boreholes, cement grade limestone (+44% CaO) has been intersected in all boreholes as thick layer of limestone, Cement grade limestone is intersected throughout in the entire run in 4 boreholes ALD-01, ALD-03, ALD-04 and ALD-06 for thickness of 44.0m, 46.0m, 48.20m and 44.30m respectively. Whereas cement grade partially encountered in 8 borehole ALD-02, ALD-05, ALD-09, ALD-10, , ALD-12, ALD-13, ALD-15 and ALD- 16.

Cement Blendable(benificiable) grade limestone is encountered in 07 boreholes only, namely ALD-02, ALD- 05, ALD-09, ALD-12, ALD-13, ALD-15, and ALD- 16. The thickness of CBB grade limestone are 16.0m, 34.0m, 5.0m, 35.0m, 17.90m, 16.0m, and 21.0m respectively. Blendable grade limestone is concerned, it has been encountered in four boreholes i.e. ALD-02, ALD- 09, ALD-10, and ALD- 16. The thickness of Blendable grade are 23.0m, 14.0m, 4.0m, and 11.0m respectively.

Therefore, resource estimation could be done as Cement Grade ($> 44\%$ CaO) Blandable Grade(34% to 38%CaO). & Blendable (threshold) Grade (38% to 44% CaO) . As below to 34% CaO (low grade limestone) had not been considered as limestone deposits.

7.5 ALTERATION ZONE

The alteration of limestone is resultant of chemical and physical process. The layer of physically or chemically altered material is known as saprolite and soil. The top crystalline bedrock can be altered a few centimeters to tens of meters thick depending on the landscape and the external driving forces eroding the landscape. The ‘soil’ is the physically mobile material that is produced by the mechanical disruption of the underlying bedrock whereas Saprolite is the non mobile, weathered mantle produced by chemical alteration of the bedrock that lies beneath. Saprolites should be treated as parent materials of the majority of soils in the tropics and subtropics environments.

7.6 GENESIS OF MINERALISATION

Limestone is a sedimentary deposit formed predominantly by biochemical processes, through the accumulation of calcite from dying marine organism. Limestone are consist of mainly calcite 56% CaO while dolomite 30.4% CaO with 21.9% MgO.

In general, the genesis of any sedimentary rock involves three phases:

- The mobilization of material in the crust of weathering comes through mechanical and chemical denudation.
- The transportation of sediments from the catchment area; and

- Sedimentation in the final basin.

The third phase is most important part for sedimentary rocks. Sedimentation in the final basin takes place through mechanical, chemico-biological and chemical processes.

Mechanical separation and deposition of the suspended material are brought about by the total movement of the water like agitation, tidal displacement and currents. Large particles are dumped near the shore and fines ones are carried farther from the shore and completely deposited. (Granulometric sorting in the sea). The chemico-biological setting from solutions occurs through the selective assimilation of definite elements by marine

organisms and their accumulation after the death of organisms. A considerable part of the mass of organic deposits, carbonates, phosphates and silica formed in this way. The chemical precipitation from coagulation of colloidal solutions depends upon combined effect of EH and pH of the marine environment on the stability fields of sediments. Differentiation of mineral matter is a function of pH of water, deposition of organic matter depends upon neutral value of Eh. and combined relation of EH, pH and zone of deposition is a matter of oxide, carbonates, sulphates and sulphides of metal deposits.

Finally, the sequence of the deposition of compounds of the various elements in the littoral zone of marine basins depends on a number of factors including Eh and pH of the water like; distance of sea basin from the coast, inner slop of the shelf and central part of sea basin, the acidity and alkanity of sea water, amount of oxygen dissolved, climatic and geological environment.

After the sedimentation, it involves the various processes of Diagenesis and varius stages of Catagenesis.

Diagenesis refers to the various physical, chemical, and biological changes that sediments undergo during and after lithification. These changes can include the conversion of minerals, the development of porosity, and the growth of new minerals, fossil assemblage etc. Diagenesis continues after lithification, affecting the final properties of the sedimentary rock.

Catagenesis stage is one of the further transformation of sedimentary rock linked with temperature and pressure. The water liberated through this time of temperature and pressure is saline and interacting with the rock (example Gypsum deposit).

CHAPTER 8

EXPLORATION SYSTEMATIC DRILLING

8.1 Borehole spacing

As per guidelines of Mineral Evidence of Mineral contents rule-2015, for G-3 level exploration of limestone, or other bedded stratified type of deposit boreholes should be on 800m grid interval or less. In case of limestone. Alda Limestone block, we adopted 800x800m grid interval.

8.2 Methodology of Drilling with details of the type of drilling

DGM has performed 630m of drilling out of 12 nos. of boreholes in the block and other associated geological analytical work. The details of the boreholes are given in Annexure-II, D.G.M. Chhattisgarh deployed 02 nos. of heavy drill machine Model No. **Voltas 180, Longyear W/L and Voltas35** (Medium size drill machine) which were operated using a conventional diamond core drilling technique. The rigs are equipped with 3-cylinder engine. The power output end of the engine is equipped with three hydraulic pumps. These pumps supply hydraulic oil to all motors equipped for hoisting, lowering, rotation, feed etc. operations. All operations required for drilling are controlled by the hydraulic system. Two Nos. of Boreholes ALD-03 & ALD-06 drilled by Cylix drill machine. Boreholes were started with NX and HX casing and TC bit was used to drill the loose soil. Then bore holes were first reduced to HX casing size and then to NX casing size and loose formation zone were covered by lowering HX/NX casing. In some boreholes, complete water loss occurred. Rock formation encountered in drilling operations varies from loose to medium hard and in some boreholes hard and fractured. Medium hard and hard formations, often fractured, were drilled by wet drilling with a diamond core bit. The depth of the boreholes drilled in the area varies between 50.00 m to 79.00 m.



Photo-8.1 Drilling Operation By Drill No.06/Voltas 180 At BH No. ALD-12

8.3 Borehole planning

8.3.1 Spacing of Boreholes

However, the procedure of gridding and marking of boreholes designed such a way to cover the entire area with minimum borehole points. Although marginal boundary boreholes is designed as that way to covers whole block area under as mineralized cover zone.

During the proposal of G-3 level exploration, initially a total of 16 numbers of boreholes were planned for adequate and systematic drilling within the block but due to double crop in the field, it is reduced to 12 Nos. Borehole was planned in regular 800x800m grid interval. It has to be concluded with fulfilment of other necessary parameter required as per auctionable block.

8.3.2 Level of intersection

As per the approved project, 12 Nos. of boreholes were drilled with a depth of 50 m (min.) to 79.00 m (max.) .

8.3.3 Coordinates of the boreholes:

Table – 8.1

S. No.	BOREHOLE_NO.	LATITUDE	LONGITUDE	NORTHING	EASTING
1	ALD-1	21° 37' 12.539" N	81° 53' 21.286" E	2391046.991	592033.8843
2	ALD -2	21° 37' 12.390" N	81° 53' 49.111" E	2391046.991	592833.8843
3	ALD -3	21° 37' 12.239" N	81° 54' 16.935" E	2391046.991	593633.8843
4	ALD-4	21° 36' 46.522" N	81° 53' 21.127" E	2390246.991	592033.8843
5	ALD-5	21° 36' 46.372" N	81° 53' 48.950" E	2390246.991	592833.8843
6	ALD-6	21° 36' 46.221" N	81° 54' 16.773" E	2390246.991	593633.8843
7	ALD-9	21° 36' 20.204" N	81° 54' 16.611" E	2389446.991	593633.8843
8	ALD-10	21° 36' 20.052" N	81° 54' 44.433" E	2389446.991	594433.8843

9	ALD-12	21° 35' 54.186" N	81° 54' 16.450" E	2388646.991	593633.8843
10	ALD-13	21° 35' 54.035" N	81° 54' 44.270" E	2388646.991	594433.8843
11	ALD -15	21° 35' 28.169" N	81° 54' 16.288" E	2387846.991	593633.8843
12	ALD -16	21° 35' 28.017" N	81° 54' 44.107" E	2387846.991	594433.8843

8.3.4 SURVEY USED TO LOCATE BLOCK BOUNDARY AND DRILL HOLES

The entire survey work has been carried out with the help of DGPS (Make-Leica GNSS System, Model-Cs10). With the help of DGPS, co-ordinates of surface features i.e., roads, village boundaries, water bodies, base station and co-ordinates of 12 nos. of block boundary cardinal points with R.L. has been determined and accordingly, the topographical map is presented (Plate-II). Contour interval in topographical map is taken as 5 m. The topographic survey was done in PPK (Post Precision Kinematics) mode. Positional (horizontal) accuracy of the survey is 10mm, while the elevation accuracy is 20mm in PPK Mode. The photograph depicting DGPS survey in the block is given in Photo-8.2.



Photo-8.2: DGPS SURVEY (Make-Leica GNSS System, Model- Cs10)

Table – 8.2 RL OF COLLAR OF BOREHOLES

S. No.	BOREHOLE_NO.	EASTING	NORTHING	RL OF BOREHOLE
1	ALD-1	592033.8843	2391046.991	265.543
2	ALD -2	592833.8843	2391046.991	263.637
3	ALD -3	593633.8843	2391046.991	261.549
4	ALD-4	592033.8843	2390246.991	263.985
5	ALD-5	592833.8843	2390246.991	263.886
6	ALD-6	593633.8843	2390246.991	266.740
7	ALD-9	593633.8843	2389446.991	268.175
8	ALD-10	594433.8843	2389446.991	275.094
9	ALD-12	593633.8843	2388646.991	269.960
10	ALD-13	594433.8843	2388646.991	280.833
11	ALD -15	593633.8843	2387846.991	269.730
12	ALD -16	594433.8843	2387846.991	274.455

8.3.5 Borehole Logging

The entire core recovered by drilling was logged systematically in detail describing lithological units with mineralisation details that can be observed by visual inspection. The details of lithology, grain size, colour, texture, structural features, presence of intercalations and cavities have been recorded. Wherever recovery is less than 100%, extrapolations of drilled depth were done on proportionate basis considering the physical characteristics of individual units recovered. All the cores were kept and preserved properly in the PVC core boxes of specifications given by

following “ Book pattern” The detailed run wise litholog and summarized litholog for boreholes are given in Annexure- II and Annexure- III respectively.

During the course of drilling, limestone intersected in all the 12 numbers of boreholes. For proper logging of core generated through borehole, every drilled run and core recovery was measured. Overall, the average core recovery was ranges between 85% to 90%.in wet drilling methods. The core recovery affected due to loose, fractured formations and cavity zone.

The core of each borehole received from drilling was arranged in book pattern run wise in the core boxes for its logging and sampling. Details logging sheet for each borehole are prepared. Qualitative logging of the samples included, lithology, mineralogy, grain size, alteration .Also, no apparent relationship could be established between core recovery and assay results, which indicate the drilled samples, were devoid of bias due to preferential loss during drilling.The run-wise logging was carried out for each borehole. The lithological variations intersected in the boreholes have been systematically logged and consolidated /summarised litho-logs were prepared for drilled boreholes and displayed through graphic representation. The various litho-units intersected in the borehole are soil, limestone, shale, dolomitic limestone , shaly limestone etc. The run-wise summarised litho-log is given in Annexure-II.



Photo-8.3 Borehole Logging of ALD-01



Photo-8.4 Borehole Logging of ALD-09

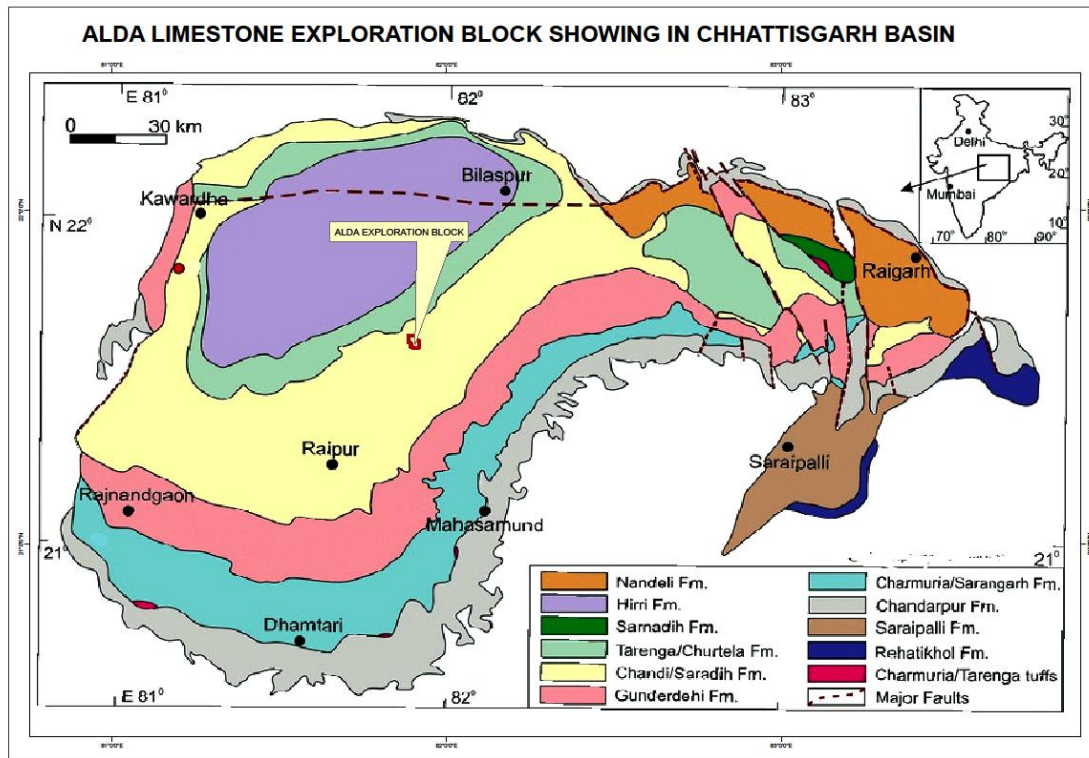
8.3.6 Core Recovery percentage.

The entire core drilling has been done by NX size diamond drill bit with single barrel, wet core drilling method. Initially 0.00m to 5.00m NX casing bit was set in each borehole by using NX casing shortpiece. After setting NX casing, drilling advanced in NW/NWG Core bit size till. NW casing was set in the drilled ranging from 5.00 m to 80.00 m depending on the formation of the boreholes. The water based mud was used as drilling fluid to flush out the cuttings and stabilize the borehole wall. The drilling fluid also works as a coolant to avoid burning of drill bits. Proper core recovery of more than 90% was maintained in Limestone, however in case of weathered, loose and fractured zone and in solution cavities, the core recovery was low. Whenever core recovery is less, the grade of the recovered portion has been extrapolated over the non-recovered section. However, All the precautions like modulated water pressure, proper liner, optimum head pressure and the hands of an expert drilling technician had been taken to maintain the quality of drilling. Recovery% in each boreholes has been given in detailed litholog description given in Annexure -II

In the limestone ore mineralized zone core recovery was very good. The core recovery percentage is about 85%-90 % in the explored area. Wet drilling was done using diamond impregnated bit. The core recovered from the boreholes by wet drilling has been systematically logged as per lithology.

8.4 Mineralogy of ore zone

12 Nos. of boreholes are drilled within the block. The boreholes were drilled on 800x800 grid pattern . It was observed that the limestones is bedded with NNW-SSE trend having almost horizontal dip towards east. Flaggy limestone which is observed to be the mineral commodity in current block is seen as fine grained dark grey to grey colour beds with fine laminations and striations with thickness varying from 5mm to 20mm. It is well known for its flaggy nature where thin layers of silt and clay occur within the calcareous laminations. Limestone is a blanket-type deposit; it is well-exposed and outcrops are distributed over 5% of the block extent. The maximum thickness of this limestone variety is proven upto 79.00m. It is occasionally traversed by thin veins of calcite and quartz.



(Text Figure – 8.5: Regional Geological map of the Chhattisgarh basin showing location of Alda Limestone Explored Block

The above map (Photo. – 8.5) indicates the location of the current block along with extents of Chandi Limestone, shale and various other litho units of Chhattisgarh Basin.

8.5 Borehole Deviation Test and Methodology

The vertical boreholes were drilled in the explored area up to maximum depth of 80.00 m. As there is lesser possibility of deviation in vertical borehole, no deviation test was done to determine the deviation of the borehole.

8.6 Methodology of ore zone sampling, sample preparation

8.6.1 The core sampling and chemical analysis of core samples have been carried out for entire mineralized zones/length intersected in the boreholes drilled. Samples were marked and collected in limestone zones marked on the basis of visual inspection. In general, the primary sample (core

sample) of 1.00 m to 4.00 m length had been marked in the mineralized zones intersected in the borehole on the basis of variation of mineralization / lithology. The mineralized core has been split into two equal halves by manual core splitting (Photo- 8.1) in such a way that the concentrations of ore minerals are uniform in both the equal halves (Photo-8.2). The whole quantity of half portion of the sample as marked while logging crushed to (-) 120 mesh and about 500g representative sample of (-)120 mesh was drawn by coning and quartering method of gradual size reduction with the help of crusher and pulverizer (Photo-8.3 and 8.4). Three samples pouches weighing samples 100gm each were drawn, one of which were sent to Central laboratories of DGM Raipur for Chemical / XRF analysis of 7 radicals (CaO, MgO, Al₂O₃, SiO₂, Fe₂O₃, P₂O₅, and LOI) second samples pouches were used for the purpose of check analysis , & Third samples pouches were used for reserved purpose.

8.6.2 During the present exploration, a total of 480 Nos. of primary core samples, 20 Nos. BRS & 50 Nos.(10% of primary samples)of check samples for limestone, mineralization were prepared. The primary core samples have been analysed for 7 radicals i.e CaO, MgO, Al₂O₃, SiO₂, Fe₂O₃, P₂O₅,and LOI) by XRF method at Central laboratories of DGM Raipur.

Check samples for same 7 radicals (CaO, MgO, Al₂O₃, SiO₂, Fe₂O₃, P₂O₅, and LOI) have been analysed by chemical method at Chemical Laboratory of Regional Office Raipur. The details of analysis of primary core samples, check samples, are given in Annexure-II, Annexure-VI, respectively.

8.6.3 NATURE, QUALITY AND APPROPRIATENESS OF THE SAMPLE

PREPARATION TECHNIQUE

The details of sampling procedure for primary samples are described in para 8.6.1 Quality of the sample preparation is maintained by proper cleaning, maintenance of the equipment and proper crushing, sieving and coning and quartering of samples. For sample preparation, proper technique and expertise has been used.

8.6.4 QUALITY CONTROL PROCEDURES ADOPTED

The primary core samples have been collected from entire mineralized zones/length intersected in the boreholes drilled and the samples have been prepared at centralized mechanized sampling unit. The standard sampling procedure in supervision of qualified sampling technician has been

adopted to control the quality of samples. Similarly, check samples have also been prepared under the supervision of qualified sampling technician following the standard sampling procedure.

8.6.5 MEASURES TAKEN TO ENSURE THE SAMPLING IS REPRESENTATIVE OF THE IN SITU MATERIAL COLLECTED

All the primary samples have been marked and prepared from mineralised cores. During the preparation of primary samples, the mineralised cores have been studied meticulously, and samples have been marked properly. These mineralised cores are subjected for preparation of primary samples as per the sampling procedure for primary samples are described in Para 8.6.1. The proper marking of primary samples from drilled cores and following the standard procedure for sample preparation shows that the representative samples have been collected from the in situ materials.

8.6.6 WHETHER SAMPLE SIZES ARE APPROPRIATE TO THE GRAIN SIZE OF THE MATERIAL BEING SAMPLED

The primary samples have been prepared (–) 120 mesh size and all the other samples have been prepared from primary samples. As per the previous studies in the area, (–) 120 mesh size is appropriate for the analysis of limestone etc., mineralization in the block area sampling technician following the standard sampling procedure.

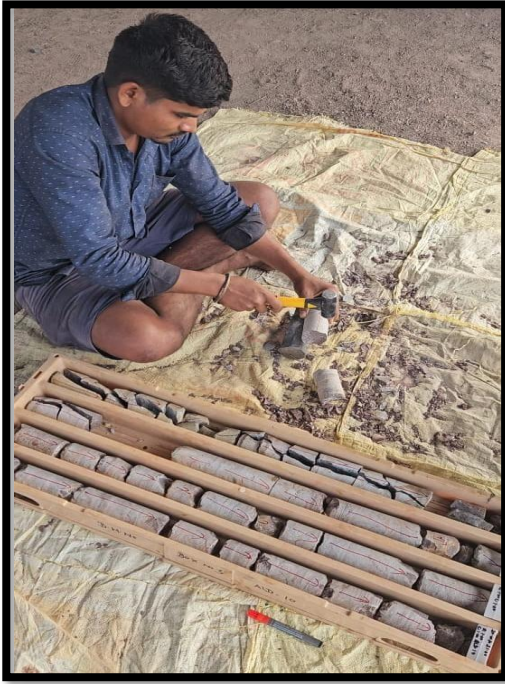


Photo. –8.6: Manual Core Splitting



Photo. – 8.7: Half Splitted Core Of Borehole ALD-1



Photo.-8.8: Sample Crushing Machine



Photo.-8.9: Pulverizer Machine

8.7 Chemical analysis and Laboratory Procedures

8.7.1 THE NATURE, QUALITY AND APPROPRIATENESS OF THE ASSAY AND LABORATORY PROCEDURES

Standard operating procedure (SOP) for the analysis by Departmental Central Laboratory have been followed:-

The primary core samples of limestone mineralization have been analyzed for 7 radicals i.e. CaO, MgO, Al₂O₃, SiO₂, Fe₂O₃, P₂O₅ and LOI by XRF method at Departmental Central Laboratory.

The following Procedure is followed for the XRF pellet method with preparation sample pellet from a homogenised 100 g sample with a hydraulic compressor, The following are the steps followed

1. EDXRF (Model- Epsilon 3^{XLE})
2. CRM used- NCSDC-16006
3. Procedure for Preparation of Pellets by Pellete Press Machine:
4. For XRF measurement a sample must be homogenized, pulverized to -400 mesh and pressed into pellet.
5. Weigh accurately 08 gm of limestone sample and used 02 gm of boric acid (H₃BO₃) as a binder and mix well with the help of VCM Vibratory Cup Mill
6. Press the sample at a pressure of around 20-22 tons on a hydraulic press (Pallet Making Machine) with a diameter of 40 mm
7. Calibrate the EDXRF equipment using known standards for elements present in limestone (Calcium, Magnesium etc)
8. Ensure the instrument is set up correctly according to standard guidelines
9. Place the prepared pellet into the sample holder
10. Ensure the sample cup is positioned correctly in the instrument for carrying out analysis
11. Start the EDXRF analysis using software and initiate the analysis process automatically
12. Allow the EDXRF instrument to scan the sample. It will emit X-rays onto the sample, causing the atoms to emit fluorescence
13. Record the results in a report, including elemental concentrations and any relevant information about the analysis conditions
14. Intermediate check also performed using bead and CRM sample with inbuilt software

Procedure for determination of LOSS ON IGNITION (LOI)

Weighed quantity of sample (duly dried at 110 °c) is placed in porcelain crucible and heated to 950 °C to 1000 °c in Muffle Furnace for about an hour. The sample is again weighed after it is cooled. Difference in weight expressed in percentage as LOI.



Photo -8.10: Photograph Of ED-XRF Instrument At Departmental Central Lab DGM, RAIPUR.

8.8 Primary samples & Check samples analysis.

Primary Sample Analysis: The XRF analysis of primary samples was carried out in Central Laboratory of DGM Raipur for determining seven radicals i.e., CaO, MgO, Al₂O₃, SiO₂, Fe₂O₃, P₂O₅ and LOI. The data was processed based on the analysis received for these radicals, Total 20 BRS samples & 480 core samples are analysed. The details of the analysis of 480 core samples, & 20 BRS samples, are shown in Annexure-II, Annexure- III, respectively.

Check Sample Analysis: As per provision made in the proposal for QA/QC, chemical analysis of check samples and its comparison have been carried out in order to assess the bias and inaccuracies in assaying. A total of 50 Nos. (10% of primary samples) check samples have been analysed by chemical method in the Chemical Laboratory of Regional office Raipur respectively. The comparative analytical results of Check sample with Primary sample are shown in annexure-VI.

8.9 Security and chain of control of samples should be clearly mentioned

The samples have been prepared at centralized mechanized sampling unit with proper labeling and tag and sent to chemical laboratory in supervision of qualified sampling technician. At the sampling unit, standard procedure has been followed and all the precautionary measures have been taken to avoid the contamination. The sampling unit is separate from the chemical laboratory, so there is no chance of contamination.

8.10 Details of intersected ore zones of the boreholes drilled and their correlation

The investigation carried out by way of exploratory drilling with associated geological and laboratory studies have generated the exploration data to establish the shape, size, and geometry of the deposit. This formed the basis for evaluation of various deposit parameters of the block. The limestone zones and grades encountered in the boreholes drilled in the block were assessed according to their end-use classification. Limestone has been encountered in all the twelve boreholes. Limestone grade is broadly divided into three categories, i) Cement grade ($\geq 44\%$ CaO, $<3\%$ MgO and $<16\%$ SiO₂). ii) Cement Blendable(beneficiable) grade (≥ 38 to $<44\%$ CaO, $<5\%$ MgO and $<18\%$ SiO₂) and iii) Blendable grade (≥ 34 to $<38\%$ CaO) .

As far as Cement Grade Limestone is concerned, it has been encountered in 4 boreholes ALD-01, ALD-03, ALD-04 and ALD-06 the thickness of Cement grade limestone are 44.0m, 46.0m, 48.20m and 44.30m respectively.

Whereas cement grade partially encountered in 8 borehole ALD-02, ALD- 05, ALD-09, ALD-10, , ALD-12, ALD-13, ALD-15 and ALD- 16. The thickness are 34.0m, 12.0m, 12.50m, 38.0m, 5.00m, 27.0m, 5.50m, and 9.0m respectively.

Cement Blendable(beneficiable) grade limestone is encountered in 07 boreholes only, namely ALD-02, ALD- 05, ALD-09, ALD-12, ALD-13, ALD-15, and ALD- 16. The thickness of CBB grade limestone are 16.0m, 34.0m, 5.0m, 35.0m, 17.90m, 16.0m, and 21.0m respectively. Blendable grade limestone is concerned, it has been encountered in few four boreholes i.e. ALD-02, ALD- 09, ALD-10, and ALD- 16. The thickness of Blendable grade are 23.0m, 14.0m, 4.0m, and 11.0m respectively.

Table 8.3
Cement Grades of limestone zones intersected in exploratory boreholes drilled by DGM in
Alda block, Dist Raipur & Balodabazar-Bhatapara ,Chhattisgarh.(Plate No.-7(A))

S. No.	BH. No.	Total Depth (m)	From	To	Thickness of Limestone (m)	SiO ₂ %	Al ₂ O ₃ %	CaO %	MgO %
1	ALD-1	50.00	6.00	50.00	44.00	9.54	4.51	46.033	0.92
2	ALD-3	50.00	4.00	50.00	46.00	11.58	4.93	45.11	0.56
3	ALD-4	50.00	1.8	50	48.20	11.38	6.83	44.50	0.82
4	ALD-6	50.00	5.70	50.00	44.30	11.86	5.46	44.63	0.58
5	ALD-2	79.00	13.00	39.00	26.00	11.14	4.52	44.09	1.53
6	ALD-2	79.00	47.00	55.00	8.00	11.10	3.77	44.30	1.93
7	ALD-5	50.00	12.00	17.00	5.00	9.61	7.58	44.39	0.91
8	ALD-5	50.00	30.00	37.00	7.00	9.52	7.78	44.24	1.04
9	ALD-09	50.00	13.50	26.00	12.50	11.77	4.70	44.29	1.21
10	ALD-10	51.00	9.00	47.00	38.00	10.58	4.56	44.49	1.79
11	ALD-12	50.00	45.00	50.00	5.00	12.56	4.93	44.28	0.90
12	ALD-13	50.00	5.10	32.10	27.00	10.42	1.34	44.10	0.89
13	ALD-15	50.00	13.60	19.10	5.50	11.35	7.03	44.06	0.64
14	ALD-16	50.00	9.00	18.00	9.00	10.40	6.93	44.62	0.59

Table 8.4

Cement Blendable/Beneficiable(CBB) Grades of limestone zones intersected in exploratory boreholes drilled by DGM in Alda block, Dist Raipur & Balodabazar-Bhatapara ,Chhattisgarh.(Plate No-7(B))

S. No.	BH. No.	Total Depth (m)	From	To	Thickness of Limestone (m)	SiO ₂ %	Al ₂ O ₃ %	CaO %	MgO %
1	ALD-2	79.00	39.00	47.00	8.00	14.55	5.57	41.12	1.797
2	ALD-2	79.00	55.00	63.00	8.00	17.89	8.02	38.38	1.333
3	ALD-05	50.00	4.00	12.00	8.00	12.27	8.38	42.41	0.84
4	ALD-05	50.00	17.00	30.00	13.00	12.64	9.07	41.49	1.05
5	ALD-05	50.00	37.00	50.00	13.00	18.11	9.19	38.24	0.93
6	ALD-09	50.00	26.00	31.00	5.00	17.98	8.39	38.07	1.46
7	ALD-12	50.00	10.00	45.00	35.00	15.73	6.21	38.98	3.00
8	ALD-13	50.00	32.10	50.00	17.90	16.06	10.33	38.99	0.77
9	ALD-15	50.00	19.10	35.10	16.00	15.99	8.99	40.06	0.56
10	ALD-16	50.00	18.00	34.00	16.00	17.16	11.24	38.03	0.54
11	ALD-16	50.00	45.00	50.00	5.00	11.41	1.42	43.20	0.52

Table 8.5

Blendable Grades of limestone zones intercepted in exploratory boreholes drilled by DGM in Alda block, Dist Raipur & Balodabazar-Bhatapara ,Chhattisgarh.(Plate No.-7(C))

S. No.	BH. No.	Total Depth (m)	From	To	Thickness of Limestone (m)	SiO ₂ %	Al ₂ O ₃ %	CaO %	MgO %
1	ALD-2	79.00	6.00	13.00	7.00	23.76	6.44	34.83	2.09
2	ALD-2	79.00	63.00	79.00	16.00	22.76	8.35	34.61	1.90
3	ALD-09	50.00	31.00	45.00	14.00	21.22	11.46	34.12	1.47
4	ALD-10	51.00	47.00	51.00	4.00	23.79	8.89	34.91	0.72
5	ALD-16	50.00	34.00	45.00	11.00	23.00	10.80	35.75	0.63

CHAPTER 9

RESOURCE ESTIMATION

9.1 Detailed description of ore zones

The Preliminary exploration (G-3 stage) has been carried out for Limestone in Alda Block. The exploration has been completed by drilling 12 Nos. of boreholes with a total drilling meterage of 630m to cover the entire block area with the objective to make systematic assessment of the grades of Limestone and to estimate inferred category (333) resources along with associated laboratory studies. There are 480 primary borehole core samples for limestone mineralisation that have been analysed, and the results of the same is furnished in Annexure-II

Grades and resources have been assessed on the basis of end-use grade classification given by IBM's National Mineral Inventory (NMI) in following three categories

- i) Cement grade ($\geq 44\%$ Cao, $< 3.5\%$ MgO and $< 16\%$ SiO₂).
- ii) Cement Blendable(beneficiable)grade (≥ 38 to $< 44\%$ Cao, $< 5\%$ MgO and $< 18\%$ SiO₂)
- iii) Blendable grade (≥ 34 to $< 38\%$ Cao)
- iv) Dolomite CaO $> 25\%$, MgO $> 15\%$, SiO₂ $< 6\%$)

9.2 CUT-OFF GRADE

Resources estimated for Cement grade limestone CaO $\geq 44\%$, 3.5% MgO (Max) and 16% SiO₂ (Max), Cement Blendable(beneficiable) grade CaO $\geq 38\%$ to $< 44\%$, 5.00% MgO (Max) and 18% SiO₂(Max) and Blendable grade limestone is CaO% $\geq 34\%$ to $< 38\%$ are considered for the assessment of limestone resources. For limestone grade categorization into cement, blendable and threshold grade, Cao% has been considered strictly. For other radicals like in case of MgO and CaO, slight variation on higher side is also considered.

Table 9.1 Limestone resource classification

Grade	CaO % (Min)	MgO % (Max)	SiO ₂ % (Max)
Cement (Portland)	≥ 44.00	3.50	16%
Cement Blendable(beneficiable)	≥ 38.00	< 5.00	< 18.00
Blendable	≥ 34.00		

9.3 DETERMINATION OF BULK DENSITY/SPECIFIC GRAVITY

9.3.1 Object - This method of test covers the procedure for determining unit weight or bulk density and void of aggregates.

NOTE 1 - The bulk density is the weight of material in a given volume, and for the purpose of this standard, it is measured in kilograms per litre. The bulk density of an aggregate is affected by several factors, including the amount of moisture present and the amount of effort introduced in filling the measures.

NOTE 2 - It is emphasised that this is a laboratory test intended for comparing properties of different aggregates. It is not generally suitable for use as a basis for quoting mix design conversion factors.

NOTE 3- Considerably more compact effort is used in the determination of angularity number [see IS: 13030- 1991] than in this test, and hence the values for bulk density and voids are different.

9.3.2 Apparatus - The apparatus shall consist of the following:

A. Balance - A balance sensitive to 0-5 percent of the weight of the sample to be weighed.

B. Cylindrical Metal Measure-The measure shall preferably be machined to accurate internal dimensions and shall be provided with handles. It shall also be watertight, and of sufficient rigidity to retain its form under rough usage, and should be protected against corrosion. The measure shall be of 3 15 or 30 litres capacity,, according to the maximum nominal size of the coarsest particles of aggregate and shall comply pith the requirements given in Table 9.2

C. Tamping Rod- A straight metal tamping rod of cylindrical cross-section 16 mm in diameter and 60 cm long, rounded at one end.

Table 9.2 : Cylindrical metal measure

S. No.	Size of the largest particles	Nominal Capacity (in litre)	Inside Diameter (in cm)	Inside Height (in cm)	Thickness of Metal min (in mm)
01	4.75 mm and under	3	15	17	3.15
02	Over 4.75 mm to 40mm	15	25	30	4.00
03	Over 40 mm	30	35	31	5.00

9.3.3 Calibration - The measure shall be calibrated by determining the weight of water at 27°C required to fill it such that **no meniscus is present** above the rim of the container.

The capacity in litres shall be obtained by dividing the weight of water in kilograms required to fill the container at 27°C by the weight of water in one litre at 27°C, which may be taken as one kilogram.

9.3.4 Procedure

9.3.4.1 Condition of Specimen-*The* test shall normally be carried out on dry material when determining the voids, but when bulking tests are required material with a given percentage of moisture may be used.

9.3.4.2 Rodded or Compacted Weight - The measure shall be filled about one-third full with thoroughly mixed aggregate and tamped with 25 strokes of the rounded end of the tamping rod. A further similar quantity of aggregate shall be added and a further tamping of 25 strokes given. The measure shall finally be filled to over-flowing, tamped 25 times and the surplus aggregate struck off, using the tamping rod as a straightedge. The net weight of the aggregate in the measure shall be determined and the bulk density calculated in kilogram per litre.

9.3.4.3 Loose Weight - The measure shall be filled to overflowing by means of a shovel or scoop, the aggregate being discharged from a height not exceeding 5 cm above the top of the measure. Care shall be taken to prevent, as far as possible, segregation of the particle sizes of which the sample is composed. The surface of the aggregate shall then be levelled with a straightedge. The net weight of the aggregate in the measure shall then be determined and the bulk density calculated in kilogram per litre.

9.3.5 Calculation of Voids - The percentage of voids shall be calculated as follows:

$$\text{Percentage of voids} \equiv \frac{G_s - \gamma}{G_s} \times 100$$

Where

G_s = specific gravity of the aggregate, and

γ = bulk density in kg/litre.

9.3.6 Reporting of Result - The bulk density shall be reported in **kg/litre** to the nearest 0.01 kg.

The voids shall be reported as a percentage to the nearest whole number.

The **condition** of aggregate at the time of test shall be stated, that is

- (a) oven dry,
- (b) saturated and surface' dry, or
- (c) with a given percentage of moisture.

Table 9.3: Bulk density

S. No.	Sample No.	BH No.	From (m)	To (m)	Bulk density (gm/cc)
1	ALD -2	ALD -2	51.00	52.00	2.793
2	ALD -9	ALD -9	22.00	23.00	2.780
3	ALD -10	ALD -10	27.00	28.00	2.763
4	ALD -13	ALD -13	12.00	13.00	2.762
5	ALD-16	ALD-16	14.00	15.00	2.728
Average bulk density					2.76

9.3.7 Average bulk density of limestone comes out to be 2.76 gm/cm³, which has been considered for estimation of resource.(Reports are shown in Annexure - VII)

9.3.8 Specific gravity- Determination of specific gravity (By Walker steel yard Balance) of Limestone samples of Alda Area studies in Petrology Lab DGM, Raipur

Table 9.4: Specific gravity

S. No.	Sample No.	Name of Sample (Core)	Colour	From (m)	To (m)	Specific Gravity
1	ALD -2	Limestone	Grey	30.0	31.0	2.74
2	ALD -9	Limestone	Grey	46.0	47.0	2.73
3	ALD -10	Limestone	Grey	49.0	50.0	2.76
4	ALD -13	Limestone	Grey	5.10	6.60	2.76
5	ALD-16	Limestone	Grey	11.0	12.0	2.72
Average specific gravity						2.74

9.4 Assumptions for resource estimation

The Preliminary exploration (G-3 stage) has been carried out for Limestone, in Alda (G-3 stage) block. The exploration has been completed by drilling 12 Nos. of boreholes in so as to cover the entire block area with the objective to make systematic assessment of grades of Limestone ore and to estimate inferred category (333) resources alongwith associated laboratory studies. There are 428 Nos. of primary borehole core samples for limestone mineralization has been analysed (Annexure-II). On the basis, of all the primary sample analysis, ore zone / lode have been delineated above cut-off / threshold value ($\geq 34\%$ CaO).

9.4.1 Grades and Resource have been assessed on the basis of end-use grade classification given by IBM's National Mineral Inventory (NMI) in following three categories i) Blendable grade (≥ 34 to $< 38\%$ Cao) ii) Cement Blendable(Benificiable) grade (≥ 38 to $< 44\%$ Cao, $< 5\%$ MgO and $< 18\%$ SiO₂) and iii) Cement grade ($\geq 44\%$ Cao, $< 3.5\%$ MgO and $< 16\%$ SiO₂)Further Resource have been estimated and categorized as per UNFC and placed as Inferred Resources (333) and Reconnaissance Resources (334) categories (Annexure IVA, IV B, IV C, VI)

9.4.2 Resource estimation was under taken using the Area of influence method, which involved construction of polygons around each borehole point.

9.4.3 In case of two consecutives boreholes, the area of influence was considered to be 50% of the grid spacing; and in case of marginal boreholes, the area of influence was restricted within the interpreted mineralised boundary or 25% of the average grid spacing.

9.4.4 For the resource estimation, the recovered thickness of limestone has been considered. The cut of thickness is considered as minimum 1.00m

9.4.5 Any low grade intersection with more than 0.50m of intersection and occurs within the mineralised zone, were considered to be inter-burden and excluded from the mineral resources reporting.

9.5 Resource estimation by Area of influence method (principle method)

9.5.1 The estimation of resource consists of finding out the total volume and converting it into total tonnage. For calculation of resource of a block for each borehole point, area of

influence is determined and this area is multiplied by actual thickness of limestone core obtained at each borehole point to get volume.

9.5.2 An average bulk density of **2.76** gm/cc, has been assumed for limestone. The total volume in cubic meter is multiplied by bulk density of limestone to obtain resource.

9.5.3 Resource of auctionable block has been calculated for cement grade, cement blendable beneficiable grade and blendable (Threshold) grade limestone.

9.5.4 The resource is calculated by following formula:

$$\text{Resource} = \text{Volume} \times \text{Bulk Density} .$$

$$\text{Volume} = \text{Thickness of limestone} \times \text{Area (length} \times \text{width)}$$

9.5.5 Weighed Average

The chemical analysis of sample collected from a borehole gives the grade in terms of CaO, MgO, Al₂O₃, SiO₂, Fe₂O₃, P₂O₅ and LOI, percentages.

Weighted average grade defines the quality of ore/rock of a block. The thickness of limestone availability varies from a borehole to another, vertically and laterally simple average (arithmetic mean) of CaO, MgO, Al₂O₃, SiO₂, Fe₂O₃, P₂O₅ and LOI, has been determined for cement grade, cement blendable beneficiable grade and blendable grade limestone as defined. The Weighted average of a borehole is determined by following formula:

If G₁ to G_n are the values whose weighted average is to be determined, and a₁ to a_n are the weighting factors, then the weighted average is G_w

$$G_w = \frac{G_1a_1 + G_2a_2 + G_3a_3 + \dots + G_na_n}{a_1 + a_2 + \dots + a_n} \quad i=1$$

9.5.6 Resource estimation was under taken using by Area of influence method, which involved construction of polygons around each borehole point in order to derive the tonnage and grade of limestone.

9.5.7 This method assigns an area to the point of observation, which is a function of the distance to the immediate neighbouring point of measurement. This method is appropriate for the type of deposit, nature of the study and level of exploration.

9.5.8 After consideration of limestone horizons, constructed polygons around each borehole point in by drawing perpendicular bisectors of the lines that connect to the adjacent boreholes.

9.5.9 All polygons were constrained by the extent of mineralisation; Cumulative thickness of each limestone horizon in each borehole was calculated and recorded against the respective borehole numbers.

9.6 Resource calculated using “ Cross- Section ” method is as follows:

For this method 4 No. of parallel section lines are drawn namely, A-A', C-C', D-D', E-E' with 600 m to 800 m internal across the stike. Cross-sectional lines were drawn, area on each section has been calculated using the Arc Gis software. Strike influence between two section lines and boreholes has been taken half way. Each of these areas has been multiplied with sectional influence/ stike influence of the section lines to give volume. The volume is been multiplied with assumed bulk density (2.76) to calculate gross resources.

Table 9.5: Inferred Mineral Resource (333) by cross sectional method of Alda Block in accordance with the Mineral (Evidence and Mineral Contents) Rule 2015 is tabulated as under:

BH. No.	Section Line	Influence	Sectional area	Volume	BD	Resource	Chemical Analysis(Wt. Avg.)			Grade
							SiO2 %	CaO %	MgO %	
2	3		4				11	14	15	20
ALD15	AA'	600	2970.57	1782342	2.76	4.91926392	11.35	44.06	0.64	CG
		600	8871.81	5323086	2.76	14.69171736	15.99	40.06	0.56	CBB
ALD12		800	23131.61	18505288	2.76	51.07459488	15.73	38.98	3.00	CBB
ALD09		800	9543.08	7634464	2.76	21.07112064	11.77	44.29	1.21	CG
		800	8503.67	6802936	2.76	18.77610336	21.22	34.12	1.47	BLENDABLE
ALD06		800	30850.01	24680008	2.76	68.11682208	11.86	44.63	0.58	CG
ALD03		600	26923.08	16153848	2.76	44.58462048	11.58	45.11	0.56	CG
ALD01	CC'	600	40830.32	24498192	2.76	67.61500992	9.54	46.03	0.92	CG
ALD04		600	41418.75	24851250	2.76	68.58945	11.38	44.50	0.82	CG
ALD02	DD'	600	4091.38	2454828	2.76	6.77532528	23.76	34.83	2.09	BLENDABLE
		600	14979.32	8987592	2.76	24.80575392	11.14	44.09	1.53	CG
		600	6302.96	3781776	2.76	10.43770176	14.55	41.12	1.80	CBB
		600	5998.5	3599100	2.76	9.933516	11.10	44.30	1.93	CG

		600	11608.85	6965310	2.76	19.2242556	22.76	34.61	1.90	BLENDABLE
ALD05		600	15622	9373200	2.76	25.870032	12.27	42.41	0.84	CBB
		600	4693.3	2815980	2.76	7.7721048	9.61	44.39	0.91	CG
		600	5214.94	3128964	2.76	8.63594064	12.64	41.49	1.05	CBB
ALD10		600	22047.61	13228566	2.76	36.51084216	10.58	44.49	1.79	
		600	3056.26	1833756	2.76	5.06116656	23.79	34.91	0.72	BLENDABLE
ALD13		800	21081.72	16865376	2.76	46.54843776	10.42	44.10	0.89	CG
		800	12898.41	10318728	2.76	28.47968928	16.06	38.99	0.77	CBB
	EE'	600	6646.57	3987942	2.76	11.00671992	10.40	44.62	0.59	CG
		600	8706.04	5223624	2.76	14.41720224	17.16	38.03	0.54	CBB
ALD16		600	5371.34	3222804	2.76	8.89493904	23.00	35.75	0.63	BLENDABLE
		600	3542.89	2125734	2.76	5.86702584	11.41	43.20	0.52	CBB
			344904.99		2.76	629.6793554	14.44	41.32	1.13	

Table 9.6 Mineral Resource Statement (grade-wise) by cross sectional method of Alda Block in accordance with the Mineral (Evidence and Mineral Contents) Rule 2015 is tabulated as under

Category – I (more than 44% CaO)

BH. No.	Section Line	Influence	Sectional area	Volume	BD	Resource	Chemical Analysis(Wt. Avg.)		
							SiO2 %	CaO %	MgO %
2	3	4	5	6	7		9	12	13
ALD15	AA'	600	2970.57	1782342	2.76	4.91926392	11.35	44.06	0.64
ALD09	AA'	800	9543.08	7634464	2.76	21.07112064	11.77	44.29	1.21
ALD06	AA'	800	30850.01	24680008	2.76	68.11682208	11.86	44.63	0.58
ALD03	AA'	600	26923.08	16153848	2.76	44.58462048	11.58	45.11	0.56
ALD01	CC'	600	40830.32	24498192	2.76	67.61500992	9.54	46.03	0.92
ALD04	CC'	600	41418.75	24851250	2.76	68.58945	11.38	44.50	0.82
ALD02	DD'	600	14979.32	8987592	2.76	24.80575392	11.14	44.09	1.53
ALD02	DD'	600	5998.5	3599100	2.76	9.933516	11.10	44.30	1.93
ALD05	DD'	600	4693.3	2815980	2.76	7.7721048	9.61	44.39	0.91
ALD10	EE'	600	22047.61	13228566	2.76	36.51084216	10.58	44.49	1.79
ALD13	DD'	800	21081.72	16865376	2.76	46.54843776	10.42	44.10	0.89
ALD16	DD'	600	6646.57	3987942	2.76	11.00671992	10.40	44.62	0.59
			227982.83		2.76	411.4736616	10.90	44.55	1.03

Category – II (38% to 44% CaO)

BH. No.	Section Line	Influence	Sectional area	Volume	BD	Resource	Chemical Analysis(Wt. Avg.)		
							SiO2 %	CaO %	MgO %
2	3		4				11	14	15
ALD15	AA'	600	8871.81	5323086	2.76	14.69171736	15.99	40.06	0.56
ALD12	AA'	800	23131.61	18505288	2.76	51.07459488	15.73	38.98	3.00
ALD02	DD'	600	6302.96	3781776	2.76	10.43770176	14.55	41.12	1.80
ALD05	DD'	600	15622	9373200	2.76	25.870032	12.27	42.41	0.84
ALD05	DD'	600	5214.94	3128964	2.76	8.63594064	12.64	41.49	1.05
ALD13	DD'	800	12898.41	10318728	2.76	28.47968928	16.06	38.99	0.77
ALD16	DD'	600	8706.04	5223624	2.76	14.41720224	17.16	38.03	0.54
ALD16	DD'	600	3542.89	2125734	2.76	5.86702584	11.41	43.20	0.52
			84290.66		2.76	159.473904	14.48	40.53	1.13

Category – III (34% to 38% CaO)

BH. No.	Section Line	Influence	Sectional area	Volume	BD	Resource	Chemical Analysis(Wt. Avg.)		
							SiO2 %	CaO %	MgO %
2	3		4				11	14	15
ALD09	AA'	800	8503.67	6802936	2.76	18.77610336	21.22	34.12	1.47
ALD02	DD'	600	4091.38	2454828	2.76	6.77532528	23.76	34.83	2.09
ALD02	DD'	600	11608.85	6965310	2.76	19.2242556	22.76	34.61	1.90
ALD10	DD'	600	3056.26	1833756	2.76	5.06116656	23.79	34.91	0.72
ALD16	DD'	600	5371.34	3222804	2.76	8.89493904	23.00	35.75	0.63
			32631.50		2.76	58.73178984	22.91	34.84	1.36

Table 9.7: Comparison of resources by “Area of Influence Method” and “Cross - Section” method:

Method of Estimation	Gross Resources (MT)		
	Cement Grade	Benificiable-Blendable Grade	Blendable Grade
Area of Influence (333)	331.548	166.941	55.802
Cross–Section (333)	411.47	159.47	58.73
Difference	+ 79.922	-7.47	+ 2.92

9.6 Tentative Reconnaissance Mineral Resource (334) of Alda block by area of influence method .

9.7.1 In the 74th Technical-cum-Cost Committee (TCC) meeting held on February 20th - 21th, 2025, the DGM proposed excluding 4 no.s of boundary boreholes due to standing crops in the field and revised the area . However, the TCC decided not to revise the area. Instead, the calculate the tentative Reconnaissance Mineral Resource of excluded 4 Nos. of boreholes using surrounding drill boreholes. **(PLATE NO.-7(D))**

9.7.2 Tentative resource potentiality of limestone in the block are based on surface and core sample analytical results of surrounding drilled boreholes . limestone mineral is bulk mineral and is of Bedded Stratiform and tabular type deposit of regular habit, to have some idea about tentative resource potentiality of different grades of limestone , results obtained from BRS & core samples collected from drilled boreholes, chemical analysis results which conforms to Cement grade , Cement Blendable/Benificiable grade , Bendable grade ,and its area is measured from area of influence method by surrounding drilled boreholes, Thickness of limestone is taken as average thickness intersected in systematic boreholes (800x800) drilled within the block.**(Annexure-VII)**

9.7.3 The resource was estimated using the formula:

$$\text{Resource} = \text{Volume} \times \text{Bulk Density} .$$

$$\text{Volume} = \text{Thickness of limestone} \times \text{Area (length} \times \text{width)}$$

9.8 Category of resources as per MEMC RULE 2015 (as amended) along with UNFC Classification:

Mineral Resource estimation of Alda limestone block, into G-3 category as the term defined in the Mineral (Evidence and Mineral contents) Rule 2015.

Based on the above techniques and assumptions, resources of the block assessed by DGM, is presented in table:

Table 9.8: Mineral Resource Statement (grade-wise) by area of influence method of Alda Block in accordance with the Mineral (Evidence and Mineral Contents) Rule 2015 is tabulated as under

Category – I (more than 44% CaO)

Sr No.	Category	Average Recovered Thickness (m)	Quantity (MT)	SiO ₂ %	CaO %	MgO %	Fe ₂ O ₃ %
1	Inferred Mineral Resource (333)	21.24	331.548	10.92	44.51	1.02	1.84
2	Reconnaissance Mineral Resource (334)	9.25	82.13				
Total			413.678				

Category – II (38% to 44% CaO)

Sr No.	Category	Average Recovered Thickness (m)	Quantity (MT)	SiO ₂ %	CaO %	MgO %	Fe ₂ O ₃ %
1	Inferred Mineral Resource (333)	12.15	166.941	15.26	39.91	1.07	2.54
2	Reconnaissance Mineral Resource (334)	15.0	64.91				
Total			231.851				

Category – III (34% to 38% CaO)

Sr No.	Category	Average Recovered Thickness (m)	Quantity (MT)	SiO ₂ %	CaO %	MgO %	Fe ₂ O ₃ %
1	Inferred Mineral Resource (333)	9.31	55.802	22.67	34.84	0.94	2.56
2	Reconnaissance Mineral Resource (334)	8.0	64.91				
Total			120.712				

Table 9.9: Inferred Mineral Resource (333) by area of influence method of Alda Block in accordance with the Mineral (Evidence and Mineral Contents) Rule 2015 is tabulated as under :

Sr No.	Category	Average Recovered Thickness (m)	Quantity (MT)	SiO ₂ %	CaO %	MgO %	Fe ₂ O ₃ %
1	(> 44% CaO)	21.24	331.548	10.92	44.51	1.02	1.84
2	(38% to 44% CaO)	12.15	166.941	15.26	39.91	1.07	2.54
3	(34% to 38% CaO)	9.31	55.802	22.67	34.84	0.94	2.56
Total			554.291				

Table 9.10: Tentative Reconnaissance Mineral Resource (334) of 04 undrilled boreholes of Alda Block in accordance with the Mineral (Evidence and Mineral Contents) Rule 2015 is tabulated as under:

Sr No.	Category	Average Thickness (m)	Quantity (MT)	SiO ₂ %	CaO %	MgO %	Fe ₂ O ₃ %
1	(> 44% CaO)	9.25	82.13				
2	(38% to 44% CaO)	15.0	64.91				
3	(34% to 38% CaO)	8.0	64.91				
Total			211.95				

Table 9.11: Inferred Mineral Resource (333) + Tentative Reconnaissance Mineral Resource (334) of Alda Block in accordance with the Mineral (Evidence and Mineral Contents) Rule 2015

Sr No.	Category	Quantity (MT)
1	Inferred Mineral Resource (333)	554.291
2	Reconnaissance Mineral Resource (334)	211.95
Total		766.241

CHAPTER 10

CORE PRESERVATION

G-3 stage Exploration programmes involves subsurface drilling operation is based solely on the understanding of the natural behaviour of the particular economic mineral being explored. This behaviour in turn leads to the understanding of the nature and tectonic setting of the mineral deposits. The skeletonised drill cores as well as the complete drill core for stratigraphic correlation purpose and future reference may be preserved at DGM Core Library.

As per guideline of MEMC Rule 2015, it is mentioned that core preservation technique evaluated by the Officer of the project to establish its scientific, educational or economic use. For that purposes, mineral project wise certain instructions has followed by the project in-charge as given below:

1. Only a small percentage of cores preserved generated through mineral exploration can be stored each and every year.
2. For permanent preservation of drill core, core has been preserve in the PVC core boxes. Boxes of PVC having 100cm length x 30 cm width x 10 cm height with four adjustable partitions dividing the box longitudinally in four compartments are recommended. These boxes are suitable for handling and stacking them in the heavy-duty racks.
3. For permanent preservation of drill core, methodology for preservation of drill core in core boxes has been adopted.
4. As per guideline of MEMC Rule-2015, for limestone exploration projects only 5 % core preservation is prioritised to be kept in Drill Core Library and it is obligatory for all exploration in-charge to make submission his selected borehole core samples generated through drilling in prescribed type of core boxes is compulsory, by amending the MMDR Act appropriately.

DGM Chhattisgarh, followed-up all the above mentioned instructions and guidelines made by the auctionable block rule of core preservation techniques and adopted it during G-3 stage exploration of limestone in Alda block.

CHAPTER 11

CONCLUSION AND RECOMMENDATION

11.1.0 CONCLUSION

11.1.1 The Alda Limestone block for Preliminary Exploration (G-3 stage) for limestone, lies in the vicinity of well established limestone horizon of district Raipur & Balodabazar-Bhatapara of Chhattisgarh .It falls in parts of the Survey of India Toposheet No. 64G/14 and it lies between 21° 35' 14.932" N to 21° 37' 25.622" N latitudes and 81° 53' 06.978" E to 81° 54' 58.426" E longitudes. The block covers an area of 10.25 sq.km, in and around villages of Alda, Kareli, Bhainsa, Nawapara , Mudhpar, Khilora etc. of District- Raipur & Balodabazar-Bhatapara district, State- Chhattisgarh .

11.1.2 The Alda Limestone exploration block majorly comprises of lithologies including of Chandi limestone formation of Raipur Group of Chhattisgarh Supergroup belonging to Meso-Neo Proterozoic age. General strike of these lithologies is NE-SW dipping 2°-5° towards west. At

few places bedding plane are dipping south easterly that is suggestive of the presence of local folding at places.Major litho-units of the block area includes limestone, shale, laterite, shaly limestone etc.

11.1.3 Laterites of Recent to Quaternary age have marked in Southern- Eastern part of the block.

11.1.4 In the present exploration block, extensive limestone mineralization has been observed on surface and in boreholes. On surface, limestone is occurring in throughout the block. In Southern- Eastern part of the block, laterite capping is observed with limestone. Limestone is intersected in all the boreholes with intercalation of shaly limestone. Most of the limestone is of Stromatolitic limestone and are of compact and massive type. Limestone horizon is continuing upto 79.00 m as observed in borehole ALD-02. These limestone are known to be deposited normally in tidal swept shallow sea, mainly in tidal flats, near-shore, marine or low energy environments.

11.1.5 The exploratory work in the block was commenced on 01.07.2024 with Survey work and Geological mapping on 1:4,000 scale. The exploratory drilling commenced on 28.11.2024 with borehole No. ALD-10 and was completed with the closure of borehole No. ALD-02 on 15.04.2025 The allied field-works including surveying, geological mapping, drilling and

borehole core sampling etc. were completed simultaneously. The analytical / laboratory studies were also carried out simultaneously in Central Laboratories of DGM Raipur and other Central Laboratories of Regional office Raipur.

11.1.6 DGM carried out a total of 630m of exploratory drilling with 12 boreholes (i.e. ALD-01, ALD-02, ALD-03, ALD-04 ALD-05, ALD-06, ALD-09, ALD-010, ALD-12, ALD-13, ALD-15 and ALD-16, out of which Eleven boreholes (ALD-01, ALD-03, ALD-04 ALD-05, ALD-06, ALD-09, ALD-010, ALD-12, ALD-13, ALD-15 and ALD-16) were drilled upto 50.0m depth, while ALD-02 was drilled upto 79 m. Soil cover encountered in boreholes vary between 1.80 m (ALD-04) to 13.60 m (ALD-15).

11.1.7 Limestone has been encountered in all the 12 Nos.of boreholes, Limestone grade is broadly divided into three categories, i) Cement grade ($\geq 44\%$ Cao, $<3\%$ MgO and $<16\%$ SiO₂). ii) Cement Blendable(benificiable) grade (≥ 38 to $<44\%$ Cao, $<5\%$ MgO and $<18\%$ SiO₂) and iii) Blendable grade (≥ 34 to $<38\%$ Cao) . As far as Cement grade limestone is concerned ,it has been encountered in 4 boreholes ALD-01, ALD-03, ALD-04 and ALD-06 the thickness of cement grade limestone are 44.0m, 46.0m, 48.20m and 44.30m respectively.

Whereas Cement grade partially encountered in 8 borehole ALD-02, ALD- 05, ALD-09, ALD-10, , ALD-12, ALD-13, ALD-15 and ALD- 16. The thickness are 34.0m, 12.0m, 12.50m, 38.0m, 5.00m, 27.0m, 5.50m, and 9.0m respectively.

Cement Blendable(benificiable) grade limestone is encountered in 07 boreholes only, namely ALD-02, ALD- 05, ALD-09, ALD-12, ALD-13, ALD-15, and ALD- 16. The thickness of CBB grade limestone are 16.0m, 34.0m, 5.0m, 35.0m, 17.90m, 16.0m, and 21.0m respectively.

Blendable grade limestone is concerned, it has been encountered in few (four) boreholes i.e. ALD-02, ALD- 09, ALD-10, and ALD- 16. The thickness of Blendable grade are 23.0m, 14.0m, 4.0m, and 11.0m respectively.

11.1.8 A total of **563.035 Million Tonnes** of Net in-situ Inferred Resources (333 category) of limestone with average grade of 40.93% Cao, 1.47% MgO, 14.46% SiO₂ in which **cement Grade limestone is 331.548 Million Tonnes**, Cement Blendable Benificiable (CBB) Grade limestone is **166.941 Million Tonnes** and Blendable Grade is **55.802 Million Tonnes** and **211.95 Million Tonnes** of Net in-situ Tentative Reconnaissance Resources (334 category) of limestone have been estimated by Area of influence method. The cumulative **Net in-situ Resources (333+334)** by Area of influence method is **766.241 Million Tonnes**.

11.2 RECOMMENDATIONS

11.2.1 The exploration has been carried out as per Mineral (Evidence of Mineral Contents) Rule-2015, as amended and the Mineral Resources are estimated as per UNFC norms. Limestone comes under Schedule-II of Mineral (Evidence of Mineral Contents) Rule-2021, so, the present level of exploration will facilitate the state government for auctioning of the block under ML. The base-line data generated/collected during the present study will be useful in the further development of the block. Any future mining project may generate employment for the local people and will increase socio economic status of the people residing in the nearby areas and state.

CHAPTER 12

EXPENDITURE

FINAL COST ESTIMATION FOR PRELIMINARY EXPLORATION (G-3) FOR LIMESTONE IN ALDA BLOCK, TEHSIL: TILDA & SUHELA, DISTRICT: RAIPUR & BALODABAZAR-BHATAPARA, Total Area - 10.25 sq km; Nos. of Borehole - 12 ; Completion Time - 10 Months,								
S. No.	Item of work	Unit	Rates as per NMET 2020-21 SoC		Revised Cost of the Project		Total	
			SoC Item - S.No.	Rates as per SoC	Qty.	Total Amount	Qty.	Amount
A.	GEOLOGICAL WORK							
1	Survey Party Days (1 party)	Day	1.6.1a	8300	60	498000	60	498000
2	Labour charges for Survey work	Per Labour	5.7	504	240	120960	240	120960
3	Geologist Party Days (1 Party) Field	Day	1.3	11000	85	935000	85	935000
4	Geologist Party Days (1 Party) HQ	Day	1.3	9000	30	270000	30	270000
5	Labour charges for Geological Field work	Per Labour	5.7	504	170	85680	170	85680
6	Core Sampling Party Days - (2 Parties)	Day	1.5.2	5100	75	382500		
7	Labour for Sampling	Per Labour	5.7	504	300	151200	300	151200
	Sub Total A					2443340		2060840
B.	DRILLING						0	
1	Surface drilling (2 rigs)	Meter	2.2.1.3	6775	630	4268250	630	4268250
2	Road making (flat terrain)	Per km	2.2.10a	22020	10	220200	10	220200
3	Transportation (2 rigs)	Per km	2.2.8	36	600	21600	600	21600
4	Monthly Accommodation charges for drilling camp	Monthly basis	2.2.9	50000	4	200000	4	200000
5	Camp Establishment cost	Per Drill	2.2.9a	250000	2	500000	2	500000
6	Camp Winding	Per Drill	2.2.9b	250000	2	500000	2	500000
7	Drill core preservation	Per meter	2.2.8	1590	480	763200	480	763200
	Sub Total B					6473250		6473250
C.	LABORATORY STUDIES							
a	Bulk density	per sample	4.1	3540	5	17700	5	17700
b.	Chemical Analysis							
1	Primary + Check Samples							
	(i) Primary Samples 7 radicals (CaO%, MgO%, SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ %, P ₂ O ₅ , & LOI)	per sample	4.1.15a	4200	500	2100000	500	2100000
	(ii) For Check Samples 7 radicals (CaO%, MgO%, SiO ₂ , Al ₂ O ₃ , Fe ₂ O ₃ %, P ₂ O ₅ , & LOI)	per sample	4.1.15a	4200	50	210000	50	210000
	(iii) Petrological study	per sample	4.3.4	4232	5	21160	5	21160
	(iv) preparation of standard thin section	per sample	4.3.1	2353	5	11765	5	11765
	Sub Total C					2360625		2360625
D.	Land/crop compensation	Per BH	5.6	20000				
	Sub Total D							
E.	Total A + B + C					11277215		10894715
F.	Peer review					30000		30000

	Preparation of exploration proposal	One Number (5 Hard copies along with soft copy)	5.1	2% of the project cost or Rs 3.8 lakh whichever is lower		225544		217894
	Geological Report Preparation	Copy per 5 Hard copies of report along with soft copy	5.2	For the projects having cost upto Rs 150 lakhs : A Minimum of Rs.2.5 lakhs or 5% of the value of work whichever is more		563861		544736
	Sub Total F					819405		792630
	Grand Total E+F					12096620		11687345
	GST 18%					2177392		2103722
	Grand Total: with GST 18%					14274012		13791067
Say 142.74 Lakhs						142.74		137.92

CHAPTER 13

REFERENCE

1. Tiwari S.B., Sankhala V.K., Kankane S. (F.S.1991 to 1993) Report on Prospecting of Cement grade limestone in Karmadih, Maldi-Mopar Area, Tahsil-Balodabazar, District-Raipur (M.P.),
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6. Tiwari S.K., Chaubey Seema (F.S.2011 to 2013) Report on exploration of Limestone in KESLA-I, District-Raipur (C.G.)
7. Tiwari S.K., Chaubey Seema, Manjhi Prafful (F.S.2013 to 2016) Report on exploration of Limestone in KESLA-II District-Raipur (C.G.)
8. Seema Chaubey, Renuka Nag and Manjhi Prafful (F.S.2016 to 2017) Report on exploration of Limestone in Guma-II District-Balodabazar-Bhatapara (C.G.)
9. Seema Chaubey, Renuka Nag, Manjhi Prafful (F.S.2016 to 2017) Report on exploration of Limestone in Kukurdih--II District-Balodabazar-Bhatapara (C.G.)
10. Seema Chaubey, Manjhi Prafful (F.S.2017 to 2018) Report on exploration of Limestone in Kathiya-Pachari-Bharuadih District-Raipur (C.G.)

CHAPTER 14

LOCALITY INDEX

TABLE NO.-14.1

NAME OF VILLAGE	CO-ORDINATES	
	LATITUDE	LONGITUDE
Alda	21°49'47.40" N	80°55'7.36"E
Kareli	21°49'44.61" N	80°54'10.66"E
Bhainsa	21°48'54.85" N	80°54'11.27"E
Nawapara	21°48'47.07" N	80°55'11.37"E
Mudhpar	21°38'4.38" N	81°54'91.51"E
Khilora	21°37'53.30" N	81°52'28.24"E

ANNEXURE-I

**DETAILS OF BOREHOLES DRILLED BY DGM CHHATTISGARH
IN ALDA LIMESTONE BLOCK, TEHSIL-TILDA, SIMGA & SUHELA
DISTRICT- RAIPUR & BALODABAZAR-BHATAPARA CHHATTISGARH**

S. NO.	BOREHOLE NO	RL (M)	TOTAL DEPTH DRILLED (M)	NORTHING (M)	EASTING (M)	DATE OF COMMENCEMENT	DATE OF CLOSURE
1	ALD -01	265.543	50.00	2391046.991	592033.8843	18.01.2025	10.02.2025
2	ALD-02	263.637	79.00	2391046.991	592833.8843	01.03.2025	15.04.2025
3	ALD-03	261.549	50 .00	2391046.991	593633.8843	17.01.2025	30.01.2025
4	ALD-04	263.985	50 .00	2390246.991	592033.8843	19.01.2025	06.02.2025
5	ALD-05	263.886	50 .00	2390246.991	592833.8843	07.01.2025	16.01.2025
6	ALD-06	266.74	50 .00	2390246.991	593633.8843	11.01.2025	23.01.2025
7	ALD-09	268.175	50 .00	2389446.991	593633.8843	13.12.2024	23.12.2024
8	ALD-10	275.094	51 .00	2389446.991	594433.8843	28.11.2024	10.12.2024
9	ALD-12	269.96	50 .00	2388646.991	593633.8843	16.12.2024	04.01.2025
10	ALD-13	280.833	50 .00	2388646.991	594433.8843	01.12.2024	13.12.2024
11	ALD-15	269.73	50 .00	2387846.991	593633.8843	03.01.2025	15.01.2025
12	ALD-16	274.455	50 .00	2387846.991	594433.8843	14.12.2024	31.12.2024
13	TOTAL		630 M				

ANNEXURE-II

THE DETAILED (RUN WISE) LITHOLOGS & CHEMICAL ANALYSIS OF BORE HOLE SAMPLES OF BOREHOLES DRILLED BY DGM, CHHATTISGARH IN ALDA LIMESTONE BLOCK, DISTRICT-RAIPUR- BALODABAZAR-BHATAPARA, CHHATTISGARH

S. No.-01						<u>BOREHOLE NO. ALD-01</u>	Total depth (in m) : 50.00 m							
Reduced Level:265.543							Date of Starting : 18.01.2025							
Co-ordinates: 21° 37' 12.539" N 81° 53' 21.286" E							Date of Closing : 10.02.2025							
Drill No.- Vol 35/12							ANALYTICAL RESULT IN %							
FROM	TO	RUN	CORE	RECO%	SAMPLE	LITHOLOGY	SiO2%	Al2O3%	Fe2O3%	CaO%	MgO%	P2O5%	LOI	TOTAL
0.00	1.00	1.00	0.00	0		Brown, soft soil								
1.00	2.00	1.00	0.00	0		Brown, soft soil								
2.00	3.00	1.00	0.00	0		Brown, soft soil								
3.00	4.50	1.50	0.00	0		Brown, soft soil								
4.50	6.00	1.50	0.00	0		Brown, soft soil								
6.00	7.00	1.00	0.85	85	1	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.016	4.196	1.622	44.153	1.837	0.034	36.7	99.56
7.00	8.00	1.00	0.90	90		Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.016	4.196	1.622	44.153	1.837	0.034	36.7	99.56

8.00	9.00	1.00	1.00	100	2	Pinkish purple, fine-grained, hard and compact, massive, stromatolitic limestone with shale partings.	7.353	2.907	1.256	47.54	1.585	0.029	38.660	99.330
9.00	10.00	1.00	1.00	100		Pinkish purple, fine-grained, hard and compact, massive, stromatolitic limestone with shale partings.	7.353	2.907	1.256	47.54	1.585	0.029	38.660	99.330
10.00	11.00	1.00	0.80	80	3	Pinkish purple, fine-grained, hard and compact, massive, stromatolitic limestone with solution cavity.	7.858	3.594	1.487	47.422	1.192	0.03	38	99.58
11.00	12.00	1.00	1.00	100		Pinkish purple, fine grained, hard and compact, massive, stromatolitic limestone.	7.858	3.594	1.487	47.422	1.192	0.03	38	99.58
12.00	13.00	1.00	1.00	100	4	Pinkish purple, fine grained, hard and compact, massive, stromatolitic limestone with shale partings	8.448	3.714	1.453	47.02	1.011	0.034	37.62	99.3
13.00	14.00	1.00	1.00	100		Pinkish purple, fine grained, hard and compact, massive, stromatolitic limestone with shale partings	8.448	3.714	1.453	47.02	1.011	0.034	37.62	99.3
14.00	15.00	1.00	1.00	100	5	Pinkish purple, fine grained, hard and compact, massive, stromatolitic limestone with shale intercalation.	11.641	4.561	2.03	43.83	1.65	0.03	35.62	99.37
15.00	16.00	1.00	1.00	100		Pinkish purple, fine grained, hard and compact, massive, stromatolitic limestone with shale intercalation.	11.641	4.561	2.03	43.83	1.65	0.03	35.62	99.37
16.00	17.00	1.00	1.00	100	6	Pinkish purple, fine grained, hard and compact, massive, stromatolitic limestone with shale intercalation.	8.288	3.776	1.455	47.012	1.021	0.029	38.01	99.59

17.00	18.00	1.00	1.00	100		Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shale intercalation .	8.288	3.776	1.455	47.012	1.021	0.029	38.01	99.59
18.00	19.00	1.00	1.00	100	7	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shale intercalation .	9.511	4.678	1.594	45.839	1.086	0.035	36.69	99.43
19.00	20.00	1.00	1.00	100		Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shale intercalation .	9.511	4.678	1.594	45.839	1.086	0.035	36.69	99.43
20.00	21.00	1.00	1.00	100	8	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shale intercalation .	11.20	5.18	1.87	45.17	0.59	0.03	35.56	99.60
21.00	22.00	1.00	0.80	80		Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shale intercalation .	11.20	5.18	1.87	45.17	0.59	0.03	35.56	99.60
22.00	23.00	1.00	0.75	75	9	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.35	5.42	2.42	42.45	1.07	0.03	34.43	99.35
23.00	24.00	1.00	0.80	80		Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.35	5.42	2.42	42.45	1.07	0.03	34.43	99.35
24.00	25.00	1.00	0.80	80	10	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.42	5.58	2.03	44.02	0.88	0.03	35.21	99.17
25.00	26.00	1.00	0.85	85		Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.42	5.58	2.03	44.02	0.88	0.03	35.21	99.17

26.00	27.00	1.00	0.75	75	11	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.61	6.38	2.18	44.42	0.54	0.03	35.07	99.17
27.00	28.00	1.00	0.65	65		Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shally portion	10.61	6.38	2.18	44.42	0.54	0.03	35.07	99.17
28.00	29.00	1.00	0.80	80	12	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shally portion	9.57	4.89	1.58	45.96	0.79	0.03	36.32	99.14
29.00	30.00	1.00	0.90	90		Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shally portion	9.57	4.89	1.58	45.96	0.79	0.03	36.32	99.14
30.00	31.00	1.00	0.90	90	13	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	7.02	4.20	1.00	48.26	0.79	0.03	38.20	99.50
31.00	32.00	1.00	0.90	90		Purple , fine grained, hard and compact , massive , stromatolitic limestone.	7.02	4.20	1.00	48.26	0.79	0.03	38.20	99.50
32.00	33.00	1.00	0.90	90	14	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	5.81	3.55	0.72	49.35	0.86	0.03	39.06	99.37
33.00	34.00	1.00	0.90	90		Purple , fine grained, hard and compact , massive , stromatolitic limestone.	5.81	3.55	0.72	49.35	0.86	0.03	39.06	99.37
34.00	35.00	1.00	0.95	95	15	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	8.36	4.55	1.60	46.92	0.65	0.03	37.07	99.17
35.00	36.00	1.00	1.00	100		Purple , fine grained, hard and compact , massive , stromatolitic limestone.	8.36	4.55	1.60	46.92	0.65	0.03	37.07	99.17
36.00	37.00	1.00	1.00	100	16	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	8.313	4.171	1.259	47.858	0.321	0.033	37.63	99.59
37.00	38.00	1.00	1.00	100		Purple , fine grained, hard and compact , massive , stromatolitic limestone.	8.313	4.171	1.259	47.858	0.321	0.033	37.63	99.59

38.00	39.00	1.00	1.00	100	17	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	6.856	3.491	0.858	49.358	0.238	0.026	38.84	99.67
39.00	40.00	1.00	1.00	100		Greyish purple , fine grained, hard and compact, massive, stromatolitic limestone.	6.856	3.491	0.858	49.358	0.238	0.026	38.84	99.67
40.00	41.00	1.00	1.00	100	18	Grey , fine grained, hard and compact , massive, limestone.	8.777	4.407	1.512	47.234	0.391	0.026	36.96	99.31
41.00	42.00	1.00	1.00	100		Grey , fine grained, hard and compact , massive, limestone.	8.777	4.407	1.512	47.234	0.391	0.026	36.96	99.31
42.00	43.00	1.00	0.85	85	19	Grey , fine grained, hard and compact , massive, limestone.	10.67	4.866	1.858	44.711	1.126	0.031	35.95	99.21
43.00	44.00	1.00	0.80	80		Grey , fine grained, hard and compact , massive, limestone.	10.67	4.866	1.858	44.711	1.126	0.031	35.95	99.21
44.00	45.00	1.00	0.80	80	20	Grey , fine grained, hard and compact , massive, limestone.	13.447	5.307	2.25	43.063	0.961	0.031	34.45	99.51
45.00	46.00	1.00	1.00	100		Grey , fine grained, hard and compact , massive, dolomitic limestone.	13.447	5.307	2.25	43.063	0.961	0.031	34.45	99.51
46.00	47.00	1.00	1.00	100	21	Grey , fine grained, hard and compact , massive, dolomitic limestone.	11.603	5.794	1.672	44.17	0.8	0.032	35.25	99.32
47.00	48.00	1.00	0.70	70		Grey , fine grained, hard and compact , massive, limestone.	11.603	5.794	1.672	44.17	0.8	0.032	35.25	99.32
48.00	49.00	1.00	0.50	50	22	Grey , fine grained, hard and compact , massive, limestone.	11.384	5.64	1.552	44.302	0.961	0.032	35.5	99.37
49.00	50.00	1.00	0.80	80		Grey , fine grained, hard and compact , massive, limestone.	11.384	5.64	1.552	44.302	0.961	0.032	35.5	99.37
					Borehole closed at the depth of 50.00 m									

S. No.-02						<u>BOREHOLE NO. ALD-02</u>	Total depth (in m) : 79 .00m							
Reduced Level: 263.637							Date of Starting: 1.03.2025							
Co-ordinates: 21° 37' 12.390" N 81° 53 49.111" E							Date of Closing: 15.04.2025							
Drill No.- W/L,11							ANALYTICAL RESULT IN %							
FROM	TO	RUN	CORE	RECO%	SAMPLE	LITHOLOGY	SiO ₂ %	Al ₂ O ₃ %	Fe ₂ O ₃ %	CaO%	MgO%	P ₂ O ₅ %	LOI	TOTAL
0.00	1.00	1.00	0.00	0		Brown, soft soil								
1.00	2.00	1.00	0.00	0		Brown, soft soil								
2.00	3.00	1.00	0.00	0		Brown, soft soil								
3.00	4.00	1.00	0.00	0		Brown, soft soil								
4.00	5.00	1.00	0.00	0		Brown, soft soil								
5.00	6.00	1.00	0.30	30		Shally Limestone								
6.00	7.00	1.00	0.60	60	1	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	20.928	6.123	2.328	38.204	0.800	0.053	30.990	99.426
7.00	8.00	1.00	0.70	70		Pinkish purple, fine-grained, hard and compact, massive, stromatolitic limestone with shale partings.	20.928	6.123	2.328	38.204	0.800	0.053	30.990	99.426
8.00	9.00	1.00	0.50	50		Pinkish purple, fine-grained, hard and compact, massive, shaly limestone with shale partings.	20.928	6.123	2.328	38.204	0.800	0.053	30.990	99.426
9.00	10.00	1.00	1.00	100	2	Pinkish purple, fine-grained, hard and compact , massive, stromatolitic limestone with solution cavity .	33.479	8.563	3.444	26.324	3.236	0.058	24.320	99.424

10.00	11.00	1.00	1.00	100	3	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	22.662	5.429	2.253	36.218	2.260	0.042	30.680	99.544
11.00	12.00	1.00	0.60	60	4	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shale partings	20.811	5.980	2.592	35.705	2.924	0.056	31.150	99.218
12.00	13.00	1.00	0.60	60		Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shale partings	20.811	5.980	2.592	35.705	2.924	0.056	31.150	99.218
13.00	14.00	1.00	0.90	90	5	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shale intercalation .	9.719	2.921	1.684	45.624	1.837	0.040	37.640	99.465
14.00	15.00	1.00	0.70	70		Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shale intercalation .	9.719	2.921	1.684	45.624	1.837	0.040	37.640	99.465
15.00	16.00	1.00	0.65	65		Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shale intercalation .	9.719	2.921	1.684	45.624	1.837	0.040	37.640	99.465
16.00	17.00	1.00	0.60	60	6	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shale intercalation .	10.288	4.234	2.115	45.053	1.201	0.036	36.520	99.447
17.00	18.00	1.00	0.70	70		Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shale intercalation .	10.288	4.234	2.115	45.053	1.201	0.036	36.520	99.447
18.00	19.00	1.00	0.90	90	7	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shale intercalation .	13.034	5.206	2.556	42.516	1.379	0.033	34.690	99.414

19.00	20.00	1.00	0.60	60		Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shale intercalation .	13.034	5.206	2.556	42.516	1.379	0.033	34.690	99.414
20.00	21.00	1.00	0.80	80	8	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shale intercalation .	7.692	3.247	1.645	47.541	1.119	0.028	38.060	99.332
21.00	22.00	1.00	0.85	85		Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	7.692	3.247	1.645	47.541	1.119	0.028	38.060	99.332
22.00	23.00	1.00	1.00	100	9	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.863	5.043	2.583	42.697	1.138	0.030	34.820	99.174
23.00	24.00	1.00	1.00	100	10	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.911	5.238	2.454	42.879	0.891	0.032	34.700	99.105
24.00	25.00	1.00	1.00	100	11	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.482	5.511	2.204	43.926	1.080	0.028	35.390	99.621
25.00	26.00	1.00	1.00	100	12	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.752	4.243	1.508	46.198	1.449	0.033	37.360	99.543
26.00	27.00	1.00	1.00	100	13	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shally portion	10.727	4.447	1.824	44.640	1.523	0.025	36.330	99.516
27.00	28.00	1.00	1.00	100	14	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shally portion	11.241	6.021	1.865	43.184	1.561	0.030	35.650	99.552

28.00	29.00	1.00	1.00	100	15	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone with shally portion	14.288	6.255	2.716	40.338	2.051	0.028	33.730	99.406
29.00	30.00	1.00	1.00	100	16	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	11.601	5.098	2.208	43.065	1.898	0.029	35.490	99.389
30.00	31.00	1.00	1.00	100	17	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	9.539	4.068	1.575	45.177	1.900	0.028	37.170	99.457
31.00	32.00	1.00	1.00	100	18	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	11.333	4.066	1.865	43.178	2.630	0.033	36.310	99.415
32.00	33.00	1.00	1.00	100	19	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	10.884	4.544	1.929	44.506	1.062	0.028	36.260	99.213
33.00	34.00	1.00	1.00	100	20	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	10.226	3.736	2.092	44.182	2.228	0.025	36.650	99.139
34.00	35.00	1.00	1.00	100	21	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	9.112	3.719	1.602	46.175	1.211	0.026	37.400	99.245
35.00	36.00	1.00	1.00	100	22	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	11.752	4.609	2.017	43.789	1.569	0.029	35.830	99.595
36.00	37.00	1.00	1.00	100	23	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	13.353	4.409	2.124	42.326	1.762	0.028	35.190	99.192
37.00	38.00	1.00	1.00	100	24	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	13.081	5.278	2.090	43.027	0.970	0.033	34.890	99.369
38.00	39.00	1.00	1.00	100	25	Greyish purple , fine grained, hard and compact, massive, stromatolitic limestone.	13.435	5.521	1.948	42.149	1.641	0.035	34.730	99.459
39.00	40.00	1.00	1.00	100	26	Grey , fine grained, hard and compact , massive, limestone.	14.512	5.674	2.367	41.185	1.773	0.031	34.040	99.582
40.00	41.00	1.00	1.00	100	27	Grey , fine grained, hard and compact , massive, limestone with shale partings	13.659	5.049	2.215	41.996	2.035	0.031	34.520	99.505

41.00	42.00	1.00	1.00	100	28	Grey , fine grained, hard and compact , massive, limestone with shale partings	14.391	5.815	2.474	41.296	1.494	0.032	34.030	99.532
42.00	43.00	1.00	1.00	100	29	Grey , fine grained, hard and compact , massive, limestone with shale partings	15.844	6.292	2.534	39.991	1.734	0.026	33.130	99.551
43.00	44.00	1.00	1.00	100	30	Grey , fine grained, hard and compact , massive, limestone with shale partings	13.921	5.149	2.023	41.753	1.939	0.032	34.610	99.427
44.00	45.00	1.00	1.00	100	31	Grey , fine grained, hard and compact , massive, limestone with shale partings	14.722	6.546	2.100	40.685	1.762	0.031	33.610	99.456
45.00	46.00	1.00	1.00	100	32	Grey , fine grained, hard and compact , massive, dolomitic limestone.	15.011	4.547	2.353	40.670	2.052	0.031	33.660	98.324
46.00	47.00	1.00	1.00	100	33	Grey , fine grained, hard and compact , massive, limestone.	14.330	5.522	2.268	41.362	1.587	0.033	34.270	99.372
47.00	48.00	1.00	1.00	100	34	Grey , fine grained, hard and compact , massive, limestone.	12.472	4.414	1.787	43.065	2.008	0.030	35.610	99.386
48.00	49.00	1.00	1.00	100	35	Grey , fine grained, hard and compact , massive, limestone.	9.693	4.097	1.395	45.615	1.626	0.029	37.060	99.515
49.00	50.00	1.00	1.00	100	36	Grey , fine grained, hard and compact , massive, limestone.	10.430	3.002	1.587	44.956	1.934	0.030	37.360	99.299
50.00	51.00	1.00	1.00	100	37	Grey , fine grained, hard and compact , massive, limestone.	10.398	3.576	1.471	44.965	2.056	0.034	37.070	99.570
51.00	52.00	1.00	1.00	100	38	Grey , fine grained, hard and compact , massive, limestone.	10.551	3.650	1.503	44.686	1.777	0.034	36.980	99.181
52.00	53.00	1.00	1.00	100	39	Grey , fine grained, hard and compact , massive, limestone.	9.772	3.302	1.400	45.541	1.696	0.036	37.410	99.157
53.00	54.00	1.00	1.00	100	40	Grey , fine grained, hard and compact , massive, limestone.	11.834	3.657	1.661	43.615	2.096	0.036	36.410	99.309
54.00	55.00	1.00	1.00	100	41	Grey , fine grained, hard and compact , massive, limestone.	13.671	4.444	1.937	41.975	2.253	0.035	35.140	99.455

55.00	56.00	1.00	1.00	100	42	Grey , fine grained, hard and compact , massive, limestone.	13.738	5.643	2.048	41.891	1.680	0.029	34.460	99.489
56.00	57.00	1.00	1.00	100	43	Grey , fine grained, hard and compact , massive, limestone.	12.757	5.701	1.732	42.733	1.395	0.030	35.020	99.368
57.00	58.00	1.00	1.00	100	44	Grey , fine grained, hard and compact , massive, limestone.	10.749	5.413	1.531	44.610	1.003	0.035	36.130	99.471
58.00	59.00	1.00	1.00	100	45	Grey , fine grained, hard and compact , massive, limestone.	17.793	8.293	2.188	38.195	1.492	0.042	31.430	99.433
59.00	60.00	1.00	1.00	100		Grey , fine grained, hard and compact , massive, limestone.	17.793	8.293	2.188	38.195	1.492	0.042	31.430	99.433
60.00	61.00	1.00	1.00	100		Grey , fine grained, hard and compact , massive, limestone.	17.793	8.293	2.188	38.195	1.492	0.042	31.430	99.433
61.00	62.00	1.00	1.00	100	46	Grey , fine grained, hard and compact , massive, limestone with shale partings	26.231	11.256	3.239	31.612	1.055	0.056	26.100	99.549
62.00	63.00	1.00	1.00	100		Grey , fine grained, hard and compact , massive, limestone with shale partings	26.231	11.256	3.239	31.612	1.055	0.056	26.100	99.549
63.00	64.00	1.00	1.00	100		Grey , fine grained, hard and compact , massive, limestone with shale partings	26.231	11.256	3.239	31.612	1.055	0.056	26.100	99.549
64.00	65.00	1.00	1.00	100	47	Grey , fine grained, hard and compact , massive, limestone with shale partings	24.307	9.586	3.547	33.749	0.989	0.040	27.240	99.458
65.00	66.00	1.00	1.00	100		Grey , fine grained, hard and compact , massive, limestone.	24.307	9.586	3.547	33.749	0.989	0.040	27.240	99.458
66.00	67.00	1.00	1.00	100	48	Grey , fine grained, hard and compact , massive, limestone.	23.213	7.658	2.874	34.381	2.242	0.045	29.130	99.543
67.00	68.00	1.00	1.00	100		Grey , fine grained, hard and compact , massive, limestone.	23.213	7.658	2.874	34.381	2.242	0.045	29.130	99.543
68.00	69.00	1.00	1.00	100		Grey , fine grained, hard and compact , massive, limestone.	23.213	7.658	2.874	34.381	2.242	0.045	29.130	99.543

69.00	70.00	1.00	1.00	100	49	Grey , fine grained, hard and compact , massive, limestone.	22.585	8.185	2.584	34.153	2.482	0.041	29.370	99.400
70.00	71.00	1.00	1.00	100		Grey , fine grained, hard and compact , massive, limestone.	22.585	8.185	2.584	34.153	2.482	0.041	29.370	99.400
71.00	72.00	1.00	1.00	100		Grey , fine grained, hard and compact , massive, limestone.	22.585	8.185	2.584	34.153	2.482	0.041	29.370	99.400
72.00	73.00	1.00	0.70	70	50	Grey , fine grained, hard and compact , massive, limestone.	25.862	9.435	2.580	32.396	1.641	0.061	27.410	99.385
73.00	74.00	1.00	0.80	80		Grey , fine grained, hard and compact , massive, limestone.	25.862	9.435	2.580	32.396	1.641	0.061	27.410	99.385
74.00	75.00	1.00	0.80	80		Grey , fine grained, hard and compact , massive, limestone.	25.862	9.435	2.580	32.396	1.641	0.061	27.410	99.385
75.00	76.00	1.00	0.80	80	51	Grey , fine grained, hard and compact , massive, limestone.	18.071	6.759	2.443	37.920	2.285	0.045	31.850	99.373
76.00	77.00	1.00	0.80	80		Grey , fine grained, hard and compact , massive, limestone.	18.071	6.759	2.443	37.920	2.285	0.045	31.850	99.373
77.00	78.00	1.00	0.80	80	52	Grey , fine grained, hard and compact , massive, limestone.	18.339	6.594	2.128	38.721	1.784	0.037	31.840	99.443
78.00	79.00	1.00	0.80	80		Grey , fine grained, hard and compact , massive, limestone.	18.339	6.594	2.128	38.721	1.784	0.037	31.840	99.443
			Borehole closed at the depth of 79.00 m											

S. No.-03						<u>BOREHOLE NO. ALD-03</u>	Total depth (in m) : 50 .00							
Reduced Level :261.549							Date of Starting: 17.01.2025							
Co-ordinates : 21° 37' 12.239" N 81° 54' 16.935" E							Date of Closing : 30.01.2025							
Drill No.- Cylex 19							ANALYTICAL RESULT IN %							
FROM	TO	RUN	CORE	RECO%	SAMPLE	LITHOLOGY	SiO ₂ %	Al ₂ O ₃ %	Fe ₂ O ₃ %	CaO%	MgO%	P ₂ O ₅ %	LOI	TOTAL
0.00	3.00	3.00	0.00	0		Brown, soft and loose soil.								
3.00	4.00	1.00	0.40	40		Pink, fine grained, hard and compact , shale.								
4.00	5.00	1.00	0.53	53	1	Pink purple, fine grained, hard and compact , shaly limestone.	13.819	6.774	1.691	42.796	0.388	0.009	33.94	99.417
5.00	6.00	1.00	0.55	55		Pink purple, fine grained, hard and compact , shaly limestone.	13.819	6.774	1.691	42.796	0.388	0.009	33.94	99.417
6.00	7.00	1.00	0.85	85	2	Purple, fine grained, hard and compact , massive , shaly limestone.	14.950	5.318	1.411	43.081	0.392	0.021	34.16	99.333
7.00	8.00	1.00	0.55	55	3	Greyish & pink , fine grained, hard and compact , massive , stromatolitic limestone.	17.815	6.071	1.616	41.064	0.475	0.040	32.45	99.531
8.00	9.00	1.00	0.60	60	4	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.832	5.702	1.484	43.782	0.240	0.043	34.51	99.593
9.00	10.00	1.00	0.65	65	5	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	6.384	3.797	0.837	49.500	0.172	0.006	38.60	99.296

10.00	11.00	1.00	0.70	70	6	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	6.570	4.761	0.826	48.446	0.229	0.006	38.33	99.168
11.00	12.00	1.00	0.70	70	7	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.077	3.001	0.991	46.667	0.243	0.021	36.48	99.480
12.00	13.00	1.00	0.70	70	8	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.567	5.252	1.176	47.079	0.260	0.009	37.01	99.353
13.00	14.00	1.00	1.00	100	9	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.400	3.995	1.442	44.533	0.613	0.030	35.34	99.353
14.00	15.00	1.00	1.00	100	10	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.979	2.993	1.212	46.249	0.378	0.015	36.47	99.296
15.00	16.00	1.00	1.00	100	11	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	14.347	3.155	1.436	44.653	0.442	0.018	35.30	99.351
16.00	17.00	1.00	1.00	100	12	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.556	2.923	1.113	46.386	0.531	0.015	36.82	99.344
17.00	18.00	1.00	1.00	100	13	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.683	5.212	1.333	44.841	0.482	0.006	35.68	99.237
18.00	19.00	1.00	1.00	100	14	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.681	6.260	1.517	43.298	0.475	0.012	34.45	99.693
19.00	20.00	1.00	1.00	100	15	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.024	3.965	1.233	45.417	0.632	0.015	36.17	99.456

20.00	21.00	1.00	1.00	100	16	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.751	4.852	1.152	45.748	0.599	0.012	36.49	99.604
21.00	22.00	1.00	1.00	100	17	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.100	4.173	0.912	47.863	0.553	0.012	37.70	99.313
22.00	23.00	1.00	1.00	100	18	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.091	5.221	1.243	44.042	0.729	0.018	35.10	99.444
23.00	24.00	1.00	1.00	100	19	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	7.177	3.735	0.812	48.894	0.282	trace	38.43	99.330
24.00	25.00	1.00	1.00	100	20	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.204	4.854	1.046	47.158	0.437	trace	37.46	99.159
25.00	26.00	1.00	1.00	100	21	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	7.297	4.142	1.040	48.359	0.257	trace	38.04	99.135
26.00	27.00	1.00	1.00	100	22	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	7.374	4.168	0.976	48.076	0.500	trace	38.07	99.164
27.00	28.00	1.00	1.00	100	23	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.228	4.478	0.995	47.519	0.439	trace	37.64	99.299
28.00	29.00	1.00	1.00	100	24	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.002	4.202	1.219	45.358	0.415	0.021	36.05	99.267
29.00	30.00	1.00	1.00	100	25	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	14.627	6.118	1.533	42.495	0.608	0.024	34.06	99.465

30.00	31.00	1.00	1.00	100	26	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.038	4.290	1.298	44.945	0.370	0.024	35.58	99.545
31.00	32.00	1.00	1.00	100	27	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.173	4.892	1.469	44.163	0.504	0.015	35.13	99.346
32.00	33.00	1.00	1.00	100	28	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.159	5.084	1.393	44.203	0.377	0.012	35.11	99.338
33.00	34.00	1.00	1.00	100	29	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.939	4.161	1.291	45.374	0.568	0.012	36.10	99.445
34.00	35.00	1.00	1.00	100	30	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.660	5.839	1.448	43.457	0.853	0.021	35.03	99.308
35.00	36.00	1.00	1.00	100	31	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.488	5.794	1.403	43.737	0.731	0.012	35.03	99.195
36.00	37.00	1.00	1.00	100	32	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.351	5.298	1.234	44.887	0.899	0.021	35.99	99.680
37.00	38.00	1.00	1.00	100	33	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.047	5.722	1.029	46.987	0.449	trace	37.09	99.324
38.00	39.00	1.00	1.00	100	34	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.472	3.336	0.861	48.124	0.493	trace	37.83	99.116
39.00	40.00	1.00	1.00	100	35	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.172	4.637	0.915	47.044	0.669	trace	37.69	99.127

40.00	41.00	1.00	1.00	100	36	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.319	5.475	1.206	43.809	1.424	0.027	36.09	99.350
41.00	42.00	1.00	1.00	100	37	Pink purple, fine grained, hard and compact , massive , stromatolitic dolomitic limestone.	9.926	5.241	1.196	43.939	2.305	trace	37.05	99.657
42.00	43.00	1.00	1.00	100	38	Pink purple, fine grained, hard and compact , massive , stromatolitic dolomitic limestone.	7.052	2.962	0.633	49.567	0.360	0.006	38.89	99.470
43.00	44.00	1.00	1.00	100	39	Pink purple, fine grained, hard and compact , massive , stromatolitic dolomitic limestone.	8.967	5.390	0.982	45.787	1.078	0.0G3	37.09	99.303
44.00	45.00	1.00	1.00	100	40	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	15.179	7.241	1.698	40.440	1.385	0.033	33.28	99.256
45.00	46.00	1.00	1.00	100	41	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.060	5.405	1.089	45.328	0.524	0.037	36.06	99.503
46.00	47.00	1.00	1.00	100	42	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	15.578	6.755	1.573	42.018	0.311	0.040	33.06	99.335
47.00	48.00	1.00	1.00	100	43	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	15.064	3.962	1.354	44.095	0.243	0.033	34.49	99.241
48.00	49.00	1.00	1.00	100	44	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	16.229	5.577	1.551	42.111	0.289	0.030	33.51	99.297
49.00	50.00	1.00	1.00	100	45	Pink purple, fine grained, hard and compact , massive , stromatolitic limestone.	18.664	9.795	1.950	38.078	0.461	0.024	30.43	99.402
Borehole closed at the depth of 50.00 m														

S. No.-04						<u>BOREHOLE NO. ALD-04</u>	Total depth (in m) : 50 .00m							
Reduced Level : 263.985							Date of Starting: 19.01.2025							
Co-ordinates : 21° 36' 46.522" N 81° 53' 21.127" E							Date of Closing : 06.02.2025							
Drill No.- Vol 180/06							ANALYTICAL RESULT IN %							
FROM	TO	RUN	CORE	RECO%	SAMPLE	LITHOLOGY	SiO ₂ %	Al ₂ O ₃ %	Fe ₂ O ₃ %	CaO %	MgO %	P ₂ O ₅ %	LOI	TOTAL
0.00	1.00	1.00	0.00	0		Brown, soft and loose soil.								
1.00	2.00	1.00	0.20	20	1	Pink / purple, fine grained, hard and compact , massive , stromatolitic doomitic limestone.								
2.00	3.00	1.00	0.80	80		Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.407	5.376	1.536	44.124	0.599	0.024	35.20	99.266
3.00	4.00	1.00	0.90	90	2	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.321	4.675	0.980	45.425	1.299	0.027	36.79	99.517

4.00	5.00	1.00	0.80	80	3	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.547	5.893	1.060	44.591	0.639	0.033	35.75	99.513
5.00	6.00	1.00	0.90	90	4	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.664	6.624	1.451	42.458	1.563	0.015	34.70	99.475
6.00	7.00	1.00	0.90	90	5	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.389	4.720	1.033	45.923	0.751	0.012	36.49	99.318
7.00	8.00	1.00	1.00	100	6	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.122	5.553	1.140	45.192	1.163	0.021	36.27	99.461
8.00	9.00	1.00	0.90	90	7	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.393	6.821	1.305	43.398	1.098	trace	35.29	99.305
9.00	10.00	1.00	0.80	80	8	Pink / purple, fine grained, hard and compact , massive , stromatolitic dolomitic limestone.	12.499	5.290	1.395	43.781	1.230	trace	35.27	99.465
10.00	11.00	1.00	0.90	90	9	Pink / purple, fine grained, hard and compact ,10cm LST+5 cm shale+70 cm LST+5 cm shale.	14.422	7.816	1.416	42.035	0.664	trace	33.24	99.593
11.00	12.00	1.00	0.80	80		Pink / purple, fine grained, hard and compact, shale.								

12.00	13.00	1.00	1.00	100	10	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.889	4.917	1.101	44.286	1.154	trace	35.99	99.337
13.00	14.00	1.00	0.90	90	11	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.795	5.372	0.971	45.202	1.288	trace	36.96	99.588
14.00	15.00	1.00	1.00	100	12	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.609	5.126	0.892	47.027	0.549	trace	37.28	99.483
15.00	16.00	1.00	0.90	90	13	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.746	6.569	1.425	43.156	0.754	trace	34.73	99.380
16.00	17.00	1.00	1.00	100	14	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	14.972	5.809	1.605	42.266	0.708	0.037	33.79	99.187
17.00	18.00	1.00	1.00	100	15	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	14.283	5.510	1.612	42.940	0.675	0.021	34.30	99.341
18.00	19.00	1.00	0.80	80	16	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.935	5.781	1.621	42.393	1.291	0.021	34.23	99.272

19.00	20.00	1.00	1.00	100	17	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.879	6.859	1.600	42.072	1.016	0.009	34.11	99.545
20.00	21.00	1.00	1.00	100	18	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.079	6.254	1.093	44.931	0.729	0.006	36.16	99.252
21.00	22.00	1.00	0.80	80	19	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.511	6.150	1.370	43.769	0.597	0.003	35.00	99.400
22.00	23.00	1.00	0.80	80	20	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.328	6.187	1.394	43.816	0.737	0.015	35.17	99.647
23.00	24.00	1.00	0.90	90	21	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.340	4.701	0.949	47.469	0.510	0.015	37.52	99.504
24.00	25.00	1.00	1.00	100	22	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.995	4.493	1.001	46.774	0.773	0.012	37.29	99.338
25.00	26.00	1.00	1.00	100	23	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	7.384	5.557	0.905	46.841	0.863	trace	37.61	99.160

26.00	27.00	1.00	1.00	100	24	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	7.568	5.275	0.939	46.962	0.917	trace	37.53	99.191
27.00	28.00	1.00	1.00	100	25	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	7.814	5.416	1.065	46.755	0.938	trace	37.33	99.318
28.00	29.00	1.00	1.00	100	26	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.334	5.180	1.123	46.337	0.588	trace	36.92	99.482
29.00	30.00	1.00	1.00	100	27	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.586	5.453	1.137	45.851	0.567	trace	36.52	99.114
30.00	31.00	1.00	0.80	80	28	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.859	5.558	1.039	45.961	0.841	trace	37.03	99.288
31.00	32.00	1.00	0.80	80	29	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.255	5.091	1.237	43.959	0.800	trace	34.99	99.332
32.00	33.00	1.00	0.80	80	30	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.666	4.645	1.055	46.113	0.856	0.00. 3	36.77	99.108

33.00	34.00	1.00	0.70	70	31	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.766	7.217	1.465	42.849	0.834	0.003	34.21	99.344
34.00	35.00	1.00	0.85	85	32	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.409	5.588	1.310	45.830	0.397	0.012	35.95	99.496
35.00	36.00	1.00	0.90	90	33	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.184	6.569	1.450	43.152	0.508	0.012	34.50	99.375
36.00	37.00	1.00	0.90	90	34	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.458	5.765	1.523	43.396	0.661	0.012	34.47	99.285
37.00	38.00	1.00	0.80	80	35	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.199	5.492	1.271	43.840	0.628	0.015	35.04	99.485
38.00	39.00	1.00	0.70	70	36	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.033	5.291	1.254	44.114	0.659	0.012	35.09	99.453
39.00	40.00	1.00	0.40	40	37	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.643	5.840	1.386	43.160	0.837	0.015	34.40	99.281

40.00	41.00	1.00	0.20	20		Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.643	5.840	1.386	43.160	0.837	0.015	34.40	99.281
41.00	42.00	1.00	0.30	30		Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.643	5.840	1.386	43.160	0.837	0.015	34.40	99.281
42.00	43.00	1.00	0.40	40	38	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.958	5.246	1.017	45.075	1.239	0.009	36.71	99.254
43.00	44.00	1.00	0.40	40		Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.958	5.246	1.017	45.075	1.239	0.009	36.71	99.254
44.00	45.00	1.00	0.30	30		Core dissolved.								
45.00	46.00	1.00	0.90	90	39	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.780	4.689	0.914	47.113	0.656	0.009	37.27	99.431
46.00	47.00	1.00	0.55	55	40	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.162	5.751	0.899	46.554	0.397	0.006	36.90	99.669
47.00	48.00	1.00	0.50	50	41	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.704	7.097	1.247	44.178	0.743	0.003	35.39	99.362

48.00	49.00	1.00	0.90	90	42	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	14.556	7.273	1.576	41.231	1.099	0.003	33.54	99.278
49.00	50.00	1.00	0.80	80	43	Pink / purple, fine grained, hard and compact , massive , stromatolitic limestone.	16.960	8.077	1.657	39.845	0.623	0.043	31.94	99.145
Borehole closed at the depth of 50.00 m														

S. No.-07						BOREHOLE NO. ALD-05	Total depth (in m) : 50 mtr							
Reduced Level : 263.886							Date of Starting: 07.01.2025							
Co-ordinates : 21° 36' 46.372" N 81° 53' 48.950" E							Date of Closing : 16.01.2025							
Drill No.- Vol 180/06							ANALYTICAL RESULT IN %							
FROM	TO	RUN	CORE	RECO%	SAMPLE	LITHOLOGY	SiO ₂ %	Al ₂ O ₃ %	Fe ₂ O ₃ %	CaO%	MgO%	P ₂ O ₅ %	LOI	TOTAL
0.00	1.00	1.00	0.00	0		Brown, soft and loose soil.								
1.00	3.00	2.00	0.00	0		Brown, soft and loose soil.								
3.00	4.00	1.00	0.00	0		Brown, soft and loose soil.								
4.00	5.00	1.00	0.10	10	1	Pink, fine grained, hard and compact , massive , stromatolitic limestone.	14.131	7.769	1.765	42.202	0.413	0.061	33.28	99.621
5.00	6.00	1.00	0.20	20		Pink, fine grained, hard and compact , massive , stromatolitic limestone.	14.131	7.769	1.765	42.202	0.413	0.061	33.28	99.621
6.00	7.00	1.00	1.00	100		Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	14.131	7.769	1.765	42.202	0.413	0.061	33.28	99.621
7.00	8.00	1.00	1.00	100	2	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.493	7.287	1.412	43.211	0.700	Traces	34.42	99.523
8.00	9.00	1.00	0.90	90	3	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.887	7.661	1.358	43.064	1.213	Traces	35.06	99.243
9.00	10.00	1.00	0.60	60	4	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.028	8.389	1.338	43.568	0.685	Traces	34.65	99.658
10.00	11.00	1.00	1.00	100	5	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.236	8.714	1.286	43.798	0.895	Traces	35.40	99.329
11.00	12.00	1.00	1.00	100	6	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	14.668	10.627	1.885	39.247	1.259	Traces	31.78	99.466
12.00	13.00	1.00	1.00	100	7	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	7.970	7.603	1.161	45.197	0.955	0.043	36.30	99.229
13.00	14.00	1.00	1.00	100	8	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.894	8.399	1.249	43.248	0.877	Traces	34.83	99.497

14.00	15.00	1.00	0.80	80	9	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.115	6.838	1.010	44.836	0.755	Traces	35.95	99.504
15.00	16.00	1.00	1.00	100	10	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.707	6.641	1.031	45.147	1.081	Traces	36.59	99.197
16.00	17.00	1.00	1.00	100	11	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.482	8.284	1.289	43.618	0.882	Traces	34.99	99.545
17.00	18.00	1.00	1.00	100	12	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.584	8.158	1.521	41.946	1.140	Traces	34.06	99.409
18.00	19.00	1.00	1.00	100	13	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.036	7.431	1.457	43.283	0.774	Traces	34.49	99.471
19.00	20.00	1.00	1.00	100	14	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.095	8.317	1.207	43.746	0.683	Traces	35.14	99.188
20.00	21.00	1.00	1.00	100	15	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.794	8.278	1.293	43.664	0.772	Traces	34.77	99.571
21.00	22.00	1.00	1.00	100	16	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.700	9.101	1.418	41.837	0.920	Traces	33.69	99.666
22.00	23.00	1.00	1.00	100	17	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	16.933	9.261	2.040	38.503	1.173	Traces	31.34	99.250
23.00	24.00	1.00	1.00	100	18	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.723	10.079	1.729	41.044	1.031	0.061	32.98	99.647
24.00	25.00	1.00	1.00	100	19	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.385	7.397	1.597	43.363	0.808	Traces	34.83	99.380
25.00	26.00	1.00	1.00	100	20	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.734	10.524	1.774	40.628	0.855	0.061	32.97	99.546
26.00	27.00	1.00	1.00	100	21	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.957	8.843	1.420	42.390	1.136	Traces	34.56	99.306
27.00	28.00	1.00	1.00	100	22	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.483	8.497	1.443	41.365	1.963	Traces	34.60	99.351

28.00	29.00	1.00	1.00	100	23	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	18.172	12.586	2.209	35.803	1.251	Traces	29.41	99.431
29.00	30.00	1.00	1.00	100	24	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.765	9.440	1.528	41.746	1.166	Traces	33.93	99.575
30.00	31.00	1.00	1.00	100	25	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	7.903	7.345	0.964	45.746	0.809	Traces	36.58	99.347
31.00	32.00	1.00	1.00	100	26	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	7.254	7.737	0.861	46.706	0.359	Traces	36.62	99.537
32.00	33.00	1.00	1.00	100	27	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	19.738	11.058	2.110	36.018	1.128	Traces	29.40	99.452
33.00	34.00	1.00	1.00	100	28	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	8.436	7.106	1.070	44.521	1.699	Traces	36.70	99.532
34.00	35.00	1.00	1.00	100	29	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	8.316	7.343	1.101	44.377	1.803	Traces	36.71	99.650
35.00	36.00	1.00	1.00	100	30	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	6.750	6.753	0.829	46.750	0.755	Traces	37.45	99.287
36.00	37.00	1.00	1.00	100	31	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	8.242	7.122	0.999	45.558	0.751	Traces	36.48	99.152
37.00	38.00	1.00	0.80	80	32	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	12.092	8.669	1.554	41.397	1.428	0.061	33.99	99.191
38.00	39.00	1.00	0.90	90	33	Purple , fine grained, hard and compact , massive , stromatolitic limestone.	12.475	8.923	1.526	42.204	0.565	Traces	33.70	99.393
39.00	40.00	1.00	1.00	100	34	Greyish purple , fine grained, hard and compact, massive, stromatolitic limestone.	13.190	9.081	1.621	41.958	0.401	0.061	33.09	99.402
40.00	41.00	1.00	1.00	100	35	Grey , fine grained, hard and compact , massive, limestone.	15.834	10.484	1.838	39.301	0.486	0.065	31.28	99.288
41.00	42.00	1.00	1.00	100	36	Grey , fine grained, hard and compact , massive, limestone.	18.829	9.694	1.913	38.030	0.487	0.065	30.40	99.418

42.00	43.00	1.00	0.80	80	37	Grey , fine grained, hard and compact , massive, limestone.	18.569	9.176	1.855	38.547	0.553	0.065	30.83	99.595
43.00	44.00	1.00	0.80	80	38	Grey , fine grained, hard and compact , massive, limestone.	19.160	9.344	1.925	37.780	0.712	0.065	30.41	99.396
44.00	45.00	1.00	1.00	100	39	Grey , fine grained, hard and compact , massive, limestone.	19.809	8.835	1.963	37.534	1.027	0.065	30.28	99.513
45.00	46.00	1.00	1.00	100	40	Grey , fine grained, hard and compact , massive, dolomitic limestone.	21.017	10.045	2.192	35.501	1.454	Traces	29.29	99.499
46.00	47.00	1.00	1.00	100	41	Grey , fine grained, hard and compact , massive, dolomitic limestone.	19.765	8.393	2.263	35.139	3.111	Traces	30.71	99.381
47.00	48.00	1.00	1.00	100	42	Grey , fine grained, hard and compact , massive, limestone.	21.428	9.874	2.076	35.897	0.792	Traces	29.10	99.167
48.00	49.00	1.00	1.00	100	43	Grey , fine grained, hard and compact , massive, limestone.	21.731	8.644	2.030	36.847	0.564	Traces	29.30	99.116
49.00	50.00	1.00	0.90	90	44	Grey , fine grained, hard and compact , massive, limestone.	21.322	8.206	1.849	37.635	0.425	Traces	29.95	99.387
					Borehole closed at the depth of 50.00 m									

S. No.-06						<u>BOREHOLE NO. ALD-06</u>	Total depth (in m) : 50 .00m							
Reduced Level : 266.740							Date of Starting: 11.01.2025							
Co-ordinates : 21° 36' 46.221" N 81° 54' 16.773" E							Date of Closing : 23.01.2025							
Drill No.- Cylex 17							ANALYTICAL RESULT IN %							
FROM	TO	RUN	CORE	RECO%	SAMPLE	LITHOLOGY	SiO ₂ %	Al ₂ O ₃ %	Fe ₂ O ₃ %	CaO %	MgO %	P ₂ O ₅ %	LOI	TOTAL
0.00	5.70	5.70	0.00	0		Brown, soft and loose soil.								
5.70	6.00	0.30	0.30	100	1	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	14.367	6.113	1.843	43.206	0.088	0.046	33.77	99.433
6.00	7.00	1.00	0.25	25		Purple, fine grained, hard and compact , massive , stromatolitic limestone.	14.367	6.113	1.843	43.206	0.088	0.046	33.77	99.433
7.00	8.00	1.00	0.20	20		Purple, fine grained, hard and compact , massive , stromatolitic limestone.	14.367	6.113	1.843	43.206	0.088	0.046	33.77	99.433
8.00	9.00	1.00	0.30	30		Purple, fine grained, hard and compact , massive , stromatolitic limestone.	14.367	6.113	1.843	43.206	0.088	0.046	33.77	99.433
9.00	10.00	1.00	0.10	10	2	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	7.209	1.759	0.576	50.077	0.088	0.099	39.47	99.278
10.00	11.00	1.00	0.50	50		Grey, fine grained, hard and compact , massive , stromatolitic limestone.	7.209	1.759	0.576	50.077	0.088	0.099	39.47	99.278

11.00	12.00	1.00	0.50	50	3	Greyish pink, fine grained, hard and compact , massive , stromatolitic limestone.	4.870	2.464	0.573	51.158	0.160	0.003	40.08	99.308
12.00	13.00	1.00	0.60	60		Greyish pink, fine grained, hard and compact , massive , stromatolitic limestone.	4.870	2.464	0.573	51.158	0.160	0.003	40.08	99.308
13.00	14.00	1.00	1.00	100	4	Greyish pink, fine grained, hard and compact , massive , stromatolitic limestone.	4.835	2.464	0.536	51.135	0.228	0.003	40.03	99.231
14.00	15.00	1.00	0.90	90	5	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	5.088	3.597	0.733	50.185	0.267	0.006	39.40	99.276
15.00	16.00	1.00	1.00	100	6	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	7.826	3.979	1.029	48.213	0.304	0.006	38.13	99.487
16.00	17.00	1.00	1.00	100	7	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	4.310	3.374	0.548	50.838	0.206	trace	39.97	99.246
17.00	18.00	1.00	1.00	100	8	Purple, fine grained, hard and compact , massive , stromatolitic limestone. Calcite crystal	4.229	3.222	0.521	51.031	0.160	trace	39.96	99.123
18.00	19.00	1.00	1.00	100	9	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	7.150	3.465	0.721	49.116	0.344	trace	38.67	99.466
19.00	20.00	1.00	1.00	100	10	Greyish Purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.027	3.532	0.649	48.927	0.145	trace	38.18	99.460
20.00	21.00	1.00	1.00	100	11	Greyish Purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.496	4.548	0.953	46.447	0.230	trace	36.68	99.354

21.00	22.00	1.00	1.00	100	12	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.179	5.248	1.196	44.994	0.215	trace	35.60	99.432
22.00	23.00	1.00	1.00	100	13	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.479	4.588	1.174	46.814	0.164	0.021	36.93	99.170
23.00	24.00	1.00	1.00	100	14	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.346	3.334	0.912	48.621	0.152	0.009	37.96	99.334
24.00	25.00	1.00	1.00	100	15	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.811	5.366	1.240	44.980	0.319	0.021	35.64	99.377
25.00	26.00	1.00	1.00	100	16	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.446	5.077	1.245	45.267	0.478	0.024	35.89	99.427
26.00	27.00	1.00	1.00	100	17	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.853	5.238	1.080	45.643	0.528	0.015	36.29	99.647
27.00	28.00	1.00	1.00	100	18	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.715	5.096	1.172	45.830	0.268	0.015	36.20	99.296
28.00	29.00	1.00	1.00	100	19	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.886	3.498	0.872	47.779	0.285	0.003	37.77	99.093
29.00	30.00	1.00	1.00	100	20	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.573	3.429	0.801	47.787	0.631	0.003	38.12	99.344
30.00	31.00	1.00	1.00	100	21	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	7.218	4.357	0.833	47.992	0.664	trace	38.45	99.514

31.00	32.00	1.00	1.00	100	22	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.200	3.426	0.863	47.999	0.772	trace	38.23	99.490
32.00	33.00	1.00	1.00	100	23	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	6.406	3.441	0.744	49.303	0.427	trace	38.98	99.301
33.00	34.00	1.00	1.00	100	24	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	6.454	3.573	0.697	49.425	0.180	trace	38.97	99.299
34.00	35.00	1.00	1.00	100	25	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	6.908	4.437	0.883	47.804	0.899	trace	38.38	99.311
35.00	36.00	1.00	1.00	100	26	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.447	4.866	0.919	47.377	0.311	trace	37.36	99.280
36.00	37.00	1.00	1.00	100	27	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.687	5.898	1.247	44.775	0.447	trace	35.52	99.574
37.00	38.00	1.00	1.00	100	28	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.262	6.014	1.403	43.540	0.481	0.012	34.62	99.332
38.00	39.00	1.00	1.00	100	29	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	17.325	8.879	1.830	39.723	0.315	0.015	31.14	99.227
39.00	40.00	1.00	1.00	100	30	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	15.062	7.908	1.645	41.579	0.272	0.018	32.94	99.424
40.00	41.00	1.00	1.00	100	31	Greyish purple , fine grained, hard and compact , massive , stromatolitic limestone.	18.672	7.567	1.817	39.544	0.330	0.027	31.37	99.327

41.00	42.00	1.00	1.00	100	32	Grey, fine grained, hard and compact , massive , stromatolitic limestone.	18.062	7.937	1.796	39.616	0.376	0.024	31.52	99.331
42.00	43.00	1.00	1.00	100	33	Grey, fine grained, hard and compact , massive , stromatolitic limestone.	19.528	9.088	1.918	38.031	0.406	0.027	30.27	99.268
43.00	44.00	1.00	1.00	100	34	Grey , fine grained, hard and compact , massive, limestone.	18.655	7.666	1.910	38.579	1.034	0.024	31.63	99.498
44.00	45.00	1.00	1.00	100	35	Grey , fine grained, hard and compact , massive, limestone.	22.638	8.601	2.095	35.834	1.014	0.015	29.21	99.407
45.00	46.00	1.00	1.00	100	36	Grey , fine grained, hard and compact , massive, limestone.	19.092	8.495	2.071	36.892	1.915	0.015	31.13	99.610
46.00	47.00	1.00	0.80	80	37	Grey , fine grained, hard and compact , massive, limestone.	22.065	9.706	2.179	33.779	2.641	0.012	29.13	99.512
47.00	48.00	1.00	1.00	100	38	Grey , fine grained, hard and compact , massive, limestone.	23.375	10.234	2.171	33.206	1.902	0.040	28.39	99.318
48.00	49.00	1.00	1.00	100	39	Grey , fine grained, hard and compact , massive, dolomitic limestone.	21.019	8.856	2.202	34.463	2.542	0.021	30.04	99.143
49.00	50.00	1.00	0.60	60	40	Grey , fine grained, hard and compact , massive, dolomitic limestone.	25.007	9.469	1.997	33.103	1.786	0.030	28.07	99.462
						Borehole closed at the depth of 50.00 m								

S.No.-07						BOREHOLE No. ALD-09	Total depth (in m) : 50 .00M							
Reduced Level : 268.175							Date of Starting : 13.12.2024							
Co-ordinates : 21° 36' 20.204" N 81° 54' 16.611" E							Date of Closing : 23.12.2024							
Drill No.-06/VOLTAS 180							ANALYTICAL RESULT IN %							
FROM (m)	TO (m)	RUN (m)	CORE THICKNESS	RECO. %	SAMPLE NO.	LITHOLOGY	SiO ₂ %	Al ₂ O ₃ %	Fe ₂ O ₃ %	CaO %	MgO %	P ₂ O ₅ %	LOI %	TOTAL
0.00	3.00	3.00	0.00	0		Lateritic soil, brownish red coloured soft and loose soil								
3.00	6.00	3.00	0.00	0		Lateritic soil, brownish red coloured soft and loose soil								
6.00	9.00	3.00	0.00	0		Lateritic soil, brownish red coloured soft and loose soil								
9.00	12.00	3.00	0.00	0		Lateritic soil, brownish red coloured soft and loose soil								
12.00	12.50	0.50	0.00	0		Lateritic soil, brownish red coloured soft and loose soil								
12.50	13.50	1.00	0.00	0		Lateritic soil, brownish red coloured soft and loose soil								
13.50	14.50	1.00	0.40	40	1	purple, fine grained, hard and compact , stromatolitic limestone.	14.78	5.72	2.10	41.49	1.29	0.067	33.76	99.207
14.50	15.50	1.00	0.80	80		purple, fine grained, hard and compact , stromatolitic limestone.	14.78	5.72	2.10	41.49	1.29	0.067	33.76	99.207
15.50	16.50	1.00	0.80	80	2	purple, fine grained, hard and compact , stromatolitic limestone.	13.34	4.86	1.70	43.96	0.48	Traces	34.88	99.220
16.50	17.50	1.00	0.80	80	3	purple, fine grained, hard and compact , stromatolitic limestone.	14.80	4.94	1.70	41.94	1.45	0.030	34.29	99.150
17.50	18.50	1.00	0.90	90	4	purple, fine grained, hard and compact , stromatolitic limestone.	12.38	4.88	1.40	43.51	1.45	0.030	35.49	99.140

18.50	19.50	1.00	1.00	100	5	purple, fine grained, hard and compact , stromatolitic limestone.	10.88	4.62	1.50	44.41	1.61	0.024	36.37	99.414
19.50	20.50	1.00	1.00	100	6	purple, fine grained, hard and compact , stromatolitic limestone.	9.86	3.90	1.10	46.43	0.80	Traces	37.17	99.260
20.50	21.50	1.00	1.00	100	7	purple, fine grained, hard and compact , stromatolitic limestone.	9.32	3.90	0.90	47.10	0.64	Traces	37.52	99.380
21.50	22.00	0.50	0.50	100	8	purple, fine grained, hard and compact , stromatolitic limestone.	9.86	4.12	1.40	46.43	0.64	Traces	36.98	99.430
22.00	23.00	1.00	1.00	100	9	purple, fine grained, hard and compact , stromatolitic limestone.	9.96	3.90	1.20	46.20	0.96	Traces	37.02	99.240
23.00	24.00	1.00	1.00	100	10	purple, fine grained, hard and compact , stromatolitic limestone.	9.54	4.16	1.10	45.76	1.45	0.030	37.23	99.270
24.00	25.00	1.00	1.00	100	11	purple, fine grained, hard and compact , stromatolitic limestone.	12.34	5.34	1.00	43.74	1.29	0.071	35.51	99.291
25.00	26.00	1.00	1.00	100	12	purple, fine grained, hard and compact , stromatolitic limestone.	13.64	5.68	1.80	41.49	2.09	0.071	34.71	99.481
26.00	27.00	1.00	1.00	100	13	purple, fine grained, hard and compact , stromatolitic limestone.	16.36	6.86	1.90	39.70	1.77	0.021	32.85	99.461
27.00	28.00	1.00	0.80	80	14	purple, fine grained, hard and compact , stromatolitic limestone.	17.58	7.36	1.90	39.48	1.12	0.021	32.07	99.531
28.00	29.00	1.00	1.00	100	15	purple, fine grained, hard and compact , stromatolitic limestone.	17.76	7.72	1.90	39.48	0.80	0.037	31.74	99.437
29.00	30.00	1.00	1.00	100	16	Greyish , fine grained, hard and compact , massive , limestone.	18.32	10.32	2.9	36.33	1.61	0.037	30.14	99.657
30.00	31.00	1.00	1.00	100	17	Greyish , fine grained, hard and compact , massive , limestone.	19.82	9.48	2.80	35.66	1.93	0.043	29.93	99.663
31.00	32.00	1.00	1.00	100	18	Greyish , fine grained, hard and compact , massive , limestone.	17.92	8.94	2.70	37.23	1.77	Traces	30.92	99.480
32.00	33.00	1.00	1.00	100	19	Greyish , fine grained, hard and compact , massive , limestone.	20.74	10.74	2.80	34.54	1.77	0.037	28.76	99.387

33.00	34.00	1.00	1.00	100	20	Greyish , fine grained, hard and compact , massive , limestone.	19.56	9.44	3.00	36.33	1.45	0.043	29.83	99.653
34.00	35.00	1.00	1.00	100	21	Greyish , fine grained, hard and compact , massive , limestone.	19.80	10.94	2.90	34.76	1.93	0.043	29.15	99.523
35.00	36.00	1.00	1.00	100	22	Greyish , fine grained, hard and compact , massive , limestone.	18.00	9.24	2.70	37.46	1.45	0.033	30.70	99.583
36.00	37.00	1.00	1.00	100	23	Greyish , fine grained, hard and compact , massive , limestone.	18.64	10.54	2.80	35.66	1.93	0.033	29.95	99.553
37.00	38.00	1.00	1.00	100	24	Greyish , fine grained, hard and compact , massive , limestone.	18.16	13.08	2.70	35.44	1.29	0.043	28.93	99.643
38.00	39.00	1.00	1.00	100	25	Greyish , fine grained, hard and compact , massive , limestone.	18.40	11.18	2.80	36.56	1.12	0.046	29.66	99.766
39.00	40.00	1.00	1.00	100	26	Greyish , fine grained, hard and compact , massive , limestone.	22.46	12.01	3.00	32.52	1.93	0.049	27.41	99.379
40.00	41.00	1.00	1.00	100	27	Greyish , fine grained, hard and compact , massive , limestone.	22.88	13.46	3.10	32.52	0.96	Traces	26.31	99.230
41.00	42.00	1.00	1.00	100	28	Purple greyish , fine grained, hard and compact , massive , stromatolitic limestone.	22.80	12.60	3.20	33.19	0.96	0.027	26.86	99.637
42.00	43.00	1.00	1.00	100	29	Greyish , fine grained, hard and compact , limestone.	22.56	13.40	3.00	32.30	1.29	0.021	26.93	99.501
43.00	44.00	1.00	1.00	100	30	Greyish , fine grained, hard and compact , limestone with intercalation of shale.	23.74	15.32	3.40	30.05	1.77	0.018	25.27	99.568
44.00	45.00	1.00	1.00	100	31	Greyish , fine grained, hard and compact , limestone with intercalation of shale.	31.38	9.54	3.90	29.16	0.96	0.015	24.53	99.485
45.00	46.00	1.00	1.00	100		Greyish , fine grained, hard and compact , shale.								
46.00	47.00	1.00	1.00	100		Greyish , fine grained, hard and compact , shale.								
47.00	48.00	1.00	1.00	100		Greyish , fine grained, hard and compact , shale.								

48.00	49.00	1.00	1.00	100		Pinkish , fine grained, hard and compact , shale.								
49.00	50.00	1.00	1.00	100	32	Greyish pink, fine grained, hard and compact , shaly limestone.	13.18	5.44	1.60	43.51	0.96	0.024	34.68	99.394
Borehole closed at the depth of 50.00 m														

S.No.-08						BOREHOLE No. ALD-10	Total depth (in m) : 51 .00 m							
Reduced Level : 275.094							Date of Starting : 28.11.2024							
Co-ordinates : 21° 36' 20.052" N 81° 54' 44.433" E							Date of Closing : 10.12.2024							
Drill No.-06							ANALYTICAL RESULT IN %							
FROM (m)	TO (m)	RUN (m)	CORE THICKNESS	RECO. %	SAMPLE NO.	LITHOLOGY	SiO ₂ %	Al ₂ O ₃ %	Fe ₂ O ₃ %	CaO %	MgO %	P ₂ O ₅ %	LOI %	TOTAL
0.00	9.00	9.00	0.00	0		Brownish red coloured soft and loose,Lateritic soil,								
9.00	10.00	1.00	0.77	77	1	purple, fine grained, hard and compact , massive, stromatolitic limestone.	11.26	4.24	1.80	43.06	2.58	0.027	36.50	99.467
10.00	11.00	1.00	0.90	90	2	purple, fine grained, hard and compact , massive, stromatolitic limestone.	12.20	5.16	1.90	42.17	2.41	0.015	35.53	99.385
11.00	12.00	1.00	1.00	100	3	purple, fine grained, hard and compact , massive, stromatolitic limestone.	11.26	4.56	1.70	42.39	3.06	Traces	36.42	99.390
12.00	13.00	1.00	1.00	100	4	purple, fine grained, hard and compact , massive, stromatolitic limestone.	11.76	5.04	1.80	41.05	3.70	0.012	36.09	99.452
13.00	14.00	1.00	1.00	100	5	purple, fine grained, hard and compact , massive, stromatolitic limestone.	9.68	3.70	1.00	45.53	1.93	0.009	37.64	99.489
14.00	15.00	1.00	1.00	100	6	purple, fine grained, hard and compact , massive, stromatolitic limestone.	10.50	3.94	1.40	44.86	1.77	0.012	36.99	99.472
15.00	16.00	1.00	1.00	100	7	purple, fine grained, hard and compact , massive, stromatolitic limestone.	8.84	3.18	1.40	45.76	2.09	Traces	38.06	99.330
16.00	17.00	1.00	1.00	100	8	purple, fine grained, hard and compact , massive, stromatolitic limestone.	6.26	2.80	1.00	47.70	2.09	0.006	39.50	99.356
17.00	18.00	1.00	1.00	100	9	purple, fine grained, hard and compact , massive, stromatolitic limestone.	4.02	2.08	0.80	50.92	0.96	0.009	40.72	99.509

18.00	19.00	1.00	1.00	100	10	purple, fine grained, hard and compact , massive, stromatolitic limestone.	5.36	2.54	0.80	49.35	1.29	0.003	39.89	99.233
19.00	20.00	1.00	1.00	100	11	purple, fine grained, hard and compact , massive, stromatolitic limestone.	5.08	2.88	0.20	49.79	1.12	0.018	40.13	99.218
20.00	21.00	1.00	1.00	100	12	purple, fine grained, hard and compact , massive, stromatolitic limestone.	5.88	2.28	1.00	50.24	0.32	0.012	39.62	99.352
21.00	22.00	1.00	0.90	90	13	purple, fine grained, hard and compact , massive, stromatolitic limestone.	7.74	2.72	1.20	48.00	1.12	0.006	38.64	99.426
22.00	23.00	1.00	1.00	100	14	purple, fine grained, hard and compact , massive, stromatolitic limestone. (14 cm greyish shale)	7.64	3.32	1.10	47.70	1.12	0.012	38.53	99.422
23.00	24.00	1.00	1.00	100	15	purple, fine grained, hard and compact , massive, limestone.	6.20	2.52	0.50	48.22	2.09	0.012	39.93	99.472
24.00	25.00	1.00	1.00	100	16	purple, fine grained, hard and compact , massive, limestone.	5.12	2.52	0.50	49.35	1.77	0.003	40.37	99.633
25.00	26.00	1.00	1.00	100	17	purple, fine grained, hard and compact , massive, limestone.	6.70	3.48	1.00	46.65	2.41	Traces	39.13	99.370
26.00	27.00	1.00	1.00	100	18	purple, fine grained, hard and compact , massive, limestone.	8.58	4.02	1.10	45.76	2.09	0.012	37.92	99.482
27.00	28.00	1.00	1.00	100	19	purple, fine grained, hard and compact , massive, limestone.	5.56	3.18	0.90	48.45	1.77	0.015	39.69	99.565
28.00	29.00	1.00	1.00	100	20	purple, fine grained, hard and compact , massive, limestone.	6.10	3.12	1.00	48.90	1.12	0.009	39.29	99.539
29.00	30.00	1.00	1.00	100	21	purple, fine grained, hard and compact , massive, limestone.	6.26	3.42	1.00	45.98	3.38	0.009	39.52	99.569
30.00	31.00	1.00	1.00	100	22	Greyish purple , fine grained, hard and compact , massive , limestone.	11.18	5.14	1.70	43.74	1.77	0.027	36.01	99.567
31.00	32.00	1.00	1.00	100	23	purple, fine grained, hard and compact , massive, limestone.	11.86	5.83	2.10	42.62	1.93	0.024	35.30	99.664

32.00	33.00	1.00	1.00	100	24	purple, fine grained, hard and compact , massive, limestone.	11.82	5.90	1.80	41.94	2.58	0.037	35.47	99.547
33.00	34.00	1.00	1.00	100	25	purple, fine grained, hard and compact , massive, limestone.	14.56	7.28	2.00	39.48	2.58	0.043	33.66	99.603
34.00	35.00	1.00	1.00	100	26	purple, fine grained, hard and compact , massive, limestone.	13.12	6.26	2.00	41.49	2.09	0.037	34.57	99.567
35.00	36.00	1.00	1.00	100	27	purple, fine grained, hard and compact , massive, limestone.	12.84	5.50	2.00	41.05	2.90	0.037	35.25	99.577
36.00	37.00	1.00	1.00	100	28	purple, fine grained, hard and compact , massive, limestone.	11.58	5.68	1.70	43.06	1.93	0.012	35.65	99.612
37.00	38.00	1.00	1.00	100	29	purple, fine grained, hard and compact , massive, limestone.	10.54	5.12	1.60	45.08	0.96	0.024	36.18	99.504
38.00	39.00	1.00	1.00	100	30	purple, fine grained, hard and compact , massive, limestone.	11.10	6.10	1.20	42.39	2.74	0.024	36.01	99.564
39.00	40.00	1.00	1.00	100	31	purple, fine grained, hard and compact , massive, limestone.	16.14	5.30	1.90	41.27	1.45	0.030	33.48	99.570
40.00	41.00	1.00	1.00	100	32	purple, fine grained, hard and compact , massive, stromatolitic limestone.	14.68	5.66	1.90	43.06	1.12	0.030	33.08	99.530
41.00	42.00	1.00	1.00	100	33	purple, fine grained, hard and compact , massive, stromatolitic limestone.	12.20	5.34	2.00	44.19	0.48	0.033	35.34	99.583
42.00	43.00	1.00	1.00	100	34	purple, fine grained, hard and compact , massive, stromatolitic limestone.	18.00	6.92	1.90	38.58	1.77	0.037	32.40	99.607
43.00	44.00	1.00	1.00	100	35	purple, fine grained, hard and compact , massive, stromatolitic limestone.	15.98	6.00	1.90	41.49	0.96	0.043	33.23	99.603
44.00	45.00	1.00	1.00	100	36	Greyish purple, fine grained, hard and compact , massive, limestone.	15.64	5.64	1.80	42.17	0.80	0.037	33.46	99.547
45.00	46.00	1.00	1.00	100	37	Greyish purple, fine grained, hard and compact , massive, limestone.	18.86	6.90	2.00	38.80	0.96	0.043	31.95	99.513
46.00	47.00	1.00	1.00	100	38	Greyish purple, fine grained, hard and compact , massive, limestone.	20.00	7.66	2.30	38.35	0.80	Traces	30.43	99.540

47.00	48.00	1.00	1.00	100	39	Greyish purple, fine grained, hard and compact , massive, limestone.	22.68	8.46	2.40	35.89	0.64	0.049	29.18	99.299
48.00	49.00	1.00	1.00	100	40	Greyish purple, fine grained, hard and compact , massive, limestone.	24.36	8.94	2.70	34.78	0.64	0.049	27.98	99.449
49.00	50.00	1.00	1.00	100	41	Greyish purple, fine grained, hard and compact , massive, limestone.	22.00	9.06	2.70	34.99	0.96	0.037	29.70	99.447
50.00	51.00	1.00	0.90	90	42	Greyish purple, fine grained, hard and compact , massive, limestone.	26.40	9.12	2.80	33.87	0.64	0.043	26.76	99.633
Borehole closed at the depth of 50.00 m														

S.No.-09						BOREHOLE No. ALD-12	Total depth (in m) : 50.00 M							
Reduced Level : 269.960							Date of Starting : 16.12.2024							
Co-ordinates : 21° 35' 54.186" N 81° 54' 16.450" E							Date of Closing : 04.01.2025							
Drill No.-Vol 180/6							ANALYTICAL RESULT IN %							
FROM (m)	TO (m)	RUN (m)	CORE THICKNESS	RECO. %	SAMPLE NO.	LITHOLOGY	SiO ₂ %	Al ₂ O ₃ %	Fe ₂ O ₃ %	CaO %	MgO %	P ₂ O ₅ %	LOI %	TOTAL
0.00	3.00	3.00	0.00	0		Brownish, red,soft and loose soil.								
3.00	4.00	1.00	0.80	80	1	Pinkish purple, fine grained, hard and compact , massive , stromatolitic dolomitic limestone.	7.96	2.66	1.60	34.34	12.58	0.012	40.23	99.384
4.00	5.00	1.00	0.90	90	2	Pinkish purple, fine grained, hard and compact , massive , stromatolitic dolomitic limestone.	10.14	5.02	1.80	28.71	15.00	0.012	38.89	99.572
5.00	6.00	1.00	0.90	90	3	Pinkish purple, fine grained, hard and compact , massive , stromatolitic dolomitic limestone.	11.60	5.00	1.80	28.71	14.19	0.015	38.15	99.465
6.00	7.00	1.00	1.00	100	4	Pinkish purple, fine grained, hard and compact , massive , stromatolitic dolomitic limestone.	11.36	5.20	2.00	30.73	13.71	0.030	36.25	99.280
7.00	8.00	1.00	1.00	100	5	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.16	4.90	1.90	31.65	12.26	0.012	37.66	99.544
8.00	9.00	1.00	1.00	100	6	Pinkish purple, fine grained, hard and compact , massive , stromatolitic dolomitic limestone.	13.70	5.76	2.20	36.11	7.09	0.037	34.56	99.457
9.00	10.00	1.00	1.00	100	7	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.14	4.62	1.80	36.11	6.93	0.033	36.92	99.553
10.00	11.00	1.00	1.00	100	8	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.96	4.40	2.00	42.39	2.58	0.037	35.20	99.567
11.00	12.00	1.00	1.00	100	9	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.24	4.12	2.00	45.08	0.32	0.018	35.80	99.578

12.00	13.00	1.00	1.00	100	10	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.00	2.28	1.70	36.33	10.97	Traces	40.18	99.460
13.00	14.00	1.00	1.00	100	11	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	14.22	5.54	1.90	38.58	4.52	0.021	34.80	99.581
14.00	15.00	1.00	1.00	100	12	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.80	4.58	1.90	37.23	7.74	0.021	36.98	99.251
15.00	16.00	1.00	1.00	100	13	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.30	4.10	1.90	39.92	5.48	0.024	36.89	99.614
16.00	17.00	1.00	1.00	100	14	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.84	4.42	1.30	40.60	5.32	0.018	37.88	99.378
17.00	18.00	1.00	1.00	100	15	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.74	6.00	2.00	43.74	0.64	0.024	34.41	99.554
18.00	19.00	1.00	1.00	100	16	Pinkish purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.12	2.68	1.50	34.09	14.52	0.009	38.64	99.559
19.00	20.00	1.00	1.00	100	17	Purple, fine grained, hard and compact , massive , stromatolitic dolomitic limestone.	13.10	5.22	1.90	41.05	3.23	0.021	35.06	99.581
20.00	21.00	1.00	1.00	100	18	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.20	2.92	1.40	39.03	7.74	0.012	38.32	99.622
21.00	22.00	1.00	1.00	100	19	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.04	4.88	1.60	38.35	6.45	0.012	37.90	99.232
22.00	23.00	1.00	1.00	100	20	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.10	4.34	1.30	45.76	0.64	0.150	37.45	99.740
23.00	24.00	1.00	1.00	100	21	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	22.44	8.58	2.50	35.89	0.96	Traces	28.97	99.340
24.00	25.00	1.00	1.00	100	22	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.84	5.64	1.70	42.17	1.93	0.021	35.32	99.621
25.00	26.00	1.00	1.00	100	23	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.60	8.48	2.00	41.72	1.61	0.024	34.23	99.664

26.00	27.00	1.00	1.00	100	24	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.02	1.78	2.50	42.84	3.22	0.015	36.90	99.275
27.00	28.00	1.00	1.00	100	25	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	15.56	6.34	2.50	40.37	1.61	0.024	33.04	99.444
28.00	29.00	1.00	1.00	100	26	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	17.92	8.42	2.50	38.35	1.12	0.030	31.22	99.560
29.00	30.00	1.00	1.00	100	27	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	18.04	6.84	1.90	39.70	0.96	0.033	31.91	99.383
30.00	31.00	1.00	1.00	100	28	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	16.28	9.40	2.60	37.01	2.58	0.037	31.57	99.477
31.00	32.00	1.00	1.00	100	29	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	19.92	6.44	2.30	39.48	0.80	Traces	30.57	99.510
32.00	33.00	1.00	1.00	100	30	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	18.62	9.38	2.70	35.66	2.41	0.037	30.50	99.307
33.00	34.00	1.00	1.00	100	31	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.68	6.24	2.00	43.29	2.58	0.027	36.61	99.427
34.00	35.00	1.00	1.00	100	32	Greyish purple , fine grained, hard and compact , massive , stromatolitic limestone.	19.48	10.13	2.00	37.46	0.64	0.027	29.89	99.627
35.00	36.00	1.00	1.00	100	33	Light purple , fine grained, hard and compact , massive , stromatolitic limestone.	24.00	8.36	2.00	35.66	0.96	0.021	28.44	99.441
36.00	37.00	1.00	1.00	100	34	Greyish purple , fine grained, hard and compact , massive , stromatolitic limestone.	20.64	8.04	2.20	37.46	0.80	0.037	30.23	99.407
37.00	38.00	1.00	1.00	100	35	Greyish purple , fine grained, hard and compact , massive , stromatolitic limestone.	21.58	8.24	2.00	36.78	0.96	0.037	29.88	99.477
38.00	39.00	1.00	1.00	100	36	Greyish purple , fine grained, hard and compact , massive , stromatolitic limestone.	14.54	4.72	1.60	40.37	3.55	0.024	34.68	99.484
39.00	40.00	1.00	1.00	100	37	Greyish purple , fine grained, hard and compact , massive , stromatolitic limestone.	20.14	7.26	2.00	36.78	2.41	0.027	30.92	99.537

40.00	41.00	1.00	1.00	100	38	Greyish purple , fine grained, hard and compact , massive , stromatolitic limestone.	23.56	7.46	2.80	35.66	1.12	0.043	28.92	99.563
41.00	42.00	1.00	1.00	100	39	Greyish purple , fine grained, hard and compact , massive , stromatolitic dolomitic limestone.	23.12	7.16	2.70	36.33	0.96	0.043	29.18	99.493
42.00	43.00	1.00	1.00	100	40	Greyish purple , fine grained, hard and compact , massive , stromatolitic dolomitic limestone.	20.82	8.04	2.60	37.23	0.80	0.037	29.92	99.447
43.00	44.00	1.00	1.00	100	41	Greyish purple , fine grained, hard and compact , massive , stromatolitic dolomitic limestone.	24.18	7.56	3.70	34.76	1.12	0.037	28.24	99.597
44.00	45.00	1.00	1.00	100	42	Greyish purple , fine grained, hard and compact , massive , stromatolitic dolomitic limestone.	21.08	7.36	2.00	37.01	1.61	0.030	30.44	99.530
45.00	46.00	1.00	1.00	100	43	Greyish purple , fine grained, hard and compact , massive , stromatolitic dolomitic limestone.	13.80	5.02	1.60	43.96	0.64	0.021	34.56	99.601
46.00	47.00	1.00	1.00	100	44	Greyish purple , fine grained, hard and compact , massive , stromatolitic limestone.	12.94	4.80	1.50	44.41	0.64	Traces	35.22	99.510
47.00	48.00	1.00	1.00	100	45	Grey , fine grained, hard and compact , massive , stromatolitic limestone.	13.00	5.16	1.60	44.19	0.48	0.021	35.15	99.601
48.00	49.00	1.00	1.00	100	46	Grey , fine grained, hard and compact , massive , stromatolitic limestone.	13.40	5.14	1.70	43.96	0.64	0.024	34.69	99.554
49.00	50.00	1.00	1.00	100	47	Grey , fine grained, hard and compact , massive , stromatolitic limestone.	9.68	4.52	1.60	44.86	2.09	0.018	36.70	99.468
Borehole closed at the depth of 50.00 m														

S.No.-10						BOREHOLE No. ALD-13	Total depth (in m) : 50.00 m							
Reduced Level : 280.833							Date of Starting : 01.12.2024							
Co-ordinates : 21° 35' 54.035" N 81° 54' 44.270" E							Date of Closing : 13.12.2024							
Drill No.-Vol35/12							ANALYTICAL RESULT IN %							
FROM (m)	TO (m)	RUN (m)	CORE THICKNESS	RECO. %	SAMPLE NO.	LITHOLOGY								
0.00	0.60	1.00	0.00	0		Brownish red coloured soft and loose ,Lateritic soil,								
0.60	2.10	1.50	0.00	0		Brownish red coloured soft and loose ,Lateritic soil,								
2.10	3.10	1.00	0.00	0		Brownish red coloured soft and loose ,Lateritic soil,								
3.10	4.10	1.00	0.00	0		Brownish red coloured soft and loose ,Lateritic soil,								
4.10	5.10	1.00	0.00	0		Brownish red coloured soft and loose ,Lateritic soil,								
5.10	6.60	1.50	1.50	100	1	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.40	8.74	1.70	42.63	0.80	Traces	34.25	99.52
6.60	8.10	1.50	1.50	100	2	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.98	6.50	1.10	44.63	1.12	0.043	36.20	99.58
8.10	9.10	1.00	1.00	100	3	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.70	7.10	1.10	44.86	0.80	0.043	36.02	99.62
9.10	10.10	1.00	1.00	100	4	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.02	5.62	1.20	45.19	1.45	Traces	36.79	99.27
10.10	11.10	1.00	1.00	100	5	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.94	6.56	1.50	44.30	1.12	0.043	35.76	99.22

SiO₂
%Al₂O₃
%

11.10	12.10	1.00	1.00	100	6	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.26	6.78	1.40	44.72	1.12	0.043	36.30	99.62
12.10	13.10	1.00	1.00	100	7	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.82	6.08	1.30	45.69	0.80	Traces	36.58	99.27
13.10	14.10	1.00	1.00	100	8	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	7.00	5.54	1.00	47.31	0.64	Traces	37.86	99.35
14.10	15.10	1.00	1.00	100	9	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.80	7.40	1.30	44.48	0.80	0.043	35.84	99.67
15.10	16.10	1.00	1.00	100	10	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.30	7.78	1.40	43.97	0.64	0.043	35.32	99.45
16.10	17.10	1.00	1.00	100	11	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.34	7.36	1.30	44.55	0.64	0.043	35.34	99.57
17.10	18.10	1.00	1.00	100	12	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	6.60	4.48	0.80	48.36	0.80	Traces	38.48	99.52
18.10	19.10	1.00	1.00	100	13	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.64	7.12	1.30	45.75	0.48	Traces	36.05	99.35
19.10	20.10	1.00	1.00	100	14	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.82	8.08	1.40	43.95	0.64	0.043	35.34	99.27
20.10	21.10	1.00	1.00	100	15	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.84	7.88	1.40	43.80	0.64	Traces	34.86	99.42
21.10	22.10	1.00	1.00	100	16	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.98	8.56	1.40	42.91	0.80	Traces	34.66	99.30
22.10	23.10	1.00	1.00	100	17	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	16.50	10.76	2.00	38.60	0.64	0.065	30.71	99.27
23.10	24.10	1.00	1.00	100	18	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.78	7.02	1.20	44.51	0.97	0.043	35.99	99.50
24.10	25.10	1.00	1.00	100	19	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	15.78	10.62	2.00	39.18	0.65	0.065	31.14	99.43

25.10	26.10	1.00	1.00	100	20	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.22	5.76	1.00	45.73	1.12	0.043	36.72	99.59
26.10	27.10	1.00	1.00	100	21	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	9.02	6.18	1.00	45.61	0.96	0.043	36.78	99.59
27.10	28.10	1.00	1.00	100	22	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.58	7.22	1.30	44.64	0.48	Traces	35.18	99.39
28.10	29.10	1.00	1.00	100	23	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.30	6.10	1.20	44.55	1.29	Traces	35.92	99.36
29.10	30.10	1.00	1.00	100	24	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.90	7.28	1.40	42.36	1.61	Traces	34.84	99.39
30.10	31.10	1.00	1.00	100	25	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.30	6.28	1.40	43.92	0.96	Traces	35.39	99.25
31.10	32.10	1.00	1.00	100	26	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	13.88	8.54	1.70	40.78	1.12	0.061	33.20	99.28
32.10	33.10	1.00	1.00	100	27	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	15.86	10.62	1.90	39.37	0.48	0.065	31.29	99.58
33.10	34.10	1.00	1.00	100	28	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	14.08	8.36	1.70	40.51	1.29	0.061	33.17	99.17
34.10	35.10	1.00	1.00	100	29	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	12.72	6.88	1.60	41.94	1.61	Traces	34.52	99.26
35.10	36.10	1.00	1.00	100	30	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	17.08	11.03	2.00	38.27	0.64	0.065	30.46	99.55
36.10	37.10	1.00	1.00	100	31	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	16.54	11.06	2.00	38.36	0.80	0.065	30.72	99.54
37.10	38.10	1.00	1.00	100	32	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	17.26	8.48	2.10	39.13	0.80	0.065	31.29	99.12
38.10	39.10	1.00	1.00	100	33	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	16.32	12.04	1.90	38.03	0.64	0.065	30.32	99.31

39.10	40.10	1.00	1.00	100	34	Greyish , fine grained, hard and compact , massive , stromatolitic limestone, with intercalation of shale.	20.24	13.24	2.10	35.41	0.32	Traces	28.12	99.43
40.10	41.10	1.00	1.00	100	35	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	11.00	6.96	1.30	43.22	1.29	Traces	35.36	99.13
41.10	42.10	1.00	1.00	100	36	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	13.66	7.62	1.60	41.21	1.45	0.061	33.72	99.32
42.10	43.10	1.00	1.00	100	37	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	15.06	10.12	2.50	39.21	0.80	0.065	31.70	99.46
43.10	44.10	1.00	1.00	100	38	whitish Grey , fine grained, hard and compact , massive , stromatolitic limestone.	13.16	9.28	1.70	41.82	0.48	0.061	33.09	99.58
44.10	45.10	1.00	1.00	100	39	whitish Grey , fine grained, hard and compact , massive , stromatolitic limestone.	16.70	11.52	1.80	38.46	0.48	0.065	30.35	99.37
45.10	46.10	1.00	1.00	100	40	whitish Grey , fine grained, hard and compact , massive , stromatolitic limestone.	19.66	13.26	2.00	35.62	0.32	Traces	28.33	99.19
46.10	47.10	1.00	1.00	100	41	whitish Grey , fine grained, hard and compact , massive , stromatolitic limestone.	19.92	12.48	2.00	35.87	0.64	Traces	28.50	99.41
47.10	48.10	1.00	1.00	100	42	whitish Grey , fine grained, hard and compact , massive , stromatolitic limestone.	17.96	12.38	2.00	37.00	0.48	Traces	29.60	99.42
48.10	49.10	1.00	1.00	100	43	whitish Grey , fine grained, hard and compact , massive , stromatolitic limestone.	16.88	10.98	2.00	38.47	0.48	0.065	30.49	99.36
49.10	50.00	0.90	0.90	100	44	whitish Grey , fine grained, hard and compact , massive , stromatolitic limestone.	14.82	9.56	1.70	40.14	0.80	0.061	32.22	99.29
Borehole closed at the depth of 50.00 m														

S. No.-.11						BOREHOLE NO. <u>ALD-15</u>	Total depth (in m) : 50 .00 m							
Reduced Level : 269.730							Date of Starting: 03.01.2025							
Co-ordinates : 21° 35' 28.169" N 81° 54' 16.288" E							Date of Closing : 15.01.2025							
Drill No.-Vol 35/12							ANALYTICAL RESULT IN %							
FROM	TO	RUN	CORE	CORE RECO%	SAMPLE	LITHOLOGY	SiO ₂ %	Al ₂ O ₃ %	Fe ₂ O ₃ %	CaO %	MgO %	P ₂ O ₅ %	LOI %	TOTAL
0.00	0.60	0.60	0.00			Brown, soft and loose soil.								
0.60	2.10	1.50	0.00			Brown, soft and loose soil.								
2.10	3.60	1.50	0.00			Yellowish Brown, soft and loose, lateritic soil.								
3.60	4.60	1.00	0.00			Yellowish Brown, soft and loose, lateritic soil.								
4.60	5.60	1.00	0.00			Yellowish Brown, soft and loose, lateritic soil.								
5.60	6.60	1.00	0.00			Yellowish Brown, soft and loose, lateritic soil.								
6.60	7.60	1.00	0.00			Yellowish Brown, soft and loose, lateritic soil.								
7.60	8.60	1.00	0.00			Yellowish Brown, soft and loose, lateritic soil.								
8.60	9.60	1.00	0.00			Yellowish Brown, soft and loose, lateritic soil.								
9.60	10.60	1.00	0.00			Yellowish Brown, soft and loose, lateritic soil.								
10.60	11.60	1.00	0.00			Yellowish Brown, soft and loose, lateritic soil.								

11.60	12.60	1.00	0.00			Yellowish Brown, soft and loose, lateritic soil.								
12.60	13.60	1.00	0.00			Yellowish Brown, soft and loose, lateritic soil.								
13.60	14.60	1.00	0.85	85	1	Grey, fine grained, hard and compact , massive , shaly limestone.	10.179	6.613	1.138	44.787	0.891	Traces	35.82	99.428
14.60	15.60	1.00	0.95	95	2	Grey, fine grained, hard and compact , massive , limestone.	14.545	9.420	1.982	40.177	0.907	Traces	32.19	99.221
15.60	16.60	1.00	1.00	100	3	Grey, fine grained, hard and compact , massive , shaly limestone.	10.168	6.239	0.738	45.946	0.206	Traces	36.11	99.407
16.60	17.10	0.50	0.50	100	4	Grey, fine grained, hard and compact , massive , limestone.	8.599	6.118	0.655	46.997	0.177	Traces	37.01	99.556
17.10	18.10	1.00	1.00	100	5	Greyish Purple, fine grained, hard and compact , massive ,limestone.	11.137	6.781	1.169	44.134	0.798	Traces	35.43	99.449
18.10	19.10	1.00	1.00	100	6	Purple, fine grained, hard and compact , massive , limestone.	12.103	6.624	1.423	43.688	0.702	Traces	34.69	99.230
19.10	20.10	1.00	0.80	80	7	Purple, fine grained, hard and compact , massive , limestone.	14.723	9.452	1.933	40.311	0.734	Traces	32.37	99.523
20.10	21.10	1.00	0.75	75	8	Purple, fine grained, hard and compact , massive , limestone.	13.188	8.027	1.608	42.805	0.333	Traces	33.66	99.621
21.10	22.10	1.00	0.70	70	9	Purple, fine grained, hard and compact , massive , limestone.	12.156	6.851	1.315	43.871	0.463	Traces	34.75	99.406
22.10	23.10	1.00	1.00	100	10	Purple, fine grained, hard and compact , massive , limestone.	14.024	8.575	1.661	41.343	0.655	0.061	33.24	99.559
23.10	24.10	1.00	1.00	100	11	Purple, fine grained, hard and compact , massive , limestone.	12.588	8.449	1.490	42.798	0.372	Traces	33.59	99.287
24.10	25.10	1.00	0.60	60	12	Purple, fine grained, hard and compact , massive , limestone.	12.280	8.379	1.437	42.747	0.446	Traces	33.99	99.279

25.10	26.10	1.00	0.50	50	13	Purple, fine grained, hard and compact , massive , limestone.	13.217	7.037	1.424	43.442	0.288	Traces	34.12	99.528
26.10	27.10	1.00	0.85	85	14	Greyish Purple, fine grained, hard and compact , massive , limestone.	15.674	6.799	1.617	41.262	0.724	0.061	33.20	99.337
27.10	28.10	1.00	0.90	90	15	Greyish Purple, fine grained, hard and compact , massive , limestone.	13.830	6.053	1.533	42.930	0.599	Traces	34.24	99.185
28.10	29.10	1.00	0.90	90	16	Grey, fine grained, hard and compact , massive , limestone.	15.497	8.641	1.717	40.624	0.524	0.061	32.44	99.504
29.10	30.10	1.00	0.85	85	17	Grey, fine grained, hard and compact , massive , limestone.	13.918	8.560	1.430	41.918	0.389	0.061	33.28	99.556
30.10	31.10	1.00	0.80	80	18	Grey, fine grained, hard and compact , massive , limestone.	18.304	11.436	2.187	37.148	0.520	Traces	29.70	99.295
31.10	32.10	1.00	0.50	50	19	Grey, fine grained, hard and compact , massive , limestone.	20.492	12.349	2.579	34.960	0.692	Traces	28.26	99.332
32.10	33.10	1.00	0.80	80	20	Grey, fine grained, hard and compact , massive , limestone.	25.749	13.342	2.883	31.098	0.843	Traces	25.27	99.185
33.10	34.10	1.00	0.65	65	21	Grey, fine grained, hard and compact , massive , limestone.	20.304	9.856	2.251	36.363	0.921	Traces	29.75	99.445
34.10	35.10	1.00	0.80	80	22	Grey, fine grained, hard and compact , massive , limestone.	21.561	11.050	2.245	35.678	0.506	Traces	28.32	99.360
35.10	36.10	1.00	0.80	80	23	Grey, fine grained, hard and compact , massive , shale.	46.580	16.593	5.185	16.161	1.195	0.056	13.64	99.410
36.10	37.10	1.00	0.75	75	24	Grey, fine grained, hard and compact , massive , shale.	49.150	19.435	5.866	12.602	1.063	0.056	11.02	99.192
37.10	38.10	1.00	0.70	70	25	Grey, fine grained, hard and compact , massive , shale.	44.508	18.210	5.460	15.346	1.717	0.025	14.24	99.506
38.10	39.10	1.00	0.85	85	26	Grey, fine grained, hard and compact , massive , shaly limestone.	29.486	14.672	3.773	27.992	0.683	0.065	22.88	99.551

39.10	40.10	1.00	1.00	100	27	Grey, fine grained, hard and compact , massive , shale.	40.439	16.514	6.142	18.693	1.486	0.025	16.00	99.299
40.10	41.10	1.00	1.00	100	28	Grey, fine grained, hard and compact , massive , shale.	50.910	18.465	6.011	12.221	1.037	0.043	10.52	99.207
41.10	42.10	1.00	1.00	100	29	Grey, fine grained, hard and compact , massive , shale.	52.212	21.324	6.013	10.116	1.005	0.043	8.81	99.523
42.10	43.10	1.00	0.75	75	30	Grey, fine grained, hard and compact , massive , shale.	53.623	21.761	6.097	9.422	0.677	0.061	7.92	99.561
43.10	44.10	1.00	0.90	90	31	Grey, fine grained, hard and compact , massive , shale.	55.231	21.967	5.869	8.260	0.704	0.061	7.28	99.372
44.10	45.10	1.00	0.85	85	32	Grey, fine grained, hard and compact , massive , shale.	55.952	22.297	5.942	7.742	0.727	0.061	6.64	99.361
45.10	46.10	1.00	1.00	100	33	Grey, fine grained, hard and compact , massive , shale.	48.419	17.858	6.143	14.225	0.761	0.056	12.02	99.482
46.10	47.10	1.00	1.00	100	34	Grey, fine grained, hard and compact , massive , shaly limestone.	51.471	20.143	6.265	11.034	0.734	0.043	9.70	99.390
47.10	48.10	1.00	0.90	90	35	Grey, fine grained, hard and compact , massive , shaly limestone.	57.300	25.036	6.139	5.442	0.561	0.037	4.92	99.435
48.10	49.10	1.00	0.65	65	36	Grey, fine grained, hard and compact , massive , shale.	55.414	24.048	5.849	7.283	0.597	0.061	6.18	99.432
49.10	50.00	0.90	0.60	66.66666667	37	Grey, fine grained, hard and compact , massive , shaly limestone.	27.654	13.855	3.610	29.638	0.548	0.065	23.85	99.220
Borehole closed at the depth of 50.00 m														

S.No.-12						BOREHOLENo. ALD-16	Total depth (in m) : 50 .00 m							
Reduced Level : 274.455							Date of Starting : 14.12.2024							
Co-ordinates : 21° 35' 28.017" N 81° 54' 44.107" E							Date of Closing : 31.12.2024							
Drill No.-Vol 35/12							ANALYTICAL RESULT IN %							
FROM (m)	TO (m)	RUN (m)	CORE THICKNESS	RECO. %	SAMPLE NO.	LITHOLOGY	SiO2 %	Al2O3 %	Fe2O3 %	CaO %	MgO %	P2O5 %	LOI %	TOTAL
0.00	0.60	0.60	0.00	0		brown, soft and loose soil								
0.60	2.10	1.50	0.00	0		brown, soft and loose soil								
2.10	3.60	1.50	0.00	0		brown, soft and loose soil								
3.60	4.60	1.00	0.00	0		brownish red soft and loose soil lateritic soil								
4.60	5.60	1.00	0.00	0		brownish red soft and loose soil lateritic soil								
5.60	6.60	1.00	0.00	0		brownish red soft and loose soil lateritic soil								
6.60	7.60	1.00	0.00	0		brownish red soft and loose soil lateritic soil								

7.60	8.60	1.00	0.00	0		brownish red soft and loose soil lateritic soil								
8.60	9.00	0.40	0.30	75		Purple, fine grained, hard and compact , massive , stromatolitic limestone.								
9.00	10.00	1.00	1.00	100	1	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	7.18	4.64	1.40	47.10	0.96	Traces	38.05	99.33
10.00	11.00	1.00	1.00	100	2	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.88	6.64	1.30	44.30	0.80	Traces	35.31	99.22
11.00	12.00	1.00	1.00	100	3	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.36	6.48	1.00	46.64	0.32	Traces	36.71	99.51
12.00	13.00	1.00	1.00	100	4	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.70	7.68	1.40	43.29	0.64	Traces	34.64	99.35
13.00	14.00	1.00	0.90	90	5	Purple, fine grained, hard and compact , massive , stromatolitic limestone.	10.44	6.78	1.20	44.86	0.48	Traces	35.63	99.39
14.00	15.00	1.00	0.80	80	6	Light purple, fine grained, hard and compact , massive , stromatolitic limestone.	8.04	6.48	1.10	46.43	0.48	Traces	37.01	99.54

15.00	16.00	1.00	0.75	75	7	Light purple, fine grained, hard and compact , massive , stromatolitic limestone.	16.06	10.74	1.70	39.25	0.48	0.067	31.17	99.46
16.00	17.00	1.00	1.00	100	8	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	7.74	6.10	0.90	47.15	0.32	Traces	37.31	99.52
17.00	18.00	1.00	1.00	100	9	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	14.20	7.68	1.50	41.65	0.80	0.071	33.32	99.22
18.00	19.00	1.00	1.00	100	10	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	20.20	12.24	2.40	35.42	0.64	Traces	28.48	99.37
19.00	20.00	1.00	0.70	70	11	Greyish purple, fine grained, hard and compact , massive , stromatolitic limestone.	11.46	7.36	1.30	43.80	0.48	Traces	34.93	99.32
20.00	21.00	1.00	0.65	65	12	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	18.98	12.08	2.00	36.78	0.48	Traces	29.32	99.64
21.00	22.00	1.00	0.75	75	13	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	7.62	5.90	1.00	47.56	0.32	Traces	37.33	99.73

22.00	23.00	1.00	0.80	80	14	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	16.00	10.36	1.80	39.40	0.64	0.067	31.23	99.50
23.00	24.00	1.00	0.80	80	15	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	19.96	12.28	2.40	35.88	0.48	Traces	28.72	99.72
24.00	25.00	1.00	0.80	80	16	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	17.18	11.24	2.00	38.26	0.48	0.067	30.26	99.48
25.00	26.00	1.00	0.75	75	17	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	19.38	12.62	2.20	35.92	0.48	Traces	28.63	99.23
26.00	27.00	1.00	0.80	80	18	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	15.98	11.02	2.00	38.86	0.64	0.067	31.11	99.68
27.00	28.00	1.00	0.80	80	19	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	16.50	10.98	2.00	38.64	0.64	0.067	30.72	99.54
28.00	29.00	1.00	1.00	100	20	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	16.98	11.06	2.10	37.93	0.80	0.067	30.44	99.38

29.00	30.00	1.00	0.90	90	21	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	17.86	11.56	2.00	37.46	0.48	0.067	29.77	99.20
30.00	31.00	1.00	1.00	100	22	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	13.52	9.06	1.50	41.57	0.64	0.071	33.24	99.60
31.00	32.00	1.00	0.90	90	23	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	24.02	17.00	3.90	29.68	0.64	Traces	24.08	99.31
32.00	33.00	1.00	0.90	90	24	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	15.64	10.18	1.90	39.43	0.80	Traces	31.81	99.77
33.00	34.00	1.00	0.90	90	25	Greyish , fine grained, hard and compact , massive , stromatolitic limestone.	21.40	13.78	2.50	34.09	0.64	Traces	27.01	99.42
34.00	35.00	1.00	1.00	100		Greyish , fine grained, hard and compact , shale.								
35.00	36.00	1.00	0.90	90		Greyish purple, fine grained, hard and compact , shale								
36.00	37.00	1.00	0.85	85	26	Greyish , fine grained, hard and compact limestone.	18.84	12.36	2.40	35.44	1.12	Traces	29.17	99.33
37.00	38.00	1.00	0.90	90	27	Greyish , fine grained, hard and compact limestone.	21.18	14.48	2.40	33.59	0.48	Traces	26.96	99.09

38.00	39.00	1.00	0.80	80	28	Greyish , fine grained, hard and compact limestone.	15.96	11.08	2.40	38.51	0.64	0.067	30.90	99.57
39.00	40.00	1.00	1.00	100		Greyish , fine grained, hard and compact , shale.								
40.00	41.00	1.00	1.00	100		Greyish , fine grained, hard and compact , shale.								
41.00	42.00	1.00	1.00	100		Greyish , fine grained, hard and compact , shale.								
42.00	43.00	1.00	0.70	70		Greyish , fine grained, hard and compact , shale.								
43.00	44.00	1.00	0.40	40		Greyish , fine grained, hard and compact , shale.								
44.00	45.00	1.00	0.60	60		Greyish , fine grained, hard and compact , shale.								
45.00	46.00	1.00	0.95	95		Greyish , fine grained, hard and compact , shaly limestone , (31 cm shale)								
46.00	47.00	1.00	0.70	70	30	Greyish , fine grained, hard and compact , limestone.	9.70	7.54	1.10	44.94	0.32	Traces	35.67	99.27
47.00	48.00	1.00	0.75	75	31	Greyish , fine grained, hard and compact , limestone.	10.62	4.88	1.70	45.34	0.80	0.043	36.09	99.47

48.00	49.00	1.00	0.75	75		Greyish , fine grained, hard and compact , shale								
49.00	50.00	1.00	0.70	70	32	Greyish , fine grained, hard and compact , limestone.	11.92	13.38	1.00	40.30	0.48	0.071	32.16	99.31
Borehole closed at the depth of 50.00 m														

ANNEXURE-III**CHEMICAL ANALYSIS OF 20 NO. BRS COLLECTED DURING DETAIL
GEOLOGICAL MAPPING IN ALDA LIMESTONE BLOCK (G-3 Stage)****TEHSIL- TILDA, SIMGA & SUHELA, DISTRICT-RAIPUR & BALODABAZAR-BHATAPARA, CHHATTISGARH
(PART OF TOPOSHEET NO.64G/14)**

S.No.	Geographical Co-ordinates	Physical Properties	Sample No.	SiO ₂ %	Al ₂ O ₃ %	Fe ₂ O ₃ %	CaO %	MgO %	P ₂ O ₅ %	LOI %	Total
1	21° 37' 4.792" N 81° 54' 4.608" E	Pink purple , Hard and compact, massive stromatolitic Limestone quartz vein	ALD-1	7.52	1.99	2.50	47.70	1.12	Traces	38.40	99.23
2	21° 37' 4.991" N 81° 54' 3.899" E	Pink purple , Hard and compact, massive stromatolitic Limestone quartz vein	ALD-2	5.32	2.78	2.00	47.33	2.41	Traces	39.56	99.40
3	21° 36' 45.629" N 81° 53' 21.994" E	Pink purple , Hard and compact, massive stromatolitic Limestone quartz vein	ALD-3	5.74	2.34	2.50	46.88	2.58	Traces	39.31	99.35

4	21° 36' 46.232" N 81° 53' 20.541" E	Pink purple , Hard and compact, massive stromatolitic Limestone quartz vein	ALD-4	6.70	3.80	2.00	48.00	0.80	Traces	38.31	99.61
5	21° 36' 46.307" N 81° 53' 23.728" E	Pink purple , Hard and compact, massive stromatolitic Limestone quartz vein	ALD-5	8.58	4.66	1.20	46.65	0.80	0.01	37.39	99.29
6	21° 36' 46.633" N 81° 53' 29.790" E	Pink purple , Hard and compact, massive stromatolitic Limestone quartz vein	ALD-6	7.62	4.52	2.30	45.98	1.61	0.01	37.60	99.64
7	21° 36' 44.987" N 81° 53' 33.854" E	Pink purple , Hard and compact, massive stromatolitic Limestone quartz vein	ALD-7	2.84	1.72	2.10	51.14	0.64	Traces	41.00	99.44
8	21° 36' 45.597" N 81° 53' 37.648" E	Pink purple , Hard and compact, massive stromatolitic Limestone quartz vein	ALD-8	9.14	3.78	2.00	45.53	1.45	0.01	37.69	99.60
9	21° 36' 46.624" N 81° 53' 40.027" E	Pink purple , Hard and compact, massive stromatolitic Limestone quartz vein	ALD-9	8.68	4.08	2.30	45.98	1.29	0.01	37.12	99.46
10	21° 35' 25.428" N 81° 53' 55.523" E	Pink, Hard and compact, massive stromatolitic Limestone	ALD-10	9.90	4.38	1.40	46.43	0.48	0.03	36.58	99.20

11	21° 35' 42.801" N 81° 53' 58.371" E	Pink, Hard and compact, massive stromatolitic Limestone	ALD-11	13.26	6.30	1.70	42.17	1.61	0.02	34.48	99.54
12	21° 35' 35.757" N 81° 54' 0.907" E	Pink, Hard and compact, massive stromatolitic Limestone	ALD-12	8.44	8.80	2.80	42.62	1.61	0.02	35.06	99.35
13	21° 35' 44.183" N 81° 54' 23.622" E	Pink, Hard and compact, massive stromatolitic Limestone	ALD-13	5.22	1.80	2.70	49.57	0.64	0.01	39.45	99.39
14	21° 36' 10.138" N 81° 54' 34.101" E	Pink, Hard and compact, massive stromatolitic Limestone	ALD-14	6.38	2.38	2.50	47.10	2.09	0.01	38.93	99.39
15	21° 36' 8.809" N 81° 54' 40.166" E	Pink, Hard and compact, massive stromatolitic Limestone	ALD-15	8.96	3.08	2.40	45.53	1.93	0.01	37.71	99.62
16	21° 36' 2.845" N 81° 54' 55.477" E	Light pink, fine grained, Hard, massive compact Dolomite	ALD-16	2.58	0.38	2.00	34.54	15.80	Traces	44.25	99.55
17	21° 36' 0.180" N 81° 54' 55.344" E	Light pink, fine grained, Hard, massive compact Dolomite limestone abundance silica	ALD-17	7.58	3.40	2.30	44.63	3.22	0.01	38.33	99.47
18	21° 35' 56.663" N 81° 54' 52.843" E	Pink, Hard and compact, massive stromatolitic Limestone	ALD-18	5.58	1.94	2.40	49.79	0.48	0.01	39.31	99.51
19	21° 36' 6.752" N 81° 54' 47.224" E	Pink, Hard and compact, massive stromatolitic Limestone	ALD-19	8.64	4.12	1.60	45.76	1.77	0.01	37.47	99.37

20	21° 35' 59.252" N 81° 54' 39.053" E	Pink, Hard and compact, massive stromatolitic Limestone	ALD-20	7.48	4.34	2.20	45.31	1.93	0.01	38.35	99.62
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ANNEXURE-IV A

**BOREHOLE DETAILS AND ANALYTICAL DATA
PRELIMINARY EXPLORATION IN ALDA LIMESTONE BLOCK (G-3 Stage)
TEHSIL- TILDA, SIMGA & SUHELA, DISTRICT-RAIPUR & BALODABAZAR-BHATAPARA, CHHATTISGARH
(PART OF TOPOSHEET NO.64G/14)**

S. No.	BH. No.	RL	Total Depth (m)	OB (m)	Thickness of Limestone (m)				Core Recovery %	Chemical Analysis(Wt. Avg.)						Area	Volume	Resource	Grade
					From	To	Run	Core		SiO ₂ %	Fe ₂ O ₃ %	Al ₂ O ₃ %	CaO %	MgO %	P ₂ O ₅ %				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	ALD-1	265.543	50.00	6.00	6.00	50.00	44.00	39.65	90.11	9.54	1.58	4.51	46.03	0.92	0.03	360000	14274000	39.40	CG
2	ALD-2	263.637	79.00	6.00	6.00	13.00	7.00	5.00	71.42	23.76	2.60	6.44	34.83	2.09	0.05	480000	2400000	6.62	BLENDABLE
					13.00	39.00	26.00	23.70	91.15	11.14	2.01	4.52	44.09	1.53	0.03	480000	11376000	31.40	CG
					39.00	47.00	8.00	8.00	100.00	14.55	2.29	5.57	41.12	1.80	0.03	480000	3840000	10.60	CBB
					47.00	55.00	8.00	8.00	100.00	11.10	1.59	3.77	44.30	1.93	0.03	480000	3840000	10.60	CG
					55.00	63.00	8.00	8.00	100.00	17.89	2.29	8.02	38.38	1.33	0.04	480000	3840000	10.60	CBB
					63.00	79.00	16.00	14.50	90.63	22.76	2.76	8.35	34.61	1.90	0.05	480000	6960000	19.21	BLENDABLE
3	ALD-3	261.549	50.00	4.00	4.00	50.00	46.00	42.83	93.11	11.58	1.24	4.93	45.11	0.56	0.02	360000	15418800	42.56	CG
4	ALD-4	263.985	50.00	1.80	1.8	50	48.20	37.8	78.42	11.38	1.24	6.83	44.50	0.82	0.01	360000	13608000	37.56	CG
5	ALD-05	263.886	50.00	4.00	4.00	12.00	8.00	5.80	72.50	12.27	1.53	8.38	42.41	0.84	0.01	480000	2784000	7.68	CBB
					12.00	17.00	5.00	4.80	96.00	9.61	1.15	7.58	44.39	0.91	0.01	480000	2304000	6.36	CG
					17.00	30.00	13.00	13.00	100.00	12.64	1.58	9.07	41.49	1.05	0.01	480000	6240000	17.22	CBB
					30.00	37.00	7.00	7.00	100.00	9.52	1.13	7.78	44.24	1.04	0.00	480000	3360000	9.27	CG
					37.00	50.00	13.00	12.20	93.85	17.84	1.90	9.19	38.24	0.93	0.03	480000	5856000	16.16	CBB
6	ALD-06	266.740	50.00	5.70	5.70	50.00	44.30	39.05	88.15	11.86	1.60	5.46	44.63	0.58	0.61	440000	17182000	47.42	CG
7	ALD-09	268.175	50.00	13.50	13.50	26.00	12.50	11.20	89.60	11.77	1.41	4.70	44.29	1.21	0.03	440000	4928000	13.60	CG

					26.00	31.00	5.00	4.80	96.00	17.98	2.30	8.39	38.07	1.46	0.03	440000	2112000	5.83	CBB
					31.00	45.00	14.00	14.00	100.00	21.22	3.00	11.46	34.12	1.47	0.03	440000	6160000	17.00	BLENDABLE
					45.00	50.00	5.00	5.00	100.00									0.00	Shale
8	ALD-10	275.094	51.00	9.00	9.00	47.00	38.00	37.57	98.87	10.58	1.44	4.56	44.49	1.79	0.02	360000	13525200	37.33	CG
					47.00	51.00	4.00	3.90	97.50	23.79	2.65	8.89	34.91	0.72	0.04	360000	1404000	3.88	BLENDABLE
9	ALD-12	269.960	50.00	3.00	3.00	10.00	7.00	6.60	94.29	11.41	1.88	4.79	32.39	11.56	0.02	480000	3168000	0.00	Dolomictic Limestone
					10.00	45.00	35.00	35.00	100.00	15.73	2.09	6.21	38.98	3.00	0.03	480000	16800000	46.37	CBB
					45.00	50.00	5.00	5.00	100.00	12.56	1.60	4.93	44.28	0.90	0.02	480000	2400000	6.62	CG
10	ALD-13	280.833	50.00	5.10	5.10	32.10	27.00	27.00	100.00	10.42	7.22	1.34	44.10	0.89	0.03	480000	12960000	35.77	CG
					32.10	50.00	17.90	17.90	100.00	16.06	1.88	10.33	38.99	0.77	0.04	480000	8592000	23.71	CBB
11	ALD-15	269.730	50.00	13.60	13.60	19.10	5.50	5.30	96.36	11.35	1.23	7.03	44.06	0.64	0.00	360000	1908000	5.27	CG
					19.10	35.10	16.00	12.40	77.50	15.99	1.82	8.99	40.06	0.56	0.02	360000	4464000	12.32	CBB
					35.10	50.00	14.90	14.90	100.00									0.00	SHALE
12	ALD-16	274.455	50.00	9.00	9.00	18.00	9.00	8.45	93.89	10.40	1.27	6.93	44.62	0.59	0.01	360000	3042000	8.40	CG
					18.00	34.00	16.00	13.45	84.06	17.16	2.08	11.24	38.03	0.54	0.03	360000	4842000	13.36	CBB
					34.00	45.00	11.00	9.15	83.18	23.00	2.04	10.80	35.75	0.63	0.00	360001	3294009	9.09	BLENDABLE
					45.00	50.00	5.00	3.10	62.00	11.41	7.70	1.42	43.20	0.52	0.00	360000	1116000	3.08	CBB
TOTAL			630.00	6.73	23.67	40.31	16.65	13.19		14.46	2.20	6.85	40.93	1.47	0.04	13400001	128441209	554.291	

- CG- CEMENT GRADE
- CBB – CEMENT BLENDABLE(BENEFICABLE) GRADE

ANNEXURE-IV B

RESOURCE ESTIMATION OF CEMENT GRADE LIMESTONE (>44%) CaO PRELIMINARY EXPLORATION IN ALDA LIMESTONE BLOCK (G-3), TEHSIL-TILDA, SIMGA & SUHELA, DISTRICT-RAIPUR & BHATAPARA, CHHATTISGARH (PART OF TOPOSHEET NO.64G/14)

S. No.	BH. No.	RL	Total Depth (m)	OB (m)	Thickness of Limestone (m)				Core Recovery %	Chemical Analysis						Area	Volume	Resource
					From	To	Run	Core		SiO ₂ %	Fe ₂ O ₃ %	Al ₂ O ₃ %	CaO %	MgO %	P ₂ O ₅ %			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	ALD-1	265.543	50.00	6.00	6.00	50.00	44.00	39.65	90.11	9.54	1.58	4.51	46.03	0.92	0.03	360000	14274000	39.396
2	ALD-2	263.637	79.00	6.00	13.00	39.00	26.00	23.70	91.15	11.14	2.01	4.52	44.09	1.53	0.03	480000	11376000	31.398
					47.00	55.00	8.00	8.00	100.00	11.1	1.59	3.77	44.30	1.93	0.03	480000	3840000	10.598
3	ALD-3	261.549	50.00	4.00	4.00	50.00	46.00	42.83	93.11	11.58	1.24	4.93	45.11	0.56	0.02	360000	15418800	42.556
4	ALD-4	263.985	50.00	1.80	1.8	50	48.20	37.8	78.42	11.38	1.24	6.83	44.50	0.82	0.01	360000	13608000	37.558
5	ALD-05	263.886	50.00	4.00	12.00	17.00	5.00	4.80	96.00	9.61	1.15	7.58	44.39	0.91	0.01	480000	2304000	6.359
					30.00	37.00	7.00	7.00	100.00	9.52	1.13	7.78	44.24	1.04	0.00	480000	3360000	9.274
6	ALD-06	266.740	50.00	5.70	5.70	50.00	44.30	39.05	88.15	11.86	1.60	5.46	44.63	0.58	0.61	440000	17182000	47.422
7	ALD-09	268.175	50.00	13.50	13.50	26.00	12.50	11.20	89.60	11.77	1.41	4.70	44.29	1.21	0.03	440000	4928000	13.601
8	ALD-10	275.094	51.00	9.00	9.00	47.00	38.00	37.57	98.87	10.58	1.44	4.56	44.49	1.79	0.02	360000	13525200	37.330
9	ALD-12	269.960	50.00	3.00	45.00	50.00	5.00	5.00	100.00	12.56	1.60	4.93	44.28	0.90	0.02	480000	2400000	6.624
10	ALD-13	280.833	50.00	5.10	5.10	32.10	27.00	27.00	100.00	10.42	7.22	1.34	44.10	0.89	0.03	480000	12960000	35.770
11	ALD-15	269.730	50.00	13.60	13.60	19.10	5.50	5.30	96.36	11.35	1.23	7.03	44.06	0.64	0.00	360000	1908000	5.266
12	ALD-16	274.455	50.00	9.00	9.00	18.00	9.00	8.45	93.89	10.40	1.27	6.93	44.62	0.59	0.01	360000	3042000	8.396
TOTAL			630.00	6.73	15.34	38.59	23.25	21.24		10.92	1.84	5.35	44.51	1.02		5920000	120126000	331.548

ANNEXURE-IV C

RESOURCE ESTIMATION OF CEMENT BLENDABLE (BENIFICIABLE) GRADE LIMESTONE (38%-44%)CaO PRELIMINARY EXPLORATION IN ALDA LIMESTONE BLOCK(G-3), TEHSIL-TILDA, SIMGA & SUHELA, DISTRICT-RAIPUR & BHATAPARA, CHHATTISGARH (PART OF TOPOSHEET NO.64G/14)

S. No.	BH. No.	RL	Total Depth (m)	OB (m)	Thickness of Limestone (m)				Core Recovery %	Chemical Analysis						Area	Volume	Resource
					From	To	Run	Core		SiO ₂ %	Fe ₂ O ₃ %	Al ₂ O ₃ %	CaO %	MgO %	P ₂ O ₅ %			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
2	ALD-2	263.637	79.00	6.00	39.00	47.00	8.00	8.00	100	14.55	2.29	5.57	41.12	1.80	0.03	480000	3840000	10.60
					55.00	63.00	8.00	8.00	100	17.89	2.29	8.02	38.38	1.33	0.04	480000	3840000	10.60
5	ALD-05	263.886	50.00	4.00	4.00	12.00	8.00	5.80	72.50	12.27	1.53	8.38	42.41	0.84	0.01	480000	2784000	7.68
					17.00	30.00	13.00	13.00	100.00	12.64	1.58	9.07	41.49	1.05	0.01	480000	6240000	17.22
					37.00	50.00	13.00	12.20	93.85	17.84	1.90	9.19	38.24	0.93	0.03	480000	5856000	16.16
7	ALD-09	268.175	50.00	13.50	26.00	31.00	5.00	4.80	96.00	17.98	2.30	8.39	38.07	1.46	0.03	440000	2112000	5.83
9	ALD-12	269.960	50.00	3.00	10.00	45.00	35.00	35.00	100.00	15.73	2.09	6.21	38.98	3.00	0.03	480000	16800000	46.37
10	ALD-13	280.833	50.00	5.10	32.10	50.00	17.90	17.90	100.00	16.06	1.88	10.33	38.99	0.77	0.04	480000	8592000	23.71
11	ALD-15	269.730	50.00	13.60	19.10	35.10	16.00	12.40	77.50	15.99	1.82	8.99	40.06	0.56	0.02	360000	4464000	12.32
12	ALD-16	274.455	50.00	9.00	18.00	34.00	16.00	13.45	84.06	17.16	2.08	11.24	38.03	0.54	0.03	360000	4842000	13.36
12					45.00	50.00	5.00	3.10	62.00	11.41	7.70	1.42	43.20	0.52	0.00	360000	1116000	3.08
TOTAL			379.00	7.74	27.47	40.65	13.17	12.15		15.41	2.50	7.89	39.91	1.16		4880000	60486000	166.941

ANNEXURE-IV D

**RESOURCE ESTIMATION OF BLENDABLE GRADE LIMESTONE (34%-38%) CaO
PRELIMINARY EXPLORATION IN ALDA LIMESTONE BLOCK(G-3),
TEHSIL-TILDA, SIMGA & SUHELA, DISTRICT-RAIPUR & BHATAPARA, CHHATTISGARH
PART OF TOPOSHEET NO.64G/14**

S. No.	BH. No.	RL	Total Depth (m)	OB (m)	Thickness of Limestone (m)				Core Recovery %	Chemical Analysis						Area	Volume	Resource
					From	To	Run	Core		SiO ₂ %	Fe ₂ O ₃ %	Al ₂ O ₃ %	CaO %	MgO %	P ₂ O ₅ %			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
2	ALD-2	263.637	79.00	6.00	6.00	13.00	7.00	5.00	71.42	23.76	2.5996	6.43788	34.831	2.089	0.053	480000	2400000	6.62
					63.00	79.00	16.00	14.50	90.625	22.76	2.7555	8.34637	34.61	1.896	0.046	480000	6960000	19.21
7	ALD-09	268.175	50.00	13.50	31.00	45.00	14.00	14.00	100.00	21.22	3.00	11.46	34.12	1.47	0.03	440000.00	6160000.000	17.00
8	ALD-10	275.094	51.00	9.00	47.00	51.00	4.00	3.90	97.50	23.79	2.65	8.89	34.91	0.72	0.04	360000.00	1404000.000	3.88
12	ALD-16	274.455	50.00	9.00	34.00	45.00	11.00	9.15	83.18	23.00	2.04	10.80	35.75	0.63	0.00	360001.00	3294009.150	9.09
TOTAL			230.00	9.38	36.20	46.60	10.40	9.02		22.67	2.56	10.38	34.84	0.94		1160001.00	10858009.15	55.802

ANNEXURE-V

**PERTOLOGICAL STUDIES OF BRS COLLECTED DURING
DETAILED GEOLOGICAL MAPPING
PRELIMINARY EXPLORATION IN ALDA LIMESTONE BLOCK (G-3 Stage)
TEHSIL- TILDA, SIMGA & SUHELA, DISTRICT-RAIPUR & BALODABAZAR-BHATAPARA, CHHATTISGARH
(PART OF TOPOSHEET NO.64G/14)**

S. No.	Sample No.	Geographical Co-ordinate	Physical Properties	Petrological Properties	Rock Identified	Remark
	ALD-1	21° 35' 41.276" N 81° 54' 3.881" E	Megascopically, the rock is fine grained, hard compact, pinkish grey and gives good effervescence with dilute HCl.	Under microscope, the rock consists about 90 % of carbonate minerals, 10% argillaceous material (Clay minerals). Out of total carbonate, the rock contains about 63.00 % calcite micro spar size (size 0.005 to 0.05 mm)grains to Sparry calcite grains (Size 0.1mm-0.2mm, grains showing well developed grain boundaries and cleavage traces)and about 27.00 % dolomite microspar to sparry dolomite grains.. On staining calcite grains give red staining while dolomite grains does not give any color.	Limestone (Dolomitic limestone)	
2	ALD-2	21° 36' 43.594" N 81° 53' 30.987" E	Megascopically, the rock is fine grained, hard compact, pink and gives good effervescence with dilute HCl.	Under microscope, the rock consists about 80 % of micrite size calcite (0.002- 0.004mm) and about 15% Sparry dolomite (Size 0.1mm-0.2mm) grains showing well developed grain boundaries and cleavage traces.About 5% argillaceous material (Clay minerals) are also present. Calcite grains give pale red staining while dolomite grains does not give any color on staining.	Limestone	
3	ALD-3	21° 36' 46.402" N 81° 53' 43.317" E	Megascopically, the rock is fine grained, hard	Under microscope, the rock consists about 95 % of carbonate minerals, 5% argillaceous material (Clay	Limestone	

			compact, pinkish grey and gives moderate effervescence with dilute HCl.	minerals). Out of total carbonate, the rock contains about 85.50 % dolomite micro spar size (size 0.005 to 0.05 mm) grains to Sparry dolomite grains (Size 0.1mm-0.2mm, grains showing well developed grain boundaries and cleavage traces) and about 9.50 % calcite microspar to sparry calcite grains.. On staining calcite grains give red staining while dolomite grains does not give any color.		
4	ALD-4	21° 36' 5.947" N 81° 54' 55.920" E	Megascopically, the rock is fine grained, hard compact, pinkish grey and gives moderate effervescence with dilute HCl.	Under microscope, the rock consists about 95 % of carbonate minerals, 5% argillaceous material (Clay minerals). Out of total carbonate, the rock contains about 85.50 % calcite micrite (0.002-0.004mm) and about 9.50 % dolomite microspar to sparry dolomite grains.. On staining calcite grains give red staining while dolomite grains does not give any color	Dolomite	
5	ALD-5	21° 36' 4.019" N 81° 54' 39.858" E	Megascopically, the rock is fine grained, hard compact, pink and gives good effervescence with dilute HCl.	Under microscope, the rock consists about 80 % of micrite size calcite (0.002- 0.004mm) grains. About 20% argillaceous material (Clay minerals) are also present. Calcite grains give pale red staining.	Limestone	

ANNEXURE-VI

COMPARISION OF PRIMARY SAMPLES AND CHECK SAMPLES ANALYSIS PRELIMINARY EXPLORATION IN ALDA BLOCK (G-3 STAGE) TEHSIL- TILDA, SIMGA & SUHELA, DISTRICT-RAIPUR & BALODABAZAR-BHATAPARA, CHHATTISGARH

S. No.	Primary Sample					Cross-check Sample					Difference		
	B.H.No.	Sample No.	SiO ₂ %	CaO %	MgO %	B.H.No.	Sample No.	SiO ₂ %	CaO %	MgO %	SiO ₂ %	CaO %	MgO %
1	ALD15	1	10.179	44.787	0.891	ALD/CC	1	11.56	43.06	2.58	-1.381	1.727	-1.689
2	ALD15	2	14.545	40.177	0.907	ALD/CC	2	16.16	38.13	2.74	-1.615	2.047	-1.833
3	ALD15	3	10.168	45.946	0.206	ALD/CC	3	10.28	45.76	1.45	-0.112	0.186	-1.244
4	ALD15	4	8.599	46.997	0.177	ALD/CC	4	8.46	44.86	2.74	0.139	2.137	-2.563
5	ALD15	5	11.137	44.134	0.798	ALD/CC	5	10.88	43.96	2.09	0.257	0.174	-1.292
6	ALD5	6	14.668	39.247	1.259	ALD/CC	6	16.84	38.13	2.58	-2.172	1.117	-1.321
7	ALD5	7	7.970	45.197	0.955	ALD/CC	7	9.94	46.20	1.29	-1.970	-1.003	-0.335
8	ALD05	8	10.894	43.248	0.877	ALD/CC	8	11.64	43.06	1.93	-0.746	0.188	-1.053
9	ALD05	9	10.115	44.836	0.755	ALD/CC	9	9.56	43.96	2.58	0.555	0.876	-1.825
10	ALD05	10	8.707	45.147	1.081	ALD/CC	10	8.38	45.31	2.09	0.327	-0.163	-1.009
11	ALD13	11	10.34	44.55	0.64	ALD/CC	11	13.26	43.06	1.12	-2.920	1.486	-0.478
12	ALD13	12	6.60	48.36	0.80	ALD/CC	12	8.34	48.00	0.64	-1.739	0.355	0.160
13	ALD13	13	8.64	45.75	0.48	ALD/CC	13	11.02	45.31	1.12	-2.377	0.438	-0.640
14	ALD13	14	9.82	43.95	0.64	ALD/CC	14	12.26	45.31	0.32	-2.440	-1.360	0.322
15	ALD13	15	10.84	43.80	0.64	ALD/CC	15	12.36	44.86	0.32	-1.525	-1.059	0.323
16	ALD16	16	17.18	38.26	0.48	ALD/CC	16	20.50	38.80	0.16	-3.325	-0.545	0.320
17	ALD16	17	19.38	35.92	0.48	ALD/CC	17	23.76	36.33	0.80	-4.378	-0.411	-0.320
18	ALD16	18	15.98	38.86	0.64	ALD/CC	18	17.20	39.03	0.96	-1.220	-0.175	-0.320
19	ALD16	19	16.50	38.64	0.64	ALD/CC	19	20.94	38.13	0.96	-4.445	0.512	-0.318

20	ALD16	20	16.98	37.93	0.80	ALD/CC	20	21.52	38.13	0.96	-4.540	-0.198	-0.160
21	ALD-09	21	19.80	34.76	1.93	ALD/CC	21	23.56	35.89	1.12	-3.760	-1.130	0.810
22	ALD-09	22	18.00	37.46	1.45	ALD/CC	22	18.00	37.23	1.45	0.000	0.230	0.000
23	ALD-09	23	18.64	35.66	1.93	ALD/CC	23	18.42	37.23	0.80	0.220	-1.570	1.130
24	ALD-09	24	18.16	35.44	1.29	ALD/CC	24	23.88	35.89	0.48	-5.720	-0.450	0.810
25	ALD0-9	25	18.40	36.56	1.12	ALD/CC	25	23.28	36.56	0.96	-4.880	0.000	0.160
26	ALD-10	26	13.12	41.49	2.09	ALD/CC	26	13.26	42.84	0.96	-0.140	-1.350	1.130
27	ALD-10	27	12.84	41.05	2.90	ALD/CC	27	13.16	43.29	0.80	-0.320	-2.240	2.100
28	ALD-10	28	11.58	43.06	1.93	ALD/CC	28	12.48	43.51	0.80	-0.900	-0.450	1.130
29	ALD-10	29	10.54	45.08	0.96	ALD/CC	29	11.26	43.29	1.61	-0.720	1.790	-0.650
30	ALD-10	30	11.10	42.39	2.74	ALD/CC	30	11.72	44.19	0.80	-0.620	-1.800	1.940
31	ALD-06	31	18.672	39.544	0.330	ALD/CC	31	17.90	37.68	1.77	0.772	1.864	-1.440
32	ALD-06	32	18.062	39.616	0.376	ALD/CC	32	18.18	37.68	1.77	-0.118	1.936	-1.394
33	ALD-06	33	19.528	38.031	0.406	ALD/CC	33	19.88	36.33	1.45	-0.352	1.701	-1.044
34	ALD-06	34	18.655	38.579	1.034	ALD/CC	34	18.42	36.78	2.41	0.235	1.799	-1.376
35	ALD-06	35	22.638	35.834	1.014	ALD/CC	35	21.68	32.75	3.22	0.958	3.084	-2.206
36	ALD-03	36	11.319	43.809	1.424	ALD/CC	36	10.38	41.72	3.38	0.939	2.089	-1.956
37	ALD-03	37	9.926	43.939	2.305	ALD/CC	37	10.00	39.48	5.48	-0.074	4.459	-3.175
38	ALD-03	38	7.052	49.567	0.360	ALD/CC	38	6.84	48.00	1.29	0.212	1.567	-0.930
39	ALD-03	39	8.967	45.787	1.078	ALD/CC	39	9.58	42.62	3.38	-0.613	3.167	-2.302
40	ALD-03	40	15.179	40.440	1.385	ALD/CC	40	15.40	35.44	5.16	-0.221	5.000	-3.775
41	ALD-12	41	24.18	34.76	1.12	ALD/CC	41	22.84	32.75	2.09	1.340	2.010	-0.970
42	ALD-12	42	21.08	37.01	1.61	ALD/CC	42	20.08	35.89	1.93	1.000	1.120	-0.320
43	ALD-12	43	13.80	43.96	0.64	ALD/CC	43	13.52	40.37	2.58	0.280	3.590	-1.940
44	ALD-12	44	12.94	44.41	0.64	ALD/CC	44	12.50	39.03	4.03	0.440	5.380	-3.390
45	ALD-12	45	13.00	44.19	0.48	ALD/CC	45	12.10	36.33	6.12	0.900	7.860	-5.640
46	ALD-04	39	8.780	47.113	0.656	ALD/CC	46	7.96	47.70	0.64	0.820	-0.587	0.016

47	ALD-04	40	9.162	46.554	0.397	ALD/CC	47	8.36	47.56	0.48	0.802	-1.006	-0.083
48	ALD-04	41	10.704	44.178	0.743	ALD/CC	48	11.16	45.08	0.80	-0.456	-0.902	-0.057
49	ALD-04	42	14.556	41.231	1.099	ALD/CC	49	15.82	38.35	3.38	-1.264	2.881	-2.281
50	ALD-04	43	16.960	39.845	0.623	ALD/CC	50	17.76	40.15	0.96	-0.800	-0.305	-0.337

ANNEXURE-VII

**RESOURCE ESTIMATION OF EXCLUDED BOREHOLES
PRELIMINARY EXPLORATION IN ALDA BLOCK (G-3),
TEHSIL -TILDA, SIMGA & SUHELA, DISTRICT-RAIPUR & BALODABAZAR -BHATAPARA,
CHHATTISGARH**

UNEXPLORED AREA								
S. No.	BH. No.	Total Depth (m)	OB (m)	Thickness of limestone Core (m)	Area	Volume	Resource	Grade
1	2	4	5	6	7	8	9	10
1	ALD-7	50	13	13.00	480000	6240000	17.22	CC
				5.00	480000	6240000	17.22	CBB
				4.00	480000	6240000	17.22	BLENDABLE
2	ALD-8	50	13	13.00	960000	12480000	34.44	CC
				5.00	960000	12480000	34.44	CBB
				4.00	960000	12480000	34.44	BLENDABLE
3	ALD-11	50	10	35.00	480000	4800000	13.25	CBB
				5.00	480000	4800000	13.25	CC
4	ALD-14	50	13	6.00	480000	6240000	17.22	CC
				16.00	480000	4800000	13.25	BLENDABLE
TOTAL		200			2400000		211.95	

ANNEXURE-VIII-A

 Marshal Geo Test Laboratory-LLP Accredited by NABL vide Certificate number TC-13476 For Testing of Civil Engineering Materials		 TC-13476										
Test Report												
ULR-TC1347625000001464F T.R. No. / MGTL-LLP / TRR / N-0107253/R-1		Date :- 02/07/2025										
To, The Regional Head Directorate of Geology and Mining Regional Office Raipur, Sonakhan Bhawan, Ring Road No. 01, Ravigram, Raipur (C.G.) - 492001												
Subject :- Test result of Lime Stone Boulder Sample.												
Ref.:- Your Letter No.:- 1168/Geology/NMET/Alda/Limestone/N.No.01/2024 Raipur Date :- 30/06/2025												
Lab Sample ID : N-0107253/S-1												
Sample ID : ALD - 02 (As reported)												
Sir, With reference to above the test result / report is as follows: -												
Mechanical Discipline Soil and Rock (Stones/Rock)												
PARTICULAR OF SAMPLE (S) Nature:- Lime Stone Boulder Sample Test Performance Area of Lab : Concrete Testing Area Quantity Tested :- 01 Nos. Dt. of Received of Sample in the Lab :- 01/07/2025 LAB JOB NO. :- N-0107253/J-1												
Testing Date : 01/07/2025												
<table border="1"><thead><tr><th>Sr. No.</th><th>Properties</th><th>Test Method</th><th>Test Result</th><th>Unit</th></tr></thead><tbody><tr><td>1</td><td>Bulk Density</td><td>IS : 13030 - 1991</td><td>2.793</td><td>g/cc</td></tr></tbody></table>			Sr. No.	Properties	Test Method	Test Result	Unit	1	Bulk Density	IS : 13030 - 1991	2.793	g/cc
Sr. No.	Properties	Test Method	Test Result	Unit								
1	Bulk Density	IS : 13030 - 1991	2.793	g/cc								
 Verified by Dr. R. P. Hardaha (TM-II)		 Authorised Signatory Avinash Vaishampayan (TM.-I)										
Note : 1 Samples are not drawn by us, unless otherwise mentioned. 2 Samples may be destroyed / removed away from Laboratory after Testing, unless otherwise particular request is made. 3 This report in full or part may not be reproduced, published or used for any legal action unless prior permission is secured from C.E.O. MGTL-LLP Raipur. Subject to Raipur Jurisdiction. 4 Although Site name has been mentioned, MGTL-LLP is not responsible for the actual site conditions. 5 This report pertains to only sample submitted by client and tested at Raipur Laboratory. 6 Any complaint / dispute / discrepancy etc. about the contents of this report to be informed within 15 days of date of report, beyond this period no claim will be accepted.												
*****END OF REPORT *****												
												
<p>PS City Road, Near Dhelabai Sonkar ostel, Changorabhata, Ring Road No.-01 Raipur 492013 (C.G.), Ph. :+91 7879798900 E-mail : raipur.marshalllp@gmail.com Website : marshalgeoraipur.com</p> 												



Marshall Geo Test Laboratory-LLP

Accredited by NABL vide Certificate number TC-13476
For Testing of Civil Engineering Materials



Test Report

ULR-TC134762500001465F
T.R. No. / MGTL-LLP / TRR / N-0107253/R-2

Date :- 02/07/2025

To,
The Regional Head
Directorate of Geology and Mining
Regional Office Raipur, Sonakhan Bhawan, Ring Road No. 01,
Ravigram, Raipur (C.G.) - 492001.

Subject :- Test result of Lime Stone Boulder Sample.

Ref.:- Your Letter No.:- 1168/Geology/NMET/Alda/Limestone/N.No.01/2024 Raipur Date :- 30/06/2025
Lab Sample ID : N-0107253/S-2
Sample ID : ALD - 09 (As reported)

Sir,
With reference to above the test result / report is as follows: -

Mechanical Discipline Soil and Rock (Stones/Rock)


PARTICULAR OF SAMPLE (S)

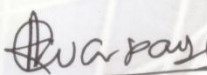
Nature:- Lime Stone Boulder Sample
Test Performance Area of Lab : Concrete Testing Area
Quantity Tested :- 01 Nos.
Dt. of Received of Sample in the Lab :- 01/07/2025

Testing Date : 01/07/2025

LAB JOB NO. :- N-0107253/J-1

Sr. No.	Properties	Test Method	Test Result	Unit
1	Bulk Density	IS : 13030 - 1991	2.780	g/cc


Verified by
Dr. R. P. Hardaha (TM-II)


Authorised Signatory
Avinash Vaishampayan (TM.-I)

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Website : marshallgeoraipur.com





Marshal Geo Test Laboratory-LLP

Accredited by NABL vide Certificate number TC-13476
For Testing of Civil Engineering Materials



Test Report

ULR-TC134762500001466F

Date :- 02/07/2025

T.R. No. / MGTL-LLP / TRR / N-0107253/R-3

To,
The Regional Head
Directorate of Geology and Mining
Regional Office Raipur, Sonakhan Bhawan, Ring Road No. 01,
Ravigram, Raipur (C.G.) - 492001.

Subject :- Test result of Lime Stone Boulder Sample.

Ref.:- Your Letter No.:- 1168/Geology/NMET/Alda/Limestone/N.No.01/2024 Raipur Date :- 30/06/2025

Lab Sample ID : N-0107253/S-3

Sample ID : ALD - 10 (As reported)

Sir,

With reference to above the test result / report is as follows: -

Mechanical Discipline

Soil and Rock (Stones/Rock)

PARTICULAR OF SAMPLE (S)

Nature:- Lime Stone Boulder Sample

Test Performance Area of Lab : Concrete Testing Area

Quantity Tested :- 01 Nos.

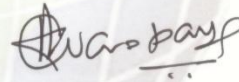
Dt. of Received of Sample in the Lab :- 01/07/2025

Testing Date :- 01/07/2025

LAB JOB NO. :- N-0107253/J-1

Sr. No.	Properties	Test Method	Test Result	Unit
1	Bulk Density	IS : 13030 - 1991	2.763	g/cc


Verified By
Dr. R. P. Hardaha (TM-II)


Authorised Signatory
Avinash Vaishampayan (TM.-I)

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PS City Road, Near Dhebabai Sonkar
ostel, Changorabhata, Ring Road No.-01
Raipur 492013 (C.G.), Ph. :+91 7879798900
E-mail : raipur_marshall.llp@gmail.com
Website : marshallgeoraipur.com





Marshal Geo Test Laboratory-LLP

Accredited by NABL vide Certificate number TC-13476
For Testing of Civil Engineering Materials



Test Report

ULR-TC134762500001467F
T.R. No. / MGTL-LLP / TRR / N-0107253/R-4

Date :- 02/07/2025

To,
The Regional Head
Directorate of Geology and Mining
Regional Office Raipur, Sonakhan Bhawan, Ring Road No. 01,
Ravigram, Raipur (C.G.) - 492001.

Subject :- Test result of Lime Stone Boulder Sample.

Ref.:- Your Letter No.:- 1168/Geology/NMET/Alda/Limestone/N.No.01/2024 Raipur Date :- 30/06/2025

Lab Sample ID : N-0107253/S-4

Sample ID : ALD - 13 (As reported)

Sir,

With reference to above the test result / report is as follows :-

Mechanical Discipline

Soil and Rock (Stones/Rock)

PARTICULAR OF SAMPLE (S)

Nature:- Lime Stone Boulder Sample

Test Performance Area of Lab : Concrete Testing Area

Quantity Tested :- 01 Nos.

Dt. of Received of Sample in the Lab :- 01/07/2025

Testing Date : 01/07/2025

LAB JOB NO. :- N-0107253/J-1

Sr. No.	Properties	Test Method	Test Result	Unit
1	Bulk Density	IS : 13030 - 1991	2.762	g/cc

Verified by
Dr. R. P. Hardaha (TM-II)

Authorised Signatory
Avinash Vaishampayan (TM.-I)

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PS City Road, Near Dhelabai Sonkar
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E-mail : raipur.marshalllp@gmail.com
Website : marshallgeoraipur.com





Marshal Geo Test Laboratory-LLP

Accredited by NABL vide Certificate number TC-13476
For Testing of Civil Engineering Materials



Test Report

ULR-TC134762500001468F
T.R. No. / MGTL-LLP / TRR / N-0107253/R-5

Date :- 02/07/2025

To,
The Regional Head
Directorate of Geology and Mining
Regional Office Raipur, Sonakhan Bhawan Ring Road No. 01,
Ravigram, Raipur (C.G.) - 492001.

Subject :- Test result of Lime Stone Boulder Sample.

Ref.:- Your Letter No.:- 1168/Geology/NMET/Alda/Limestone/N.No.01/2024 Raipur Date :- 30/06/2025

Lab Sample ID : N-0107253/S-5

Sample ID : ALD - 16 (As reported)

Sir,

With reference to above the test result / report is as follows: -

Mechanical Discipline

Soil and Rock (Stones/Rock)

PARTICULAR OF SAMPLE (S)

Nature:- Lime Stone Boulder Sample

Test Performance Area of Lab : Concrete Testing Area

Quantity Tested :- 01 No.

Dt. of Received of Sample in the Lab :- 01/07/2025

Testing Date : 01/07/2025

LAB JOB NO. :- N-0107253/J-1

Sr. No.	Properties	Test Method	Test Result	Unit
1	Bulk Density	IS : 13030 - 1991	2.728	g/cc

Verified by
Dr. R. P. Hardaha (TM-II)

Authorised Signatory
Avinash Vaishampayan (TM.-I)

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E-mail : raipur.marshall.llp@gmail.com
Website : marshallgeoaripur.com



ANNEXURE-VIII-B

 Marshal Geo Test Laboratory - LLP Accredited by NABL vide Certificate number TC-13476 For Testing of Civil Engineering Materials		 TC-13476		
Test Report				
ULR-TC134762500001636F T.R. No. / MGTL-LLP / TRR / N-2207253/R-1		Date :- 24/07/2025		
To, The Regional Head Directorate of Geology and Mining Regional Office Raipur, Sonakhan Bhawan, Ring Road No. 01, Ravigram, Raipur (C.G.) - 492001				
Subject :- Test result of Specific Gravity of Lime Stone Boulder Sample. Ref.:- Your Letter No.:- 1348/Geology/NMET/Alda/Limestone/N.No.01/2024 Raipur Date :- 22/07/2025 Lab Sample ID : N-2207253/S-1 Sample ID : ALD - 02 (As reported)				
Sir, With reference to above the test result / report is as follows: -				
Mechanical Discipline Soil and Rock (Stones/Rock)				
PARTICULAR OF SAMPLE (S) Nature:- Lime Stone Boulder Sample Test Performance Area of Lab : Concrete Testing Area Quantity Tested :- 01 Nos. Dt. of Received of Sample in the Lab :- 22/07/2025 Testing Date : 24/07/2025 LAB JOB NO. :- N-2207253/J-1				
Sr. No.	Properties	Test Method	Test Result	Unit
1	Specific Gravity	IS : 2386 Part-3 : 1963	2.741	--
Verified by  Dr. R. P. Hardaha (TM-II)		Authorised Signatory  Arun Bhawe (CEO)		
Note : 1 Samples are not drawn by us, unless otherwise mentioned. 2 Samples may be destroyed / removed away from Laboratory after Testing, unless otherwise particular request is made. 3 This report in full or part may not be reproduced, published or used for any legal action unless prior permission is secured from C.E.O. MGTL-LLP Raipur. Subject to Raipur Jurisdiction. 4 This report pertains to only sample submitted by client and tested at Raipur Laboratory. 5 Any complaint / dispute / discrepancy etc. about the contents of this report to be informed within 15 days of date of report, beyond this period no claim will be accepted.				
*****END OF REPORT*****				
PS City Road, Near Dhebabai Sonkar Hostel, Changorabhata, Ring Road No.-01 Raipur 492013 (C.G.), Ph. : +91 7879798900 E-mail : raipur.marshalllp@gmail.com Website : marshallgeoraipur.com				



Marshal Geo Test Laboratory - LLP

Accredited by NABL vide Certificate number TC-13476
For Testing of Civil Engineering Materials



Test Report

ULR-TC134762500001637F

T.R. No. / MGTL-LLP / TRR / N-2207253/R-2

Date :- 24/07/2025

To,
The Regional Head
Directorate of Geology and Mining
Regional Office Raipur, Sonakhan Bhawan, Ring Road No. 01,
Ravigram, Raipur (C.G.) - 492001

Subject :- Test result of Specific Gravity of Lime Stone Boulder Sample.

Ref:- Your Letter No.:- 1348/Geology/NMET/Alda/Limestone/N.No.01/2024 Raipur Date :- 22/07/2025

Lab Sample ID : N-2207253/S-2

Sample ID : ALD - 09 (As reported)

Sir,
With reference to above the test result / report is as follows: -

Mechanical Discipline Soil and Rock (Stones/Rock)

PARTICULAR OF SAMPLE (S)

Nature:- Lime Stone Boulder Sample

Test Performance Area of Lab : Concrete Testing Area

Quantity Tested :- 01 No.

Dt. of Received of Sample in the Lab :- 22/07/2025

Testing Date : 24/07/2025

LAB JOB No. :- N-2207253/J-1

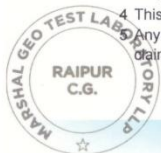
Sr. No.	Properties	Test Method	Test Result	Unit
1	Specific Gravity	IS : 2386 Part-3 : 1963	2.735	--

Verified by
Dr. R. P. Hardaha (TM-II)

Authorised Signatory
Arun Bhave (CEO)

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*****END OF REPORT*****

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Iostel, Changorabhata, Ring Road No.-01
Raipur 492013 (C.G.), Ph. :+91 7879798900
E-mail : raipur.marshall.llp@gmail.com
Website : marshallgeoraipur.com





Marshal Geo Test Laboratory-LLP

Accredited by NABL vide Certificate number TC-13476
For Testing of Civil Engineering Materials



Test Report

ULR-TC134762500001638F

Date :- 24/07/2025

T.R. No. / MGTL-LLP / TRR / N-2207253/R-3

To,
The Regional Head
Directorate of Geology and Mining
Regional Office Raipur, Sonakhan Bhawan, Ring Road No. 01,
Ravigram, Raipur (C.G.) - 492001

Subject :- Test result of Specific Gravity of Lime Stone Boulder Sample.

Ref.:- Your Letter No.:- 1348/Geology/NMET/Alda/Limestone/N.No.01/2024 Raipur Date :- 22/07/2025

Lab Sample ID : N-2207253/S-3

Sample ID : ALD - 10 (As reported)

Sir,

With reference to above the test result / report is as follows: -

Mechanical Discipline

Soil and Rock (Stones/Rock)

PARTICULAR OF SAMPLE (S)

Nature:- Lime Stone Boulder Sample

Test Performance Area of Lab : Concrete Testing Area

Quantity Tested :- 01 No.

Dt. of Received of Sample in the Lab :- 22/07/2025

Testing Date : 24/07/2025

LAB JOB No. :- N-2207253/J-1

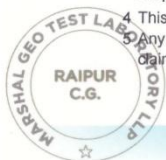
Sr. No.	Properties	Test Method	Test Result	Unit
1	Specific Gravity	IS : 2386 Part-3 : 1963	2.768	--

Verified by
Dr. R. P. Hardaha (TM-II)

Authorised Signatory
Arun Bhawe (CEO)

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tostel, Changorabhata, Ring Road No.-01
Raipur 492013 (C.G.), Ph. :+91 7879798900
E-mail : raipur.marshall.llp@gmail.com
Website : marshallgeoraipur.com





Marshal Geo Test Laboratory-LLP

Accredited by NABL vide Certificate number TC-13476
For Testing of Civil Engineering Materials



Test Report

ULR-TC1347625000001639F

T.R. No. / MGTL-LLP / TRR / N-2207253/R-4

Date :- 24/07/2025

To,
The Regional Head
Directorate of Geology and Mining
Regional Office Raipur, Sonakhan Bhawan, Ring Road No. 01,
Ravigram, Raipur (C.G.) - 492001

Subject :- Test result of Specific Gravity of Lime Stone Boulder Sample.

Ref.:- Your Letter No.:- 1348/Geology/NMET/Alda/Limestone/N.No.01/2024 Raipur Date :- 22/07/2025

Lab Sample ID : N-2207253/S-4

Sample ID : ALD - 13 (As reported)

Sir,

With reference to above the test result / report is as follows: -

Mechanical Discipline

Soil and Rock (Stones/Rock)

PARTICULAR OF SAMPLE (S)

Nature:- Lime Stone Boulder Sample

Test Performance Area of Lab : Concrete Testing Area

Quantity Tested :- 01 No

Dt. of Received of Sample in the Lab :- 22/07/2025

Testing Date : 24/07/2025

LAB JOB No. :- N-2207253/J-1

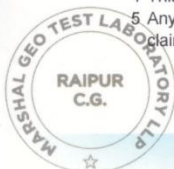
Sr. No.	Properties	Test Method	Test Result	Unit
1	Specific Gravity	IS : 2386 Part-3 : 1963	2.765	--

Verified by
Dr. R. P. Hardaha (TM-II)

Authorised Signatory
Arun Bhawe (CEO)

Note :

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PS City Road, Near Dhelebai Sonkar
Hostel, Changorabhata, Ring Road No.-01
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E-mail : raipur_marshall.llp@gmail.com
Website : marshallgeoraiipur.com





Marshall Geo Test Laboratory-LLP

Accredited by NABL vide Certificate number TC-13476
For Testing of Civil Engineering Materials



Test Report

ULR-TC134762500001640F

T.R. No. / MGTL-LLP / TRR / N-2207253/R-5

Date :- 24/07/2025

To,
The Regional Head
Directorate of Geology and Mining
Regional Office Raipur, Sonakhan Bhawan, Ring Road No. 01,
Ravigram, Raipur (C.G.) - 492001

Subject :- Test result of Specific Gravity of Lime Stone Boulder Sample.

Ref.:- Your Letter No.:- 1348/Geology/NMET/Alda/Limestone/N.No.01/2024 Raipur Date :- 22/07/2025

Lab Sample ID : N-2207253/S-5

Sample ID : ALD - 16 (As reported)

Sir,
With reference to above the test result / report is as follows: -

Mechanical Discipline
Soil and Rock (Stones/Rock)

PARTICULAR OF SAMPLE (S)

Nature:- Lime Stone Boulder Sample
Test Performance Area of Lab : Concrete Testing Area
Quantity Tested :- 01 No.
Dt. of Received of Sample in the Lab :- 22/07/2025

Testing Date : 24/07/2025

LAB JOB No. :- N-2207253/J-1

Sr. No.	Properties	Test Method	Test Result	Unit
1	Specific Gravity	IS : 2386 Part-3 : 1963	2.722	--

Verified by
Dr. R. P. Hardaha (TM-II)

Authorised Signatory
Arun Bhawe (CEO)

Note :

- 1 Samples are not drawn by us, unless otherwise mentioned.
- 2 Samples may be destroyed / removed away from Laboratory after Testing, unless otherwise particular request is made.
- 3 This report in full or part may not be reproduced, published or used for any legal action unless prior permission is secured from C.E.O. MGTL-LLP Raipur. Subject to Raipur Jurisdiction.
- 4 Although Site name has been mentioned, MGTL-LLP is not responsible for the actual site conditions.
- 5 This report pertains to only sample submitted by client and tested at Raipur Laboratory.
- 6 Any complaint / dispute / discrepancy etc. about the contents of this report to be informed within 15 days of date of report, beyond this period no claim will be accepted.



*****END OF REPORT *****

PS City Road, Near Dhelabai Sonkar
Hostel, Changorabhata, Ring Road No.-01
Raipur 492013 (C.G.), Ph. :+91 7879798900
E-mail : raipur.marshall.llp@gmail.com
Website : marshallgeoraipur.com



ANNEXURE-IX

COMMENTS / REPLY ON NOTE OF PEER REVIEWER

SHRI B.P. RATURI / GM EXPLORATION AND GEOLOGICAL SERVICES (RETIRED MINERAL EXPLORATION CORPORATION LIMITED)

1- In the Plate No.-2 Contour map of the block, the values of the contour line surrounding the drilled boreholes are not matching and very much on higher/lower side e.g. borehole No. ALD-9, the reduced level is 268.175m, whereas the surrounding contour line shows values of 321 & 328. The same may be examined & explained.

- *The discrepancy has been resolved and incorporated into concern contour map.*

2- The scale in the Index list of Plates is shown as RF 1:4000 but same is not matching in the Plates No. 2,3,4, where it comes around 1:4255 the same may be corrected.

- *Correction has been made as per comments of Peer Reviewer.*

3- DGM, Chhattisgarh has indicate three cut off grades (i- Cement Grade >44.00 CaO, <3.5% MgO & 16% SiO₂, ii- Cement Blendable (Beneficial) Grade- >38% to 44% CaO, < 5% MgO & <18% SiO₂ and iii- Blendable Grade- >34% to 38% CaO) for delineation of different category of limestone mineralised zones. There is slight variations observed in delineation of mineralised zones as per cut off and given in the following tables for all the three cut offs which looks better correlation of zones in Geological Cross Sections (Plates No. 6(A), 6(B), 6(C), 6(D), & 6(E).

Details of Cement Grade limestone mineralised Zones, intersected in Boreholes drilled by DGM, Chhattisgarh in Alda Limestone Block							
S. No.	BH. No.	Depth of mineralised Zone Intersected			Chemical analysis		
		From(m)	To(m)	Thickness (m)	CaO %	SiO ₂ %	MgO %
1	ALD-1	6.00	50.00	44.00	46.03	9.54	0.92
2	ALD-2	13.00	36.00	23.00	44.44	10.754	1.53
		47.00	54.00	7.00	44.63	10.73	1.88
3	ALD-3	9.00	48.00	39.00	45.65	11.66	0.59
4	ALD-4	2.00	48.00	46.00	44.61	11.05	0.81
5	ALD-5	12.00	17.00	5.00	44.39	9.61	0.91

		30.00	37.00	7.00	44.24	9.52	1.04
6	ALD-6	9.00	38.00	29.00	49.12	8.53	0.33
7	ALD-9	17.50	25.00	7.50	48.48	11.21	1.18
8	ALD-10	13.00	31.00	18.00	47.61	7.04	1.68
9	ALD-12	45.00	50.00	5.00	44.28	12.56	0.90
10	ALD-13	6.60	29.10	22.50	44.42	10.09	0.81
11	ALD-15	13.60	19.10	5.50	44.06	11.35	0.64
12	ALD-16	9.00	17.00	8.00	44.62	10.40	0.59
		46.00	48.00	2.00	45.14	10.16	0.56

Details of Cement Blendable (Beneficial) Grade limestone mineralised Zones, intersected in Boreholes drilled by DGM, Chhattisgarh in Alda Limestone Block							
S. No.	BH. No.	Depth of mineralised Zone Intersected			Chemical analysis		
		From(m)	To(m)	Thickness (m)	CaO %	SiO ₂ %	MgO %
1	ALD-2	6.00	9.00	3.00	38.20	20.93	0.80
		36.00	47.00	11.00	41.49	14.21	1.70
		54.00	61.00	7.00	40.82	14.90	1.54
2	ALD-3	4.00	9.00	5.00	42.70	14.85	0.38
		48.00	50.00	2.00	40.09	17.45	0.38
3	ALD-4	48.00	50.00	2.00	40.54	15.76	0.86
4	ALD-5	4.00	12.00	8.00	42.41	12.27	0.84
		17.00	30.00	13.00	41.49	12.64	1.05
5	ALD-6	5.70	9.00	3.30	43.21	14.37	0.09
		38.00	44.00	6.00	39.51	17.88	0.46
6	ALD-9	13.50	17.50	4.00	42.22	14.43	1.23
		25.00	29.00	4.00	40.04	16.34	1.45
7	ALD-10	9.00	13.00	4.00	42.17	11.62	2.94
		31.00	47.00	16.00	41.43	14.31	1.63
8	ALD-12	8.00	34.00	26.00	39.65	13.24	4.03
9	ALD-13	5.10	6.60	1.50	42.63	11.40	0.80
		29.10	50.00	20.90	39.48	15.53	0.83

10	ALD-15	19.10	30.10	11.00	42.19	13.71	0.50
11	ALD-16	17.00	34.00	17.00	38.37	16.88	0.62

Details of Cement Grade limestone mineralised Zones, intersected in Boreholes drilled by DGM, Chhattisgarh in Alda Limestone Block							
S. No.	BH. No.	Depth of mineralised Zone Intersected			Chemical analysis		
		From(m)	To(m)	Thickness (m)	CaO %	SiO ₂ %	MgO %
1	ALD-2	10.00	13.00	3.00	35.87	21.43	2.70
		66.00	79.00	13.00	35.08	22.14	2.08
2	ALD-5	43.00	50.00	7.00	36.61	20.60	1.15
3	ALD-6	44.00	49.00	5.00	34.83	24.64	2.00
4	ALD-9	29.00	39.00	10.00	35.99	18.93	1.63
5	ALD-10	47.00	51.00	4.00	34.91	23.79	1.35
6	ALD-12	34.00	45.00	11.00	36.86	21.19	1.35
7	ALD-15	30.10	35.10	5.00	35.05	21.282	0.70
8	ALD-16	36.00	39.00	3.00	35.85	18.66	0.75

- As per end use grade classification of IBM, the resource estimation of limestone of Alda block has been carried out which mentioned below.

Grade	CaO%	MgO% (Max)
Cement (Portland)	44 to 52	3.50
Cement Blendable (benificiable)	38 to 44	5.00
Blendable	34 (Minimum)	-

The bands of limestone containing CaO 38% to 44% found in between the two bands (upper & lower band) having the CaO content of 44% or above have been merged as a whole for computation of resource estimation for cement (Portland) grade.

In addition to above, about 16% of SiO₂ content has considered for the resource estimation of cement grade limestone whereas in cement blandable beneficiable grade of limestone resources, maximum 18 % of SiO₂ has taken into consideration.

The DGM Chhattisgarh is practicing in respect of computation of mineral resource accordingly and preparation of auctionable blocks of limestone have been prepared and successfully auctioned since the MEMC Rule 2015 and MAC Rule 2015 (as amended) came into forced .

4- In view of changes in delineation of limestone mineralised zones, the corresponding corrections in the text, Annexure & plates may be incorporated.

- ***As per suggestions of Peer Reviewer, the same has been corrected and incorporated.***

5- DGM, Chhattisgarh has carried out bulk density & specific gravity determination sample studies and the average bulk density of 4 (four) sample studies is 3.06 gm/sec and 5(five) No. of borehole core sample studies for specific gravity determination with average estimation and it seems to be on the higher side, hence it is suggested to consider the average specific gravity of 2.77 for estimation of resources.

- ***The average specific gravity of 2.77 has been considered for computation of mineral resources as per the suggestion of Peer Reviewer.***

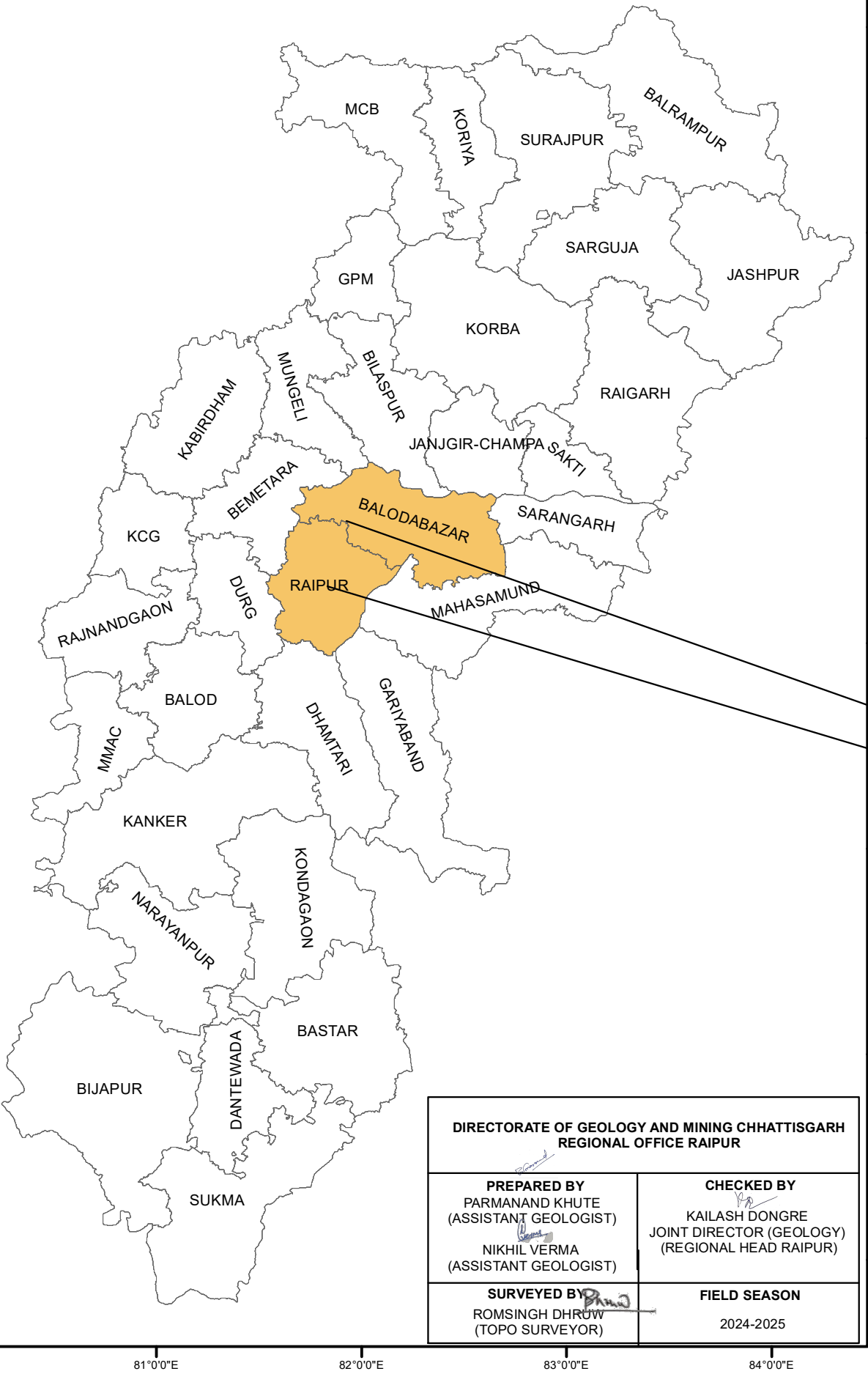
6- DGM, Chhattisgarh has estimated limestone resources only by Polygon method. if possible , try for resource estimation by cross section method, which will help in comparative study of resource estimation by two methods.

- ***Both the polygonal and cross section method has applied for resource estimation as per the suggestion of Peer Reviewer. The comparative resource estimation table has been appended in the GR.***

7- In addition to the above, the correction suggested in the Text, Annexure, and Plates may be attended.

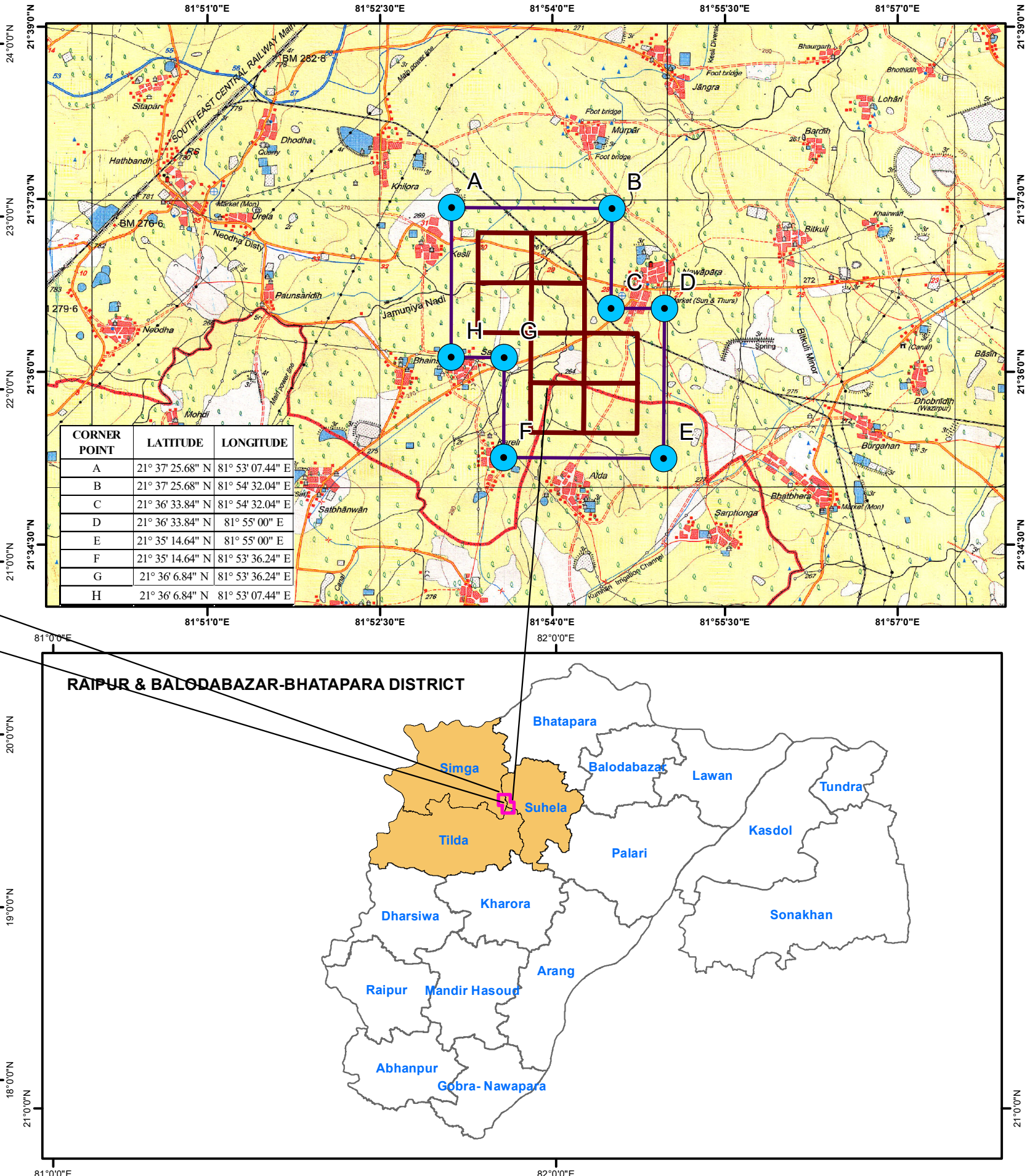
The point wise corrections are made and respective annexures and plates have been appended accordingly.

CHHATTISGARH STATE

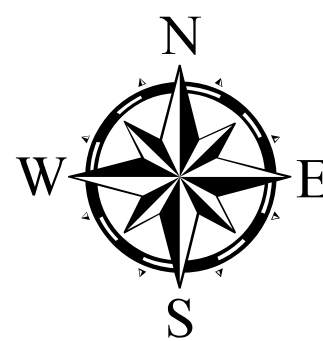


DIRECTORATE OF GEOLOGY AND MINING CHHATTISGARH REGIONAL OFFICE RAIPUR	
PREPARED BY PARMANAND KHUTE (ASSISTANT GEOLOGIST) NIKHIL VERMA (ASSISTANT GEOLOGIST)	CHECKED BY KAILASH DONGRE JOINT DIRECTOR (GEOLOGY) (REGIONAL HEAD RAIPUR)
SURVEYED BY ROMSINGH DHRUW (TOPO SURVEYOR)	FIELD SEASON 2024-2025

LOCATION MAP OF ALDA LIMESTONE EXPLORATION BLOCK(G-3)
TEHSIL-TILDA,SIMGA & SUHELA,
DISTRICT-RAIPUR & BALODABAZAR-BHATAPARA, CHHATTISGARH



CONTOUR MAP OF ALDA LIMESTONE EXPLORED BLOCK (STAGE - G3)
TEHSIL -TILDA, SIMGA & SUHELA, DISTRICT - RAIPUR & BALODA-BAZAR BHATAPARA (CG)



81°54'0"E

81°55'0"E

21°37'0"N

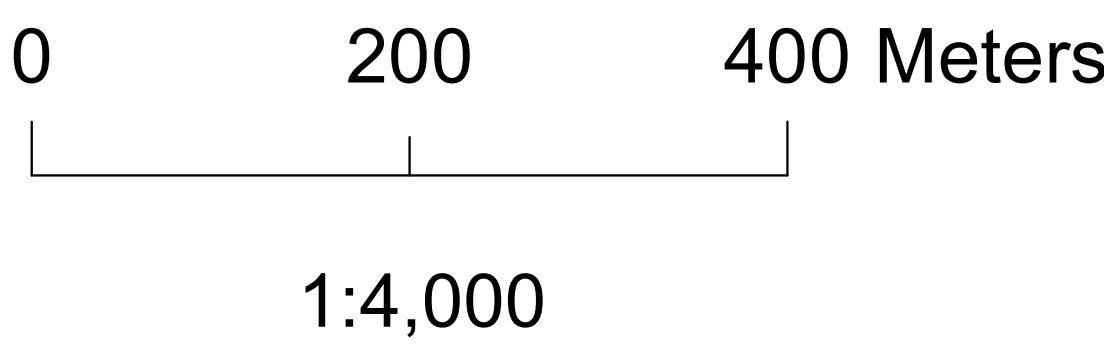
21°36'0"N

21°37'0"N

21°36'0"N

81°54'0"E

81°55'0"E



CORNER POINT	LATITUDE	LONGITUDE
A	21° 37' 25.68" N	81° 53' 07.44" E
B	21° 37' 25.68" N	81° 54' 32.04" E
C	21° 36' 33.84" N	81° 54' 32.04" E
D	21° 36' 33.84" N	81° 55' 00" E
E	21° 35' 14.64" N	81° 55' 00" E
F	21° 35' 14.64" N	81° 53' 36.24" E
G	21° 36' 6.84" N	81° 53' 36.24" E
H	21° 36' 6.84" N	81° 53' 07.44" E

Legend

- UNDRILLED BOREHOLE
- DRILLED BOREHOLE
- CORNER POINT
- CONTOUR LINE
- GRID LINE
- EXPLORED AREA

DIRECTORATE OF GEOLOGY AND MINING CHHATTISGARH
REGIONAL OFFICE RAIPUR

PREPARED BY
PARMANAND KHUTE
(ASSISTANT GEOLOGIST)
NIKHIL VERMA
(ASSISTANT GEOLOGIST)

CHECKED BY
KAILASH DONGRE
JOINT DIRECTOR (GEOLOGY)
(REGIONAL HEAD RAIPUR)

SURVEYED BY
ROMSINGH DHURUW
(TOPO SURVEYOR)

FIELD SEASON
2024-2025

ALD-1
RL-265.543m
TD-50m
OB-6m

ALD-2
RL-263.637m
TD-79m
OB-6m

ALD-3
RL-261.549m
TD-50m
OB-4m

ALD-4
RL-263.985m
TD-50m
OB-1.8m

ALD-5
RL-263.886m
TD-50m
OB-4m

ALD-6
RL-266.74m
TD-50m
OB-5.7m

ALD-7

ALD-8

ALD-9
RL-268.175m
TD-50m
OB-13.5m

ALD-10
RL-275.094m
TD-51m
OB-9m

ALD-11

ALD-12
RL-269.96m
TD-50m
OB-3m

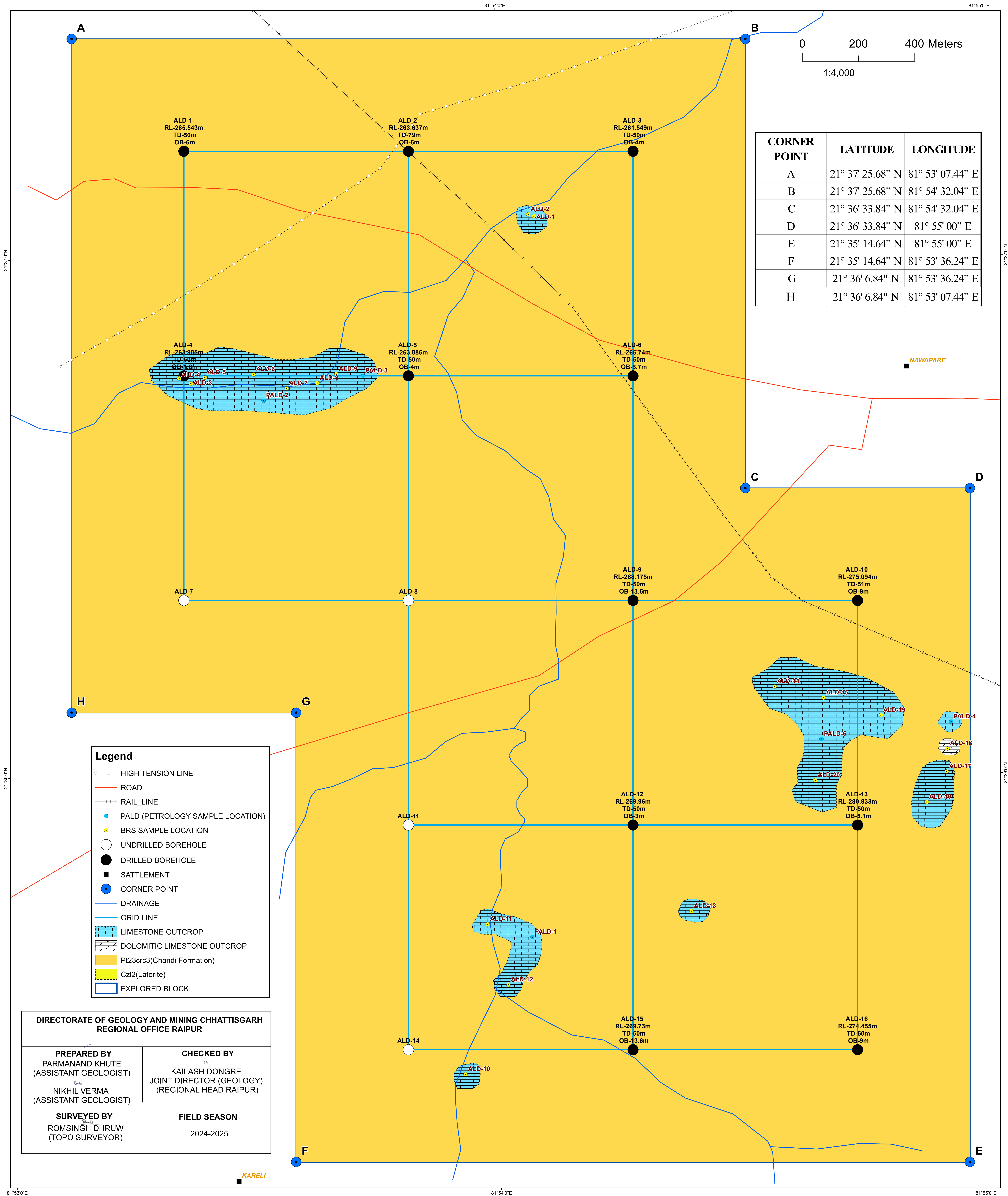
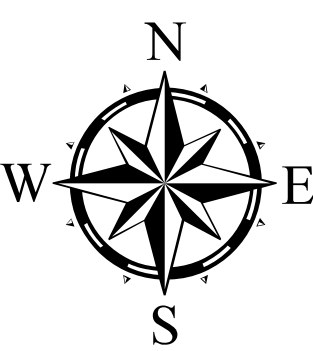
ALD-13
RL-280.833m
TD-50m
OB-5.1m

ALD-14

ALD-15
RL-269.73m
TD-50m
OB-13.6m

ALD-16
RL-274.455m
TD-50m
OB-9m

DETAILED GEOLOGICAL MAP OF ALDA LIMESTONE EXPLORED BLOCK (STAGE - G3)
TEHSIL -TILDA, SIMGA & SUHELA, DISTRICT - RAIPUR & BALODA-BAZAR BHATAPARA (CG)



CORNER POINT	LATITUDE	LONGITUDE
A	21° 37' 25.68" N	81° 53' 07.44" E
B	21° 37' 25.68" N	81° 54' 32.04" E
C	21° 36' 33.84" N	81° 54' 32.04" E
D	21° 36' 33.84" N	81° 55' 00" E
E	21° 35' 14.64" N	81° 55' 00" E
F	21° 35' 14.64" N	81° 53' 36.24" E
G	21° 36' 6.84" N	81° 53' 36.24" E
H	21° 36' 6.84" N	81° 53' 07.44" E

- Legend**
- HIGH TENSION LINE
 - ROAD
 - RAIL_LINE
 - PALD (PETROLOGY SAMPLE LOCATION)
 - BRS SAMPLE LOCATION
 - UNDRILLED BOREHOLE
 - DRILLED BOREHOLE
 - SATTLEMENT
 - CORNER POINT
 - DRAINAGE
 - GRID LINE
 - LIMESTONE OUTCROP
 - DOLOMITIC LIMESTONE OUTCROP
 - Pl23crc3(Chandi Formation)
 - CzI2(Laterite)
 - EXPLORED BLOCK

DIRECTORATE OF GEOLOGY AND MINING CHHATTISGARH
REGIONAL OFFICE RAIPUR

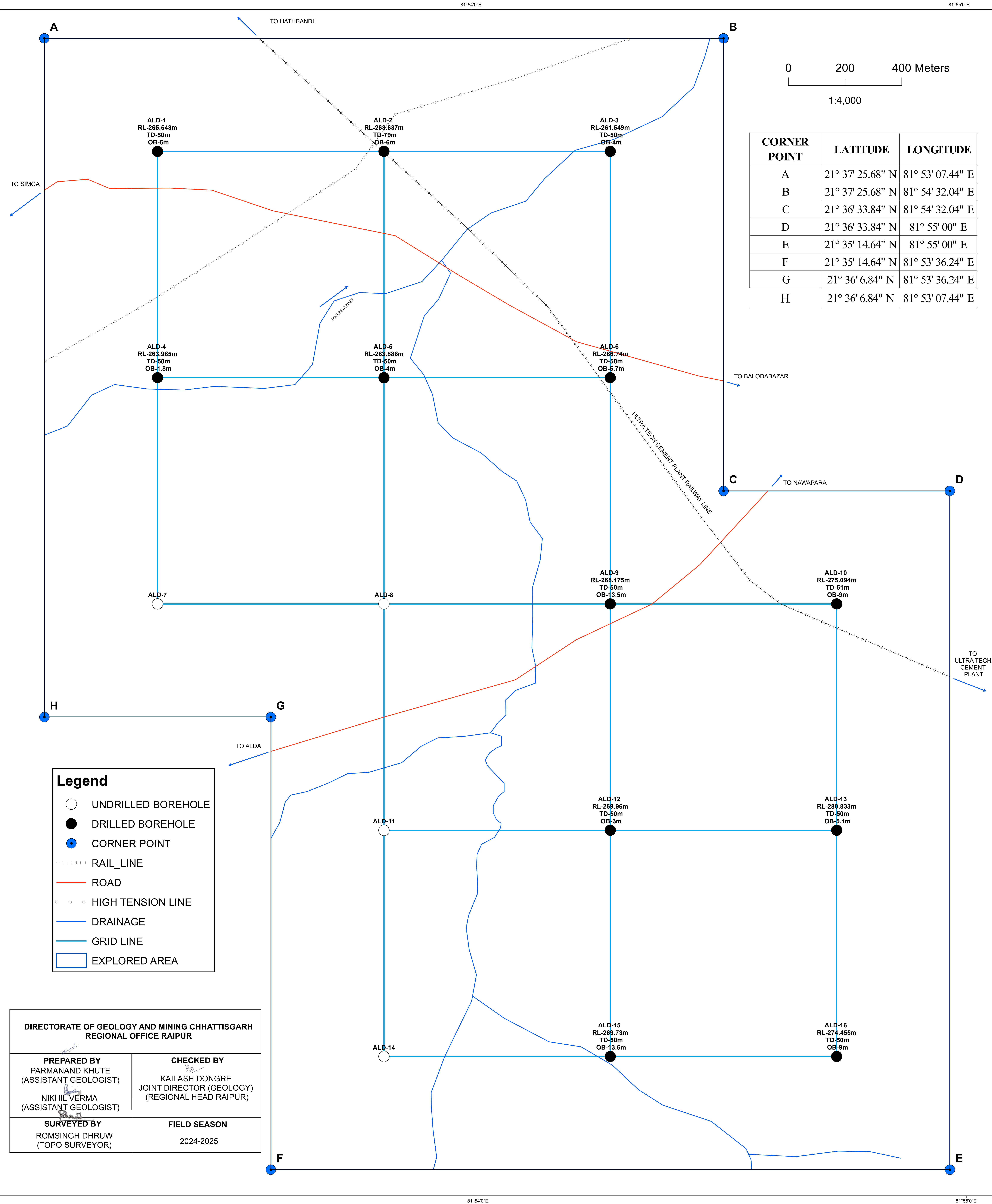
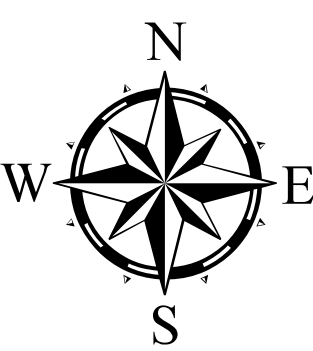
PREPARED BY
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(ASSISTANT GEOLOGIST)
NIKHIL VERMA
(ASSISTANT GEOLOGIST)

CHECKED BY
KAILASH DONGRE
JOINT DIRECTOR (GEOLOGY)
(REGIONAL HEAD RAIPUR)

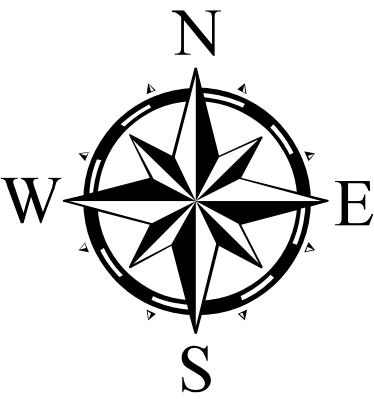
SURVEYED BY
ROMSINGH DHRUW
(TOPO SURVEYOR)

FIELD SEASON
2024-2025

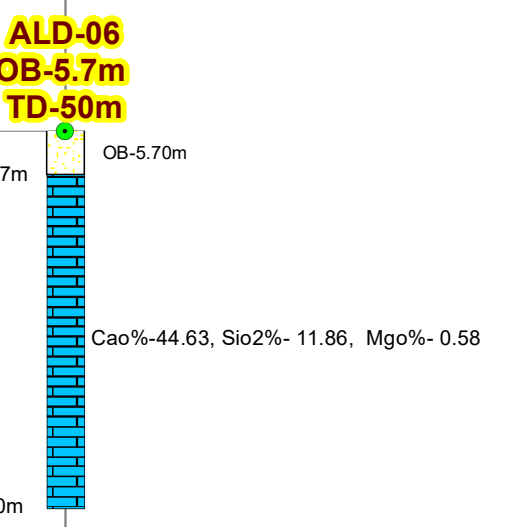
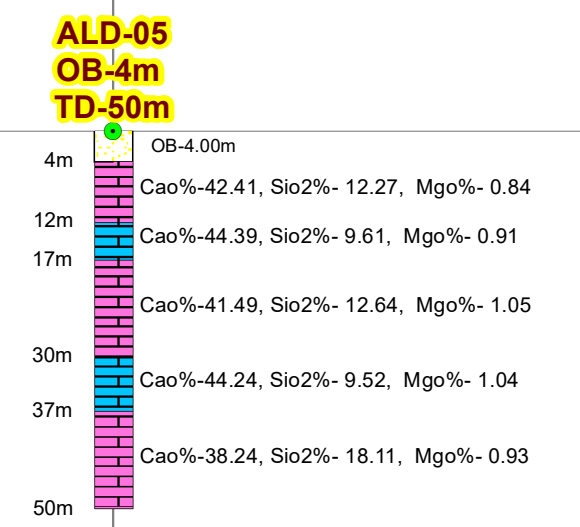
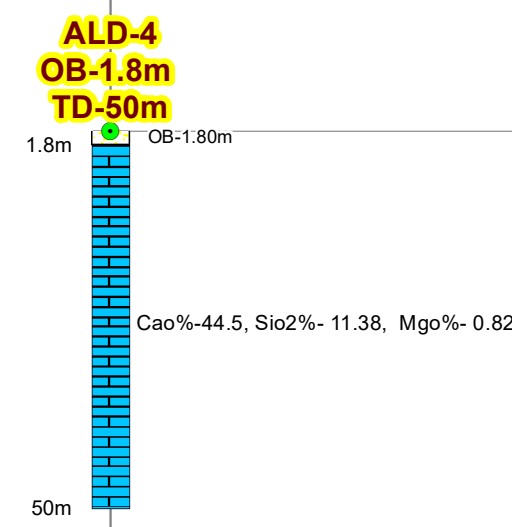
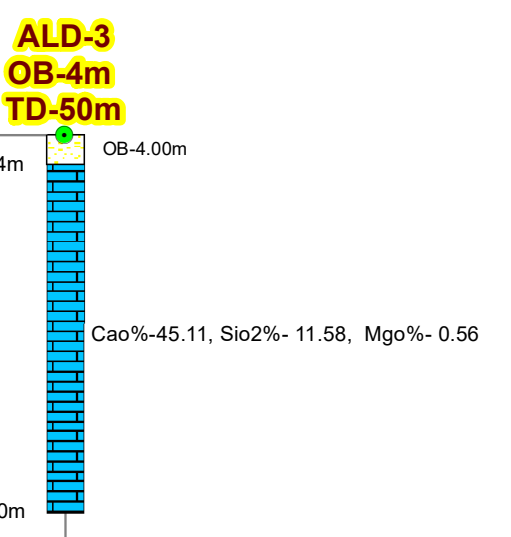
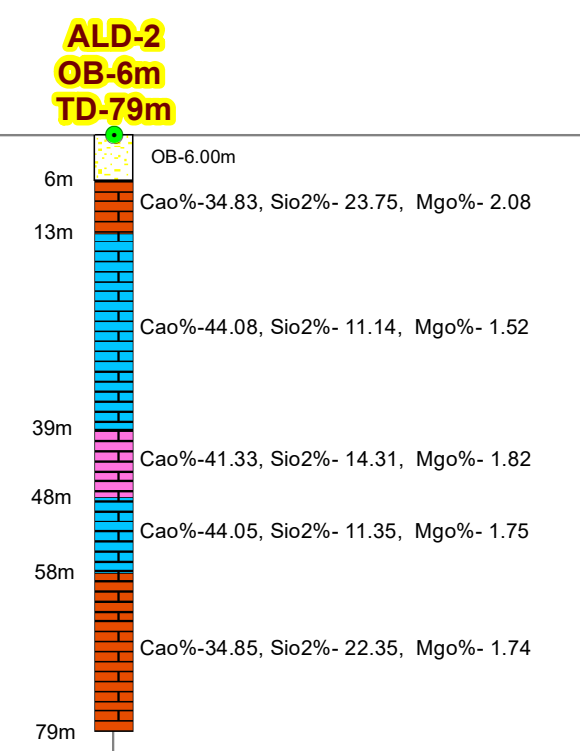
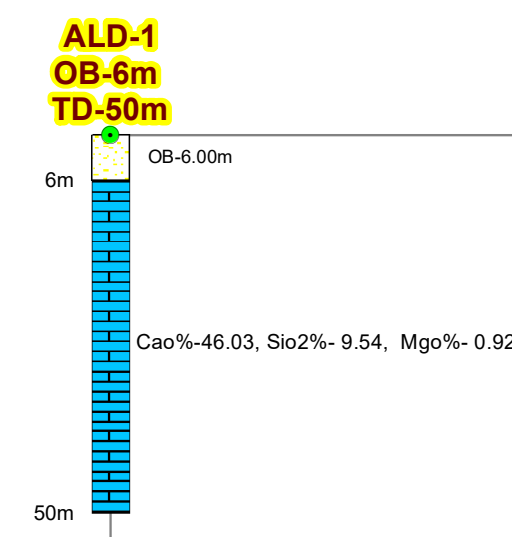
GRID PLAN MAP OF ALDA LIMESTONE EXPLORED BLOCK (STAGE - G3)
TEHSIL -TILDA, SIMGA & SUHELA, DISTRICT - RAIPUR & BALODA-BAZAR BHATAPARA (CG)



LITHOLOG OF BOREHOLES DRILLED BY DGM CHHATTISGARH
ALDA LIMESTONE EXPLORATION BLOCK
TEHSIL- TILDA , SIMGA & SUHELA, DISTRICT- RAIPUR & BALODABAZAR-BHATAPARA
(PART OF TOPOSHEET NO.64 G/14)

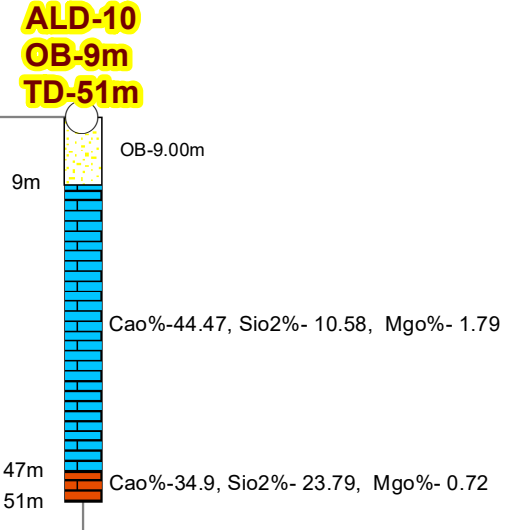
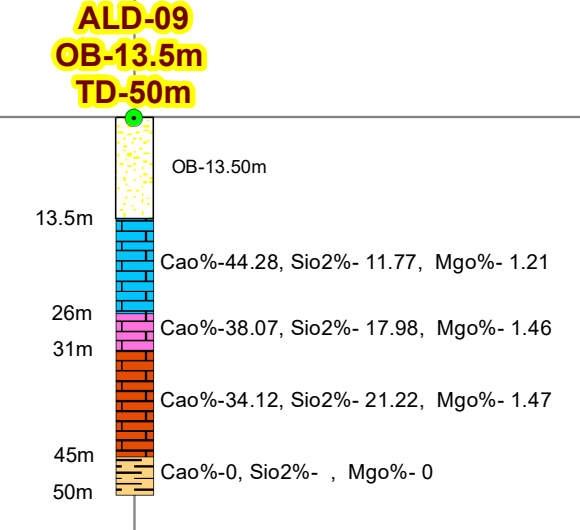


CORNER POINT	LATITUDE	LONGITUDE
A	21° 37' 25.68" N	81° 53' 07.44" E
B	21° 37' 25.68" N	81° 54' 32.04" E
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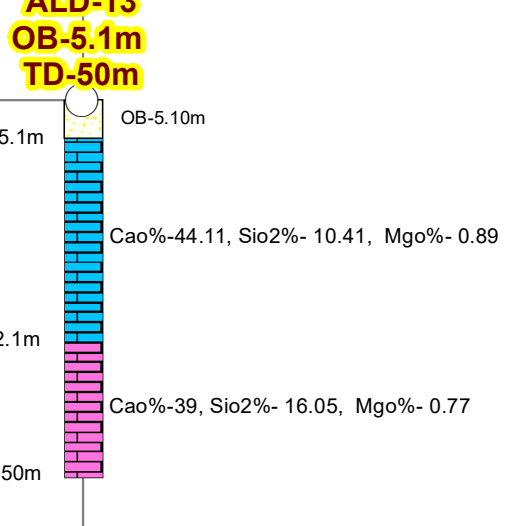
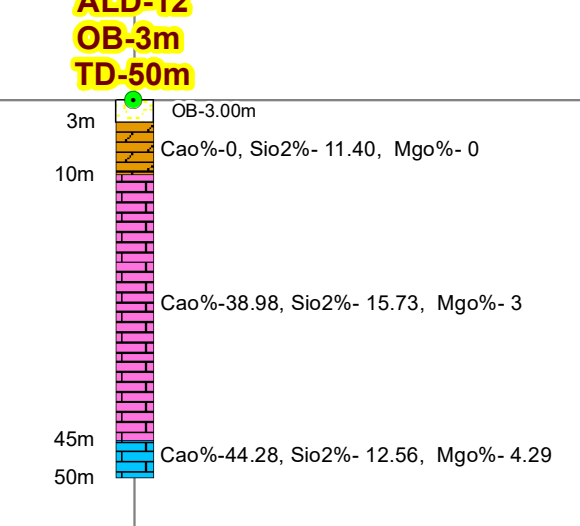


ALD-7

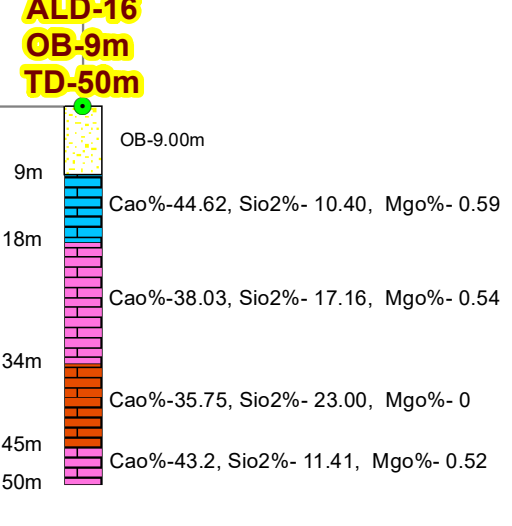
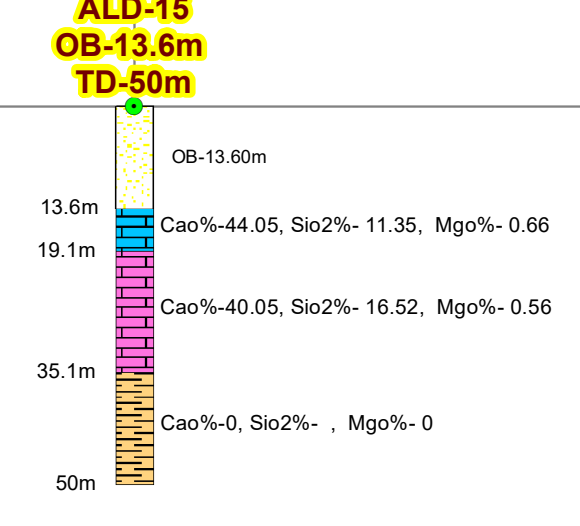
ALD-8



ALD-11



ALD-14



DIRECTORATE OF GEOLOGY AND MINING CHHATTISGARH
REGIONAL OFFICE RAIPUR

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SUPERVISION / CHECKED BY

KAILASH DONGRE
JOINT DIRECTOR (GEOLOGY)
(REGIONAL HEAD RAIPUR)

SURVEYED BY
ROMSINGH DHURUW
(TOPO SURVEYOR)

FIELD SEASON
2024-2025

VERTICAL SCALE

SCALE 1:1,000

0 10 20 30 40 50 Meters



HORIZONTAL SCALE

SCALE 1:4,000

0 40 80 160 240 Meters

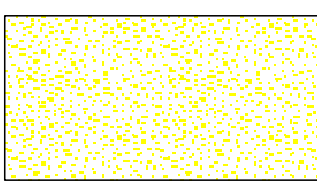


LEGEND

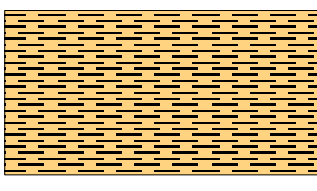
● BOREHOLE DRILLED
○ BOREHOLE UNDRILLED

□ GRID LINE

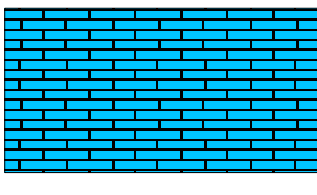
□ BLOCK BOUNDARY



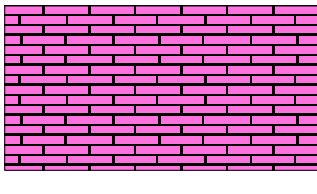
Over burden



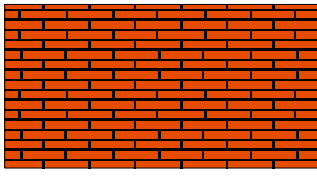
Shale



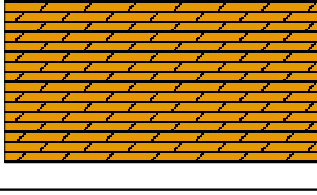
Cement Grade Limestone



Cement Blendable/Beneficiable Grade Limestone



Blendable Grade Limestone

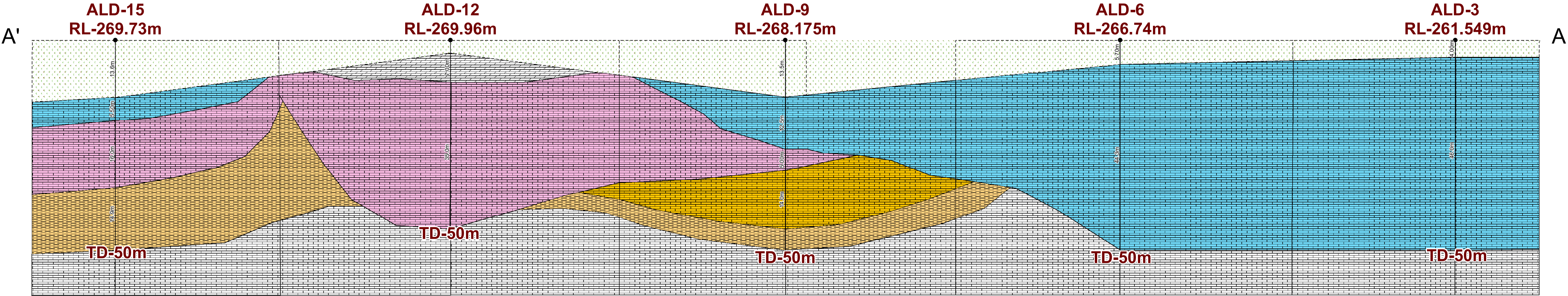


Low Grade (dolomitic) Limestone

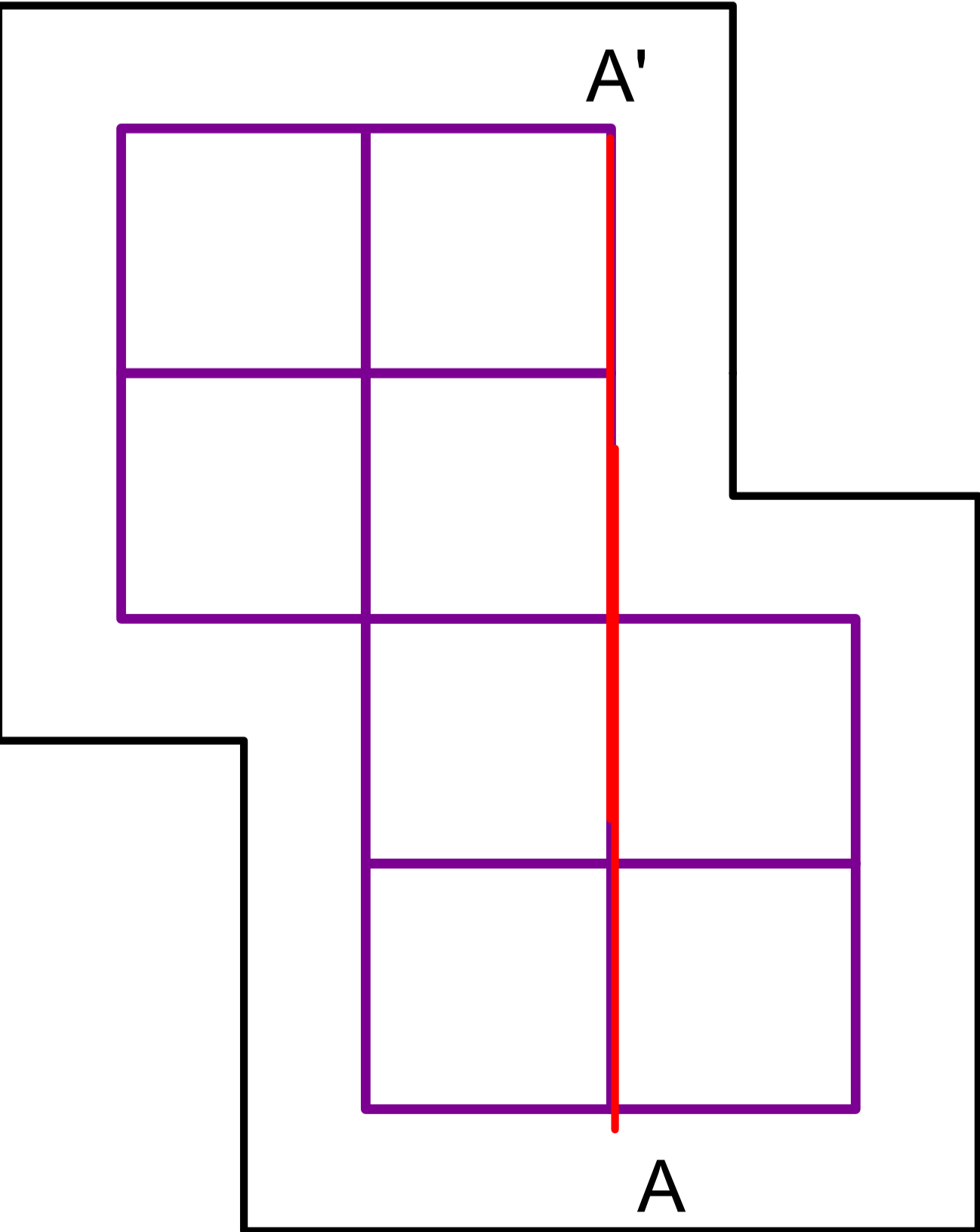
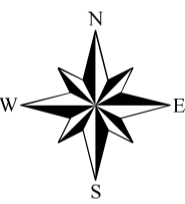
CROSS SECTION ALONG SECTION LINE AA' OF ALDA LIMESTONE EXPLORED BLOCK (STAGE - G3)

TEHSIL -TILDA, SIMGA & SUHELA, DISTRICT - RAIPUR & BALODA-BAZAR BHATAPARA (CG)

Plate No. - 6 (A)



GRID PLAN &
CROSS SECTION LINE



Legend

- SOIL
- DOLOMITIC LIMESTONE
- CEMENT GRADE LIMESTONE
- CEMENT BLENDABLE / BENEFICIABLE GRADE LIMESTONE
- BLENDABLE GRADE
- SHAPE
- UNEXPLORED AREA

HORIZONTAL SCALE

1:4,000

0 40 80 160 240 320 400 Meters

VERTICAL SCALE

1:400

0 4 8 16 24 32 40 Meters

DIRECTORATE OF GEOLOGY AND MINING CHHATTISGARH
REGIONAL OFFICE RAIPUR

PREPARED BY

PARMANAND KHUTE
(ASSISTANT GEOLOGIST)

NIKHIL VERMA
(ASSISTANT GEOLOGIST)

CHECKED BY

KAILASH DONGRE
JOINT DIRECTOR (GEOLOGY)
(REGIONAL HEAD RAIPUR)

SURVEYED BY

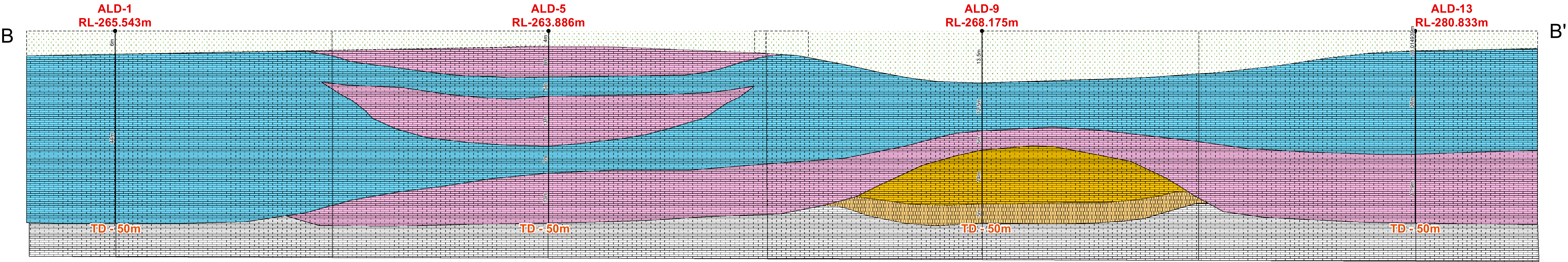
ROMSINGH DHURUW
(TOPO SURVEYOR)

FIELD SEASON

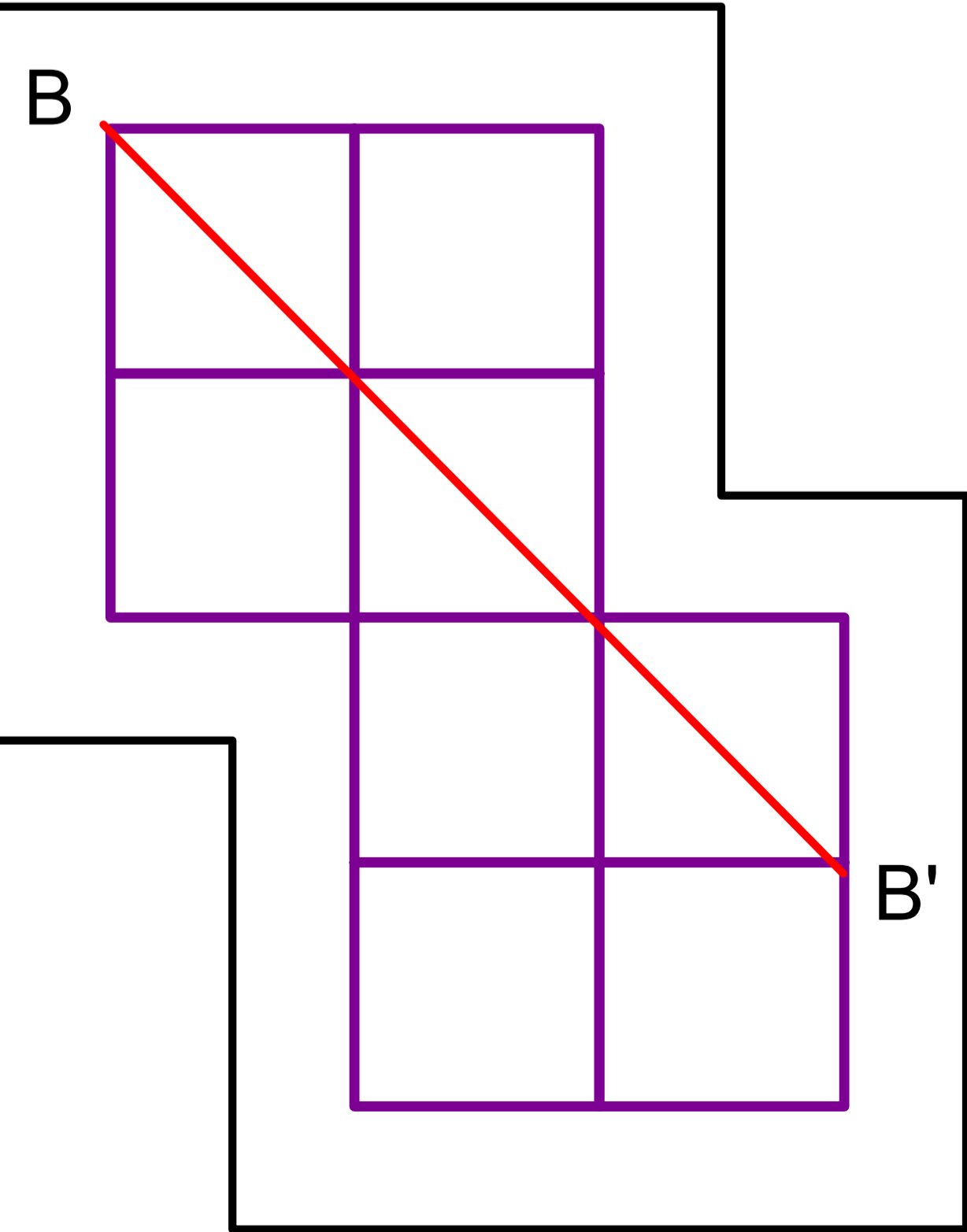
2024-2025

CROSS SECTION ALONG SECTION LINE BB' ALONG S-N OF ALDA LIMESTONE EXPLORED BLOCK (STAGE - G3)

TEHSIL -TILDA & SUHELA, DISTRICT - RAIPUR & BALODA-BAZAR BHATAPARA (CG)



GRID PLAN & CROSS SECTION LINE



Legend

- SOIL
- CEMENT GRADE LIMESTONE
- BLENDABLE GRADE
- CEMENT BLENDABLE / BENEFICIABLE GRADE LIMESTONE
- SHALE
- UNEXPLORED AREA

HORIZONTAL SCALE

1:4,000

0 40 80 160 240 320 Meters

VERTICAL SCALE

1:400

0 4 8 16 24 32 Meters

DIRECTORATE OF GEOLOGY AND MINING CHHATTISGARH
REGIONAL OFFICE RAIPUR

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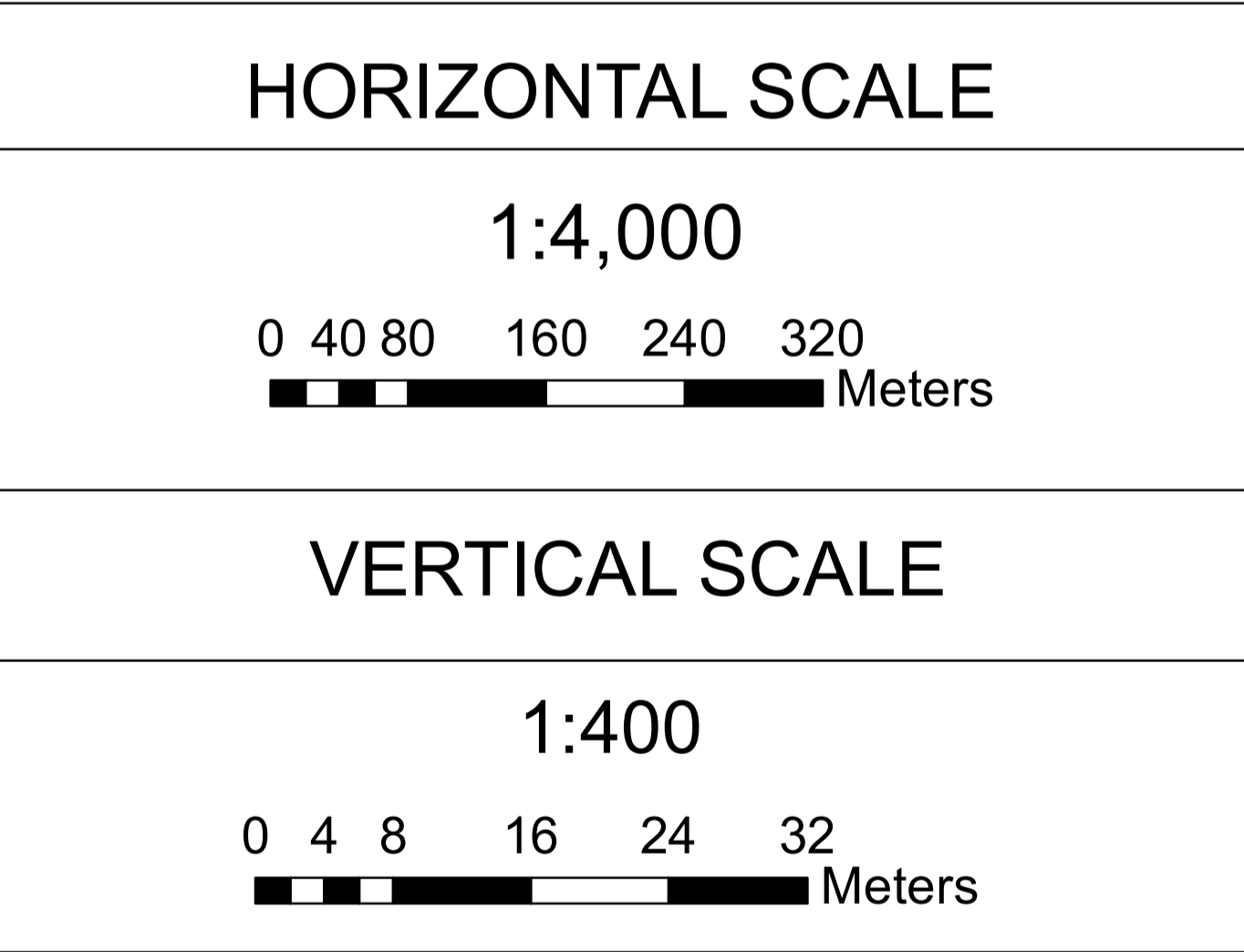
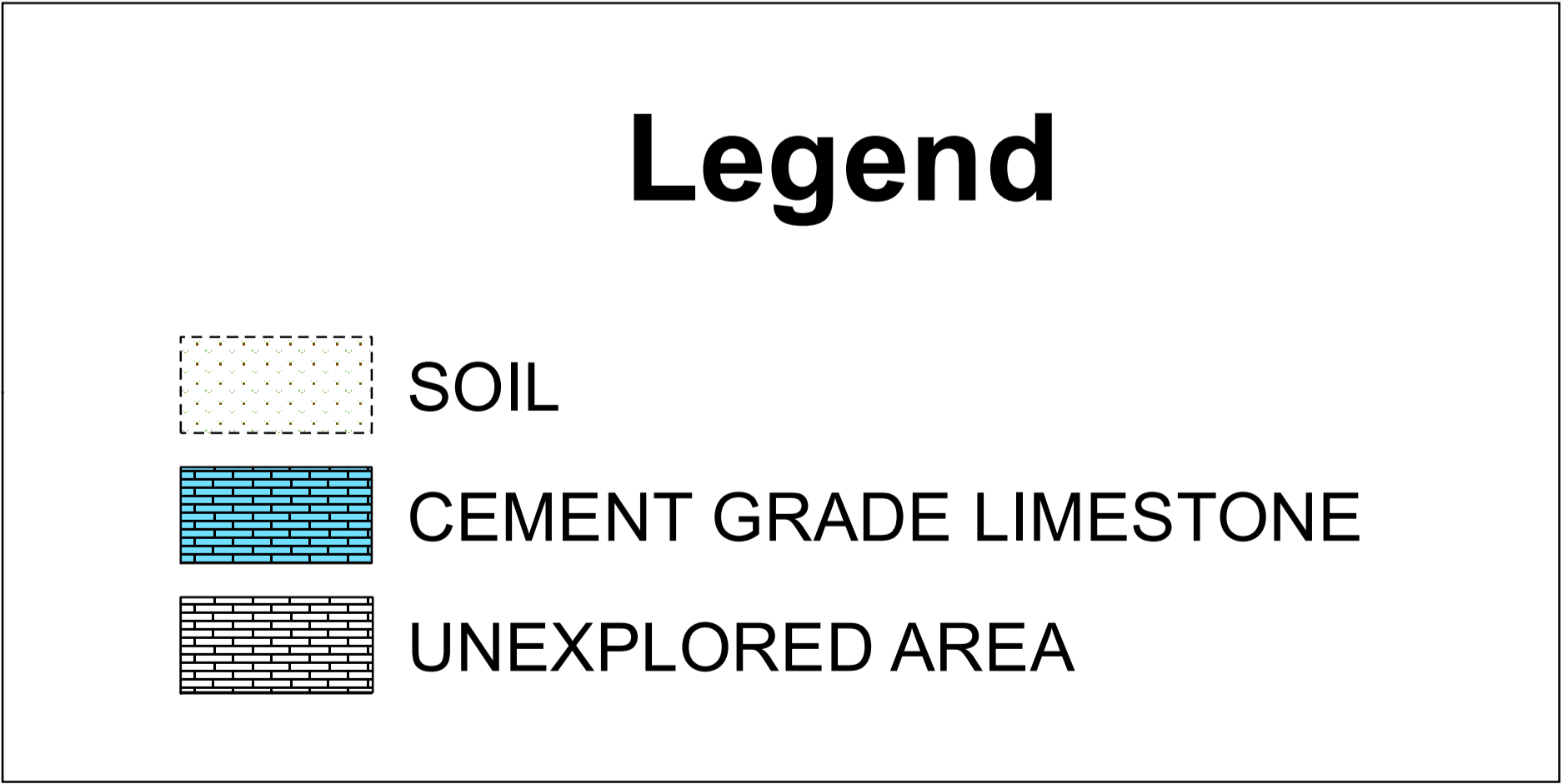
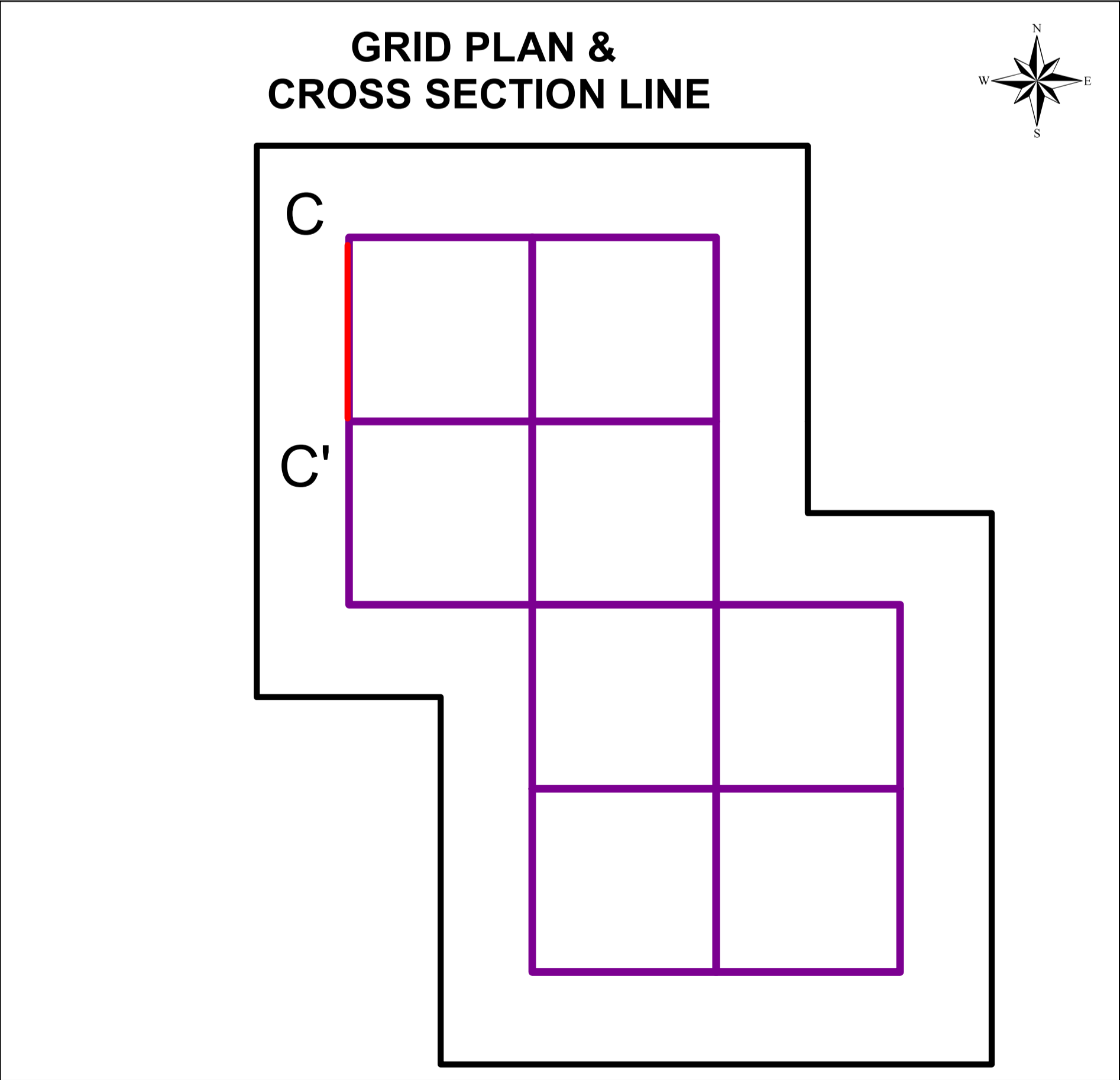
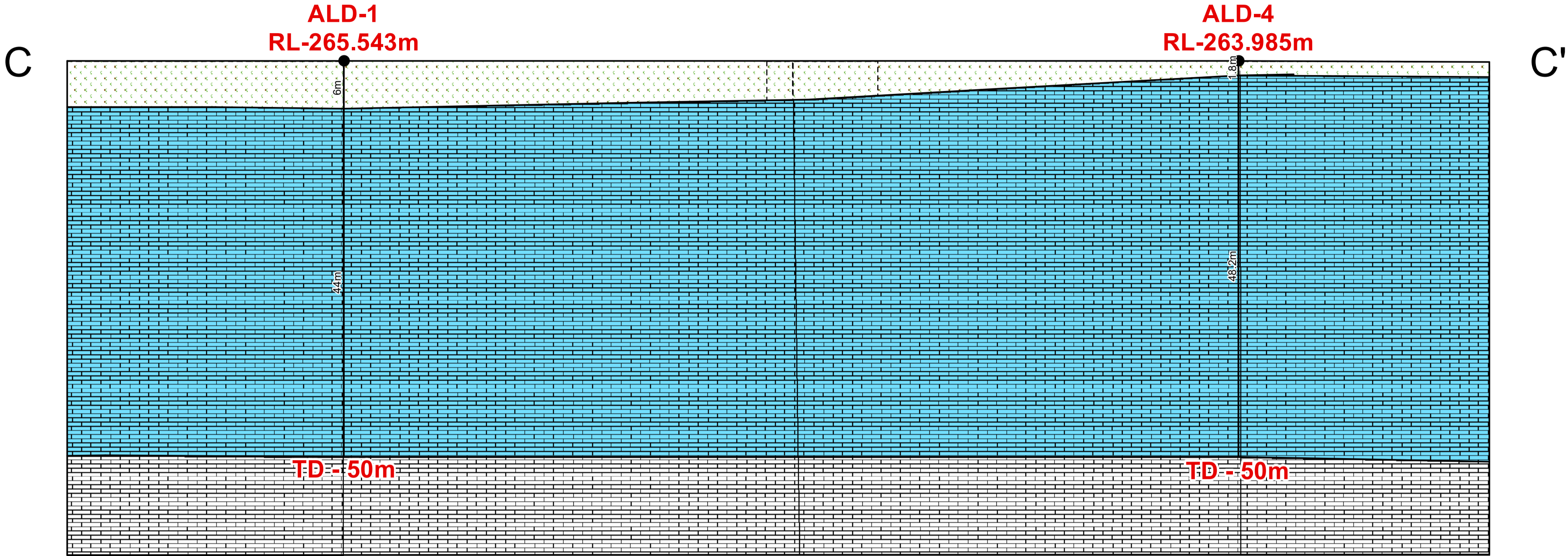
FIELD SEASON

2024-2025

CROSS SECTION ALONG SECTION LINE CC' OF ALDA LIMESTONE EXPLORED BLOCK (STAGE - G3)

TEHSIL -TILDA, SIMGA & SUHELA, DISTRICT - RAIPUR & BALODA-BAZAR BHATAPARA (CG)

Plate No. - 6 (C)

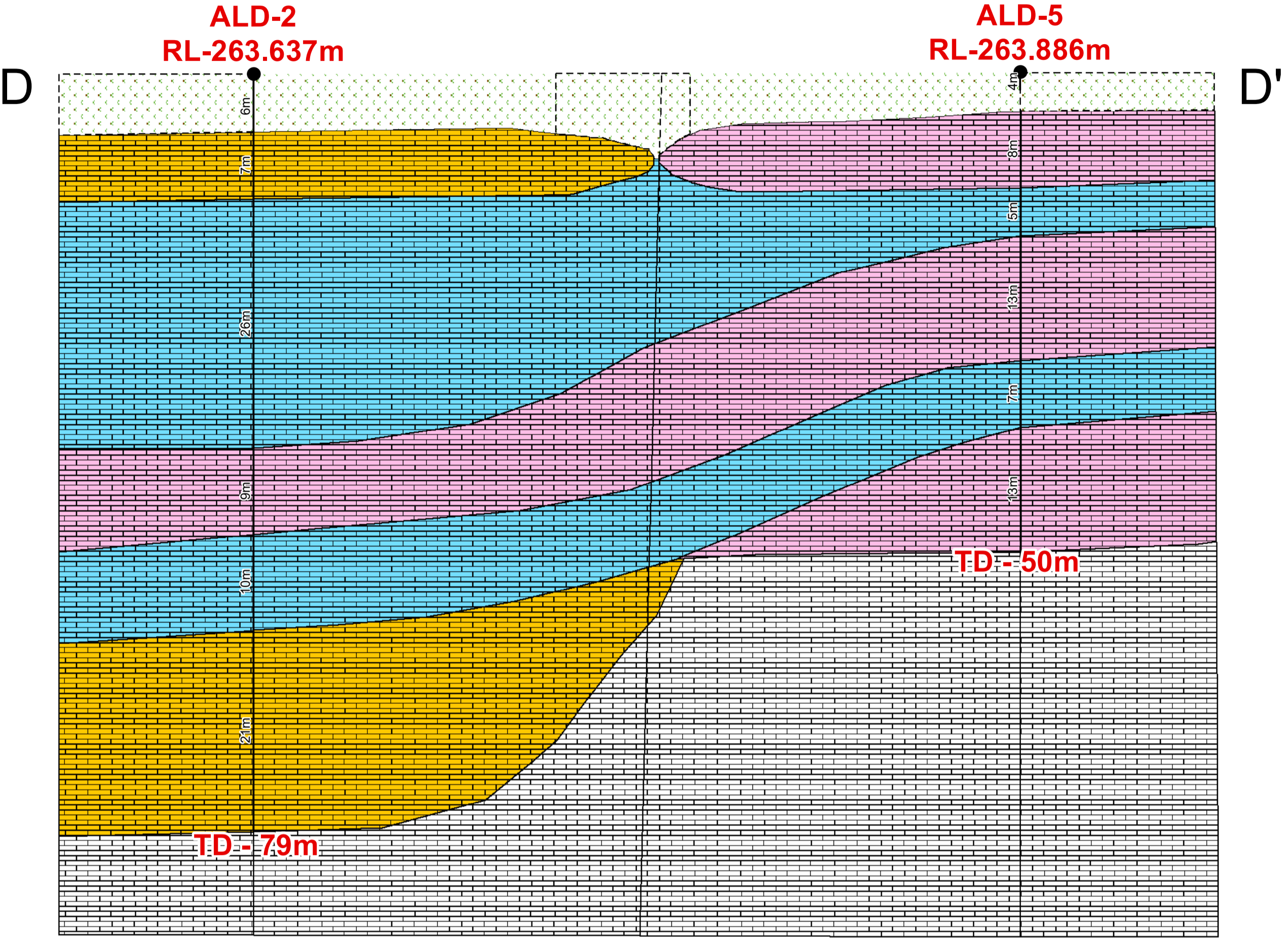


DIRECTORATE OF GEOLOGY AND MINING CHHATTISGARH REGIONAL OFFICE RAIPUR	
PREPARED BY PARMANAND KHUTE (ASSISTANT GEOLOGIST) NIKHIL VERMA (ASSISTANT GEOLOGIST)	CHECKED BY KAILASH DONGRE JOINT DIRECTOR (GEOLOGY) (REGIONAL HEAD RAIPUR)
SURVEYED BY ROMSINGH DHURUV (TOPO SURVEYOR)	FIELD SEASON 2024-2025

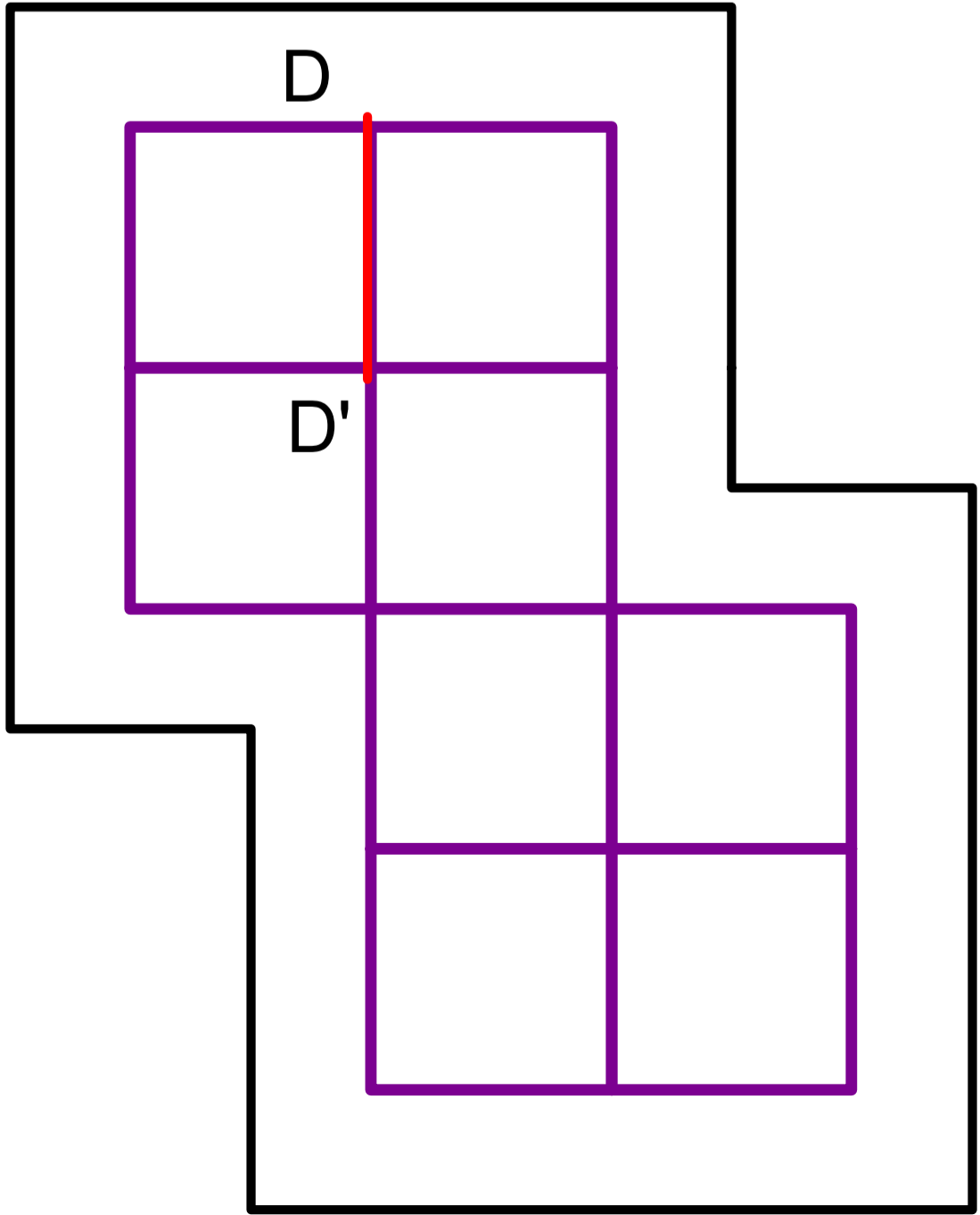
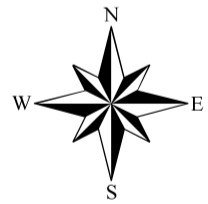
CROSS SECTION ALONG SECTION LINE DD' OF ALDA LIMESTONE EXPLORED BLOCK (STAGE - G3)

TEHSIL -TILDA, SIMGA & SUHELA, DISTRICT - RAIPUR & BALODA-BAZAR BHATAPARA (CG)

Plate No. - 6 (D)



GRID PLAN & CROSS SECTION LINE



Legend

- SOIL
- CEMENT GRADE LIMESTONE
- BLENDABLE
- CEMENT BLENDABLE / BENEFICIABLE GRADE LIMESTONE
- UNEXPLORED AREA

HORIZONTAL SCALE

1:4,000

0 40 80 160 240 320 Meters

VERTICAL SCALE

1:400

0 4 8 16 24 32 Meters

DIRECTORATE OF GEOLOGY AND MINING CHHATTISGARH
REGIONAL OFFICE RAIPUR

PREPARED BY
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(ASSISTANT GEOLOGIST)
NIKHIL VERMA
(ASSISTANT GEOLOGIST)

CHECKED BY
KAILASH DONGRE
JOINT DIRECTOR (GEOLOGY)
(REGIONAL HEAD RAIPUR)

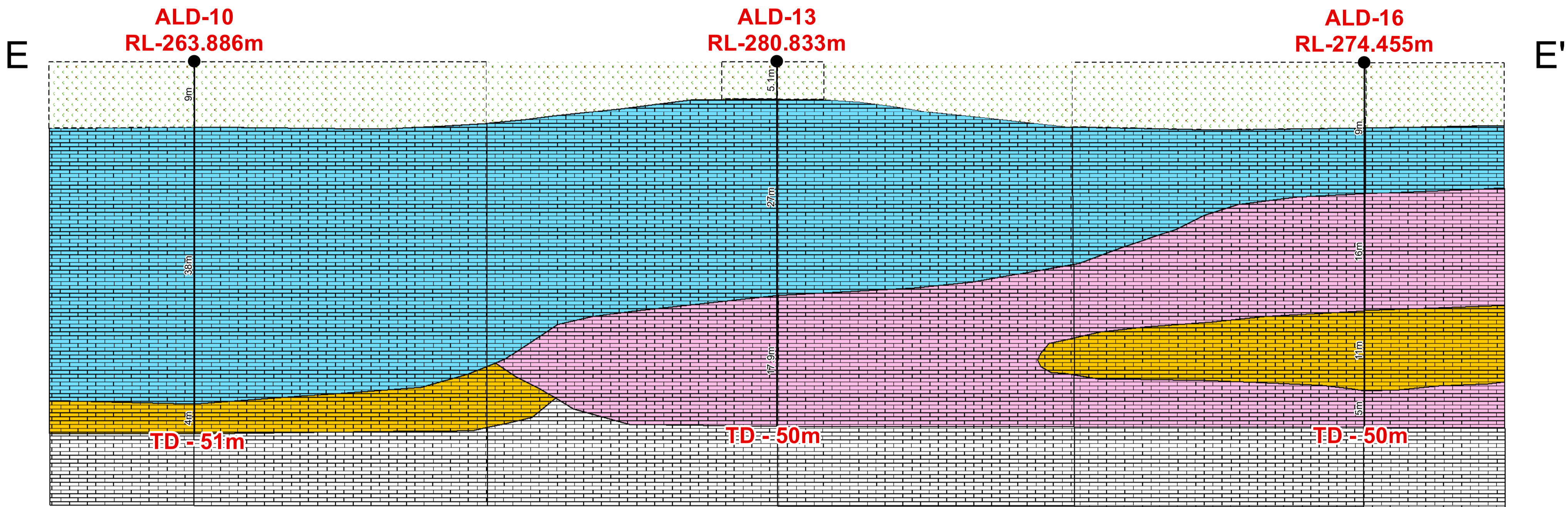
SURVEYED BY
ROMSINGH DHURUW
(TOPO SURVEYOR)

FIELD SEASON
2024-2025

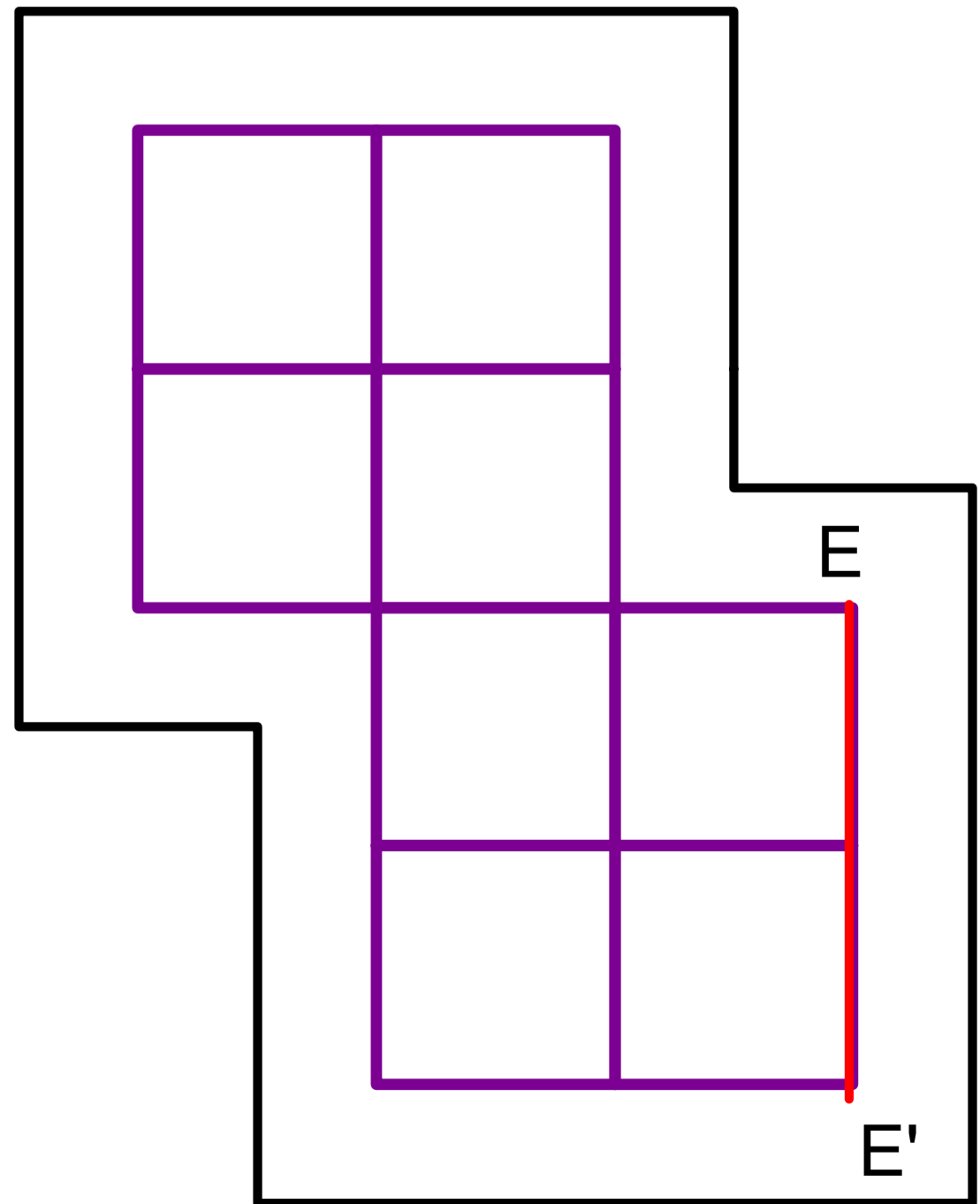
CROSS SECTION ALONG SECTION LINE EE' OF ALDA LIMESTONE EXPLORED BLOCK (STAGE - G3)

TEHSIL -TILDA, SIMGA & SUHELA, DISTRICT - RAIPUR & BALODA-BAZAR BHATAPARA (CG)

Plate No. - 6 (E)



GRID PLAN &
CROSS SECTION LINE



Legend

- SOIL
- CEMENT GRADE LIMESTONE
- BLENDABLE
- CEMENT BLENDABLE / BENEFICIABLE GRADE LIMESTONE
- UNEXPLORED AREA

HORIZONTAL SCALE

1:4,000

0 40 80 160 240 320 Meters

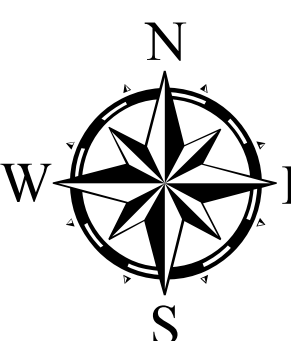
VERTICAL SCALE

1:400

0 4 8 16 24 32 Meters

DIRECTORATE OF GEOLOGY AND MINING CHHATTISGARH REGIONAL OFFICE RAIPUR	
PREPARED BY PARMANAND KHUTE (ASSISTANT GEOLOGIST) NIKHIL VERMA (ASSISTANT GEOLOGIST)	CHECKED BY KAILASH DONGRE JOINT DIRECTOR (GEOLOGY) (REGIONAL HEAD RAIPUR)
SURVEYED BY ROMSINGH DHURUW (TOPO SURVEYOR)	FIELD SEASON 2024-2025

CEMENT GRADE MAP OF ALDA LIMESTONE EXPLORED BLOCK (STAGE - G3)
TEHSIL -TILDA, SIMGA & SUHELA, DISTRICT - RAIPUR & BALODA-BAZAR BHATAPARA (CG)



81°54'0"E

81°55'0"E

0 200 400 Meters

CORNER POINT	LATITUDE	LONGITUDE
A	21° 37' 25.68" N	81° 53' 07.44" E
B	21° 37' 25.68" N	81° 54' 32.04" E
C	21° 36' 33.84" N	81° 54' 32.04" E
D	21° 36' 33.84" N	81° 55' 00" E
E	21° 35' 14.64" N	81° 55' 00" E
F	21° 35' 14.64" N	81° 53' 36.24" E
G	21° 36' 6.84" N	81° 53' 36.24" E
H	21° 36' 6.84" N	81° 53' 07.44" E

NAWAPARE

KARELI

Legend

- UNDRILLED BOREHOLE
- DRILLED BOREHOLE
- SATTLEMENT
- CORNER POINT
- DRAINAGE
- GRID LINE
- CEMENT GRADE LIMESTONE
- EXPLORED BLOCK

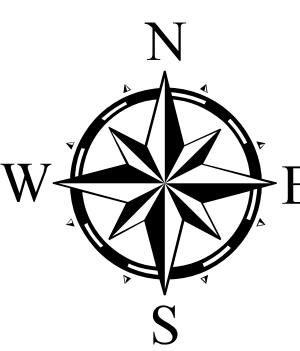
DIRECTORATE OF GEOLOGY AND MINING CHHATTISGARH
REGIONAL OFFICE RAIPUR

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(REGIONAL HEAD RAIPUR)

SURVEYED BY
ROMSINGH DHURUW
(TOPO SURVEYOR)

FIELD SEASON
2024-2025



CEMENT BLENDABLE/BENEFICIABLE GRADE LIMESTONE MAP OF
ALDA LIMESTONE EXPLORED BLOCK (STAGE - G3)
TEHSIL -TILDA, SIMGA & SUHELA, DISTRICT - RAIPUR & BALODA-BAZAR BHATAPARA (CG)

81°54'0"E

81°55'0"E

0 200 400 Meters

CORNER POINT	LATITUDE	LONGITUDE
A	21° 37' 25.68" N	81° 53' 07.44" E
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E	21° 35' 14.64" N	81° 55' 00" E
F	21° 35' 14.64" N	81° 53' 36.24" E
G	21° 36' 6.84" N	81° 53' 36.24" E
H	21° 36' 6.84" N	81° 53' 07.44" E

NAWAPARE

KARELI

Legend

- DRILLED BOREHOLE
- UNDRILLED BOREHOLE
- SATTLEMENT
- CORNER POINT
- DRAINAGE
- GRID LINE
- CEMENT BLENDABLE/BENEFICIABLE GRADE LIMESTONE
- EXPLORED BLOCK

DIRECTORATE OF GEOLOGY AND MINING CHHATTISGARH
REGIONAL OFFICE RAIPUR

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FIELD SEASON
2024-2025

21°37'0"N

21°36'0"N

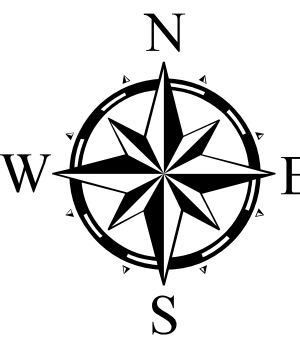
21°37'0"N

21°36'0"N

81°54'0"E

81°55'0"E

CEMENT BLENDABLE GRADE MAP OF ALDA LIMESTONE EXPLORED BLOCK (STAGE - G3)
TEHSIL -TILDA, SIMGA & SUHELA, DISTRICT - RAIPUR & BALODA-BAZAR BHATAPARA (CG)



81°54'0"E

81°55'0"E

0 200 400 Meters

CORNER POINT	LATITUDE	LONGITUDE
A	21° 37' 25.68" N	81° 53' 07.44" E
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G	21° 36' 6.84" N	81° 53' 36.24" E
H	21° 36' 6.84" N	81° 53' 07.44" E

NAWAPARE

Legend

- UNDRILLED BOREHOLE
- DRILLED BOREHOLE
- SATTLEMENT
- CORNER POINT
- DRAINAGE
- GRID LINE
- CEMENT BLENDABLE GRADE LIMESTONE
- EXPLORED BLOCK

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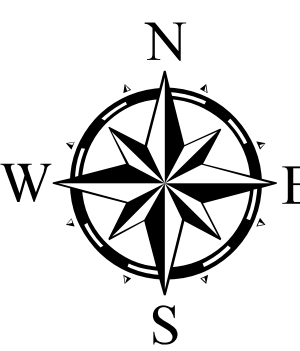
SURVEYED BY
ROMSINGH DHURUW
(TOPO SURVEYOR)

FIELD SEASON
2024-2025

KARELI

81°54'0"E

81°55'0"E



UNEXPLORED AREA MAP OF
ALDA LIMESTONE EXPLORED BLOCK (STAGE - G3)
TEHSIL -TILDA, SIMGA & SUHELA, DISTRICT - RAIPUR & BALODA-BAZAR BHATAPARA (CG)

81°54'0"E

81°55'0"E

0 200 400 Meters

CORNER POINT	LATITUDE	LONGITUDE
A	21° 37' 25.68" N	81° 53' 07.44" E
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NAWAPARE

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- SATTLEMENT
- CORNER POINT
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- GRID LINE
- UNEXPLORED AREA
- EXPLORED BLOCK

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FIELD SEASON
2024-2025

KARELI

81°54'0"E

81°55'0"E

21°37'0"N

21°36'0"N

21°37'0"N

21°36'0"N