

# EXECUTIVE SUMMARY

## CHETTIPILLAYARNATHAM ROUGH STONE AND GRAVEL CLUSTER QUARRIES

### NAME OF PROPOSED PROJECT PROPONENTS APPLYING IN CLUSTER

S.Nos.	Proponent Name	Extent (Ha)
1	Thiru. P. Shanmugam,	4.68.5
2	Thiru.P.Kandavelu,	4.98.0

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

\* **CLUSTER EXTENT = 13.05.0 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.9276/SEAC/ToR-1209/2022 Dated:14.07.2022-Thiru.P. Shanmugam,
2. Lr.No. SEIAA-TN/F.No.9067/ToR-1179/2022 Dated:13.06.2022- Thiru.P. Kandavelu,

### Environmental Consultant

### GEO EXPLORATION AND MINING SOLUTIONS



Old No. 260-B, New No. 17,  
Advaitha Ashram Road, Alagapuram,  
Salem – 636 004, Tamil Nadu, India



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**Baseline Monitoring Period - December 2022 to February 2023**

### Environmental Lab

### Chennai Mettex Lab Pvt Ltd

(Approved by AAI, AGMARK, APEDA, BIS, EIC, FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD)  
Jothi Complex, 83, M.K.N, Road, Guindy, Chennai – 600 032, Tamil Nadu, INDIA

**March 2023**

## 1. INTRODUCTION

Rough Stone and Gravel are the major requirements for construction industry. This EIA report is prepared by considering Cumulative load of all proposed & existing quarries of Chettipillayarnatham Rough Stone and Gravel Cluster Quarries consisting of Three Proposed and one Existing Quarries with total extent of Cluster of 13.05.0Ha in Chettipillayarnatham Village, Thirumangalam Taluk, Madurai 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, Madurai 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. P. Shanmugam,	4.68.5	Lr.No.SEIAA-TN/F.No.9276/SEAC/ToR-1209/2022 Dated:14.07.2022
P2	Thiru.P.Kandavelu,	4.98.0	Lr.No.SEIAA-TN/F.No.9067/ToR-1179/2022 Dated:13.06.2022

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

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

### **“Draft EIA report prepared on the basis of ToR Issued for carrying out public hearing for the grant of Environmental Clearance from SEIAA, Tamil Nadu”**

#### 1.1 DETAILS OF PROJECT PROPONENT

PROPOSAL – P1	
Name of the Company	Thiru. P. Shanmugam, Rough Stone & Gravel Quarry Project
Address	S/o. Palanisamy, Yadhavar Street, Iravadhanallur, Madurai District – 625 009, Tamil Nadu State.
Mobile	+91 7305048510, 9952423202
Status	Proprietor
PROPOSAL – P2	
Name of the Company	Thiru.P. Kandavelu, Rough Stone & Gravel Quarry Project
Address	S/o. K. Palanisamy, Yadavar Street, Iravathanallur,

	Madurai District – 625 009
<b>Mobile</b>	+91 7305048510
<b>Status</b>	Proprietor

The project proponent is an individual.

## 1.2 QUARRY DETAILS WITHIN 500 M RADIUS

<b>PROPOSED QUARRIES</b>				
<b>CODE</b>	<b>Name of the Proponent and Address</b>	<b>S.F. Nos, Village &amp; Taluk</b>	<b>Extent in Ha</b>	<b>Status</b>
P1	<b>Thiru. P. Shanmugam,</b> S/o. Palanisamy, Yadhavar Street, Iravadhanallur, Madurai District – 625 009, Tamil Nadu State.	51/1A & etc., 74/1A1 & etc., 75/4B & etc of Chettipillayarnatham Village, Thirumangalam Taluk, Madurai	4.68.5ha	Obtained ToR vide, Lr.No. SEIAA- TN/F.No.9276/SEAC/ToR- 1209/2022 Dated:14.07.2022
P2	<b>Thiru.P. Kandavelu,</b> S/o. K. Palanisamy, Yadavar Street, Iravathanallur, Madurai District – 625 009	28/1, 29/1, 29/2, 30/1A1, etc., Chettipillayarnatham Village, Thirumangalam Taluk, Madurai	4.98.0Ha	Obtained ToR vide, Lr.No. SEIAA- TN/F.No.9067/ToR- 1179/2022 Dated:13.06.2022
P3	<b>Thiru. P. Rajmohan,</b> S/o. Periyamani 2/10, Nadu Street, Alampatti Post, Thirumangalam Taluk, Madurai District	81/2A1 and 81/2A2, Chettipillayarnatham Village, Thirumangalam Taluk, Madurai	1.65.5 Ha	vide Lr.No. SEIAA TN/F.No. 8438/SEAC/ToR- 998/2021Dated:28.07.2021. <b>Public Hearing Conducted</b>
	<b>Total Extent</b>		<b>11.32.0 Ha</b>	
<b>EXISTING QUARRIES</b>				
<b>CODE</b>	<b>Name of the Proponent and Address</b>	<b>S.F. Nos, Village &amp; Taluk</b>	<b>Extent in Ha</b>	<b>Lease Period</b>
E1	<b>Thiru. P. Shanmugam,</b> S/o. Palanisamy, Yadhavar Street, Iravadhanallur, Madurai District – 625 009, Tamil Nadu State.	79/4D, 79/7A, etc., etc., Chettipillayarnatham Village, Thirumangalam Taluk, Madurai	1.73.0	ROC.NO.533/2018 dt 28.02.2019 06.03.2019 to 05.03.2024
	<b>Total Extent</b>		<b>1.73.0</b>	
<b>ABANDONED/EXPIRED QURRIES</b>				
<b>CODE</b>	<b>Name of the Proponent and Address</b>	<b>S.F. Nos, Village &amp; Taluk</b>	<b>Extent in Ha</b>	<b>Lease Period</b>
Ex-1	<b>Thiru.P.Kandavelu,</b> S/o. K.Palanisamy, Yadavar Street, Iravathanallur, Madurai District – 625 009	51/2A, 51/2B, 51/2C,etc, Chettipillayarnatham Village, Thirumangalam Taluk, Madurai	<b>4.41.0 Ha</b>	ROC.NO.320/2011 dt 03.07.2015 28.07.2015 to 27.07.2020

Ex-2	<b>Thiru. R. Gopalakrishnan</b> Madurai	82/2A, 82/2B, 82/3,82/4A &82/5 Chettipillayarnatham Village, Thirumangalam Taluk,	<b>2.49.5 Ha</b>	ROC.NO.404/2014 dt 13.11.2015 05.12.2015 to 04.12.2020
<b>TOTAL CLUSTER EXTENT</b>			<b>13.05.0 Ha</b>	

**TABLE 1.3 SALIENT FEATURES OF THE PROPOSAL**

SALIENT FEATURES OF PROPOSAL "P1"		
Name of the Mine	<b>Thiru. P. Shanmugam, Rough Stone &amp; Gravel Quarry Project</b>	
Land Type	It is a Patta lands. Registered in the name of the applicant (Thiru. P. Shanmugam), vide Patta Nos. 556 & 566, Thiru. P. Thirugnanasambanthan, vide Patta Nos. 508 & 464 and Thiru. P. Ketharnath, vide Patta No. 558. The applicant has obtained consent from the other Pattadars.	
S.F. Nos	51/1A, etc., 74/1A1 & etc., 75/4B	
Extent	4.68.5 Ha	
Previous quarry operation details	<ul style="list-style-type: none"> <li>➤ <b>Thiru.P.Thirugnanasambanthan</b>, over an extent of 1.69.5 hectares of Patta lands in S.F.Nos.74/1A1, 1A2 etc., vide RC.No.58/2006/Mines-A, Dated: 22.05.2006 period of five years from 01.08.2006 to 31.07.2011</li> <li>➤ <b>Thiru. S. Alagar, Legal Representative P. Shanmugam</b>, over an extent of 5.19.0ha of Patta lands in S.F.Nos.51/1A, 1B etc., vide RC.No.895/2008/Mines, Dated: 17.06.2009 for five years period from 31.07.2009 to 30.07.2014</li> <li>➤ <b>Thiru. P.Kanthavelu, Legal Representative P. Thirugnanasambanthan</b>, over an extent of 4.41.0ha of Patta lands in S.F.Nos.51/2A, 2B, 2C etc., RC.No.320/2011-Mines, Dated: 03.07.2015 for five years period from 28.07.2015 to 27.07.2020.</li> <li>➤ <b>Thiru. P. Shanmugam</b> has <b>applied a quarry lease</b> on 11.06.2021 for over an extent of 4.68.5ha of Patta lands in S.F.Nos.51/1A, 51/1B, etc., period of five years.</li> </ul>	
Existing pit dimensions	238m (L) x 150m (W) x24m(D)	
Geological Reserves	Rough Stone	TopSoil
	15,56,402m <sup>3</sup>	21,292m <sup>3</sup>
Mineable Reserves	Rough Stone	Gravel
	7,24,757m <sup>3</sup>	12,938m <sup>3</sup>
Mining Plan Period / Lease Period	5 Years	
The Ultimate Depth (as per ToR)	47m (2m Gravel +45m Rough stone) bgl.	
Existing Pit Dimension	238m(L) x 150m (W) x24m (D)	
Ultimate Pit Dimension	270m(L) x 168m (W) x47m(D)	
Toposheet No	58 G/13	
Latitude	09°47'24.75"N to 09°47'32.87"N	
Longitude	77°57'43.99"E to 77°57'54.50"E	
Highest elevation	125m AMSL	
Machinery proposed	Jack Hammer	17
	Compressor	4
	Excavator with Bucket and Rock Breaker	3
	Tippers	9
Blasting	Usage of Slurry Explosive with MSD detonators	
Manpower Deployment	75 Nos	
Total Project Cost	Project Cost	Rs. 97,44,000/-

	EMP Cost	Rs. 3,80,000/-
	Total	Rs. 1,01,24,000/-
CER Cost		Rs.2,03,000/-
<b>SALIENT FEATURES OF PROPOSAL "P2"</b>		
Name of the Mine	<b>Thiru.P. Kandavelu, Roughstone and gravel quarry</b>	
Land Type	It is a Patta lands, vide Patta No. 639(Thiru.P.Kandavelu), Thiru.P.Ketharnath vide patta No. 558, Thiru.P.Shanmugam vide patta No. 556, Thiru.P.Ketharnath vide patta No. 1385, Thiru.P.Shanmugam vide patta No.1386, Thiru.P.Shanmugam vide patta No. 1337	
S.F. No.	28/1, 29/1, 29/2, 30/1A1, 30/1A2, 30/1B, 30/1C1, 30/1C2, 30/2A, 30/2B, 30/3D, 31/1A, 31/1B, 31/2A, 47/10C, 48/4A, 48/4B & 48/4C	
Extent	4.98.0 Ha	
Previous quarry operation details	It is a fresh lease application	
Proposed pit dimension	Pit I - 152m (L) X 223m (W) X 32m (D) Pit II - 146m (L) X 55m (W) X 27m (D) Pit III - 30m (L) X 47m (W) X 12m (D)	
Depth restricted as per ToR	42m (32m for the first five years and upto 42m for the remaining Five Years) below ground level	
Geological Resources	Rough Stone	Gravel
	19,92,000m <sup>3</sup>	99,600m <sup>3</sup>
Mineable Reserves	Rough Stone	Gravel
	8,64,680m <sup>3</sup>	80,820m <sup>3</sup>
Proposed production for five years	(4,43,530m <sup>3</sup> for first five years)	
Mining Plan Period / Lease Period	10 Years	
Ultimate Pit Dimension	Pit I - 152m (L) X 223m (W) X 42m (D) Pit II - 146m (L) X 55m (W) X 27m (D) Pit III - 30m (L) X 47m (W) X 12m (D)	
Toposheet No	58 - G/13	
Latitude	09° 47' 15.78"N to 09° 47' 27.56"N	
Longitude	77° 57' 58.92"E to 77° 58' 07.43"E	
Highest Elevation	128m AMSL	
Machinery	Jack Hammer	11
	Compressor	3
	Excavator with Bucket and Rock Breaker	3
	Tippers	6
Blasting	Usage of Slurry Explosive with MSD detonators	
Manpower Deployment	49 Nos	
Total Cost	Project Cost	Rs. 88,70,000/-
	EMP Cost	Rs. 7,60,000/-
	Total	Rs. 96,30,000/-
CER Cost	Rs.1,93,000/-	

### 1.3 STATUTORY DETAILS

#### Project – P1 – Thiru. P. Shanmugam

∞ The proponent applied for Rough Stone and Gravel Quarry Lease Dated: 21.02.2022.

- ⊗ Thiru.P. Shanmugam Precise Area Communication was issued by the Joint Director / Assistant Director (i/c), Madurai District vide Rc.No.890/Mines/2021, Dated: 21.02.2022 for a period of Five Years. It is a fresh lease application.
- ⊗ The Mining Plan was prepared by Recognized Qualified Person and approved by Deputy Director, Department of Geology and Mining, Madurai District Rc.No.890/Mines/2021, Dated: 16.03.2022
- ⊗ Proponent applied for ToR for Environmental Clearance vides online Proposal No. SIA/TN/MIN/77088/2022, Dated:19.05.2022

#### **Project – P2 – Thiru.P. Kandavelu,**

- ⊗ The proponent applied for Rough Stone and Gravel Quarry Lease Dated: 24.09.2021.
- ⊗ Precise Area Communication was issued by the Assistant Director, Department of Geology and Mining, Madurai District vide Rc.No.688/Mines/2020, Dated: 24.09.2021 for a period of 10 Years. It is a fresh lease application.
- ⊗ The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Department of Geology and Mining, Madurai vide Rc.No.688/Mines/2020, Dated: 03.11.2021.
- ⊗ Proponent applied for ToR for Environmental Clearance vides online Proposal No. SIA/TN/MIN/72693/2022, Dated:26.02.2022.

#### **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	NH744- Thirumangalam – Srivilliputhur -1.0km- NW SH73 - Thirumangalam – Pallapatti – Silukkuvarpatti -4.0km- NE MD10-Thirumangalam – Pallapatti – Silukkuvarpatti Road – 1.0km NW
Nearest Village	Rayapalayam village – 960m-S
Nearest Town	Thirumangalam – 4.0km-NE
Nearest Railway	Thirumangalam – 4.0km-NE
Nearest Airport	Madurai – 23.0km – NE
Seaport	Cochin 185 Km-W

## 2.2 LAND USE PATTERN OF THE PROPOSED PROJECT

<b>LAND USE PATTERN OF PROJECT – P1</b>		
<b>Description</b>	<b>Present area in (ha)</b>	<b>Area at the end of life of quarry (Ha)</b>
Area under Quarrying	338.7	4.08.9
Infrastructure	Nil	0.01.0
Roads	0.02.0	0.02.0
Green Belt	Nil	0.46.6
Un – utilized area	1.27.8	0.10.0
<b>Grand Total</b>	<b>4.68.5</b>	<b>4.68.5</b>
<b>LAND USE PATTERN OF PROJECT – P2</b>		
<b>Description</b>	<b>Present area in (ha)</b>	<b>Area at the end of life of quarry (Ha)</b>
Quarrying Pit	Nil	3.85.2
Infrastructure	Nil	0.01.0
Road	Nil	0.02.0
Green Belt	Nil	0.40.0
Unutilized area	4.98.0	0.69.8
<b>Grand Total</b>	<b>4.98.0</b>	<b>4.98.0</b>

## 2.3 OPERATIONAL DETAILS OF LEASE APPLIED AREA

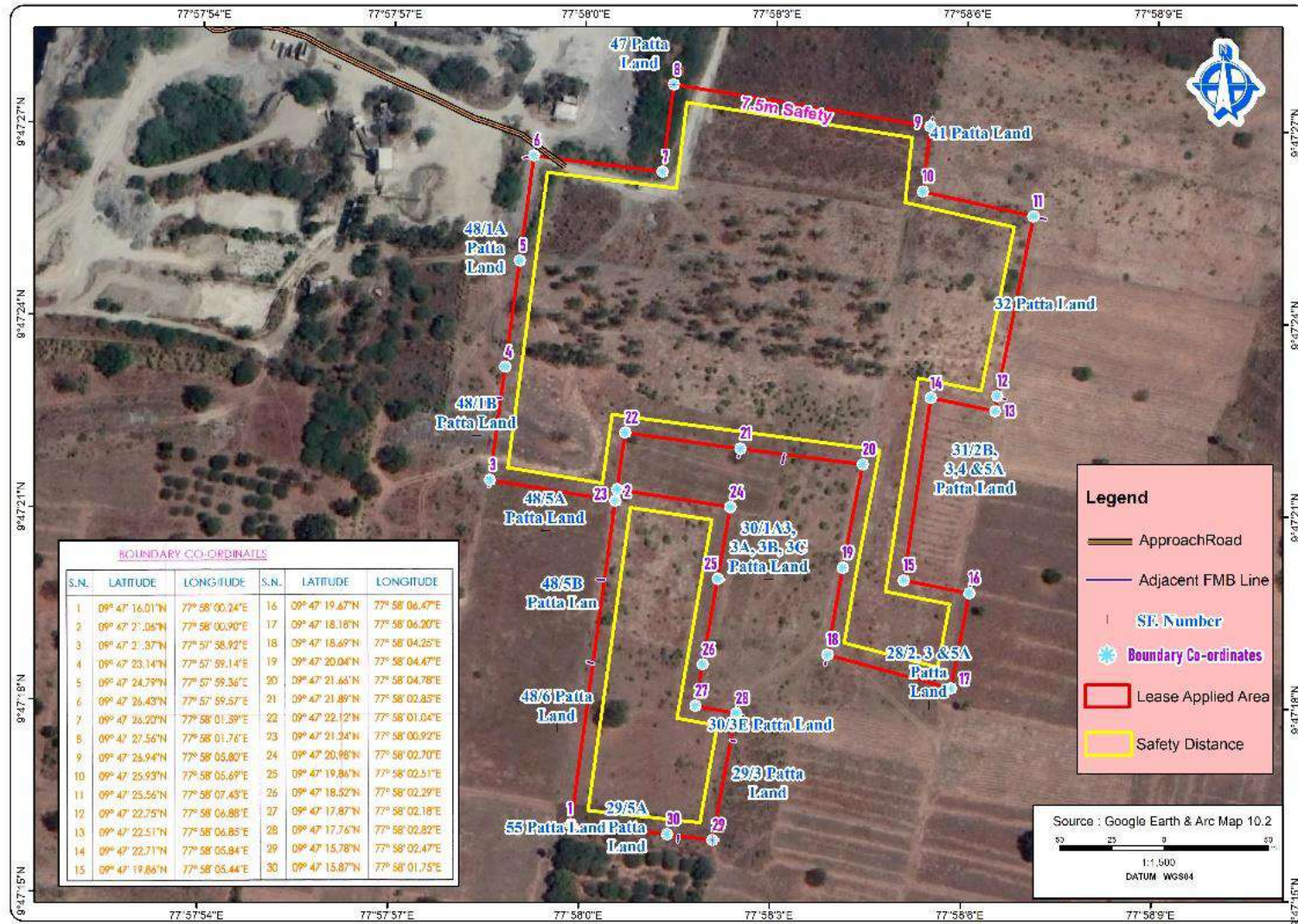
<b>OPERATIONAL DETAILS FOR PROJECT – P1</b>		
<b>PARTICULARS</b>	<b>DETAILS</b>	
	<b>Rough Stone (m<sup>3</sup>) (5Year Plan period)</b>	<b>Gravel (m<sup>3</sup>) (3 Years Plan per iod)</b>
Geological Resources	15,56,402	21,292
Mineable Reserves	7,24,757	12,938
Production for five years Plan as per ToR	6,47,327	12,938
Mining Plan Period / Lease Applied Period	5Years	
Number of Working Days	300 Days	
Production per day	483	14
No of Lorry loads (12m <sup>3</sup> per load)	40	1 lorry load per week
Total Depth of Mining (As per ToR)	47m (2m Gravel +45m Rough stone) bgl.	
<b>OPERATIONAL DETAILS FOR PROJECT – P2</b>		
<b>PARTICULARS</b>	<b>DETAILS</b>	
	<b>Rough Stone (m<sup>3</sup>) (5Year Plan period)</b>	<b>Gravel (m<sup>3</sup>) (3 Years Plan period)</b>
Geological Resources	19,92,000m <sup>3</sup>	99,600m <sup>3</sup>
Mineable Reserves	4,43,530m <sup>3</sup>	80,820m <sup>3</sup>
Production for five years Plan After bench reduction	4,43,530m <sup>3</sup>	
Mining Plan Period / Lease Applied Period	10 Years	
Number of Working Days	300 Days	
Production per day	296	90
No of Lorry loads (12m <sup>3</sup> per load)	25	7
Total Depth of mining	42m (32m for the first five years and upto 42m for the remaining Five Years) below ground level	

FIGURE – 1: GOOGLE IMAGE SHOWING PROJECT AREA -P1

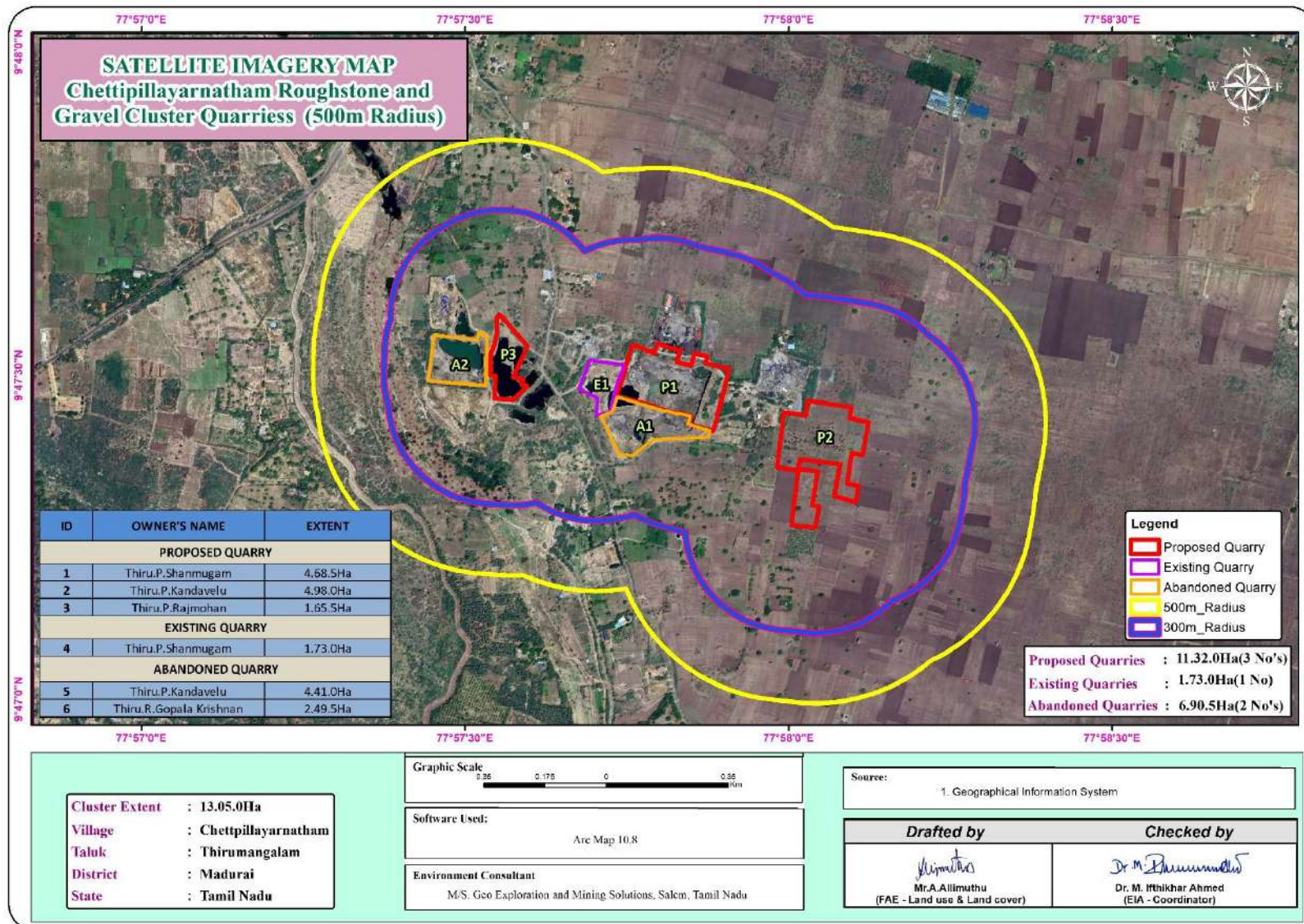




FIGURE – 2: GOOGLE IMAGE SHOWING PROJECT AREA -P2



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



**FIGURE – 4: TOPOSHEET MAP COVERING 10 KM RADIUS**

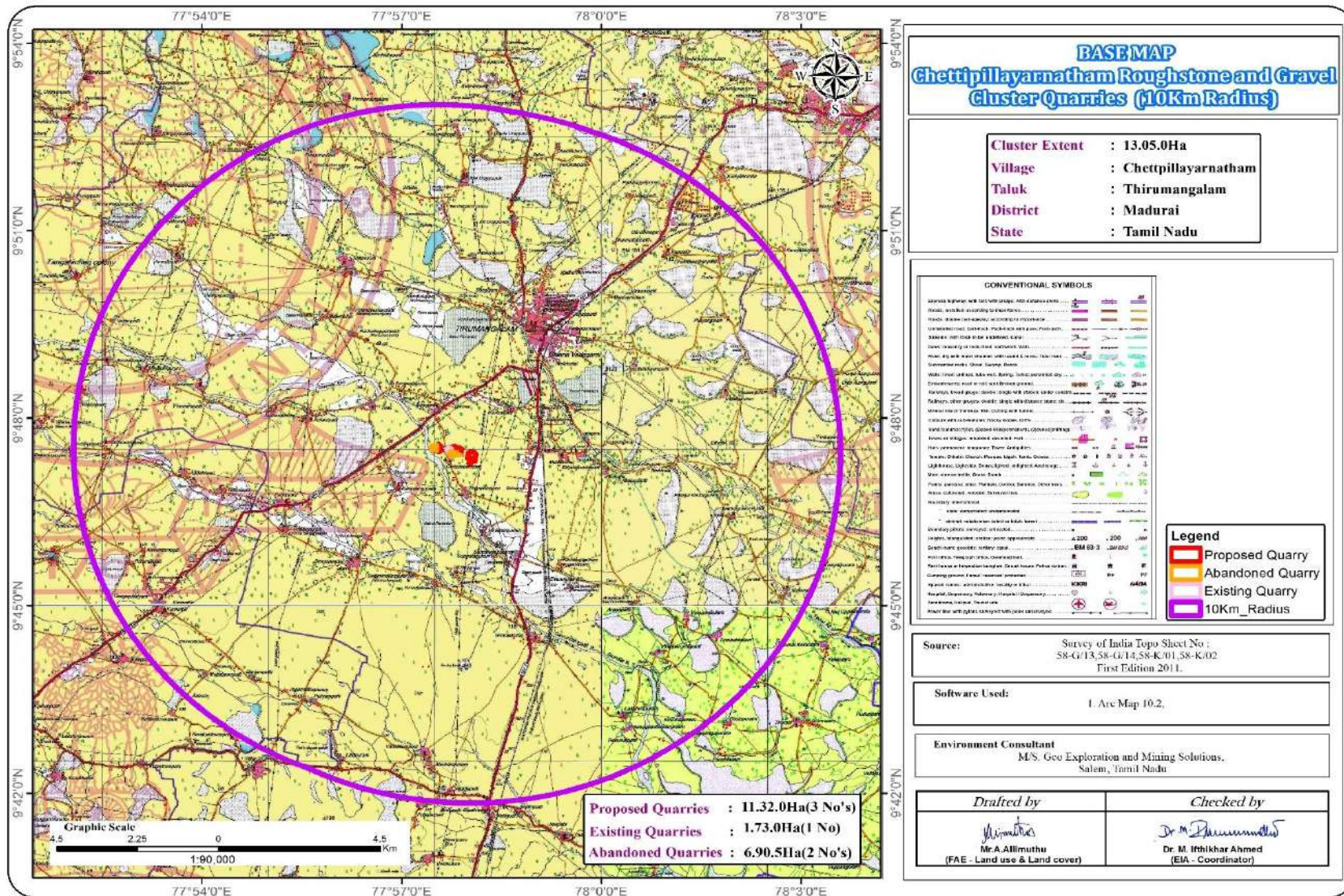
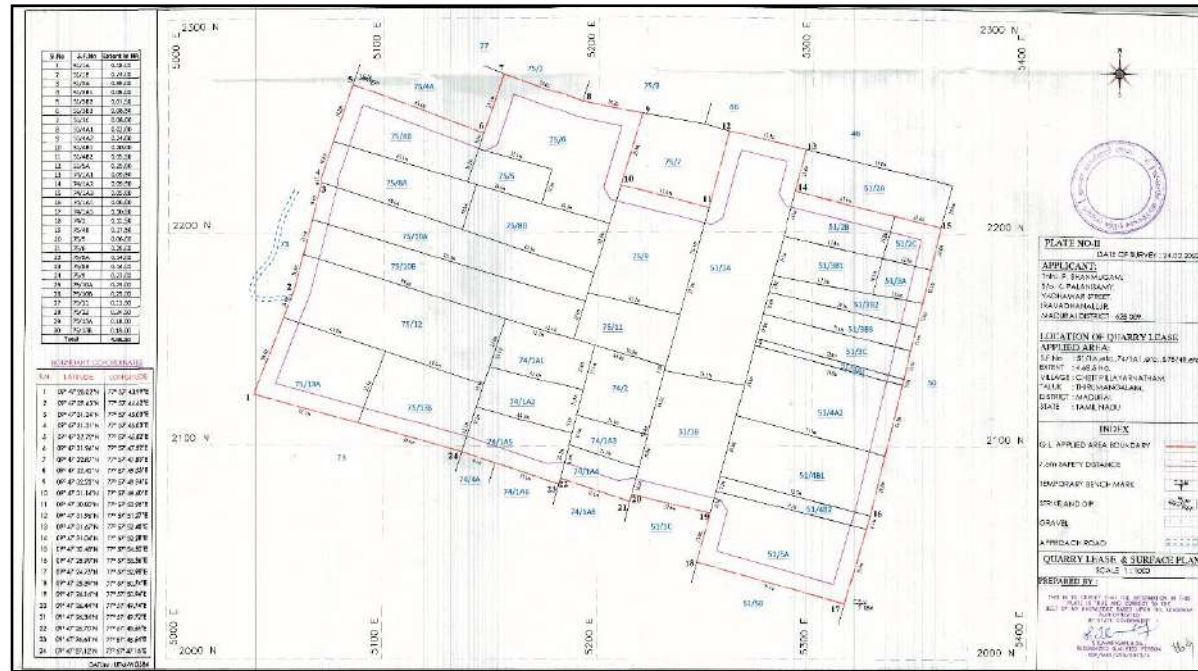
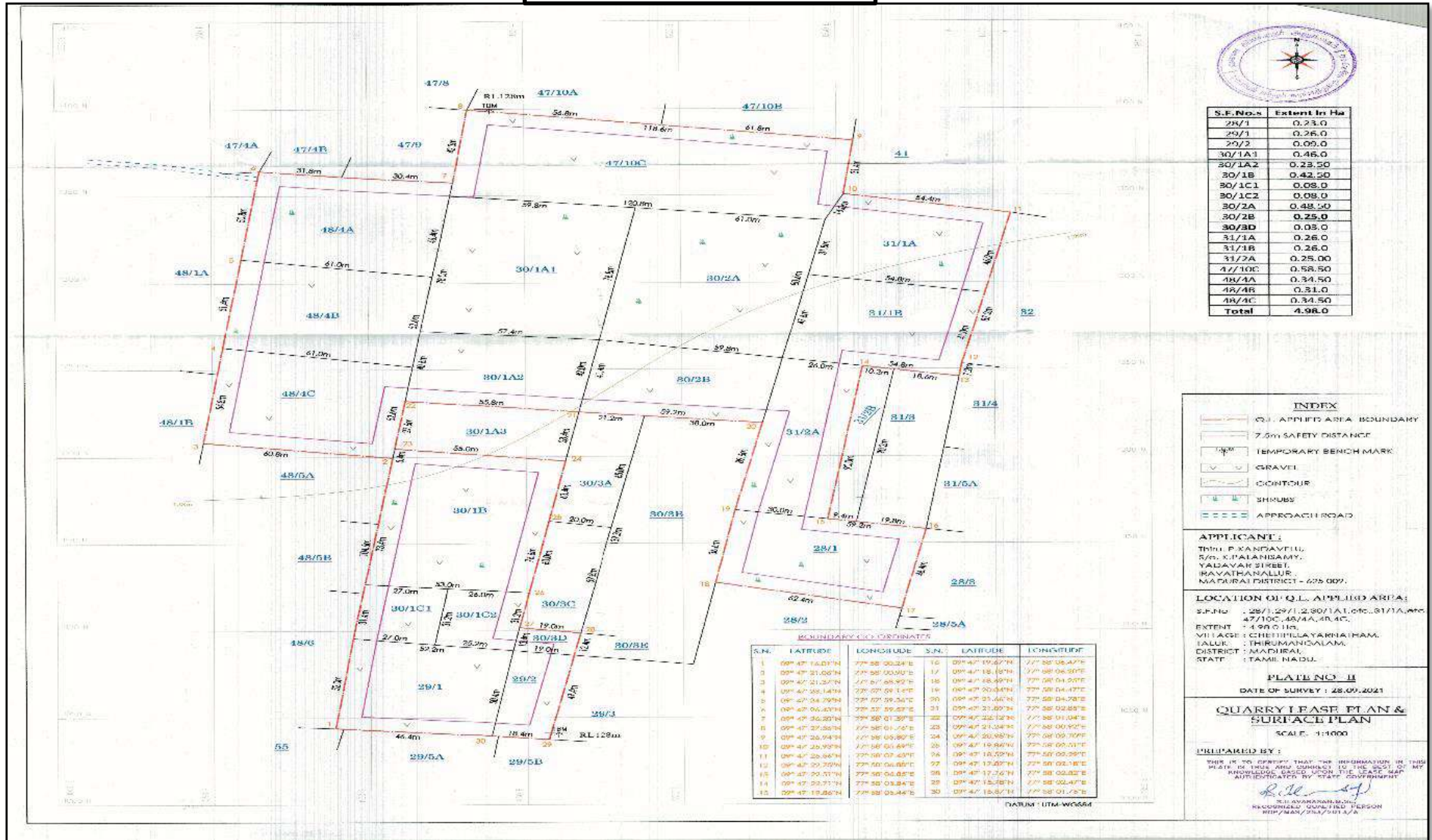


FIGURE – 5: QUARRY LEASE PLAN & SURFACE PLAN

P1- Thiru. P. Shanmugam,



**P2- Thiru.P. Kandavelu**



## 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	17	1.2m to 2.0m	Compressed air
2	Compressor	4	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker	3	300 HP	Diesel Drive
4	Tippers	9	20 Tonnes	Diesel Drive
PROPOSAL – P2				
S.NO.	TYPE	NOS	SIZE/CAPACITY	MOTIVE POWER
1	Jack hammers	11	1.2m to 2.0m	Compressed air
2	Compressor	3	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker Unit 4	3	300 HP	Diesel Drive
4	Tippers	6	20 Tonnes	Diesel Drive

## 2.6 CONCEPTUAL MINING PLAN/ FINAL MINE CLOSURE PLAN

The ultimate pit size is designed based on certain practical parameters such as economical depth of mining, safety zones, permissible area, etc.,

## 2.7 ULTIMATE PIT DIMENSION

PROPOSAL – P1			
Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max)
I	270	168	47m below ground level
PROPOSAL – P2			
Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max)
I	152	223	42m below ground level
II	146	55	27m below ground level
III	30	47	12m below ground level

### 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 December 2022 to February 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 (2 core & 4 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 <sub>10</sub> PM <sub>2.5</sub> SO <sub>2</sub> NO <sub>x</sub> Fugitive Dust	24 hourly twice a week (Oct – Dec 2022)	8 (2 core & 6 buffer)	IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB
*Noise Levels	Ambient Noise	Hourly observation for 24 Hours per location	8 (2 core & 6 buffer zone)	IS 9989 As per CPCB Guidelines
Ecology	Existing Flora and Fauna	Through field visit during the study period	Study Area	Primary Survey by 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 %
<b>BUILTUP</b>			
1	Builtup Urban	420.48	1.24
2	Builtup Rural	330.41	0.98
3	Builtup Mining	173.81	0.51
<b>AGRICULTURAL LAND</b>			
4	Crop Land	21330.13	62.99
5	Agricultural Plantation	860.38	2.54
6	Fallow Land	6111.94	18.05
<b>BARREN/WASTELAND</b>			
7	Salt Affected Land	155.37	0.46
8	Scrub Land	468.02	1.38
9	Barren Rocky	628.98	1.86
<b>WATERBODIES</b>			
10	Waterbodies	3382.73	9.99
		33862.24	100.00

***LU/LC Interpretation:***

- ☞ The 10 km radius study area mainly comprises of crop land & Agriculture Plantation land accounting of 62.9% & 2.54% of the total study area. The study area also consists of fallow land of 18.05%.
- ☞ The buffer zone studied has no ecological sensitive area (National Park, Wildlife Sanctuary, Biosphere Reserve/ etc.).
- ☞ Water Bodies such as ponds/ lakes comprises of 10% of the total buffer area. The two seasonal rivers such as Gundra river at 3 Km in S direction, Tank 2.6km in N and Gaundan River at 710m in SW direction of the total study area.
- ☞ The Scrub land accounts of 1.38%. As per the primary survey, it was observed the scrub land is mainly occupied by the stony waste and left-over domestic waste generated by the nearby areas.
- ☞ 0.51% of the total study area is occupied by the mine industries of captive mines. The area occupied by Mainly Roughstone and gravel of the total buffer area. As also observed within the primary survey, the 10 km buffer area is also occupied by the medium scaled granite and marble and small Brick kiln industries also located in the study area.
- ☞ 2.12% of the area is covered under the human Settlement. The nearest village within the 3 km radius from the project site boundary is observed to be villages Chettipillayarnatham, Alampatti, Andipatti and Rayapalayam 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

- Variation in pH of the soil in the study area was found to be 8.19 to 8.77
- Mostly the soils collected from different location in the study area are clay loam soil in texture.
- The bulk density of the soil in the study area ranged between 0.97– 1.34 g/cc.
- Available Nitrogen between 310 to 475 mg/kg and phosphorous content 1.16 to 2.03 mg/kg and potassium content 21.5 to 319 mg/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 7.29-7.69 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 636-700 mg/l, the TDS mainly composed of carbonates, bicarbonates, Chlorides, phosphates and nitrates of calcium, magnesium, sodium and other organic matter.

##### Other parameters:

170-180 mg/l. Nitrates 10-13.7 mg/l, while sulphates 81.6-91.1 mg/l.

#### Ground Water

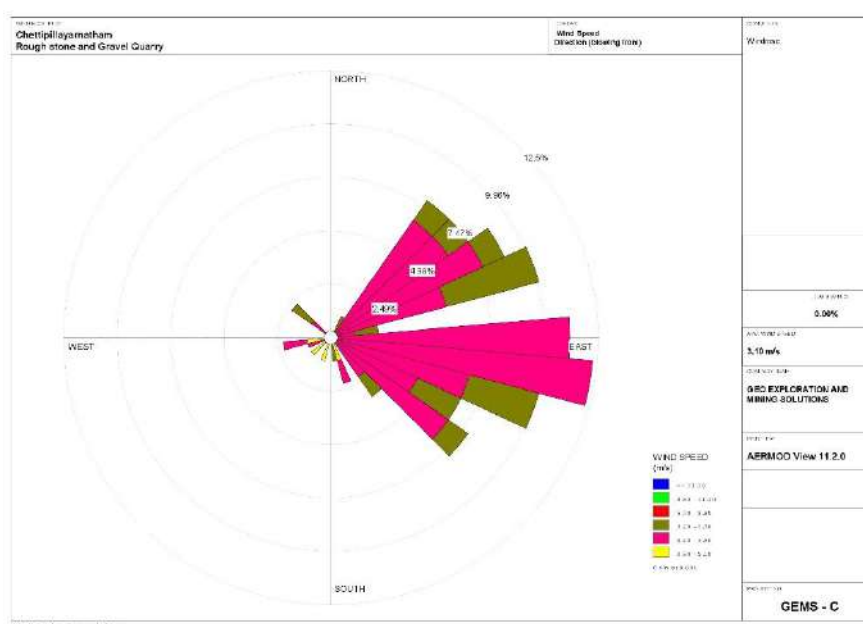
The pH of the water samples collected ranged from 6.88 to 7.38 and within the acceptable limit of 6.5 to 8.5. pH, Sulphates and Chlorides of water samples from all the sources are within the limits as per the Standard. on Turbidity, the water samples meet the requirement. The Total Dissolved Solids were found in the range of 559- 740 mg/l in all samples. The Total hardness varied between 194.92 – 234.08 mg/l for all samples.

On Microbiological parameters, the water samples from all the locations meet the requirement. The parameters thus analysed were compared with IS 10500:2012 and are well within the prescribed limits.

### 3.5 AIR ENVIRONMENT

The baseline studies on air environment include identification of specific air pollution parameters and their existing levels in ambient air. The ambient air quality with respect to the study zone of 10 km radius around the proposed quarry forms the baseline information.

**FIGURE – 6: WIND ROSE DIAGRAM**



### 3.6 SUMMARY OF AMBIENT AIR QUALITY

As per monitoring data, PM10 ranges from 17.2  $\mu\text{g}/\text{m}^3$  to 23.2  $\mu\text{g}/\text{m}^3$ , PM2.5 data ranges from 22.1  $\mu\text{g}/\text{m}^3$  to 46.7  $\mu\text{g}/\text{m}^3$ , SO2 ranges from 5.3  $\mu\text{g}/\text{m}^3$  to 9.5  $\mu\text{g}/\text{m}^3$  and NO2 data ranges from 18.1  $\mu\text{g}/\text{m}^3$  to 26.7  $\mu\text{g}/\text{m}^3$ . The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB. The minimum & maximum concentrations of PM10 were found to be 18.1  $\mu\text{g}/\text{m}^3$  in core zone area & 23.2  $\mu\text{g}/\text{m}^3$  in Project 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 46.8 – 47.8 dB (A) Leq and during night time were from 37.6 – 39.4 (A) Leq. Noise levels recorded in buffer zone during day time were from 40.9 – 48.1 dB (A) Leq and during night time were from 37.3– 40.7 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 81 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

<b>PROPOSAL FOR P1 – Thiru. P. Shanmugam</b>				
<b>Year</b>	<b>No. of trees proposed to be planted</b>	<b>Survial %</b>	<b>Area to be planted</b>	<b>Name of the species</b>
I	It is proposed to plant 2300 Nos of trees in the 1 <sup>st</sup> year	80%	Safety barrier, Un utilized areas and nearby village roads	Neem, Pongamia pinnata, Casuarina, etc
<b>PROPOSAL FOR P2 – Thiru.P.Kandavelu</b>				
I	It is proposed to plant 2500 Nos of trees in the 1 <sup>st</sup> year	80%	Safety barrier, Un utilized area's and nearby village roads	Neem, Pongamia pinnata, Casuarina, etc.,

## 4.7 SOCIO ECONOMIC ENVIRONMENT

### ANTICIPATED IMPACT

- ⊗ No. of people will get employment during the construction stage resulting in the ancillary development and growth. Nearby Local people will be given preference for employment on the basis of their skill and experience.
- ⊗ Further due to proposed project, influx of working community will also generate an indirect employment through development of nearby market/ shops, trade centers, activities, transportation etc.
- ⊗ Population influx during the construction phase can introduce various water and vector borne diseases which can lead to various unhygienic health problems in the area by disturbing the existing sanitation infrastructure.
- ⊗ Rapid diverse population influx at the project site can create unusual behavioural activity such as worker-community conflicts, increase violence such as theft/stabbing, and increased consumption of drugs/alcohol within the area.
- ⊗ Impacts on the health of nearby villagers can be envisaged due to the transportation activities leading to short term exposure of fugitive dust, resulting in various acute diseases such as increased eye irritation, nausea, headache etc.

### MITIGATION MEASURES

- Good maintenance practices will be adopted for all machinery and equipment, which will help to avert potential noise problems.
- Green belt will be developed in and around the project site as per Central Pollution Control Board (CPCB) guidelines.
- Air pollution control measure will be taken to minimize the environmental impact within the core zone.
- For the safety of workers, personal protective appliances like hand gloves, helmets, safety shoes, goggles, aprons, nose masks and ear protecting devices will be provided as per mines act and rules.
- Benefit to the State and the Central governments through financial revenues by way of royalty, tax, duties, etc., from this project directly and indirectly.
- From above details, the quarry operations will have highly beneficial positive impact in the area.

**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 rough stone and Gravel quarry over a cluster extent of 13.05.0 ha of Patta lands in Chettipillayarnatham Village, Thirumangalam Taluk, Madurai District, Tamil Nadu State.

<b>Potential Effect/ Concern</b>	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.			
<b>Characteristics of Impacts</b>				
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)
			✓	
<b>Significance of Impact</b>				
Significance	Insignificant	Minor	Moderate	Major
			✓	

## 5. ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

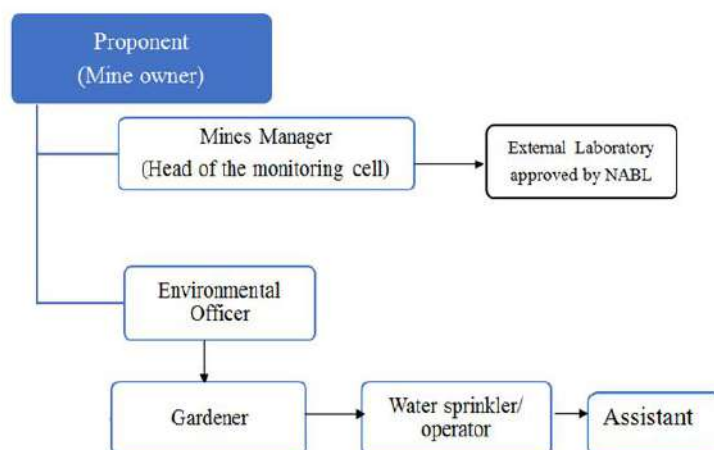
No alternatives are suggested as all the mine sites are mineral specific.

## 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



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## 6.2 PROPOSED MONITORING SCHEDULE POST EC FOR P1 TO P2

S. No.	Environment Attributes	Location	Monitoring		Parameters
			Duration	Frequency	
1	Air Quality	8 Locations (2Core & 6 Buffer)	24 hours	Once in 6 months	Fugitive Dust, PM <sub>2.5</sub> , PM <sub>10</sub> , SO <sub>2</sub> and NO <sub>x</sub> .
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	6 Locations (2SW & 4GW)	-	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	6 Locations (2Core & 4 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	7 Locations (2 Core & 5 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 31<sup>st</sup> 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 II. 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 five-year plan period m <sup>3</sup>	Per Year Production in m <sup>3</sup>	Per Day Production in m <sup>3</sup>	Number of Lorry Load Per Day @ 12m <sup>3</sup> per load
P1	7,24,757 m <sup>3</sup>	1,44,951	483	40Trips /Day
P2	4,43,530 m <sup>3</sup>	88,706	296	25Trips /Day
P3	1,24,210	24,842	83	7 Trips /day
<b>Total</b>	<b>1,292,497</b>	<b>2,58,499</b>	<b>862</b>	<b>72 Trips /Day</b>
E1	2,49,120	49,824	166	14 Trips /day
<b>Total</b>	<b>2,49,120</b>	<b>49,824</b>	<b>166</b>	<b>14Trips /Day</b>
<b>Grant Total</b>	<b>15,41,617</b>	<b>3,08,323</b>	<b>1028</b>	<b>86 Trips /Day</b>

#### CUMULATIVE PRODUCTION LOAD OF GRAVEL IN CLUSTER

Quarry	Mineable Reserves in m <sup>3</sup>	Per Year Production in m <sup>3</sup>	Per Day in m <sup>3</sup>	Number of Lorry Load @ 12m <sup>3</sup> per load
P1	12,938	4313	15	1 Trips /Day, 6- Trips /week
P2	80,820	26,940	89	7- Trips /week
P3	1,185	395	1	1- Trips /week
<b>TOTAL</b>	<b>94,943</b>	<b>31,647</b>	<b>105</b>	<b>9 Trips/ week</b>
E1	-	-	-	-
<b>Total</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Grand total</b>	<b>94,943</b>	<b>31,647</b>	<b>105</b>	<b>9 Trips/ week</b>

#### 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	47.9	60.1	60.4	Residential Day Time– 55 dB (A) Night Time- 45 dB (A)
N2	48.1	54.1	55.1	
N3	49.8	43.4	50.7	
N4	48.6	34.1	48.8	
N5	45.9	28.1	46.0	
N6	46.8	24.8	46.8	
N7	46.2	25.3	46.2	
N8	49.7	8.5	49.7	

#### SOCIO ECONOMIC BENEFITS

Location Code	Employment	Project Cost	CER Cost
P1	75	Rs. 1,01,24,000/-	Rs.5,00,000
P2	49	Rs. 96,30,000/-	Rs.5,00,000
P3	17	Rs. 26,29,000/-	Rs.5,00,000
<b>Total</b>	<b>141</b>	<b>Rs. 22,383,000/-</b>	<b>Rs. 15,00,000/-</b>
E1	16	Rs. 30,00,000	Rs. 5,00,000/-
<b>Total</b>	<b>16</b>	<b>Rs. 30,00,000</b>	<b>Rs. 5,00,000</b>
<b>Grand Total</b>	<b>157</b>	<b>Rs.25,383,000/-</b>	<b>Rs.20,00,000/-</b>

A total of 141 people will get employment due to 3 mines in cluster and already employed at existing mines are 16 Nos. Allocation for Corporate Environment Responsibility (CER) shall be made as per Government of India, MoEF & CC Office Memorandum F.No.22-65/2017-IA.III, Dated: 01.05.2018 by all the mines.

## 8. PROJECT BENEFITS

- The two Proposed Projects for Quarrying Rough Stone and Gravel at Chettipillayarnatham Village aims to produce cumulatively 11,68,287 m<sup>3</sup> Rough Stone over period of 5 Years & 93,758m<sup>3</sup> of Gravel over a period of 3 Years. This will enhance the socio-economic activities in the adjoining areas and will result in the following benefits
- Increase in Employment Potential
- Improvement in Socio-Economic Welfare
- Improvement in Physical Infrastructure
- Improvement in Social infrastructure

## 9. ENVIRONMENT MANAGEMENT PLAN

The Environment Monitoring cell 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.