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 = 15.20.5 hectares

At

Nagamangalam Village, Denkanikottai Taluk,

Krishnagiri District, Tamil Nadu State

ToR letter No. Lr. No. SEIAA-TN/F.No.10059/SEAC/ToR-/2023 Dated:31.07.2023

NAME AND ADDRESS OF THE PROPOSED PROJECT PROPONENT

Name and Address	Extent & S.F.No.	Mineral Production
Thiru.K.Madhusudhanan S/o.Krishnappa, No.1, Varaganapalli Village, Nagamangalam Post, Denkanikottai Taluk, Krishnagiri District- 635113	**4.00.0 Ha &** **629 (Part)**	**Rough Stone-584380 m^3**

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,
Website: www.gtmsind.com

NABET ACC. NO: NABET/EIA/23-26/RA 0319
Valid till: Dec 31, 2026

ENVIRONMENTAL LAB

Ekdant Enviro Services (P) Limited

R-7/1, AVK Towers, Ground Floor, North main road

Anna Nagar, West Extn, Chennai - 101, Tamil Nadu

NABL Certificate Number: TC-11742, Valid Until : 31.05.2025

Baseline Study Period – December 2023 through February 2024

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 15.20.5 ha, it requires submission of EIA report for grant of Environmental Clearance (EC) after conducting public hearing. The proposed project falling in S.F.No.629(Part) over the extent of 4.00.0 ha is situated in the cluster falling in Nagamangalam Village, Denkanikottai Taluk, Krishnagiri District and Tamil Nadu. The quarries involved in the calculation of cluster extent are two proposed quarries and two existing quarries.

2. PROJECT DESCRIPTION

The proposed project area is located between Latitudes from 12°34'14.84"N to 12°34'21.28"N and Longitudes from 77°54'59.38"E to 77°55'08.51"E in Nagamangalam Village, Denkanikottai Taluk, Krishnagiri District and Tamil Nadu, According to the approved mining plan, about 584380 m^3 of rough stone will be mined up to the ultimate depth of 46 m (40 AGL + 6 m BGL) in the five years. The quarrying operation is proposed to be carried out by opencast semi mechanized mining method involving drilling, blasting, and formation of benches of the prescribed dimensions.

3. DESCRIPTION OF THE ENVIRONMENT

Baseline data were collected to evaluate the existing environmental condition in the core and buffer areas during **December 2023 through February 2024** as per CPCB guidelines. The data were collected by both the FAEs and NABL accredited and MoEF notified **Ekdant Enviro Services (P) Limited** for the environmental attributes including soil, water, noise, air and by FAEs for ecology and biodiversity, traffic, and socio-economy.

3.1. Land Environment

Land use pattern of the area of 5 km radius was studied using Sentinel II imagery. LULC types and their extent are given in Table 1.

3.2. Soil Environment

The soil samples in the study area show loamy textures varying between silty clay loam, sandy loam and Clay Loam. pH of the soil varies from 6.8 to 7.3 indicating slightly acidic and alkaline nature. Electrical conductivity of the soil varies from 225 to 261 µs/cm. Bulk density ranges between 1.11 and 1.53 g/cm3. Potassium ranges between 19.34 and 36.90 mg kg-1. Calcium ranges between 124 and 168 mg kg-1. Organic Matter ranges between 1.04 and 1.58 %. Chlorides ranges between 126 and 142 mg kg-1 soil.

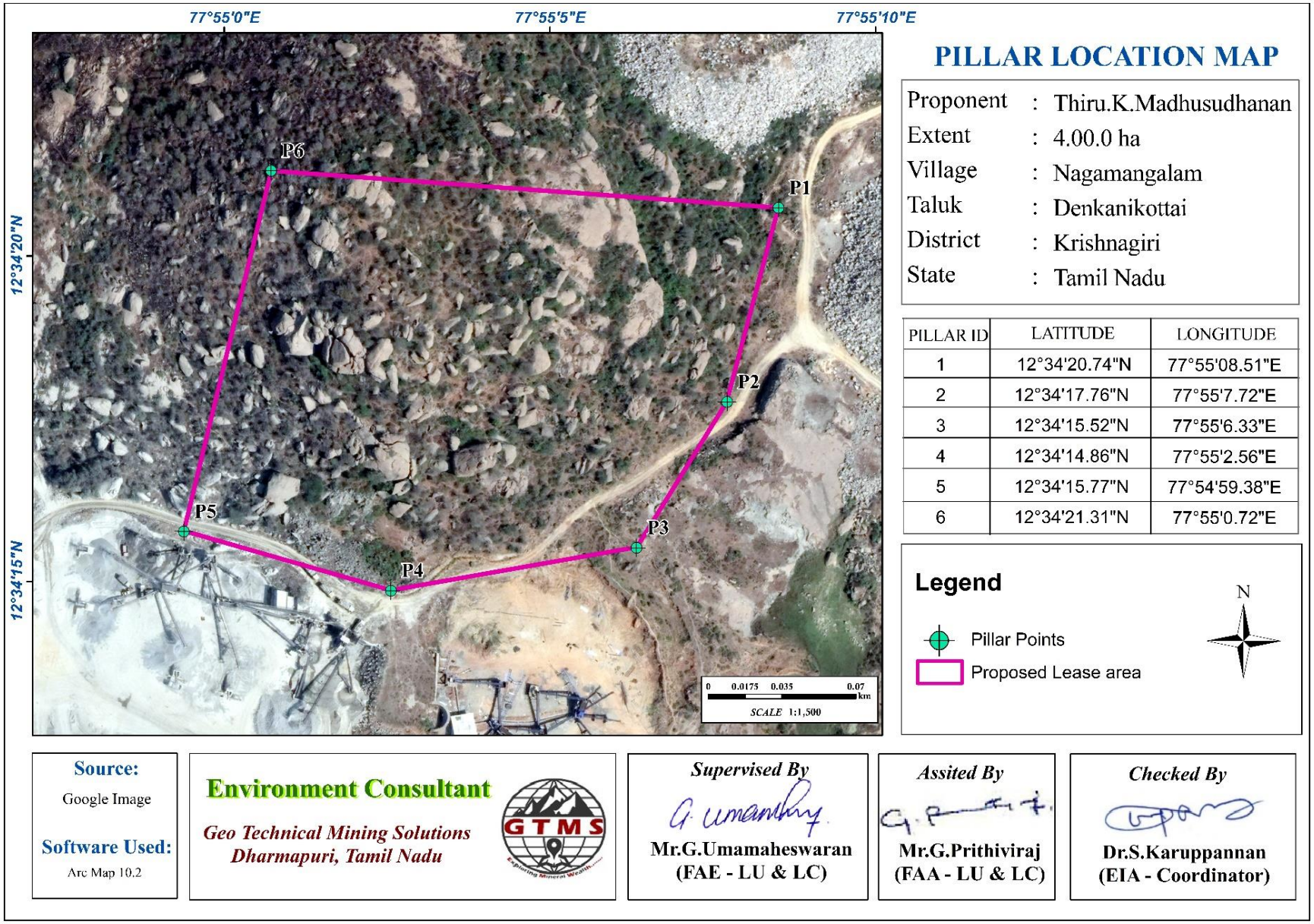

Figure 1 Google Earth Image Showing Lease Area with Pillars

Table.1 LULC Statistics of the Study Area

S. No.	Classification	Area (ha)	Area (%)
1	Barren Rocky / stony waste	977.27	12.71
2	Crop land	3769.76	49.04
3	Dense Forest	60.50	0.79
4	Fallow land	894.80	11.64
5	Mining / Industrial wastelands	92.11	1.20
6	Land with or without scrub	1446.64	18.82
7	Plantations	391.52	5.09
8	Water bodies	55.14	0.72
Total		**7650.16**	**100.0**

Source: Sentinel II Satellite Imagery

3.3. Water Environment

Anusonai Lake and Dholasetti Cheruvu Lake are the two prominent surface water resources present in the study area. The proposed project area is located 2.92 km NW of the Anusonai Lake and 3.93 km NW of the Dholasetti Cheruvu Lake as shown in Table 3.5 and Figure 3.7. Totally, two surface water samples, known as SW1 and SW2 were collected from the river and lakes to assess the baseline water quality. Result for surface water sample in the Table 3.6a indicate that the physical, chemical and biological parameters are within permissible limits in comparison with standards of IS10500:2012.

Data regarding depth to groundwater levels are essential to infer the direction of groundwater movement within the study area. Knowledge of groundwater flow direction is must in choosing location for background groundwater quality monitoring well and in locating recharge and discharge areas. Therefore, data regarding groundwater elevations were collected from 9 open wells and 9 bore wells at various locations within 2 km radius around the proposed project sites for the period from March through May 2023 (Pre-Monsoon Season) and from December through February, 2024 (Post Monsoon Season).

The open well water level data thus collected onsite are provided in Tables 3.7 and 3.8. According to the data, average depths to the static water table in open wells range from 4.5 to 5.8 m BGL in pre monsoon and 5.5-7.5 m BGL in post monsoon. The bore well data thus

collected onsite are provided in Tables 3.9 and 3.10. The average depths to static potentiometric surface in bore wells for the period of December through February 2024 (Post-Monsoon Season) vary from 52.0 – 52.7 m BGL and from 57.03 – 57.80 m BGL for the period of March through May, 2023 (Pre-Monsoon Season).

3.4. Air Environment

As per the monitoring data, $PM_{2.5}$ ranges from 14.4 µg/m^3 to 16.3 µg/m^3, PM_{10} from 36.0µg/m^3 to 40.7µg/m^3, SO_2 from 2.6µg/m^3 to 4.2µg/m^3, NO_X from 8.3µg/m^3 to 13.4g/m^3. The concentration levels of the pollutants fall within the acceptable limits of NAAQS prescribed by CPCB.

Air quality Index (AQI)

The AQI shows that the air quality of the study area falls within good category 37 causing minimal impact to human health.

3.5. Noise Environment

Noise level in core zone was 51.4 dB (A) Leq during day time and 35.8 dB(A) Leq during night time. Noise levels recorded in buffer zone during day time varied from 38.8 to 46.4 dB (A) Leq and during night time from 30.2 to 34.5 dB (A) Leq. Thus, the noise level for industrial and residential area meets the requirements of CPCB.

3.6. 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 mine lease area (core zone)

Taxonomically 19 species belonging to 14 families have been recorded from the core mining lease area. Based on habitat classification of the enumerated plants the majority of species were 5 Tree followed by Herbs & Climbers & Grass 8, Shrubs 6. Details of flora with the scientific name were mentioned in Table.3.21-3.23.

Flora in 300 m radius buffer zone

Taxonomically 40 species belonging to 25 families have been recorded from the 300 m radius buffer zone. Based on habitat classification of the enumerated plants the majority of species were seven Tree 11 followed by Herbs & Climbers & Grass 21, Shrubs 7. Details of flora with the scientific name and species richness index were mentioned in Table.3.24-3.25.

Flora in 10 km radius buffer zone

Similar type of environment also in buffer area but with more flora diversity compare than core zone area, because of nearby agriculture land was found to be dominate in all the directions. Majority of the flat landscape around project unit is occupied by agriculture fields. It contains a total of 89 species belonging to 43 families have been recorded from the buffer zone. The floral (89) varieties among them Trees 37 (42%) Shrubs 13 (14%) and Herbs & Climbers & Creeper & Cactus 39 (44%). Details of flora with the scientific name were mentioned in Table.3.26.

Fauna in Core Zone

A total of 26 varieties of species were observed in the Core zone (Table.3.28). Among them are 8 Insects, 5 Reptiles, 4 Mammals and 9 Avian. A total of 26 species belonging to 20 families were recorded from the core area. The study shows that number of species decreases towards the mining area. This might be due the lack of vegetation. None of these species in the core zone are threatened or endemic. The survey was conducted to identify species listed in IUCN Red List. According to the field data, any species are not of Schedule I and nine species are of schedule IV. There are no critically endangered, endangered, vulnerable and endemic species were observed. Details of fauna in core zone with the scientific name were mentioned in Table 3.29.

3.7. 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.
- 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 agricultural fields during the rainy season.

- Increase in agricultural productivity of land when mine water is discharged to the surrounding lands for irrigation.

Mitigation Measures

- 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
- 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., 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. 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 4.0 KLD 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.

4.3. AIR ENVIRONMENT

Anticipated Impact

- During mining at various stages of activities such as excavation, drilling and transportation of materials, particular matter (PM), gases such as sulphur dioxide, oxides of nitrogen from vehicular exhaust are the main air pollutants.
- Emissions of noxious gases due to incomplete detonation of explosive may sometimes pollute the air.
- The fugitive dust released from the mining operations may cause effect on the mine workers who are directly exposed to the fugitive dust.
- Simultaneously, the air-borne dust may travel to longer distances and settle in the villages located near the mine lease area.

Mitigation Measures

- To control dust at source, wet drilling will be practiced. Where there is a scarcity of water, suitably designed dust extractor will be provided for dry drilling along with dust hood at the mouth of the drill-hole collar
- Controlled blasting will be carried out using suitable explosive charge and short delay detonators, adequate stemming of holes at collar zone
- Blasting will be restricted to a particular time of the day i.e., at the time of lunch hours
- Before loading of material water will be sprayed on blasted material
- Dust mask will be provided to the workers and their use will be strictly monitored
- Water will be sprinkled on haul roads twice a day to avoid dust generation during transportation
- Transportation of material will be carried out during day time and material will be covered with tarpaulin
- The speed of tippers plying on the haul road will be limited to < 20 km/hr to avoid generation of dust
- The un-metaled haul roads will be compacted weekly before being put into use
- It will be ensured that all transportation vehicles carry a valid PUC certificate
- Haul roads and service roads will be graded to clear accumulation of loose materials

- Planting of trees all along main mine haul roads and around the project site will be practiced to prevent the generation of dust
- Dust mask will be provided to the workers and their use will be strictly monitored

4.4. Noise Environment

Anticipated Impact

The attenuation due to several factors including ground reflection, atmosphere, wind speed, temperature, trees, and buildings as 35.5 dB (A), the barrier effect. Attenuation due to Green Belt has been taken to be 4.9 dB (A). The inputs required for the model are: source data, receptor data, and attenuation factor. Source data has been computed taking into account of all the machinery and activities used in the mining process. Same has been listed in Table 4.5.

The total noise to be produced by mining activity is calculated to be 95.8 dB (A). We have considered the total noise to be produced by mining activity to be 95.8 dB (A) for noise prediction modelling.

Mitigation Measures

- Usage of sharp drill bits while drilling which will help in reducing noise
- Secondary blasting will be totally avoided and hydraulic rock breaker will be used for breaking boulders
- Controlled blasting with proper spacing, burden, stemming and optimum charge/delay will be maintained
- The blasting will be carried out during favourable atmospheric condition and less human activity timings by using nonelectrical initiation system
- Proper maintenance, oiling and greasing of machines will be done every week to reduce generation of noise
- Provision of sound insulated chambers for the workers working on machines (HEMM) producing higher levels of noise
- Silencers / mufflers will be installed in all machineries
- Greenbelt/Plantation will be developed around the project area and along the haul roads. The plantation minimizes propagation of noise
- Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators of HEMM and persons working near HEMM and their use will be ensured though training and awareness

- Regular medical check–up and proper training to personnel to create awareness about adverse noise level effects.

4.5. Biological Environment

Impact on Ecology and Biodiversity

- 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 table 3.21 which vegetation in the lease area may be removed during mining.
- Carbon released from quarrying machineries and tippers during quarrying would be 4917 kg per day, 1327700 kg per year and 6638498 kg over five years.

Mitigation Measures on Flora

- 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.
- None of the plants in the lease area will be cut during operational phase of the mine. we recommend uprooting and planting of the 10 trees along the 7.5 m safety zone to prevent environmental pollution during quarrying. As the survival rate due to uprooting was only 30%, 100 seedlings will be procured at the rate of 10 seedlings per tree and planted in 7.5 m safety zone.
- 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 47952 kg 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 4.13), about 1500 trees (Table 4.13) will be planted within three months from the beginning of mining. These trees, when grown up would sequester carbon of about 239760 kg of the total carbon.

Anticipated Impact on Fauna

- Direct impact is anticipated on fauna of core zone.
- Insignificant impact is anticipated on fauna in the buffer area due to air emissions, noise, vibration, transportation, waste water discharges, and changes in land use.

Mitigation Measures on Flora

- Fencing will be constructed around the proposed mine lease area to restrict the entry of stray animals.
- The workers shall be trained not to harm any wildlife near the project site.

4.6. 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.
- From above details, the quarry operations will have highly beneficial positive impact in the area.

4.7. 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, Spiro metric 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 two 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 two proposed project is well below the permissible limit of Peak Particle Velocity of 5 mm/s
- The proposed two projects will allocate **Rs.10,00,000/-** towards CER as recommended by SEAC
- The proposed two projects will directly provide jobs to **55** local people, in addition to indirect jobs
    - The proposed two projects will plant **3603** about trees in and around the lease area
    - The proposed two projects will add 384 PCU per day to the nearby roads.

7. Project Benefits

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

- Direct employment to 18 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.82,12,420** as capital cost and recurring cost as **Rs.2939014** 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. 24452328.**