

EXECUTIVE SUMMARY

TMT.M. MEENATCHI ROUGH STONE QUARRY

NAME OF PROPOSED PROJECT PROPONENTS APPLYING IN CLUSTER

S.Nos.	Proponent Name	Extent (Ha)
1	Tmt.M. Meenatchi,	1.42.0 ha

B1" CATEGORY – MINOR MINERAL – CLUSTER – NON-FOREST LAN PATTA LAND

*** CLUSTER EXTENT = 16.84.20 Ha**

At

S.F. Nos. 16/2B, 16/3 & 16/4

Achankulam Village, Kallikudi Taluk, Madurai District, Tamil Nadu State

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

ToR Obtained vide

Lr No. SEIAA-TN/F.No.9488/ToR- 1303/2022 Dated: 07.12.2022

Environmental Consultant

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Baseline Monitoring Period - December 2022 to February 2023

Environmental Lab

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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 are the major requirements for construction industry. This EIA report is prepared by considering Cumulative load of all proposed & existing quarries of Tmt.M. Meenatchi, Rough Stone Cluster Quarries consisting of two Proposed and four Existing Quarries with total extent of Cluster of 16.84.20 Ha in Achankulam Village, Kallikudi Taluk, Madurai District and Tamil Nadu State, cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016..

This EIA Report is prepared in compliance with ToR obtained for the below proposals in Table 1.1 and the Baseline Monitoring study has been carried out during the period of December 2022 – February 2023

Proponent applied for Environmental Clearance to SEIAA, Tamil Nadu and obtained

CODE	Name of the proponent	Extent (Ha)	Terms of Reference (ToR)
P1	Tmt.M. Meenatchi	1.42.0	Lr.No.SEIAA-TN/F.No.9488/ToR-1303/2022 Dated: 07.12.2022

for carrying out EIA and EMP studies for the rough stone and gravel quarry.

To carry out the EIA studies and to prepare EIA and EMP studies the proposed & existing quarries Tmt.M. Meenatchi, Rough Stone Cluster Quarries have engaged a consultant M/s. Geo Exploration and Mining Solutions, Salem, Tamil Nadu. The Baseline Monitoring study has been carried out during post monsoon season (Dec 2022 – Feb 2023) considering the provisions of MoEF & CC Office Memorandum Dated: 29.08.2017 and MoEF & CC Notification S.O. 996 (E) Dated: 10.04.2015.

“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

The project proponent is an individual.

1.2 QUARRY DETAILS WITHIN 500 M RADIUS

Description	PROPOSAL – P1
Name of the Project	Tmt.M. Meenatchi, Rough Stone Quarry
S.F. No.	16/2B, 16/3 & 16/4
Extent	1.42.0 Ha
Village Taluk	Achankulam Village, Kallikudi Taluk
District	Madurai District

TABLE 1.3 SALIENT FEATURES OF THE PROPOSAL

SALIENT FEATURES OF PROPOSAL "P1"		
Name of the Mine	Tmt.M. Meenatchi, Rough Stone Quarry Project	
Land Type	It is a Patta land, registered in the name of the applicant Tmt.M.Meenatchi.	
Previous quarry operation details	The quarry lease was previously granted in favour of Thiru.P.Kannan over an extent of 0.85.5 Hectares of Patta land in S.F.No. 16/3 of Achankulam Village, Kallikudi Taluk, Madurai District vide Rc.No.687/2008/Mines, Dated: 03.07.2009 for the period of five years from 21.08.2009 to 20.08.2014 for quarrying of Rough Stone. Now the applicant has applied a quarry lease on 06.06.2016 for the period of five years over an extent of 1.42.0 Ha.	
S.F. Nos	16/2B, 16/3 & 16/4, Achankulam, Kallikudi Taluk, Madurai District.	
Extent	1.42.0 Ha	
Toposheet No	58 K/01	
Latitude	09° 46' 03.67"N to 09° 46' 08.60"N	
Longitude	78° 02' 28.65"E to 78° 02' 35.52"E	
Highest elevation	107m AMSL	
Geological Reserves	Rough Stone	Top Soil
	2,50,411m ³	8,110m ³
Mineable Reserves	Rough Stone	Top Soil
	33,148m ³	2,520m ³
Proposed Quantity of Reserves Level of production	33,148m ³	2,520m ³
Mining Plan Period / Lease Period	5 Years	
Proposed Depth	30m (2m Topsoil + 28m Rough Stone) Bgl	
Existing Pit Dimension	153m(L) x 73m (W) x19m(D)	
Ultimate Pit Dimension	177m(L) x 73m (W) x30m(D)	
Water Level in the surrounds area	The Water table is found at a depth of 70m in summer and at 65m in rainy seasons.	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is a Plain terrain. The area has gentle sloping towards Southeastern side and altitude of the area is 107m (max) above from Mean Sea level. The area is covered by 2m thickness of Topsoil and followed by Massive Charnockite which is clearly inferred from the existing quarry pit.	
Machinery proposed	Jack Hammer	1
	Compressor	1
	Excavator with Bucket and Rock Breaker	1
	Tippers	1
Blasting	Usage of Slurry Explosive with MSD detonators	
Manpower Deployment	12 Nos	
Total Project Cost	Project Cost	Rs. 19,55,000/-
	EMP Cost	Rs. 3,80,000/-
	Total	Rs. 23,35,000/-
CER Cost	Rs.5,00,000/-	
Nearest Habitation	Achankulam 830m-NE	

1.3 STATUTORY DETAILS**Project – P1 – Tmt.M. Meenatchi**

- The proponent applied for Rough Stone Quarry Lease Dated: 06.06.2016.
- The Deputy Director, Department of Geology and Mining, Madurai District and passed a precise area Communication letter vide Rc.No. 276/Mines/2016, Dated: 21.01.2022 for over an extent of 1.42.0 Hectares of patta lands in S.F.Nos. 16/2B, 16/3 & 16/4 of Achankulam Village, Kallikudi Taluk, Madurai District.

- As per the precise area communication letter the **Mining plan was prepared and got approval from the Assistant Director, Department of Geology and Mining, Madurai District** vide Rc.No. 276/Mines/2016, Dated: 14.07.2022
- Proponent applied for ToR for Environmental Clearance vides online Proposal No. SIA/TN/MIN/402043/2022, Dated:03.10.2022
- The proposal was placed in 331^h SEAC meeting held on 24.11.2022 and the committee recommended for issue of ToR.
- The proposal was considered in 576th SEIAA meeting held on 07.12.2022 and issued ToR vide Lr No. SEIAA-TN/F.No.9488/ToR- 1303/2022 Dated: 07.12.2022

1.4 PROJECT DESCRIPTION

The Proposed and Existing Rough Stone Quarry requires Environmental Clearance. There are two proposed and four existing quarries forming a cluster; calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016 and the total extent of cluster is 16.84.20 ha.

As the extent of cluster are more than 5 ha, the proposal falls under B1 Category as per the 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, and requirement for EIA, EMP and Public Consultation for obtaining Environmental Clearance

2.1 SITE CONNECTIVITY TO THE PROJECT AREA

Nearest Roadway	(NH – 38) - Vellore – Thoothukudi road is situated about 6.0km -E (SH – 195) - Madurai - Viradhanur - Valayankulam is about 7.0km -NE (MD-895) – Melakkottai – Paraippathi road– 800m – NE
Nearest Village	Achangulam 830m-NE
Nearest Town	Kallikudi – 10km – SW
Nearest Railway	Thirumangalam – 8.0km – NW
Nearest Airport	Madurai – 9.0km – NE
Seaport	Thoothukudi 113.0 Km - SE

2.2 LAND USE PATTERN OF THE PROPOSED PROJECT

LAND USE PATTERN OF PROJECT – P1		
Description	Present area in (ha)	Area at the end of life of quarry (Ha)
Area under Quarrying	0.62.0	0.73.0
Infrastructure	Nil	0.1.0
Roads	0.01.0	0.02.0
Green Belt	Nil	0.25.0
Un – utilized area	0.79.0	0.41.0
Grand Total	1.42.0	1.42.0

2.3 OPERATIONAL DETAILS OF LEASE APPLIED AREA

OPERATIONAL DETAILS FOR PROJECT – P1		
PARTICULARS	DETAILS	
	Rough Stone (m³) (5Year Plan period)	Topsoil (m³) (1Years Plan per iod)
Geological Resources	2,50,411m ³	8,110m ³
Mineable Reserves	33,148m ³	2,520m ³
Production for first five-year plan period as per ToR	33,148m ³	2,520m ³
Production per day	22	8.4
No of Lorry loads (6m ³ per load)	4	1
Number of Working Days	300 Days	
Total Depth of Mining	30m (2m Topsoil +28m Rough stone)	

FIGURE – 1: GOOGLE IMAGE SHOWING PROJECT AREA -P1



FIGURE – 2: TOPOSHEET MAP COVERING 10 KM RADIUS

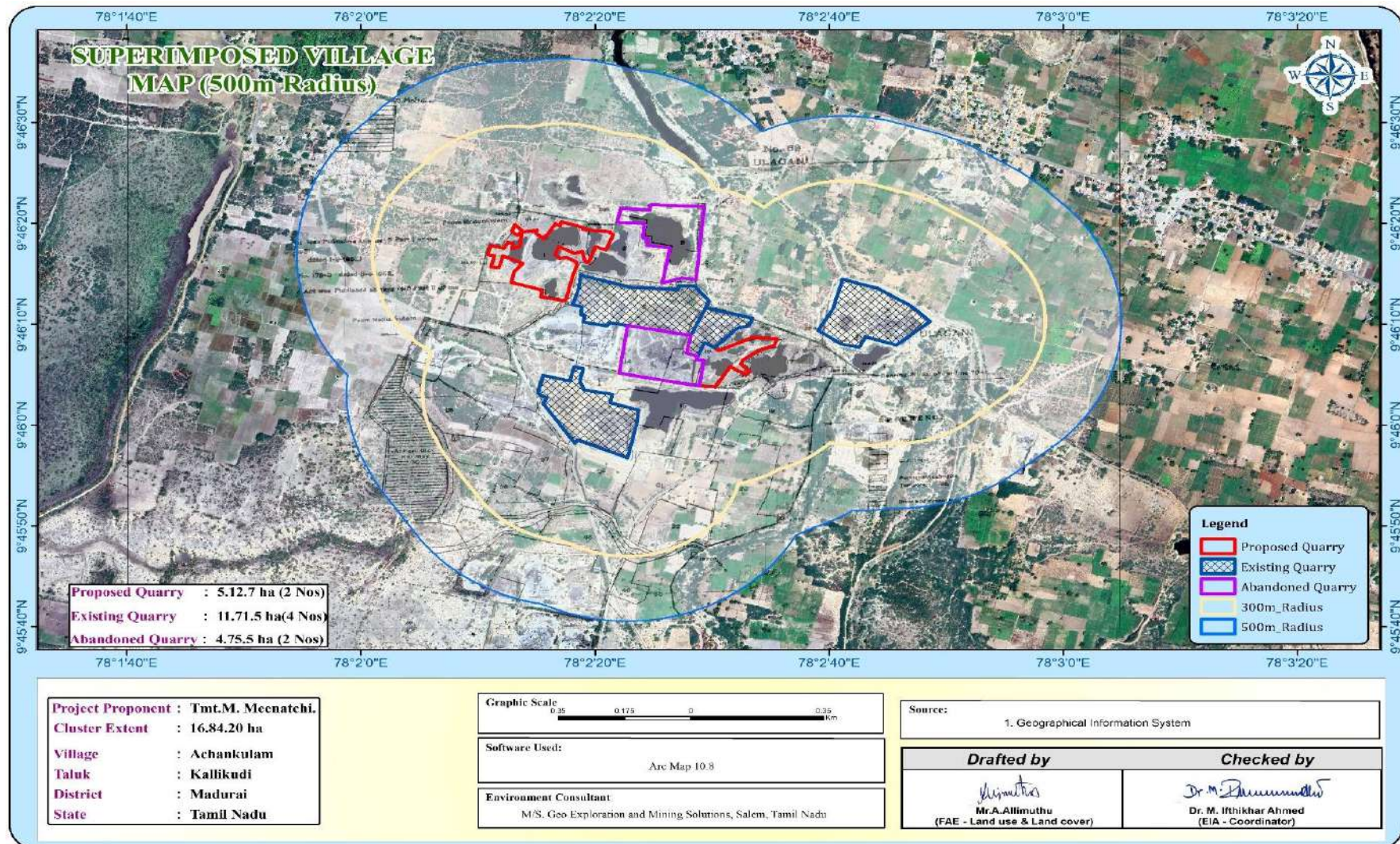


FIGURE – 3: DIGITIZED MAP OF THE STUDY AREA (10 KM RADIUS FROM PROJECT SITE)

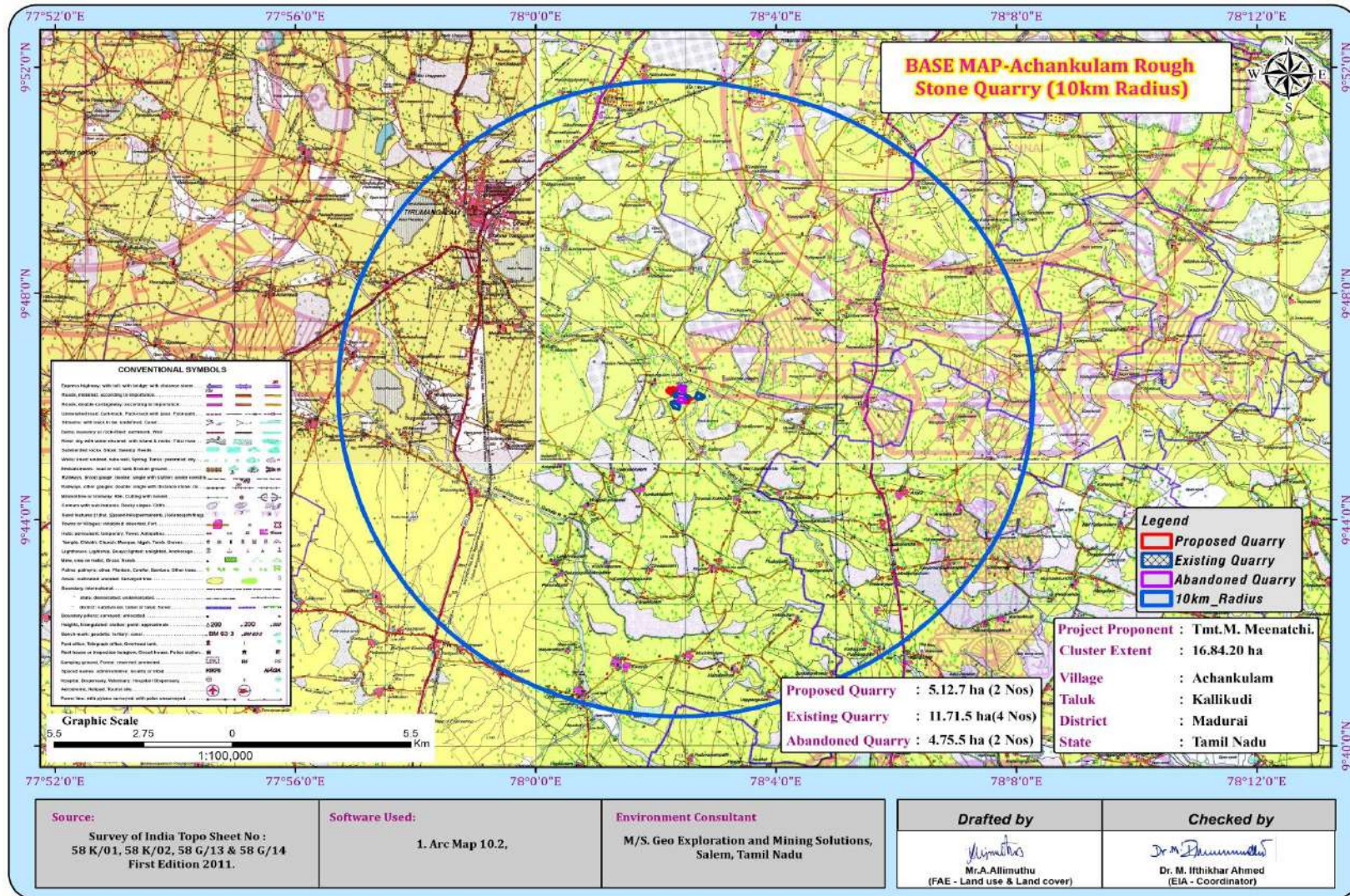
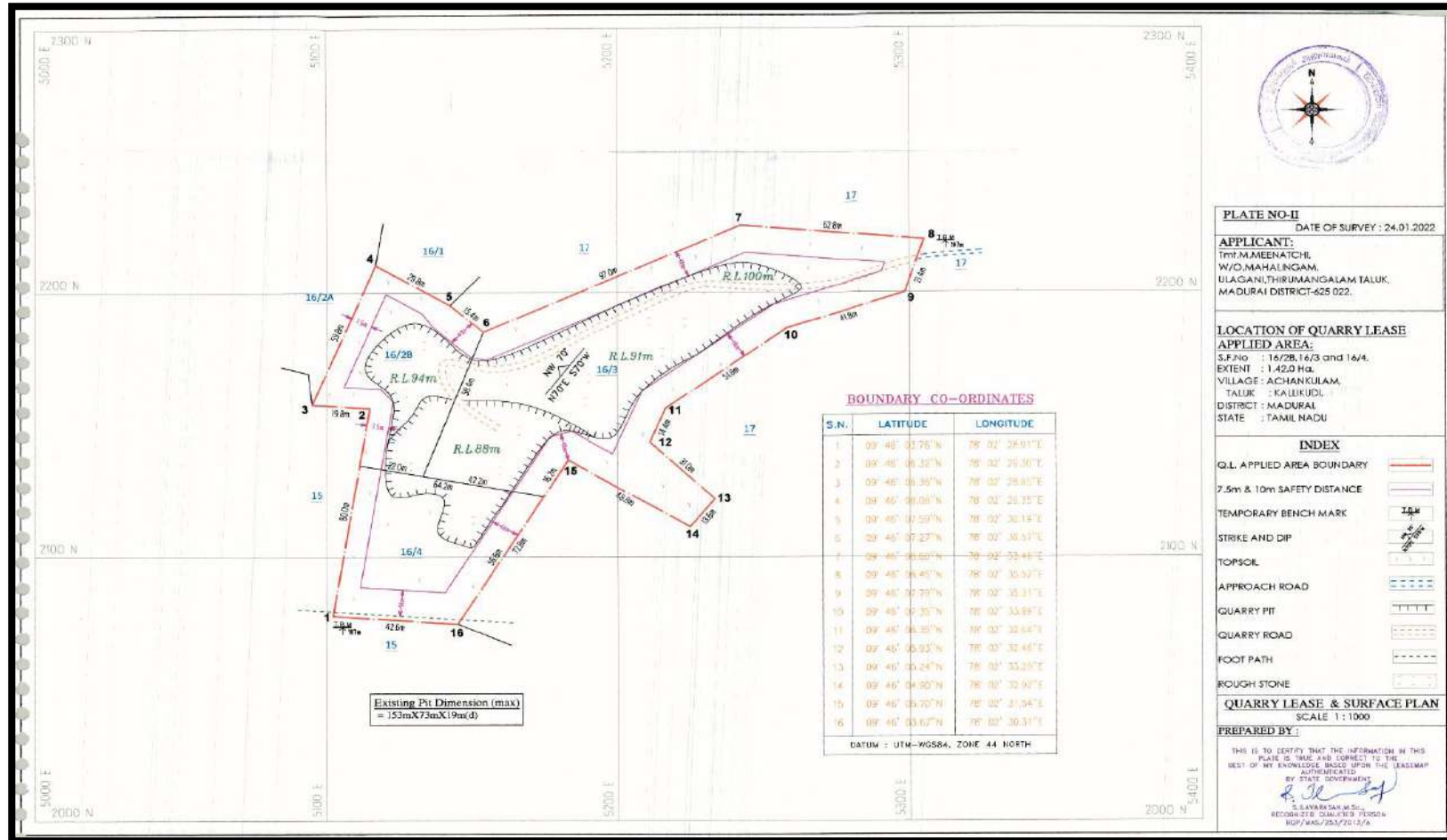


FIGURE – 4: QUARRY LEASE PLAN & SURFACE PLAN



2.4 METHOD OF MINING

The method of mining is common for all the proposed projects – 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 top layer of overburden (Gravel) will be Excavate directly by Hydraulic Excavators and loaded into tippers directly and sold to needy customers. 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

PROPOSAL – P1				
S.NO.	TYPE	NOS	SIZE/CAPACITY	MOTIVE POWER
1	Jack hammers	1	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) (m)
I	177	73	30

3.0 DESCRIPTION OF THE ENVIRONMENT

This chapter presents a regional background to the baseline data at the very onset, which will help in better appreciation of micro-level field data, generated on several environmental and ecological attributes of the study area. 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 Dec2022, Jan & Feb 2023 with CPCB guidelines. Environmental data has been collected with reference to cluster quarries by **Ehs 360 Labs Private Limited** private Limited– Approved by AAI, AGMARK, APEDA, BIS, [IC, FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD, for the below attributes-

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'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 (Dec 2022 – Feb 2023)	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 (1core & 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
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.

Source: On-site monitoring/sampling by Ehs 360 Labs Private Limited in association with GEMS

* All monitoring and testing are been carried out as per the Guidelines of CPCB and MoEF & CC.

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	594.67	1.74
2	RURAL	259.77	0.76
3	MINING	89.12	0.26
AGRICULTURAL LAND			
4	CROP LAND	19379.66	56.55
5	PLANTATION	382.46	1.12
6	FALLOW LAND	7007.72	20.45
BARREN LAND/WASTELANDS			
7	SCRUB LAND	1199.92	3.50
8	SALT AFFECTED LAND	65.06	0.19
9	BARREN ROCKY	620.12	1.81
WETLANDS/ WATER BODIES			
11	WATER BODIES/LAKE/RIVER	4670.61	13.63
TOTAL		34269.11	100.00

Interpretation & Conclusion

- ∞ The 10 km radius study area mainly comprises of crop land & Agriculture Plantation land accounting of 56.55% & 1.12% of the total study area. The study area also consists of fallow land of 20.45%.
- ∞ The buffer zone studied has no ecological sensitive area (National Park, Wildlife Sanctuary, Biosphere Reserve/ etc.).
- ∞ Water Bodies such as ponds/ lakes comprises of 14% of the total buffer area. The two seasonal rivers such as Gundra river at 5.2Km in SW direction, Terku Aaru stream 40m in NE and Canal at 270m in SE direction of the total study area.
- ∞ The Scrub land accounts of 3.50%. and Salt affected land is accounts of 0.19% As per the primary survey, it was observed the scrub land is mainly occupied by the stony waste and left-over domestic waste generated by the nearby areas.
- ∞ 0.26% of the total study area is occupied by the mine industries of captive mines. The area occupied by Mainly Roughstone and Topsoil of the total buffer area. As also observed within the primary survey, the 10 km buffer area is also occupied by the medium scaled granite and marble and small Brick kiln industries also located in the study area.
- ∞ 2.50% of the area is covered under the human Settlement. The nearest village within the 3 km radius from the project site boundary is observed to be villages Achangulam, Nedungulam, Chinna ulagani, Valayankulam etc.,

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. The standard classification of soil and physico-chemical characteristics of the soils are presented below in Table 3.6 & Test Results in Table 3.7

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 to Sandy Soil and Bulk Density of Soils in the study area varied between 1.07– 1.41 g/cc. The Water Holding Capacity of the soil samples ranging from 40.4 – 45.9% and Porosity of the soil is found to be medium i.e ranging from 41.7 – 46.8%.

Chemical Characteristics –

- The nature of soil is slightly alkaline to strongly alkaline in nature with pH range 7.08 to 8.46
- The available Nitrogen content range between 292 to 365mg/kg
- The available Phosphorus content range between 1.21 to 2.09mg/kg
- The available Potassium range between 29.7 to 39.8 mg/kg

Whereas, the micronutrient as zinc (Zn), iron (Fe) and copper (Cu) were found in the range of 1.16 to 2.45 mg/kg; 1.98 to 3.03 mg/kg and cobber is (BDL).

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

Surface Water

The pH of surface 8.06-8.21 while turbidity found within the standards. Total Dissolved Solids 596- 757mg/l and Chloride 169.4 – 186.7 mg/l. Nitrates 12.3 – 14.3 mg/l, while sulphates 68.2 – 72.6mg/l.

Ground Water

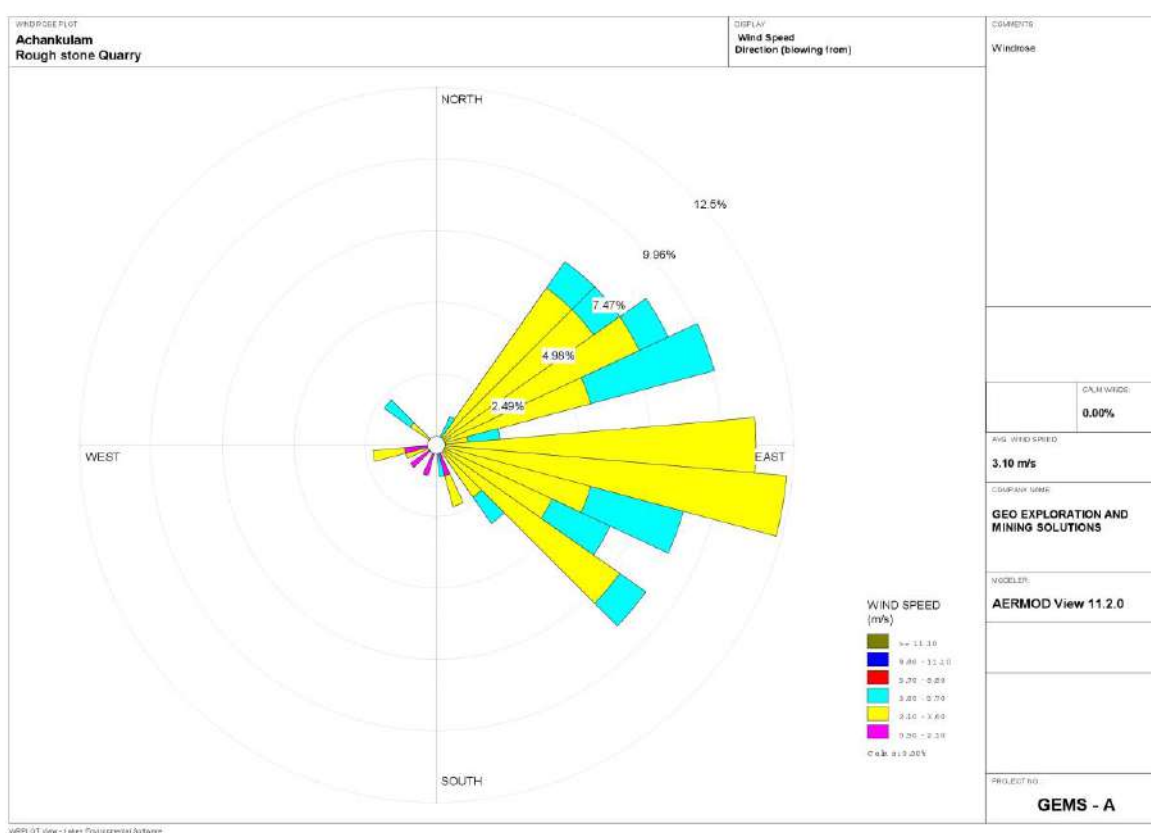
The pH of the water samples collected ranged from 7.47 to 7.92 and within the acceptable limit of 6.5 to 8.5. pH, Sulphates and Chlorides of water samples from all the sources are within the limits as per the Standard. on Turbidity, the water samples meet the requirement. The Total Dissolved Solids were found in the range of 490 – 594 mg/l in all samples. The Total hardness varied between 175.4 – 220.3 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 35.3 µg/m³ to 48.2 µg/m³, PM_{2.5} data ranges from 20 µg/m³ to 25.5 µg/m³, SO₂ ranges from 5.0 µg/m³ to 8.8 µg/m³ and NO₂ data ranges from 19.1 µg/m³ to 27.3 µg/m³. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB.

3.7 NOISE ENVIRONMENT

Ambient noise levels were measured at 8 (eight) locations around the project area considering cluster quarries. Noise levels recorded in core zone during day time were from 34.2 – 47.4 dB (A) Leq and during night time were from 30.2 – 38.6 (A) Leq. Noise levels recorded in

buffer zone during day time were from 30.2 – 47.2 dB (A) Leq and during night time were from 25.1– 42.1 dB (A) Leq.

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

Based on the data, following inferences could be drawn:

- Total literacy rate in the study area is 74%.
- The study area had average educational facilities. The overall status depicts that the education is limited to primary and middle level.
- The schedule tribe community forms 0.03% and Scheduled Caste forms 17% of the total population of study area.
- The Other Population forms 80% of the total population of study area.
- The study area is well connected by NH/SH/Village Road.
- The study area not well health facilities of primary level.
- Gounda River, Lake, Pond - 5.7km-SW from mine lease boundary this river dry. from mine lease boundary this river dry
- Considering the above facts, the proposed project will boost the socio-economic development activities in the area and hence will leave positive impact.
- The study area has mobile connectivity.

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

The top layer of the project site in the form of Gravel formation, the Gravel will be directly loaded into tippers for the filling and levelling of low-lying areas. There is no disposal of Gravel. The excavated rough stone will be directly loaded into dumpers to the needy customers.

There will be no disposal of waste water from the quarry operation, No discharge of toxic effluent from the proposed projects. The dust emission at working face and haul roads will be controlled by water sprinkling and plantation.

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

4.3 WATER ENVIRONMENT

ANTICIPATED IMPACT

The impact due to quarrying on the water quality is expected to be insignificant because of no use of chemicals or hazardous substances during quarrying process. The quarrying activity will not intersect ground water table as the maximum depth of the quarry in the cluster is 30m and water table is found at a depth of 70-65m BGL The quarrying operation will be carried out well above the water table. There is no intersection of surface water bodies (Streams, Canal, Odai etc.,) in the project area. During rainy season rain water will be collected in the quarry pit and later used for greenbelt development and for the water sprinkling in the haul roads. There is no proposal for discharging of quarry pit water outside the project area.

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.

4.4 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

4.5 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 in Table 4-8..

MITIGATION MEASURES

- The following noise mitigation measures are proposed for control of Noise.
- Time intervals for each quarry during blasting.
- Use of personal protective devices i.e., earmuffs and earplugs by workers, who are working in high noise generating areas.
- Limiting time exposure of workers to excessive noise.
- Proper and regular maintenance of vehicles, machinery and other equipment's.
- The noise generated by the machinery will be reduced by proper lubrication of the machinery and other equipment's.
- Speed of trucks entering or leaving the quarry will be limited to moderate speed to prevent undue noise from empty vehicles...
- Noise levels will be controlled by using optimum explosive charge, proper delay detonators and proper stemming to prevent blow out of holes (occasionally).
- Providing proper noise proof enclosure for the workers separated from the noise source and noise prone equipment.
- Provision of Quiet areas, where employees can get relief from workplace noise.
- The development of green belts around the periphery of the quarry site to attenuate noise.
- Regular medical check-up and proper training to personnel to create awareness about adverse noise level effects.

4.6 BIOLOGICAL ENVIRONMENT

ANTICIPATED IMPACT

1. There are no impacts on the nearby agricultural land due to this mining activity.
2. None of the plants will be cut during the operational phase of the mine.

3. 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.

4. 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

agroclimatic zone and soil characteristics in a place that will make the area cooler, reduce air pollution, prevent soil erosion, and further improve the soil fertility status. A green belt around the periphery of the boundary and roadside will be created to avoid erosion of soil, prevention of landslides, and minimize air pollution and noise pollution in the project area. Green plants are capable of absorbing air pollutants and forming sinks for pollutants. Leaves with their vast area in a tree crown, absorb pollutants on their surface, effectively reducing their concentration and noise level in the ambient.

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

PROPOSAL FOR P1 – Tmt.M. Meenatchi,				
Year	No. of trees proposed to be planted	Survial %	Area to be planted	Name of the species
I	It is proposed to plant 300 Nos of trees in the 1 st year	80%	Safety barrier, Un utilized areas and nearby village roads	Neem, Pongamia pinnata, Casuarina, etc

4.7 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.

Table 4.6.3 Impact Evaluation Impact evaluation is given in table below.

Impact Evaluation Element	Impact on socio economics due to the applied for Achankulam Rough Stone cluster quarry over an extent of 16.84.20 ha of Patta lands of Achankulam Village, Kallikudi Taluk, Madurai District, Tamil Nadu State.			
Potential Effect/ Concern	Proposed project will provide direct & indirect employment opportunities to the local residents, which will help to increase their earning and better living standard as well as further up-liftment of socio-economic status of the area.			
Characteristics of Impacts				
Nature	Positive		Negative	Netural
	✓			
Type	Direct	Indirect	Cumulative	
			✓	
Extent	Project area	Local	Zonal	Regional
		✓		
Duration	Short time		Long term	
			✓	

Intensity	Low		Medium	High
			✓	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C)
			✓	
Significance of Impact				
Significance	Insignificant	Minor	Moderate	Major
			✓	

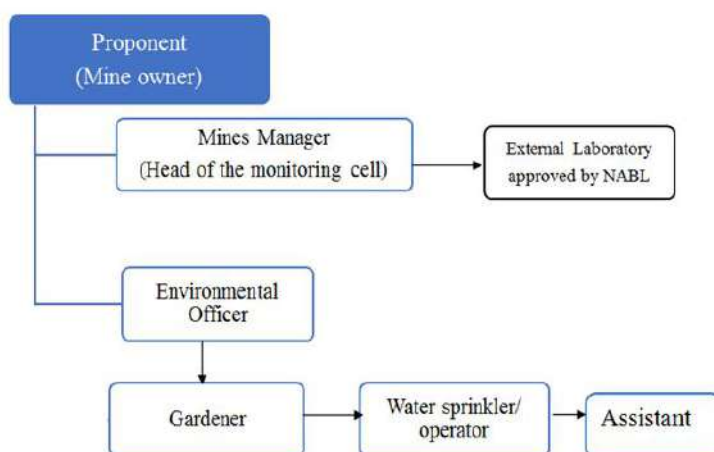
5. ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

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

6. ENVIRONMENT MONITORING PROGRAM

- ☞ Environmental Monitoring will be taken up for various environmental components as per conditions stipulated in Environmental Clearance Letter issued by MoEF & Consent to Operate issued by the State Pollution Control Board. Monitoring reports will be submitted to regulator as per statutory requirements. The entire monitoring work will be carried out by MoEF & CC / NABL recognized laboratories.
- ☞ The monitoring and evaluation of environmental parameters indicates potential changes occurring in the environment, which paves way for implementation of rectifying measures wherever required to maintain the status of the natural environment. Evaluation is also a very effective tool to judge the effectiveness or deficiency of the measures adopted and provides insight for future corrections.

6.1 ENVIRONMENTAL MONITORING CELL



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6.2 PROPOSED MONITORING SCHEDULE POST EC FOR P1

Sl No.	Recommendations	Time Period	Schedule
1	Land Environment Control Measures	Before commissioning of the project	Immediately after the commencement of the project
2	Soil Quality Control Measures	Before commissioning of the project	Immediately after the commencement of the project
3	Water Pollution Control Measures	Before commissioning of the project and along with mining operation	Immediately and as project progress
4	Air Pollution Control Measures	Before commissioning of the project and along with mining operation	Immediately and as project progress
5	Noise Pollution Control Measures	Before commissioning of the project and along with mining operation	Immediately and as project progress
6	Ecological Environment	Phase wise implementation every year along with mine operations	Immediately and as project progress

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 time table are recorded along with pinpointed responsibilities.

The cluster 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. 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 has 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.

In case a disaster takes place, despite preventive actions, disaster management will have to be done in line with the descriptions below..

7.3 CUMULATIVE IMPACT STUDY

CUMULATIVE PRODUCTION LOAD OF ROUGH STONE IN CLUSTER

Quarry	Proposed Production m ³	Per Year Production in m ³	Per Day Production in m ³	Number of Lorry Load Per Day @ 6m ³ per load
P1	33,148	6,630	22	4 Trips /Day
P2	3,03,577	60,715	202	34 Trips /Day
Total	3,36,724	67,345	224	38 Trips /Day
E4	5,47,795	1,09,559	365	61 Trips /Day
Total	5,47,795	1,09,559	365	61 Trips /Day
Grant Total	8,84,519	1,76,904	589	99Trips /Day

CUMULATIVE PRODUCTION LOAD OF TOPSOIL/GRAVEL IN CLUSTER

Quarry	Mineable Reserves in m ³	Per Year Production in m ³	Per Day in m ³	Number of Lorry Load @ 6m ³ per load
P1	2,520	2520	8	1Trips /day
P2	8,282	4141	14	2Trips /day
TOTAL	10,802	6,661	22	3Trips/ day
E1	-	-	-	-
E2	-	-	-	-
E3				
E4	63,798	31,899	106	18 Trips/ day
Total	63,798	31,899	106	18 Trips/ day
Grand total	1,23,366	41,122	137	12 Trips/ day

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)
N1	42.6	46.1	47.7	Residential Day Time- 55 dB (A) Night Time- 45 dB (A)
N2	41.9	38.5	43.5	
N3	39.2	29.0	39.6	
N4	38.4	27.4	38.7	
N5	37.1	24.1	37.3	
N6	41.4	28.5	41.6	
N7	36.1	27.6	36.7	
N8	37.8	29.2	38.4	

SOCIO ECONOMIC BENEFITS

Location Code	Employment	Project Cost (Rs)	CER Cost
P1	12	Rs. 19,55,000/-	Rs.5,00,000/-

P2	32	Rs. 49,07,000/-	Rs.5,00,000/-
Total	44	Rs. 68,62,000/-	Rs. 10,00,000/-

A total of 44 people will get employment due to 2 mines in cluster and already employed at existing mines are 16 Nos. Allocation for Corporate Environment Responsibility (CER) shall be made as per Government of India, MoEF & CC Office Memorandum F.No.22-65/2017-IA.III, Dated: 01.05.2018 by all the mines.

8. PROJECT BENEFITS

The Proposed and Existing Projects for Quarrying Rough Stone at Achankulam Village aims to produce cumulatively 33,148m³ of Rough Stone over a period of 5 years & 2,520m³ of Topsoil 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.