

EXECUTIVE SUMMARY

**B1” CATEGORY – MINOR MINERAL – CLUSTER – NON-FOREST LAND-
GOVERNMENT LAND**

THIRU. N.M. ARUMUGABALAJI ROUGH STONE QUARRY

Project Proponent	Project Details
Thiru.N.M. Arumugabalaji, S/o.N.Muthupandian, Door.No.11/339-CIB, 6th Cross Street, V.O.C. Nagar, Rajapalayam Taluk, Virudhunagar District-626 102.	S.F. No 328(Part-III) Mellur Duraisamipuram Village, Rajapalayam Taluk, Virudhunagar District, Tamil Nadu Extent = 1.25.0 ha

*** CLUSTER EXTENT = 9.50.0 ha**

* Cluster Calculated as per MoEF & CC Notification – S.O. 2269(E) Dated: 01.07.2016

ToR obtained vide

Lr No. SEIAA-TN/F.No. 9610/SEAC/1(a)/ToR-1331/2022 dated:10.02.2023

Environmental Consultant

GEO EXPLORATION AND MINING SOLUTIONS



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Salem – 636 004, Tamil Nadu, India



Accredited for sector 1 Category ‘A’, 31 Category ‘B’ & 38 Category ‘B’

Certificate No : NABET/EIA/2225/RA 0276 Dated: 06.08.2025

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Baseline Monitoring Period - March to May 2023

ENVIRONMENTAL LAB

EHS 360 LABS PRIVATE LIMITED,

10/2 Ground floor, 50th street, 7th Avenue,
Ashok Nagar, Chennai – 600 083.

JUNE 2023

1. INTRODUCTION

Environmental Impact Assessment (EIA) is the management tool to ensure the sustainable development and it is a process, used to identify the environmental, social and economic impacts of a project prior to decision-making. It is a decision-making tool, which guides the decision makers in taking appropriate decisions for any project. EIA systematically examines both beneficial and adverse consequences of the project and ensures that these impacts are taken into account during the project designing. It also reduces conflicts by promoting community participation, information, decision makers, and helps in developing the base for environmentally sound project.

Rough Stone is the major requirements for construction industry. This EIA report is prepared by considering Cumulative load of proposed & existing quarries of Thiru.N.M. Arumugabalaji Rough Stone Quarry consisting of two Proposed and three Existing Quarry with total extent of Cluster of 9.50.0 ha in Mellur Duraisamipuram Village, Rajapalayam Taluk, Virudhunagar District, Tamil Nadu, cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016..

Code	Name of the Owner	Extent	ToR Status
P1	Thiru.N.M. Arumugabalaji	1.25.0 Ha	Lr.No.SEIAA-TN/F.No. 9610/SEAC/I(a)/ToR-1331/2022 dated:10.02.2023.

The Baseline Monitoring study has been carried out during the period of **March 2023-May 2023** and this EIA/ EMP report is prepared for considering cumulative impacts arising out of these projects, the Cumulative Environmental Impact Assessment study is undertaken, which is followed by preparation of a detailed Environmental Management Plan (EMP) individually to minimize those adverse impacts

“Draft EIA report prepared on the basis of ToR Issued for carrying out public hearing for the grant of Environmental Clearance from SEIAA, Tamil Nadu”

1.1 DETAILS OF PROJECT PROPONENT –

P1	
Name of the Company	Thiru.N.M. Arumugabalaji
Address	S/o.N.Muthupandian, Door.No.11/339-CIB, 6th Cross Street, V.O.C.Nagar, Rajapalayam Taluk, Virudhunagar District-626 102
Mobile	+91 95003 86817
Aadhaar No	4060 3897 4353
Status	Proprietor

The project proponent is an individual.

1.2 QUARRY DETAILS WITHIN 500 M RADIUS

PROPOSED QUARRY				
Code	Name of the Owner	S.F. Nos	Extent	Status
P1	Thiru.N.M.Arumugabalaaji, S/o.N.Muthupandian, Door.No.11/339-CIB, 6th Cross Street, V.O.C.Nagar, Rajapalayam Taluk, Virudhunagar District-626 102	328(Part-III)	1.25.0 ha	TOR Obtained: Lr No. SEIAA-TN/F.No. 9610/SEAC/I(a)/ToR-1331/2022 dated:10.02.2023.
Nearby Proposed Quarry				
P2	Tmt. R. Ineyasneha W/o. Rajkumar, No.54, South Car Street, Vellaikkottai, Aruppukottai & Taluk, Virudhunagar District – 626 101.	328 (P-III)	1.25.0 Ha	KV1/243/2018 dt. 09.11.2018
TOTAL			2.50.0 ha	
EXISTING QUARRY				
Code	Name of the Owner	S.F. No	Extent	Status
E1	Thiru.N.Muthupandiyan	328 (P-I)	2.50.0 ha	01.03.2019 To 29.02.2024
E2	Thiru.M.Kanthakrishnakumar	328 (P-II)	2.50.0 ha	01.03.2019 To 29.02.2024
E3	Thiru.S.Victor Alponse Raja	328(Part-III)	2.00.0 ha	19.04.2018 To 18.04.2023
TOTAL			7.00.0ha	
ABANDONED QUARRY				
Code	Name of the Owner	S.F. No	Extent	Status
A1	Nila Mahalir SGSY	328	5.00.0 Ha	02.06.2011 To 01.06.2016
Total			5.00.0 Ha	
TOTAL CLUSTER EXTENT			9.50.0 ha	

TABLE 1.3 SALIENT FEATURES OF THE PROPOSAL

Name of the Quarry	Thiru.N.M. Arumugabalaaji Rough Stone Quarry		
S.F. No.	328(Part-III)		
Extent	1.25.0 ha		
Village and Taluk	Mellur Duraisamipuram Village, Rajapalayam Taluk,		
Land Type	It is a government poramboke land (classified as poramboke land)		
Land Ownership	It is a Government Land		
Toposheet No	58 - G/07		
Latitude between	09°21'29.20"N to 09°21'32.80"N		
Longitude between	77°26'46.80"E to 77°26'51.15"E		
Highest Elevation	250m(Max) AMSL		
Proposed Depth of Mining	76m (61m above ground level + 15m below ground level).		
Lease Period	10 Years		
Mining Plan Period	5Years		
Geological Resources	Rough Stone in m ³		Top soil m ³
	6,55,930		12,500
Mineable Reserves	Rough Stone in m ³		Top soil m ³

	1,57,530	10,350
Proposed Quantity of Production for five years	Rough Stone in m ³	Top soil m ³
	1,07,530	10,350
Ultimate Pit Dimension	Pit 1- 115m (L) * 90 m (W) * 76m (D) (61m agl + 15m bgl)	
Water Level in the surrounds area	The Water table is found at a depth of 45m in summer and at 40m in rainy seasons.	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits Hillock topography. The area has gentle sloping towards North Eastern side. The altitude of the area is 250m (Max) above Mean Sea level. The area is covered by the Topsoil which is about 1m thickness. Massive Charnockite is found after 1m (Topsoil) which is clearly inferred from the existing quarrying pits.	
Machinery proposed	Jack Hammer	4 Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	1 No
	Tipper	1No
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	24 Nos	
Project Cost	Rs 1,16,57,000/-	
CER Cost	Rs.5,00,000/-	
Nearest water Bodies	Odai	460m-NW
	Periyakulam Kanmoi	570m_W
	Pudur Pond	5.5Km_E
	Thenmaai Kanmoi	5Km_SE
	Rajasingapaeri	7.5Km_SW
	Sastha kovil dam	7.1km-NW
Greenbelt Development Plan	Proposed to plant 950 trees in Safety Barriers and nearest panchayat Roads have been identified	
Proposed Water Requirement	1.6 KLD	
Nearest Habitation	1.4km -South East	

1.3 STATUTORY DETAILS

- The proponent applied for Rough Stone Quarry Lease Dated: 16.02.2018
- Precise Area Communication Letter was issued by the District Collector, Virudhunagar Rc.No. K.V.1 /242/ 2018 Dated: 13.04.2018
- The Mining Plan was prepared by Recognized Qualified Person and approved by Deputy Director, Geology and Mining, Virudhunagar District, Roc.No.KV1/242/2018 Dated: 07.05.2018.
- The proposed project falls under “B1” Category as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018
- Proponent applied for ToR Environmental Clearance vides online Proposal No. SIA/TN/MIN/77887/2022, Dated: 08.06.2022.

1.4 PROJECT DESCRIPTION

The proposed project is site specific and there is no additional area required for the project. There is no effluent generation/discharge from the proposed quarries. Method is mining is common for all the proposed quarries in the cluster. Rough Stone are proposed to be

excavated by opencast mechanized method involving splitting of rock mass of considerable volume from the parent rock mass by jackhammer drilling and blasting, hydraulic excavators are used for loading the Rough Stone from pit head to the needy crushers and rock breakers to avoid secondary blasting.

2.1 SITE CONNECTIVITY TO THE PROJECT AREA

Nearest Roadway	(NH – 208) Kollam – Tirumangalam - 250.0m -W (SH-41) Rajapalayam – Sankarankovil -11.0km – E
Nearest Village	1.4km - SE
Nearest Town	Rajapalayam –15.0km – NE
Nearest Railway	Cholapuram Railway station –13.0km – E
Nearest Airport	Madurai - 88Km – NE
Seaport	Thoothukudi-105km – SE
Interstate Boundary	Tamilnadu-Kerala -13km-W

2.2 LAND USE PATTERN OF THE PROPOSED PROJECT

Description	Present area (Ha)	Area at the end of this quarrying period (Ha)
Area under quarrying	Nil	1.03.5
Infrastructure	Nil	0.01.0
Roads	Nil	0.01.0
Green Belt	Nil	0.15.0
Unutilized	1.25.0	0.04.5
Grand Total	1.25.0	1.25.0

2.3 OPERATIONAL DETAILS OF LEASE APPLIED AREA

PARTICULARS	DETAILS	
	Rough Stone (5 Year Plan period)	Top Soil (1 Years Plan period)
Geological Resources in m ³	6,55,930	12,500
Mineable Reserves in m ³	1.57,530	10,350
Yearwise reserves in m ³	1.04,530	10,350
Number of Working Days	300 Days	300 Days
Production per day in m ³	70	35
No of Lorry loads (12 m ³ per load)	6	2
Total Depth of Mining	76m (61m above ground level + 15m below ground level).	

FIGURE 2.1: GOOGLE IMAGE OF THE PROJECT-P1



**FIGURE 2.2: SATELLITE IMAGERY CLUSTER QUARRIES
WING CLUSTER (500 m QUARRIES)**

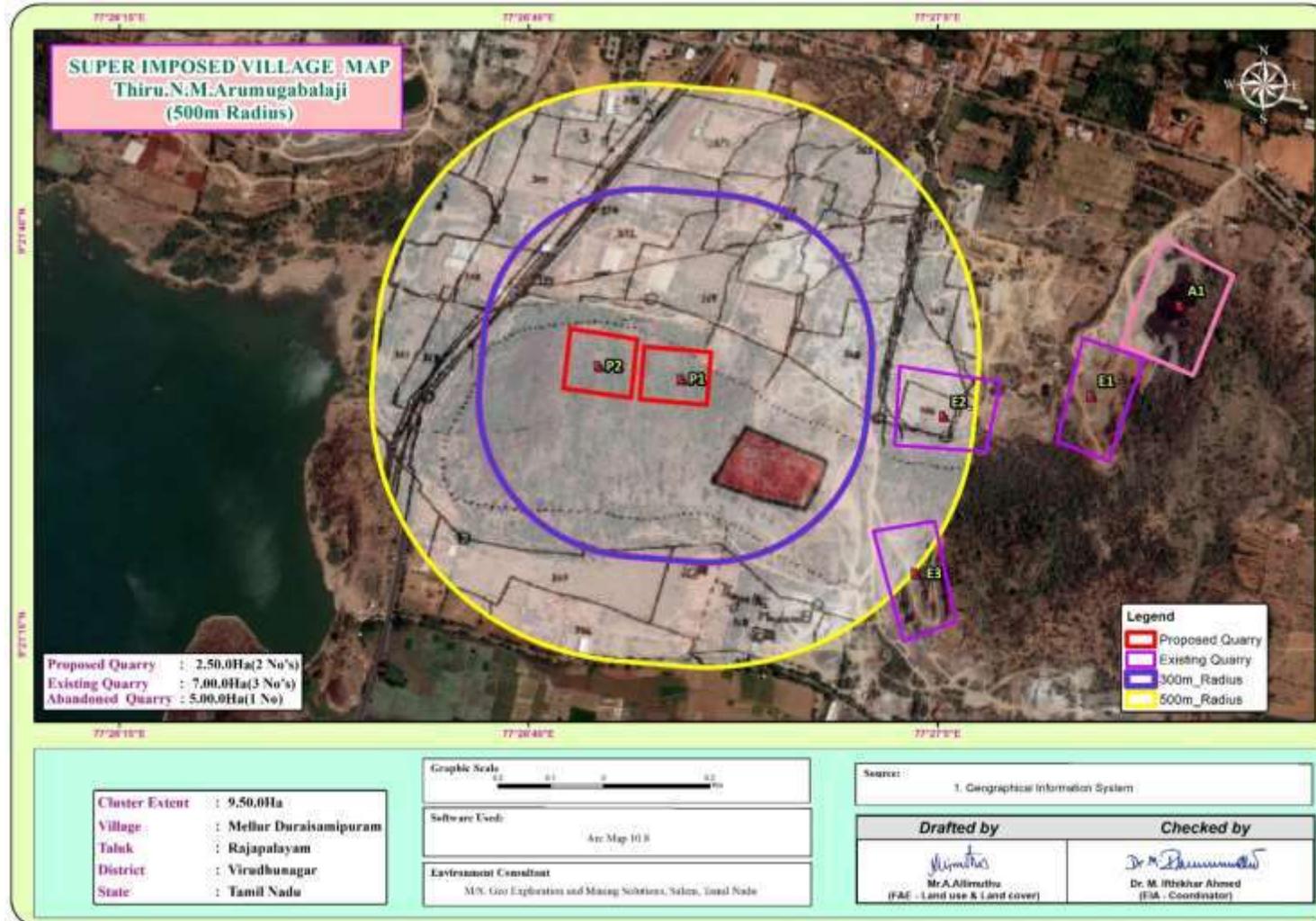


FIGURE – 3: TOPOSHEET MAP COVERING 10 KM RADIUS

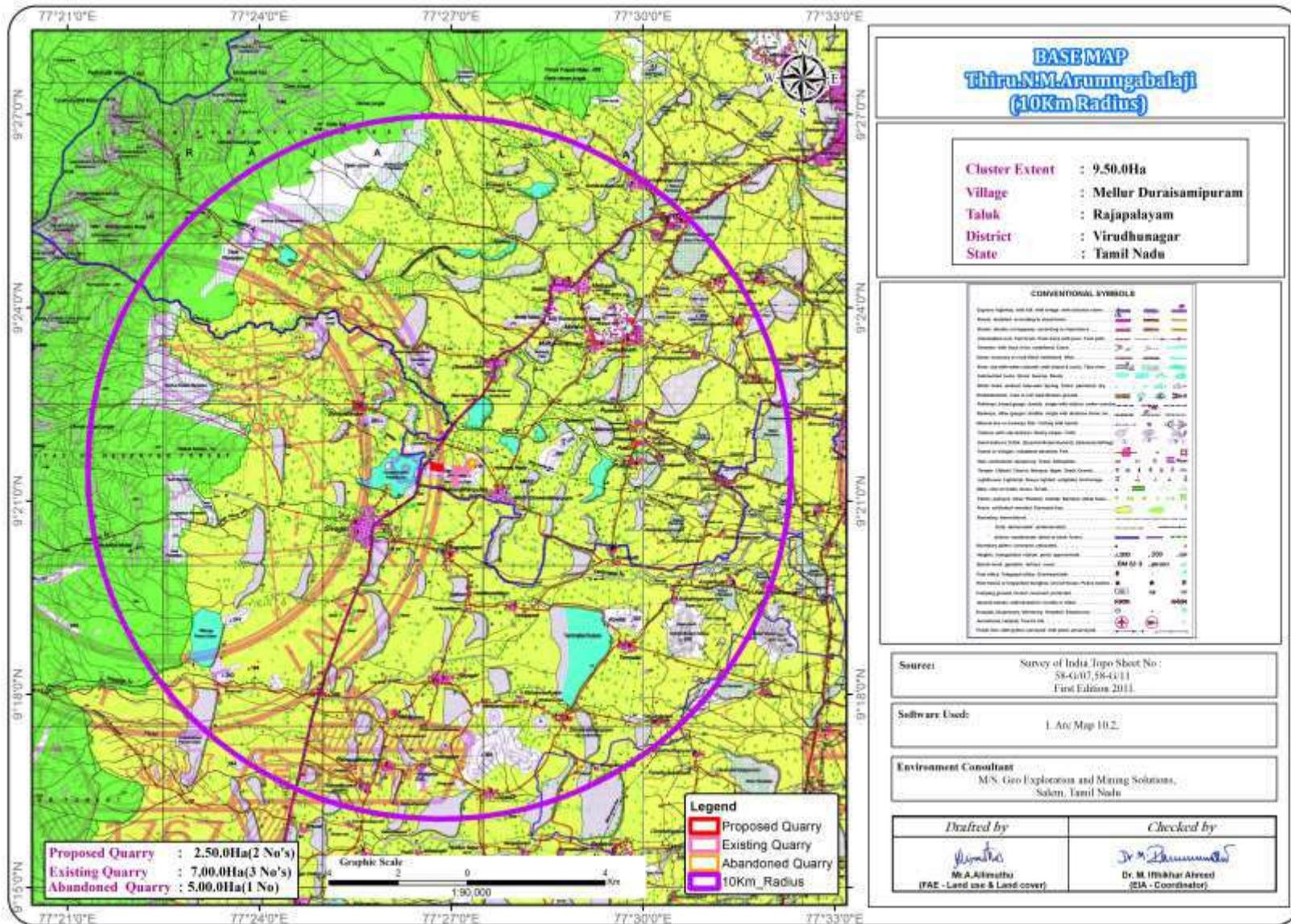


FIGURE – 3: TOPOSHEET MAP OF THE STUDY AREA 10 KM RADIUS

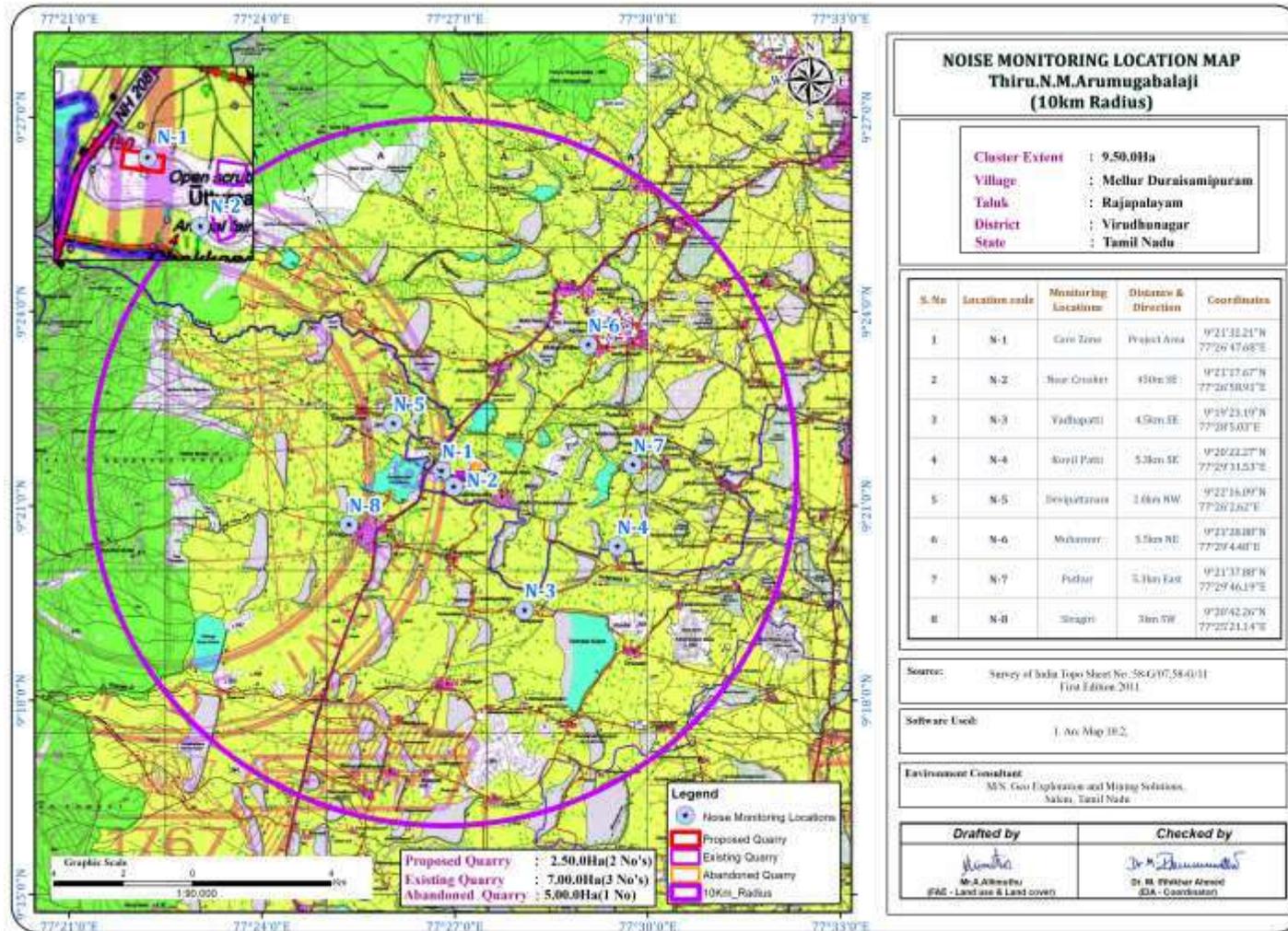
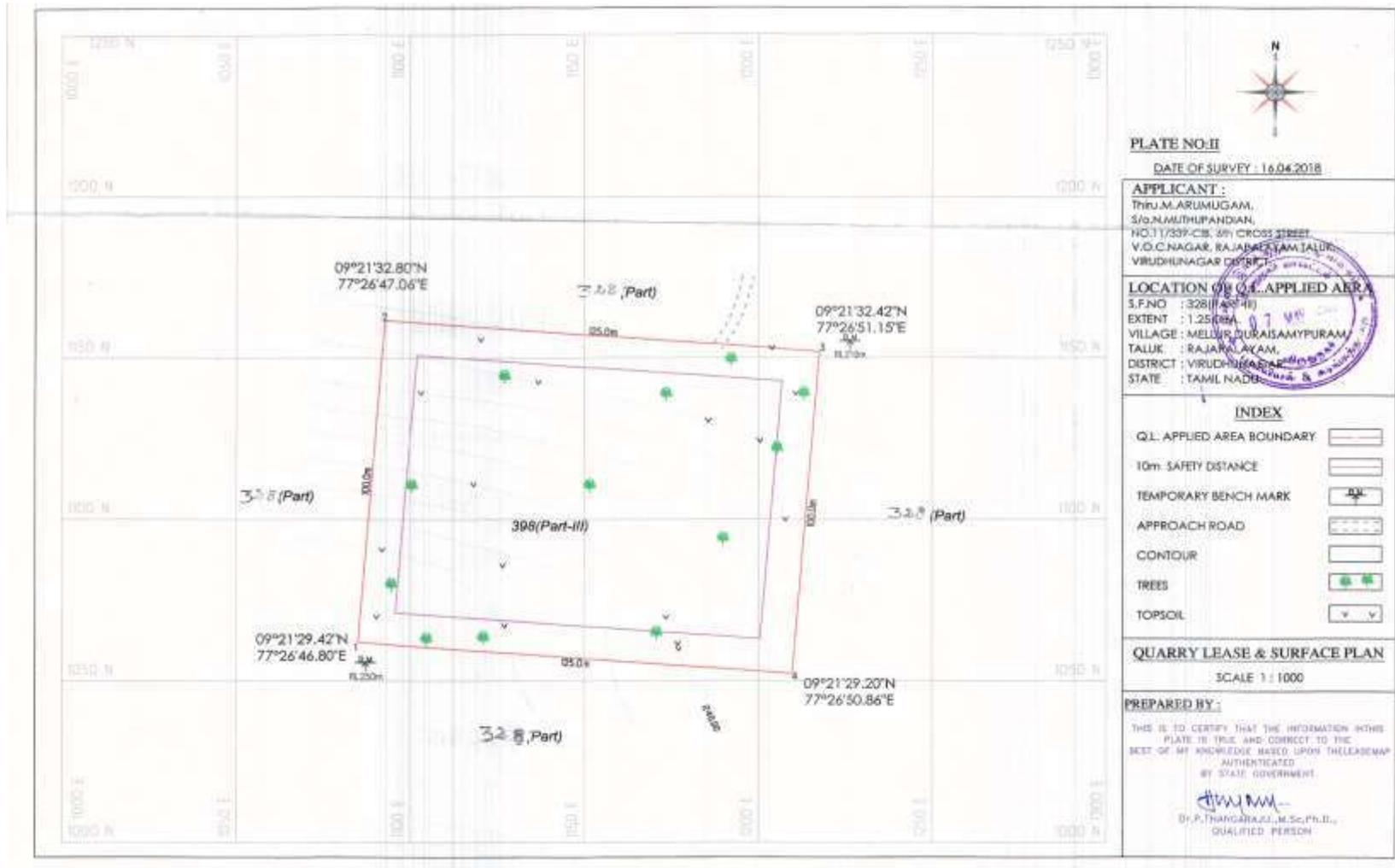


FIGURE – 4: QUARRY LEASE PLAN & SURFACE PLAN



2.4 METHOD OF MINING

The method of mining is Opencast Mechanized Mining Method is being proposed by formation of 5.0-meter height bench with a bench width not less than the bench height. However, as far as the quarrying of Rough Stone is concerned, observance of the provisions of Regulation 106 (2) (b) as above is seldom possible due to various inherent petro genetic factors coupled with mining difficulties. Hence it is proposed to obtain relaxation to the provisions of the above regulation from the Director of Mines Safety for which necessary provision is available with the Regulation 106 (2) (b) of MMR-1961, under Mine Act – 1952.

The Rough Stone is a batholith formation and the splitting of rock mass of considerable volume from the parent rock mass will be carried out by deploying jackhammer drilling and Slurry Explosives will be used for blasting. Hydraulic Excavators attached with Rock Breakers unit will be deployed for breaking large boulders to required fragmented sizes to avoid secondary blasting and hydraulic excavators attached with bucket unit will be deployed for loading the Rough Stone into the tippers and then the stone is transported from pithead to the nearby crushers.

2.5 PROPOSED MACHINERY DEPLOYMENT

S.NO.	TYPE	NOS	SIZE/CAPACITY	MOTIVE POWER
1	Jack hammers	4	1.2m to 2.0m	Compressed air
2	Compressor	1	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker	1	300 HP	Diesel Drive
4	Tippers	1	20 Tonnes	Diesel Drive

2.6 CONCEPTUAL MINING PLAN/ FINAL MINE CLOSURE PLAN

The ultimate pit size is designed based on certain practical parameters such as economical depth of mining, safety zones, permissible area, etc.,

2.7 ULTIMATE PIT DIMENSION

Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max)
Pit1	115	90	76m (61 m above ground level + 15 m Below Ground level)

3.0 DESCRIPTION OF THE ENVIRONMENT

The baseline status of the project environment is described section wise for better understanding of the broad-spectrum conditions. The baseline environment quality represents the background environmental scenario of various environmental components such as Land, Water, Air, Noise, Biological and Socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out covering March, April and May 2023 with CPCB guidelines. Environmental data has been collected with reference to cluster quarries by EHS 360 Labs Private Limited, – An accredited by ISO/IEC 17025:2017 (NABL) Laboratory, for the below attributes –.

3.1 ENVIRONMENT MONITORING ATTRIBUTES

Attribute	Parameters	Frequency of Monitoring	No. of Locations	Protocol
Attribute	Parameters	Frequency of Monitoring	No. of Locations	Protocol
Land-use Land cover	Land-use Pattern within 10 km radius of the study area	Data's from census handbook 2011 and from the satellite imagery	Study Area	Satellite Imagery Primary Survey
*Soil	Physio-Chemical Characteristics	Once during the study period	6 (1 core & 5 buffer zone)	IS 2720 Agriculture Handbook - Indian Council of Agriculture Research, New Delhi
*Water Quality	Physical, Chemical and Bacteriological Parameters	Once during the study period	6 (2 surface water & 4 ground water)	IS 10500& CPCB Standards
Meteorology	Wind Speed Wind Direction Temperature Cloud cover Dry bulb temperature Rainfall	1 Hourly Continuous Mechanical/Automatic Weather Station	1	Site specific primary data& Secondary Data from IMD Station
*Ambient Air Quality	PM ₁₀ PM _{2.5} SO ₂ NO _x Fugitive Dust	24 hourly twice a week (Mar to May 2023)	8 (1core & 7 buffer)	IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB
*Noise Levels	Ambient Noise	Hourly observation for 24 Hours per location	8 (1 core & 7 buffer zone)	IS 9989 As per CPCB Guidelines
Ecology	Existing Flora and Fauna	Through field visit during the study period	Study Area	Primary Survey by Quadrante & Transect Study Secondary Data – Forest Working Plan

3.2 LAND ENVIRONMENT

The main objective of this section is to provide a baseline status of the study area covering 10km radius around the proposed mine site so that temporal changes due to the mining activities on the surroundings can be assessed in future..

TABLE 3.1: LAND USE / LAND COVER TABLE 10 KM RADIUS

S.No	Classification	Area_Ha	Area_%
BUILTUP			
1	Builtup Urban	475.26	1.51
2	Builtup Rural	589.38	1.88
3	Builtup Mining	93.84	0.30
AGRICULTURAL LAND			
4	Crop Land	16230.60	51.65
5	Agricultural Plantation	1863.88	5.93
6	Fallow Land	2567.91	8.17
FOREST			
7	Evergreen Forest	1022.16	3.25
8	Decidious Forest	1775.72	5.65
9	Forest Plantation	1100.22	3.50
10	Scrub Forest	740.67	2.36
BARREN/WASTELAND			
11	Scrub Land	666.19	2.12
12	Barren Rocky	706.37	2.25
WATERBODIES			
13	Waterbodies	3591.88	11.43
		31424.09	100.00

- The 10 km radius study area mainly comprises of crop land & Agriculture Plantation land accounting of 51.65% & 5.93 % of the total study area. The study area also consists of fallow land of 8.17%.
- Water Bodies such as ponds/ lakes comprises of 11.43% of the core and buffer area.
- The Scrub land accounts of 2.12%. As per the primary survey, it was observed the scrub land is mainly occupied by the grass with stony waste and left-over domestic waste generated by the nearby areas.
- 0.30% of the total study area is occupied by the mine industries of captive mines. The area occupied by Mainly Rough stone quarry of the total buffer area. As also observed within the primary survey, the 10 km buffer area.
- The 10 km study area mostly covers of crop land 51.65%. As per current study 2.12% of the area is occupied by scrub land.
- The forest area covered Sivagiri R.F and Settur R.F (Western ghats) is about 8.9% in the buffer zone area.
- Forest plantation covered in an area is 3.50% (1100.22 Ha), Scrub Forest is about 2.36% in buffer zone.
- 3.39% of the area is covered under the human Settlement. The nearest village within the 3km radius from the project site boundary is observed to be villages like Chokkanathputhur, Sivagiri, Kovilur and Terku Devadanam etc.,

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3.3 SOIL ENVIRONMENT

Soil quality of the study area is one of the important components of the land environment. The composite soil samples were collected from the study area and analysed for different parameters. The locations of the monitoring sites are detailed

Interpretation & Conclusion

Physical Characteristics –

The physical properties of the soil samples were examined for texture, bulk density, porosity and water holding capacity. The soil texture found in the study area is Clay Loam Soil and Bulk Density of Soils in the study area varied between 1.02– 1.31 g/cm³. The Water Holding Capacity 40.9-47.8% and Porosity of the soil samples is found to be medium i.e. ranging from 42.4– 47.6%.

Chemical Characteristics –

- The nature of soil is slightly alkaline to strongly alkaline with pH range 7.72 to 8.63
- The available Nitrogen content range between 282 to 357 kg/ha
- The available Phosphorus content range between 1.07 to 2.31 kg/ha
- The available Potassium range between 31.9 to 41.6 mg/kg

3.4 WATER ENVIRONMENT

The study area is studded with few tanks that serve as the source of drinking water and also their surplus feeds adjoining tanks. The rainfall over the area is moderate, the rainwater storage in open wells and trenches are in practice over the area and the stored water acts as source of freshwater for couple of months after rainy season.

Surface Water

Ph:

The pH 7.83 to 7.96 while turbidity found within the standards (Optimal pH range for sustainable aquatic life is 6.5 to 8.5 pH).

Total Dissolved Solids:

Total Dissolved Solid 596-610 mg/l, the TDS mainly composed of carbonates, bicarbonates, Chlorides, phosphates and nitrates of calcium, magnesium, sodium and other organic matter.

Other parameters:

Chloride content is 110-116 mg/l. Nitrates 13.2 – 14.6 mg/l, while sulphate 48.2 – 59.4 mg/l..

Ground Water

The pH of the water samples collected ranged from 7.31 – 7.91 and within the acceptable limit of 6.5 to 8.5. PH, Sulphates and Chlorides of water samples from all the sources are within the limits as per the Standard. On Turbidity, the water samples meet the requirement.

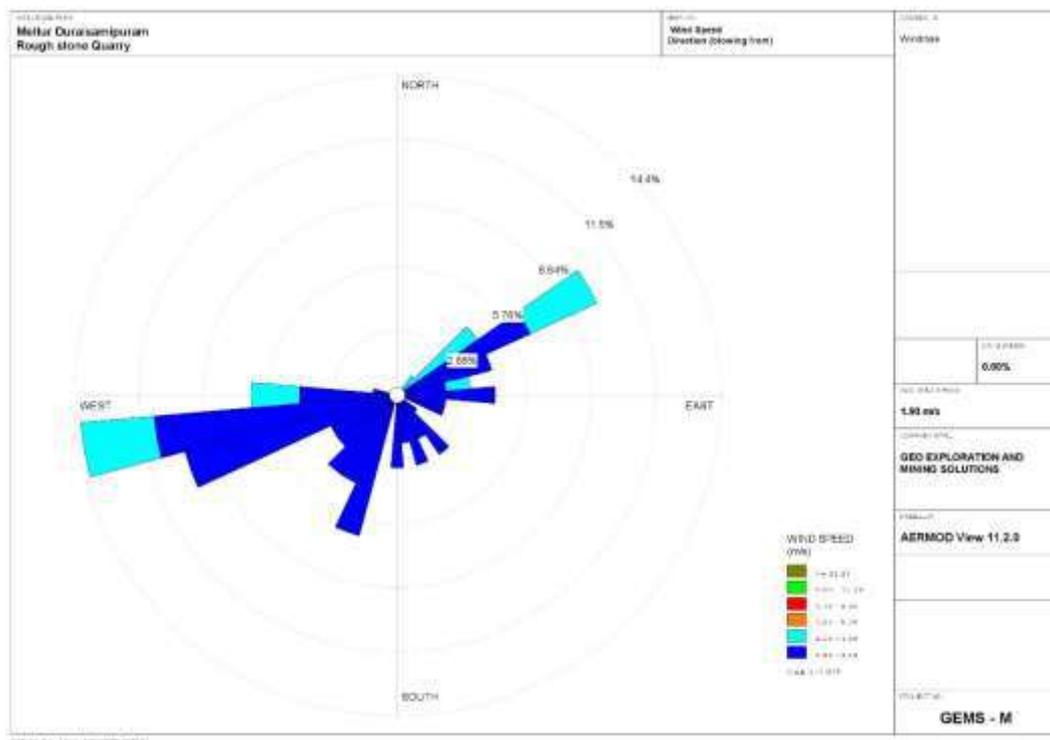
The Total Dissolved Solids were found in the range of 519-609 mg/l in all samples. The Total hardness varied between 189.8-218.2 -mg/l for all samples.

On Microbiological parameters, the water samples from all the locations meet the requirement. The parameters thus analysed were compared with IS 10500:2012 and are well within the prescribed limits.

3.5 AIR ENVIRONMENT

The baseline studies on air environment include identification of specific air pollution parameters and their existing levels in ambient air. The ambient air quality with respect to the study zone of 10 km radius around the cluster forms the baseline information. The sources of air pollution in the region are mostly due to vehicular traffic, dust arising from unpaved village road and domestic & agricultural activities. The prime objective of the baseline air quality study was to establish the existing ambient air quality of the study area. These will also be useful for assessing the conformity to standards of the ambient air quality during the operation of proposed projects in cluster.

FIGURE – 6: WIND ROSE DIAGRAM



3.7 NOISE ENVIRONMENT

Ambient noise levels were measured at 8 (Eight) locations around the proposed project area.

Ambient noise levels were measured at 8 (Eight) locations around the proposed project area. Noise levels recorded in core zone during day time were from 41.6 – 41.8 dB (A) Leq and during night time were is 35.9-36.7 dB (A) Leq. Noise levels recorded in buffer zone during day time were from 37.5 – 40.1 dB (A) Leq and during night time were from 34.3 – 36.7 dB (A) Leq.

3.8 ECOLOGICAL ENVIRONMENT

The core area extent of 1.25.0 Ha of Rough stone quarry has an impact on the diversity of flora and fauna of the surrounding area. But present work was carried out on the detailed study of the impacts of the Rough stone quarry on the ecology and biodiversity of the core lease area with the proper mitigation and sustainable management plan. The proposed applied lease area exhibits hillock topography. The following methods were applied during the baseline study of flora, fauna, and diversity assessment.

3.9 SOCIO ECONOMIC ENVIRONMENT

There is no habitation/ village within the radius of 10km from the project area. Socio-economic study is an essential part of environmental study. It includes demographic structure of the area, provision of basic amenities viz., housing, education, health and medical services, occupation, water supply, sanitation, communication, transportation, prevailing diseases pattern as well as feature like temples, historical monuments etc., at the baseline level. This will help in visualizing and predicting the possible impact depending upon the nature and magnitude of the project.

It is expected that the Socio-Economic Status of the area will slightly improve because of this proposed project. As the proposed project will provide direct and indirect employment and improve the infrastructural facilities in that area and, thus, improve their standard of living.

According to Census 2011 information the location of Chokkanathaputtur village is located in Rajapalayam taluka of Virudhunagar district in Tamil Nadu, India. It is situated 20km away from sub-district headquarter Rajapalayam As per 2009 statistics, Mellur Duraisamyapuram is the gram panchayat of Chokkanathaputtur village in the study area

4. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

In order to maintain the environmental commensuration with the mining operation, it is essential to undertake studies on the existing environmental scenario and assess the impact on different environmental components. This would help in formulating suitable management plans sustainable resource extraction..

4.1 LAND ENVIRONMENT:

ANTICIPATED IMPACT

- Permanent or temporary change on land use and land cover.
- Change in Topography: Topography of the ML area will change at the end of the life of the mine.
- Movement of heavy vehicles sometimes cause problems to agricultural land, human habitations due to dust, noise and it also causes traffic hazards.
- Due to degradation of land by pitting the aesthetic environment of the core zone may be affected.
- Earthworks during the rainy season increase the potential for soil erosion and sediment laden water entering the water ways.
- If no due care is taken wash off from the exposed working area may choke the water course & can also causes the siltation of water course

MITIGATION MEASURES

- The mining activity will be gradual confined in blocks and excavation will be undertaken progressively along with other mitigative 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 safety barrier and other safety provided) so as to help minimise 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

IMPACT ON SOIL ENVIRONMENT

Erosion and Sedimentation (Removal of protective vegetation cover; Exposure of underlying soil horizons that may be less pervious, or more erodible than the surface layers; Reduced capacity of soils to absorb rainfall; Increased energy in storm-water runoff due to concentration and velocity; and Exposure of subsurface materials which are unsuitable for vegetation establishment).

MITIGATION MEASURES FOR SOIL CONSERVATION

- Run-off diversion – Garland drains will be constructed all 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

4.2 WATER ENVIRONMENT

ANTICIPATED IMPACT

The major sources of water pollution normally associated due to mining and allied operations are:

- Generation of waste water from vehicle washing.
 - Washouts from surface exposure or working areas
 - Domestic sewage
 - Disturbance to drainage course in the project area
 - Mine Pit water discharge
- Increase in sediment load during monsoon in downstream of lease area
 - This being a mining project, there will be no process effluent. Waste from washing of machinery may result in discharge of Oil & grease, suspended solids.
 - The sewage from soak pit may percolate to the ground water table and contaminate it.
 - Surface drainage may be affected due to Mining
 - Abstraction of water may lead to depletion of water table

MITIGATION MEASURES

- Garland drain, settling tank will be constructed along the proposed mining lease area. The Garland drain will be connected to settling tank and sediments will be trapped in the settling traps and only clear water will be discharged out to the natural drainage.
- Rainwater will be collected in sump in the mining pits and will be allowed to store and pumped out to surface setting tank of 15 m x 10m x 3m to remove suspended solids if any. This collected water will be judiciously used for dust suppression and such sites where dust likely to be generated and for developing green belt. The proponent will collect and judiciously utilize the rainwater as part of rainwater harvesting system.
- Providing benches with inner slopes and through a system of drains and channels, allowing rain water to descent into surrounding drains, so as to minimize the effects of erosion & water logging arising out of uncontrolled descent of water.

- Reuse the water collected during storm for dust suppression and greenbelt development within the mines
- Installing interceptor traps/oil separators to remove oils and greases. Water from the tipper wash-down facility and machinery maintenance yard will pass through interceptor traps/oil separators prior to its reuse;
- Using flocculating or coagulating agents to assist in the settling of suspended solids during monsoon seasons;
- Periodic (every 6 month once) analysis of quarry pit water and ground water quality in nearby villages
- Domestic sewage from site office & urinals/latrines provided in ML is discharged in septic tank followed by soak pits
- Waste water discharge from mine will be treated in settling tanks before using for dust suppression and tree plantation purposes
- De-silting will be carried out before and immediately after the monsoon season
- Regular monitoring (every 6 month once) and analysing the quality of water in open well, bore wells and surface water

4.3 AIR ENVIRONMENT

ANTICIPATED IMPACT

- During mining, at various stages activities such as excavation, drilling, blasting, 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

Drilling – 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.

Advantages of Wet Drilling:-

- In this system dust gets suppressed close to its formation. Dust suppression become very effective and the work environment will be improved from the point of occupational comfort and health.
- Due to dust free atmosphere, the life of engine, compressor etc., will be increased.
- The life of drill bit will be increased.
- The rate of penetration of drill will be increased.
- Due to the dust free atmosphere visibility will be improved resulting in safer working conditions.

Blasting –

- Establish time of blasting to suit the local conditions and water sprinkling on blasting face
- Avoid blasting i.e., when temperature inversion is likely to occur and strong wind blows towards residential areas
- Controlled blasting includes Adoption of suitable explosive charge and short delay detonators, adequate stemming of holes at collar zone and restricting blasting to a particular time of the day i.e. at the time lunch hours, controlled charge per hole as well as charge per round of hole
- 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

Haul Road & Transportation –

- 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 below 20 km/hr to avoid generation of dust.
- Water sprinkling on haul roads & loading points will be carried out twice a day
- Main source of gaseous pollution will be from vehicle used for transportation of mineral; therefore weekly maintenance of machines improves combustion process & makes reduction in the pollution.
- The un-metalled haul roads will be compacted weekly before being put into use.
- Over loading of tippers will be avoided to prevent spillage.
- It will be ensured that all transportation vehicles carry a valid PUC certificate
- Grading of haul roads and service roads to clear accumulation of loose materials

Green Belt –

- Planting of trees all along main mine haul roads and regular grading of haul roads will be practiced to prevent the generation of dust due to movement of dumpers/trucks
- Green belt of adequate width will be developed around the project areas

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 & tipper drivers
- Ambient Air Quality Monitoring will be conducted six months once to assess effectiveness of mitigation measures proposed

4.4 NOISE ENVIRONMENT

ANTICIPATED IMPACT

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
- 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.

MITIGATION MEASURES

The following noise mitigation measures are proposed for control of Noise

- 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;
- Green Belt/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 through training and awareness.
- Regular medical check-up and proper training to personnel to create awareness about adverse noise level effects

4.5 BIOLOGICAL ENVIRONMENT

ANTICIPATED IMPACT

- None of the plants will be cut during the operational phase of the mine.
- There shall be negligible air emissions or effluents from the project site. During the loading of the truck, dust generation will be likely. This shall be a temporary effect and not anticipated to affect the surrounding vegetation significantly.
- Most of the land in the buffer area is undulating terrain with croplands, grass patches, and small shrubs. Hence, there will be no effect on the flora of the region

MITIGATION MEASURES

The project site should have land to develop a greenbelt in and around the limits of the mine, along roads, and another vacant area. The main objective of the green belt is to provide a

barrier between the source of pollution and the surrounding areas. Although the project will not lead to any tree cutting, it is proposed to improve the greenery of the locality through plantation services. To avoid dust emissions, the mined materials will be covered with tarpaulin during transportation.

The objectives of the green belt cover will cover the following:

The selection of plant species for the green belt development depends on various factors such as climate, elevation, and soil. The plants should exhibit the following desirable characteristics in order to be selected for plantation.

- Native plant species will be preferred.
- The species should be wind-firm and deep-rooted.
- The species should form a dense canopy.
- Fast-growing plants will be planted
- Species tolerance to air pollution like SO₂ and NO₂ should be preferred.
- Plants having large leaf area index will be considered
- Soil improving plants (Nitrogen fixing rapidly decomposable leaf litter).
- Attractive appearance with good flowering and fruit-bearing.
- Birds and insects attract tree species.
- Roadsides will be planted with local vegetation.

GREENBELT DEVELOPMENT PLAN

Year	No. of trees proposed to be planted	Survival %	Area to be covered	Name of the species	No. of trees expected to be grown
I	950	80%	Safety zone, Approach Road and village road	Neem, Pongamia Pinnata, etc.,	750

4.6 SOCIO ECONOMIC ENVIRONMENT

ANTICIPATED IMPACT

- No. of people will get employment during the construction stage resulting in the ancillary development and growth. Nearby Local people will be given preference for employment on the basis of their skill and experience.
- Further due to proposed project, influx of working community will also generate an indirect employment through development of nearby market/ shops, trade centers, activities, transportation etc.
- Population influx during the construction phase can introduce various water and vector borne diseases which can lead to various unhygienic health problems in the area by disturbing the existing sanitation infrastructure.
- Rapid diverse population influx at the project site can create unusual behavioural activity such as worker-community conflicts, increase violence such as theft/stabbing and increased consumption of drugs/alcohol within the area.

- Impacts on the health of nearby villagers can be envisaged due to the transportation activities leading to short term exposure of fugitive dust, resulting in various acute diseases such as increased eye irritation, nausea, headache etc.

MITIGATION MEASURES

- Deploying of mobile toilets or the construction of temporary toilets will be done near to the construction site with the adequate water supply.
- Awareness programme will be conducted before the monsoon season regarding the spread of water borne/ vector diseases.
- Mosquito repellents will be provided in the nearby villages and at construction site to avoid the spread of diseases.
- To overcome behavioural impact, proper site in charge with timely supervision will be done. In advance, facilities with equipped medical and safety services will be provided to take a control over the incident/violence if any caused.
- To overcome behavioural impact, supervision will be done by site in charge. In advance, emergency cell will be formed with fully equipped communication system, medical and safety services to take control over the incident/violence caused.

5. ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

No alternatives are suggested as all the mine sites are mineral specific

6. ENVIRONMENT MONITORING PROGRAM

An Environment monitoring cell (EMC) will be constituted to monitor the implementation of EMP and other environmental protection measures in all the proposed quarries.

- The responsibilities of this cell will be:
- Implementation of pollution control measures
- Monitoring programme implementation
- Post-plantation care
- To check the efficiency of pollution control measures taken
- Any other activity as may be related to environment
- Seeking expert's advice when needed

6.1 ENVIRONMENTAL MONITORING CELL

POST ENVIRONMENTAL CLEARANCE MONITORING SCHEDULE

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 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

7. ADDITIONAL STUDIES

7.1 RISK ASSESSMENT

The methodology for the risk assessment has been based on the specific risk assessment guidance issued by the Directorate General of Mine Safety (DGMS), Dhanbad, vide Circular No.13 of 2002, dated 31st December, 2002. 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. Further, mechanisms responsible for these hazards are identified and their control measures, set to timetable are recorded along with pinpointed responsibilities.

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 all proposed projects. Risk Assessment is all about prevention of accidents and to take necessary steps to prevent it from happening.

7.2 DISASTER MANAGEMENT PLAN

Natural disasters like Earthquake, Landslides have not been recorded in the past history as the terrain is categorized under seismic zone III. The area is far away from the sea hence the disaster due to heavy floods and tsunamis are not anticipated.

The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities.

The objective of the Disaster Management Plan is to make use of the combined resources of the mine and the outside services to achieve the following: Rescue and medical treatment of casualties;

- Rescue and medical treatment of 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

7.3 CUMULATIVE IMPACT STUDY

CUMULATIVE PRODUCTION LOAD OF ROUGH STONE

Quarry	PROPOSED PRODUCTION DETAILS			
	5 Years in m ³	Per Year in m ³	Per Day in m ³	Number of Lorry Load Per Day (12m ³ per load)
P1	1,07,530	21,506	71	6
Total	1,07,530	21,506	71	6

CUMULATIVE PRODUCTION LOAD OF GRAVEL

Quarry	PROPOSED PRODUCTION DETAILS			
	1 Years in m ³	Per Year in m ³	Per Day in m ³	Number of Lorry Load Per Day (12m ³ per load)
P1	10,350	10,350	35	6
Total	10,350	10,350	35	6

PREDICTED NOISE INCREMENTAL VALUES FROM CLUSTER

Location ID	Distance in Meters
Habitation Near P1	1400

SOCIO ECONOMIC BENEFITS

Code	Project Cost	CER Cost
P1	Rs. 1,20,37,000/-	Rs.5,00,000/-
Total	Rs. 1,20,37,000/-	Rs.5,00,000/-

- As per para 6 (II) of the office memorandum, all the mines being a green field project & Capital Investment is \leq 100 crores, they shall contribute 2% of Capital Investment towards CER as per directions of EAC/SEAC.
- 1 Proposed project shall fund towards CER – **Rs 5,00,000/-**

8. PROJECT BENEFITS

Thiru.N.M.Arumugabalaji for Quarrying Rough Stone at Mellur Duraisamipuram Village aims to produce cumulatively 1,07,530 m³ Rough Stone over a period of 5 Years & 10,350 m³ of Top soil over a period of 1 Years. This will enhance the socio-economic activities in the adjoining areas and will result in the following benefits

- ✚ Increase in Employment Potential
- ✚ Improvement in Socio-Economic Welfare
- ✚ Improvement in Physical Infrastructure
- ✚ Improvement in Social infrastructure

9. ENVIRONMENT MANAGEMENT PLAN

The Environment Monitoring Cell discussed under Chapter 6 will ensure effective implementation of environment management plan and to ensure compliance of environmental statutory guidelines through Mine Management Level of each Proposed Quarry.

The said team will be responsible for:

- ✚ Monitoring of the water/ waste water quality, air quality and solid waste generated
- ✚ Analysis of the water and air samples collected through external laboratory
- ✚ Implementation and monitoring of the pollution control and protective measures/ devices which shall include financial estimation, ordering, installation of air pollution control equipment, waste water treatment plant, etc.
- ✚ Co-ordination of the environment related activities within the project as well as with outside agencies
- ✚ Collection of health statistics of the workers and population of the surrounding villages
- ✚ Green belt development
- ✚ Monitoring the progress of implementation of the environmental monitoring programme
- ✚ Compliance to statutory provisions, norms of State Pollution Control Board, Ministry of Environment and Forests and the conditions of the environmental clearance as well as the consents to establish and consents to operate.

10. CONCLUSION

Various aspects of mining activities were considered and related impacts were evaluated. Considering all the possible ways to mitigate the environmental concerns Environmental Management Plan was prepared and fund has been allocated for the same. The EMP is dynamic, flexible and subjected to periodic review. For project where the major environmental impacts are associated, EMP will be under regular review. Senior Management responsible for the project will conduct a review of EMP and its implementation to ensure that the EMP remains effective and appropriate. Thus, the proper steps will be taken to accomplish all the goals mentioned in the EMP and the project will bring the positive impact in the study area.