

COMMODITY: BAUXITE AND ASSOCIATED CRITICAL MINERALS

PRELIMINARY EXPLORATION FOR BAUXITE AND ASSOCIATED CRITICAL
MINERALS IN BASNI BLOCK, RATNAGIRI DISTRICT, MAHARASHTRA.
STAGE: G3

BY
GEOLOGICAL SURVEY OF INDIA
CENTRAL REGION, PUNE

PLACE: PUNE
DATE: JUNE 2026

Summary of the Block for G3 Level Exploration

GENERAL INFORMATION ABOUT THE BLOCK

Feature	Details
Block ID	Basni Block
Exploration Agency	Geological Survey of India, Central Region, State Unit: Maharashtra (Pune)
Commodity	Bauxite and associated critical minerals
Mineral Belt / Geological Domain	Deccan Trap lateritic profile, Ratnagiri coastal belt
Block Area	5.37 sq. km
Completion Period	One year (FS 2026-27)
Objectives	To establish the subsurface continuity and estimate the resource of bauxite and associated critical minerals.
Projected Outcome	Preliminary exploration data for resource appraisal and further advancement of the block.
Personnel	Two geoscientists
Expected Field Days	Officer-1: 100 days; Officer-2: 100 days; Supervisory Officer: 7 days
Toposheet / Degree Sheet	47G/08, 47G
District / State	Ratnagiri / Maharashtra

1. Location

BLOCK

Cardinal Points	Longitude	Latitude
A	73°20'40"E	17°03'10"N
B	73°20'40" E	17°04'00"N
C	73°18'30"E	17°04'00"N
D	73°18'30" E	17°03'10"N
E	73°19'00" E	17°03'10"N

Cardinal Points	Longitude	Latitude
F	73°19'00" E	17°03'30"N
G	73°19'30"E	17°03'30"N
H	73°19'30"E	17°03'10"N
Tehsil/Taluk	Ratnagiri	
District	Ratnagiri	
State	Maharashtra	

2. Area

Block Area	5.37 sq. km
Forest Area	Nil as per available preliminary information
Government Land Area	Data not available.
Private Land Area	Data not available.

3. Accessibility

Nearest town	Ratnagiri town, located south of Basni Block
District headquarters	Ratnagiri
Nearest Rail head	Ratnagiri Railway Station
Nearest Airport	Chipi airport.

4. Hydrography: The area is drained by westerly flowing tidal streams joining the Arabian Sea. The drainage pattern is dominantly dendritic to sub-dendritic and is controlled by lithology.

5. Climate: Humid tropical coastal climate with intense monsoonal rainfall.

6. Topography: The area comprises undulatory lateritic plateaus with elevations rising eastward, steep rocky slopes encircling plateaus of lower elevation and a narrow stretch of marine beach.

7. Availability of baseline geoscience data

Geological map	Large-scale geological mapping investigations by GSI in and around the block
Geochemical data	NGCM stream sediment data
Geophysical data	Not available

8. Justification for taking up G3 level exploration

Basni Block lies in the lateritic terrain developed over Deccan Trap basalt, north of

Ratnagiri town. Earlier geological work in parts of toposheet 47G/08, reported vesicular and non-vesicular laterites and pockets of bauxite with significant alumina enrichment in the Ratnagiri coastal belt. During FS 2021–22, NGCM stream sediment sampling in toposheets 47G/07 and 47G/08 yielded anomalous values of vanadium, chromium, cobalt and nickel, indicating the critical-mineral potential of the area.

During FS 2024–25, G4 stage investigation in the Bhandarpule–Mirajole area recommended further exploratory work in the laterite-capped plateau areas owing to significant enrichment of Al_2O_3 , TiO_2 , vanadium, scandium and gallium. Basni Block forms part of this favorable lateritic plateau terrain and has already yielded encouraging surface analytical values. The laterite capping in the area has a thickness ranging from 12 m to 15 m, with maximum concentration of vanadium and gallium observed in the duricrust horizon. Therefore, G3 stage exploration through detailed mapping and drilling is required to establish subsurface continuity, thickness variation, grade distribution and resource potential of bauxite and associated critical minerals.

A total of 15 surface/lateritic profile samples from Basni Block, comprising 5 bedrock samples, 4 trench samples and 6 channel samples, show encouraging values of Al_2O_3 and associated critical minerals. The bedrock samples show Al_2O_3 values ranging from 28.32% to 37.53% and vanadium values ranging from 832 ppm to 1602 ppm. Trench samples show Al_2O_3 values ranging from 31.26% to 44.28% and vanadium values ranging from 930 ppm to 1793 ppm. Channel samples show Al_2O_3 values ranging from 27.50% to 41.79% and vanadium values ranging from 630 ppm to 1077 ppm. Enrichment of associated critical elements is also noticed in the Basni samples. In bedrock samples, Cr ranges from 518 ppm to 1217 ppm, Ga from 41 ppm to 64 ppm, Sc from 10 ppm to 17 ppm and Zr from 330 ppm to 366 ppm. In trench samples, Cr ranges from 646 ppm to 803 ppm and Ga from 43 ppm to 64 ppm. In channel samples, Cr ranges from 422 ppm to 735 ppm, Ga from 42 ppm to 60 ppm, Sc from 14 ppm to 28 ppm and Zr from 273 ppm to 396 ppm. These analytical results confirm the potential of Basni Block for bauxite and associated critical mineral resources.

A systematic G3 stage programme comprising detailed mapping and shallow grid drilling is required to establish the thickness, grade and continuity of the bauxite/lateritic critical-mineral horizons and to prepare resource estimates.

PRELIMINARY EXPLORATION FOR BAUXITE AND ASSOCIATED CRITICAL MINERALS IN BASNI BLOCK, RATNAGIRI DISTRICT, MAHARASHTRA.

1.1.0 INTRODUCTION

The Basni Block is situated in the southwestern part of Maharashtra and lies towards the north of Ratnagiri town. The area falls in Survey of India toposheet no. 47G/08 and covers an area of 5.37 sq. km.

The block exposes basaltic flows of the Sahyadri Group of Deccan Trap Supergroup. Intense tropical weathering of the basaltic flows has resulted in the development of thick laterite profiles, which form the principal target horizon for bauxite and associated critical minerals.

The proposed programme is designed to generate geological, geochemical and drilling data required for preliminary resource appraisal and to guide subsequent exploration of bauxite and associated critical minerals.

2.1.0 BACKGROUND INFORMATION

Three basaltic flows grouped under Purandargarh formations of the Sahyadri Group of Deccan Trap Supergroup have been identified in the area. Contacts between flows are marked on the basis of fragmentary top breccia, vesicularity and break-in-slope. The laterite occurs as capping over the basaltic flows. Alluvium is present only along the coastal tract.

Previous mapping by Kulkarni during FS 1970-71 in parts of toposheet 47G/08 reported laterites and bauxite pockets north of Ratnagiri town. Reported alumina values include 57.30% Al₂O₃ west of Ganpatipule and north of Bhandara, 54.00% Al₂O₃ southeast of Varavda near Shirgaon, 55.14% Al₂O₃ around Vada Mirya, and bauxite up to 2.5 m thick with 55.20% Al₂O₃ north of Dhamansa.

The G4 stage investigation during FS 2024-25 covered 100 sq. km by large scale mapping on 1:12,500 scale. The work included 70 bedrock samples, 25 pit/trench samples, 30 channel samples, 20 groove samples and 25 stream sediment samples, along with petrographic, petrochemical, EPMA, SEM-EDX and PGE studies. The integrated results established the presence of laterite, aluminous laterite, bauxite pockets and associated critical mineral enrichment in the Bhandarpule–Mirajole–Basni sector.

The Basni Block has not been explored in detail previously. G4 stage results, however, indicate strong potential for bauxite and associated critical minerals, warranting detailed G3 stage investigation.

3.1.0 LOCATION AND ACCESSIBILITY

Basni Block lies in Ratnagiri district, Maharashtra, and falls in Survey of India toposheet no. 47G/08. The block is located north of Ratnagiri town. The area is approachable from Ratnagiri through metalled and village roads. Ratnagiri is the district headquarters and also the nearest major railway station. Local accessibility to borehole sites will be finalized during pre-field reconnaissance after verification of land status, approach roads and drill-site feasibility.

4.1.0 PHYSIOGRAPHY, DRAINAGE AND CLIMATE

The area comprises undulatory lateritic plateaus, steep rocky slopes, wave-cut scarp faces, deep-cut nalas and a narrow coastal tract. Basaltic flows are exposed mainly along scarp sections and nala cuttings, whereas laterite forms prominent capping over the basaltic flows.

The drainage is dendritic to sub-dendritic and is controlled by lithology and topography. A number of westerly flowing tidal streams drain the area and join the Arabian Sea.

The climate is humid tropical coastal type. The area receives heavy rainfall during the southwest monsoon. Such climatic conditions are favorable for deep chemical weathering, lateritisation and concentration of alumina and associated critical elements in the weathering profile.

5.1.0 PREVIOUS WORK

Patil (1968) carried out geological work in parts of Chiplun and Guhagar tahsils of Ratnagiri district. Kulkarni, during FS 1970–71, carried out geological mapping in parts of Ratnagiri district in toposheet no. 47G/08 and reported laterites and bauxite pockets north of Ratnagiri town. Roy, B.C. (1951) carried out geological investigations in western Maharashtra and reported occurrence of ilmenite sands along the Ratnagiri coast. Sahastrabuddhe and Sharma (1986) carried out geological studies in parts of Lanja, Pali, Hatkhamba and Ratnagiri talukas. The Report on Bauxite Technical Data and Information Bank, Volume I, prepared as a joint project of JNARDDC, Nagpur and GSI, CR, also provides regional information on bauxite occurrences in Maharashtra. During FS 2021–22, NGCM stream sediment sampling in toposheet nos. 47G/07 and 47G/08 recorded anomalous values of vanadium, chromium, cobalt and nickel. During FS 2024–25, G4 stage investigation in and around Bhandarpule and Mirajole areas identified laterite capping over basalt enriched in Al_2O_3 , TiO_2 , vanadium, scandium and gallium. These studies form the basis for proposing Basni Block for G3 stage preliminary exploration.

6.1.0 GEOLOGY OF THE AREA

The Basni Block is underlain by Deccan Trap basaltic flows belonging to the Sahyadri Group of Deccan Trap Supergroup. The flows are grouped under the Diveghat and Purandargad formations. The basaltic flows are generally of “aa” type and show vesicular, amygdaloidal and massive characters. Contacts between individual flows are marked by fragmentary top breccia, vesicularity and break-in-slope.

Laterite occurs as capping over the basaltic flows and constitutes the principal target horizon in the block. The lateritic profile is represented by ferruginous duricrust, aluminous laterite/bauxite zones, mottled zone, lithomarge and saprolite developed over basaltic flows. The duricrust is dominantly ferruginous and enriched in Fe-oxyhydroxides, whereas aluminous laterite and bauxite pockets are locally developed within the plateau-top lateritic profile.

The presence of gibbsite, goethite, hematite, kaolinite, ilmenite, titanomagnetite and anatase indicates intense chemical alteration of basalt under tropical weathering conditions and enrichment of relatively immobile oxides. The development of a thick lateritic profile has resulted in enrichment of alumina, titanium, vanadium, gallium, scandium and other associated critical elements

7.1.0 OBJECTIVES OF THE PROPOSED EXPLORATION PROGRAMME

The present exploration programme has been formulated with the following objectives:

- i) To establish the subsurface continuity of bauxite/lateritic aluminous horizons in Basni Block.
- ii) To estimate the resource of bauxite and associated critical minerals.
- iii) To assess the potential of associated critical minerals such as vanadium, gallium, scandium, zirconium and other associated elements.

8.1.0 PROPOSED SCHEME OF EXPLORATION

The proposed G3 exploration programme comprises detailed geological mapping on 1:4000 scale over 5.37 Sq.km and shallow vertical drilling on an approximate 400 m × 400 m grid pattern. A

total of 36 vertical boreholes is tentatively proposed, each up to 12 m to 15 m depth, for a cumulative drilling target of 468 m.

The drilling is proposed to assess the thickness, grade and continuity of the lateritic profile and bauxite/aluminous horizons. The borehole locations are tentative and may be modified after detailed mapping and drill-site feasibility assessment.

Core sampling will be carried out from boreholes. Chemical analysis will include major oxides such as Al_2O_3 , SiO_2 , Fe_2O_3 , TiO_2 , K_2O , CaO , MgO , Na_2O , P_2O_5 , MnO and LOI. Trace elements including V, Ga, Sc, Y and Zr will also be analysed. Reactive silica analysis will be carried out for selected bauxite samples. Petrographic, minerographic and XRD studies will be undertaken for mineralogical characterization.

The results of the proposed work will help in establishing the subsurface continuity of the bauxite/lateritic horizons and in estimating G3 level resources of bauxite and associated critical minerals.

9.1.0 QUANTUM OF WORK

Item of Work	Unit	Proposed Quantum
Detailed Mapping (1:4000)	Sq.km	5.37
Drilling	m	468
Core Sampling (CS)	nos.	468
Reactive Silica (for bauxite samples)	nos.	5
Petrographic Studies (PS)	nos.	10
Petrochemical Samples (PCS)	nos.	10
Ore Microscopy / Minerography (ORM/OM)	nos.	10
XRD	nos.	10
Chemical Analysis - Major oxides and trace elements	nos.	CS: 468; PCS: 10; REE: 10

10.1.0 COST

Summary of the Cost estimates

Preliminary Exploration for Bauxite and Associated Critical Minerals in Basni Block, Ratnagiri District, Maharashtra (G3)								
1	Drilling			468m	36 Boreholes with 12 to 15m depth for each borehole			
Item of Work				Unit	SoC-Item - Sl No. NMED T	Rates as per NMET SoC 2025	Estimated Cost	
							Qty.	Total Amount (Rs)
D. Drilling - OUT SOURCED								
DRILLING	Drilling in/ Drilling in Soft rock/ Strata: HQ size borehole upto 400m Depth and NQ Size beyond 400m depth in case of NQ size drilling is done before 400m depth, the rate shall decrease by 20%			m	2.2.1.1c	5,500	468	₹ 2,574,000
Total Cost D- outsourced								₹ 2,574,000
Total (Drilling)								₹ 2,574,000
GST 18%								₹ 463,320
Total Fund Required inclusive of 18% GST								₹ 3,037,320
In Lakh								30.37

11.1.0 TIME SCHEDULE

The work programme is proposed for FS 2026–27, with field, laboratory, reporting, and circulation milestones as summarized below.

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Fig. 1: Location map of Basni Block

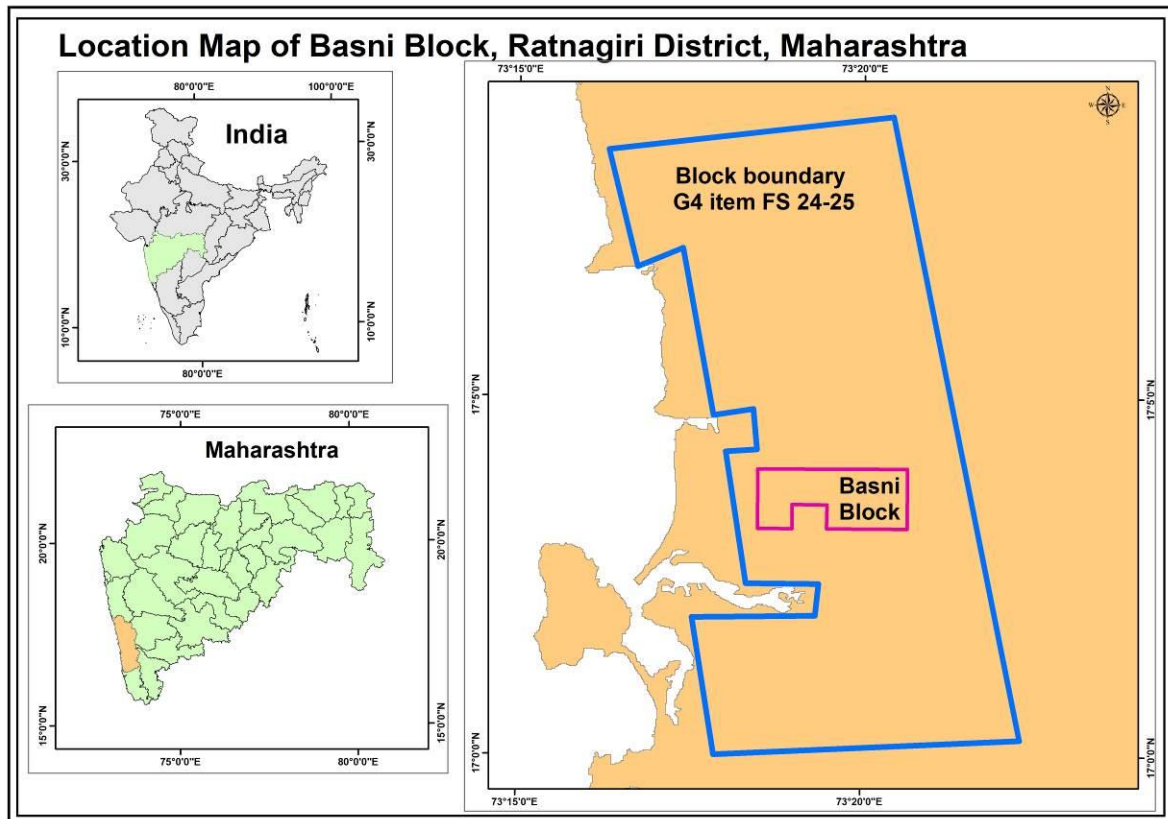
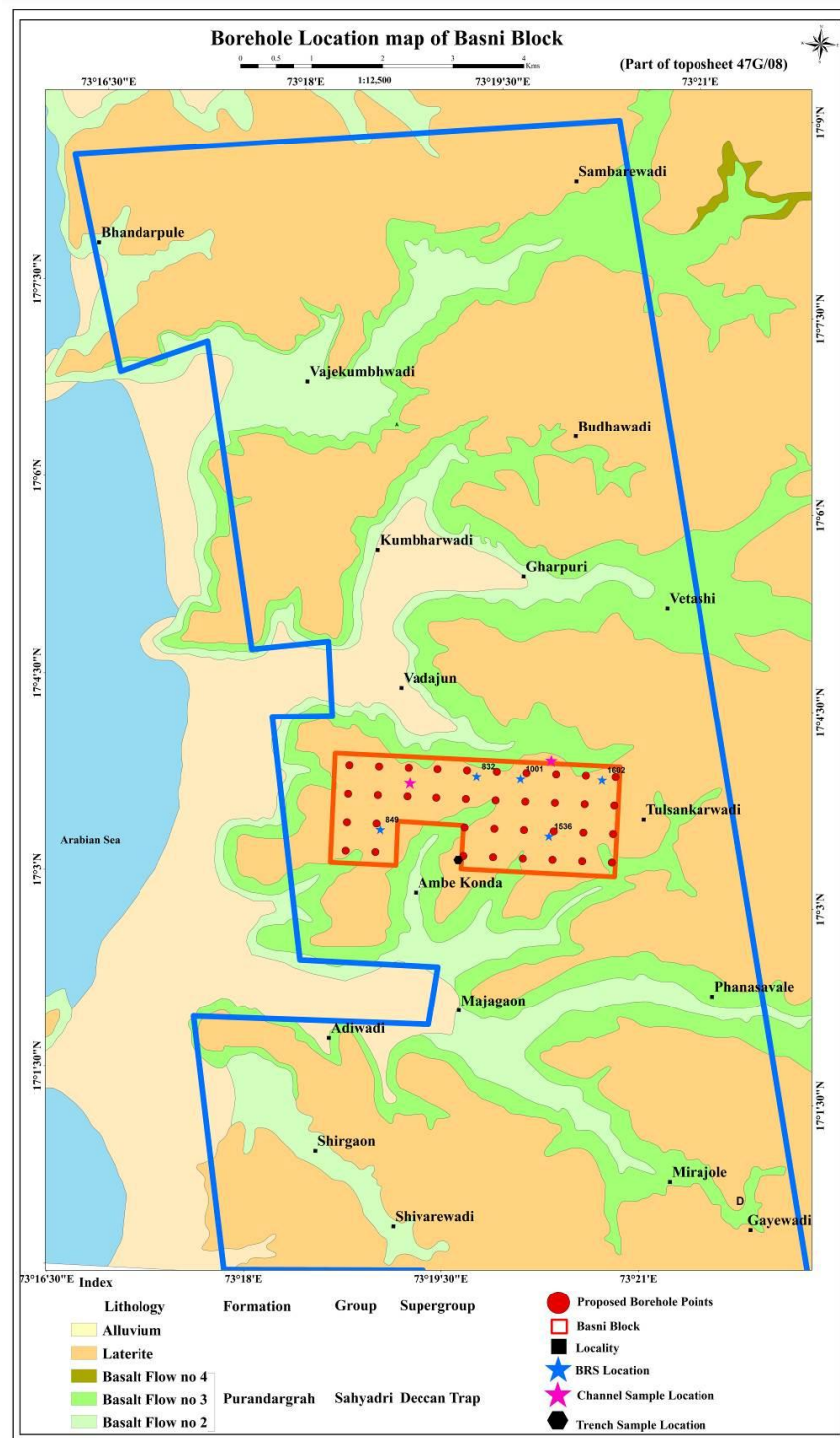


Fig. 2: Geological map of Basni Block



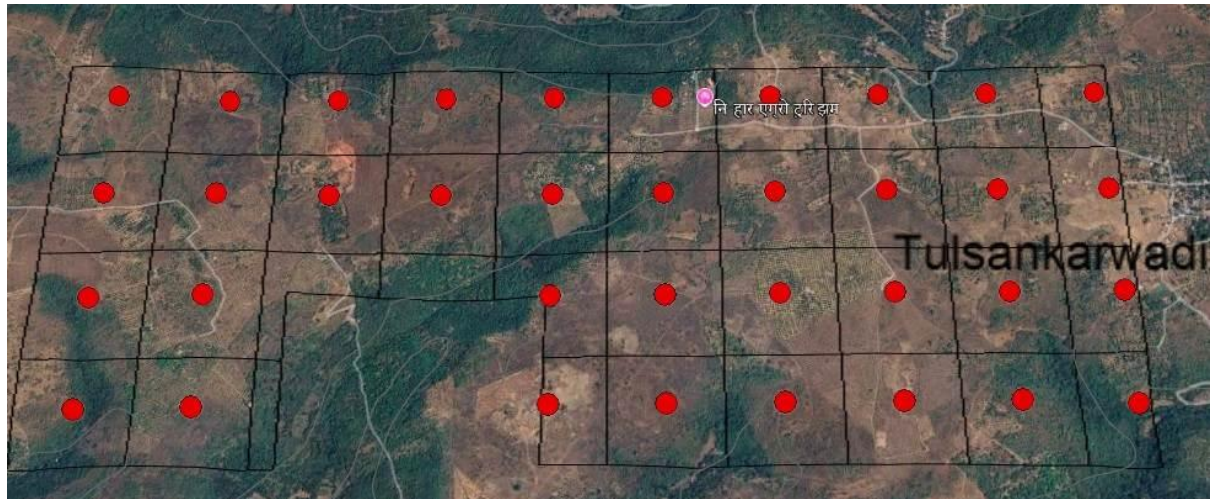


Fig. 3: Borehole plan of Basni Block

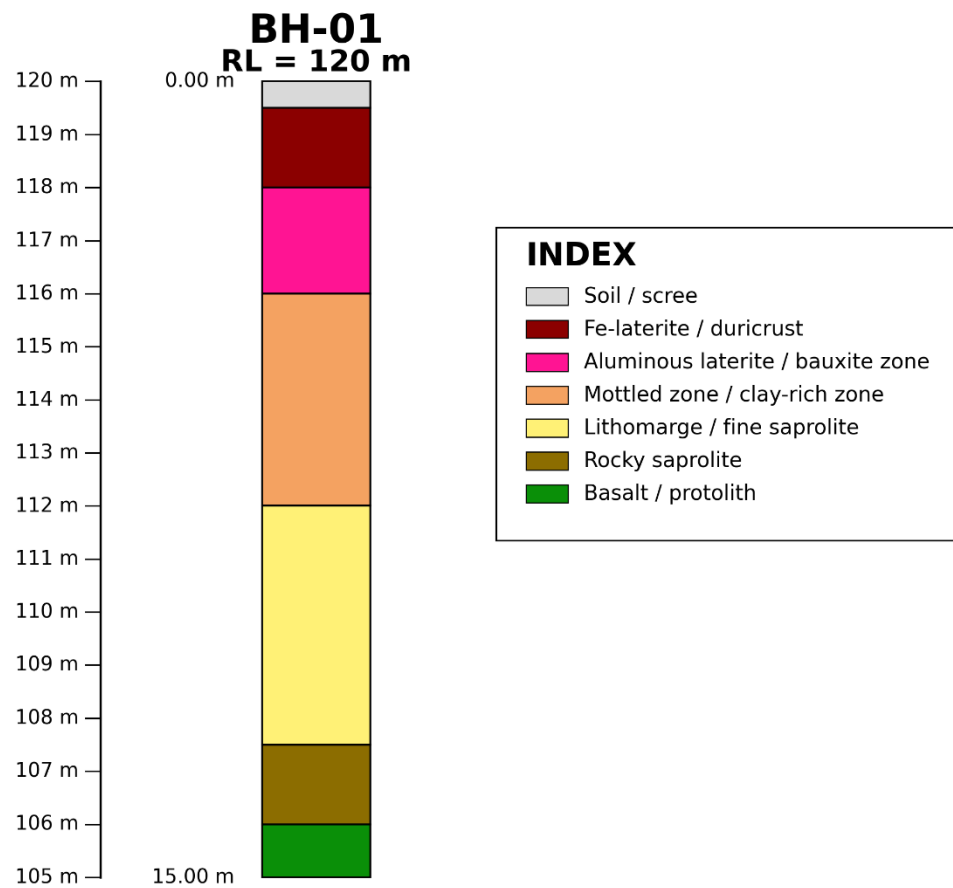


Fig. 4: Vertical profile section of Basni Block

Fig. 5: Typical laterite profile of the area

