

EXECUTIVE SUMMARY

PROJECT PROPONENTS

Sl. No.	Name	Extent of Mining Applied
1	Thiru. T. Senthivel	3.69.72
2	Tmt. R. Subashini	3.11.0

ROUGH STONE & GRAVEL MINE – CLUSTER

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

CLUSTER EXTENT = 19.17.72 ha

At

Sundakkottai Village, Kalyanayasundarapuram Village and Aladipatti Village,

**Aruppukkottai Taluk,
Virudhunagar District, Tamil Nadu**

Complied as per ToR obtained and MoEF & CC for the Projects in Cluster Situation – Cluster area is calculated as per MoEF & CC Notification – S.O. 2269 (E) Dated: 01.07.2016

- ✚ Letter No SEIAA-TN/F.No.8459/SEAC/TOR-1002/2021 Dated :28.07.2021 for Thiru. T. Senthivel;
- ✚ Letter No. SEIAA-TN/F.No.8446/SEAC/TOR-1005/2021 Dated :28.07.2021 for Tmt. R. Subashini;

Environmental Consultant



ENVIRO RESOURCES

(NABET Certificate No: NABET/EIA/1922/SA0133
valid upto 30th March, 2022)

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Draft EIA/EMP for Sundakkottai, Kalyanasundarapuram and Sundakkottai, Aladipatti Village Cluster (Cluster Area: 19.17.72 Ha) of Aruppukkottai Taluk, Virudhunagar District, Tamil Nadu

Lessee: Thiru. T. Senthivel (Area: 3.69.72 Ha) and Tmt. R. Subashini (Area: 3.11.0 Ha)

Executive Summary

1. INTRODUCTION

Rough Stone & Gravel is the major requirements for construction industry. This EIA report is prepared by considering Cumulative load of all proposed & existing Rough Stone & Gravel Quarries consisting of 3 Proposed + 4 Abandoned + 4 Existing Quarries with total extent of Cluster of 19.17.72 ha in Sundakkottai Village, Kalyanasundarapuram Village and Aladipatti Village, Aruppukkottai Taluk, Virudhunagar 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 vide –

- ✚ Letter No SEIAA-TN/F.No.8459/SEAC/TOR-1002/2021 Dated :28.07.2021 for P1;
- ✚ Letter No. SEIAA-TN/F.No.8446/SEAC/TOR-1005/2021 Dated :28.07.2021 for P2;

The Baseline Monitoring study has been carried out during the period of October 2021– December 2021 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) individually to minimize those adverse impacts.

“Draft EIA report prepared on the basis of ToR Issued for carrying out Public Hearing for the Grant of Environmental Clearance from SEIAA, - Tamil Nadu”

1.1 DETAILS OF PROJECT PROPONENT –

PROPOSAL – M/s Thiru. T. Senthivel	
Name of the Project	T. Senthivel Rough Stone and Gravel Quarry
S.F. No.	72/2A, 72/2B, 72/3, 72/4, 72/5, 72/7, 73/5A & 73/5B, 4/1A
Extent	3.69.72 ha
Land Type	Patta Land
Village Taluk and District	Sundakkottai & Kalyanasundarapuram Village, Taluk: Aruppukkottai District: Virudhunagar
PROPOSAL – Tmt. R. Subashini	
Name of the Project	R. Subashini Rough Stone and Gravel Quarry
S.F. No.	70/4, 70/5A1, 70/5A2, 70/5B, 70/6, 70/7 and 70/8, 54/2, 54/3
Extent	3.11.0 Ha
Land Type	Patta Land
Village Taluk and District	Sundakkottai Village, Aladipatti Village, Taluk: Aruppukkottai District: Virudhunagar

1.2 QUARRY DETAILS WITHIN 500 M RADIUS

Sl. No	Name of the lessee	Village	S.F. Nos	Extent Area (Ha)
Proposed				
1.	Thiru. T. Senthivel	Sundakottai and Kalyanasundarapuram	72/2A, 72/2B, 72/3, 72/4, 72/5, 72/7, 73/5A & 73/5B, 4/1A	3.69.72
2.	Tmt. R. Subashini	Aladipatti and Sundakottai	70/4, 70/5A1, 70/5A2, 70/5B, 70/6, 70/7 and 70/8 in Aladipatti, 54/2, 54/3 Sundakottai	3.11.0
3	Thiru. T. R. Varadharajan	Sundakottai & Aruppukkottai	48/12, 13, 14, 50/2,34,5,6 & 11	2.22.5
Existing				
1	S. Balasubramani	Aladipatti, Aruppukkottai	72/1,2,4A,4B ETC	2.26.5
2	R. R. Senthikumar		61/4, 63/5, 63/6, 64/1, 64/2	1.15.5

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Executive Summary

	Raju			
3	V. Rajkumar		61/1B2, 61/3, 61/5A	0.71.5
4	T. R Vardharajan	Sundakottai, Aruppukkottai	53/4, 53/5A	1.40.5
5	R. Sankar	Kalaiyar Karisalkulam, Aruppukkottai	46/1, 46/2A	2.20.5
6	M. Ravi	Kalaiyar Karisalkulam, Aruppukkottai	40/4A, 40/4B	1.39.0
7	A. Saraswathi	Kalaiyar Karisalkulam, Aruppukkottai	41/6, 45/3C	1.01.0
Total Extent				19.17.72

1.3 SALIENT FEATURES OF THE PROPOSAL

PROPOSAL – P1		
Name of the Quarry	T. Senthivel Rough Stone and Gravel Quarry	
Toposheet No	58 - I/03	
Latitude between	09°28'02.84"N-09°28'09.17"N	
Longitude between	78°11'22.32"E - 78°11'31.77"E	
Highest Elevation	72 m AMSL	
Proposed Depth of Mining	The ultimate depth of mining is about 42m (2m Gravel + 40m Rough stone) below ground level.	
Geological Resources	Rough Stone in m ³	Gravel m ³
	14,78,880	73,944
Mineable Reserves	Rough Stone in m ³	Gravel m ³
	4,17,600	42,216
Ultimate Pit Dimension	215 m (L) x 117 m (W) x 42m (D) (BGL)	
Water Level in the surrounds area	60 – 65 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	Flat terrain, the area has gentle sloping towards South-eastern side and altitude of the area is 72m above from Mean Sea level.	
Machinery proposed	Jack Hammer	6 Nos
	Compressor	2 Nos
	Hydraulic Excavator	2 Nos
	Tippers	4 Nos
Blasting Method	The quarrying operation is proposed to carried out by Mechanized Opencast Method in conjunction with conventional method of mining using jack hammer drilling and blasting of shattering effect for loosen the Rough Stone.	
Proposed Manpower Deployment	32 Nos	
Project Cost	Rs. 63,11,000/-	
CER Cost @ 2% of Project Cost	Rs. 1,27,000/-	
Nearby Water Bodies	Muthuramalingapuram Village Pond 2.5km W	
Greenbelt Development Plan	Proposed to plant 620 trees in 5600 Sq.m area	
Proposed Water Requirement	4 KLD	
Nearest Habitation	1 km North East	

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Executive Summary

PROPOSAL – P2		
Name of the Quarry	R. Subashini Rough Stone & Gravel Quarry	
Toposheet No	58 - I/03	
Latitude between	09°28'21.45"N-09°28'27.70"N	
Longitude between	78°11'21.10"E -78°11'28.71"E	
Highest Elevation	72 m AMSL	
Proposed Depth of Mining	The ultimate depth of mining is about 47m (2m Gravel + 5m Weathered Rock + 40m Rough Stone) below ground level.	
Geological Resources	Rough Stone in m ³	Gravel m ³
	12,44,000	62,200
Mineable Reserves	Rough Stone in m ³	Gravel m ³
	2,96,445	35,044
Ultimate Pit Dimension	193 m (L) x 119 m (W) x 47 m (D) (BGL)	
Water Level in the surrounds area	60– 65 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	Altitude of the area is 72m above from Mean Sea level	
Machinery proposed	Jack Hammer	4 Nos
	Compressor	1 Nos
	Hydraulic Excavator	1 Nos
	Tippers	2 Nos
Blasting Method	The quarrying operation is proposed to carried out by Mechanized Opencast Method in conjunction with conventional method of mining using jack hammer drilling and blasting of shattering effect for loosen the Rough Stone.	
Proposed Manpower Deployment	20 Nos	
Project Cost	Rs. 66,57,000/-	
CER Cost @ 2% of Project Cost	Rs. 1,34,000/-	
Nearby Water Bodies	Muthuramalingapuram Village Pond	2.5km W
Greenbelt Development Plan	Proposed to plant 1500 trees in 14050 Sq.m area.	
Proposed Water Requirement	4 KLD	
Nearest Habitation	1.0 km North East	

1.4 STATUTORY DETAILS

PROPOSAL – P1

- The proponent applied for Rough Stone and Gravel Quarry Lease Dated: 18.12.2020
- Precise Area Communication Letter was issued by the District Collector, Virudhunagar Rc.No.KV1/518/2020-Mines, Dated: 18.12.2021
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Virudhunagar District, vide Roc. No.: KVI/469/2020/Mines Dated :18.12.2020
- 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 and got the TOR vide a letter No. SEIAA/TN/F.No.8459/SEAC/ToR-1002/2021 dated 28.07.2021.

PROPOSAL – P2

- The proponent applied for Rough Stone and Gravel Quarry Lease Dated: 18.12.2020
- Precise Area Communication Letter was issued by the District Collector, Tiruppur R.C.No.518/2020/Mines Dated: 18.12.2020
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Virudhunagar District, vide R.C. No.: KVI/518/2020/Mines Dated :09.02.2021
- The proposed project falls under “B1” Category as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and

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Executive Summary

MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018

- Proponent applied for ToR for Environmental Clearance and got the TOR vide a letter No. SEIAA/TN/F.No.8446/SEAC/ToR-1005/2021 dated 28.07.2021

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 proposed quarries in the cluster. Rough Stone is proposed to be excavated by opencast mechanized method involving splitting of rock mass of considerable volume from the parent rock mass by jackhammer drilling and blasting, hydraulic excavators are used for loading the Rough Stone from pithead to the needy crushers and rock breakers to avoid secondary blasting.

2.1 SITE CONNECTIVITY TO THE PROJECT AREA

Nearest Roadway	NH-45B- Madurai – Thoothukudi – 10km – NW SH-47 –Aruppukkottai – Tiruchuli – 4km – NW
Nearest Village	Aladipatti – 1.0 km-NorthEast
Nearest Town	Aruppukkottai- 9.4km in the NW
Nearest Railway	Tiruchuli Railway station – 7km – NE
Nearest Airport	Madurai Airport – 50km – NW
Seaport	Gulf of Manar- 46 km – South East

2.2 LAND USE PATTERN OF THE LEASE APPLIED AREA

S. No.	Description	Thiru. T. Senthivel		Tmt. R. Subashini	
		Present area (Ha)	Area at the end of this quarrying period (Ha)	Present area (Ha)	Area at the end of this quarrying period (Ha)
1.	Area under Quarrying	Nil	2.11.00	Nil	1.57.5
2.	Infrastructure	Nil	0.01.00	Nil	0.01.0
3.	Roads	Nil	0.02.00	Nil	0.02.0
4.	Green Belt	Nil	0.28.00	Nil	1.40.5
5.	Unutilized Area	3.69.72	1.27.72	3.11.0	0.10.0
Total		3.69.72	3.69.72	3.11.0	3.11.0

2.3 OPERATIONAL DETAILS OF LEASE APPLIED AREA

THIRU. T. SENTHIVEL		
PARTICULARS	DETAILS	
	Rough Stone	Gravel
Geological Resources in m ³	14,78,880	73,944
Mineable Reserves in m ³	417600	42216
Mining Plan Period	10 Years	
Number of Working Days	300 Days	
Production per day in m ³	139.2	14
No of Lorry loads (6 m ³ per load)	23	2
Total Depth of Mining	42m (2m Gravel + 40m Rough stone) below ground level.	

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Executive Summary

TMT. R. SUBASHINI		
PARTICULARS	DETAILS	
	Rough Stone	Gravel
Geological Resources in m ³	12,44,000	31,100
Mineable Reserves in m ³	296445	35,044
Mining Plan Period	10 Years	7 Years
Number of Working Days	300 Days	
Production per day in m ³	98.8	16.6
No of Lorry loads (6m ³ per load)	16	3
Total Depth of Mining	47m (2m Gravel + 5m Weathered Rock + 40m Rough Stone)	

2.4 YEAR-WISE PRODUCTION PLAN

Thiru. T. Senthivel		
YEAR	ROUGH STONE (m³)	GRAVEL (m³)
i.	43000	11696
ii.	43000	8944
iii.	41250	21576
iv.	41750	-
v.	45000	-
vi.	41100	-
vii.	41500	-
viii.	38200	-
ix.	44000	-
x.	38800	-
TOTAL	417600	42216
Tmt. R. Subashini		
YEAR	ROUGH STONE (m³)	GRAVEL (m³)
I.	43000	11696
II.	43000	8944
III.	41250	21576
IV.	41750	-
V.	45000	-
VI.	41100	-
VII.	41500	-
VIII.	38200	-
IX.	44000	-
X.	38800	-
TOTAL	417600	42216

Draft EIA/EMP for Sundakkottai, Kalyanasundarapuram and Sundakkottai, Aladipatti Village Cluster (Cluster Area: 17.85.72 Ha) of Aruppukkottai Taluk, Virudhunagar District, Tamil Nadu

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Executive Summary

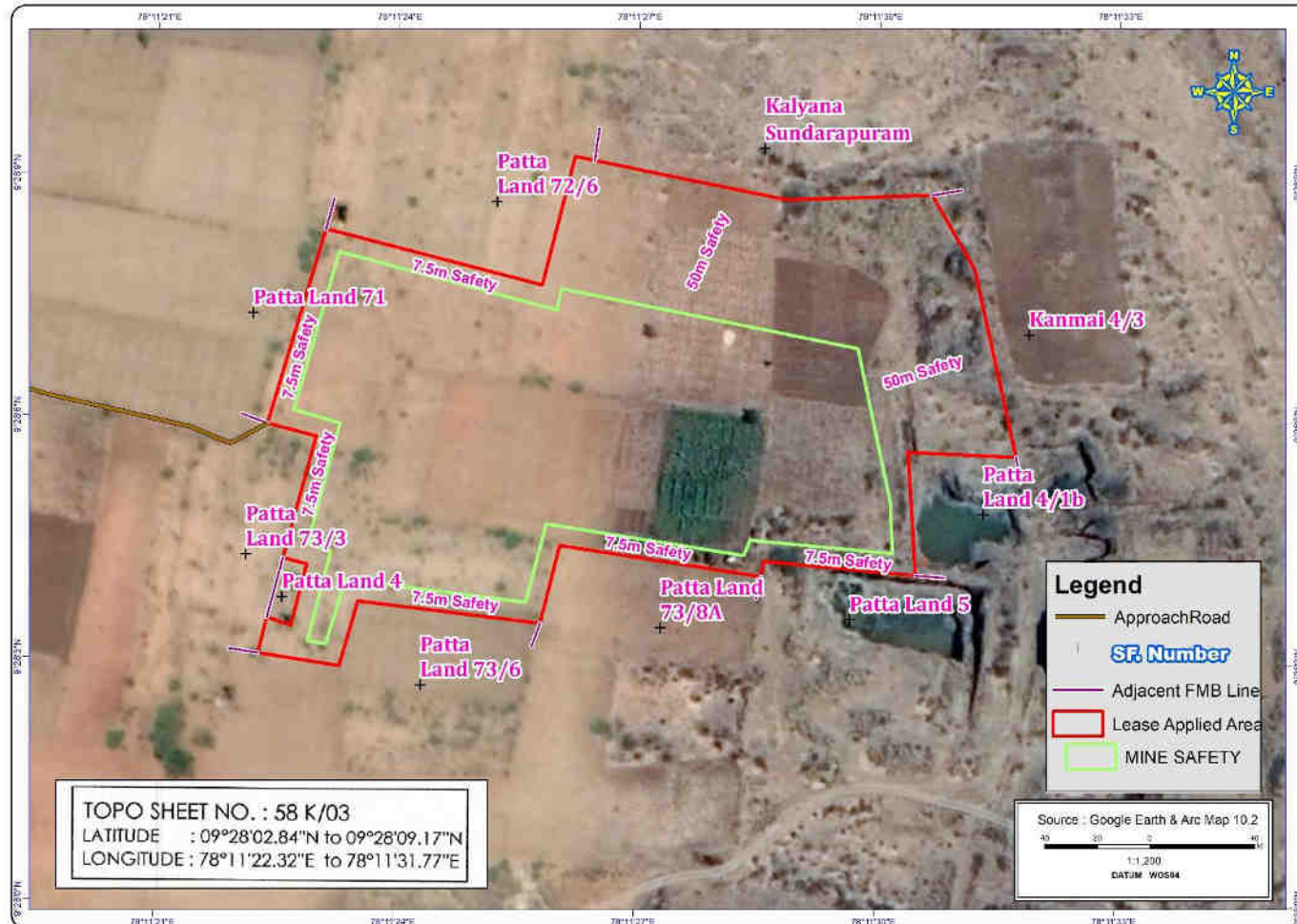


FIGURE – 1: GOOGLE IMAGE SHOWING APPLIED QUARRY LEASE AREA – THIRU. T. SENTHIVEL

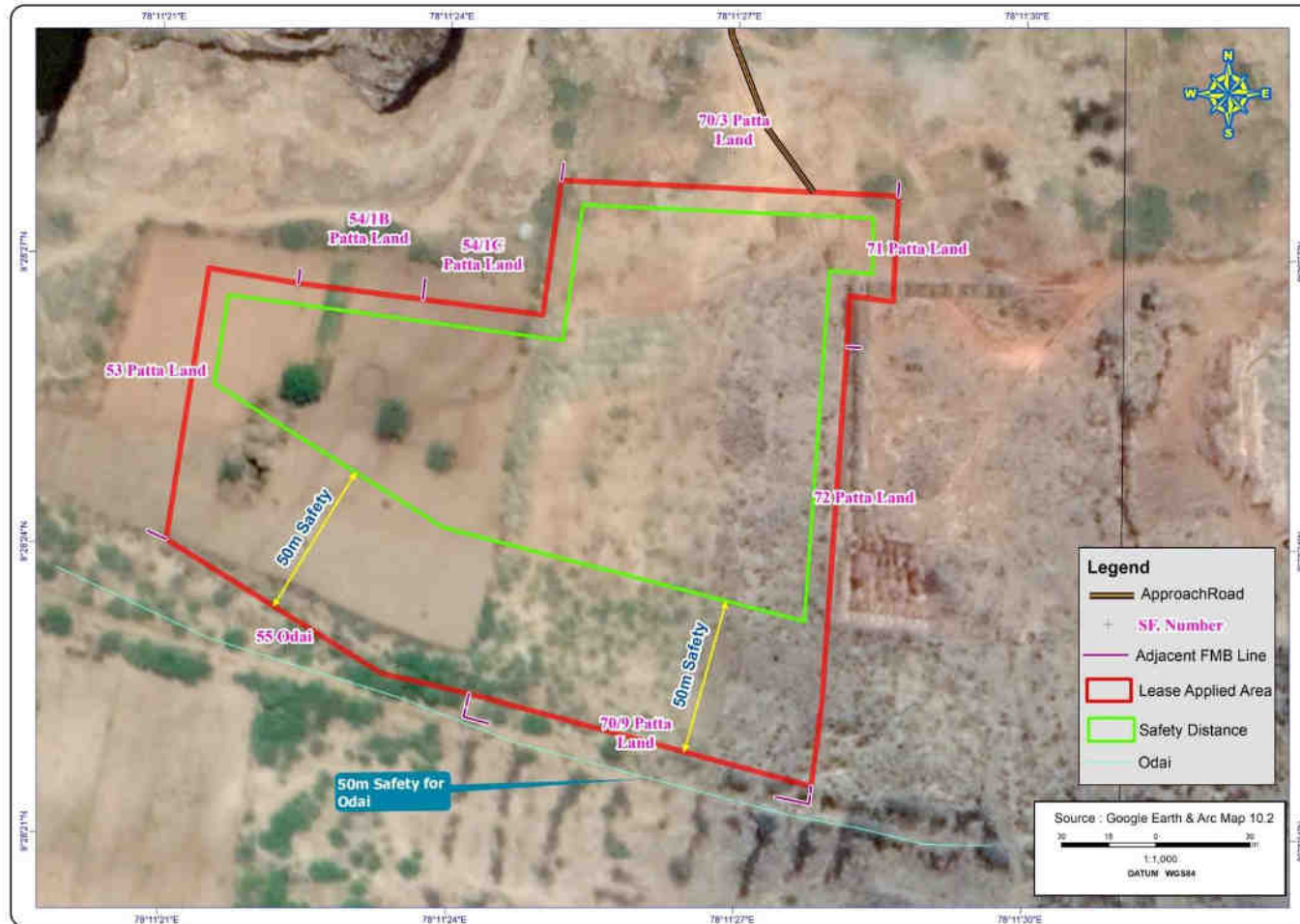


FIGURE – 2: GOOGLE IMAGE SHOWING APPLIED QUARRY LEASE AREA – TMT. R. SUBASHINI

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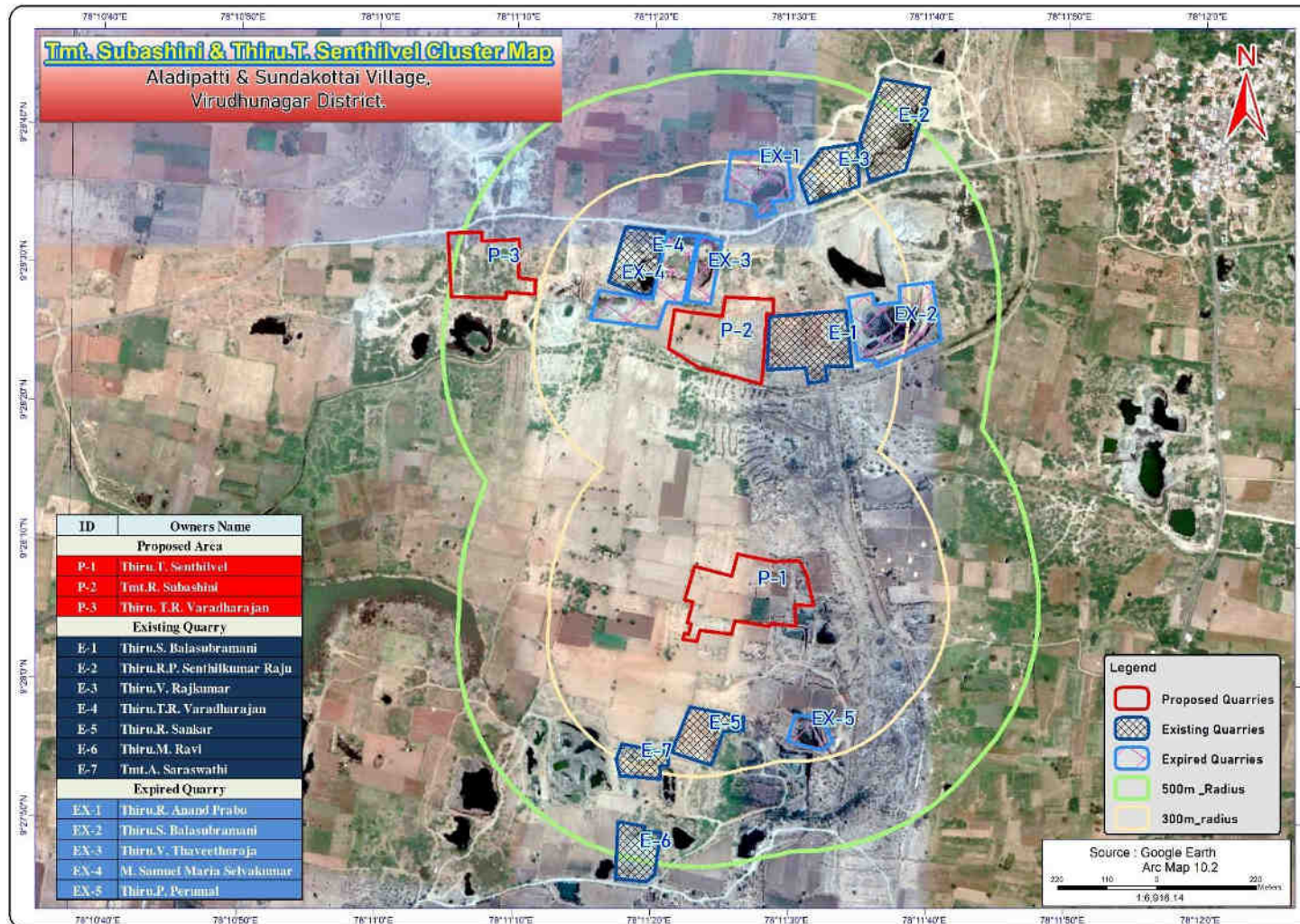


FIGURE – 3: GOOGLE IMAGE SHOWING CLUSTER (500 m QUARRIES)

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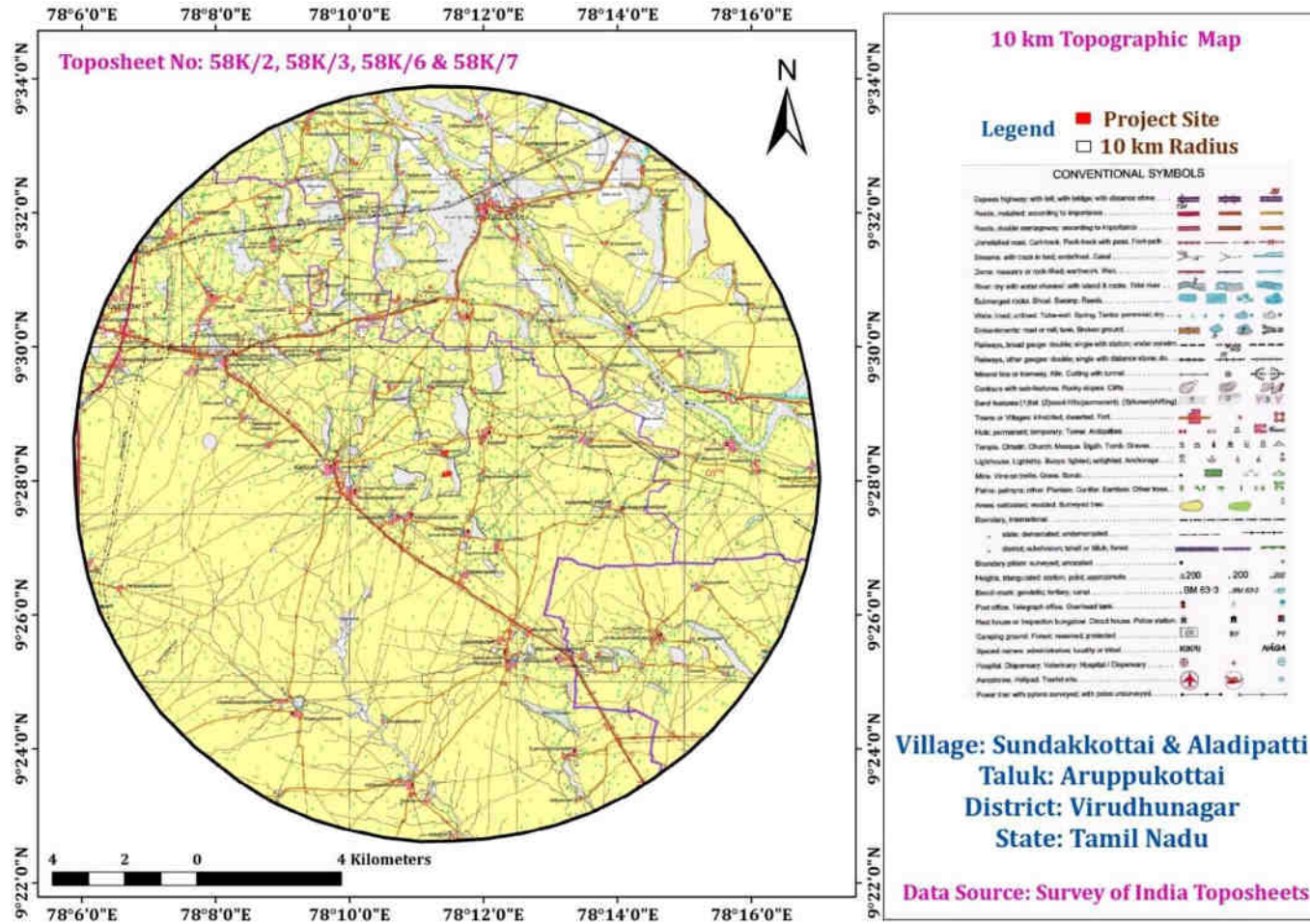


FIGURE – 4: TOPOSHEET MAP COVERING 10 KM RADIUS

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.

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	Particulars	T. Senthivel	R. Subashini
1.	Mine Foreman/ Manager	1	1
2.	Blaster/mate	1	1
3.	Excavator- Operator & Driver	6	3
4.	Jack hammer operator	12	8
Semi- Skilled Labour			
5.	Watchman/ Security	1	1
Unskilled Labour			
6.	Labour & Helper	5	3
7.	Cleaner	6	3
Total		32	20

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 principle 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.

2.8 ULTIMATE PIT DIMENSION

PROPOSAL – P1			
Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max)
I	215	117	42 m bgl
PROPOSAL – P2			
Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max)
I	193	119	47 m bgl

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Executive Summary

3. DESCRIPTION OF THE ENVIRONMENT

Field monitoring studies to evaluate the base line status of the project site were carried out during October to December 2021 as per CPCB guidelines. Environmental Monitoring data has been collected with reference to proposed mine by ENVIRO TECH SERVICES ISO 9001: 2008, OHSAS 18001: 2007 Certified & MoEF Notified Laboratory

3.1 ENVIRONMENT MONITORING ATTRIBUTES

Sl.No.	Attributes	Parameters	Source and Frequency
1	Ambient Air Quality	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂	Continuous 24-hourly samples twice a week for three months at 9 locations (2 Core & 7 Buffer)
2	Meteorology	Wind speed and direction, temperature, relative humidity and rainfall	Near project site continuous for three months with hourly recording and from secondary sources of IMD station
3	Water quality	Physical, Chemical and Bacteriological parameters	Grab samples were collected at 6 locations – 5 ground water and 1 surface water samples; once during study period.
4	Ecology	Existing terrestrial and aquatic flora and fauna within 10 km radius circle.	Limited primary survey and secondary data was collected from the Forest department.
5	Noise levels	Noise levels in dB(A)	9 locations – data monitored once for 24 hours during EIA study
6	Soil Characteristics	Physical and Chemical Parameters	Once at 9 locations during study period
7	Land use	Existing land use for different categories	Based on Survey of India topographical sheet and satellite imagery and primary survey.
8	Socio-Economic Aspects	Socio-economic and demographic characteristics, worker characteristics	Based on primary survey and secondary sources data like census of India 2011.
9	Hydrology	Drainage pattern of the area, nature of streams, aquifer characteristics, recharge and discharge areas	Based on data collected from secondary sources as well as hydro-geology study report prepared.
10	Risk assessment and Disaster Management Plan	Identify areas where disaster can occur by fires and explosions and release of toxic substances	Based on the findings of Risk analysis done for the risk associated with mining.

3.2 LAND ENVIRONMENT

S.No	Level I	Level -II	Area (Km ²)	Percentage (%)
1	Built-up Land	Built-up Land	48.77	14.48
2	Agricultural Land	Crops – Cultivated & Uncultivated	175.8	52.60
3	Waste Land	Scrub/Shrub	86.88	26.0
		Plantation	1.19	0.35
		Bare Land	11.04	3.30
4	Water Body	Water Body	6.42	1.92
5	Others	Mining land	0.62	0.19
		Solar Panels Land	3.54	1.06
Total			323.26	100

Of the 6 LU/LC classes as per NRSA-TR-LU & CD-01-90 the 10 Km radius study area has presence of only 5 LU/LC classes are shown in Table above of which the agricultural land has the highest category of land which is combination of both cultivated and Uncultivated 52.6 % (175.8 Km²) followed by waste land which comprises

of scrub 26 % (86.88 Km²), plantation 0.35 % (1.19 Km²) and bare land 1.92 % (11.04 km²), followed by built-up land 14.48 % (48.77 Km²), while water body comprises of 1.92 % (6.42 Km²) and the last other i.e. mining comprises of 0.19 % (0.62 Km²) and solar panels land 1.06 % (3.54 Km²),.

3.3 SOIL ENVIRONMENT

- pH of the soil samples varied from 7.18 to 8.78 indicating slightly alkaline soil
- Bulk density of the soil samples varied from 0.91 to 1.19 g/cm³
- Organic matter in the soil samples varied from 1.22 to 1.96 %
- Total Nitrogen in the soil samples varied from 125.6 to 190.3 mg/kg
- Water Holding Capacity (WHC) in the soil samples varied from 42.1 to 48.

From the analysis results of the soil samples, it was observed that the soil was low to medium fertile and having low productivity. The soil in the study area needs additional fertilizers for improving the fertility status and increase in crop productivity. This also indicates the poor level of micro-nutrient. The organic matter was found in the range of 1.22 to 1.90.3 % indicating moderate organic content in the soil. Overall, the soil quality in the area was found to medium to fair fertile with moderate productivity.

3.4 WATER ENVIRONMENT

Surface Water

The pH of the water samples collected is 7.12 and is within the acceptable limit of 6.5 to 8.5. The total dissolved solids were found 419 mg/l in all samples. The total hardness was 173.6 mg/l for all sample collected at 1 location only.

In all samples, iron content is 0.11 mg/l, Nitrate in between 12.2 mg/l, fluoride varied between 0.19 mg/l, chloride 82.6 to 85.7 mg/l, Sulphate 21.3 to 26.2 mg/l, alkalinity 163.5 to 176.4 mg/l, calcium 80.2 mg/l and magnesium in between 22.4 mg/l. The overall surface water quality was found to be good in the village. The levels of heavy metals content were found to be within permissible limits.

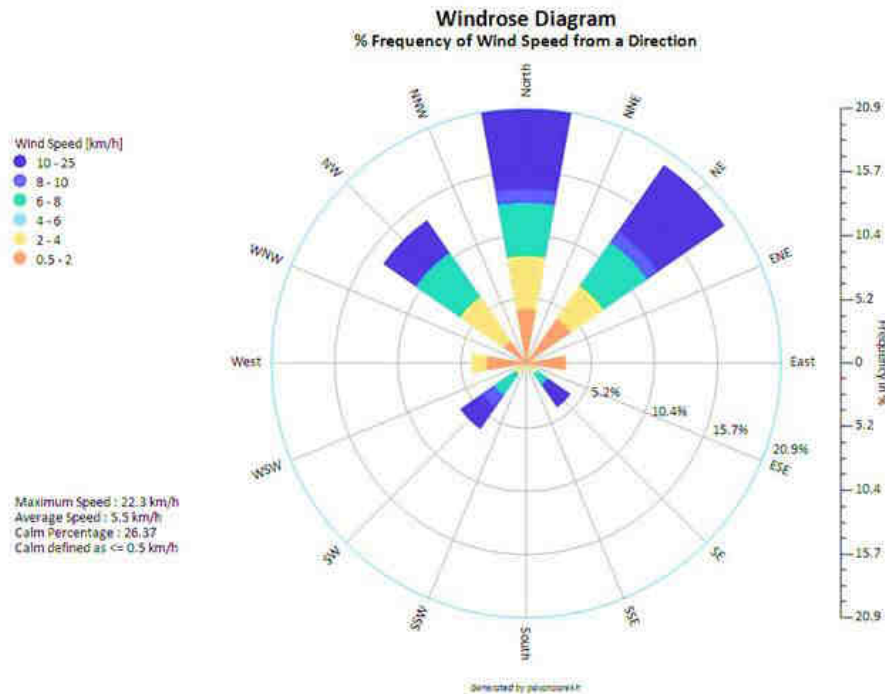
Ground Water

The physico-chemical characteristics of groundwater are presented in Table below and are compared with the standards. The pH of the water samples collected ranged from 6.52 to 7.67 and within the acceptable limit of 6.5 to 8.5. The total dissolved solids were found in the range of 373 to 450 mg/l in all samples. The total hardness varied between 104.7 to 145.9 mg/l for all samples collected at 5 locations.

In all samples, iron content is 0.12 to 0.3 mg/l, Nitrate in between 13.0 to 18.0 mg/l, fluoride varied between 0.11 to 0.27 mg/l, chloride 71.5 to 90.0 mg/l, Sulphate 17.2 to 24.5 mg/l, alkalinity 150.0 to 188.0 mg/l, calcium 20.1 to 28.0 mg/l and magnesium in between 14.6 to 18.5 mg/l. The overall ground water quality was found to be good in most of the villages. The levels of heavy metals content were found to be within permissible 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 – 14: WIND ROSE DIAGRAM
SUMMARY OF AMBIENT AIR QUALITY DATA**

Particulate matter PM-2.5					
Station ID	Max	Min	Mean	98 Percentile Value	STDEV
AAQ-1	21.8	20	20.9	21.6	0.54
AAQ-2	24.7	21.1	23.0	24.1	0.94
AAQ-3	21.8	19	20.1	21.4	0.85
AAQ-4	20.9	16.5	19.3	20.6	0.98
AAQ-5	24.6	21.1	23.0	24.1	0.96
AAQ-6	25.9	21.2	24.1	25.55	1.19
AAQ-7	24.9	22.1	23.6	24.65	0.81
AAQ-8	25.3	21.2	23.8	25.1	1.16
AAQ9	25.8	21.3	23.9	25.5	1.42
Particulate matter PM-10					
Station ID	Max	Min	Mean	98 Percentile Value	STDEV
AAQ-1	42.7	39.9	41.2	42.2	0.74
AAQ-2	46.8	42.1	44.4	46.1	1.22
AAQ-3	42.1	38.3	39.9	41.3	1.01
AAQ-4	41.9	38.5	40.7	41.7	0.90
AAQ-5	46.2	42.5	44.4	45.9	1.09
AAQ-6	47.2	43.5	45.8	46.9	0.88
AAQ-7	46.8	43.2	45.6	46.6	1.00
AAQ-8	45.1	43	44.0	44.9	0.72
AAQ9	45.9	42.9	44.14	45.9	1.11

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Lessee: Thiru. T. Senthivel (Area: 3.69.72 Ha) and Tmt. R. Subashini (Area: 3.11.0 Ha)

Executive Summary

Sulphur Di-oxide as SO₂					
Station ID	Max	Min	Mean	98 Percentile Value	STDEV
AAQ-1	9.7	7.8	8.8	9.6	0.53
AAQ-2	8.9	7.1	8.1	8.7	0.53
AAQ-3	7.6	5.8	6.5	7.2	0.47
AAQ-4	6.9	5.2	6.1	6.7	0.44
AAQ-5	7.9	6.1	7.1	7.6	0.43
AAQ-6	7.9	6.3	7.2	7.8	0.39
AAQ-7	7.8	6.2	7.2	7.6	0.37
AAQ-8	7.9	6.1	7.0	7.7	0.53
AAQ9	7.9	6.1	7.0	7.8	0.38
Oxide of Nitrogen as NO₂					
Station ID	Max	Min	Mean	98 Percentile Value	STDEV
AAQ-1	24.6	19.5	21.7	23.6	1.41
AAQ-2	24.8	20.2	23.4	24.6	1.30
AAQ-3	23.9	21.6	22.5	23.7	0.74
AAQ-4	24.9	21.4	23.5	24.8	1.01
AAQ-5	24.9	22	23.5	24.8	0.90
AAQ-6	24.7	21.9	23.8	24.7	0.80
AAQ-7	26.4	21.9	23.9	25.7	1.37
AAQ-8	24.8	21.3	23.1	24.3	0.93
AAQ9	24.8	21.3	23.1	24.7	1.23

The results of ambient air quality monitoring for the period (October 2021 to December 2021) are presented in the report. Data has been compiled for three months.

- PM₁₀ concentration in the study area varied from 38.3 to 47.2 µg/m³ during the study period.
- PM_{2.5} concentration in the study area varied from 16.5 to 25.9 µg/m³ during the study period.
- SO₂ concentration in the study area varied from 5.2 to 9.7 µg/m³ during the study period.
- NO₂ concentration in the study area varied from 19.5 to 26.4 µg/m³ during the study period.

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 9 (Nine) locations around the proposed project area. Noise levels recorded in core zone during day time were from 39.4 to 46.1 dB (A) Leq and during night time were from 34.5 to 38.8 dB (A) Leq.

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 COMMON FOR BOTH PROPOSED QUARRIES

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 soil 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 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 drains, settling tank will be constructed along the individual mining leases. The Garland drains of the individual leases will be connected to settling tank and after settling the 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 onwards 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
- 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 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 and analysing the quality of water in open well, bore wells and surface water

4.3 AIR ENVIRONMENT

ANTICIPATED IMPACT

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

MITIGATION MEASURES

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

Advantages of Wet Drilling: -

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

Blasting –

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

Haul Road & Transportation –

- Water will be sprinkled on haul roads twice a day to avoid dust generation during transportation
- Transportation of material will be carried out during day time and material will be covered with tarpaulin
- The speed of tippers plying on the haul road will be limited below 20 km/hr to avoid generation of dust.
- Water sprinkling on haul roads & loading points will be carried out twice a day

- Main source of gaseous pollution will be from vehicle used for transportation of mineral; therefore, weekly maintenance of machines improves combustion process & makes reduction in the pollution.
- The un-metalled haul roads will be compacted weekly before being put into use.
- Over loading of tippers will be avoided to prevent spillage.
- It will be ensured that all transportation vehicles carry a valid PUC certificate
- Grading of haul roads and service roads to clear accumulation of loose materials

Green Belt –

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

Occupational Health –

- Dust mask will be provided to the workers and their use will be strictly monitored
- Annual medical 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

PROPOSED AFFORESTATION PROGRAM - T. SENTHIVEL

Year	No. of trees proposed to be planted	Survival %	Area to be covered sq.m.	Name of the species	No. of trees expected to be grown
1.	62	80%	560	Neem, Pongamia pinnata, Thespesia, Casuarina, etc.,	50
2.	62	80%	560		50
3.	62	80%	560		50
4.	62	80%	560		50
5.	62	80%	560		50
6.	62	80%	560		50
7.	62	80%	560		50
8.	62	80%	560		50
9.	62	80%	560		50
10.	62	80%	560		50

PROPOSED AFFORESTATION PROGRAM - TMT. R. SUBASHINI

Year	No. of trees proposed to be planted	Survival %	Area to be covered sq.m.	Name of the species	No. of trees expected to be grown
1.	150	80%	1405	Neem, Pongamia pinnata, Thespesia, Casuarina, etc.,	120
2.	150	80%	1405		120
3.	150	80%	1405		120
4.	150	80%	1405		120
5.	150	80%	1405		120
6.	150	80%	1405		120
7.	150	80%	1405		120
8.	150	80%	1405		120
9.	150	80%	1405		120
10.	150	80%	1405		120

4.6 SOCIO ECONOMIC ENVIRONMENT

ANTICIPATED IMPACT

Employment generation due to the project will provide direct employment for about 52 (total) 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.

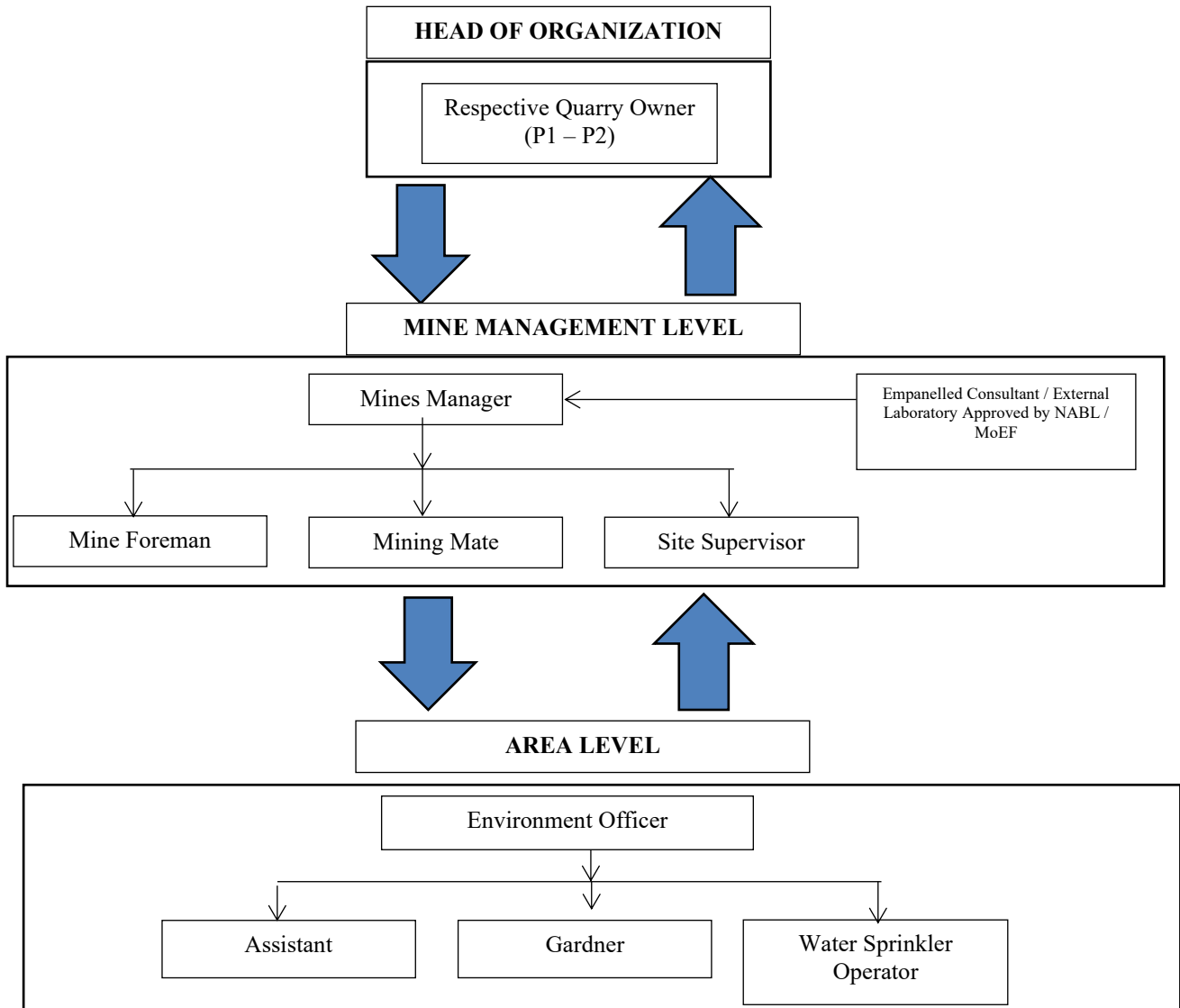
6. ENVIRONMENT MONITORING PROGRAM

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 ENVIRONMENTAL MONITORING CELL



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Executive Summary

6.2 POST ENVIRONMENTAL CLEARANCE MONITORING SCHEDULE

IN COMMON FOR PROPOSED MINE					
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.

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Lessee: Thiru. T. Senthivel (Area: 3.69.72 Ha) and Tmt. R. Subashini (Area: 3.11.0 Ha)

Executive Summary

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	10 Years in m ³	Per Year in m ³	Per Day in m ³	Number of Lorry Load Per Day
M/s T. Senthivel	4,17,600	41760	139	23
M/s R. Subashini	2,96,445	29644	99	16
Total	714045	71404	238	39

CUMULATIVE PRODUCTION LOAD OF GRAVEL

Quarry	Years in m ³	Per Year in m ³	Per Day in m ³	Number of Lorry Load Per Day
M/s T. Senthivel	42,216 (3years)	14072	47	8
M/s R. Subashini	35,044 (7years)	5006	17	3
Total	77260	19078	64	11

ANTICIPATED GROUND VIBRATIONS IN CLUSTER

Distance from blasting site, m	R. Subashini		T. Senthivel	
	Quantity of Explosive/Blast, Kg	PPV, mm/s	Quantity of Explosive/Blast, Kg	PPV, mm/s
100	43	13.3	60	16.4
150	43	8.0	60	9.8
200	43	5.5	60	6.8
250	43	4.2	60	5.2
300	43	3.3	60	4.1
350	43	2.7	60	3.4
400	43	2.3	60	2.8
450	43	2.0	60	2.5
500	43	1.7	60	2.1
550	43	1.5	60	1.9
600	43	1.4	60	1.7
650	43	1.2	60	1.5
700	43	1.1	60	1.4
750	43	1.0	60	1.3

Draft EIA/EMP for Sundakkottai, Kalyanasundarapuram and Sundakkottai, Aladipatti Village Cluster (Cluster Area: 17.85.72 Ha) of Aruppukkottai Taluk, Virudhunagar District, Tamil Nadu

Lessee: Thiru. T. Senthivel (Area: 3.69.72 Ha) and Tmt. R. Subashini (Area: 3.11.0 Ha)

Executive Summary

SOCIO ECONOMIC BENEFITS FROM CLUSTER

As per comments during public hearing need-based CSR will be carried out while as per project cost 2% CER comes to as:

Particulars	Thiru. T. Senthivel	Tmt. R. Subashini
CER Cost (2.0%)	Rs. 1,27,000/-	Rs. 1,34,000

EMPLOYMENT BENEFITS

S.No	Particulars	Thiru. T. Senthivel	Tmt. R. Subashini
1.	Mine Foreman/ Manager	1	1
2.	Blaster/mate	1	1
3.	Excavator- Operator & Driver	6	3
4.	Jack hammer operator	12	8
Semi- Skilled Labour			
5.	Watchman/ Security	1	1
Unskilled Labour			
6.	Labour & Helper	5	3
7.	Cleaner	6	3
Total		32	20

8. PROJECT BENEFITS

Two Proposed Projects for Quarrying Rough Stone at Sundakkottai Village, Kalyanayasundarapuram Village, and Aladipatti Village aims to produce cumulatively **714045** m³ Rough Stone & **77260** m³ of Gravel over a period of 10 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

Draft EIA/EMP for Sundakkottai, Kalyanasundarapuram and Sundakkottai, Aladipatti Village Cluster (Cluster Area: 17.85.72 Ha) of Aruppukkottai Taluk, Virudhunagar District, Tamil Nadu

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Executive Summary

- ✚ 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.