

EXECUTIVE SUMMARY

THIRU. C. RENGARAJ ROUGH STONE QUARRY

S.F. Nos:217/3A, 217/20, 217/21, 217/22 & 217/24

Extent: 1.34.0 ha

Sathiyamangalam Village, Kulathur Taluk, Pudukkottai District,
Tamil Nadu State

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

CLUSTER EXTENT = 9.23.5 ha

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

Complied as per ToR Obtained vide

Letter No.SEIAA- TN/F.No.8551/SEAC/ToR-1141/2022 Dated:08.04.2022

Project Proponent

THIRU. C. RENGARAJ,

S/o. Chinnaiya,

No. 1/133, Melamuthukadu,

Cauvery Nagar Post, Kulathur Taluk,

Pudukkottai District – 625 501,

Tamilnadu State.

Environmental Consultant

GEO EXPLORATION AND MINING SOLUTIONS

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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. C. Rengaraj Rough Stone Quarry consisting of one Proposed, Three Nearby Proposed Quarries and One Existing Quarry with total extent of Cluster of 9.23.5 ha in Sathiyamangalam Village, Kulathur Taluk, Pudukkottai District and Tamil Nadu State, cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016.

Baseline Monitoring study has been carried out during the period of March to May 2022 and this EIA and EMP report is prepared for considering cumulative impacts arising out of this project, 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 –

Name of the Company	Thiru. C. Rengaraj Rough Stone Quarry Project
Address	S/o. Chinnaiya, No. 1/133, Melamuthukadu, Cauvery Nagar Post, Kulathur Taluk, Pudukkottai District – 625 501.
Mobile	94431 39189
Status	Individual

1.2 QUARRY DETAILS WITHIN 500 M RADIUS

PROPOSED QUARRIES				
CODE	Name of the Owner	S.F. Nos	Extent	Status
P1	Thiru. C. Rengaraj, S/o. Chinnaiya, No. 1/133, Melamuthukadu, Cauvery Nagar Post, Kulathur Taluk, Pudukkottai District – 625 501.	S.F.Nos:217/3A, 217/20, 217/21, 217/22 & 217/24	1.34.0ha	ToR Obtained vide Lr.No. SEIAA- TN/F.No.8551/SEAC/ToR- 1141/2022 Dated:08.04.2022
P2	Thiru. Bahurudeen, S/O. Sahul Hameed, No. 215, Kallar Street, Thiruvapoor, Pudukkottai	220/24B2, etc.,	1.14.0 ha	EC Granted vide Lr.No.SEIAA- TN/F.No.7731/EC.No:5002/2020 dated 18.02.2022
P3	M/s. Veeram Stones Pvt., Ltd., 952, Udaiyandipatti Village, Sathiyamangalam Post, Kulathu Taluk, Pudukkottai District.	214/5, 214/8, 214/9 and 214/2A	0.73.0	Under process of Geology Department

P4	Thiru. S. Manikandan, S/o. S.M.Sait, 51,52 Charlas Nagar, 2 nd Street, Pudukkottai	220/29 & 219	0.93.5	Awaiting EC
TOTAL			4.14.5ha	
EXISTING QUARRIES				
CODE	Name of the Owner	S.F. Nos	Extent	Status
E1	Thiru. B. Kajamaideen, S/o. Bahurudeen, No. 215, Kallar Street, Thiruvappur, Pudukkottai	217/1B, etc.,	1.90.0	07.09.2018 to 06.09.2023
TOTAL			1.90.0ha	
EXPIRED QUARRIES				
CODE	Name of the Owner	S.F. No	Extent	Lease Period
EX1	Thiru. L. Thangadurai, S/o. Lakshman, Udaiyandipatti, Sathiyamangalam (Po) Kulathur Taluk,	217/6, 7A	0.88.0	03.07.2007 to 02.07.2012
EX2	Thiru. P. Murugesan, S/o. Palani, Sithannaval, Illuppur Taluk.	217/2a, etc.,	2.31.0	03.06.2010 to 02.06.2015
TOTAL			3.19.0 ha	
TOTAL CLUSTER EXTENT			9.23.5 ha	

Note:-

- Cluster area is calculated as per MoEF & CC Notification – S.O. 2269 (E) Dated: 01.07.2016

TABLE 1.3 SALIENT FEATURES OF THE PROPOSAL

Name of the Quarry	Thiru. C. Rengaraj Rough Stone Quarry		
Toposheet No	58-J/11		
Latitude between	10°28'07.82"N to 10°28'12.86"N		
Longitude between	78°44'45.46"E to 78°44'50.48"E		
Highest Elevation	112 m AMSL		
Proposed Depth of Mining	30m bgl		
Geological Resources	Rough Stone in m ³	Weathered rock m ³	Topsoil m ³
	3,57,660	21,044	31,380
Mineable Reserves	Rough Stone in m ³	Weathered rock m ³	Topsoil m ³
	42,620	8,648	17,781
Year wise Production for 5 years	Rough Stone in m ³	Weathered rock m ³	Topsoil m ³
	42,620	8,648	17,781
Existing Pit Dimension	60m (L) x 55m (W) x 17m (D) bgl		
Ultimate Pit Dimension	137m (L) x 98m (W) x 30m (D) bgl		
Water Level in the surrounds area	65 – 70m bgl		
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting		
Topography	The lease applied area exhibits plain topography. The area has gentle sloping towards eastern side. The altitude of the area is 112m (max) above mean sea level. The area is covered by 3m thickness of topsoil and 2m weathered rock. Massive charnockite is found after 3m topsoil and 2m weathered rock which is clearly inferred from the existing quarrying pits.		
Machinery proposed	Jack Hammer	2 Nos	
	Compressor	1 No	
	Excavator with bucket and rock breaker	1 No	
	Trucks	1 No	
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	14 Nos	
Project Cost	Rs.26,93,000/-	
CER Cost @ 2% of Project Cost	Rs 5,00,000/-	
Nearby Water Bodies	Odai	10m Safety East
	Tank	120m NE
	Tank	400m SW
	Kuttai	370m SW
	Lake near Vellanur	4.8km East
	Lake Near Sembattur	8.4km NE
Greenbelt Development Plan	Proposed to plant 750 trees in 1300Sq.m area in the 7.5m & 10m Safety Zone and panchayat roads	
Proposed Water Requirement	2.0 KLD	
Nearest Habitation	350m Southeast	

1.3 STATUTORY DETAILS

- The proponent applied for Rough Stone Quarry Lease Dated: 20.07.2020.
- Precise Area Communication Letter was issued by the District Collector, Pudukkottai, vide letter No. 177/2020 (G&M) dated 04.02.2021.
- The Mining Plan was prepared by Qualified Person and approved by Deputy Director, Geology and Mining, Pudukkottai District, vide Rc.No.177/2020 (G&M) dated 17.03.2021.
- 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 for Environmental Clearance vide online Proposal No. SIA/TN/MIN/62979/2021, Dated: 29.04.2021.

2. PROJECT DESCRIPTION

- The proposed project is site specific and there is no additional area required for this 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 is 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 pithead to the needy crushers and rock breakers to avoid secondary blasting

2.1 SITE CONNECTIVITY TO THE PROJECT AREA

Nearest Roadway	NH-336 – Trichy – Pudukkottai – 4.0Km - E SH-71 – Viralimalai – Pudukkottai – 4.0Km - SW
Nearest Village	Sathiyamangalam – 1km – Northeast
Nearest Town	Pudukkottai – 13.0Km - SE
Nearest Railway	Vellanur Railway station - 5.0Km - SE
Nearest Airport	Trichy Airport – 33.0Km - N
Seaport	Thoothukudi - 200km – SW

2.2 LAND USE PATTERN OF THE PROPOSED PROJECTS

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	0.26.0	0.92.0
Infrastructure	Nil	0.01.0
Roads	0.02.0	0.02.0
Green Belt	Nil	0.13.0
Un – utilized area	1.06.0	0.26.0
TOTAL	1.34.0	1.34.0

2.3 OPERATIONAL DETAILS OF LEASE APPLIED AREA

PARTICULARS	DETAILS		
	Rough Stone (5Year Plan period)	Weathered rock (3 Years Plan period)	Topsoil (3 Years Plan period)
Geological Resources in m ³	3,57,660	21,044	31,380
Mineable Reserves in m ³	42,620	8,648	17,781
Production in m ³	42,620	8,648	17,781
Mining Plan Period	5 Years		
Number of Working Days	300 Days		
Production per day in m ³	28	10	20
No of Lorry loads (12m ³ per load)	3	1	2
Total Depth of Mining	30m bgl		

FIGURE – 1: GOOGLE IMAGE SHOWING PROJECT AREA

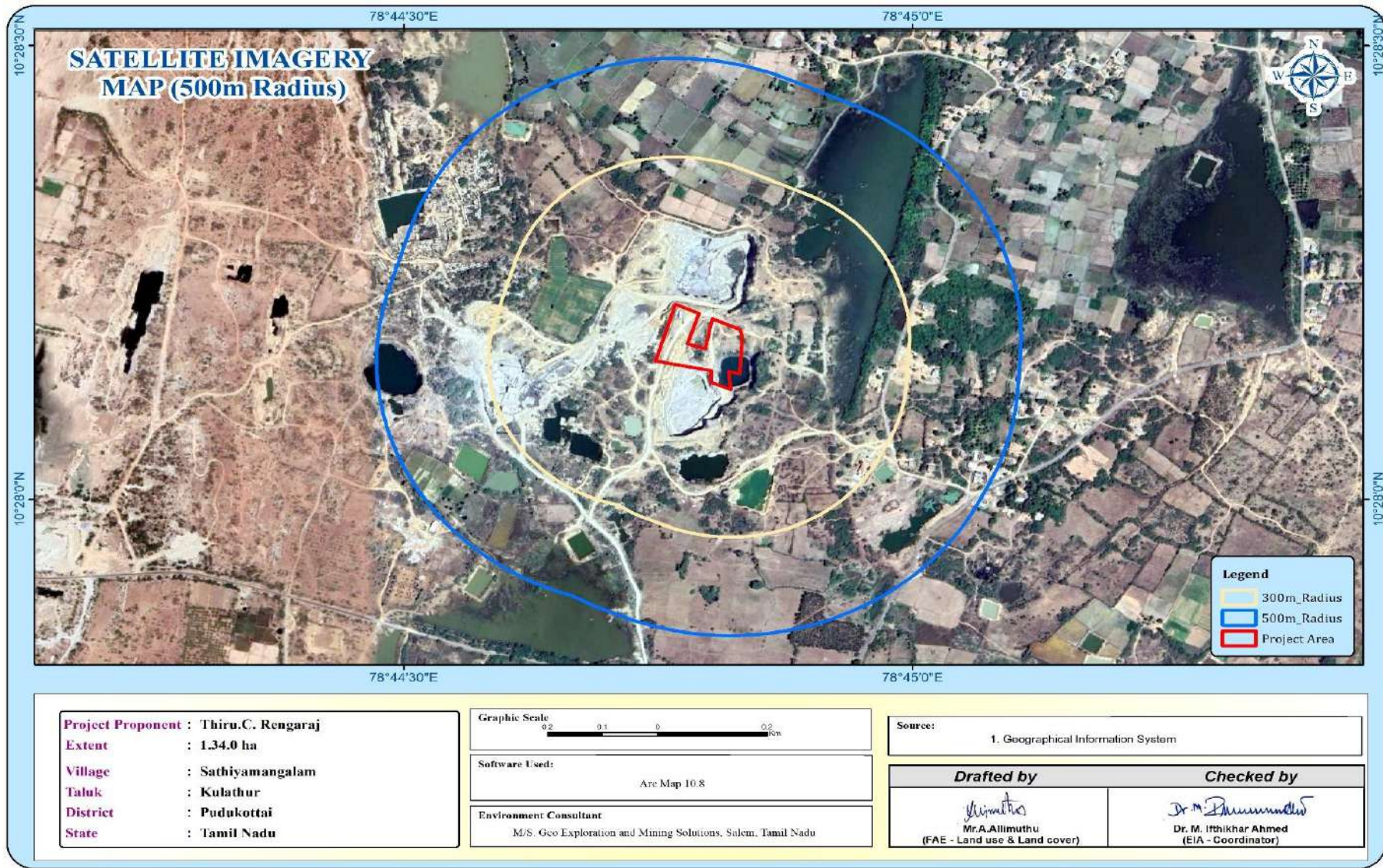


FIGURE – 2: GOOGLE IMAGE SHOWING CLUSTER (500 m QUARRIES)

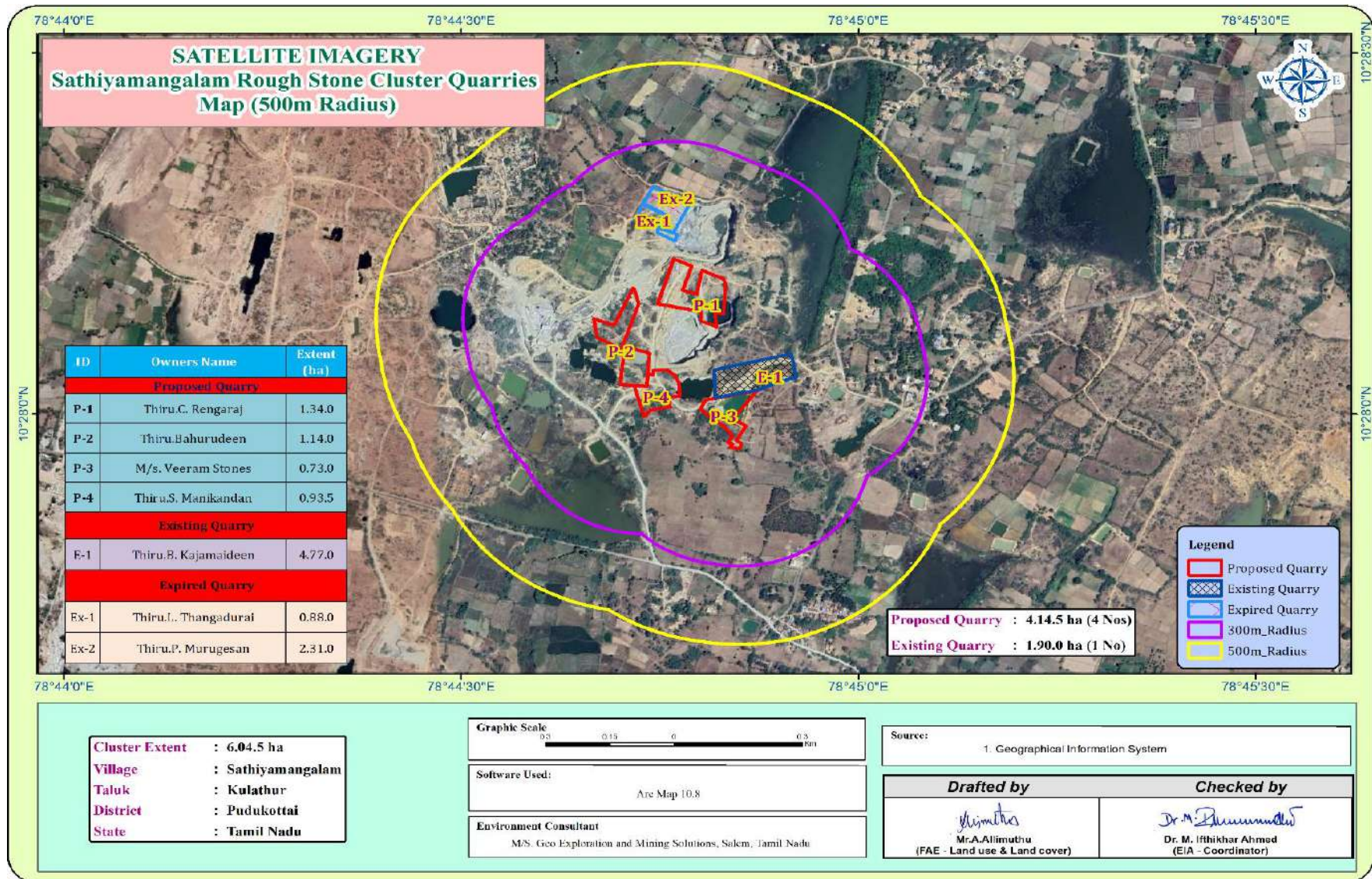


FIGURE – 3: TOPOSHEET MAP COVERING 10 KM RADIUS

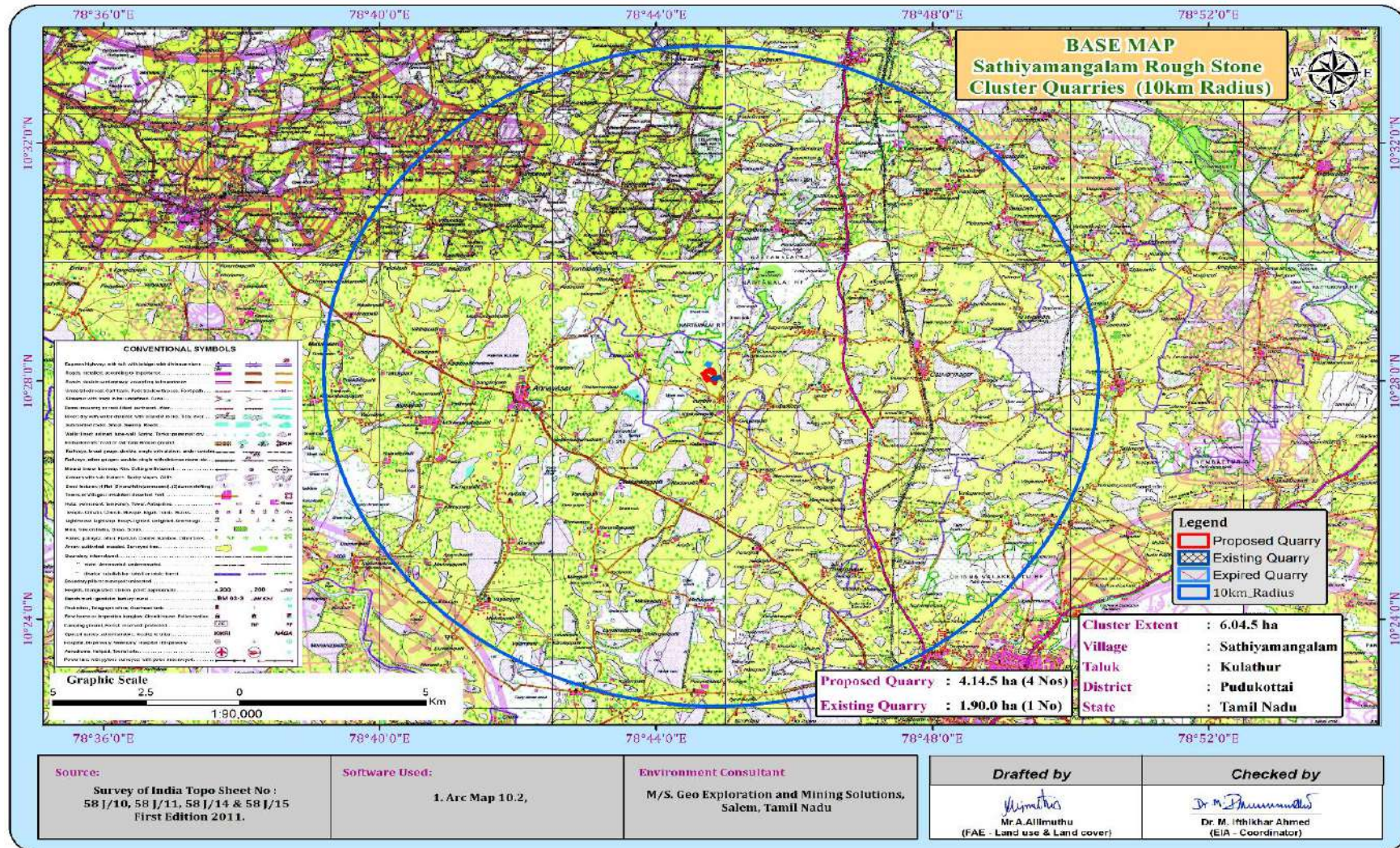
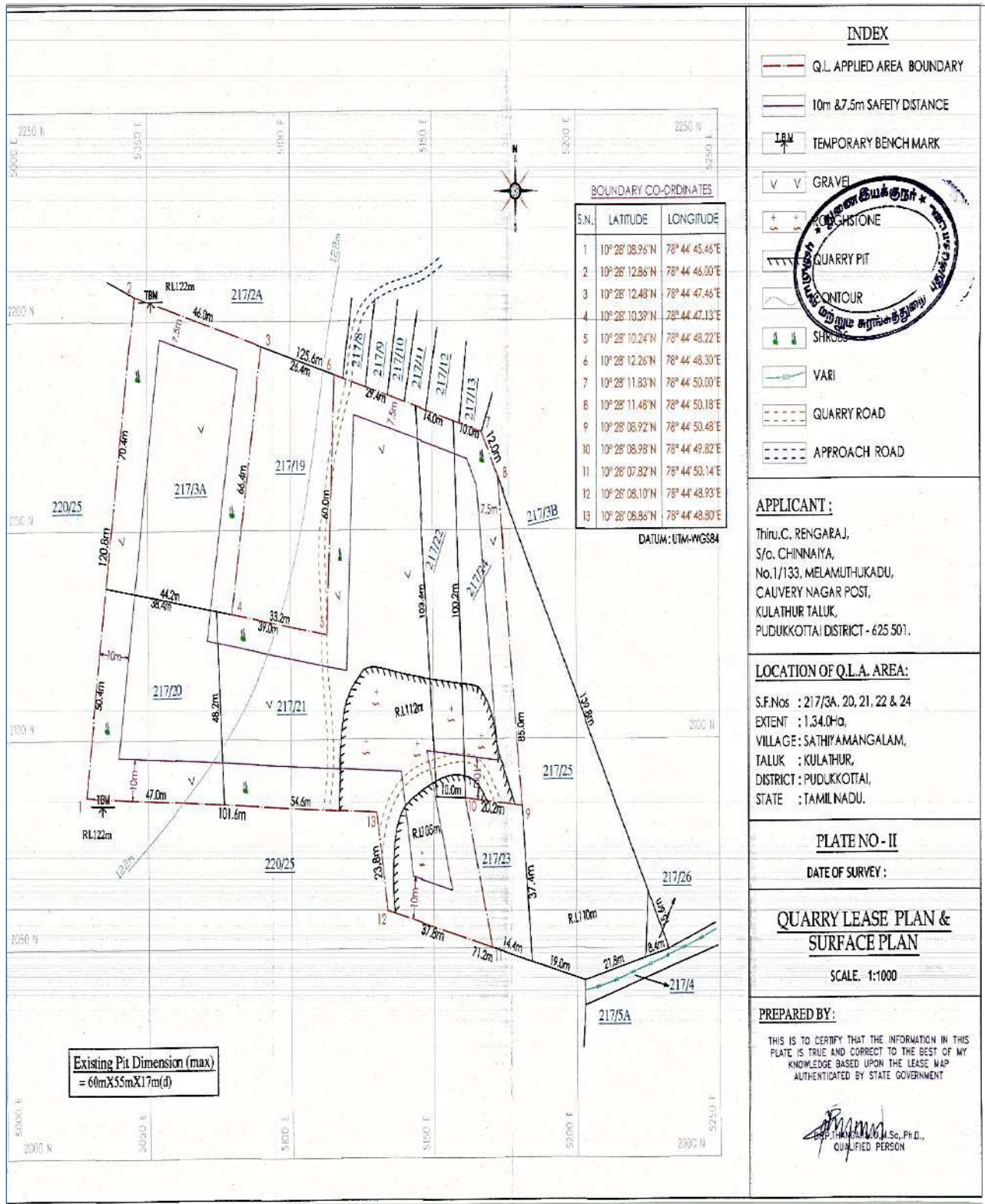


FIGURE – 4: QUARRY LEASE PLAN & SURFACE PLAN



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	2	1.2m to 2.0m	Compressed air
2	Compressor	1	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker Unit 4	1	300 HP	Diesel Drive
4	Tippers / Dumpers	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)
I	137	98	30 m bgl

3.0 DESCRIPTION OF THE ENVIRONMENT

Field monitoring studies to evaluate the base line status of the project site were carried out covering March, April & May 2022 with CPCB guidelines. Environmental data has been collected with reference to cluster quarries by Chennai Mettex lab private Limited– Approved by AAI, AGMARK, APEDA, BIS, [IC, FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD, for the below attributes –

- Land
- Water
- Air
- Noise
- Biological
- Socio-economic status

3.1 ENVIRONMENT MONITORING ATTRIBUTES

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 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 (1 surface water & 5 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	PM10 PM2.5 SO2 NOX Fugitive Dust	24 hourly twice a week (March – May 2019)	8 (1 core & 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 & 6 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 Quadrate & Transect Study Secondary Data – Forest Working Plan
Socio Economic Aspects	Socio–Economic Characteristics, Population Statistics and Existing Infrastructure in the study area	Site Visit & Census Handbook, 2011	Study Area	Primary Survey, census handbook & need based assessments.

3.2 LAND ENVIRONMENT

A visual interpretation technique has been adopted for land use classification based on the keys suggested in the chapter – V of the guidelines issued by NNRMS Bangalore & Level III classification with 1:50,000 scale for the preparation of land use mapping. Land use pattern of the area was studied through LISS III imagery of Bhuvan (ISRO). The 10 km radius map of study area was taken for analysis of Land use cover.

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

S.No	CLASSIFICATION	AREA_HA	AREA_%
BUILTUP			
1	URBAN	360.48	1.09
2	RURAL	502.20	1.52
3	MINING	327.16	0.99
AGRICULTURAL LAND			
4	CROP LAND	20675.04	62.78
5	PLANTATION	355.13	1.08
6	FALLOW LAND	3924.15	11.91
FOREST			
7	FOREST DECIDUOUS	186.34	0.57
8	SCRUB FOREST	750.37	2.28
9	FOREST PLANTATION	331.14	1.01
BARREN/WASTE LANDS			
10	SALT AFFECTED LAND	300.77	0.91
11	SCRUB LAND	763.78	2.32
12	BARREN ROCKY	37.42	0.11
WETLANDS/ WATER BODIES			
13	WATER BODIES/LAKE	4421.04	13.42
TOTAL		32935.00	100.00

From the above table, pie diagram and land use map it is inferred that the majority of the land in the study area is Agriculture land (includes crop land, plantation & fallow land) 75.77% followed by Built-up Lands (includes Urban & Rural) 2.61%, Barren Land 3.34%; Water bodies 13.42% and Mining – 0.99%.

The total mining area within the study area is 327.16 ha i.e., 0.99%. The cluster area of 9.23.5 ha contributes about 1.84% of the total mining area within the study area. This small percentage of Mining Activities shall not have any significant impact on the environment.

3.3 SOIL ENVIRONMENT

The samples were analysed as per the standard methods prescribed in “Soil Chemical Analysis (M.L. Jackson, 1967) & Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India”. The important properties analysed for soil are bulk density, porosity, infiltration rate, pH and Organic matter, kjeldahi Nitrogen, Phosphorous and Potassium.

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 1.12 - 1.26 g/cc. The Water Holding Capacity and Porosity of the soil samples is found to be medium i.e. ranging from 32.4 – 40.2%.

Chemical Characteristics –

- The nature of soil is slightly alkaline to strongly alkaline with pH range 7.62 to 8.72
- The available Nitrogen content range between 160 to 188 kg/ha
- The available Phosphorus content range between 1.18 to 1.68 kg/ha
- The available Potassium range between 32.5 to 43.8 mg/kg.

3.4 WATER ENVIRONMENT

The water resources, both surface and groundwater play a significant role in the development of the area. The purpose of this study is to assess the water quality characteristics for critical parameters and evaluate the impacts on agricultural productivity, domestic community usage, recreational resources and aesthetics in the vicinity. The water samples were collected and transported as per the norms in pre-treated sampling cans to laboratory for analysis.

Surface Water

Ph:

The pH varied from 7.39 to 7.42 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 Solids varied from 512 to 538 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 146 to 178 mg/l. Nitrates varied from 15.4 to 22.6 mg/l, while sulphates varied from 36 to 40 mg/l.

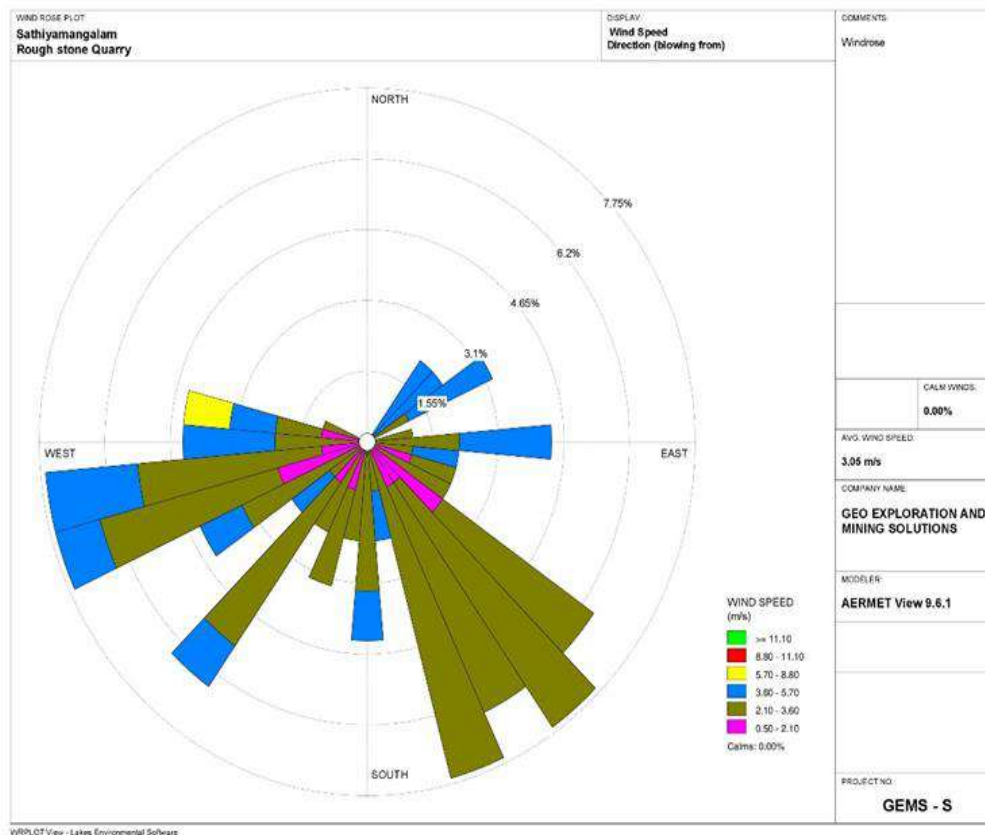
Ground Water

The pH of the water samples collected ranged from 7.32 to 7.64 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 534 - 610 mg/l in all samples. The Total hardness varied between 174 – 238 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 proposed quarry forms the baseline information.

FIGURE – 6: WIND ROSE DIAGRAM

3.6 SUMMARY OF AMBIENT AIR QUALITY

As per monitoring data, PM10 ranges from 50.2 $\mu\text{g}/\text{m}^3$ to 69.8 $\mu\text{g}/\text{m}^3$, PM2.5 data ranges from 20.0 $\mu\text{g}/\text{m}^3$ to 39.9 $\mu\text{g}/\text{m}^3$, SO2 ranges from 8.7 $\mu\text{g}/\text{m}^3$ to 10.3 $\mu\text{g}/\text{m}^3$ and NO2 data ranges from 20.7 $\mu\text{g}/\text{m}^3$ to 23.7 $\mu\text{g}/\text{m}^3$. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB.

NOISE ENVIRONMENT

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 60.9 dB (A) Leq and during night time were from 52.6dB (A) Leq. Noise levels recorded in buffer zone during day time were from 51.4to 52.5 dB (A) Leq and during night time were from 42.0 to 42.8 dB (A) Leq.

The values of noise observed in some of the areas are primarily owing to quarrying activities due to cluster of quarries within 500m radius, movement of vehicles and other anthropogenic activities.

3.8 ECOLOGICAL ENVIRONMENT

The study involved in the collection of primary data by conducting a survey in the field, examination of floral and faunal records in previously published reports and records. Analysis of the information is the view of the possible alteration in the environment of the project site. For the survey of fauna, both direct and indirect observation methods were used.

There is no schedule I species of animals observed within study area as per Wildlife Protection Act 1972 as well as no species is in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area. Hence this small operation over short period of time will not have any significant impact on the surrounding flora and fauna.

3.9 SOCIO ECONOMIC ENVIRONMENT

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 substantially 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.

The proposed project will aim to provide preferential 14 persons to the local people there by improving the indirect employment opportunity for 10 persons and in turn the social standards will improve.

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 project 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 include 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 check-ups, 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 month once to assess effectiveness of mitigation measures proposed

4.4 NOISE ENVIRONMENT

ANTICIPATED IMPACT

Noise pollution is mainly due to operation like drilling & blasting and plying of trucks & HEMM. These activities will not cause any problem to the inhabitants of this area because there is no human settlement in close proximity to the project area. Noise modelling has been carried out considering blasting and compressor operation (drilling) and transportation activities.

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;
- 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

- There is no Eco Sensitive zone/ Critically polluted area/ HACA/CRZ located within 10 km radius of the area. (Kindly refer the Plate No 1A in the approved Mining plan). It is away from the proposed project site. There are no impacts due to this mining activity.
- 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 loading 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.

- Plants that grow fast will be preferred.
- Preference for high canopy covers plants with local varieties.
- Perennial and evergreen plants will be preferred.
- The development of the Green Belt is an important aspect for any plant because:
 - a. It improves the ambient air quality by controlling Suspended Particulate Matter (SPM) in the air.
 - b. It helps in noise abatement for the surrounding area.
 - c. It helps in the settlement of new birds and insects within itself.
 - d. It maintains the ecological balance.
 - e. It increases the aesthetic value of the site.

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

- Noise abatement
- Ecological restoration
- Aesthetic, biological and visual improvement of area due to improved vegetative and plantations cover.

GREENBELT DEVELOPMENT PLAN

About 750 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier of applied mine lease area with survival rate 80%. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

Year	No. of trees proposed to be planted	Area to be covered	Name of the species	Survival rate expected	No. of trees expected to be grown
I	750	Along safety area, panchayat road and village road	Neem, Pongamia Pinnata, Casuarina etc.,	80%	600

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

5. ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

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

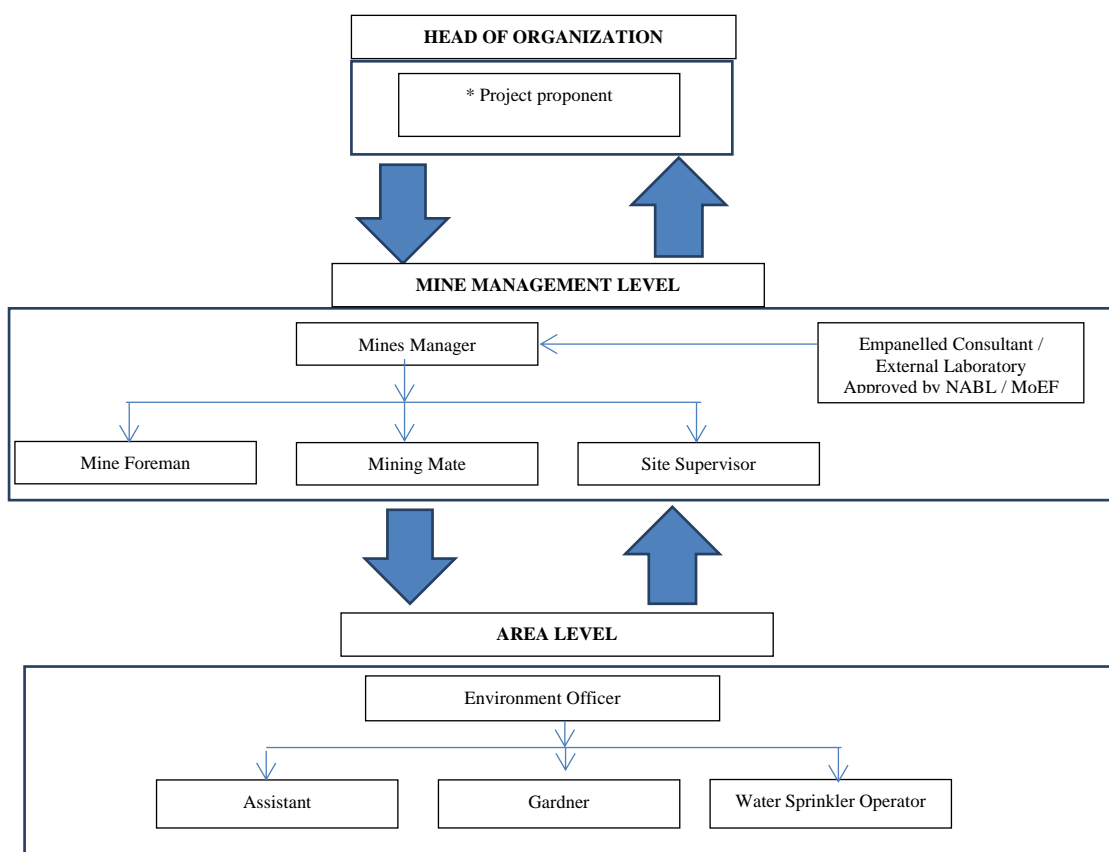
6. ENVIRONMENT MONITORING PROGRAM

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



6.2 POST ENVIRONMENTAL CLEARANCE MONITORING SCHEDULE

S. No.	Environment Attributes	Location	Monitoring		Parameters
			Duration	Frequency	
1	Air Quality	8 Locations (2 Core & 6 Buffer)	24 hours	Once in 6 months	Fugitive Dust, PM2.5, PM10, SO2 and NOx.
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	7 Locations (2SW & 5 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	7 Locations (2 Core & 5 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	5 Locations (2 Core & 3 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 proposed project. 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;
- 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
P1	42,620	8,524	28	3
P2	60,050.64	12,010	40	4
P4	76,126	15,225	51	5
Total	1,78,796	35,759	119	12
E1	1,90,935	38,187	127	11
Total	1,90,935	38,187	127	11
Grand Total	3,69,731	73,946	246	23

CUMULATIVE PRODUCTION LOAD OF GRAVEL/WEATHERED/TOPSOIL

Quarry	PROPOSED PRODUCTION DETAILS			
	3 Years in m ³	Per Year in m ³	Per Day in m ³	Number of Lorry Load Per Day
P1	26,429	8,809	29	3
P2	6,045	2,015	7	1
P4	9,348	3,116	10	1
Total	41,822	13,940	46	5
E1	29182.5	9727	32	3
Total	29,182.5	9,727	32	3
Grand Total	71,004	23,667	78	8

PREDICTED NOISE INCREMENTAL VALUES FROM CLUSTER

Location ID	Background Value (Day) dB(A)	Incremental Value dB(A)	Total Predicted dB(A)	Residential Area Standards dB(A)
Habitation Near P1	54.30	43.0	54.6	55
Habitation Near P2	54.05	43.8	54.4	
Habitation Near P4	52.50	42.7	53.2	
Habitation Near E1	53.10	46.7	54.0	

NEAREST HABITATION FROM EACH MINE

Location ID	Distance in Meters
Habitation Near P1	350
Habitation Near P2	530
Habitation Near P3	310
Habitation Near P4	410
Habitation Near E1	310

GROUND VIBRATIONS AT 5 MINES

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	6	350	0.178
P2	9	600	0.104
P4	11	530	0.149
E1	28	260	0.983

SOCIO ECONOMIC BENEFITS





Location ID	Project Cost	CER
P1	Rs. 26,93,000	Rs 5,00,000 /-
P2	Rs. 26,32,000	Rs 5,00,000 /-
P4	Rs. 15,25,000	Rs 5,00,000 /-
Total	Rs. 68,50,000	Rs 15,00,000 /-
E1	Rs. 51,99,450/-	Rs 5,00,000/-
Total	Rs. 51,99,450/-	Rs 5,00,000/-
Grand Total	Rs. 1,20,49,450	Rs. 20,00,000/-

EMPLOYMENT BENEFITS FROM 5 MINES

Location ID	Employment
P1	14
P2	15
P4	18
Total	47
E1	24
Total	24
Grand Total	71

8. PROJECT BENEFITS

The Proposed Project for Quarrying Rough Stone at Thiru. C. Rengaraj aims to produce cumulatively 42,620 m3 Rough Stone over a period of 5 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 formed by the mine management will ensure effective implementation of environment management plan and to ensure compliance of environmental statutory guidelines through Mine Management Level.

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.