

EXECUTIVE SUMMARY

THIYARANADURGAM ROUGH STONE CLUSTER QUARRIES

At

Thiyaranadurgam Village, Shoolagiri Taluk, Krishnagiri District, Tamil Nadu State

NAME OF PROPOSED PROJECT PROPONENTS APPLYING IN CLUSTER

S.Nos.	Proponent Name	Extent (Ha)
1	Thiru. N.Narayanan	4.24.5
2	Thiru.T.Kesavamoorthy	4.02.0

“B1” CATEGORY/ MINOR MINERAL /CLUSTER/ NON-FOREST LAND/ GOVERNMENT LAND

* CLUSTER EXTENT = 8.26.5 ha

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

ToR Obtained vide

1. Lr.No. SEIAA-TN/F.No.9104/ToR-1177/2022Dated:13.06.2022- Thiru. N.Narayanan
2. Lr.No. SEIAA-TN/F.No.9103/SEAC/ToR-1173/2022Dated:14.06.2022-Thiru.T.Kesavamoorthy

Environmental Consultant GEO EXPLORATION AND MINING SOLUTIONS

Old No. 260-B, New No. 17,

Advaitha Ashram Road, Alagapuram,
Salem – 636 004, Tamil Nadu, India



Accredited for sector 1 Category 'A' & 38 Category 'B'
Certificate No : NABET/EIA/2225/RA 0276



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Baseline Monitoring Period – December 2022 to February 2023

ENVIRONMENTAL LAB

EHS 360 LABS PRIVATE LIMITED,

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

MAY 2023

1. INTRODUCTION

Rough Stone quarry are the major requirements for construction industry. This EIA report is prepared by considering Cumulative load of all proposed & existing quarries of Thiyanadurgam Rough Stone Quarry Cluster Quarries consisting of two Proposed quarries with total extent of Cluster of 8.26.5 Ha in Thiyanadurgam Village, Shoolagiri Taluk, Krishnagiri District, and Tamil Nadu State, cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016.

The proponent has obtained necessary statutory clearances from the Department of Geology and Mining, Krishnagiri District, Tamil Nadu (Statutory Clearance Documents are enclosed along with Mining plan as Annexure No III). The total Extent of the quarries within the radius of 500m from this proposal is > 5Ha, hence the proposal falls under “B1” Category project as per the EIA notification, 2006 (As amended timely).

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

CODE	Name of the proponent	Extent (Ha)	Terms of Reference (ToR)
P1	Thiru. N.Narayanan	4.24.5	Lr.No.SEIAA-TN/F.No.9104/ToR-1177/2022Dated:13.06.2022
P2	Thiru.T.Kesavamoorthy	4.02.0	Lr.No.SEIAA-TN/F.No.9103/SEAC/ToR-1173/2022Dated:14.06.2022
	Total	8.26.5	

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 of Thiyanadurgam 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 (December - February 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

PROPOSAL – P1	
Name of the Company	Thiru. N. Narayanan
Address	S/o. Nallappa, D.No.3/38, Chikkagoundanoor, Nagamangalam Village, Denkanikottai Taluk, Krishnagiri District-635 113
Mobile	+91 94448 95079,
Status	Proprietor
PROPOSAL – P2	
Name of the Company	Thiru.T. Kesavamoorthy
Address	S/o Thimarayappa, D. No 2/38, Varaganapalli, Nagamangalam Post, Denkanikottai Taluk, Krishnagiri District-635 113
Mobile	+91 94448 95079,

Status	Proprietor
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The project proponent is an individual.

1.2 QUARRY DETAILS WITHIN 500 M RADIUS

		PROPOSED QUARRIES			
CODE	Name of the Proponent and Address	S.F. Nos, Village & Taluk	Extent in Ha	G.O. No & Date	Status
P1	Thiru. N.Narayanan S/o. Nallappa, D.No.3/38, Chikkagoundanoor, Nagamangalam Village, Denkanikottai Taluk, Krishnagiri District, Tamil Nadu State.	940/1 (P-2) of Thiyanadurgam Village, Shoolagiri Taluk	4.24.5ha	Roc.229/2019/Mines dated: 13.06.2019	Lr.No. SEIAA- TN/F.No.9104/SEAC/ToR- 1177/2022Dated:13.06.2022
P2	Thiru.T.Kesavamoorthy S/o Thimarayappa, D.No 2/38, Varaganapalli, Nagamangalam Post, Denkanikottai Taluk, Krishnagiri District	940/1 (P-1) of Thiyanadurgam Village, Shoolagiri Taluk	4.02.0 Ha	Roc.228/2019/Mines dated: 13.06.2019	Lr.No. SEIAA- TN/F.No.9103/SEAC/ToR- 1173/2022Dated:14.06.2022
Total Extent			8.26.5 Ha		
EXISTING QUARRIES					
CODE	Name of the Proponent and Address	S.F. Nos, Village & Taluk	Extent in Ha		-
NIL					
ABANDONED/EXPIRED QUARRIES					
CODE	Name of the Proponent and Address	S.F. Nos, Village & Taluk	Extent in Ha		-
NIL					
TOTAL CLUSTER EXTENT			8.26.5 Ha		

TABLE 1.3 SALIENT FEATURES OF THE PROPOSAL

SALIENT FEATURES OF PROPOSAL "P1"		
Name of the Mine	Thiru. N.Narayanan, Rough Stone & Gravel Quarry Project	
Land Type	It is a Government Poramboke Land.	
S.F. Nos	940/1 (P-2)	
Extent	4.24.5 Ha	
Previous quarry operation details	It is a fresh Lease area.	
Geological Reserves	Rough Stone	TopSoil
	20,24,000m ³	42,450m ³
Mineable Reserves	Rough Stone	TopSoil
	14,45,070m ³	39,300 m ³
Proposed production for First Five years	7,45,070m ³ (Depth 51m AGL)	
Proposed production for Second Five years	7,00,000m ³	
Mining Plan Period / Lease Period	10 Years	
Depth restricted as per ToR	76m (66m Agl+10m Bgl)	
Ultimate Pit Dimension	273m(L) x 150m (W) x76m(D) (66m Agl+ 10m Bgl)	
Toposheet No	57 H/14	
Latitude	12°36'14.45"N to 12°36'21.97"N	
Longitude	77°53'57.46"E to 77°54'07.76"E	
Highest elevation	875-805m AMSL	
Machinery proposed	Jack Hammer	8
	Compressor	2
	Wagon Drill	1

	Excavator	3
	Tippers	6
Blasting	Usage of Slurry Explosive with MSD detonators	
Manpower Deployment	40 Nos	
Total Project Cost	Operational Cost	Rs. 2,32,11,000/-
	EMP Cost	Rs. 7,60,000/-
	Total	Rs. 2,39,71,000/-
CER Cost	Rs.5,00,000/-	
SALIENT FEATURES OF PROPOSAL "P2"		
Name of the Mine	Thiru.T. Kesavamoorthy , Roughstone and gravel quarry	
Land Type	It is a Government Poramboke Land.	
S.F. No.	940/1 (P-1)	
Extent	4.02.0 Ha	
Previous quarry operation details	It is a fresh lease application	
Depth of Mining	76m (66m Agl+10m Bgl)	
Geological Resources	Rough Stone	Topsoil
	21,29,000m ³	40,217m ³
Mineable Reserves	Rough Stone	Topsoil
	18,50,770m ³	31,857m ³
Proposed production for First Five years	9,39,510 m ³ (Maximum depth 46m below from the existing ground)	
Proposed production for Second Five years	9,11,260 m ³	
Mining Plan Period / Lease Period	10 Years	
Ultimate Pit Dimension	307m (L) X 131m (W) X 76m (D)	
Toposheet No	57 -H/14	
Latitude	12°36'17.33"N to 12°36'24.06"N	
Longitude	77°53'47.76"E to 77°53'58.80"E	
Highest Elevation	915m to 845m AMSL	
Machinery	Jack Hammer	10
	Compressor	3
	Excavator with Bucket and Rock Breaker	4
	Wagon Drill	1
	Tippers	8
Blasting	Usage of Slurry Explosive with MSD detonators	
Manpower Deployment	46 Nos	
Total Cost	Operational Cost	Rs. 2,68,00,000/-
	EMP Cost	Rs. 7,60,000/-
	Total	Rs. 2,75,60,000/-
CER Cost	Rs.5,00,000/-	

1.3 STATUTORY DETAILS

Project – P1 – Thiru. N. Narayanan,

- ∞ The proponent applied for Rough Stone quarry Lease Dated: 08.03.2019.
- ∞ Precise Area Communication was issued by the District Collector, Krishnagiri vide Rc.No.229/2019/Mines, Dated:13.06.2019 for a period of 10 Years and the Mining plan prepared for the period of ten years.
- ∞ The mining plan was approved by the Deputy Director, Department of Geology and Mining, Krishnagiri District vide Rc.No. 229/2019/Mines, Dated: 30.07.2019.

- ☞ Proponent applied for ToR for Environmental Clearance vide online Proposal No. **SIA/TN/MIN/73796/2022, Dated:17.03.2022.**

Project – P2 – Thiru.T. Kesavamoorthy,

- ☞ The proponent applied for Rough Stone quarry Lease Dated: 08.03.2019.
- ☞ Precise Area Communication was issued by the District Collector, Krishnagiri District vide Rc.No.228/2019/Mines, Dated:13.06.2019. for a period of 10 Years and the Mining plan prepared for the period of ten years.
- ☞ The mining plan was approved by the Deputy Director, Department of Geology and Mining, Krishnagiri District vide Rc.No.228/2019/Mines Dated: 30.07.2019.
- ☞ Proponent applied for ToR for Environmental Clearance vide online Proposal No. **SIA/TN/MIN/73797/2022, Dated:17.03.2022.**

1.4 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. 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	The National Highway (NH-7) Bangalore – Salem -10.0Km – Northern side. SH17 - Shoolagiri – Dharmapuri -4.0km- NE
Nearest Village	Thiyanadurgam – 2.0Km- NE
Nearest Town	Hosur – 15.0Km – NW
Nearest Railway	Kelamangalam Railway station – 4.0Km - West
Nearest Airport	Bangalore Airport – 53Km - NW

2.2 LAND USE PATTERN OF THE PROPOSED PROJECT

LAND USE PATTERN OF PROJECT – P1	
Description	Present area in (ha)
Area under Quarrying	Nil
Infrastructure	Nil
Roads	Nil
Green Belt	Nil
Un – utilized area	4.24.5
Grand Total	4.24.5
LAND USE PATTERN OF PROJECT – P2	
Description	Present area in (ha)
Quarrying Pit	Nil
Infrastructure	Nil
Road	Nil
Green Belt	Nil
Unutilized area	4.02.0
Grand Total	4.02.0

2.3 OPERATIONAL DETAILS OF LEASE APPLIED AREA

OPERATIONAL DETAILS FOR PROJECT – P1		
PARTICULARS	DETAILS	
	Rough Stone quarry (m³) (10 Year Plan period)	Top Soil (m³) (1 Years Plan period)
Geological Resources	20,24,000m ³	42,450m ³
Mineable Reserves	14,45,070m ³	39,300 m ³
Production for five-year plan period After bench reduction	7,45,070 m³	
Production for Next five-year plan period After bench reduction	7,00,000 m³	
Mining Plan Period / Lease Applied Period	10 Years	
Number of Working Days	300 Days	
Production per day	482	131
No of Lorry loads (12m ³ per load)	40	11
Total Depth of Mining	76m (66m Agl+10m Bgl)	
OPERATIONAL DETAILS FOR PROJECT – P2		
PARTICULARS	DETAILS	
	Rough Stone quarry (m³) (10 Year Plan period)	Top Soil (m³) (1 Years Plan period)
Geological Resources	21,29,000m ³	40,217m ³
Mineable Reserves	18,50,770m ³	31,857m ³
Production for five years Plan After bench reduction	9,39,510 m³	
Production for Next five-year plan period After bench reduction	9,11,260 m³	
Mining Plan Period / Lease Applied Period	10 Years	
Number of Working Days	300 Days	
Production per day	617	106
No of Lorry loads (12m ³ per load)	51	9
Total Depth of mining	76m (66m Agl+10m Bgl)	

FIGURE – 1: GOOGLE IMAGE SHOWING PROJECT AREA



SATELLITE IMAGERY OF P1

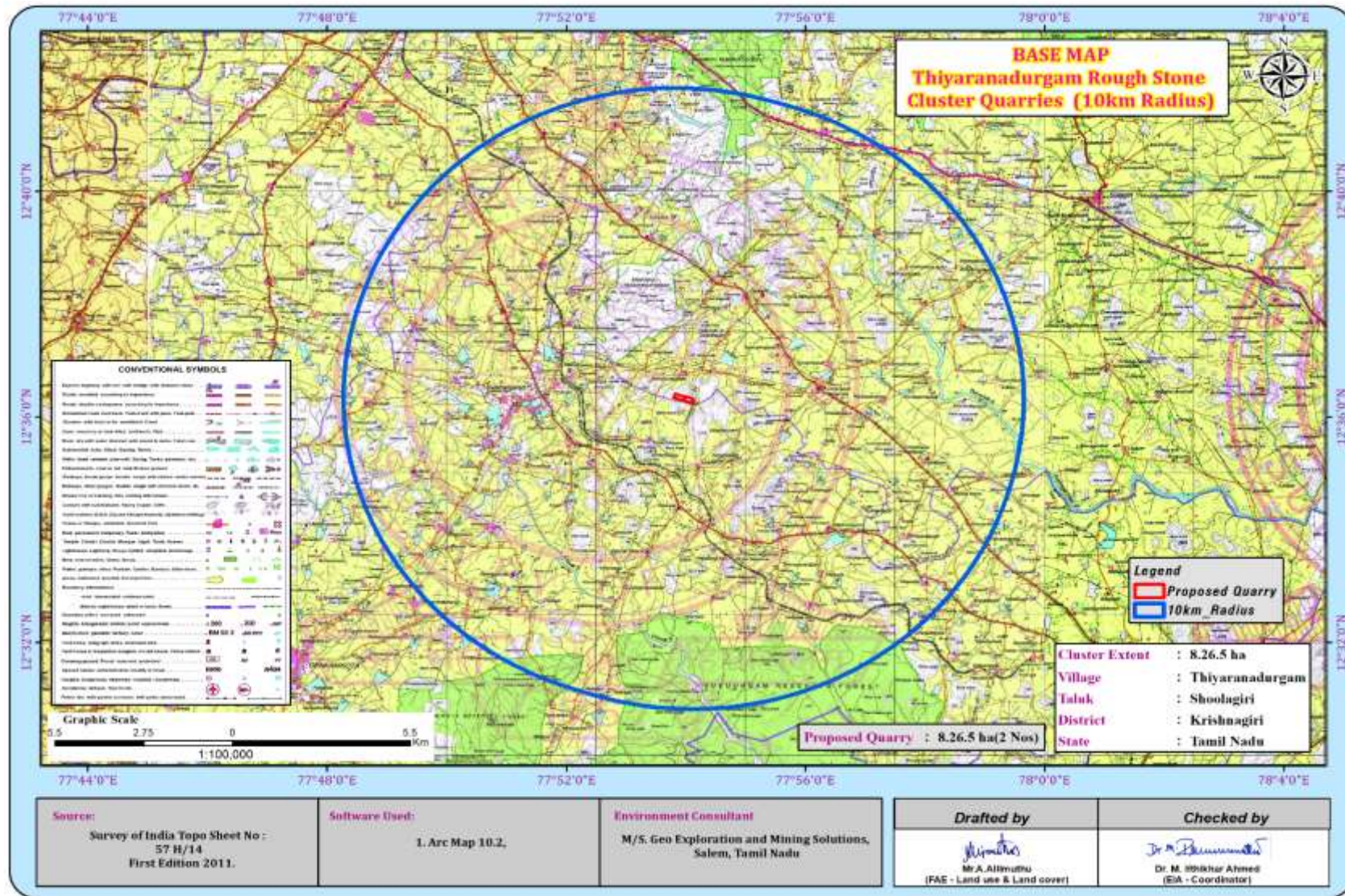


SATELLITE IMAGERY OF P2

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



FIGURE – 3: TOPOSHEET MAP COVERING 10 KM RADIUS



2.4 METHOD OF MINING

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 Topsoil will be Excavate directly by Hydraulic Excavators and preserved all along the safety barrier to facilitate greenbelt development during Mine Closure Stage. 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	8	1.2m to 2.0m	Compressed air
2	Compressor	2	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker	3	300 HP	Diesel Drive
4	Tippers	9	20 Tonnes	Diesel Drive
5	Wagon Drill	1	300 HP	Diesel Drive
PROPOSAL – P2				
S.NO.	TYPE	NOS	SIZE/CAPACITY	MOTIVE POWER
1	Jack hammers	10	1.2m to 2.0m	Compressed air
2	Compressor	3	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker Unit 4	4	300 HP	Diesel Drive
4	Tippers	8	20 Tonnes	Diesel Drive
5	Wagon Drill	1	300 HP	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	273	150	76 m (66 m AGL+ 10 m BGL)
Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max) (m)
I	307	131	76 m (66m Agl+ 10m Bgl)

3.0 DESCRIPTION OF THE ENVIRONMENT

The baseline status of the project environment is described section wise for better understanding of the broad-spectrum conditions. The baseline environment quality represents the background environmental scenario of various environmental components such as Land, Water, Air, Noise, Biological and Socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out covering Dec– Feb 2023 as per CPCB & MoEF & CC guidelines.

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 (Oct – Dec 2022)	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.

3.2 LAND ENVIRONMENT

To study the land use pattern of the core as well as a buffer zone, land use/land cover details have been identified/ maps have been prepared in accordance with the Standard ToR point. A visual interpretation technique has been adopted for land use supervised classification based on training site by Level III classification with 1:50,000 scale for the preparation of land use mapping. Land use pattern of the area was studied through **LISSIII, Bhuvan, NRSC**. The 10 km radius map of study area was taken for analysis of *Land use/Landcover*.

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

S.No	CLASSIFICATION	AREA_HA	AREA_%
BUILTUP			
1	RURAL	66.31	0.21
2	MINING	511.10	1.61
AGRICULTURAL LAND			
3	CROP LAND	19331.00	60.89
4	PLANTATION	1918.55	6.04
5	FALLOW LAND	3209.47	10.11
FOREST			
6	FOREST	2869.37	9.04
BARREN/WASTE LANDS			
7	SCRUB LAND	2035.85	6.41
8	BARREN ROCKY	993.04	3.13
WETLANDS/ WATER BODIES			
9	WATER BODIES/LAKE	811.51	2.56
TOTAL		31746.19	100.00

LU/LC Interpretation:

- ∞ The 10 km radius study area mainly comprises of crop land & Agriculture Plantation land accounting of 60.89% & 6.04% of the total study area. The study area also consists of fallow land of 10.11%.
- ∞ The buffer zone studied has no ecological sensitive area (National Park, Wildlife Sanctuary, Biosphere Reserve/ etc.).
- ∞ Water Bodies such as ponds/ lakes comprises of 3% of the total buffer area. The two seasonal rivers such as Ponnaiyar river at 7 Km in NE direction, Tank 2.6km in N and Chinnatti River at 4km in SW direction of the total study area.
- ∞ The Scrub land accounts of 6%. 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.
- ∞ The R.F area (Sanamav R.F), Perandapalli Forest, Udedurgam R.F area covered is about 9.04% in buffer zone.
- ∞ 2% of the total study area is occupied by the mine industries of captive mines. The area occupied by Mainly Roughstone 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 small Brick kiln industries also located in the study area.

0.21% of the area is covered under the Builtup Land. The nearest village within the 3 km radius from the project site boundary is observed to be villages Kendurg, Thyranadurgam, Anchetty Durgam, Kelamangalam Town Panchayat 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

Interpretation & Conclusion

- The nature of soil is slightly alkaline to strongly alkaline in nature with pH range 7.25 to 8.15
- The available Nitrogen content range between 260 to 388 mg/kg
- The available Phosphorus content range between 1.10 to 2.6 mg/kg
- The available Potassium range between 25.4 to 45.5mg/kg

3.4 WATER ENVIRONMENT

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

Surface Water

Ph:

The pH 7.05-7.55 while turbidity found within the standards (Optimal pH range for sustainable aquatic life is 6.5 to 8.5 pH).

Total Dissolved Solids:

Total Dissolved Solid 578-732 mg/l, the TDS mainly composed of carbonates, bicarbonates, Chlorides, phosphates and nitrates of calcium, magnesium, sodium and other organic matter.

Other parameters:

Chloride 147-210 mg/l. Nitrates 6.6-10.5 mg/l, while sulphates 70.1-70.5 mg/l.

Ground Water

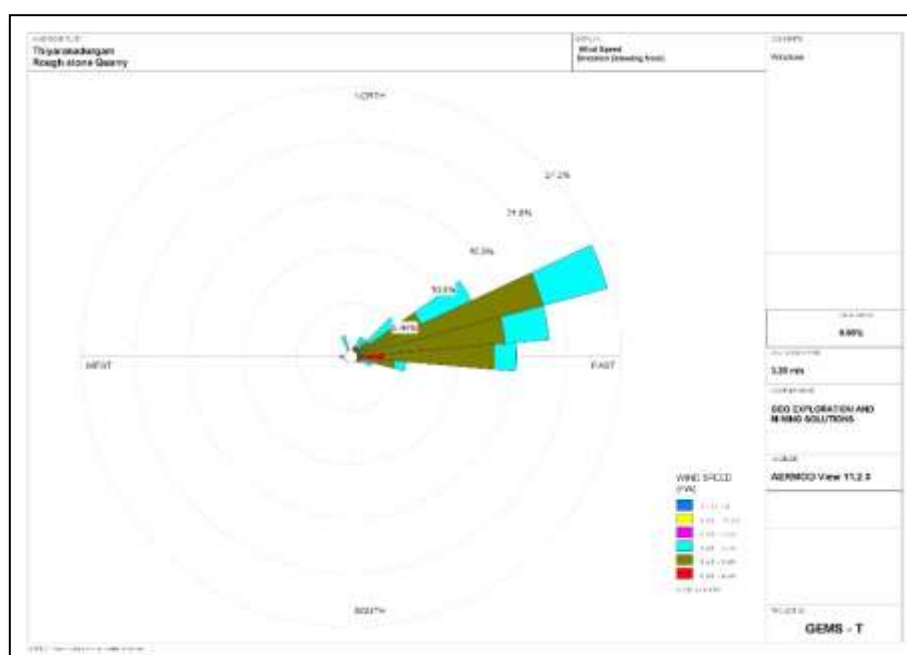
The pH of the water samples collected ranged from 6.87 to 7.79 and within the acceptable limit of 6.5 to 8.5. pH, Sulphates and Chlorides of water samples from all the sources are within the limits as per the Standard. on Turbidity, the water samples meet the requirement. Total Dissolved Solids were found in the range of 456 – 496mg/l in all samples. The Total hardness varied between 155.15 – 186.80 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, PM_{10} ranges from $39.2 \mu\text{g}/\text{m}^3$ to $47.5 \mu\text{g}/\text{m}^3$, $PM_{2.5}$ data ranges from $19.5 \mu\text{g}/\text{m}^3$ to $40.2 \mu\text{g}/\text{m}^3$, SO_2 ranges from $5.0 \mu\text{g}/\text{m}^3$ to $24.5 \mu\text{g}/\text{m}^3$ and NO_2 data ranges from $5.1 \mu\text{g}/\text{m}^3$ to $27.4 \mu\text{g}/\text{m}^3$. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB. The minimum & maximum concentrations of PM_{10} were found to be $42 \mu\text{g}/\text{m}^3$ in core zone area & $39.2 \mu\text{g}/\text{m}^3$ in Beerjepalli Village respectively. The minimum & maximum concentrations of $PM_{2.5}$ were found to be $21.0 \mu\text{g}/\text{m}^3$ in Core zone & $21.3 \mu\text{g}/\text{m}^3$ in Krishnapuram area respectively.

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 43.1 dB (A) Leq and during night time were from 35.3 (A) Leq. Noise levels recorded in buffer zone during day time were from 37.6 – 41.6 dB (A) Leq and during night time were from 34– 36.5 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

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 project will aim to provide preferential 96 persons to the local people there by improving the indirect employment opportunity for 50 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

4.3 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 settling 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 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.

4.5 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.

4.6 BIOLOGICAL ENVIRONMENT

ANTICIPATED IMPACT

The developmental programs, policies, and projects operated or managed by government or private bodies can cause potentially significant changes in the physical, biological, and socio-

economic environment. In some cases, the changes may be beneficial while in others it may be detrimental to the environment. Accordingly, environmental impact studies are required for systematic identification, qualification, and interpretation of the anticipated changes. The main environmental problems associated with mining activities are deforestation, land degradation (change in topography, soil erosion), visual intrusion, disturbance to the hydrological system, and water, air, and noise pollution which ultimately impact upon the floral and faunal status of the project area.

MITIGATION MEASURES

Greenbelt means the planting of special types of plants suitable to that particular 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 – Thiru. N. Narayanan				
Year	No. of trees proposed to be planted	Survial %	Area to be planted	Name of the species
I	It is proposed to plant 2200 Nos of trees in the 1 st year	80%	Safety barrier, Un utilized areas and nearby village roads	Neem, Pongamia pinnata, Casuarina, etc
PROPOSAL FOR P2 – Thiru.T. Kesavamoorthy				
I	It is proposed to plant 2000 Nos of trees in the 1 st year	80%	Safety barrier, Un utilized area's and nearby village roads	Neem, Pongamia pinnata, Casuarina, etc.,

4.7 SOCIO ECONOMIC ENVIRONMENT

Anticipated Impacts:

- ♣ 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 behavioral 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.

Operation Phase:

Anticipated Impacts:

- ♣ Long term exposure to the pollutants such as PM, SO₂ and NO₂ Cement dust have a potential to create health impacts such as risk of cardiovascular and respiratory disease, eye irritation, bronchitis, lung damage, increased heart ailments, etc.
- ♣ Other impacts, associated with the applied for Rough Stone quarry Project will create a positive impact as it will result in the overall development of the area in respect to the infrastructure development, educational growth, health facilities etc., as a part of the CSR activity.

Mitigation Measures:

- ♣ In order to mitigate the long-term health impacts, efficient Air Pollution Control Equipment (APCE) like Bag House / Bag Filter / ESP will be installed at all major stacks to keep the emissions

within the permissible limits. To reduce the gaseous emission, Pyro-process itself acts as a long SO₂ scrubber and De - NO_x system will be installed for fuel burning along with calciner for low NO_x formation. To reduce fugitive emission from vehicles and machineries will be regularly monitored and maintained.

♣ For emergency, proposed to develop an occupational health centre for its employees and nearby villagers.

1.6.3 Impact Evaluation:

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 Thiyanadurgam Rough Stone quarry cluster quarry over an extent of 8.26.5 ha of Poramboke land of Thiyanadurgam Village, Shoolagiri Taluk, Krishnagiri 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 upliftment 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)

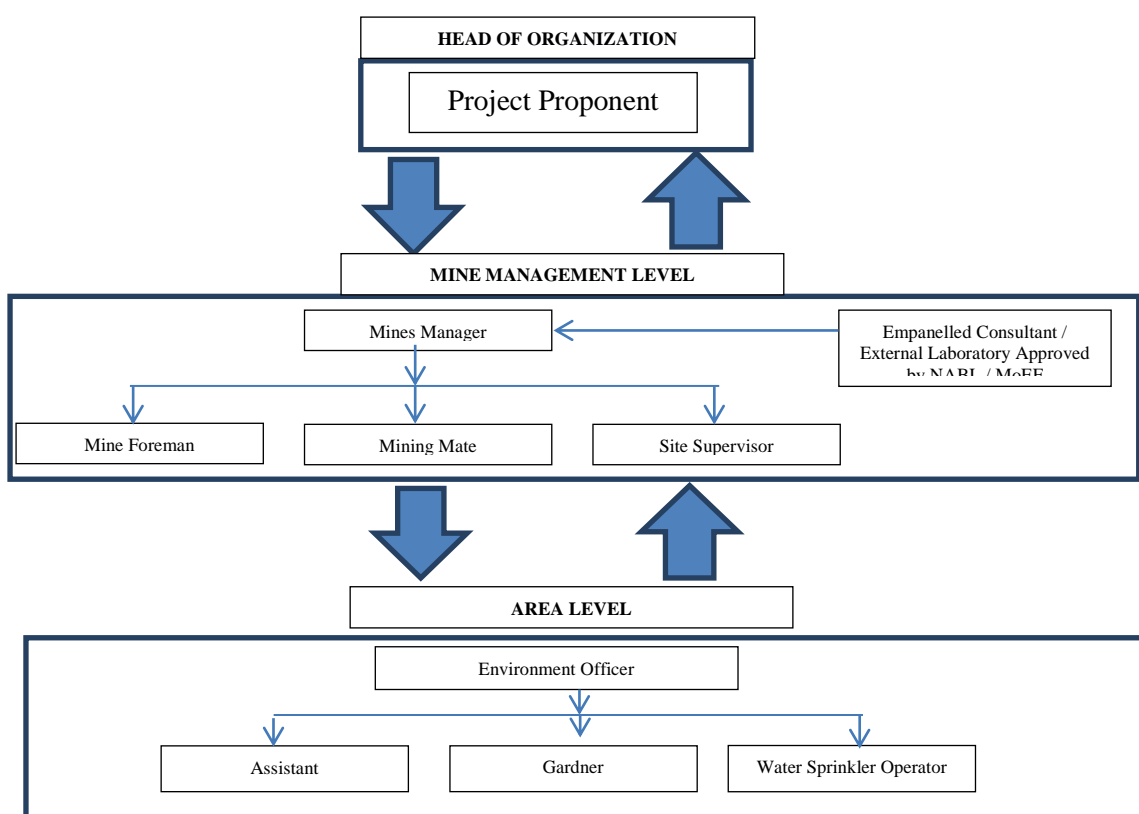
No alternatives are suggested as all the mine sites are mineral specific.

6. ENVIRONMENT MONITORING PROGRAM

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	2 Locations (1 Core & 1 Buffer)	24 hours	Once in 6 months	Fugitive Dust, PM _{2.5} , PM ₁₀ , SO ₂ and NO _x .

2	Meteorology	At mine site before start of Air Quality Monitoring & IMD Secondary Data	Hourly / Daily	Continuous online monitoring	Wind speed, Wind direction, Temperature, Relative humidity and Rainfall
3	Water Quality Monitoring	2 Locations (1SW & 1 GW)	-	Once in 6 months	Parameters specified under IS:10500, 1993 & CPCB Norms
4	Hydrology	Water level in open wells in buffer zone around 1 km at specific wells	-	Once in 6 months	Depth in bgl
5	Noise	2 Locations (1 Core & 1 Buffer)	Hourly – 1 Day	Once in 6 months	Leq, Lmax, Lmin, Leq Day & Leq Night
6	Vibration	At the nearest habitation (in case of reporting)	-	During blasting Operation	Peak Particle Velocity
7	Soil	2 Locations (1 Core & 1 Buffer)	-	Once in six months	Physical and Chemical Characteristics
8	Greenbelt	Within the Project Area	Daily	Monthly	Maintenance

7. ADDITIONAL STUDIES

7.1 RISK ASSESSMENT

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

The whole quarry operation will be carried out under the direction of a Qualified Competent Mine Manager holding certificate of competency to manage a metalliferous mine granted by the DGMS, Dhanbad for 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 IN CLUSTER

Quarry	Production for Ten-year plan period m ³	Per Year Production in m ³	Per Day Production in m ³	Number of Lorry Load Per Day @ 12m ³ per load
P1	14,45,070	1,44,507	482	40 Trips /Day
P2	18,50,770	1,85,077	617	51Trips /Day
Total	32,95,840	3,29,584	1099	91Trips /Day

CUMULATIVE PRODUCTION LOAD OF TOP SOIL IN CLUSTER

Quarry	Mineable Reserves in m ³	Per Year Production in m ³	Per Day Production in m ³	Number of Lorry Load @ 12m ³ per load
P1	39,300	39,300	131	11Trips /Day
P2	31,857	31,857	106	9 Trips /Day
Total	71,157	71,157	237	20 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	43.1	66.1	66.1	Residential Day Time– 55 dB (A) Night Time- 45 dB (A)
N2	41.6	43.7	45.8	
N3	40.7	29.0	41.0	
N4	39.3	26.5	39.5	
N5	37.6	24.8	37.8	
N6	38.0	26.1	38.3	
N7	39.7	29.7	40.1	
N8	37.9	28.5	38.4	

SOCIO ECONOMIC BENEFITS

Location Code	Employment	Project Cost	CER Cost
P1	40	Rs. 2,39,71,000/-	Rs.5,00,000/-
P2	46	Rs. 2,75,60,000/-	Rs.5,00,000/-
Grand Total	86	Rs. 5,15,31,000	Rs.10,00,000/-

A total of 86 people will get employment due to 2 mines in cluster and already employed. 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 two Proposed Projects for Quarrying Rough Stone quarry at Thiyanadurgam Village Cluster Quarries Village aims to produce cumulatively **32,95,840** m³ Rough Stone quarry over period of 10 Years & **71,157** m³ 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 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.