

EXECUTIVE SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENT MANAGEMENT PLAN

FOR OBTAINING

Environmental Clearance under EIA Notification – 2006

Schedule Sl. No. 1 (a) (i): Mining Project

“B1” CATEGORY – MINOR MINERAL – CLUSTER – NON- FOREST LAND

CLUSTER EXTENT = 37.54.5 hectares

ROUGHSTONE QUARRY

At

Kamandoddi Village, Shoolagiri Taluk, Krishnagiri District,

Tamil Nadu State

TOR File No.12003

TOR Letter No. TO25B0108TN5757195N Dated:23.05.2025

NAME AND ADDRESS OF THE PROPOSED PROJECT PROPONENT

Name and Address	Extent & S.F.No.	Production
Mr.V.Venkatesulu S/o.Venkatasamy, No.741,D.M.G Kotta, Chappadi post, Shoolagiri Taluk, Krishnagiri District.	4.00.0 & 754 & 760(P-6)	Rough stone-18,59,055 Tons

ENVIRONMENTAL CONSULTANT



GEO TECHNICAL MINING SOLUTIONS

No: 1/213-B, Ground Floor, Natesan Complex

Oddapatti, Collectorate Post office,

Dharmapuri-636705. Tamil Nadu.

E-mail: info.gtmsdpi@gmail.com,

NABET ACC. NO: NABET/EIA/23-26/RA 0319

Valid till: 31.12.2026

ENVIRONMENTAL LAB

EKDANT ENVIRO SERVICES (P) LTD No R7/1, AVK Tower, North Main Road, Anna Nagar West Extn., Chennai-101, Tamil Nadu NABL Certificate Number: TC-11742, Valid Until: 31.05.2025	GREEN LINK ANALYTICAL & RESERCH LAB S.F.No,414/1, Tex Park Road, Opp.Good Luck Syndicate, Civil Aerodrome Post, Coimbatore-641 014, Tamil Nadu, India.
---	--

Baseline Study Period – October 2023 through December 2023

EXECUTIVE SUMMARY

1 INTRODUCTION

As the proposed rough stone mining project (P1) falls within the quarry cluster of 500 m radius with the total extent of 37.54.5ha, it requires submission of EIA report for grant of Environmental Clearance (EC) after conducting public hearing. The proposed project falling in S.F.No's. 754 & 760 (P-6) over the extent of 4.00.0ha is situated in the cluster falling in Kamandoddi Village, Shoolagiri Taluk, Krishnagiri District, Tamil Nadu. The quarries involved in the calculation of cluster extent are three proposed quarries and ten existing quarries.

2 PROJECT DESCRIPTION

The proposed project area is located between Latitudes from 12°39'26.93"N to 12°39'35.28"N Longitudes from 77°57'37.60"E to 77°57'44.84"E in Kamandoddi Village, Shoolagiri Taluk, Krishnagiri District, Tamil Nadu. According to the approved mining plan, about 676020m³ of rough stone will be mined up to the ultimate depth of 55m BGL in the ten years. The quarrying operation is proposed to be carried out by open cast semi mechanized mining method involving drilling, blasting, and formation of benches of the prescribed dimensions.

3 DESCRIPTION OF THE ENVIRONMENT

Baseline data were collected maximum locations i.e, in the core and buffer zone for the present cluster in the 29.05.2025 (**one Day**), for cross verification. Field monitoring studies to evaluate the base line status of the project site were carried out with CPCB guidelines. Environmental baseline data were collected by an NABL accredited and MoEF notified **Greenlink Analytical and Research Laboratory (India) Private Ltd** for the environmental attributes including soil, water, air, and noise and by FAEs for ecology and biodiversity, traffic, and socio-economy.

3.1 Land Environment

Land use pattern of the area of 5km radius was studied using Sentinel II imagery. LULC types and their extent are given in Table 11.1.

Table.11.1 LULC Statistics of the Study Area

S. No.	LU/LC Type	Extend (ha)	Percentage
1	Water	33.7	0.39
2	Trees	62.31	0.71
3	Crops	4541.87	52.00
4	Built area	2309.73	26.44
5	Mining/Industrial area	119.24	1.37
6	Bare Land	31.07	0.36
7	Range land	1636.71	18.74
Total		8734.63	100.0

Source: Sentinel II Satellite Imagery

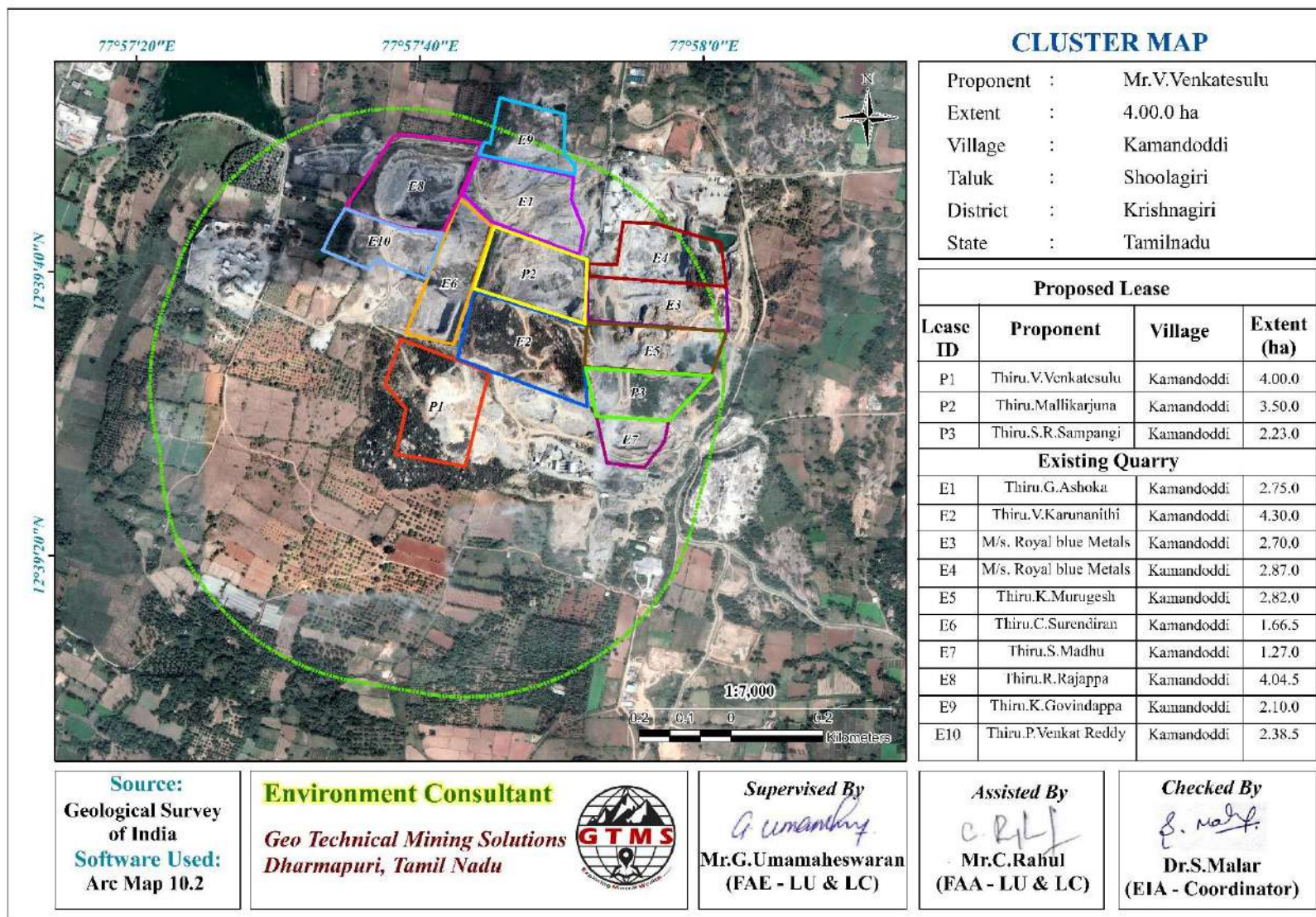


Figure 1 Location of Proposed and Existing Quarries in the Cluster of 500m Radius

3.2 Soil Environment

A. Physical Characteristics of Soil

- **Texture:** In lease area the soil is red calcareous. They are mostly sandy to loamy and characterised by the hard and compact layer of lime. In other places the soil found is brown in colour.
- **Structure:** The grain size is greater than 2mm in the lease area and in other places where the samples collected ranges from 0.002mm to 2mm.
- **Porosity:** The 500m radius cluster consists of Charnockite formations affect the porosity found in this study.
- **Density** The soil samples collected within 5km radius are generally characterized by higher bulk densities typically ranging from 1.25 to 1.66g/cm³. This is due to the presence of red sandy and in some areas with red loamy soil.
- **Consistence:** A soil moisture content between 12.5% to 18.4% is generally considered optimal for plant growth in medium-textured soils (like loams). This range falls within the 50- 75% available water zone where plants are at risk of stress if a water deficit is prolonged.

B. Chemical Characteristics of Soil

- pH is found to be from slightly acidic to neutral (6.8- 7.6) in reaction. Electrical conductivity a measure of soluble salts in the soil is in the range of 165 – 298μS/cm. The important water-soluble cations in the soil are nitrogen, phosphorus, potassium, calcium and magnesium whose concentration levels ranged from N- 13.67mg kg⁻¹ to 26.86mg kg⁻¹, P- 1.37mg kg⁻¹ to 3.42mg kg⁻¹, K- 39.91mg kg⁻¹ to 52.3mg kg⁻¹, C- 1127mg/Kg- 18564mg/Kg & M- 16737mg kg⁻¹ - 22937mg kg⁻¹ respectively.
- The soil samples in the study area show loamy textures varying between Silt Loam and sandy loam. pH of the soil varies from 6.8 – 7.6 indicating slightly acidic to slightly alkaline nature. Electrical conductivity of the soil varies from 165 – 298μS/cm. The physical and chemical properties of soil is shown in the Table 3.5.

3.3 Water Environment

3.3.1 Physical Parameter of ground water:

The basic physical parameters of water include

Colour:

- Value observed in Project Site (True/Apparent Color): 1 Hazen unit.

- Acceptable and permissible limits: 5 Hazen units and 15 Hazen units respectively. The value in the project site is as same as the acceptable limits prescribed by IS 10500: 2012 (referred as “Standards” from herein).

Odour & Taste:

The water is odour less. The taste of the water is slightly salty which is due to the presence of hardness in water which is attributed to the presence of calcium and magnesium in the water. As per the standards the odour and taste should be agreeable.

pH:

- Value observed in the Project Site: Min.-6.9 & Max. 7.3 mg/L.
- Acceptable and permissible limits: 6.5-8.5. The pH value is the measure of acid – base equilibrium. The value of pH in the project site clearly indicates that water is neutral in nature.

Turbidity:

Value observed in the Project Site: less than 1. Acceptable and permissible limits: 1 NTU & 5 NTU respectively. The value of turbidity generally indicates the presence of phytoplankton and other sediments.

Total Dissolved Solids:

- Value observed in the Project Site: Min.-592 & Max. 807 mg/L.
- Acceptable and permissible limits: 500 mg/L and 2000 mg/L respectively.
- TDS is the presence of inorganic salts and small amounts of organic matter present in the water.

3.3.2 Chemical parameters of water:

Calcium:

Value observed in Min.- 51& Max. 94 mg/L. Acceptable and permissible limits: 75mg/L and 200 mg/L respectively.

Magnesium:

Value observed in Min.- 17 & Max. 49mg/L. Acceptable and permissible limits: 30 mg/L and 100 mg/L respectively.

Chloride

Value observed in Min.- 174 & Max. 310 mg/L. Acceptable and permissible limits: 250 mg/L and 1000 mg/L respectively.

Total Alkalinity as CaCO₃:

Value observed in 196mg/L. Acceptable and permissible limits: 200 mg/L and 600 mg/L

respectively.

Hardness:

Value observed in Min.- 610 & Max. 824 mg/L. Acceptable and permissible limits: 200 mg/L and 600 mg/L respectively.

Surface water

The surface water quality is compared with the CPCB Water Quality Criteria against A, B, C, D & E class of water. From the test result, it is found that both the water does not fit Class A (Drinking Water Source without conventional treatment but after disinfection). But they can be used for outdoor bathing as it meets the requirements shown for class B water.

3.4 Air Environment

As per the monitoring data, PM_{2.5} ranges from 13.0 µg/m³ to 31.3 µg/m³, PM₁₀ from 37.3 µg/m³ to 56.1 µg/m³, SO₂ from 1.3 µg/m³ to 9.75 µg/m³, NO_x from 4 µg/m³ to 17.3 µg/m³. The concentration levels of the pollutants fall within the acceptable limits of NAAQS prescribed by CPCB.

Air quality Index

The AQI shows that the air quality of the study area falls within good category 40 causing minimal impact to human health.

3.5 Noise Environment

Noise level in core zone was 47.2 dB (A) Leq during day time and 35.4 dB(A) Leq during night time. Noise levels recorded in buffer zone during day time varied from 38.6 to 52.4 dB (A) Leq and during night time from 30.6 to 42.2 dB (A) Leq. Thus, the noise level for industrial and residential area meets the requirements of CPCB.

3.6 VIBRATION MONITORING

-  Ground Vibration and noise levels were recorded from the instruments the figure 3.33 it can be observed that the vertical Peak Particle Velocity (PPV) recorded was 1.801 mm/s at nearby bare land at distance of 100m.
-  Air Over-Pressure (AOP) was 103.5 dB and 0.003 kPa at nearby Study area at distance of 100m.

3.7 Biological Environment

The study found that there is no endemic, endangered migratory fauna found in the area. This area is not also a migratory path of any faunal species. Hence, this small mining operation over short period of time will not have any significant impact on the surrounding flora and fauna.

Flora in core zone

There are no trees in the quarry lease area, only shrubs, herbs and grasses. Taxonomically total of 23 species belonging to 18 families were recorded. Among them are herbs (19) and shrubs (4). Majority of the species belongs to the family of Fabaceae and Poaceae.

Flora in 300 m radius zone

The vegetation habit analysis indicates that the flora of the 300m radius of the study area consists of 60 species belonging to 31 families. Among the 60 species, 22 herbs, 24 shrubs and 14 trees. the highest number of species were from the Poaceae family (7), followed by Fabaceae (6), Malvaceae (4), and Mimosaceae (4). Three species were recorded from the Amaranthaceae, Apocynaceae, and Asteraceae families, while six species each were recorded from the Arecaceae, Boraginaceae, Convolvulaceae, Cucurbitaceae, Euphorbiaceae, and Lamiaceae families. The endangered or threatened and Species Richness (margalef Index) in the study area it mentioned in Table 3.27- 3.29. The Settipalli Reserve Forest is located 2.64km for Northeast of the quarry lease area. The reserve forest is predominantly populated with *Albizia amara*, *Azadirachta indica*, *Vachellia leucophloea*, *Chloroxylon swietenia*, and *Ziziphus mauritiana*.

Flora in 10 km radius buffer zone

The 10km radius A total of 102 species of invasive alien species belonging to 82 general and 39 families were recorded in 10km radius (Table 3.30). Herbs (73.83%) formed the predominant life form followed by shrubs (10.28%), climbers (8.42%), trees (4.67%) and grasses (2.80%).

Fauna in Core Zone

The faunal species observed in the study area are listed in Table 3.22. A total of 25 species were recorded in core zone of the project area. The core zone exhibited fewer species, with only a small number of insects, mammals, and reptiles, whereas the buffer zone showed greater species diversity. Among the 25 species recorded, the distribution was as follows: (08) 32% insects, (03) 12% reptiles, (05) 20% mammals & 9 (36%) Avian. These species were cross-checked against the IUCN Red List Database version 3.1 to identify any threatened species. Data analysis revealed that 8 species are categorized as Least Concern on the Red List, while 17 species were not listed. The analysis indicates that there are no REET species in the core zone of the proposed quarry site.

Fauna in Buffer Zone

The faunal species observed in the study area are listed in Table 3.32. Taxonomically a total of 50 species belonging to 35 families have been recorded from the buffer zone area. Based

on habitat classification the majority of species were Birds 15 (30%), followed by Insects 14 (28%), Reptiles 13 (26%), Mammals 5 (10%) and amphibians 3 (6%). There are 4 schedule II species and 24 schedule IV species according to Indian wild life Act 1972. Totally, 19 species of bird were sighted in the study area.

3.8 Socio Economic Environment

The proposed project will provide direct and indirect employment and improve the infrastructural facilities in that area, thus leading to the improvement of people's standard of living.

4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Land Environment

Anticipated Impact

-  Permanent change on land use and land cover.
-  Change in topography of the mine lease area will change at the end of the life of the mine.
-  Problems to agricultural land and human habitations due to dust, and noise caused by movement of heavy vehicles
-  Degradation of the aesthetic environment of the core zone due to quarrying
-  Soil erosion and sediment deposition in the nearby water bodies due to earthworks during the rainy season
-  Siltation of water course due to wash off from the exposed working area

Mitigation Measures

-  The mining activity will be gradual confined in blocks and excavation will be undertaken progressively along with other mitigate measures like phase wise development of greenbelt etc.
-  Construction of garland drains all around the quarry pits and construction of check dam at strategic location in lower elevations to prevent erosion due to surface runoff during rainfall and also to collect the storm water for various uses within the proposed area.
-  Green belt development along the boundary within safety zone. The small quantity of water stored in the mined-out pit will be used for greenbelt
-  Thick plantation will be carried out on unutilized area, top benches of mined out pits, on safety barrier, etc.,
-  At conceptual stage, the land use pattern of the quarry will be changed into Greenbelt area and temporary reservoir.

- ✚ In terms of aesthetics, natural vegetation surrounding the quarry will be retained (such as in a buffer area i.e., 7.5 m, 10m safety barrier and other safety provided) so as to help minimize dust emissions.
- ✚ Proper fencing will be carried out at the conceptual stage, Security will be posted round the clock, to prevent inherent entry of the public and cattle.

4.2 Soil Environment

Anticipated Impact

- ✚ Removal of protective vegetation cover
- ✚ Exposure of subsurface materials which are unsuitable for vegetation establishment

Mitigation Measures

- ✚ Run-off diversion – Garland drains will be constructed around the project boundary to prevent surface flows from entering the quarry works areas and will be discharged into vegetated natural drainage lines, or as distributed flow across an area stabilised against erosion.
- ✚ Sedimentation ponds - Run-off from working areas will be routed towards sedimentation ponds. These trap sediment and reduce suspended sediment loads before runoff is discharged from the quarry site. Sedimentation ponds should be designed based on runoff, retention times, and soil characteristics. There may be a need to provide a series of sedimentation ponds to achieve the desired outcome.
- ✚ Retain vegetation – Retain existing or re-plant the vegetation at the site wherever possible.
- ✚ Monitoring and maintenance – Weekly monitoring and daily maintenance of erosion control systems so that they perform as specified specially during rainy season.

4.3 Water Environment

Anticipated Impact

- ✚ Surface and ground water resources may be contaminated due to pit water discharge, domestic sewage, discharge of oil and grease bearing waste water from washing of vehicles and machineries, and washouts from surface exposure or working areas
- ✚ As the proposed project acquires 3.0KLD of water from water vendors, it will not extract water by developing abstraction structures in the lease area. Therefore, the project will not have impact on depletion of aquifer beneath the lease area.

Mitigation Measures

- Rain water from mine pit will be treated in settling tanks before being used for dust suppression and tree plantation purposes.

- Domestic sewage from site office will be discharged in septic tank and then directed to soak pits.
- Water from the tipper wash-down facility and machinery maintenance yard will be passed through interceptor traps/oil separators prior to its reuse.
- The garland drainage will be connected to settling tank and sediments will be trapped in the settling tanks and only clear water will be discharged to the natural drainage.
- Periodic (every 6 month once) analysis of ground water quality of quarry pit water and ground water of nearby villages will be conducted.
- Artificial recharge structures will be established in suitable locations as part of the rainwater harvesting management program.

4.4 AIR ENVIRONMENT

Anticipated Impact

The proposed rough stone quarry project involves activities such as formation of benches, approach roads, drilling, blasting, excavation, and transportation, all of which may lead to dust generation and pose potential health risks. To mitigate these impacts, dust suppression measures like water sprinkling at loading/unloading points and along haul roads will be implemented. Quarrying will be carried out using opencast semi-mechanized methods, where drilling and blasting will be conducted in a controlled manner to reduce dust and vibration. The primary air pollutant expected is particulate matter (PM₁₀), while emissions of Sulphur Dioxide (SO₂) and Nitrogen Dioxide (NO₂) from vehicle movement are anticipated to be minimal. Air quality impact assessment has been conducted based on the proposed production levels and estimated emissions.

Mitigation Measures

- 🚧 To mitigate air pollution and dust generation in the rough stone quarry, a range of dust control measures will be implemented. Regular water sprinkling will be carried out at key locations such as drilling sites, blasting areas, haul roads, and loading/unloading points. This will help suppress fugitive dust emissions and improve air quality around the project site. Additionally, mist spray systems will be used in dust-prone areas for enhanced control, ensuring effective dust suppression during operations.
- 🚧 Drilling and blasting activities, which are common in quarrying, will be carefully controlled to minimize air pollution. Wet drilling methods will be used to reduce the amount of dust generated during drilling operations. For blasting, controlled techniques with optimized charge and timing will be employed to limit dust dispersion. Furthermore,

blasting will only be carried out during favourable conditions, such as low wind speeds, to prevent the dust from being carried towards nearby habitations and sensitive areas.

- ✚ Vehicle emissions from haul trucks and machinery will also be managed through regular maintenance and the use of PUC-certified vehicles. These measures will help reduce exhaust emissions, especially on unpaved roads where dust generation is higher. Additionally, vehicle speed will be restricted on haul roads to minimize the lifting of dust.
- ✚ To further reduce air pollution, a greenbelt will be developed around the quarry boundary and along internal roads. This will act as a barrier to trap dust particles and reduce their spread. Regular air quality monitoring will also be conducted at strategic locations to ensure that air quality remains within permissible limits, and that the quarry operations do not negatively impact the surrounding environment or human health.

Occupational Health

- ✚ Dust mask will be provided to the workers and their use will be strictly monitored
- ✚ Annual medical checkups, trainings and campaigns will be arranged to ensure awareness about importance of wearing dust masks among all mine workers and tipper drivers.
- ✚ Ambient air quality monitoring will be conducted every six months to assess effectiveness of mitigation measures proposed.

4.5 Noise Environment

Anticipated Impact

Noise generated at the quarry will mainly result from semi-mechanized operations such as drilling, controlled blasting, and transportation of materials; however, the noise levels are expected to dissipate within the quarry boundary, and due to the considerable distance of nearby villages from the quarrying area, the impact on the surrounding community is expected to be negligible.

Mitigation Measures

- ✚ To reduce noise from the rough stone quarry, drilling will be done using well-maintained and low-noise equipment. Wet drilling methods will also be used to help reduce the amount of noise generated during the process.
- ✚ Blasting will be carried out in a controlled manner using limited charge and proper timing. All blasting activities will take place only during the daytime to avoid disturbing nearby areas during early morning or night hours.
- ✚ Vehicles and machines used in the quarry will be regularly serviced to keep noise levels low. Wherever possible, silencers and noise-dampening systems will be installed on machinery to reduce loud sounds.

- ✚ A greenbelt with trees and shrubs will be developed around the quarry to act as a natural barrier against noise. Workers will be given ear protection, such as earplugs, when working near loud equipment, and noise levels will be monitored regularly to make sure they stay within safe limits.

4.6 Ground Vibrations

Anticipated Impact

Ground vibrations due to the proposed mining activities are anticipated due to operation of mining machines like excavators, drilling and blasting, transportation vehicles, etc., however, the major source of ground vibration from the quarry is blasting. The major impact of the ground vibrations is observed on the domestic houses located in the villages nearby the mine lease area. The kutcha houses are more prone to cracks and damage due to the vibrations induced by blasting whereas RCC framed structures can withstand more ground vibrations. Apart from this, the ground vibrations may develop a fear factor in the nearby settlements.

Another impact due to blasting activities is fly rocks. These may fall on the houses or agricultural fields nearby the mining lease area and may cause injury to persons or damage to the structures.

Mitigation Measures

- ✚ The blasting operations in the cluster quarries are carried out without deep hole drilling and blasting using delay detonators which reduce the ground vibrations
- ✚ Proper quantity of explosives, suitable stemming materials and appropriate delay system will be adopted to avoid overcharging and for safe blasting
- ✚ Adequate safe distance from blasting will be maintained as per DGMS guidelines
- ✚ Blasting shelter will be provided as per DGMS guidelines
- ✚ Blasting operations will be carried out only during day time
- ✚ The charge per delay will be minimized and preferably a greater number of delays will be used per blasts.
- ✚ During blasting, other activities in the immediate vicinity will be temporarily stopped
- ✚ Drilling parameters like depth, diameter and spacing will be properly designed to give proper blast.
- ✚ A fully trained explosives blast man (Mining Mate, Mines Foreman, 2nd Class Mines Manager/ 1st Class Mines Manager) will be appointed
- ✚ A set of shot firing rules will be drawn up and blasting shall commence outlining the detailed operating procedures that will be followed to ensure that shot firing operations on site take place without endangering the workforce or public

- ✚ Sufficient angular stemming material will be used to confine the explosive force and minimise environmental disturbance caused by venting / misfire
- ✚ The detonators will be connected in a predetermined sequence to ensure that only one charge is detonated at any one time and a NONEL or similar type initiation system will be used
- ✚ The detonation delay sequence shall be designed so as to ensure that firing of the holes is in the direction of free faces so as to minimise vibration effects.
- ✚ Appropriate blasting techniques shall be adopted in such a way that the predicted peak particle velocity shall not exceed 0.251mm/s.
- ✚ Vibration monitoring will be carried out every 6 months to check the efficacy of blasting practices.

4.7 Biological Environment

Anticipated Impact

- During loading the truck, dust generation will be likely. This shall be a temporary effect and not anticipated to affect the surrounding vegetation significantly
- The Number of plants in the mining lease area is given in Chapter 3 which vegetation in the lease area may be removed during mining.
- Carbon released from quarrying machineries and tippers during quarrying would be 4113 kg per day, 14810kg per year and 177722kg over ten years.

Mitigation Measures

- ✚ During conceptual stage, the top bench will be re-vegetated by planting local /native species and lower benches will be converted into rainwater harvesting structure following completion of mining activities, which will replace habitat resources for fauna species in this locality over a longer time.
- ✚ Existing roads will be used; new roads will not be constructed to reduce impact on flora.
- ✚ To mitigate carbon emission due to mining activities, we recommend planting trees around the quarry to offset the carbon emission during quarrying. A tree can sequester 35544kg of carbon per year. Therefore, we recommend planting large number of trees around the quarry and near school campuses, government wasteland, roadsides etc.
- ✚ As per the greenbelt development plan as recommended by SEAC (Table 4.11), about 2000 trees will be planted within three months from the beginning of mining. These trees, when grown up would sequester carbon of about 177722kg of the total carbon.

4.8 Socio Economic Environment

Anticipated Impact

- Dust generation from mining activity can have negative impact on the health of the workers and people in the nearby area
- Approach roads can be damaged by the movement of tippers
- Increase in Employment opportunities both direct and indirect thereby increasing economic status of people of the region

Mitigation Measures

- Good maintenance practices will be adopted for all machinery and equipment, which will help to avert potential noise problems
- Green belt will be developed in and around the project site as per Central Pollution Control Board (CPCB) guidelines
- Air pollution control measure will be taken to minimize the environmental impact within the core zone
- For the safety of workers, personal protective appliances like hand gloves, helmets, safety shoes, goggles, aprons, nose masks and ear protecting devices will be provided as per mines act and rules
- Benefit to the State and the Central governments through financial revenues by way of royalty, tax, duties, etc., from this project directly and indirectly.

4.9 Occupational Health

- All the persons will undergo pre-employment and periodic medical examination
- Employees will be monitored for occupational diseases by conducting medical tests: General physical tests, Audiometric tests, Full chest, X-ray, Lung function tests, Spirometric tests, Periodic medical examination – yearly, Lung function test – yearly, those who are exposed to dust and Eye test
- Essential medicines will be provided at the site. The medicines and other test facilities will be provided at free of cost.
- The first aid box will be made available at the mine for immediate treatment. First aid training will be imparted to the selected employees regularly. The lists of first aid trained members shall be displayed at strategic places.

5 Environment Monitoring Program

S. No.	Environment Attributes	Location	Monitoring		Parameters
			Duration	Frequency	
1	Air Quality	2 Locations (1 Core & 1 Buffer)	24 hours	Once in 6 months	Fugitive Dust, PM _{2.5} , PM ₁₀ , SO ₂ and NO _x .
2	Meteorology	At mine site before start of Air Quality Monitoring & IMD Secondary Data	Hourly / Daily	Continuous online monitoring	Wind speed, Wind direction, Temperature, Relative humidity and Rainfall
3	Water Quality Monitoring	2 Locations (1SW & 1 GW)	-	Once in 6 months	Parameters specified under IS:10500, 1993 & CPCB Norms
4	Hydrology	Water level in open wells in buffer zone around 1 km at specific wells	-	Once in 6 months	Depth in m BGL
5	Noise	2 Locations (1 Core & 1 Buffer)	Hourly – 1 Day	Once in 6 months	Leq, Lmax, Lmin, Leq Day & Leq Night
6	Vibration	At the nearest habitation (in case of reporting)	–	During blasting operation	Peak particle velocity
7	Soil	2 Locations (1 Core & 1 Buffer)	–	Once in six months	Physical and chemical characteristics
8	Greenbelt	Within the project area	Daily	Monthly	Maintenance

Source: Guidance of manual for mining of minerals, February 2010

6 ADDITIONAL STUDIES

6.1 Risk Assessment

The DGMS risk assessment process is intended to identify existing and probable hazards in the work environment and all operations and assess the risk levels of those hazards in order to prioritize those that need immediate attention. The whole quarry operation will be carried out under the direction of a Qualified Competent Mine Manager holding certificate of competency to manage a metalliferous mine granted by the DGMS, Dhanbad for proposed project.

6.2 Disaster Management Plan

The objective of the disaster management plan is to make use of the combined resources of the mine and the outside services to:

- Rescue and treat casualties;
- Safeguard other people;
- Minimize damage to property and the environment;
- Initially contain and ultimately bring the incident under control;
- Secure the safe rehabilitation of affected area; and

- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency.

6.3 Cumulative Impact Study

The results on the cumulative impact of the four proposed projects on air environment of the cluster do not exceed the permissible limits set by CPCB for air pollutants.

- The cumulative results of noise for the habitation in consideration do not exceed the limit set by CPCB for residential areas for day time
- PPV resulting from three proposed project is well below the permissible limit of Peak Particle Velocity of 5 mm/s
- The proposed three projects will allocate Rs. 15,00,000/- towards CER as recommended by SEAC
- The proposed three projects will directly provide jobs to 59 local people, in addition to indirect jobs
- The proposed three projects will plant 7287 about trees in and around the lease area
- The proposed three projects will add 2817 PCU per day to the nearby roads.

7 Project Benefits

Various benefits are envisaged due to the three proposed mine and benefits anticipated from the proposed project to the locality, neighbourhood, region and nation as a whole are:

- Direct employment to 116 local people
- Creation of community assets (infrastructure) like school buildings, village roads/ linked roads, dispensary & health Centre, community Centre, market place etc.,
- Strengthening of existing community facilities through the Community Development Program
- Skill development & capacity building like vocational training.
- Rs. 5,00,000 will be allocated for CER

8 ENVIRONMENT MANAGEMENT PLAN

In order to implement the environmental protection measures, an amount of **Rs.90,32,180** as capital cost and recurring cost as **Rs.32,06,856** as recurring cost/ annum is proposed considering present market price considering present market scenario for the proposed project. After the adjustment of 5% inflation per year, the overall EMP cost for 5 years will be **Rs.2,67,52,084.**