

EXECUTIVE SUMMARY

FOR OBTAINING

**Environmental Clearance under EIA Notification – 2006
Schedule Sl. No. 1 (a) (i): Mining Project**

“B1” CATEGORY (Cluster) – MINOR MINERAL – CLUSTER –

PATTA LAND - FRESH QUARRY

THIRU. D. SHANMUGAM ROUGH STONE AND GRAVEL QUARRY

CLUSTER EXTENT – 9.06.5 Ha

(2 Proposed Quarries+ 2 Existing Quarries)

PROJECT PROPONENT

Proponent Name	Project Location
Thiru. D. Shanmugam S/o. D. Durai, No. 11, Kulakkarai Street, Kilarungunam Village, Marakkanam Taluk, Viluppuram District – 604 301	Extent: 1.76.5 ha S.F. Nos: 27/4 & 27/5 Nalmukkal Village, Marakkanam Taluk, Viluppuram District

Complied as per ToR obtained

File No.11637 TOR Identification No. TO24B0108TN5849832N Dated: 03.03.2025

Environmental Consultant

GEO EXPLORATION AND MINING SOLUTIONS



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

EHS 360 LABS PRIVATE LIMITED,

NABL Accredited laboratory

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

Baseline Monitoring Period: December 2024 to February 2025

MAY 2025

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

1. INTRODUCTION

The project proponent Thiru.D.Shanmugam has applied for Rough stone and Gravel quarry over an extent of 1.76.5 Ha in S.F.Nos. 27/4 & 27/5 Nalmukkal Village, Marakkanam Taluk & Villupuram District.

- Proponent applied for Rough stone and Gravel quarry lease on 20.03.2024
- Precise area communication letter was issued by the Assistant Director vide Rc.No.B/G&M/134/2024, Dated: 07.08.2024.
- The Mining plan has been prepared by the Qualified person and got approval vide Letter Rc.No.B/G&M/134/2024 Dated: 14.08.2024.
- 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/515556/2024 dated 24.12.2024
- The proposal was placed in 532nd SEAC meeting held on 13.02.2025 and the committee recommended for issue of ToR.
- The proposal was considered in 798th Authority meeting held on 26.02.2025, issued ToR vide **File No.11637. TOR Identification No TO24B0108TN5849832N, dated: 03.03.2025**
- As per the EIA Notification, 2006 and subsequent amendments and OM The proposal falls in the B1 Category (Cluster quarries – 2 proposals, 2 Existing quarries forming Cluster Category {Total Extent of the Cluster is 9.06.5 Ha}- Cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016).

Based on the ToR Baseline Monitoring study has been carried out for one season (Pre Monsoon) i.e., Dec 2024 to Feb 2025. and this EIA and EMP report is prepared for considering cumulative impacts arising out of these projects, the Cumulative Environmental Impact Assessment study is undertaken, which is followed by preparation of a detailed Environmental Management Plan (EMP) to minimize those adverse impacts.

1.1 DETAILS OF PROJECT PROPONENT –

Name of the Project Proponent	Thiru.D.Shanmugam Rough Stone and Gravel Quarry
Address	S/o. D. Durai, No. 11, Kulakkarai Street, Kilarungunam Village, Marakkanam Taluk, Viluppuram District – 604 301.
Mobile	+91 87542 22919
Email	Shanmugam.add@gmail.com
Status	Individual

Source: Approved Mining Plan

1.2 QUARRY DETAILS WITHIN 500 M RADIUS

PROPOSED QUARRIES					
Code	Name of the Owner	Village	S.F. Nos	Extent in Ha	Status
P1	Thiru.D.Shanmugam S/o. D. Durai, No. 11, Kulakkarai Street, Kilarungunam Village, Marakkanam Taluk, Viluppuram District – 604 301	Nalmukkal	27/4 & 27/5	1.76.5	File No.11637 TOR Identification No. TO24B0108TN5849832N Dated: 03.03.2025.
P2	Thiru.V.Nagarajan	Nalmukkal	34/1B1, 35/2B, 35/3, 35/4	4.75.0	Application in Process
TOTAL EXTENT				6.51.5	
EXISTING QUARRIES					
Code	Name of the Owner	Village	S.F. Nos	Extent in Ha	Status
E-1	Thiru.V.Ravichandran	Nalmukkal	26/1B1,27/3A & 27/3B	1.35.0	29.12.2022 to 28.12.2027
E-2	D.Durai	Nalmukkal	27/6, 27/7, 27/8	1.20.0	06.12.2022 to 05.12.2027
TOTAL EXTENT				2.55.0	
ABANDONED / EXPIRED QUARRIES					
Code	Name of the Owner	Village	S.F. Nos	Extent in Ha	Status
A-1	A.Sivananthan	Nalmukkal	28/3	1.64.0	-
A-2	V.Ravichandran	Nalmukkal	26/1A,26/1B1, 26/2A,27/3B,2 8/1B	3.17.5	-
A-3	V.Ravi	Nalmukkal	26/3	0.37.5	-
A-4	P.Gopi	Nalmukkal	26/4	0.98.0	-
TOTAL EXTENT				6.17.0	
TOTAL CLUSTER EXTENT				9.06.5 Ha	

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

1.2 SALIENT FEATURES OF THE PROPOSAL

DESCRIPTION OF THE PROJECT

Name of the Project	Thiru.D.Shanmugam Rough Stone and Gravel Quarry
S.F. No.	27/4 & 27/5
Extent	1.76.5 ha
Village,Taluk and District	Nalmukkal Village, Marakkanam Taluk, Viluppuram District.
Land Type	It is a patta land registered in the name of applicant Thiru.D.Shanmugam vide patta No.924
Toposheet No	57 P/16
Latitude between	12° 13' 11.6217"N to 12° 13' 18.8071"N

Longitude between	79° 45' 53.7466"E to 79° 46' 00.2482"E	
Elevation of the area	72m AMSL	
Lease period	10 Years	
Mining Plan period	10 years	
Proposed Depth of Mining	25m bgl	
Geological Resources	Rough Stone in m ³	Gravel m ³
	6,17,750	35,300
Mineable Reserves	151259	24648
Year wise Production for 1 st five years	77478	24648
Year wise Production for 2 nd five years	73781	-
Peak Production	21520	8826
Ultimate Pit Dimension	XY-AB-52m (L) x 87m (W) x 20m(D) bgl XY-CD-66m (L) x 52m (W) x 25m(D) bgl X1Y1-AB-39m (L) x 112m (W) x 15m(D) bgl	
Water Level in the region	50-55 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and Controlled blasting using Slurry Explosives	
Topography	The lease applied area is flat terrain. The area has gentle sloping towards North eastern side and altitude of the area is 72m above from Mean Sea level. The area is covered by 2m thickness of Gravel and followed by Massive Charnockite which is clearly inferred from the surface outcrops & nearby existing quarry pit.	
Machinery proposed	Hand Jack Hammer	3 Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	1 No
	Tippers	2 Nos
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	21 Nos	
Project Cost	Rs. 58,33,000/-	
EMP Cost	Rs.7,60,000/-	
Total Project cost	Rs. 65,93,000/-	
CER Cost	Rs. 5,00,000/-	
Nearby Water Bodies	Nalmukkal Eri	250m South
	Odai	480m SW
	Kunnapakkam Lake	870m NE
	Budderi	880m NW
	Ariyanthangal Eri	1.3km SE
	Perumukkal Eri	2.3km SW
Greenbelt Development Plan	Proposed to plant 900 Nos of trees considering 500 Nos of trees/ Ha criteria The plantation will be developed around the project site and nearby village roads	
Proposed Water Requirement	1.6 KLD	
Nearest Habitation	700m – South West	
Nearest Reserve Forest	Kilisevur R.F. – 3.70 km – North West (Source – DFO Letter)	
Nearest Wild Life Sanctuary	Oussudu Lake Birds Sanctuary -27.31km-South	

Source: Approved Mining Plan

1.3 STATUTORY DETAILS

SCREENING:

- Proponent applied for Rough stone and Gravel quarry lease on 20.03.2024
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- The Mining plan has been prepared by the Qualified person and got approval vide Letter Rc.No.B/G&M/134/2024 Dated: 14.08.2024.
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SCOPING:

- The proposal was placed in 532nd SEAC meeting held on 13.02.2025 and the committee recommended for issue of ToR.
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2. PROJECT DESCRIPTION

The proposed projects are 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 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 - 32 – Puducherry to Chennai-9 km -NW SH – 134 – Thindivanam to Marakkanam-2km- South
Nearest Village	Nalmukkal – 1.43km- SE
Nearest Town	Thindivanam– 12.5.0km- West
Nearest Railway Station	Thindivanam– 12.5km-West
Nearest Airport	Puducherry– 28.5km – SE
Seaport	Chennai – 111.0km – NE

Source: Survey of India Toposheet

2.2 LAND USE PATTERN OF THE LEASE APPLIED AREA

Description	Present area (Ha)	Area required during first five years (Ha)	Area at the end of the lease period (Ha)
Area Under Quarrying	Nil	1.26.20	1.26.20
Infrastructure	Nil	0.02.00	0.02.00
Roads	Nil	0.02.00	0.02.00
Green Belt	Nil	0.21.90	0.46.30
Unutilized Area	1.76.50	0.24.40	Nil
Grand Total	1.76.50	1.76.50	1.76.50

Source: Approved Mining Plans of Proposal

2.3 OPERATIONAL DETAILS OF LEASE APPLIED AREA

PARTICULARS	DETAILS	
	Rough Stone in m ³	Gravel in m ³
Geological Resources	617750	35300
Mineable Reserves	151259	24648
Production for 1 st five-year plan period	77478	24648
Production for 2 nd five-year plan period	73781	-
Peak Production	21520	8826
Mining Plan Period / Lease Applied Period	5 Years	
Number of Working Days	300 Days	
Production per day	50	27
No of Lorry loads (12m ³ per load)	4	2
Total Depth of Mining	25m below ground level.	

Source: proposed mining plan

2.4 OPERATIONAL DETAILS OF LEASE APPLIED AREA

YEAR	ROUGH STONE (m ³)	GRAVEL (m ³)
I	11630	8256
II	11760	8826
III	11568	7566
IV	21000	-
V	21520	-
VI	16911	-
VII	16910	-
VIII	18565	-
IX	14630	-
X	6765	-
TOTAL	1,51,259	24,648

Source: proposed mining plan

FIGURE – 1: GOOGLE IMAGE OF THE PROJECT AREA



Source: Google Earth Imagery

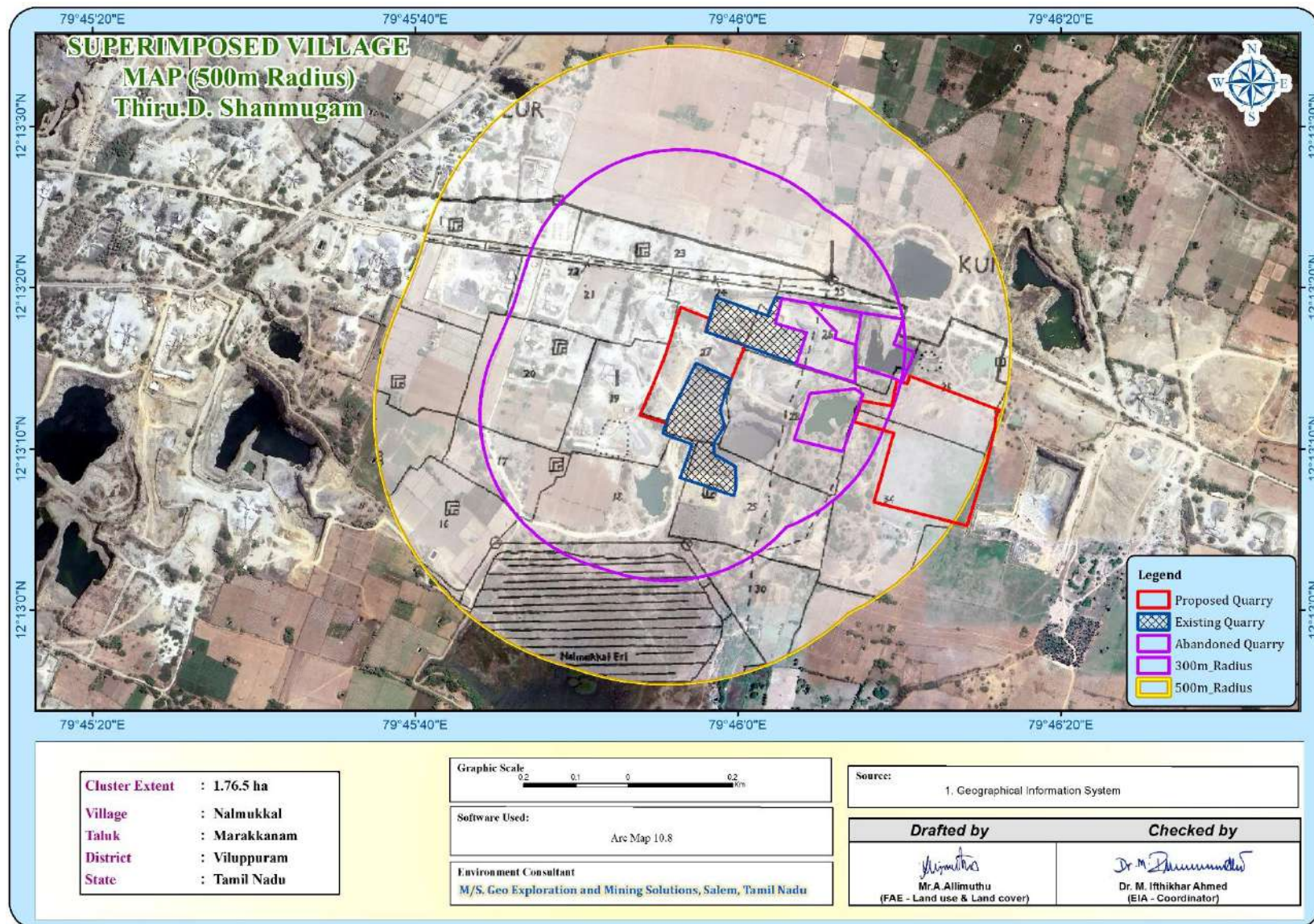
FIGURE – 2: VILLAGE MAP SUPERIMPOSED ON GOOGLE EARTH IMAGE

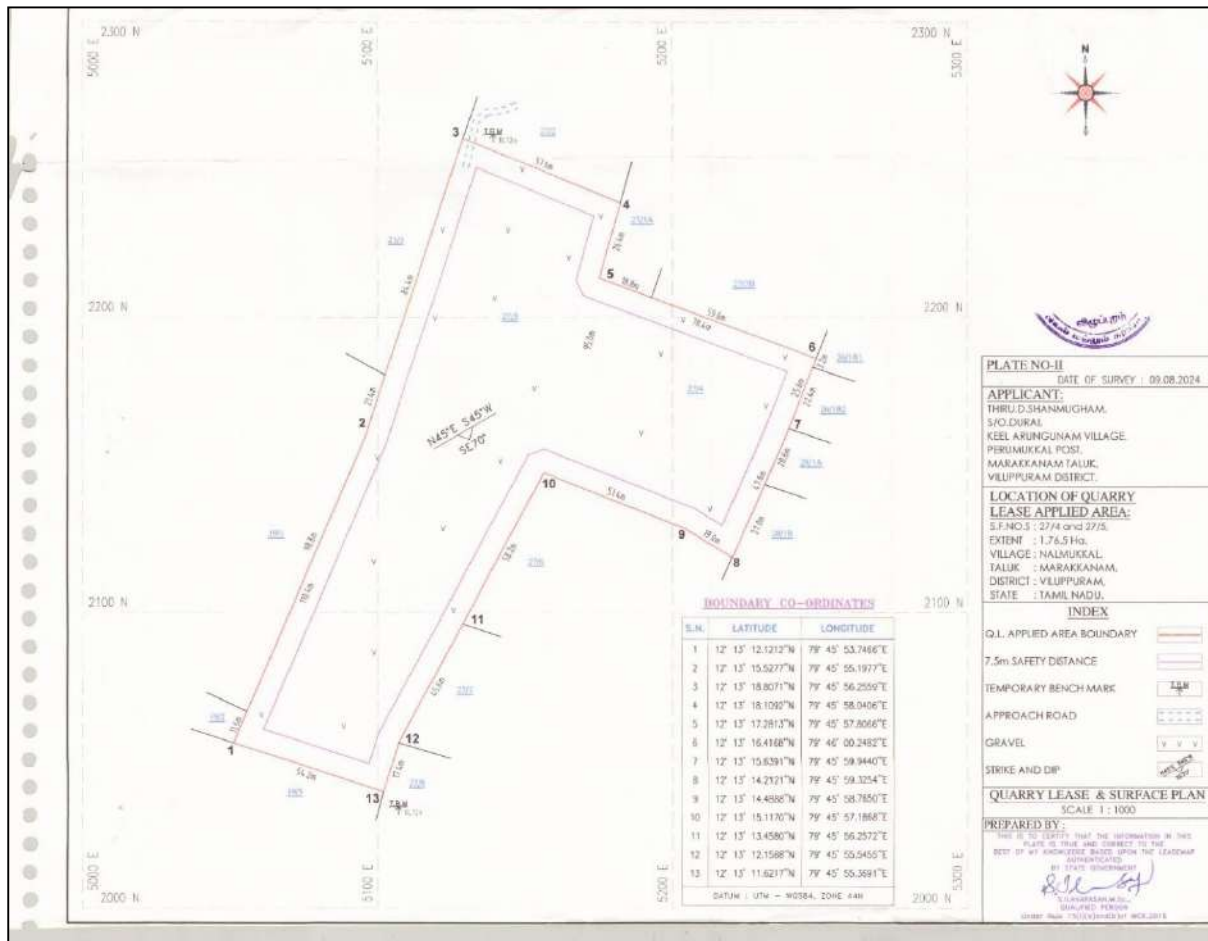
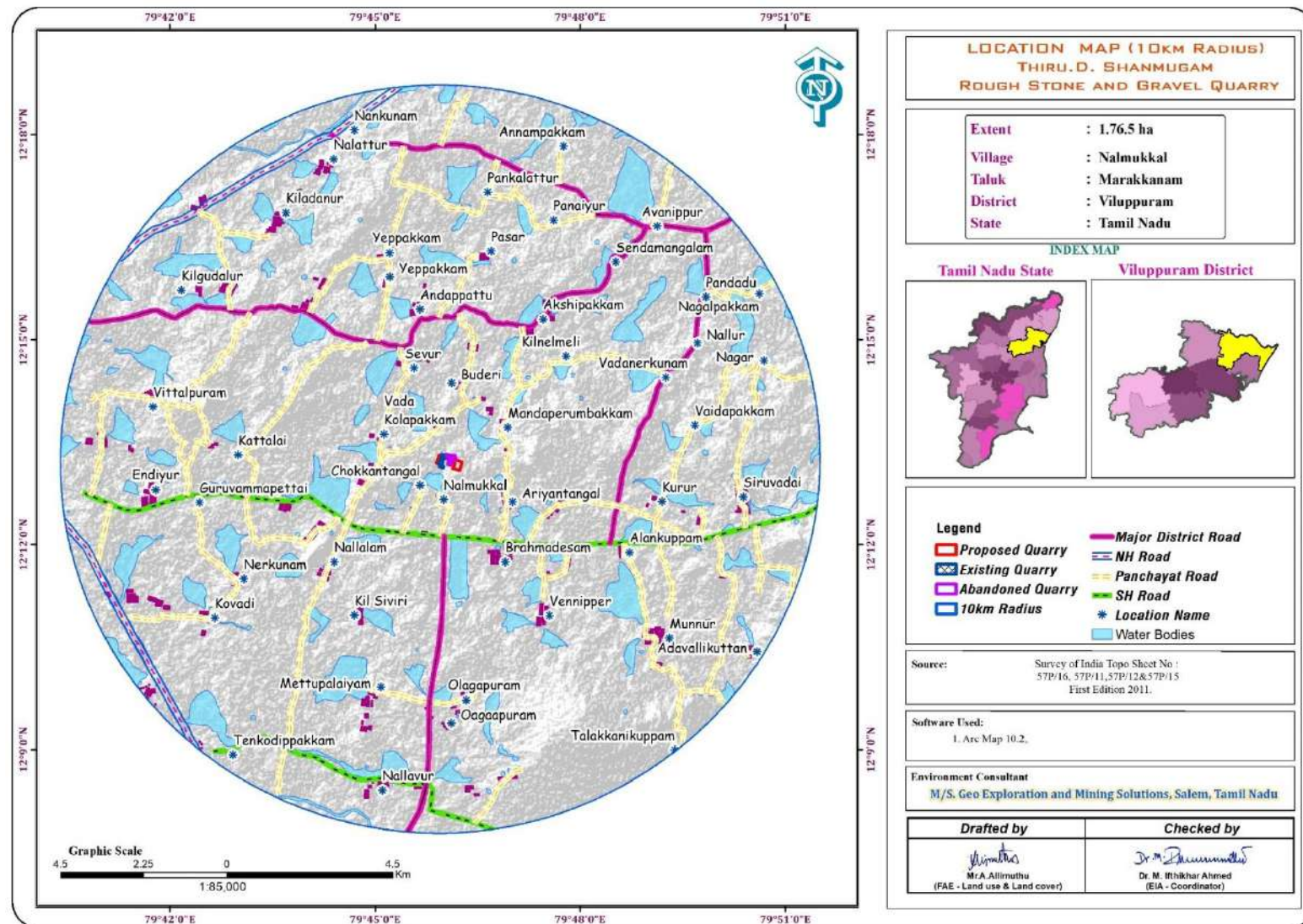
FIGURE 3: QUARRY LEASE PLAN / SURFACE PLAN

FIGURE – 4: IMAGE SHOWING SURFACE FEATURES AROUND 10 KM RADIUS

2.5 METHOD OF MINING

Proposed 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 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.

2.6 PROPOSED MACHINERY DEPLOYMENT

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

Source: Approved Mining Plan

2.7 CONCEPTUAL MINING PLAN/ FINAL MINE CLOSURE PLAN

- ✚ At the end of life of mine, the excavated mine pit / void will act as artificial reservoir for collecting rain water and helps to meet out the demand or crises during drought season.
- ✚ After mine closure the greenbelt developed along the safety barrier and top benches and temporary water reservoir will enhance the ecosystem
- ✚ Mine Closure is a process of returning a disturbed site to its natural state or which prepares it for other productive uses that prevents or minimizes any adverse effects on the environment or threats to human health and safety.
- ✚ The principal closure objectives are for rehabilitated mines to be physically safe to humans and animals, geo-technically stable, geo-chemically non-polluting/ non-contaminating, and capable of sustaining an agreed post-mining land use.

3. DESCRIPTION OF THE ENVIRONMENT

Field monitoring studies to evaluate the base line status of the project site were carried out during December 2024 to February 2025 as per CPCB guidelines. Environmental Monitoring data has been collected with reference to proposed mine by EHS 360 Lab Private Limited.

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 (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	PM10 PM2.5 SO2 NOX Fugitive Dust	24 hourly twice a week (December 2024 – February 2025)	7 (2 core & 5 buffer)	IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB
*Noise Levels	Ambient Noise	Hourly observation for 24 Hours per location	7 (2 core & 5 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.

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

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

3.2 LAND ENVIRONMENT

S. No	CLASSIFICATION	AREA in HA	AREA in %
BUILTUP			
1	Urban	35.08	0.12
2	Rural	614.58	2.02
3	Mining	305.83	1.00
AGRICULTURAL LAND			
4	Crop land	17693.40	58.02
5	Fallow Land	6023.89	19.75
6	Plantation	2834.50	9.29
FOREST			
7	Forest	743.93	2.44
BARREN/WASTE LANDS			
8	Scrub Land	193.41	0.63
9	Salt Affected Land	792.29	2.60
WETLANDS/ WATER BODIES			
10	Water bodies/lake/river	2796.93	9.17
TOTAL		30497.62	100.00

Interpretation

- 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 and fallow land (includes crop land) 87.06% followed by Built-up Lands – 2.14%, Scrub land – 0.63%, and Water bodies 9.17%.
- The total mining area within the study area is 305.83 ha i.e., 1.00%. The cluster area of 9.06.5 ha contributes about 2.96% 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

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 (22.3 % to 26.2%) to Sandy Loam Soil and Bulk Density of Soils in the study area varied between 0.87– 1.13 g/cm³. The Water Holding Capacity and Porosity of the soil samples is found to be medium i.e., ranging from 36.8 – 46.4 %. and 32.5-43.9 %.

Chemical Characteristics –

- The nature of soil is slightly alkaline to strongly alkaline with pH range 6.52 to 7.62
- The available Nitrogen content range between 232 to 473 mg/kg
- The available Phosphorus content range between 0.99 to 3.24 mg/kg
- The available Potassium range between 19.7 mg/kg to 29.9 mg/kg

3.4 WATER ENVIRONMENT

Surface Water

The pH varied from 8.09 to 8.13 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 959 to 1086 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 377 to 425mg/l. Nitrates varied from 9.2 to 12.2 mg/l, while sulphates varied from 52.5 to 75.6 mg/l.

Ground Water

The pH of the water samples collected ranged from 7.36 to 7.62 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. Total Dissolved Solids were found in the range of 434 to 786mg/l in all samples. Total hardness varied between 160 to 280 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 – 5: WIND ROSE DIAGRAM

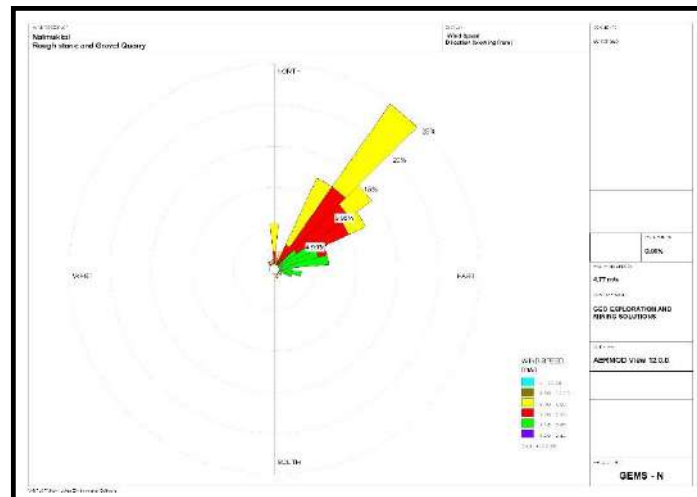
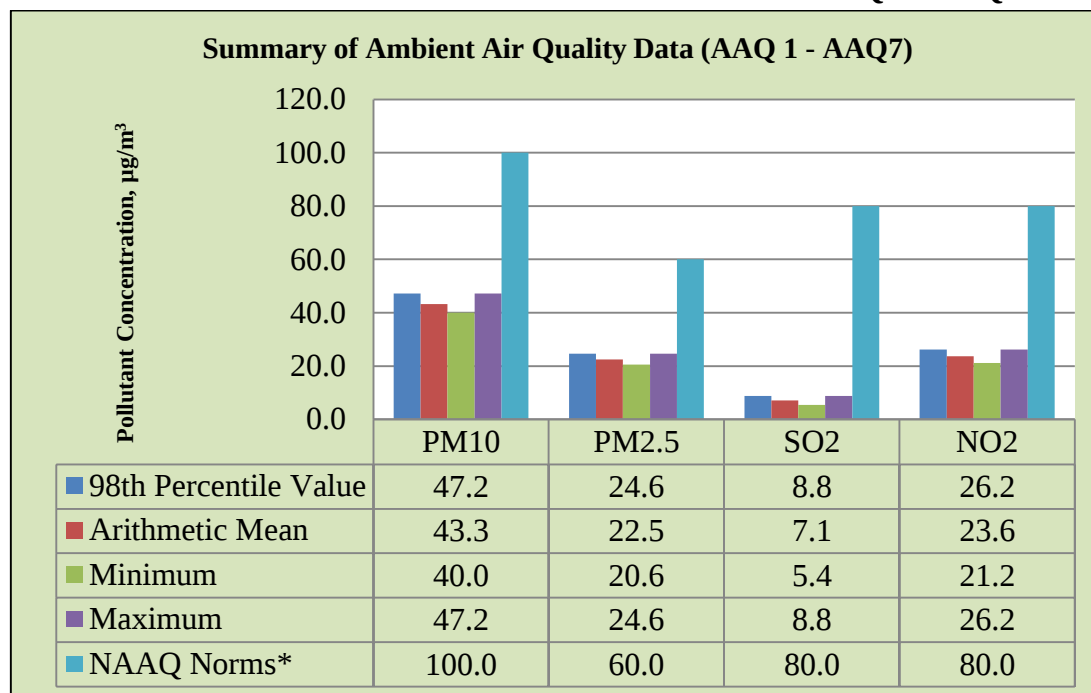


FIGURE – 6. BAR DIAGRAM OF SUMMARY OF AAQ1 – AAQ7



The results of ambient air quality monitoring for the period (Dec 2024 to Feb 2025) are presented in the report. Data has been compiled for three months.

Interpretations & Conclusion

As per monitoring data, PM₁₀ ranges from 40.7 µg/m³ to 44.7 µg/m³, PM_{2.5} data ranges from 21.6 µg/m³ to 24.2 µg/m³, SO₂ ranges from 6.4 µg/m³ to 7.0 µg/m³ and NO₂ data ranges from 22.2 µg/m³ to 24.0 µg/m³. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB.

3.6 NOISE ENVIRONMENT

Ambient noise levels were measured at 7 (Seven) locations around the proposed project area. Noise levels recorded in core zone during day time were from 39.2 to 43.1 dB (A) Leq and during night time were from 34.1 to 34.3 dB (A) Leq. Noise levels recorded in buffer zone during day time were from 38.8 to 46.1 dB (A) Leq and during night time were from 34.3 to 43.8 dB (A) Leq. Thus, the noise level for Industrial and Residential area meets the requirements of CPCB.

Thus, the noise level for Industrial and Residential area meets the requirements of CPCB.

3.7 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.

3.8 SOCIO ECONOMIC ENVIRONMENT

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.

The socio-economic study of surveyed villages gives a clear picture of its population, average household size, literacy rate and sex ratio etc. It is also found that a part of population is suffering from lack of permanent job to run their day-to-day life. Their expectation is to earn some income for their sustainability on a long-term basis. The proposed projects will aim to provide preferential employment to the local people there by improving the employment opportunity in the area 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

- 1.26.20 Ha of the land will be under mining since the Permanent or temporary change on land use and land cover will occur
- 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 cause the siltation of water course.

MITIGATION MEASURES

- The 1.26.20 Ha of the land will be converted into temporary reservoir which will full fill the water scarcity in the drought season and the nearby agriculture land will have benefitted by the supply of water
- About 900 Nos of trees will be planted in the lease area and approach road will retain the ecosystem

- The mining activity will be gradual confined in blocks and excavation will be undertaken progressively along with other mitigative measures like phase wise development in the production
- Construction of garland drains all around the quarry pits and construction of silt trap 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.,
- Fencing will be constructed before starting the mining operation and it will be maintained in the conceptual stage Security will be posted round the clock, to prevent inherent entry of the public and cattle.

4.2 WATER ENVIRONMENT

ANTICIPATED IMPACT

- 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.
- 1.6 KLD water will be utilized for the quarrying operation.

MITIGATION MEASURES

- Water for the quarrying operation such as sprinkling on haul roads, Greenbelt development will be sourced from the lower part of the mine pit which is specifically allotted to collect the rain water.
- 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.
- Periodic (every 6 months 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.

4.3 AIR ENVIRONMENT

ANTICIPATED IMPACT

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

MITIGATION MEASURES

Drilling – To control dust at source, wet drilling will be practiced. Where there is a scarcity of water, suitably designed dust extractor will be provided for dry drilling along with dust hood at the mouth of the drill-hole collar.

Advantages of Wet Drilling:

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

Blasting

- Establish time of blasting to suit the local conditions and water sprinkling on blasting face
- Avoid blasting i.e., when temperature inversion is likely to occur and strong wind blows towards residential areas
- Controlled blasting includes Adoption of suitable explosive charge and short delay detonators, adequate stemming of holes at collar zone and restricting blasting to a particular time of the day i.e., at the time lunch hours, controlled charge per hole as well as charge per round of hole
- Before loading of material water will be sprayed on blasted material
- Dust mask will be provided to the workers and their use will be strictly monitored

Haul Road & Transportation

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

Green Belt

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

Occupational Health

- Dust mask will be provided to the workers and their use will be strictly monitored.
- Annual medical 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 months once to assess effectiveness of mitigation measures proposed.

4.4 NOISE ENVIRONMENT

ANTICIPATED IMPACT

Noise pollution poses a major health risk to the mine workers. Following are the sources of noise in the existing open cast mine project are being observed such as Drilling, & Blasting, Loading and during movement of vehicles.

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 are no National Park and Archaeological monuments within project area. There are no migratory corridors, migratory avian-fauna, rare endemic and endangered species. There are no wild animals in the area. No breeding and nesting site were identified in project site. No National Park and Wildlife Sanctuary found within 10km radius. The dumps / bunds around the mine itself act as a good barrier for entry of stray animals. In the post mining stage, barbed wire fencing is proposed all around the mined-out void to prevent fall of animals in the mine pits.

MITIGATION MEASURES

To reduce the adverse effects on natural flora/fauna status of the area due to deposition of dust generated from mining operations, water sprinkling and water spraying systems will be ensured in all dust prone areas to arrest dust generation. Methodical and well-planned plantation scheme will be carried out.

4.5.1 GREENBELT DEVELOPMENT PLAN

Year	No. of trees proposed to be planted	Area to be covered in m ²	Name of the species
I	900	The safety zone along the boundary barrier and Village roads has been utilized for Greenbelt development.	Neem, Vilvam , Pungam Mahogany etc.,

4.6 SOCIO ECONOMIC ENVIRONMENT

ANTICIPATED IMPACT

Employment generation due to the project will provide direct employment for about 21 persons.

MITIGATION MEASURES

- Good maintenance practices will be adopted for plant 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.
- Appropriate 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, DMF, NMET etc, from this project directly and indirectly.

5. ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

The site has been selected based on geological investigation and exploration as below:

- Occurrence of minerals at the specific site.
- Transportation facility for materials & manpower.
- Overall impact on environment and mitigation feasibility
- Socio – economic background.

The mineral deposits are site specific in nature; hence question of seeking alternate site does not arise for this project.

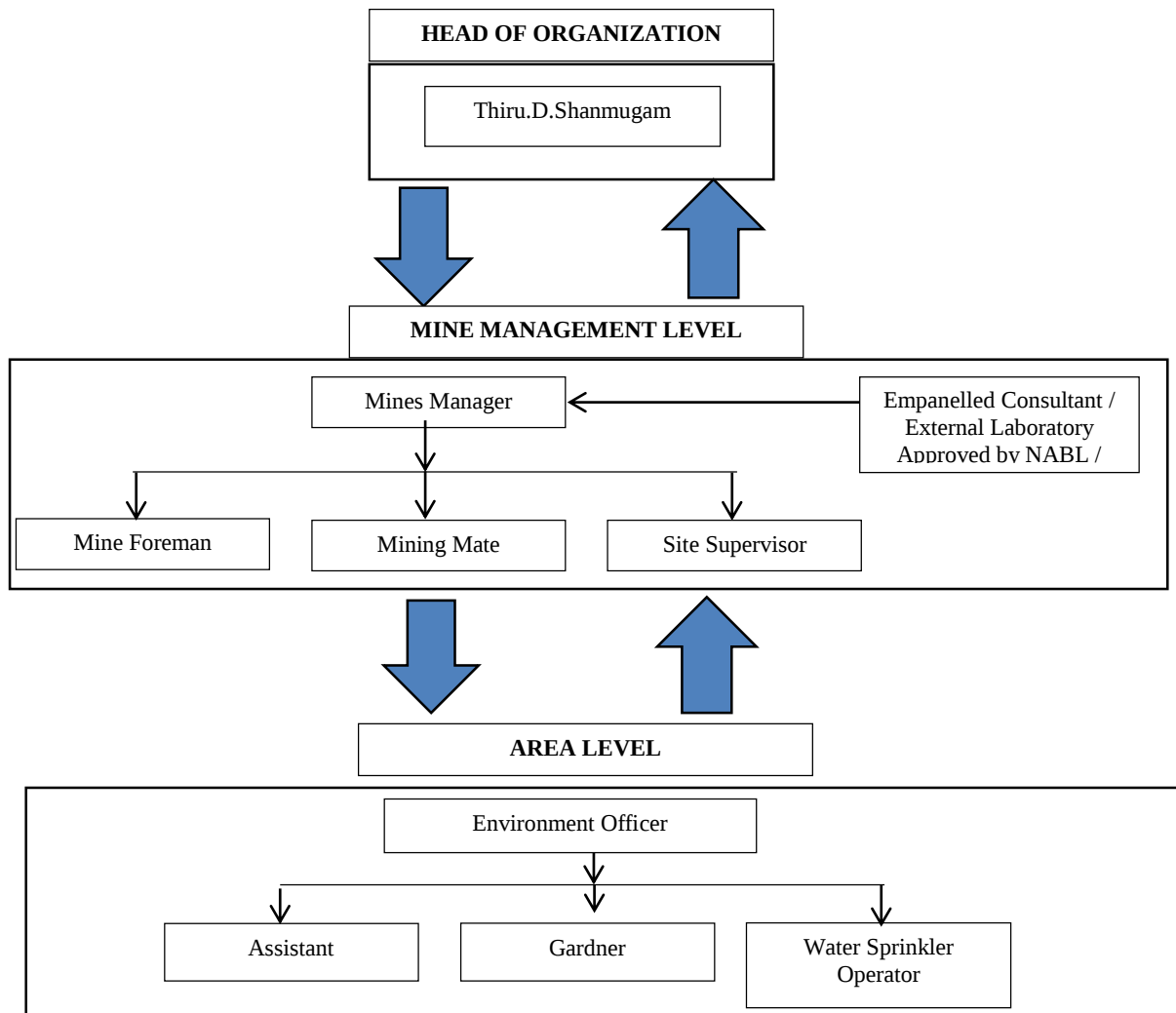
6. ENVIRONMENT MONITORING PROGRAM

Usually, an impact assessment study is carried over short period of time and the data cannot bring out all variations induced by natural or human activities. Hence regular monitoring program of Environmental parameters is essential to take into account the changes in the Environment.

The Objective of Monitoring -

- ✚ To check or assess the efficiency of the controlling measures;
- ✚ To establish a data base for future impact assessment studies.

6.1 PROPOSED ENVIRONMENTAL MONITORING CELL



6.2 POST ENVIRONMENTAL CLEARANCE MONITORING SCHEDULE

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

7	Soil	2 Locations (1 Core & 1 Buffer)	–	Once in six months	Physical and Chemical Characteristics
8	Greenbelt	Within the Project Area	Daily	Monthly	Maintenance

7. ADDITIONAL STUDIES

7.1 RISK ASSESSMENT

The methodology for the risk assessment has been based on the specific risk assessment guidance issued by the Directorate General of Mine Safety (DGMS), Dhanbad, vide Circular No.13 of 2002, dated 31st December, 2002. The DGMS risk assessment process is intended to identify existing and probable hazards in the work environment and all operations and assess the risk levels of those hazards in order to prioritize those that need immediate attention. Further, mechanisms responsible for these hazards are identified and their control measures, set to timetable are recorded along with pinpointed responsibilities.

The whole quarry operation will be carried out under the direction of a Qualified Competent Mine Manager holding certificate of competency to manage a metalliferous mine granted by the DGMS, Dhanbad. Risk Assessment is all about prevention of accidents and to take necessary steps to prevent it from happening.

7.2 DISASTER MANAGEMENT PLAN

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	Production for five-year plan period	Per Year Production in m ³	Per Day Production in m ³	Number of Lorry Load Per Day
P1	151259	15126	50	4
Total	151259	15126	50	4
E1	107475	21495	72	6
E2	187420	37484	125	10
Total	294895	58979	197	16
Grand Total	446154	74105	247	20

CUMULATIVE PRODUCTION LOAD OF GRAVEL

Quarry	Production for five-year plan period	Per Year Production in m ³	Per Day Production in m ³	Number of Lorry Load Per Day
P1	24648	8216	27	2
Total	24648	8216	27	2
E1	6328	2109	7	1
E2	24616	8205	27	2
Total	30944	10314	34	3
Grand Total	55592	18530	61	5

SOCIO ECONOMIC BENEFITS FROM 5 MINES

Location ID	Project Cost	CER
P1	Rs. 65,93,000/-	Rs.5,00,000/-
E1	Rs. 27,43,000/-	Rs.55,000/-
E2	Rs. 40,21,000/-	Rs.81,000/-
Total	Rs.1,33,57,000/-	Rs.6,36,000/-

EMPLOYMENT BENEFITS FROM 5 MINES

Description	Employment
P1	21
Total	21
E1	29
E2	22
Total	51
Grand Total	72

A total of 21 people will get employment due to 1 proposed mines in cluster and 51 people are already employed at 1 existing mines

GREENBELT DEVELOPMENT BENEFITS FROM MINES

CODE	No of Trees proposed to be planted	Area Covered Sq.m	Name of the Species
P1	900	The safety zone along the boundary barrier has been identified to be utilized for Greenbelt development	Neem, Pungam, Mahogany , Vilvam etc.,
Total	900		
E1	270		
E2	250		
Total	520		
G.Total	1420		

8. PROJECT BENEFITS

The Proposed Project for Quarrying Rough Stone and gravel at Nalmukkal Village aims to produce 1,51,259 m³ Rough Stone over a period of 5 Years and Gravel 24,648m³ for period of 3 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 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

It can be concluded from overall assessment of the impacts, in terms of positive and negative effects on various environmental components, that the mining activities will not have any adverse effect on the surrounding environment.

To mitigate any impacts due to the mining activities, a well-planned EMP and a detailed post project monitoring system is provided for regular monitoring and immediate rectification at site. Due to the cluster quarrying activities, socio economic conditions in and around the project site will be improved substantially. Hence, the Prior Environmental Clearance shall be granted at the earliest.
