DETAILED PROPOSAL FOR PRELIMINARY EXPLORATION (G-3 STAGE) FOR LIMESTONE & ASSOCIATED MINERALS IN BALEJ LIMESTONE BLOCK,PORBANDAR DISTRICT,GUJARAT

(2.86 Sq.Km Area)

COMMODITY: LIMESTONE

SUBMITTED TO
NATIONAL MINERAL EXPLORATION DEVELOPMENT TRUST (NMEDT)

BY
M/s APC DRILLING & CONSTRUCTION PRIVATE LIMITED
NAMAKKAL
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MARCH 2026

Summary of the Proposed Preliminary Exploration (G-3) for Limestone and Associated Minerals in Balej Limestone Block, Porbandar District, Gujarat

GENERAL INFORMATION ABOUT THE BLOCK

	Features	**Details**
	Block ID	Balej Limestone BlocK
	Exploration Agency	APC Drilling & Construction Private Limited
	Previous Exploration Agency	Commissioner of Geology and Mining (CGM), Gujarat Directorate of Geology & Mining Government of Gujarat,
	Geological Report (Previous stage Geological Report)	Report Item No Report No.R.N. 450 Directorate of Geology and Mining,Gujarat State.CGM, Gujarat Field Season 1995-96 & 1996-97 Report Item No. Report No.232, Directorate of Geology and Mining,Gujarat State, Field Season 1986-87
	Commodity	**Limestone and Associated Minerals**
	Mineral Belt	Sarashtra Miliolitic limestone Belt
	Completion Period with entire Time schedule to complete the project	6 months.
	Objectives	The objectives of proposed G3 level exploration are as follows. ❖ Geological Mapping on 1:4000 scale to delineate the surface outcrops of Limestone ❖ Surface Sampling and chemical analysis ❖ Pitting ❖ To drill 7 Nos. of boreholes to decipher depth persistence and subsurface continuity of bedded deposits. ❖ To estimate the in situ resource of Limestone for G3 stage of exploration and preparation of Geological Report (GR).

<table>
<tr><td></td><td></td><td>❖ To estimate in situ resource of Limestone reconnaissance category resources (333) of Limestone and associated minerals in the block as per UNFC norms & MEMC Rule- 2015 and Minerals (Evidence of Mineral Contents) Amendment Rule, 2021.</td></tr>
<tr><td></td><td>Whether the work will be carried out by the proposed agency or through outsourcing and details thereof. Components to be outsourced and
name of the outsource agency</td><td>The Geological Mapping, Geochemical studies, Pitting, Drilling,core logging, sampling and Geological Report writing will be carried out by APC Drilling & Construction Private Limited.

Chemical Analyses and Petrographic Studies will be carried out through NABAL accredited outsourcing agencies.</td></tr>
<tr><td></td><td>Name/ Number of Geoscientists</td><td>Geologists: 01 HQ
Geologists: 01 Field</td></tr>
<tr><td></td><td>Expected Field days & HQ (Geology, Surveyor)</td><td>Geologist: 30days
Geologist: 60 days (Field)
Surveyor: 20days</td></tr>
<tr><td>1.</td><td>Location</td><td>Balej Block is located 5 km NW of Balej Town and around 7 km SE of Navibandar town</td></tr>
<tr><td></td><td>Latitude & Longitude</td><td><table><tr><td>Block Corner points / Cardinal Points</td><td>Latitude</td><td>Longitude</td></tr><tr><td>A</td><td>N21.38639</td><td>E69.85702</td></tr><tr><td>B</td><td>N21.40272</td><td>E69.83777</td></tr><tr><td>C</td><td>N21.41090</td><td>E69.84294</td></tr><tr><td>D</td><td>N21.39488</td><td>E69.86250</td></tr></table></td></tr>
<tr><td></td><td>Villages</td><td>Ratiya Nes and Untada villages</td></tr>
<tr><td></td><td>Tehsil/ Taluk</td><td>Mander Taluk</td></tr>
<tr><td></td><td>District</td><td>Porbandar district</td></tr>
<tr><td></td><td>State</td><td>Gujarat</td></tr>
<tr><td>2</td><td>Area (hectares/ square kilometers)</td><td></td></tr>
<tr><td></td><td>Block Area</td><td>2.86 Sq.km</td></tr>
</table>

	Forest Area	Nil
	Government Land Area	Data not available
	Private Land Area	100% Private land
3.	**Accessibility**	The area under investigation is well connected by metalled road from Balej and Ratiya town. The Porbandar - Veraval-State Highway-101 located to the west of the Block.
	Nearest Rail Head	Porbandar Rail Head
	Road	The proposed block is well connected to Balej and Ratiya town. The Porbandar-Veraval- State Highway-6 passes in the western side of the Block.
	Airport	Porbandar Airport 35 km to the NE of the area
4.	**Hydrography**	
	Rivers/ Streams	The area there are few seasonal drains
5.	**Climate**	The maximum temperature during April and May is about 42^0C. The minimum temperature during the month December-January is 12^0C. The area, being nearer to the sea-coast, the climate is temperate.
	Mean Annual Rainfall	The average annual rainfall is 600mm.
	Temperature	Winter:Minimum temperatures 12^0C (December-January) Summer: Max.42^0 C (April - May)
6	**Topography**	
	Toposheet Number	41G/15
	Morphology of the area	The area under investigation is gently undulating with cultivated plains. The elevation is around 26m AMSL in the Eastern part and around 30 m AMSL in the Western part of the area.
7	**Availability of baseline geoscience data**	
	Geological Map (1:50K/ 25K)	Geological map on 1:50,000 scale (Source:

		NGDR/Bhukosh)

	Geochemical Map	**Not Available**
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	**Not Available**
8.	**Justification for taking up Reconnaissance Survey / Regional Exploration**	**Justification:** Directorate of Geology & Mining, Government of Gujarat, Rajkot, during field programme for 1983-1984, carried out detailed geological investigation was carried out for locating chemical grade limestone deposits in Antroli and part of Madhavpur villages of Mangral taluka of Junagad district covering and 9.8 sq. kms. area of Antroli and part of Madhavpur villages and 16.74 sq. kms. area of Makhadi village 72 representative samples of limestone from different outcrops and 4 representative samples of sea sand were collected for the purpose of chemical analysis and petrological study. On the basis of chemical analysis result about 9.67 M.T. reserve of limestone has been established having average analysis 51.50 % of cao and 4.04 % of silica. On the basis of 4 representative sample data, the estimated reserve of seas and is of the order of 65.9 laces M.T. and 10.1 laces M.T. in Antroli and Madhavpur village respectively on an average chemical composition of 49.87% Cao and 4.73 % of Sio2. This chemical composition shows that it is a cement grade deposit. It is recommended to continue detailed geological survey work in Madhavpur village and its northern coastal areas as the possibility of occurrence of chemical grade limestone deposits"(*Ref:REPORT ON THE LIMESTONE INVESTIGATION IN COASTAL AREAS AROUND ANTROLI AND PART OF MAHAVPUR VILLAGE OF MANGROL TALUKA OF JUNAGADH. Field season - 1983 - 84 Item NoReport No.232*)". CGM, Gujarat during the field seasons 1995-96 carried out Geological Mapping on 1:50,000 scales covering an

		area about 2580 sq. kms. by using Remote Sensing Techniques in part of the Junagadh and Jamnagar districts of Saurashtra(R.N. 450). This surveyed area falls under the Survey of India topographical map Nos. 41 G/5, 41 G/10 + 6, 41 G/15+11, 41 K/4, small part of 41 K/3, 41 L/5+1 and L/9+10. The Remote sensing technique revealed that the major part of the surveyed area is covered with trap rocks and miliolitic limestone and occurrence of miliolitic limestone throughout all along the coastal tract from kodinar to Miyani exposed intermittently. Geology in the parts of coastal Saurashtra from Chara to Bhogat revealed that the Deccan Trap suite of rocks are the dominant and oldest rock unit exposed in the area. The post trappen Tertiary rocks occupying the margin of the trap rocks are noticed along the coast. The younger miliolitic limestones occur as continuous strip overlying Tertaries and traps. The exposures of miliolitic limestone are observed along the coast. CGM Gujarat vide email dated 20 sept 2025,provided the list of 42 blocks identified as non-overlapping and requested APC to convey interest. APC submitted EoI for 22 blocks and CGM vide their email dated 29th January 2026, issued NoC for 9 blocks to APC Drilling & Construction Private Limited. Mander Limestone Block is one such proposed G3 block. CGM,Gujarat has published Gujarat's Mineral Wealth indicating several blocks for exploration of Limestone in the state of Gujarat. The proposed area consists of Miliolite Series which contain good quality of limestone deposits in the region and limestone leases are present in the vicinity of the block. CGM, Gujarat recommended for detailed mapping(G3-Exploration) for assessment of good quality and quantity of limestone Further, APC Team took traverse in the area and collected three samples shows CaO in the range between 48.53 and 55.66% and SiO2 ranging between 1.75 to 8.29%.

		It is proposed to carry out Preliminary Exploration (G3) in Balej Limestone Block (G3) covering an area of 2.86 Sq.km The proposed exploration activities under G3 Stage for Limestone and associated minerals are Detailed Geological Mapping (1:4,000 scale), Geochemical mapping, pitting, trenching and drilling of boreholes in 800 x 800 grid to conduct systematic exploration for Limestone in identifying economical, minable deposits in the state of Gujarat.

Detailed description

1.0.0 Background Information

Detailed description

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CGM,Gujarat has identified several blocks for exploration of Limestone as non-overlapping blocks based on their previous works and published the information of these blocks in Gujarat's Mineral Wealth. CGM, Gujarat vide official email dated Sep 20, 2025, requested some NPEA's including APC to send an expression of Interest (EoI) to take up exploration in 42 blocks for upgradation to G4/G3. On 29th January 2026, CGM Gujarat provided NoC for 9 exploration blocks to APC.The proposed Mander Limestone blockfor Limestone and associated minerals is included in the list of 9 blocks.

As the proposed area is vastly covered with milionitic limestone along with trap rock, the proposal for G3 level exploration for limestone has been formulated covering a total area of 9.39 sq.km.

2.0.0 Block Summary

Location and Accessibility

The Balej Limestone Block falls in Survey of India Toposheet No.41G/15 and is bounded by the following co-ordinates in Porbandar district of Gujarat.

Block Corner points / Cardinal Points	Latitude	Longitude
A	N21.38639	E69.85702
B	N21.40272	E69.83777

C	N21.41090	E69.84294
D	N21.39488	E69.86250

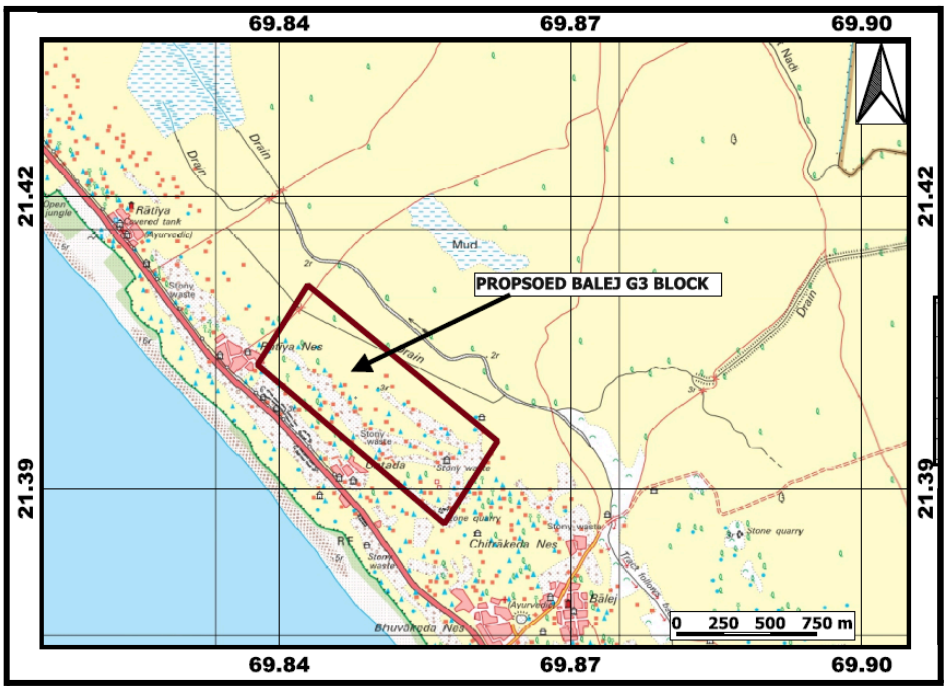

Figure-1: Location of proposed Balej Limestone Block on Toposheet No. 41G/15

Physiography

Saurashtra has a characteristic physiography. Physiography the area is almost gently sloped towards the sea southwards. The area covered under investigation is a coastal plain where major portion is flat agricultural fields leaving small patches of limestone outcrops in a form of small lowlying mounds and ridges more or less parallel to seacoast. The area is drained by a few small seasonal streams flowing towards the sea. There are several flat topped mounds separated by agricultural land.

3.0.0 Previous Work

Fedden (1884) carried out geological work in Saurashtra Peninsula, which formed the basis for almost all the latter geological work in Saurashtra region. He gave a generalized account of the regional geology of the Kathiawar Peninsula with some details of unusual rock type like Felsite, diorite, rhyolite, Trachyte and pitchstone etc. Sinor (1927) had given a good account on the petrology of the igneous and sedimentary rocks of Bhavnagar-ghogha area. The investigation for bentonite by the Directorate of Geology & Mining was carried out in the Bhavnagar-ghogha Mahuva area. The geo-physical and geological investigation were carried out in the nearby area of Bhavnagar District by Geological Survey of India and also oil and Natural Gas Commission and they have established stratigraphic sequence in the area.

Further, the proposed block has been preliminarily investigated by the Commissioner of Geology and Mining (CGM), Gujarat. The geology of the area comprises mostly of Mililolite Limestone which is exposed as outcrop in the entire area. The limestone shows gentle dip (2-7^0) trending SW-SSW and East (towards sea). Further,there are a number of Mining Leases around the proposed block.

4.0.0 Brief regional geology and structural framework

Regional Geology

Saurashtra is a rocky table land fringed by coastal plains. Deccan lava flows mainly occupy the central part of Saurashtra while Tertiary and Quaternary sediments form narrow borders swerving round it. Bhavnagar district occupies almost the entire eastern Saurashtra Region which forms an upland with E-W trending ridges. The morphology of the upland, to some extent, is controlled by the sub horizontal basaltic flows. Tertiary sediments in this area are classified as Gaj formation of Eocene to Miocene age. Lithological assemblage comprises calcareous sandstone, pebbly sandstone, pebble bed, clay and marl. Sedimentary structure and fossil assemblage favours fluvio-deltaic origin (Merh, 1995) of Gaj sediments.

Geological sequence: The Generalized Strategraphic succession of the region established by the earlier workers is as under:-

Strategraphic Unit	**Lithology**	**Age**
Recent Deposit	Coastal Sea Sand dunes, soil and alluvium	Holocene
Chhaya Formation	Shelly limestone, Coraline Limestone	Holocene to late Pliestocene
Milliolite Formation	Limestone with shell of Milolina	Pliestocene
Dwarka Formation	Fossiliferous Limestone	Pliocene
Gaj Formation	Alternate sequence of Clay and Limestone	Miocene
Deccan Traps	Basalt, dolerite dykes	Cretaceous to Eocene

Traps and limestone are the dominant country rocks covering the major portion of the area. The area in general is covered by black cotton soil and out –crops of laterite are noticed in some of the canal sections of the vicinity. The laterite forms low humps, hardly rising two to three meters above the plains. Laterites are of two types,one the hard compact ferruginous laterite and the other soft and clayey.

4.0.3 Lithounits: The lithounits of the proposed area comprises Deccan traps, Bentonite clay, Laterite and Bauxite, Gaj beds & Milionitic Limestone.

Description of Lithounits

Deccan Trap: It is the oldest rock unit in the area and is exposed in the area, It is greenish grey coloured, fine grained amygdalar basalt. The amygdules are filled with zeolites, calcite and chlorophaeite. The limestone of

miliolitic series of Pleistocene age overlies the Deccan trap. Basalt is the most prominently exposed rock type in Saurashtra region covering almost its length and width. The trap which is exposed around Tukada - Miyani and its north is highly weathered which at many places changes to laterite.

Granite (Granophyre): The Barda hills 15 km north east of Porbandar essentially expose granophyre

Laterite & Bauxite: Between Deccan Trap and overlying Gaj beds variegated hard laterite rocks are seen occurring in narrow zones. The sporadic exposures of laterite are seen SW of Palkhada, SW of Hathiani and in Visavadar villages. On the imagery it shows either as a greenish or brownish toned feature. From Harshadmata temple towards Lambha NNW-SSE trending linear hillocks also expose laterite. The laterite is also observed at Ashpura Talav and Asphapura Mandir. The scattered laterite ridges, low laying, gently slopping on one side and steep by escarped on another side on which bentonite and white clay deposits are continued. These laterite ridges have confined aggregated bauxite pockets on it in the form of capping. The capping of bauxite pockets on laterite ridges can give an idea to believe that the laterite ridges may be continued and the top layer might have bauxitized.

Gaj beds: The shales and limestone forming this series are occurring along the southern and south-western margin of the Trap/Laterite. The Gaj rocks are resting unconformably over the trap rocks. They are deep yellow to dirty yellow in colour and highly fossiliferous. The occurrences of gaj beds in the area confined the marine transgression during the late Miocene period in the corrugation developed in deccan low a hows during talc cretaceous fissure irruption. These beds are overlained by milliolite limestone. The color of these beds are typically yellow and consists of fossiliferous, calcareous and arenaceous sediments. The Gaj limestone/ shale is seen exposed west of Bhetali through kodidra, Padwa, Mantore, Mantore, Bhedala north of Morej, Inej, Umba, Malondha etc Villages. The width of gastropods and Pelecypods varying 2 to 3 km.

Dwarka Limestone:The Dwarks rocks are also exposed north west of Miyani, around are Asapura Talav and Ashpura Mandir. Here NNE-SSW trading hills are comprising Dwarka limestone and are forming capping over trap rocks. On the imagery it appears as light yellow to white coloured feature. Since its extent is meager, it is difficult to pick up on the imagery; therefore it is marked based on the field traverses.

Milliolite limestone: The Milliolitic limestone overlies unconformably fossiliferous tertiary rocks and at places it is directly resting over trap. This rock is essentially composed of fossil milliolina (foraminifera) and cemented by calcareous metric. The colour of the rock varies from light buff grey when freshly broken; some time is pinkish or brownish in colour. The brownish tint is due to leaching of iron. The outcrops of miliolitic limestone are highly pitted and porous due to chemical weathering induced by circulating water.It is composed of fragments of numerous shells of foraminifera – milliolite. It has Oolitic and pisolitic granular structure.

In the Porbandar area, the miliolitic limestone is seen around Pendavada, kantela, Degam, Rinawada, Simani, Lavadia, Bhakharla, Boricha, Dobalia talav, Kajavadari, Digvijaygad villages etc. and also all along the foot hills of Barda from Adityana to Ranavav. Numbers of working quarries are observed in this area. The thickness of limestone at Pandavada, Degam and Rinavada is about 4mt. but at the foot hills of Barda, near Adityana it is about 30 mts.

The Milliolitic limestone is seen continuous all along the Porbandar coast ie. from Bosa in south west up to Miyani in the north west. The coast of Porbandar is rocky. The limestone from Porbandar to Gosa is a long

narrow strip which extends northwardly up to the muddy areas. In this lying muddy area thick alluvial cover is noticed and no outcrops are visible. The limestone (from Porbandar to Gosa) is mostly sandy and cemented by calcareous matrix forming ridges attaining 3 to 5 mts. height.

4.0.4 Geophysical Exploration : No previous geophysical Investigation has been carried out

5.0.0 Scope for proposed exploration.

The proposed Preliminary Exploration (G3 Stage) for Limestone and associated Minerals in Balej Limestone Block, Dist:Porbandar , Gujarat, comprises of Geological mapping of 2.86 Sq.km area on 1:4000 scale, Surface/ Geochemical sampling (Bedrock), Pitting/Trenching, Drilling of 7 Nos. of boreholes involving about 250 m drilling, associated survey, chemical analysis, Petrological analysis and estimation of resources under G4 category and Geological Report preparation.

Objectives

The present exploration programme (G3) has been formulated on the basis of previous exploration data available and CGM Exploration and the data collected by APC team during the field visit to fulfil the following objectives: -

- Geological Mapping on 1:4000 scale
- Surface Sampling (Grab/Bedrock samples) & chemical analysis
- Pitting/ Trenching work
- To drill 7 Nos. of boreholes to prove lateral (strike) and vertical (depth) continuity of mineralized zones depending on results of Geological Mapping, Geochemical Studies and Pitting
- To estimate reconnaissance category resources (333) of Cement Grade Limestone and associated minerals in the block as per UNFC norms & MEMC Rule- 2015 and Minerals (Evidence of Mineral Contents) Amendment Rule, 2021.

6.0.0 Planned Methodology

The exploration program is proposed in accordance with the objective set for Preliminary Exploration (G-3) of the block. The Exploration shall be carried out as per Minerals (Evidence of Mineral Contents) Rules-2015 and Amendment 2021. Accordingly, the following scheme of exploration is formulated.

6.0.1 DGPS of Boundary Corner Pillars Survey, Topographical Surveying & Geological Mapping.

The Blocks boundary shall be surveyed by DGPS in WGS-84 datum for demarcation of block boundary/corner points. RL's and co-ordinates of survey and Borehole points will be determined with reference to the Survey of India Bench Mark as available. All the important surface features, survey stations, geological outcrop & Pits/ Trench will be surveyed. Boreholes will be fixed on the ground whose RL's and co-ordinates of survey and exploration points will be determined.

6.0.3 Geological Mapping (1:4,000 Scale)

Geological Mapping will be carried out in Large Scale Mapping (LSM) on 1:14000 scale in the block by taking geological traverses to demarcate the surface manifestations and lateral disposition of the mineralized zones with the structural features i.e. strike, dip, lineation / foliations etc. The contacts of different formations, identification of different lithological units, structural features, etc., will be carried out in detail. The geological map will be generated on the 1:4000 scale.

6.0.5 Bed Rock Sampling

During the course of Geological mapping, the bed rock samples shall be collected. A total of 10 nos. Bed rock samples will be collected from the proposed block and analyzed for 6 radicals (CaO, MgO, Al2O3, SiO2, Fe2O3, and LOI)

6.0.6 Pitting

Pitting will be carried out on the surface up to a depth of 2 m after removal of soil/weathered column in the area. Pitting shall be carried out in the potential zones identified, based on the observations of geological mapping and the results of geochemical sampling and Geophysical Investigation. A provision of pitting in mineralized zones (1m x 1m X 2m deep) of 20 cubic meters is proposed from 5 No. of pits with provision of 5 Nos. of samples.

6.0.7 Core Drilling

A total of 7 vertical boreholes (coring) are proposed for the G-3 stage of Exploration, on the basis of the results of surface exploration such as Geological Mapping & Geochemical Survey and Pitting/ Trenching in an area of 2.86 Sq.km. The average depth of the boreholes is considered to be 35 m and a total of 250 m of drilling is proposed in selected locations to find out the continuity of mineralized zones in strike & dip direction and to assess subsurface disposition of the targeted mineralized bodies.

6.0.8 Drill Core Logging and Sampling

Geological core logging will be carried out carefully by recording minute details and lithological characters of the rock formations including colour, texture, mineralogical composition, structural details and lithological variations encountered in the boreholes.

6.0.9 Core Sampling

The drilled borehole cores will be sampled for every 1-meter run from the mineralized zone, subject to change in lithology and core recovery. Around 120 core samples will be generated from 7 boreholes. Each sample thus obtained from boreholes. will be longitudinally split into two equal halves by using core splitter. One half will be powdered to -100 mesh size and the other half will be kept for future studies. The powdered material will be mixed thoroughly and about 100 gm of samples will be taken for chemical analysis by

successive coning and quartering as primary samples and rest of the material (-100 mesh size) will be kept as duplicate half for future reference

6.0.10 Check Samples: External Check samples will be 10% of the total primary samples(13 No. of samples) will be sent to NABL accredited Labs for analysis of 6 radicals(CaO, MgO, Al2O3, SiO2, Fe2O3, and LOI)

6.1.2 Petrographic Studies:

Petrological studies will be done on 5 nos. of drill core and surface specimen to know about the mineralogical composition and interrelation among the constituent minerals. 5 nos. of ore specimens from the mineralized zones will also be studied in a polished section to know about the constituent ore minerals, their mode of occurrence, textures and other mineragraphic characteristics.

6.1.4 Specific Gravity Determination

Specific Gravity will be determined on 3 nos. Drill core specimen

7.0.0 Nature Quantum and Target

Proposed Quantum of work:

Description and Nature of Work	Unit	Target
GEOLOGICAL WORK AND SURVEYING		
Geological Mapping (1:4000 scale)	Sq. km	2.60
Topographic Survey (Contour interval 5m) at 1:4000 scale		2.60
Bore Hole Fixation and determination of co-ordinates & Reduced Level (RL) of the boreholes	Nos.	7
Boundary survey by DGPS	Nos.	4
Bedrock samples		10
Pitting (1m x 1m x 2m)	Cum.	5
Drilling (Soft Rock)	m	250
Drill Core Preservation	Per m	215
Sampling & Chemical Analysis		
Primary & Check samples for Limestone BRS/Pit/Chip/Channel/BH samples)		**135**
Bedrock samples	Nos .	10
Pit samples	Nos .	5
Borehole Core samples	Nos .	120
Check samples (10% external)	Nos .	13

Spectroscopic Studies		
Petrological Studies		
i) Preparation of thin section	Nos.	5
ii) Study of thin Section alongwith photomicrographs	Nos.	5
Mineral Physics Studies		
Specific Gravity Determination		3
Geological Report Preparation -As per MEMC RULES 2015	Nos.	1

8.0.0 Time Schedule and Cost Estimates

Time Schedule: The total duration of the project proposed is 6 months.

Time Schedule for Preliminary Exploration (G-3) for Limestone in Balej Block, District: Porbandar, State: Gujarat									
Sl.		Months							
No.	**Activities**	1	2		3	4		5	6
1	Camp Setting								
2	Geological Mapping & Sampling (Bed Rock /Pit/Grab)								
3	Survey Work(1 Party) (Topography + BH Survey)								
4	Pitting								
5	Drilling (1 rig)								
6	Geological Work(1 Geologist)								
7	Sampling Work -BRS/Pit/Core Samples								
8	Camp Winding								
9	Laboratory Studies								
10	Geological Work/ Report Writing								
11	Peer Review and Report Submission								

REVIEW

REVIEW

9.0.0 Cost Estimates:

Tentative cost has been estimated based on the Schedule of Charges (SoC) of projects funded by National Exploration Trust (NMET). The total cost estimate of Rs. 60.46 Lakhs(Including GST) is being proposed for completion of exploratory work up to G-3 level. Activity wise break-ups of the same are furnished below

Activity wise break up of cost of the project

Sl.No.	Item	Total Cost
1	Geological Work	**1841186**
2	Pitting	47250
3	Laboratory Studies	601200
4	Drilling	2357250
	Sub total	**4846886**
5	Report	150000
6	Peer Review	30000
7	Proposal Preparation	96938
	Total	**5123824**
8	GST (18%)	922288
	Total cost including 18% GST	**6046112**

10.0.0 Justifications

Directorate of Geology & Mining, Government of Gujarat, Rajkot, during field programme for 1983-1984, carried out detailed geological investigation was carried out for locating chemical grade limestone deposits in Antroli and part of Madhavpur villages of Mangral taluka of Junagad district covering and 9.8 sq. kms. area of Antroli and part of Madhavpur villages and 16.74 sq. kms. area of Makhadi village. 72 representative samples of limestone from different outcrops were collected for the purpose of chemical analysis and petrological study. The analysis results show an average CaO of 51.50 % and 4.04 % of Silica and established about 9.67 M.T. reserves

- On the basis of 4 representative sample data from Sea Sand, the estimated reserve of seas and is of the order of 65.9 laces M.T. and 10.1 laces M.T. in Antroli and Madhavpur village respectively on an average chemical composition of 49.87% Cao and 4.73 % of Sio2. This chemical composition shows that it is a cement grade deposit.
- It is recommended to continue detailed geological survey work in Madhavpur village and its northern coastal areas as the possibility of occurrence of chemical grade limestone deposits

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- The Remote sensing technique revealed that the major part of the surveyed area is covered with trap rocks and miliolitic limestone and occurrence of miliolitic limestone throughout all along the coastal tract from kodinar to Miyani exposed intermittently.

- Geology in the parts of coastal Saurashtra from Chara to Bhogat revealed that the Deccan Trap suite of rocks are the dominant and oldest rock unit exposed in the area. The post trappen Tertiary rocks occupying the margin of the trap rocks are noticed along the coast. The younger miliolitic limestones occur as continuous strip overlying Tertaries and traps. The exposures of miliolitic limestone are observed along the coast.

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- Further, APC Team took traverse in the area and collected three samples shows CaO in the range between 48.53 and 55.66% and SiO2 ranging between 1.75 to 8.29%. The details of sample analyses is given below:

Sample No.	Al2O3	CaO	Fe2O3	K2O	MgO	Na2O	P2O5	SiO2	LOI
	%	%	%	%	%	%	%	%	%
GJ/PB/BJ/LST/BRS/25	0.55	53.1	0.87	0.07	0.42	0.01	0.054	2.35	42.33
GJ/PB/BJ/LST/BRS/26	1.45	48.53	0.85	0.35	0.55	0.26	0.047	8.29	39.19
GJ/PB/BJ/LST/BRS/27	0.38	53.66	0.31	0.06	0.4	0.01	0.04	1.75	43.07

- It is proposed to carry out Preliminary Exploration (G3) in Balej Limestone Block (G3) covering an area of 2.86 Sq.km The proposed exploration activities under G3 Stage for Limestone and associated minerals are Detailed Geological Mapping (1:4,000 scale), Remote Sensing studies, Geochemical mapping, pitting, trenching and drilling of boreholes in 400 x 400 grid to conduct systematic exploration for Limestone in identifying economical, minable deposits in the state of Gujarat.

Reference:

1. "(*Ref:REPORT ON THE LIMESTONE INVESTIGATION IN COASTAL AREAS AROUND ANTROLI AND PART OF MAHAVPUR VILLAGE OF MANGROL TALUKA OF JUNAGADH. Field season - 1983 - 84 Item NoReport No.232*)".
2. Geological Report of the Southern Part of Saurashtra covered under Toposheet Nos. 41 G/5, G/10+6, 41 K/4, G/15+11, 41 L/5+1. L/9+10 (Based on interpretation of Satellite Imagery with limited Field Checks)(Field Season 1995-96 And 1996-97

List of Plates:

1. Location Plan of Proposed Balej Limestone block on Topoisheet No. 41 G/15 (1:10000) **(ANNEXURE-1)**
2. Location of Proposed Balej Limestone block on Regional Geological Map (1:10000) **(ANNEXURE-2)**

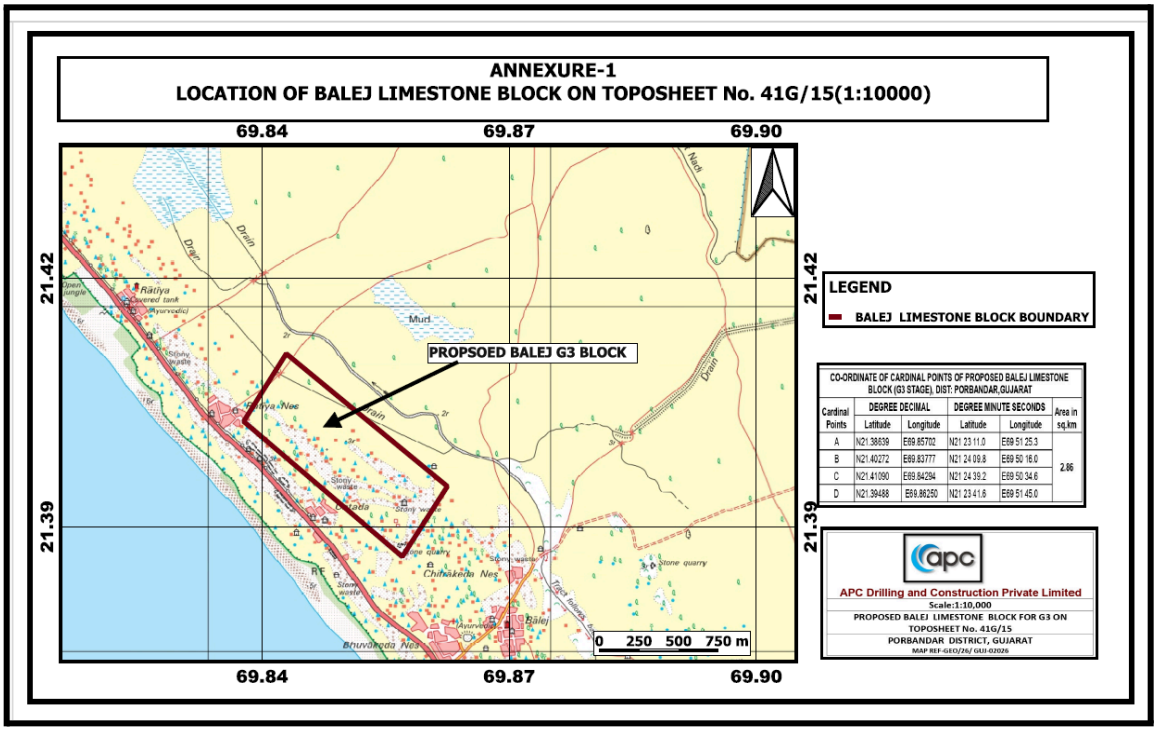


Figure-2:Location Plan of Proposed Balej Limestone Block on Topoisheet No. 41G/15

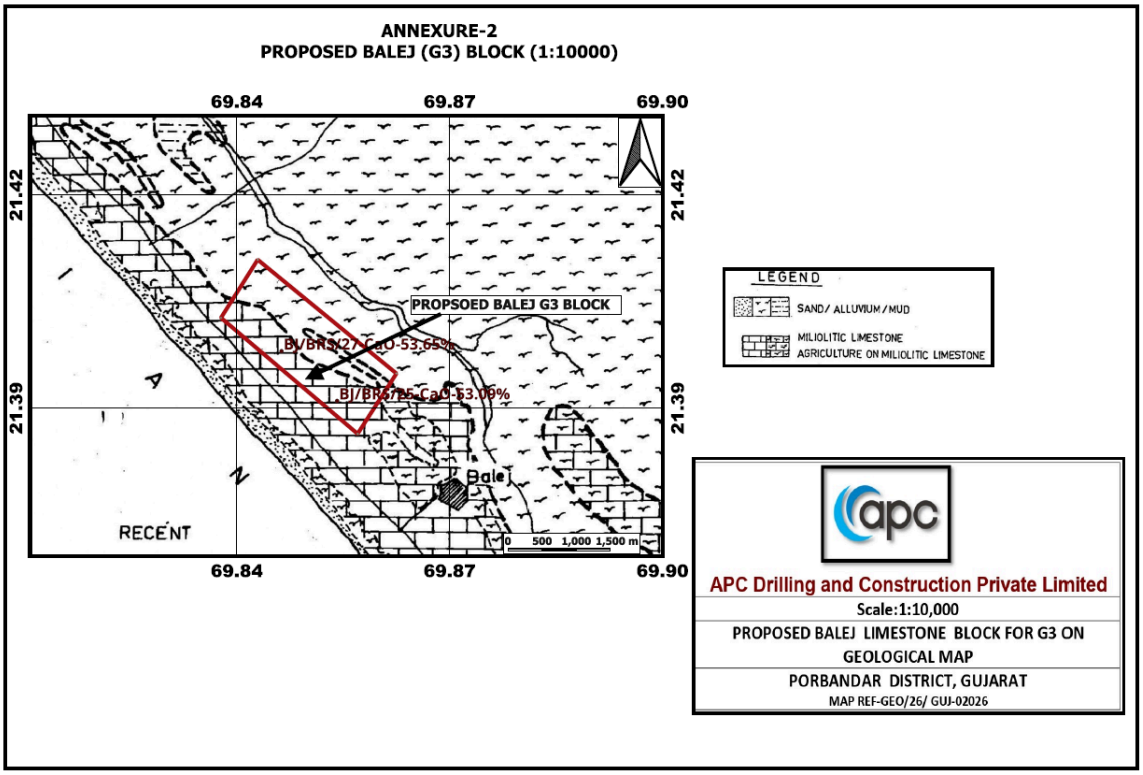


Figure-3:Location of Proposed Balej Limestone Block on CGM Geological Map

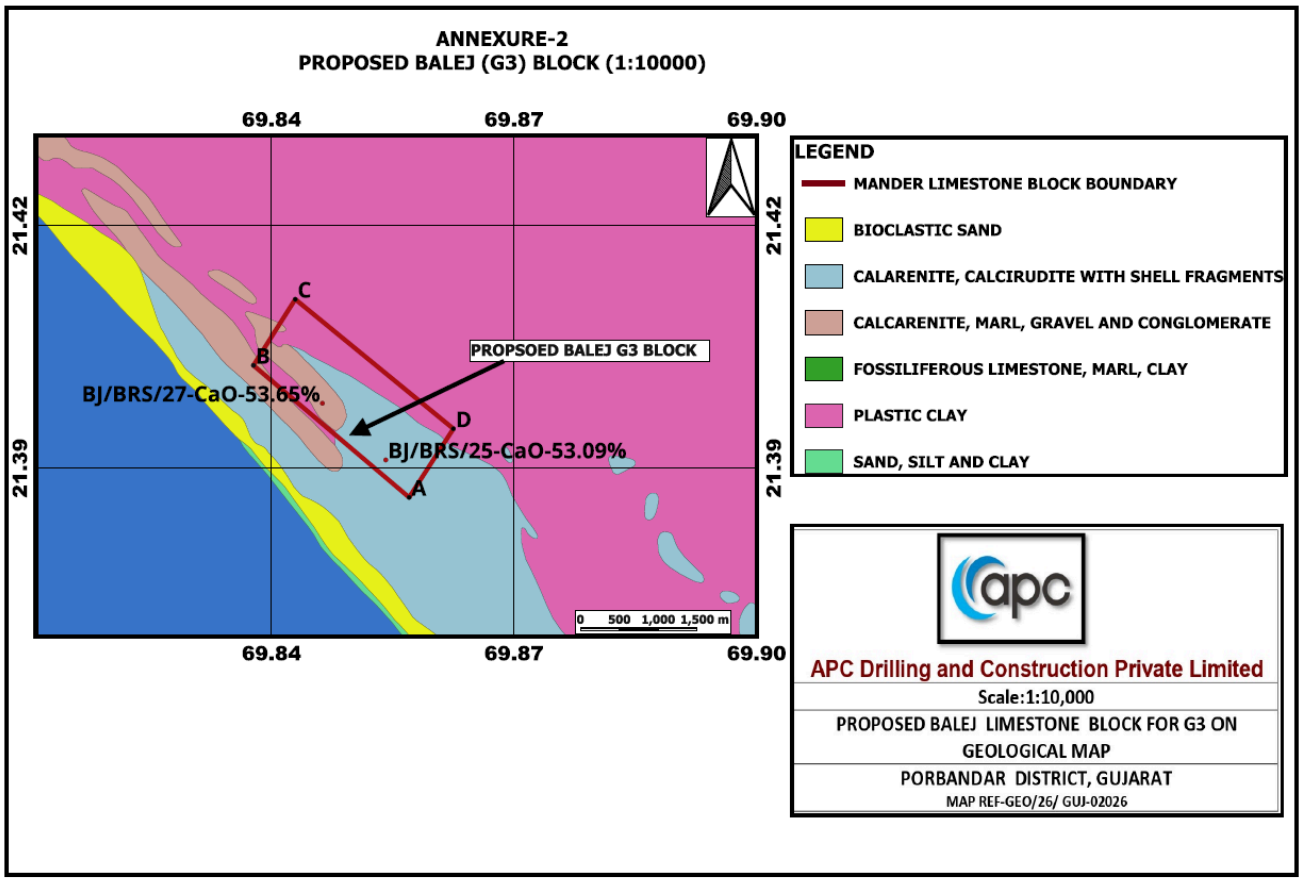


Figure-4:Location of Proposed Balej Limestone Block on Regional Geological Map

The detailed estimated cost of the project

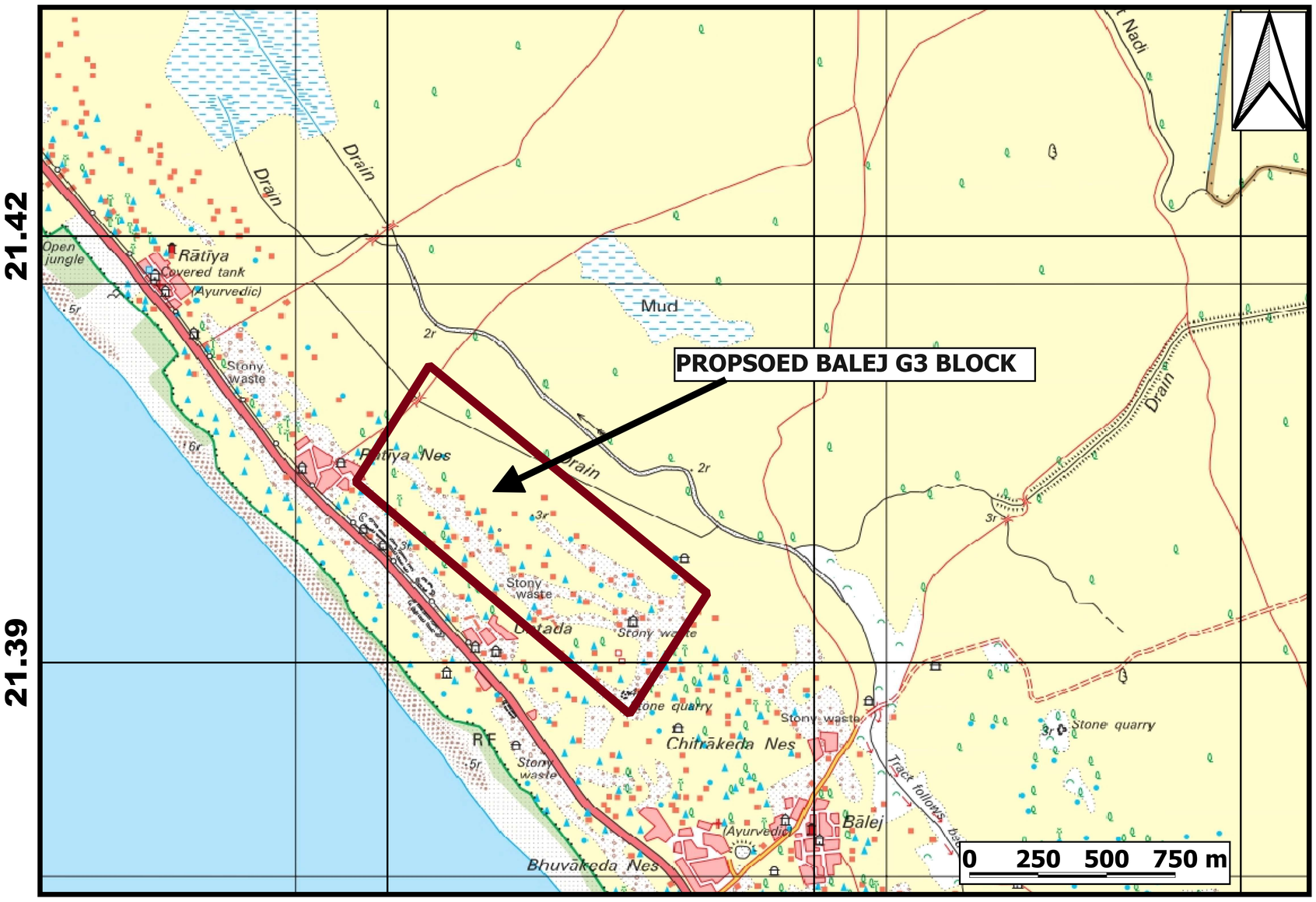
Preliminary Exploration (G-3) for Limestone in Balej Block, District: Porbandar, State: Gujarat [Block area- 2.60 sq. km; Schedule timeline-6 months, Review- After 2 and 4 months; BH-7 Nos; Total Drilling- 250 m. Depth: 35 m (approx.)]							
SL No.	**Item of Work**	**Unit**	**Rates as per NMET SoC**		**Estimated Cost of the Proposal**		**Remarks**
			SoC-Item -Sl No.	**Rates as per SoC**	**Qty.**	**Amount (Rs)**	
A	**GEOLOGICAL WORK & TOPOGRAPHICAL SURVEY (1:4000 scale)**						
i	Detailed Geological Mapping	day	1.1	18300	2.6	47580	
	Charges for one Geologist- Field		1.2.1a	14500	60	870000	
ii	Charges for one Geologist - HQ	day	1.2.1a	10500	30	315000	
iii	2 labours / Party(As per rates of Central Labour Commissioner)	day	5.8	556	120	66720	Amount will be reimburse as per the notified rates by the Central Labour

							Commissioner or respective State Govt. whichever is higher
iv	Sampling Party days-1 Samplers Labour charge not included	day	1.2.1b	7850	19	149150	
v	4 labours/ party (As per rates of Central Labour Commissioner)	day	5.8	556	76	42256	Amount will be reimbursed as per the notified rates by the Central Labour Commissioner or respective State Govt. whichever is higher
vi	Survey Party Days for DGPS topographical contour survey, BH fixation and RL determination	day	1.3. 1	10500	20	210000	
vii	Boundary survey by DGPS	Nos	1.3.2	24000	4	96000	
viii	4 labours for surveyor	day	5.8	556	80	44480	
					Sub Total- A	**1841186**	
B	**PITTING**						
i	Pitting(1 x1 x2 m)5 No. of Pit	Cu m	2.1.2	4725	10	47250	
					Sub Total- C	**47250**	
C	**DRILLING**						
i	Drilling (Soft Rock)	m	2.2.1.1c	5500	250	1375000	7 BHS @35m depth
ii	Land / Crop Compensation	per BH	5.6	30000	7	210000	
iii	Construction of concrete Pillar (12"x12"x30") (30 BH Pillar +4 Boundary Pillar)	per bore hole	2.2.7	2000	11	22000	
iv	Miscellaneous charges -Transportation of Drill Rig, Accomodation of Drill Camp, Camo setting & winding,Construction of Approach Road	Lum psum	2.2.9			343750	25% of the Drilling cost for project total drilling cost < 50 lakhs
v	Drill Core Preservation (One complete borehole plus mineralised cores of all the remaining BHs)	Per m	x	1590	150	238500	
vi	Bore Hole Fixation and determination of co- ordinates & Reduced Level of the boreholes by DGPS	Nos	1.3.2	24000	7	168000	7 BHS
					Sub Total- D	**2357250**	
D	**LABORATORY STUDIES**						
1	**Chemical Analysis**						

	Primary & Check samples for LimestoneBRS/Pit/Chip/Channel/BH samples)						
	a. Primary samples for Complete analysis of limestone (6 radicals i.e. CaO, MgO,Al2O3, SiO2,Fe2O3 and LOI by XRF)	Nos	4.1.11	3900	135	526500	BH-120 BRS-10, Pit-5
	b.Check samples(10%) 6 radicals i.e. CaO, MgO,Al2O3, SiO2,Fe2O3 and LOI by XRF	Nos	4.1.11	3900	13	50700	
2	**Petrological samples (BH Core Samples)**						
i	Preparation of thin section	Nos	4.3.1	500	5	2500	
ii	Study of thin Section alongwith photomicrographs	Nos	4.3.4	2800	5	14000	
3	**Mineral Physics Studies**						
viii	Specific Gravity Determination	Nos	4.8.1	2500	3	7500	From BH
					Sub Total- E	**601200**	
					Total A to E	**4846886**	
E	Geological Report Preparation - including charges of typing text,, table etc., digitization of maps/ sections etc.,		5.2	Cost per 5 copies of report along with soft copy		150000	Total cost of the project upto 50 lakhs: 1.5 lakhs
F	Peer review Charges		As per EC			30000	
G	Preparation of Exploration Proposal	5 Hard copies with a soft copy	5.1	2% of the Approved Project Cost or Rs. 5.0 Lakhs whichever is lower		96937.72	
H	Total Estimated Cost without GST					**5123824**	
I	Provision for GST (18% of I)					**922288**	GST will be reimbursed as per actual and as per notified prescribed rate
J	Total Estimated Cost with GST					**6046112**	
					or Say Rs. In Lakhs	**60.46**	
Note:							
1	Strict adherence to the Ministry of Finance's and GFR guidelines is mandatory. Every transaction must adhere to GFR rule 21.						

2	In case of delay/non- performance, the appropriate action will be taken by competent authority against delinquent agency as per prevailing govt. of India rules/guidelines on procurement.
3	If any part of the project is outsourced, the amount will be reimbursed as per the Paragraph 3 of NMET SoC and Item no. 6 of NMET SoC. In case of execution of the project by NEA on its own, a Certificate regarding non outsourcing of any component/project is required.
4	Necessary efforts should be made to minimize any adverse impact on the environment during exploration activities.
5	Any item of work not mentioned above shall be added as per SoC
6	All the Geological Reports and data are to be uploaded on NGDR as per MERT template by the agency

ANNEXURE-1
LOCATION OF BALEJ LIMESTONE BLOCK ON TOPOSHEET No. 41G/15(1:10000)



LEGEND

BALEJ LIMESTONE BLOCK BOUNDARY

CO-ORDINATE OF CARDINAL POINTS OF PROPOSED BALEJ LIMESTONE BLOCK (G3 STAGE), DIST: PORBANDAR,GUJARAT

Cardinal Points	DEGREE DECIMAL		DEGREE MINUTE SECONDS		Area in sq.km
	Latitude	Longitude	Latitude	Longitude	
A	N21.38639	E69.85702	N21 23 11.0	E69 51 25.3	2.86
B	N21.40272	E69.83777	N21 24 09.8	E69 50 16.0	
C	N21.41090	E69.84294	N21 24 39.2	E69 50 34.6	
D	N21.39488	E69.86250	N21 23 41.6	E69 51 45.0	

APC Drilling and Construction Private Limited

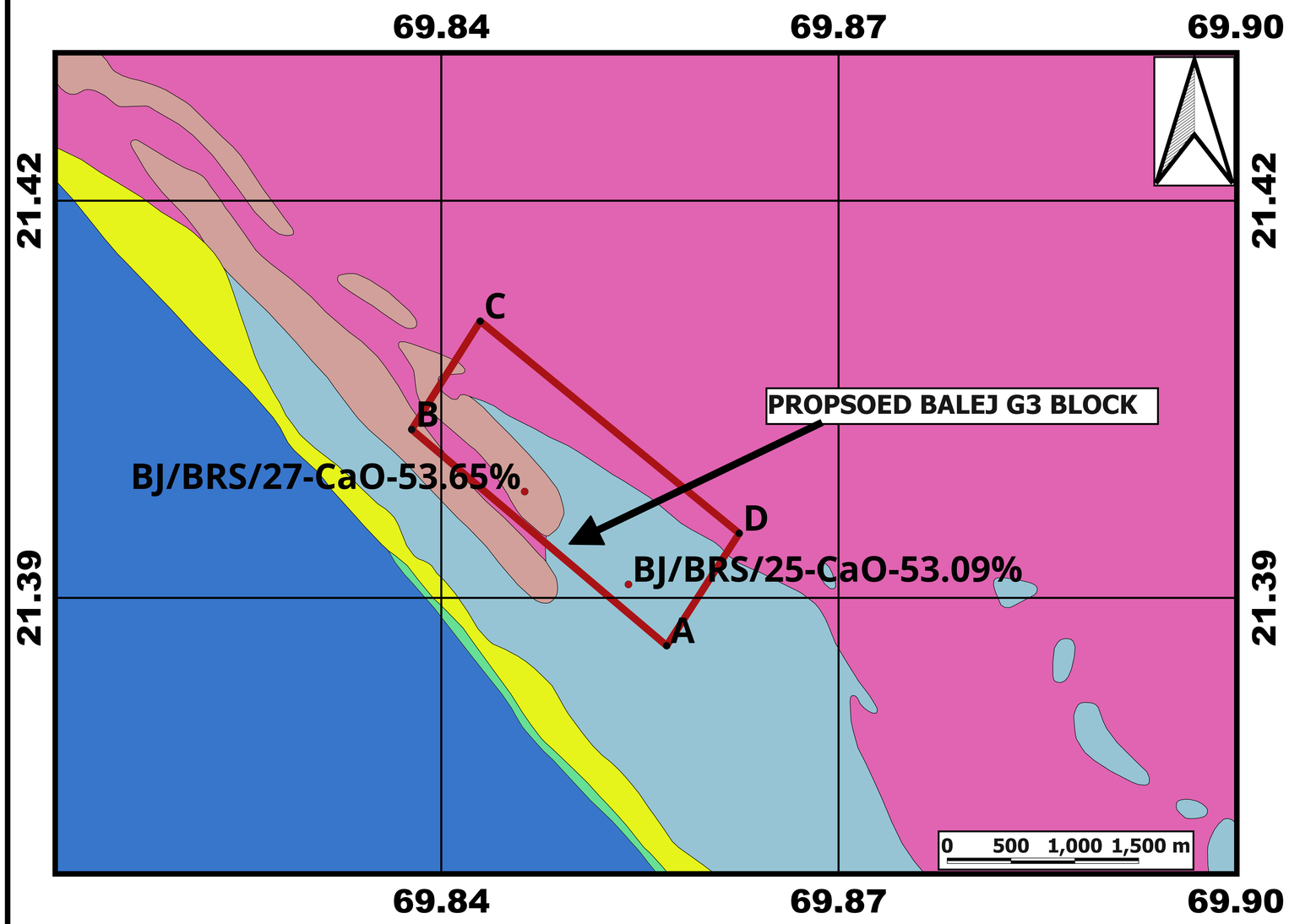
Scale:1:10,000

PROPOSED BALEJ LIMESTONE BLOCK FOR G3 ON TOPOSHEET No. 41G/15

PORBANDAR DISTRICT, GUJARAT

MAP REF-GEO/26/ GUJ-02026

ANNEXURE-2
PROPOSED BALEJ (G3) BLOCK (1:10000)



LEGEND

- MANDER LIMESTONE BLOCK BOUNDARY
- BIOCLASTIC SAND
- CALARENITE, CALCIRUDITE WITH SHELL FRAGMENTS
- CALCARENITE, MARL, GRAVEL AND CONGLOMERATE
- FOSSILIFEROUS LIMESTONE, MARL, CLAY
- PLASTIC CLAY
- SAND, SILT AND CLAY

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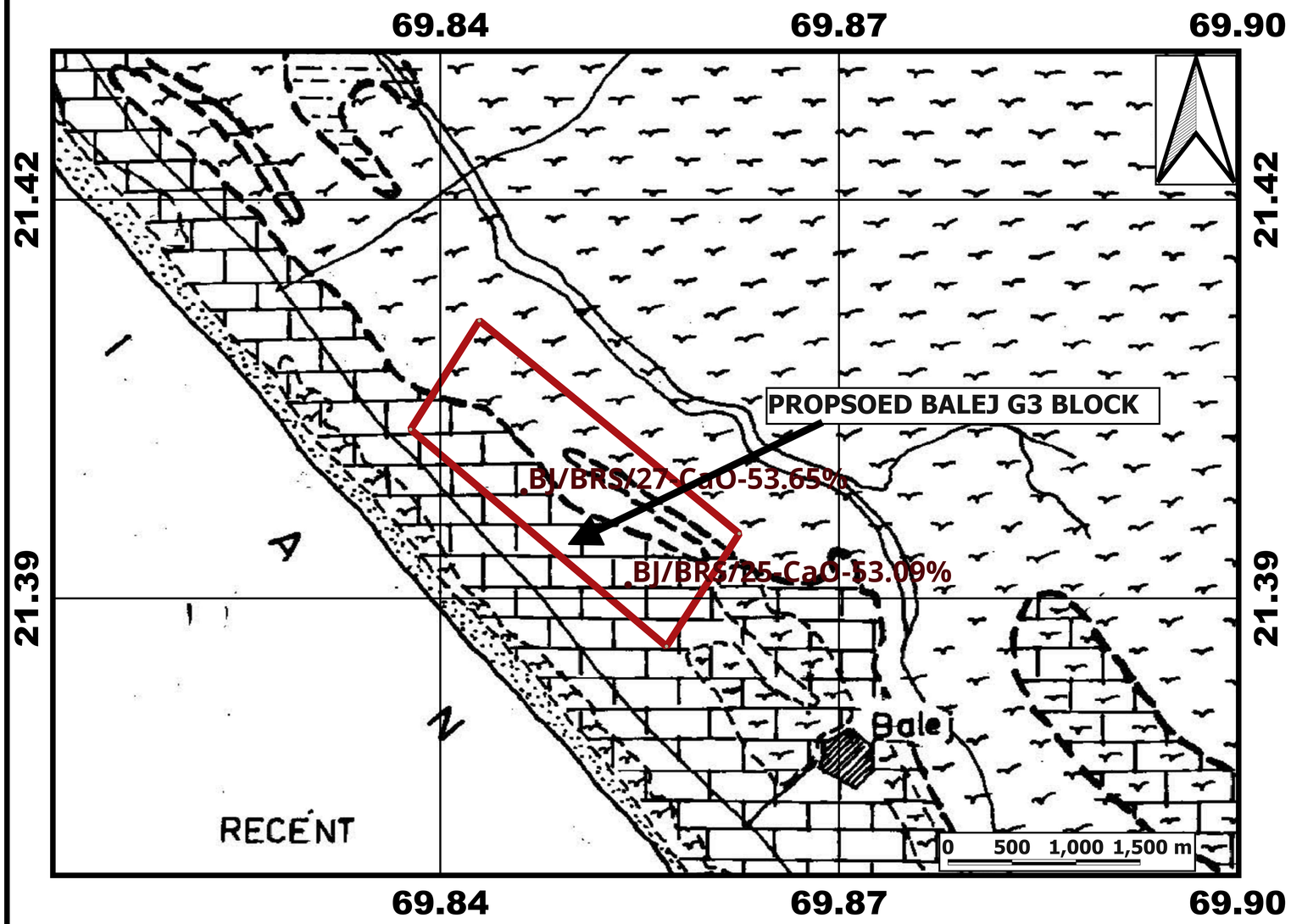
PROPOSED BALEJ LIMESTONE BLOCK FOR G3 ON GEOLOGICAL MAP

PORBANDAR DISTRICT, GUJARAT

MAP REF-GEO/26/ GUJ-02026

ANNEXURE-2
PROPOSED BALEJ (G3) BLOCK (1:10000)



LEGEND

SAND/ ALLUVIUM/MUD

MILIOLITIC LIMESTONE
AGRICULTURE ON MILIOLITIC LIMESTONE

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Scale:1:10,000

PROPOSED BALEJ LIMESTONE BLOCK FOR G3 ON GEOLOGICAL MAP

PORBANDAR DISTRICT, GUJARAT

MAP REF-GEO/26/ GUJ-02026