

# Executive Summary of EIA/ EMP Report

For Proposed Garnite Building Stone Quarry by

**M/s. Rock N Rock Associates Pvt. Ltd.**

(Represented by Mr. Devadas Ayyappan Nair, Managing Director)

Proposed Lease Area: 4.9500 ha

Cluster Area: 5.9410 ha



**Scheduled item & Category: Item:1(a), Category: B1**

**Proposed Production Capacity: 2,58,680.6169MTA**

**Proposed Project Cost: INR 4,87,85,110/-**

## Project Location

**Block No. 71, Re-Survey Nos. 11, 12, 13/1-1. 13/2 of Venganellur Village**

**[Ward No. 2, Chelakkara Grama Panchayat], Thalappilly Taluk, Thrissur District, Kerala**

## Cluster Details

**1, Proposed Quarry of M/s. Rock N Rock Associates Pvt. Ltd: 4.9500 ha**

**2, Existing Quarry of Mr. Joseph K.I: 0.9910 ha**

**Total Cluster Area: 5.9410 ha**

## Project Proponent

**M/s. Rock N Rock Associates Pvt. Ltd.**

**Represented by**

**Mr. Devadas Ayyappan Nair,**

**Managing Director,**

**Registered office at 1/371-J, Padinjarethondoor, Ooramana P.O.**

**Ernakulam, Kerala – 686663.**

**Contact No: 91 97473 77887**

**E-mail: rocknrock496@gmail.com**



**August, 2026**

## Prepared by

**M/s. Parivesh Environmental Engineering Services  
QCI-NABET Accredited Environmental Consultancy  
5/106, Viraj Khand, Gomti Nagar, Lucknow, UP-226010**

**Contact: 9819 893 405, 8089 085 335**

**Email: [parivesh.env@gmail.com](mailto:parivesh.env@gmail.com)**

## **Table of Contents**

|                                                                      |    |
|----------------------------------------------------------------------|----|
| 1.0. Executive Summary.....                                          | 1  |
| 1.1. Introduction.....                                               | 1  |
| 1.2. Cluster Scenario and Regulatory Applicability.....              | 1  |
| 2.0. Project Description.....                                        | 2  |
| 2.1. Location Coordinates.....                                       | 2  |
| 2.2. Elevation and Pit Configuration .....                           | 2  |
| 2.3. Land Use Pattern.....                                           | 2  |
| 3.0. Mining Methodology and Operational Parameters.....              | 3  |
| 3.1. Infrastructure and Connectivity .....                           | 3  |
| 4.0. Environmental and Social Setting.....                           | 4  |
| 4.1. Environmental Interpretation.....                               | 7  |
| 5.0. Resource Requirement .....                                      | 7  |
| 6.0. Material Transportation (Truck) .....                           | 8  |
| 7.0. Baseline Environmental Studies .....                            | 8  |
| 7.1. Meteorology .....                                               | 8  |
| 7.2. Ambient Air Quality.....                                        | 9  |
| 7.3. Water Environment.....                                          | 9  |
| 7.3.1. Groundwater Quality.....                                      | 9  |
| 7.3.2. Surface Water Quality.....                                    | 9  |
| 7.4. Noise Environment .....                                         | 10 |
| 7.5. Soil Environment.....                                           | 10 |
| 7.6. Land Use, Geology & Geomorphology .....                         | 10 |
| 7.7. Ecology and Biodiversity.....                                   | 10 |
| 7.8. Socio-Economic Environment .....                                | 11 |
| 7.9. Demographic and Occupational Profile .....                      | 11 |
| 7.10. Observations from Primary Socio-Economic Survey .....          | 11 |
| 7.11. Community Concerns .....                                       | 12 |
| 7.12. Impact Assessment.....                                         | 12 |
| 7.13. Mitigation Measures.....                                       | 12 |
| 7.14. Conclusion.....                                                | 13 |
| 8.0. Anticipated Environmental Impacts and Mitigation Measures.....  | 13 |
| 8.1. Impact on Air Environment .....                                 | 13 |
| 8.2. Impact on Water Environment.....                                | 14 |
| 8.3. Impact on Noise and Vibration.....                              | 14 |
| 8.4. Impact on Land Environment .....                                | 15 |
| 8.5. Impact on Biological Environment.....                           | 15 |
| 8.6. Impact on Socio-Economic Environment .....                      | 15 |
| 9.0. Environmental Management Plan .....                             | 16 |
| 9.1. EMP Budget Summary of M/s. Rock N Rock Associates Pvt. Ltd..... | 16 |
| 9.2. Implementation and Monitoring.....                              | 17 |
| 10.0. Project Cost and Schedule.....                                 | 17 |
| 11.0. Conclusion.....                                                | 17 |

## **List of Tables**

|                                                                       |    |
|-----------------------------------------------------------------------|----|
| Table 1: Applicable Cluster including proposed & cluster quarry ..... | 1  |
| Table 2: Land use pattern of proposed project.....                    | 2  |
| Table 3: Environmental / Social Setting of Proposed Project .....     | 4  |
| Table 4: Details of Machinery for proposed quarrying purpose .....    | 8  |
| Table 5: Component-wise Measures & Budget of EMP .....                | 16 |

## **1.0. Executive Summary**

### **1.1. Introduction**

M/s. Rock N Rock Associates Pvt. Ltd. (CIN: U14290KL2022PTC077658) is a private limited company incorporated on 29 August 2022, having its registered office at 1/371-J, Podinjarethondoor, Ooramana P.O., Ernakulam, Kerala – 686663. The company is incorporated under the provisions of the Companies Act, 2013 (18 of 2013) and is limited by shares. The company has two Directors, Mr. Harikrishnan Alayathottathil Sadhasivan and Mr. Shinoy Paul, and Mr. Devadas Ayyappan Nair as the Managing Director. Mr. Devadas Ayyappan Nair has been designated as the Authorized Signatory for statutory compliances and matters related to the execution of the proposed Granite Building Stone (GBS) Quarry project.

The proposed GBS Quarry is located at Venganellur Village, Chelakkara Grama Panchayat, Thalappilly Taluk, Thrissur District, Kerala, covering an extent of 4.9500 ha in Block No. 71 and Re-Survey Nos. 11, 12, 13/1-1 and 13/2. The project land comprises private non-forest land and is characterized predominantly by sparse mixed vegetation, including *Hevea brasiliensis* (rubber), along with shrubs and grasses. The project site exhibits a gently undulating to nearly flat terrain, with elevations ranging from approximately 60.093 to 86.474 m AMSL. The area represents a typical midland lateritic terrain transitioning into hard-rock exposures, providing suitable geological conditions for granite building stone extraction.

A Letter of Intent (LoI) has been issued by the Directorate of Mining & Geology, Thiruvananthapuram, vide Letter No. DMG/293/2025-M1 dated 25.08.2025. The Mining Plan has been prepared by a Recognized Qualified Person (RQP) in accordance with the provisions of the Kerala Minor Mineral Concession Rules (KMMCR), 2015, and has been approved by the competent authority.

In accordance with the EIA Notification, 2006, the proposed project falls under Schedule 1(a) – Mining of Minerals. Although the individual lease area is less than 5 ha, the project is considered under Category B1 owing to its inclusion within a mining cluster, in accordance with the MoEF&CC Office Memorandum dated 12.12.2018 and the Hon'ble National Green Tribunal (NGT) Order dated 13.09.2018.

### **1.2. Cluster Scenario and Regulatory Applicability**

The proposed quarry forms part of a mining cluster with one existing quarry unit. The cluster configuration is presented below:

**Table 1: Applicable Cluster including proposed & cluster quarry**

| Sl. No. | Name of Quarry unit/ Proponents      | Area (ha) | Status           |
|---------|--------------------------------------|-----------|------------------|
| 1       | M/s. Rock N Rock Associates Pvt. Ltd | 4.9500    | Proposed         |
| 2       | Mr. Joseph K.I.                      | 0.9910    | Existing Working |

The total cumulative cluster area is **5.9410 hectares**, exceeding the threshold limit of 5 hectares prescribed under EIA Notification, 2006. Hence, the project requires preparation of EIA Report, Environmental Management Plan (EMP), and conduct of Public Consultation as part of statutory clearance procedures.

## **2.0. Project Description**

The project involves extraction of Granite Building Stone using semi-mechanized opencast mining techniques. The geological reserve has been estimated at 28,97,842.732 MT, out of which 20,69,444.935 MT is classified as mineable reserve and 8,28,397.796 MT as blocked reserve due to safety and statutory considerations. The proposed maximum annual production capacity is 2,58,680.6169 MTA, with an anticipated mine life of approximately 8 years, based on the approved Mining Plan.

### **2.1. Location Coordinates**

- Latitude: 10°42'55.29"N-10°42'46.58"N
- Longitude: 76°20'35.81"E -76°20'27.70"E

### **2.2. Elevation and Pit Configuration**

- Highest elevation: 86.474 m AMSL
- Lowest elevation: 60.093 m AMSL
- Proposed ultimate pit level: 50 m AMSL

### **2.3. Land Use Pattern**

**Table 2: Land use pattern of proposed project**

| S. No. | Land Use Category        | Pre-Operational (Ha.) | Operational (Ha.) | Post-Operational (Ha.) |
|--------|--------------------------|-----------------------|-------------------|------------------------|
| 1      | Area under mining        | —                     | 4.1426            | —                      |
| 2      | Road                     | 0.05                  | 0.1               | 0.1                    |
| 3      | Built Up Area            | —                     | —                 | —                      |
| 4      | Mixed Vegetation         | 4.7428                | —                 | —                      |
| 5      | Exposed rocky area       | 0.1572                | —                 | —                      |
| 6      | Reclamation (Backfilled) | —                     | —                 | 1.6146                 |
| 7      | Pond                     | —                     | —                 | 2.5280                 |
| 8      | Drainage                 | —                     | 0.05              | 0.05                   |

| S. No.     | Land Use Category | Pre-Operational (Ha.) | Operational (Ha.) | Post-Operational (Ha.) |
|------------|-------------------|-----------------------|-------------------|------------------------|
| 9          | Green belt        | –                     | 0.6574            | 0.6574                 |
| Total Area |                   | 4.9500                | 4.9500            | 4.9500                 |

During the conceptual stage, the mined-out area will be rehabilitated progressively. About 1.6146 hectares will be reclaimed through plantation using preserved topsoil, while 2.5282 hectares will be converted into a rainwater harvesting pond to enhance groundwater recharge.

### **3.0. Mining Methodology and Operational Parameters**

Mining will be carried out by semi-mechanized opencast method with systematic benching. Bench height and width will be maintained at 5 m each, with intermediate sub-benches of 2.5 m merged into final benches. The final slope angle will be maintained at 45° to ensure long-term stability.

Drilling operations will utilize 32 mm diameter drill holes with depths ranging from 1.5 m to 1.8 m. The drilling pattern will be square or staggered with burden and spacing ranging from 0.9 m to 1.2 m.

Controlled blasting using NONEL (Non-Electric) detonators will be adopted, ensuring reduced vibration, minimized fly rock, and safe operations.

Excavation will be carried out using hydraulic excavators and rock breakers. Material will be transported using tipper trucks of 10–15 tonne capacity. The haul road gradient will be maintained at 1:16.

Operations will be restricted to daytime hours (06:00–18:00) for approximately 250 working days per year.

### **3.1. Infrastructure and Connectivity**

The project site is accessible through an existing village road connecting to Chelakkara-Thozhupadam Road and further connect to State Highway SH-74 at an aerial distance of 2.2 km. This highway connects major towns including Chelakkara, Thalappilly, Alathur, Vadakkanchery, and Thrissur.

The nearest railway station is Mannanur Railway Station located at 4.24 km, NNW (aerial distance), while Calicut International Airport is situated at 62.96 km, NW.

The nearest habitation is located at 106.2 m from the lease boundary (House of Smt. Sathyabhama, Thathrayikkal House, Building No. 223, Ward No. 2, Chelakkara Panchayat).

#### 4.0. Environmental and Social Setting

The environmental and social setting of the project site has been assessed within a 10 km radius study area. The project site is located in a moderately populated rural region with mixed agricultural and plantation land use, supported by adequate infrastructure and connectivity.

**Table 3: Environmental / Social Setting of Proposed Project**

| Sl. No | Particulars                                    | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.     | Geographical Location                          | Latitude (N): 10°42'55.29"N-10°42'46.58"N<br>Longitude(E): 76°20'35.81"E -76°20'27.70"E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 2.     | Nearest Habitation                             | 106.2 m from the lease boundary between BP-6 (House of Smt. Sathyabhama, Thathrayikkal House, Building No. 223, Ward No. 2, Chelakkara Panchayat).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 3.     | Accessibility (Material Transportation)        | The proposed quarry site is well integrated with the regional road network, facilitating efficient movement of raw materials, machinery, and personnel. Access to the project area is provided through a Village Road (528 m). This Village Road further links to the single-lane, double-sided Chelakkara-Thozhupadam Road (1.74 km), which in turn connects to the Vazhakode-Plazhi Road (SH-74), ensuring seamless regional and inter-regional transportation access. Presently the village road does not having enough width for carrying two side transportation, the project also been proposed one new private access road parallel to the village road with a total length of 528 m. |
| 4.     | Nearest Densely Populated area & Town/Junction | Venganellur is the moderatly populated area with significant amount of paddy fields at an aerial distance of approximately 0.88 km, S.<br>Chelakkara Town is located at an aerial distance of 2.2 km, S.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 5.     | Nearest Airport                                | <ul style="list-style-type: none"> <li>• <u>Calicut International Airport</u> <ul style="list-style-type: none"> <li>➤ Aerial Distance: 62.96 km, NW</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 6.     | Nearest Highway/Major Roads                    | <ul style="list-style-type: none"> <li>• <u>National Highway- 544 (Selam-Kochi Highway)</u> <ul style="list-style-type: none"> <li>➤ Aerial Distance: 24.54 km, ESE</li> <li>➤ (Road Distance: 28.1 km)</li> </ul> </li> <li>• <u>State Highway- 74 (Vazhakode-Alathur Road)</u> <ul style="list-style-type: none"> <li>➤ Aerial Distance: 2.13 km, S</li> <li>➤ (Road Distance: 2.2 km)</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                              |

| Sl. No | Particulars                  | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |                              | <ul style="list-style-type: none"> <li>• <u>State Highway- 23</u> (Shornur-Perinthalmanna Road) <ul style="list-style-type: none"> <li>➤ Aerial Distance: 7.92 km, NE</li> <li>➤ (Road Distance: 13.8 km)</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                             |
| 7.     | Nearest Railway Station      | <u>Mannanur Railway Station</u> <ul style="list-style-type: none"> <li>➤ Aerial Distance: 4.24 km, NNW</li> <li>➤ (Road Distance: 24.3 km)</li> </ul>                                                                                                                                                                                                                                                                                                                                                        |
| 8.     | Power Supply                 | <ul style="list-style-type: none"> <li>• LT Line- 0.52 km, S (Aerial Distance)</li> <li>• HT Line – 1.95 km, SSE (Aerial Distance)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                |
| 9.     | Nearest Hospital/Dispensary  | <ul style="list-style-type: none"> <li>• <u>Taluk Hospital, Chelakkara</u> <ul style="list-style-type: none"> <li>➤ Aerial Distance: 2.24 km, S</li> <li>➤ (Road Distance: 3.1 km)</li> </ul> </li> <li>• <u>Jeevodaya Mission Hospital</u> <ul style="list-style-type: none"> <li>➤ Aerial Distance: 2.20 km, SSW</li> <li>➤ (Road Distance: 3.4 km)</li> </ul> </li> </ul>                                                                                                                                 |
| 10.    | Nearest Educational Facility | <ul style="list-style-type: none"> <li>• <u>Educational Institutes</u> <ul style="list-style-type: none"> <li>○ ALP School, Keezhillam: 1.01 km, W</li> <li>○ Anganwadi, Venganellur, Chelakkara: 1.10 km, (Road Distance: 1.42 km)</li> <li>○ Anganwadi, Pangarappilly, Chelakkara: 2.57 km, S, (Road Distance: 2.92 km)</li> <li>○ Anganwadi, Kolathur, Chelakkara: 0.9 km, NE, (Road Distance: 1.3 km)</li> <li>○ Central School, Chelakkara: 3.14 km, SW, (Road Distance: 4.9 km)</li> </ul> </li> </ul> |
| 11.    | Nearest Police Station       | <ul style="list-style-type: none"> <li>• <u>Chelakkara Police Station</u> <ul style="list-style-type: none"> <li>➤ Aerial Distance: 2.20 km, SSW</li> <li>➤ (Road Distance: 3.01km)</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                   |
| 12.    | Nearest Fire Station         | <ul style="list-style-type: none"> <li>• <u>Fire and Rescue Station, Shornur</u> <ul style="list-style-type: none"> <li>➤ Aerial Distance: 9.43 km, NW,</li> <li>➤ (Road Distance: 17.07 km)</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                          |
| 13.    | Nearest Ambulance Facility   | <ul style="list-style-type: none"> <li>• <u>Taluk Hospital, Chelakkara</u> <ul style="list-style-type: none"> <li>➤ Aerial Distance: 2.24 km, S</li> <li>➤ (Road Distance: 3.1 km)</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                    |

| Sl. No | Particulars                                                                                       | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14.    | Nearest Religious Institutions/ Worships                                                          | <p><u>Aerial Distances</u></p> <p><b>Mosque</b></p> <p>➤ Ahmadiyya Muslim Masjid Chelakkara: 0.26 km, W</p> <p><b>Temple</b></p> <p>➤ Mallan Temple, Venganellur: 0.52 km, S</p> <p><b>Church</b></p> <p>➤ I P C Ebenezer Church Chelakkara Pentecostal Church: 1.77 km, S.</p> <p>➤ St. Mary's Forane Church Chelakkara: 2.14 km, S.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 15.    | Nearest Other Public Infrastructures                                                              | <ul style="list-style-type: none"> <li>• Post Office Venganellur: 1.11 km, S</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 16.    | Landslide Hazard Zone Status                                                                      | <p>As per the Landslide Susceptibility/ Hazard Zonation map prepared by Geological Survey of India (GSI), the nearest Landslide Hazard Zones from the proposed permit area are as follows;</p> <ul style="list-style-type: none"> <li>• Low Hazard Zone (LHZ): 3.70km, WSW</li> <li>• Medium Hazard Zone (MHZ): 3.82km, WSW</li> <li>• High Hazard Zone (HHZ): 4.61 km, WSW</li> </ul> <p>Thus, it can be concluded that, the proposed project site does not fall within any landslide hazard zones</p>                                                                                                                                                                                                                                                                                                            |
| 17.    | Eco - Sensitive Zone (National Park, Sanctuary, Habitat for Migratory Birds, Tiger Reserve, etc.) | <p>With respect to ecologically sensitive areas, the proposed project site is located approximately 12.58 km east of Choolanur Peafowl Sanctuary, 4.89 km south of Peechi-Vazhani Reserved Forest, 38.08 km north of the Silent Valley National Park Eco-Sensitive Zone (ESZ), and 40.19 km north of Silent Valley Wildlife Sanctuary. The nearest Reserved Forest is Kondazhi Reserved Forest, located approximately 1.96 km east of the project site. As per the Western Ghats High-Level Working Group (HLWG) assessments, including the Kasturirangan and Oommen V. Oommen Committee recommendations, the project site does not fall within a notified Ecologically Sensitive Area (ESA) village. The nearest ESA village, Kizhakkanchery-I, is located approximately 20 km southeast of the project site.</p> |
| 18.    | Interstate Boundary                                                                               | None within the 10 km study area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Sl. No | Particulars                                                                                 | Details                                                                       |
|--------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| 19.    | Critically Polluted Area (CPA) as Identified by CPCB                                        | None (No CPAs identified by CPCB as per the CEPI score within a 10 km radius) |
| 20.    | Defence Installations                                                                       | None within the 10 km study area                                              |
| 21.    | Archaeological Features                                                                     | None within the 10 km study area                                              |
| 22.    | Nearest Forests/ Reserved Forests (RF)                                                      | Kondazhi RF: 1.96 km, E                                                       |
| 23.    | Nearest Streams/Rivers/Other Water Bodies (from Mine Boundary)                              | Thodu: 1.23 Km, WSW<br>Bharathapuzha River: 3.19 km, NNE                      |
| 24.    | High-Level Working Group Reports (Kasturirangan & Oommen V. Oommen Report on Western Ghats) | Not Fall in ESA village<br>Nearest ESA Village is Kizhakkanchery-I: 20 km, SE |
| 25.    | CRZ (Coastal Regulation Zone) Status                                                        | Not Applicable                                                                |

#### **4.1. Environmental Interpretation**

The project site is located outside environmentally sensitive zones and does not fall within any notified ESZ, CRZ, or ESA area. The nearest wildlife sanctuary boundary is located beyond 10 km, indicating minimal ecological sensitivity.

The presence of Bharathappuzha River at 3.19 km, NNE and nearby irrigation channels indicates moderate hydrological significance; however, appropriate mitigation measures are proposed to prevent sedimentation and runoff impacts.

The surrounding area is dominated by agricultural land, plantations, and mixed vegetation, indicating anthropogenically influenced land use rather than natural forest ecosystems.

#### **5.0. Resource Requirement**

The project will require a workforce of 35 persons, including skilled and semi-skilled workers. At the cluster level, total employment is estimated at 45 persons.

Water requirement is estimated at 14 kLD for the project and 22 kLD for the cluster. Water will be used for dust suppression, plantation, and domestic purposes, and will be sourced through rainwater harvesting structures and storage tanks.

Power requirement is minimal, as all major equipment operates on diesel (HSD). Electricity is required only for lighting and office use, sourced from KSEB.

Machinery includes:

**Table 4: Details of Machinery for proposed quarrying purpose**

| Sl No | Machine Type         | No. of units |                    |
|-------|----------------------|--------------|--------------------|
| 1     | Back Hoe             | 2            | 0.9 m <sup>3</sup> |
| 2     | Rock Breaker         | 3            | --                 |
| 3     | Compressor (Chicago) | 3            | CFM/100            |
| 4     | Tipper/Trucks        | 3            | 15 MT              |
| 5     | Jack hammer          | 2            | 32 mm              |
| 6     | DG Set               | 2            | 125 kVA            |

## **6.0. Material Transportation (Truck)**

Based on production of 258680.6169 MTA and 250 working days:

- ✓ Daily production  $\approx$  1034.72 MT/day
- ✓ Truck capacity  $\approx$  12.5 MT
- ✓ Trucks required  $\approx$  84 per day
- ✓ Round Trips  $\approx$  168 per day
- ✓ Roundtrips per hour: 24 nos/ hr (during day time transportation hours only)

At cluster level, cumulative traffic is estimated at 15 vehicle movements per hour under peak conditions. Transportation will be carried out through existing road network connecting to SH-74, avoiding new road construction.

## **7.0. Baseline Environmental Studies**

Baseline environmental monitoring for the proposed Granite Building Stone Quarry project was carried out during the post-monsoon/winter season from 1<sup>st</sup> November 2025 to 31<sup>st</sup> January 2026 through a NABL-accredited laboratory. The study covered the core zone and a buffer zone of 10 km radius, and included air, water, noise, soil, land use, and meteorological parameters.

### **7.1. Meteorology**

The meteorological data indicates that the study area experiences moderate climatic conditions typical of midland Kerala. The temperature ranged between 23.37°C and 27.82°C, while relative humidity varied from 60.48% to 91%. Wind speed remained low to moderate (0.89–3.19 m/s), indicating limited dispersion potential during calm conditions. The predominant wind direction was observed to be variable, suggesting localized dispersion of pollutants.

Rainfall during the study period was recorded as 104.5 mm (November), 29.4 mm (December), and 25.7 mm (January), indicating transition from monsoon to dry season.

## **7.2. Ambient Air Quality**

Ambient Air Quality (AAQ) monitoring was conducted at eight locations (AAQ1–AAQ8) covering both core and buffer zones. The parameters monitored included PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>2</sub>, CO, and trace elements.

- PM<sub>10</sub> concentrations ranged from 26.50 µg/m<sup>3</sup> to 63.50 µg/m<sup>3</sup>, with 98th percentile values well within the CPCB limit of 100 µg/m<sup>3</sup>
- PM<sub>2.5</sub> ranged from 15.40 µg/m<sup>3</sup> to 33.70 µg/m<sup>3</sup>, below the limit of 60 µg/m<sup>3</sup>
- SO<sub>2</sub> and NO<sub>2</sub> concentrations were consistently low (<5.27 µg/m<sup>3</sup>), indicating negligible industrial influence
- CO levels were below detectable limits (<0.30 mg/m<sup>3</sup>)

Respirable crystalline silica (SiO<sub>2</sub>) ranged from 3.27 to 6.688 µg/m<sup>3</sup>, significantly lower than DGMS occupational exposure limit (25 µg/m<sup>3</sup>).

The results indicate that the study area has good ambient air quality, with minor localized influence from existing quarry operations and vehicular movement.

## **7.3. Water Environment**

### **7.3.1. Groundwater Quality**

Groundwater samples collected from multiple locations indicate that most parameters are within IS 10500:2012 standards.

- pH ranges within acceptable limits
- TDS ranges from 57–318 mg/L, indicating low mineralization
- Hardness, chloride, sulphate, calcium, and magnesium are within permissible limits
- Total coliform bacteria detected in some locations, indicating localized contamination

### **7.3.2. Surface Water Quality**

Surface water quality conforms to IS 2296 Class C standards:

- pH: Neutral
- Turbidity: up to 0.90 NTU (typical for surface water)
- TDS: 112-142 mg/L
- Total coliform present in the samples, but E-coli are absent.

No major contamination is observed; however, treatment is required before potable use.

#### **7.4. Noise Environment**

Noise monitoring was conducted at eight locations (ANL01–ANL08).

- Core zone: 53.1 dB(A) (day), 41.2 dB(A) (night)
- Residential areas: 49.6–52.6 dB(A) (day), 39.7–40.6 dB(A) (night)
- Silent Zone: 48.4–49.0 dB(A) (day), 38.3–40.0 dB(A) (night)
- All values are within CPCB permissible limits

The baseline noise environment is low to moderate, indicating absence of major industrial noise sources.

#### **7.5. Soil Environment**

The soil quality assessment indicates slightly acidic, low-salinity, well-drained lateritic soils with moderate nutrient status and no evidence of contamination. Proper topsoil conservation and erosion-control measures proposed under the EMP will help maintain soil quality throughout the project life.

- pH: 6.10 to 6.22 (Slightly Acidic) which is typical of lateritic soils
- Electrical conductivity: low (non-saline)
- Water holding capacity: 54.4–56.0%
- Organic matter: low (0.22–0.26%)

The soil is moderately fertile and suitable for plantation after reclamation.

#### **7.6. Land Use, Geology & Geomorphology**

The project area falls under “Mixed Vegetation” category, indicating anthropogenically modified land. The geology consists of Charnockite/Charnockite gneiss rocks, which is hard, compact, and suitable for quarrying. The geomorphology indicates a stable predominantly pediment–pediplain environment without direct occupation of major fluvial or active floodplain landforms with low erosion and good drainage characteristics.

#### **7.7. Ecology and Biodiversity**

The ecological study was conducted using quadrat sampling techniques. A total of 52 plant species were recorded, comprising trees (12), shrubs (13), herbs (17) and climbers (10).

The vegetation was overwhelmingly dominated by rubber (*Hevea brasiliensis*), accounting for approximately 96% of the total tree population, indicating the plantation nature of the landscape. The understory includes *Urena lobata*, *Leucas aspera*, *Mimosa pudica*, *Aerva sanguinolenta*, *Asystasia gangetica*, *Tridax procumbens*, and *Curculigo orchoides*. Grasses such as *Axonopus compressus*, *Pennisetum polystachion*, and *Eragrostis* species formed a substantial component of the ground vegetation..

Faunal assessment indicates low to moderate diversity, consisting of common species such as:

- Mammals: Indian Wild Boar
- Reptiles: Rock Agama, Oriental Garden Lizard, and Skink.
- Birds: 18 species including Common Myna, Spotted Dove, and Green Bee-eater
- Butterflies: 12 species

No Rare, Endangered, or Threatened (RET) species were recorded. No migratory corridors or breeding grounds exist in the project area. A total of 1506 trees shall be removed from the core zone.

## **7.8. Socio-Economic Environment**

The socio-economic environment of the study area has been assessed within a 10 km radius of the proposed project using both secondary data (Census 2011) and primary socio-economic survey conducted during the baseline study period. The study area consists predominantly of rural settlements under Chelakkara Grama Panchayat and nearby regions, characterized by an agriculture-based economy with moderate infrastructure facilities.

The total population of the study area is 2,88,670, with a favorable sex ratio indicating a balanced demographic structure. The Scheduled Caste population is 43224, while the Scheduled Tribe population is 668, indicating the presence of socially sensitive groups.

## **7.9. Demographic and Occupational Profile**

The population comprises a mix of nuclear and extended families, with representation across all age groups, including elderly individuals who may be more sensitive to environmental disturbances. The economy is primarily dependent on agriculture and allied activities, along with daily wage labor, small-scale business, private employment, transportation, and overseas (NRI) employment.

Households typically have 1 to 3 earning members, indicating moderate economic dependency. The presence of both BPL and APL households reflects a mixed socio-economic condition.

## **7.10. Observations from Primary Socio-Economic Survey**

---

A primary survey covering six representative households within the project influence area, including the nearest habitation at 106.2 m, indicates that household sizes range from 5 members.

The occupational pattern is diverse, including unorganized sector employment, agriculture, private jobs, business, and overseas employment. Health observations indicate the presence of respiratory and pulmonary issues in some households, along with elderly individuals who are more vulnerable to environmental stress. Notably, one household reported dust-related respiratory problems, highlighting the need for effective dust control.

### **7.11. Community Concerns**

The local community expressed concerns mainly related to ongoing and cumulative quarrying activities within the cluster. Key issues include:

- Dust emissions and air pollution
- Noise and blasting-induced vibrations
- Potential structural impacts (cracks in buildings)
- Traffic congestion and safety risks due to heavy vehicles
- Inadequate road infrastructure to handle quarry traffic

Transportation impacts were identified as a major concern, particularly due to the cumulative effect of multiple quarries. One respondent also expressed opposition to additional quarry development.

### **7.12. Impact Assessment**

The project is expected to generate both positive and localized negative impacts.

Positive impacts include:

- Employment generation (35 persons direct, additional indirect employment)
- Improvement in local economy and livelihood opportunities
- Support to local services and infrastructure

Potential negative impacts include:

- Dust, noise, and vibration impacts
- Increased traffic and associated safety concerns

### **7.13. Mitigation Measures**

To address community concerns, the following measures will be implemented:

- Regular water sprinkling and wet drilling for dust control

- Controlled blasting using NONEL technology
- Traffic management plan, including speed control and road maintenance
- Periodic health check-ups and medical camps
- Grievance redressal mechanism for local residents
- Implementation of CER activities focusing on infrastructure and community welfare

#### **7.14. Conclusion**

The socio-economic environment of the study area is stable with moderate infrastructure and economic activity. However, concerns related to dust, noise, vibration, and traffic, especially cumulative impacts from cluster quarries are significant. With proper implementation of mitigation measures and EMP provisions, the project is expected to have overall positive socio-economic benefits with manageable impacts.

### **8.0. Anticipated Environmental Impacts and Mitigation Measures**

The proposed granite building stone quarry, though small in extent (4.9500 ha), forms part of a cluster of one quarry and hence requires careful evaluation of cumulative environmental impacts. The anticipated impacts during the construction, operational, and post-operational phases are assessed for air, water, noise, land, biological, and socio-economic environments, and appropriate mitigation measures are proposed.

#### **8.1. Impact on Air Environment**

The primary sources of air pollution during quarry operations will include drilling, controlled blasting, excavation, loading/unloading of material, and vehicular movement on haul roads. Fugitive dust emissions in the form of particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) are expected to be the dominant pollutants. Secondary emissions may arise from diesel-operated equipment and vehicles.

Given the baseline air quality levels (PM<sub>10</sub>: 26.50–63.50 µg/m<sup>3</sup>; PM<sub>2.5</sub>: 15.40–33.70 µg/m<sup>3</sup>), the incremental rise due to quarrying activities is expected to be localized and within permissible limits, provided mitigation measures are effectively implemented.

#### **Mitigation Measures:**

- Regular water sprinkling on haul roads, working faces, and loading areas (minimum 3 times/day)
- Adoption of wet drilling techniques to suppress dust at source
- Installation of fixed water sprinklers and mist cannons at critical dust-generating locations

- Development of greenbelt over 0.6574 ha along the lease boundary
- Covering of trucks with tarpaulin during transportation
- Strict enforcement of PUC-certified vehicles and regular maintenance of machinery

## **8.2. Impact on Water Environment**

No major water-intensive processes are involved in quarrying operations. However, potential impacts may arise from surface runoff carrying suspended solids, especially during monsoon periods. There is also a possibility of localized groundwater quality changes due to improper waste handling.

The nearest surface water body (Bharathappuzha River) is located at 3.19 km, NNE, and an irrigation channel (Kuli Thodu) exists at 1.23 km, WSW, necessitating effective runoff management.

### **Mitigation Measures:**

- Construction of garland drains along the periphery to intercept runoff
- Installation of silt traps, desiltation tank, and check dam (total capacity: 1014 m<sup>3</sup>)
- Provision of rainwater harvesting tank (336 m<sup>3</sup>) for storage and reuse
- No discharge of untreated wastewater outside lease boundary
- Domestic wastewater treatment through septic tank and soak pit system
- Periodic monitoring of groundwater quality

## **8.3. Impact on Noise and Vibration**

Noise generation is expected from drilling, blasting, operation of excavators, and vehicular movement. Controlled blasting may also generate ground vibrations.

However, baseline noise levels are low, and the nearest habitation is located at 106.2 m, providing a natural buffer.

### **Mitigation Measures:**

- Use of controlled blasting techniques with NONEL detonators
- Limiting blasting to daytime hours only
- Maintenance of equipment to reduce noise levels
- Provision of ear protection for workers
- Development of greenbelt as noise barrier
- Monitoring of vibration levels periodically

#### **8.4. Impact on Land Environment**

The project involves removal of topsoil (0.6-1.20 m thickness) and overburden (~2.0 m thickness). Land disturbance will be limited to 4.1426 ha.

Post-mining, the land will be rehabilitated through plantation and water harvesting structures.

##### **Mitigation Measures:**

- Separate storage of topsoil for reuse in reclamation
- Stabilization of slopes through benching
- Progressive reclamation during operational phase
- Conversion of mined-out pit into water reservoir (2.5280 ha)
- Plantation over reclaimed area (1.6146 ha)

#### **8.5. Impact on Biological Environment**

The project area has sparse vegetation with no RET (Rare, Endangered, Threatened) species. A total of 1506 trees will be removed from the core zone.

##### **Mitigation Measures:**

- Compensatory plantation at a ratio of minimum 1:5
- Development of greenbelt using native species
- Avoidance of unnecessary vegetation clearance
- Periodic ecological monitoring

#### **8.6. Impact on Socio-Economic Environment**

The project will generate employment (35 persons direct, 45 cluster-level) and improve local economy. However, concerns related to dust, noise, and traffic may arise.

##### **Mitigation Measures:**

- Preference to local employment
- Regular road maintenance and dust suppression
- Community engagement and grievance redressal system
- Implementation of Corporate Environmental Responsibility (CER) activities

## 9.0. Environmental Management Plan

The Environmental Management Plan (EMP) has been formulated to mitigate the identified impacts and ensure environmentally sustainable mining operations. The EMP includes both non-recurring (capital) and recurring (operational) costs.

### 9.1. EMP Budget Summary of M/s. Rock N Rock Associates Pvt. Ltd.

**Table 5: Component-wise Measures & Budget of EMP**

| Sl. No. | EMP Component / Area of Intervention                  | Non-Recurring (INR) | Recurring Cost / Year (INR) |
|---------|-------------------------------------------------------|---------------------|-----------------------------|
| 1       | Land Environment                                      | 2,194,660           | 353,151                     |
| 2       | Occupational Health & Safety                          | 545,000             | 320,000                     |
| 3       | Public Information Systems                            | 75,000              | 75,000                      |
| 4       | Air Pollution Control                                 | 632,700             | 998,514                     |
| 5       | Haul Road & Traffic Safety Management                 | 1,017,000           | 258,400                     |
| 6       | Water Environment Management                          | 2,126,000           | 244,100                     |
| 7       | Noise Pollution Management                            | 350,000             | 120,000                     |
| 8       | Hazardous & Other Solid Waste Management              | 90,000              | 55,000                      |
| 9       | Ecology, Greenbelt & Biodiversity (incl. Reclamation) | 5,551,750           | 478,800                     |
| 10      | Environmental Management Cell (EMC)                   | 1,000,000           | 100,000                     |
| 11      | Environmental Monitoring                              | 350,000             | 164,000                     |
| 12      | Energy Conservation (Solar PV)                        | 125,000             | 1,000                       |
| 13      | Corporate Environment Responsibility (CER)            | 1,552,000           | -                           |
| —       | Total EMP Cost                                        | INR 1,56,09,110     | INR 3167965                 |
| —       | Grand Total (Capital + 1 Year Recurring)              | INR 1,89,39,831     |                             |

## **9.2. Implementation and Monitoring**

The EMP will be implemented under the supervision of site management, with periodic monitoring and reporting to regulatory authorities. Environmental monitoring will be conducted as per CPCB/MoEF&CC guidelines.

## **10.0. Project Cost and Schedule**

The Total Proposed Project Cost is INR 4,87,85,110/-, including EMP cost.

- **EMP (Non-recurring):** INR 1,56,09,110/-
- **EMP (Recurring):** INR 3167965/ year
- The project will commence after obtaining Environmental Clearance, Consent from KSPCB, and other statutory approvals. The expected life of the mine is 8 years.

## **11.0. Conclusion**

Based on the detailed Environmental Impact Assessment conducted for the proposed Granite Building Stone Quarry of M/s. Rock N Rock Associates Pvt. Ltd., at Venganellur Village, Thalappilly Taluk, Thrissur District, it is concluded that the project is technically feasible and environmentally manageable, subject to the effective implementation of the proposed mitigation measures and Environmental Management Plan (EMP) .

The project area, having an extent of 4.9500 ha, is located on private non-forest land and does not fall within any eco-sensitive zones, wildlife habitats, CRZ areas, or landslide hazard zones, indicating low environmental sensitivity. The baseline environmental conditions of the study area reflect good air quality, acceptable noise levels, stable geology, and moderate ecological diversity without any presence of RET species .

Although the project forms part of a cluster (5.9410 ha), the anticipated environmental impacts, particularly on air quality, water resources, noise levels, land use, biological environment, and traffic, are localized, short-term, and reversible in nature. With the adoption of scientific mining practices, including controlled drilling and blasting, dust suppression, runoff management, slope stabilization, and greenbelt development, the impacts will remain within permissible limits.

The project incorporates robust environmental safeguards such as:

- Progressive mine reclamation (1.6146 ha plantation)
- Rainwater harvesting reservoir (2.5280 ha)
- Compensatory afforestation for 1506 trees removed
- Cluster-level traffic and blasting management

- Comprehensive EMP with allocated budget and monitoring mechanism

From a socio-economic perspective, the project will generate direct and indirect employment, support local infrastructure, and contribute to regional economic development. The total non-recurring expenditure earmarked for the implementation of the above CER initiatives is ₹15,52,000, comprising ₹15,00,000 for the installation of the 25 kW rooftop on-grid solar power plant and ₹52,000 for the drinking water purification system.

In conclusion, the proposed project, with its limited scale, short mine life (8 years), and comprehensive environmental management framework, is not expected to cause any significant adverse environmental impacts. On the contrary, it is anticipated to yield net positive socio-economic benefits, while maintaining environmental sustainability.