DRAFT ENVIRONMENTAL IMPACT ASSESSMENT

&

ENVIRONMENT MANAGEMENT PLAN

For Obtaining

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

CLUSTER SITUATION

Total Extent in the Cluster Situation = 16.09.28Ha

P1	Thiru.R.Paramasivam	1.00.00 Ha
P2	Thiru.K.Periyasamy	1.00.00 Ha
P3	Tmt.B.Megala	1.40.00 Ha
P4	Thiru.M.Krishnan	0.90.25 Ha
P5	Thiru.S.Nandhakumar	1.16.00 Ha
P6	Thiru.S.Rangasamy	2.02.30 Ha
P7	Thiru.M.Muthukrishnan	1.73.23 Ha

"B1" CATEGORY – MINOR MINERAL
ROUGH STONE AND GRAVEL QUARRY

At

Marapparai Village, **Tiruchengode** Taluk, **Namakkal** District, **Tamil Nadu** State

As per ToR obtained

Letter No SEIAA-TN/F.No.7773/SEAC/ToR-811/2020 Dated :09.11.2020 for P1
Letter No. SEIAA-TN/F.No.7774/SEAC/ToR-818/2020 Dated :11.11.2020 for P2
Letter No. SEIAA-TN/F.No.8179/SEAC/ToR-939/2020 Dated :16.04.2021 for P4
Letter No. SEIAA-TN/F.No.8268/SEAC/ToR-947/2021 Dated :30.04.2021 for P5
Letter No. SEIAA-TN/F.No.8312/SEAC/ToR-962/2020 Dated :30.04.2021 for P6

Environmental Consultant

GEO EXPLORATION AND MINING SOLUTIONS
Old No. 260-B, New No. 17,
Advaitha Ashram Road, Alagapuram,
Salem – 636 004, Tamil Nadu, India
Accredited for sector 1, 28 & 38 Category 'A'

QUALITY COUNCIL OF INDIA
NATIONAL ACCREDITATION BOARD FOR EDUCATION & TRAINING

Certificate No : NABET/EIA/1821/RA0123
Phone: 0427-2431989,
Email: ifthiahmed@gmail.com, geothangam@gmail.com
Web: www.gemssalem.com

Environmental Monitoring data has been collected with reference to proposed mine by Omegaa Laboratories
Period of December 2020 to February 2021

MAY 2021

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

1.0 PREAMBLE

Environmental Impact Assessment (EIA) is the management tool to ensure the sustainable development and it is a process used to identify the environmental, social and economic impacts of a project prior to decision-making. It is a decision making tool, which guides the decision makers in taking appropriate decisions for any project. EIA systematically examines both beneficial and adverse consequences of the project and ensures that these impacts are taken into account during the project designing. It also reduces conflicts by promoting community participation, information, decision makers, and helps in developing the base for environmentally sound project.

This Environmental Impact Assessment Report is prepared considering cumulative load of all existing & proposed mines located within the cluster over an extent 16.09.28ha in Marapparai & Paruthipalli Village, Tiruchengode Taluk, Namakkal District and Tamil Nadu State. This EIA report will serve as an operating manual for the Project Proponent to safeguard the environment of the project site.

This report provides a structured framework for the scope of environmental considerations required during the planning, implementation and maintenance stages of quarrying activity. Identification of potential environmental issues at the initial stage of development is essential for the selection of realistic mitigation measures. Significance of these studies ensures that any development activity will be carried out with minimal adverse residual environmental impacts.

1.1 PURPOSE OF THE REPORT

The Ministry of Environment and Forests, Govt. of India, through its EIA notification S.O. 1533(E) of 14thSeptember 2006 and its subsequent amendments as per Gazette Notification S.O. 3977 (E) of 14thAugust 2018, Mining Projects are classified under two categories i.e. A (> 100 Ha) and B (≤ 100 Ha), Category – A projects (including expansion and modernization of existing projects) require Environmental Clearance from Central Government (Ministry of Environment, Forests and Climate Change, Government of India, New Delhi) while Category–B projects are considered by State Level Environmental Impact Assessment Authority (SEIAA), constituted by MoEF & CC, New Delhi.≤ 100ha falls under B Category. If in case, any Category "B" project attracts the "General Condition" given in the EIA Notification, it shall be treated as Category "A" and will be considered at MoEF & CC, New Delhi.

And Schematic Presentation of Requirements on Environmental Clearance of Minor Minerals including cluster situation in Appendix-XI, where the project falls under category "EC Proposal of Sand Mining and other Minor Mineral Mining in cluster situation" i.e. Cluster area of mine leases up to 5 ha considered as Category "B2" and requirement of EC with Form –I, PFR, DSR and Approved Mine Plan with exemption of Public Hearing to be appraised by DEAC/ DEIAA.

Now, 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, clarified the requirement for EIA, EMP and therefore, Public Consultation for all areas from 5 to 25 ha falling in Category B- 1 and appraised by SEAC/ SEIAA as well as for cluster situation.

The proposed project is categorized under category "B1" Activity 1(a) (mining lease area in cluster situation) and will be considered at SEIAA – TN after conducting Public Hearing and Submission of EIA/EMP Report for Grant of Environmental Clearance.

The following lists of quarries are located in the cluster situation (Certified by Assistant Director, Department of Geology & Mining, Namakkal District). The details of the quarries are given below in Table 1.1.

TABLE 1.1: LIST OF QUARRIES WITHIN THE CLUSTER

PROPOSED QUARRIES				
CODE	**Name of the Owner**	**S.F.Nos**	**Extent**	**Lease period**
P1	Thiru. R.Paramasivam, S/o. Ramasamy, No.4-122/2, V.P.S.Garden, Tiruchengode Road, Andagalur Gate, Rasipuram Taluk, Namakkal District, Tamil Nadu	20/2B (Part) and 21/5C (part)	1.00.0 ha	Received for ToR vide Lr.No. SEIAA-TN/F.No.7773/SEAC/ToR-811/2020 Dated :09.11.2020
P2	Thiru.K.Periyasamy, S/o. Kandasamy, No.5/49, Thennamarathupalayam, Marapparai, Tiruchengode Taluk, Namakkal District, Tamil Nadu State – 637 410	21/5B(Part)	1.00.0 ha	Received for ToR vide Lr.No. SEIAA-TN/F.No.7774/SEAC/ToR-818/2020 Dated :11.11.2020
P3	Tmt.B.Megala, D/o.Balasundaram, Thennamarathupalayam, Marapparai, Tiruchengode Taluk, Namakkal District, Tamil Nadu State – 637 410	224(Part)	1.40.0ha	Under examination of SEIAA
P4	Thiru.M.Krishnan, S/o. Marappan, Periya manali Road, Vaiyappamalai Post,Tiruchengode Taluk, Namakkal District – 637 410	176/2, 173/3(P), & 176/11(P)	0.90.25ha	Received for ToR vide Lr.No. SEIAA-TN/F.No.8179/SEAC/ToR-939/2020 Dated :16.04.2021
P5	Thiru. S.Nandhakumar, S/o. Sellappan, No.4/103, Mettukadu, Nallampalayam, Konnayar, Tiruchengode Taluk, Namakkal District – 637 202	22/2	1.16.0ha	Received for ToR vide Lr.No. SEIAA-TN/F.No.8268/SEAC/ToR-947/2021 Dated :30.04.2021
P6	Thiru.S.Rangasamy, S/o. Subbayan, Kattipalayam, Karungalpatti (Post), Tiruchengode Taluk, Namakkal District – 637 410	176/1A, 176/5A, 176/6A & 316/2B2	2.02.3 ha	Received for ToR vide Lr.No. SEIAA-TN/F.No.8312/SEAC/ToR-962/2020 Dated :30.04.2021
P7	Thiru. Muthukrishnan, S/o. Marappan, Periya Manali Road, Vaiyappamalai Post, Tiruchengode Taluk, Namakkal District – 637 410	175/2, 183/8B, 183/8C,183/8D, 183/8E,183/8F, 183/4E1, 183/4G1, & 183/4F1	1.73.23	Under examination Department of Geology, Namakkal
TOTAL			**9.21.78 ha**	
EXISTING QUARRIES				
CODE	**Name of the Owner**	**S.F.Nos**	**Extent**	**Lease Period**
E1	Thiru. S.Rangasamy S/o.Subbaiyan, Kattipalayam, Karungalpatti Post, Tiruchengode Taluk,Namakkal District	316/2B1	1.98.0 ha	03.02.2017 to 02.02.2022
E2	Tmt.P.Ramayee, W/o.Ponnusamy, 1/60, Nehru, Nagar, Mallasamudram main Road, Marapparai, Vaiyappmalai Post, Tiruchengode Taluk, Namakkal District.	176/12	1.20.0 ha	06.09.2017 to 05.09.2022
E3	Thiru.K.Ramesh S/o.Kailasamm, 2/19, Kudi Street North, Sullipalauyam, Uppupalayam Post, Paramathi –Velur Taluk, Namakkal District	175/1B	1.20.0ha	09.01.2019 to 08.01.2024
E4	Thiru.K.Sengottaiyan S/o. Kandhasamy, Elavadi, Moongilpadi Post, Chinnasalem Taluk, Viluppuram District	21/4A	0.95.5ha	09.01.2018 to 08.01.2023
E5	Thiru.K.Sengodagounder	22/3B1 & 22/3B2	1.54.0ha	23.02.2018 to 22.02.2023

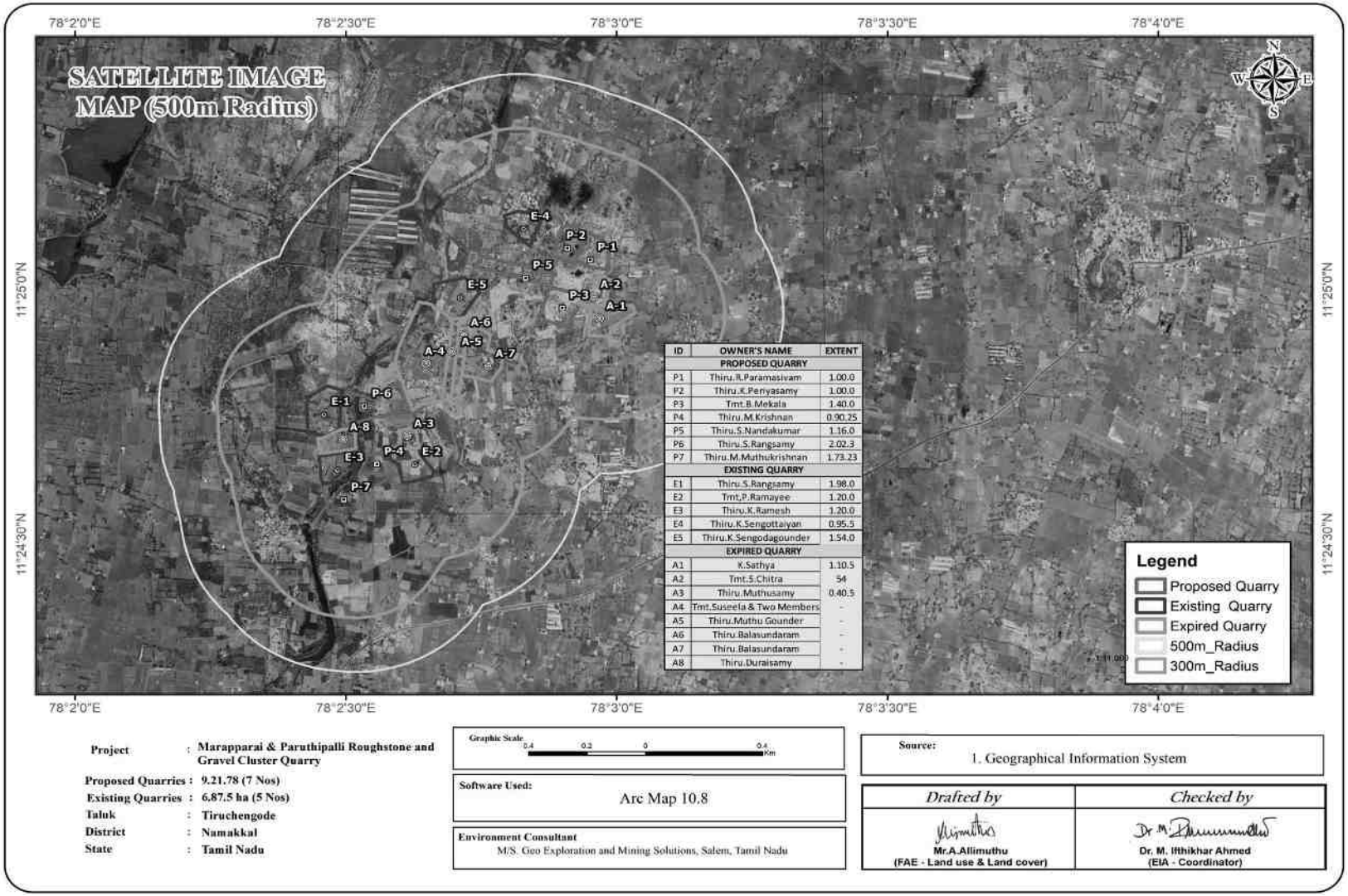
TOTAL	**6.87.5 ha**
GRAND TOTAL OF PROPOSED & EXISTING QUARRIES	**16.09.28 ha**

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

The overall Extent of Proposed and Existing Quarries within the radius of 500m is 16.09.28 ha, this EIA and EMP report is prepared for considering cumulative impacts arising out of these projects, the Cumulative Environmental Impact Assessment study is undertaken, which is followed by preparation of a detailed Environmental Management Plan (EMP) to minimize those adverse impacts.

"Draft EIA report prepared on the basis of ToR issued for carrying out public hearing for the grant of Prior Environmental Clearance /from SEIAA, Tamil Nadu"

FIGURE .1 CLUSTER QUARRIES MAP



ID	OWNER'S NAME	EXTENT
	PROPOSED QUARRY	
P1	Thiru.R.Paramasivam	1.00.0
P2	Thiru.K.Periyasamy	1.00.0
P3	Tmt.B.Mekala	1.40.0
P4	Thiru.M.Krishnan	0.90.25
P5	Thiru.S.Nandakumar	1.16.0
P6	Thiru.S.Rangsamy	2.02.3
P7	Thiru.M.Muthukrishnan	1.73.23
	EXISTING QUARRY	
E1	Thiru.S.Rangsamy	1.98.0
E2	Tmt.P.Ramayee	1.20.0
E3	Thiru.K.Ramesh	1.20.0
E4	Thiru.K.Sengottaiyan	0.95.5
E5	Thiru.K.Sengodagounder	1.54.0
	EXPIRED QUARRY	
A1	K.Sathya	1.10.5
A2	Tmt.S.Chitra	54
A3	Thiru.Muthusamy	0.40.5
A4	Tmt.Suseela & Two Members	-
A5	Thiru.Muthu Gounder	-
A6	Thiru.Balasundaram	-
A7	Thiru.Balasundaram	-
A8	Thiru.Duraisamy	-

1.2 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

1.2.1 Identification of Project

TABLE 1.2: SALIENT FEATURES OF THE PROPOSED PROJECTS

PROPOSAL – P1	
Name of the Project	Thiru.R.Paramasivam stone and Gravel quarry
S.F. Nos.	20/2B(Part) and 21/5C (part)
Extent	1.00.0 ha
Land Type	Patta Land
Village Taluk and District	Marapparai Village, Tiruchengode Taluk, Namakkal District
PROPOSAL – P2	
Name of the Project	Thiru.K.Periyasamy Rough stone and Gravel quarry
S.F. Nos.	21/5B(Part)
Extent	1.00.0 ha
Land Type	Patta Land
Village Taluk and District	Marapparai Village, Tiruchengode Taluk, Namakkal District
PROPOSAL – P3	
Name of the Project	Tmt. B.Megala Rough stone and Gravel quarry
S.F. No.	22/4(Part)
Extent	1.40.0 ha
Land Type	Patta Land
Village Taluk and District	Marapparai Village, Tiruchengode Taluk, Namakkal District
PROPOSAL – P4	
Name of the Project	Thiru.M.Krishnan Rough stone and Gravel quarry
S.F. No.	176/2, 176/3(P) & 176/11(P)
Extent	0.90.25 ha
Land Type	Patta Land
Village Taluk and District	Marapparai Village, Tiruchengode Taluk, Namakkal District
PROPOSAL – P5	
Name of the Project	Thiru.S.Nandhakumar Rough stone and Gravel quarry
S.F. No.	22/2
Extent	1.16.0 ha
Land Type	Patta Land
Village Taluk and District	Marapparai Village, Tiruchengode Taluk, Namakkal District
PROPOSAL – P6	
Name of the Project	Thiru.S.Rangasamy Rough stone and Gravel quarry
S.F. No.	176/1A, 176/5A, 176/6A & 316/2B2
Extent	2.02.3 ha
Land Type	Patta Land
Village Taluk and District	Marapparai & Paruthipalli Village, Tiruchengode Taluk, Namakkal District
PROPOSAL – P7	
Name of the Project	Thiru.M.Muthukrishnan Rough stone and Gravel quarry
S.F. No.	175/2, 183/8B, 183/8C, 183/8D, 183/8E, 183/8F, 183/4E1, 183/4G1 and 183/4F1
Extent	1.73.23 ha
Land Type	Patta Land
Village Taluk and District	Marapparai Village, Tiruchengode Taluk, Namakkal District

1.2.2 Identification of Project Proponent

TABLE 1.3: IDENTIFICATION OF PROJECT PROPONENT

PROPOSAL – P1	
Name of the Project Proponent	**Thiru. R. Paramasivam**
Address	S/o. Ramasamy, No.4-122/2, V.P.S.Garden, Tiruchengode Road, Andagalur Gate, Rasipuram Taluk, Namakkal District, Tamil Nadu
Mobile	+91 98427 23664
Status	Proprietor
PROPOSAL – P2	
Name of the Project Proponent	**Thiru. K.Periyasamy**
Address	S/o. Kandasamy, No.5/49, Thennamarathupalayam, Marapparai, Tiruchengode Taluk, Namakkal District, Tamil Nadu State – 637 410
Mobile	+91 99655 34847
Status	Proprietor
PROPOSAL – P3	
Name of the Project Proponent	**Tmt.B.Megala**
Address	D/o.Balasundaram, Thennamarathupalayam, Marapparai, Tiruchengode Taluk, Namakkal District, Tamil Nadu State – 637 410
Mobile	+91 96775 26539
Status	Proprietor
PROPOSAL – P4	
Name of the Project Proponent	**Thiru. M.Krishnan**
Address	S/o. Marappan, Periya manali Road, Vaiyappamalai Post, Tiruchengode Taluk, Namakkal District – 637 410
Mobile	+91 93622 50787 & 98427 50787
Status	Proprietor
PROPOSAL – P5	
Name of the Project Proponent	**Thiru. S.Nandhakumar**
Address	S.Nandhakumar, S/o. Sellappan, No.4/103, Mettukadu, Nallampalayam, Konnayar, tiruchengode Taluk, Namakkal District – 637 202
Mobile	+91 98884 08516 & 99947 08516
Status	Proprietor
PROPOSAL – P6	
Name of the Project Proponent	**Thiru. S.Rangasamy**
Address	S/o. Subbayan, Kattipalayam, Karungalpatti (Post), Tiruchengode Taluk, Namakkal District – 637 410
Mobile	+91 99655 31850 & 76808 94018
Status	Proprietor
PROPOSAL – P7	
Name of the Project Proponent	**Thiru.M.Muthukrishnan**
Address	S/o.Manickam, No.10/C2, Appachigounderthottam, Sankari Taluk, Salem district, Tamil Nadu State
Mobile	+91 94432 51732
Status	Proprietor

1.3 BRIEF DESCRIPTION OF THE PROJECT

1.3.1 Nature and Size of the Project

The quarrying operation is proposed to be carried out by Opencast Mechanized Mining method with 5.0m bench height and 5.0m bench width by deploying Jack Hammer Drilling & Slurry Explosive in blasting and Hydraulic Excavator for Excavation and Rock Breakers for avoiding secondary blasting.

TABLE 1.4: BRIEF DESCRIPTION OF THE PROJECT – P1

Name of the Quarry	R.Paramasivam Rough stone and Gravel Quarry	
Toposheet No	58-I/03	
Latitude between	11°25'02.29"N to 11°25'06.70"N	
Longitude between	78°02'55.42"E to 78°02'59.16"E	
Highest Elevation	205m AMSL	
Proposed Depth of Mining	47 m bgl (2m Gravel + 40m Rough Stone)	
Geological Resources	Rough Stone in m^3	Gravel m^3
	4,58,850	14,644
Mineable Reserves	Rough Stone in m^3	Gravel m^3
	1,15,582	10,048
Ultimate Pit Dimension	95 m (L)* 90 m (W)*47 m (D)	
Water Level in the surrounds area	58 – 62 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards southwestern side. The altitude of the area is 205 m (max) above mean sea level. The area is covered by 2 m thickness of Gravel Formation. Massive Charnockite is found after 2m (Gravel Formation) which is clearly inferred from the nearby existing mine pit.	
Machinery proposed	Jack Hammer	3 Nos
	Compressor	1 No
	Hydraulic Excavator	1 No
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	21 Nos	
Project Cost	Rs.27, 86,300/-	
CER Cost @ 2% of Project Cost	Rs.55,700/-	
Nearby Water Bodies	Thirumanimutharu River	950m NW
	Kattipalayam Kuttai	960m SW
	Paruthipalli Lake	1.8km km NW
	Konnayar tank	1.7km SW
	Ramapuram Lake	4.5km NW
	Natramangalam Lake	6.6km SE
	Elur Lake	9.0km SE
Greenbelt Development Plan	Proposed to plant 125 trees in 1100 Sq.m area in the 7.5 m Safety Zone	
Proposed Water Requirement	3.0 KLD	
Nearest Habitation	460m Northwest	

Source: Approved Mining Plan

TABLE 1.5: BRIEF DESCRIPTION OF THE PROJECT – P2

Name of the Quarry	K.Periyasamy Rough stone and Gravel Quarry	
Toposheet No	58-I/03	
Latitude between	11°25'03.22"N to 11°25'07.64"N	
Longitude between	78°02'52.79"E to 78°02'56.69"E	
Highest Elevation	205m AMSL	
Proposed Depth of Mining	42 m bgl (2m Gravel + 40m Rough Stone)	
Geological Resources	Rough Stone in m^3	Gravel m^3
	3,85,812	11,790
Mineable Reserves	Rough Stone in m^3	Gravel m^3
	1,14,880	8,568
Ultimate Pit Dimension	104 m (L)* 70 m (W)*42 m (D)	
Water Level in the surrounds area	58 – 62 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards southwestern side. The altitude of the area is 205 m (max) above mean sea level. The area is covered by 2 m thickness of Gravel Formation. Massive Charnockite is found after 2m (Gravel Formation) which is clearly inferred from the nearby existing mine pit.	
Machinery proposed	Jack Hammer	3 Nos
	Compressor	1 No
	Hydraulic Excavator	1 No
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	21 Nos	
Project Cost	Rs.27, 82,400/-	
CER Cost @ 2% of Project Cost	Rs.55,600/-	
Nearby Water Bodies	Thirumanimutharu River	870m NW
	Kattipalayam Kuttai	680m SW
	Paruthipalli Lake	1.7km NW
	Konnayar tank	1.7km SW
	Ramapuram Lake	4.5km NW
	Natramangalam Lake	6.6km SE
	Elur Lake	8.8km SE
Greenbelt Development Plan	Proposed to plant 125 trees in 1200 Sq.m area in the 7.5 m Safety Zone	
Proposed Water Requirement	2.9 KLD	
Nearest Habitation	410m Northwest	

Source: Approved Mining Plan

TABLE 1.6: BRIEF DESCRIPTION OF THE PROJECT – P3

Name of the Quarry	B.Mekala Rough stone and Gravel Quarry	
Toposheet No	58-I/03	
Latitude between	11°24'55.47"N to 11°25'00.26"N	
Longitude between	78°02'51.08"E to 78°02'56.10"E	
Highest Elevation	216m AMSL	
Proposed Depth of Mining	46 m bgl (1m Topsoil + 45m Rough Stone)	
Geological Resources	Rough Stone in m^3	Topsoil m^3
	6,15,465	13,677
Mineable Reserves	Rough Stone in m^3	Topsoil m^3
	86,650	608
Ultimate Pit Dimension	106 m (L)* 97 m (W)*46 m (D	
Water Level in the surrounds area	71 – 76 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards southwestern side. The altitude of the area is 205 m (max) above mean sea level. The area is covered by 2 m thickness of Gravel Formation. Massive Charnockite is found after 2m (Gravel Formation) which is clearly inferred from the nearby existing mine pit.	
Machinery proposed	Jack Hammer	3 Nos
	Compressor	1 No
	Hydraulic Excavator	1 No
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	17 Nos	
Project Cost	Rs.26,03,700/-	
CER Cost @ 2% of Project Cost	Rs.52,000/-	
Nearby Water Bodies	Thirumanimutharu River	900m NW
	Kattipalayam Kuttai	680m SW
	Paruthipalli Lake	1.8km NW
	Konnayar tank	1.7km SW
	Ramapuram Lake	4.5km NW
	Natramangalam Lake	6.5km SE
	Elur Lake	9.0km SE
Greenbelt Development Plan	Proposed to plant 375 trees in 35 00 Sq.m area in the 7.5 m Safety Zone	
Proposed Water Requirement	3.7 KLD	
Nearest Habitation	640m Northwest	

Source: Approved Mining Plan

TABLE 1.7: BRIEF DESCRIPTION OF THE PROJECT – P4

Name of the Quarry	M.Krishnan Rough stone and Gravel Quarry	
Toposheet No	58-I/03	
Latitude between	11°24'38.31"N to 11°25'40.71"N	
Longitude between	78°02'31.01"E to 78°02'35.97"E	
Highest Elevation	229m AMSL	
Proposed Depth of Mining	37 m bgl (2m Gravel + 35m Rough Stone)	
Geological Resources	Rough Stone in m^3	Gravel m^3
	3,07,900	10,100
Mineable Reserves	Rough Stone in m^3	Topsoil m^3
	1,09,075	3,102
Ultimate Pit Dimension	129 m (L)* 58 m (W)*37 m (D	
Water Level in the surrounds area	62 – 67 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards southwestern side. The altitude of the area is 205 m (max) above mean sea level. The area is covered by 2 m thickness of Gravel Formation. Massive Charnockite is found after 2m (Gravel Formation) which is clearly inferred from the nearby existing mine pit.	
Machinery proposed	Jack Hammer	3 Nos
	Compressor	1 No
	Hydraulic Excavator	1 No
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	17 Nos	
Project Cost	Rs.27,77,000/-	
CER Cost @ 2% of Project Cost	Rs.50,000/-	
Nearby Water Bodies	Thirumanimutharu River	530m NW
	Kattipalayam Kuttai	70m South
	Paruthipalli Lake	2.2km NW
	Konnayar tank	700m South
	Ramapuram Lake	4.3km NW
	Natramangalam Lake	7.0km SE
	Elur Lake	9.0km SE
Greenbelt Development Plan	Proposed to plant 150 trees in 1500 Sq.m area in the 7.5 m Safety Zone	
Proposed Water Requirement	2.7 KLD	
Nearest Habitation	510m Southeast	

Source: Approved Mining Plan

TABLE 1.8: BRIEF DESCRIPTION OF THE PROJECT – P5

Name of the Quarry	S.Nandhakumar Rough stone and Gravel Quarry	
Toposheet No	58-I/03	
Latitude between	11°25'00.40"N to 11°25'03.91"N	
Longitude between	78°02'44.17"E to 78°02'53.07"E	
Highest Elevation	202m AMSL	
Proposed Depth of Mining	27 m bgl (2m Gravel + 25m Rough Stone)	
Geological Resources	Rough Stone in m^3	Gravel m^3
	2,38,925	12,110
Mineable Reserves	Rough Stone in m^3	Topsoil m^3
	34,603	3,102
Ultimate Pit Dimension	150 m (L)* 30 m (W)*27 m (D	
Water Level in the surrounds area	63 – 68m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards southwestern side. The altitude of the area is 205 m	

	(max) above mean sea level. The area is covered by 2m thickness of Gravel Formation. Massive Charnockite is found after 2m (Gravel Formation) which is clearly inferred from the nearby existing mine pit.	
Machinery proposed	Jack Hammer	1 No
	Compressor	1 No
	Hydraulic Excavator	1 No
	Tippers	1 No
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	12 Nos	
Project Cost	Rs.22,65,000/-	
CER Cost @ 2% of Project Cost	Rs. 46,000/-	
Nearby Water Bodies	Thirumanimutharu River	640m NW
	Kattipalayam Kuttai	780m South
	Paruthipalli Lake	2.2km NW
	Konnayar tank	1.5km SW
	Ramapuram Lake	4.2km NW
	Natramangalam Lake	6.7km SE
	Elur Lake	9.0km SE
Greenbelt Development Plan	Proposed to plant 150 trees in 4170 Sq.m area in the 7.5m Safety Zone	
Proposed Water Requirement	2.5 KLD	
Nearest Habitation	520m Northeast	

Source: Approved Mining Plan

TABLE 1.9: BRIEF DESCRIPTION OF THE PROJECT – P6

Name of the Quarry	S.Rangasamy Rough stone and Gravel Quarry	
Toposheet No	58-I/03	
Latitude between	11°24'43.54"N to 11°24'49.04"N	
Longitude between	78°02'29.22"E to 78°02'36.90"E	
Highest Elevation	202m AMSL	
Proposed Depth of Mining	42 m bgl (2m Gravel + 40m Rough Stone)	
Geological Resources	Rough Stone in m^3	Gravel m^3
	6,84,560	14,996
Mineable Reserves	Rough Stone in m^3	Topsoil m^3
	1,31,800	8,050
Ultimate Pit Dimension	200m (L)* 101 m (W)*42 m (D	
Water Level in the surrounds area	63 – 68m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards southwestern side. The altitude of the area is 205 m (max) above mean sea level. The area is covered by 2m thickness of Gravel Formation. Massive Charnockite is found after 2m (Gravel Formation) which is clearly inferred from the nearby existing mine pit.	
Machinery proposed	Jack Hammer	2 Nos
	Compressor	1 No
	Hydraulic Excavator	1 No
	Tippers	1 No
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	14 Nos	
Project Cost	Rs.29,63,000/-	
CER Cost @ 2% of Project Cost	Rs. 60,000/-	
Nearby Water Bodies	Thirumanimutharu River	640m NW
	Kattipalayam Kuttai	300 SE

	Paruthipalli Lake	2.2km NW
	Konnayar tank	800m NW
	Ramapuram Lake	4.0km NW
	Natramangalam Lake	7.0km SE
	Elur Lake	9.0km SE
Greenbelt Development Plan	Proposed to plant 150 trees in 4170 Sq.m area in the 7.5m Safety Zone	
Proposed Water Requirement	2.5 KLD	
Nearest Habitation	410m Northwest	

Source: Approved Mining Plan

TABLE 1.10: BRIEF DESCRIPTION OF THE PROJECT – P7

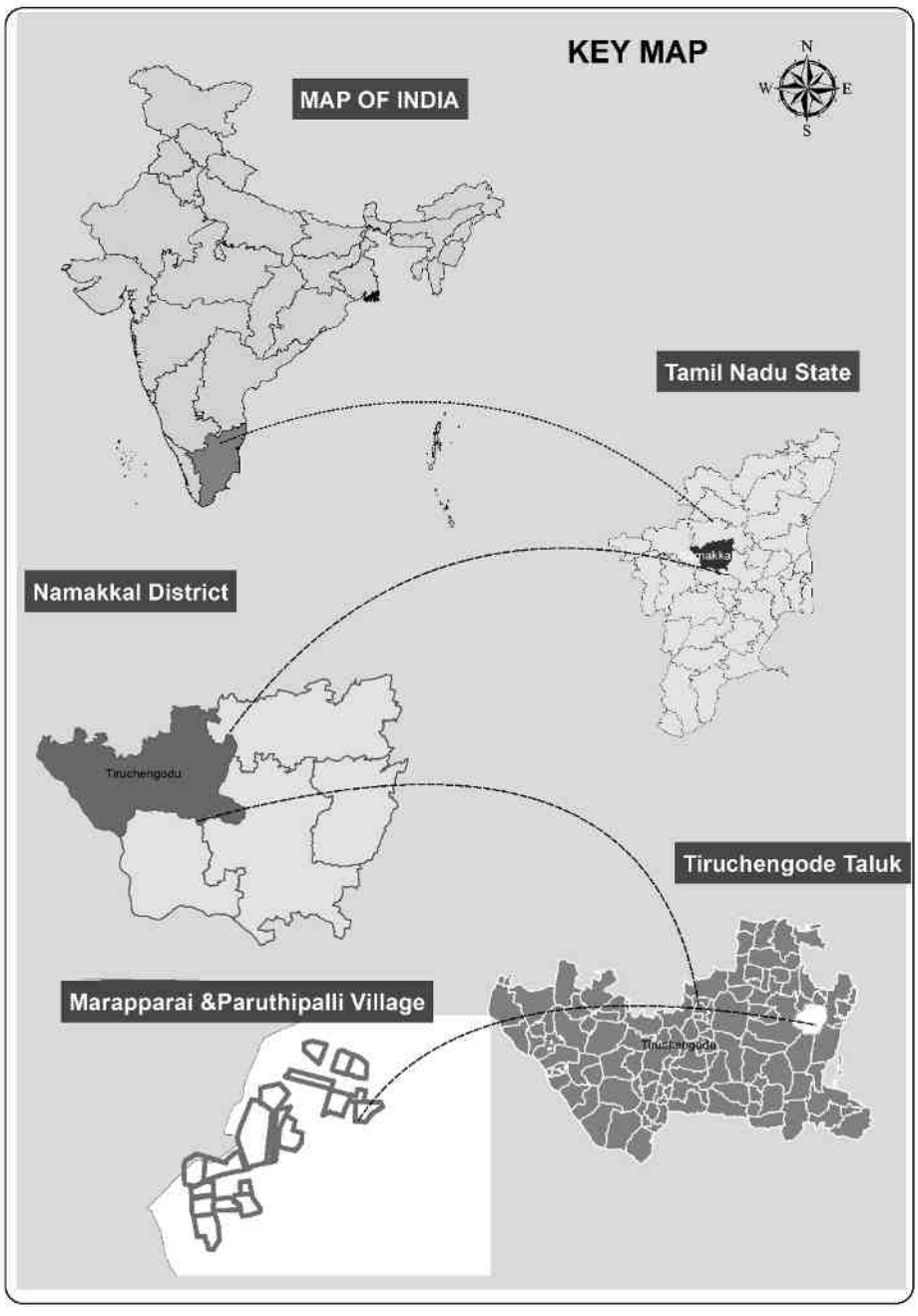
Name of the Quarry	M.Muthukrishnan Rough stone and Gravel Quarry	
Toposheet No	58-I/03	
Latitude between	11°24'32.43"N to 11°24'37.58"N	
Longitude between	78°02'27.38"E to 78°02'32.33"E	
Highest Elevation	197m AMSL	
Proposed Depth of Mining	43 m bgl (3m Gravel + 40m Rough Stone)	
Geological Resources	Rough Stone in m^3	Gravel m^3
	6,92,480	51,936
Mineable Reserves	Rough Stone in m^3	Topsoil m^3
	1,99,770	8,985
Ultimate Pit Dimension	131m (L)* 112 m (W)*43 m (D	
Water Level in the surrounds area	58 – 63m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards southwestern side. The altitude of the area is 205 m (max) above mean sea level. The area is covered by 2m thickness of Gravel Formation. Massive Charnockite is found after 2m (Gravel Formation) which is clearly inferred from the nearby existing mine pit.	
Machinery proposed	Jack Hammer	4 Nos
	Compressor	1 No
	Hydraulic Excavator	1 No
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	20 Nos	
Project Cost	Rs. 43,90,400/-	
CER Cost @ 2% of Project Cost	Rs. 87,800/-	
Nearby Water Bodies	Thirumanimutharu River	500m NW
	Kattipalayam Kuttai	100 East
	Paruthipalli Lake	2.2km NW
	Konnayar tank	500m SW
	Ramapuram Lake	4.3km NW
	Natramangalam Lake	7.0km SE
	Elur Lake	9.0km SE
Greenbelt Development Plan	Proposed to plant 250 trees in 2212 Sq.m area in the 7.5m Safety Zone	
Proposed Water Requirement	2.5 KLD	
Nearest Habitation	300m Southeast	

Source: Approved Mining Plan

1.3.2 Location of the Project

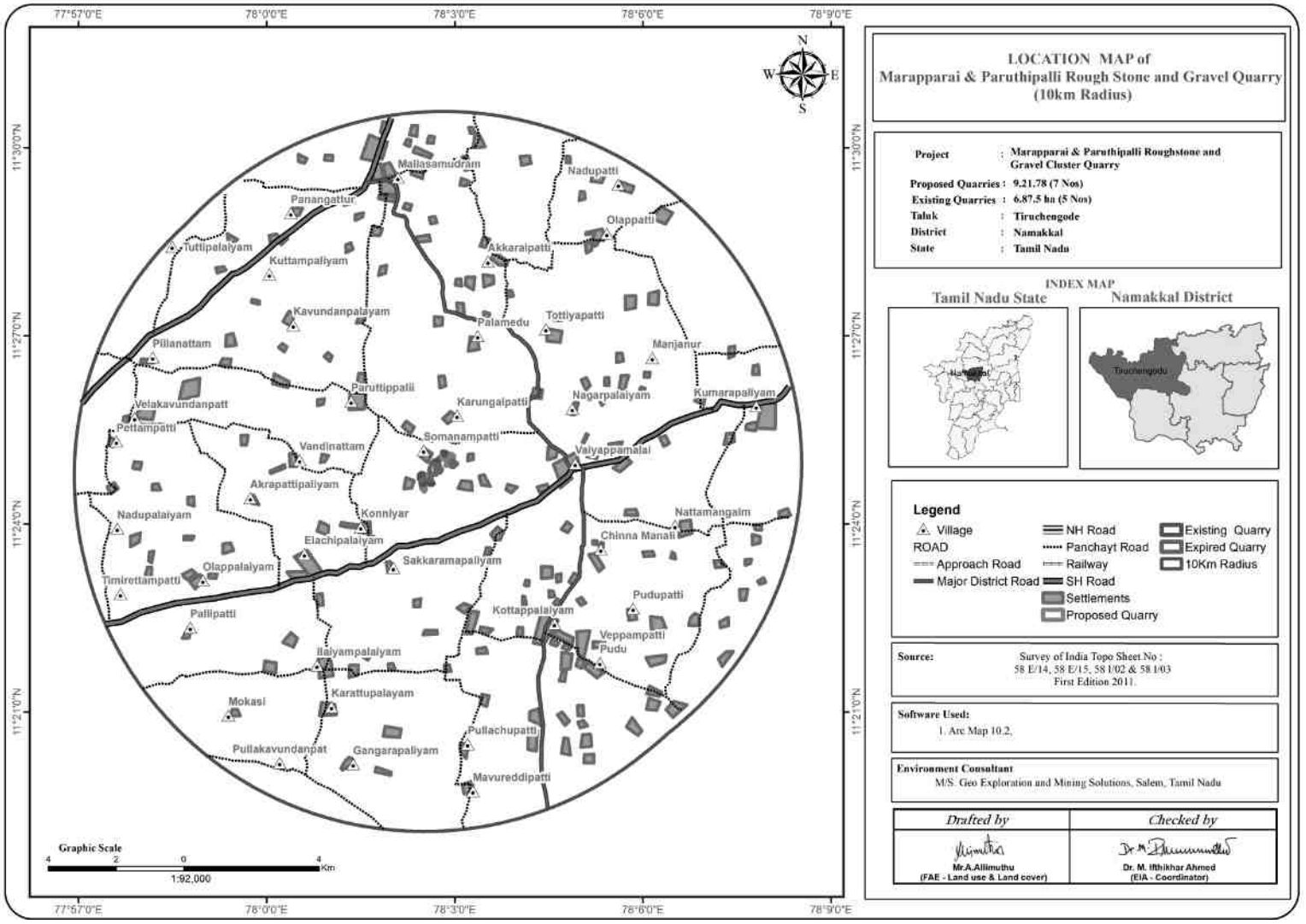
The Cluster Quarries are located about 25.0 km North West of Namakkal, 16.0 km Northeast of Tiruchengode and1.0 km Northwest of Marapparai Village. The area is marked in the Survey of India, Toposheet No. 58-I/03.

FIG1.1KEY MAP SHOWING THE LOCATION OF THE CLUSTERQUARRIES



Source: Survey of India Toposheet 58-I/03

FIGURE 1.2: TOPOSHEET OF CLUSTERCOVERING 10 KM RADIUS



Source: Survey of India Toposheet 58-I/03

1.4 ENVIRONMENTAL CLEARANCE

The Environmental Clearance process for the project will comprise of four stages. These stages in sequential order are given below:-

1. Screening
2. Scoping
3. Public consultation &
4. Appraisal

Screening –

Proposal –P1

- The proponent applied for Rough Stone and Gravel Quarry Lease Dated: 18.03.2019
- Precise Area Communication Letter was issued by the District Collector, Namakkal Rc.247/Mine/2019 dated 20.02.2020
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Namakkal District, vide Rc.No: 247Mine/2019 dated 27.05.2020
- 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 vide online Proposal No. SIA/TN/MIN/55800/2020 Dated: 20.08.2020

Proposal –P2

- The proponent applied for Rough Stone and Gravel Quarry Lease Dated: 18.06.2019
- Precise Area Communication Letter was issued by the District Collector, Namakkal Rc.557/Mine/2019 dated 20.02.2020
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Namakkal District, vide Rc.No: 557Mine/2019 dated 27.05.2020
- 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 vide online Proposal No. SIA/TN/MIN/55795/2020 Dated: 20.08.2020

Proposal –P3

- The proponent applied for Rough Stone and Gravel Quarry Lease Dated: 01.08.2018
- Precise Area Communication Letter was issued by the District Collector, Namakkal Rc.1033/Mine/2018 dated 11.02.2019
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Namakkal District, vide Rc.No: 1033/Mine/2018 dated 11.02.2020
- 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 vide online Proposal No. SIA/TN/MIN/61676/2021

Proposal –P4

- The proponent applied for Rough Stone and Gravel Quarry Lease Dated: 30.05.2019
- Precise Area Communication Letter was issued by the District Collector, Namakkal Rc.509/Mine/2019 dated 19.11.2020
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Namakkal District, vide Rc.No: Rc.509/Mine/2019 dated 03.12.2020

- 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 vide online Proposal No. SIA/TN/MIN/59394/2020

Proposal –P5

- The proponent applied for Rough Stone and Gravel Quarry Lease Dated: 25.08.2020
- Precise Area Communication Letter was issued by the District Collector, Namakkal Rc.583/Mine/2020 dated 20.11.2020
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Namakkal District, vide Rc.No: Rc.583/Mine/2020 dated 10.12.2020
- 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 vide online Proposal No. SIA/TN/MIN/60076/2021

Proposal –P6

- The proponent applied for Rough Stone and Gravel Quarry Lease Dated: 25.08.2020
- Precise Area Communication Letter was issued by the District Collector, Namakkal Rc.584/Mine/2020 dated 20.11.2020
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Namakkal District, vide Rc.No: Rc.584/Mine/2020 dated 11.12.2020
- 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 vide online Proposal No. SIA/TN/MIN/60400/2021

Proposal –P7

- Under examination Department of Geology, Namakkal

Scoping –

Proposal –P1

- The proposal was placed in 178th SEAC meeting held on 01.10.2020 for the committee recommended for issue of ToR.
- The proposal was considered in 408th SEIAA meeting held on 28.10.2020 & 29.10.2020 and issued ToR vide Letter No SEIAA-TN/F.No.7773/SEAC/ToR-811/2020 Dated 09.11.2020

Proposal –P2

- The proposal was placed in 178th SEAC meeting held on 01.10.2020 for the committee recommended for issue of ToR.
- The proposal was considered in 408th SEIAA meeting held on 28.10.2020 & 29.10.2020 and issued ToR vide Letter No SEIAA-TN/F.No. 7774/SEAC/ToR-818/2020 Dated 11.11.2020

Proposal - P3

- Under examination of SEIAA

Proposal – P4

- The proposal was placed in 203th SEAC meeting held on 23.02.2021 for the committee recommended for issue of ToR.
- The proposal was considered in 436th SEIAA meeting held on 30.03.2021 and issued ToR vide Letter No SEIAA-TN/F.No.8179/SEAC/ToR-939/2020 Dated 16.04.2021

Proposal – P5

- The proposal was placed in 206th SEAC meeting held on 08.03.2021 for the committee recommended for issue of ToR.
- The proposal was considered in 439th SEIAA meeting held on 16.04.2021 and issued ToR vide Letter No SEIAA-TN/F.No.8268/SEAC/ToR-947/2021 Dated 30.04.2021

Proposal – P6

- The proposal was placed in 208th SEAC meeting held on 24.03.2021 for the committee recommended for issue of ToR.
- The proposal was considered in 441th SEIAA meeting held on 22.04.2021 and issued ToR vide Letter No SEIAA-TN/F.No.8312/SEAC/ToR-962/2021 Dated 30.04.2021

Proposal – P7

- Under examination of SEIAA

Public Consultation –

Application to The Member Secretary of the Tamil Nadu Pollution Control Board (TNPCB) to conduct Public Hearing in a systematic, time bound and transparent manner ensuring widest possible public participation at the project site or in its close proximity in the District is submitted along with this Draft EIA/ EMP Report and the outcome of public hearing proceedings will be detailed in the Final EIA/EMP Report.

Appraisal –

Appraisal is the detailed scrutiny by the State Expert Appraisal Committee (SEAC) of the application and other documents like the final EIA & EMP Report, outcome of the Public Consultations including Public Hearing Proceedings, submitted by the proponent to the regulatory authority concerned for grant of environmental clearance.

The report has been prepared using the following references:

- Guidance Manual of Environmental Impact Assessment for Mining of Minerals, Ministry of Environment and Forests, 2010
- EIA Notification, 14thSeptember, 2006
- ToR Letter No. SEIAA-TN/F.No. 7773/SEAC/ToR-811/2020 Dated 09.11.2020 – P1
- ToR Letter No. SEIAA-TN/F.No. 7774/SEAC/ToR-818/2020 Dated 11.11.2020 – P2
- ToR Letter No. SEIAA-TN/F.No. 8179/SEAC/ToR-939/2020 Dated 16.04.2021 – P4
- ToR Letter No. SEIAA-TN/F.No. 8268/SEAC/ToR-947/2021 Dated 30.04.2021 – P5
- ToR Letter No. SEIAA-TN/F.No. 8312/SEAC/ToR-962/2020 Dated 30.04.2021 – P6
- Approved Mining Plan vide letter Rc.No. 247/Mine/2019 dated 27.05.2020 – P1
- Approved Mining Plan vide letter Rc.No. 557/Mine/2019 dated 27.05.2020 – P2
- Approved Mining Plan vide letter Rc.No. 509/Mine/2019 dated 19.11.2020 – P4
- Approved Mining Plan vide letter Rc.No. 583/Mine/2020 dated 20.11.2020 – P5
- Approved Mining Plan vide letter Rc.No. 584/Mine/2020 dated 20.11.2020 – P6
    - In addition, other relevant standards for individual activities such as Sampling and Testing of Environmental attributes have been followed.

1.5 TERMS OF REFERENCE (ToR)

"P1"– THIRU. R.PARAMASIVAM

"ToR issued vide Letter No. SEIAA-TN/F.No7773/SEAC/ToR-811/2020 Dated 09.11.2020"

SPECIFIC CONDITIONS		
1	Restricting the depth of mining to ultimate of 42m and quantity of 1,15,372m^3 of Rough stone & 10,048m^3 of Gravel for a period of five years with a bench height of 5m as per approved mining plan considering the hydro geological regime of the surrounding area	Noted & Agreed
2	The Project proponent shall furnish the contour map of the water table detailing the number of wells located around the site and impacts on the wells due to mining activity.	Contour map of the water table showing nearby wells around the project site is provided in figure no: ,Chapter no:3, pg.no:49-51
3	The Project proponent shall carryout the hydro – geological study to evaluate the impact of proposed mining activity on the ground water table, agriculture activity, and water bodies such as rivers, tanks canals, ponds etc., located nearby the proposed mining area	Hydrogeological study was carried out in the core and buffer zone. The result and impacts of mining activity on ground water are discussed in chapter no: 3, Pg.No:50
4	The proponent shall furnish the detail on number of ground water pumping wells, open wells within the radius of 1km along with the water levels in both monsoon and Non-monsoon seasons. The proponent also shall collect the data of water table level from the PWD/TWAD in this area in both monsoon and non-monsoon seasons.	detail on number of ground water pumping wells, open wells within the radius of 1km along with the water levels in both monsoon and Non-monsoon seasons is provided in chapter no:3 , Table no:3.8 and 3.9 pg.no: 49-51
5	The proponent shall conduct the cumulative impact study on the Agriculture area due to Mining, Crushers and other activities around the site area	The details of agriculture activity and livelihood of the people in the study area are studied and discussed under chapter No.3. pg.no:80
6	The details of surrounding well and the cumulative impact on the ground water shall be part of EIA study	Cumulative impact of ground water is discussed in chapter no:3 , Pg.no:50.
7	The Socio Economic studies should be carried out within 10km buffer zone from the mine	Socio-Economic Studies were carried out covering 10km radius from the periphery of the project area and identified 55 villages around the project area. The details are discussed in Chapter No. 3, Page No. 80.
8	A detailed report on the green belt development already undertaken is to be furnished. They also need to submit the proposal for green belt activities for the proposed mine(s).	Detailed report on the green belt development already undertaken is furnished. The green belt activities for the proposed mine is discussed in Chapter:4 , Pg:95
9	CER activities should be carried out taking in to consideration the requirement of the local habitants available within buffer zone as per Office Memorandum of MoEF & CC dated 01.05.2018	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.

		As per para 6 (II) of the office memorandum, being a green field project & Capital Investment is ≤ 100 crores, Thiru. R.Paramasivam shall contribute 2% of Capital Investment towards CER as per directions of EAC/SEAC. Capital cost is Rs. 27,86,300/- and 2% of the same works out to Rs 255,726/-. The detailed CER Activities is discussed under Chapter No. 2, Page No. 46
10	A detailed Mine- Closure plan for the proposed project shall be submitted.	Mine- Closure plan for the proposed project is discussed in chapter no:4 .Pg.no:99
11	A detailed report on the safety and health aspects of the workers and for the surrounding habitants during operation of mining for drilling and blasting shall be submitted	Standard Operating Procedures as per DGMS for Safety and Health aspects of the workers and for surrounding habitants during mining operations is to be followed. The details are discussed under Chapter No. 10, Page No. 137-140
12	The recommendation for the issue of Terms of Reference is subject to the final outcome of the Hon'ble NGT, Principal bench, New Delhi in O.A.No.186 of 2016 (M.A.No. 350/2016) and O.A.No.200/2016and O.A.No.580/2016(M.A.No.1182/2016)And O.A. No. 404/2016 (M.A.No758/2016, M.A.No 920/2016, M.A.No. 1122/2016, M.A.No.12/2017 & M.A.No. 843/2017) and O.A.No 405/2016 and O.A.No 520 of 2016 (M.A.No. 981/2016, M.A.No.982/2016 & M.A.No. 384/2017)	Agreed & Noted.
13	A detailed study of the lithology of the mining lease area shall be furnished	The lease applied area exhibits plain terrain covered by Gravel formation of 2m average thickness and massive Charnockite formation is notice below and sloping towards west. Ground Level is 205m AMSL.
14	A tree survey study shall be carried out (nos. name of the species, age) in the mining lease applied area and its management during mining activity.	No trees within the project area, thorny bushes and karuvelam trees are found within the project area.
15	Restricting the depth of mining to ultimate depth of 42m instead of 47m considering the hydro-geological regime of the surrounding area.	Noted & Agreed
ADDITIONAL CONDITIONS		
1	The ultimate depth of mining is restricted to 42m and quantity of 1,15,372m^3 of Rough stone & 10,048m^3 of Gravel for a period of five years with a bench height of 5m as per approved mining plan considering the hydro geological regime of the surrounding area	Noted & agreed

2	As per the MoEF & CC office Memorandum F.No.22-65/2017-IA.III dated .30.09.2020, the proponent shall furnish the Proposal to address the concerns raised during public hearing and shall be part of EMP.	The outcome of public hearing detailed under Chapter No. 7, Page No. 107. There were no objections during public hearing and the Environment Management Plan is prepared based on the outcome of public hearing.
3	Details of study on social impacts, including livelihood of local people.	The details of agriculture activity and livelihood of the people in the study area are studied and Discussed under chapter No.3. pg.no:80
4	A specific study should include impact on flora & fauna, disturbance to migratory pattern of animals	Most of the study area is dry barren land, no forest land and seasonal cultivation activities are carried out. The flora and fauna study is discussed under Chapter No. 3, Page No .74-78.
5	Reserve funds should be earmarked for proper closure plan	The mine closure plan was prepared along with mining plan and the same has been enclosed as Annexure No 3
6	A detailed plan on plastic waste management shall be furnished. Further, the proponent should strictly comply with Tamil Nadu Government Order (Ms) No. 84 Environment and forest (EC.2) Department dated 25.06.2018 regarding ban on one time use and throw away plastics irrespective of thickness with effect from 01.01.2019 under Environment (Protection) Act, 1986. In this connection, the project proponent has to furnish the action plan.	The mine management shall strictly adhere to and comply with Tamil Nadu Government Order (Ms) No. 84 Environment and forest (EC.2) Department dated 25.06.2018.
7	A detailed post-COVID health management plan for workers as per ICMR and MHA guidelines or the state Govt. guidelines may be followed and report shall be furnished,	Health Management plan for the workers in post COVID – is detailed in Chapter No 7.0, Page No 127
STANDARD TERMS OF REFERENCE		
1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	Not applicable. This is not a Violation Category Project. This proposal is for Environmental Clearance for B1 Category Cluster Situation.
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	The applied land for quarrying is patta land owned by Proponent. Patta copy, other land documents are enclosed as Annexure – 2, Page No 161 - 163.
3	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	Noted & agreed.
4	All corner coordinates of the mine lease area, superimposed on a High Resolution	Map showing –

	Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Project area is superimposed on Satellite imagery is enclosed in Figure No. 2.2 page No. 32 Toposheet of the project area covering 10km radius – Figure No. 1.2, Page No. 10 Geology map of the project area covering 10km radius - Figure No. 2.8, Page No. 47.
5	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	Geomorphological features are incorporated in the Toposheet map covering 10km radius around the project area Figure No. 1.2, Page No. 10
6	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	The applied area is inspected by the VAO, Revenue Inspector of Mines, Assistant Director and confirmed the land is suitable for Rough stone quarrying operation with the land use policy of the state.
7	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	The proponent has framed its Environmental Policy and the same is discussed in the Chapter No 10.1, Page No132
8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	It is an opencast quarrying operation proposed to operate in Mechanized method. The rough stone formation is a hard, compact and homogeneous body. The height and width of the bench is maintained as 5m with 90^0 bench slope.
9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc., should be for the life of the mine / lease period.	Noted & Agreed.
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human	Land use and land cover of the study area is discussed in Chapter No. 3, Page No. 40. Land use plan of the project area showing pre-operational, operational and post-operational

	settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	phases are discussed in Chapter No. 3, Table No 3.2, Page No 49
11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given	Not Applicable. There are no wastages anticipated during this quarry operation. The entire quarried out materials will be transported to the needy customers.
12	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	Not Applicable. There is no Forest Land involved in the proposed project area. The proposed project area is a Patta Land registered in the name of Proponent. The Patta copy is enclosed in Approved Mining Plan as Annexure – 2.
13	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	Not Applicable. The proposed project area does not involve any Forest Land.
14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not Applicable. The project doesn't attract Recognition of Forest Rights Act, 2006.
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	There is no Reserve forest within the lease area.
16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	There are No National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Tiger / Elephant Reserves within 10 km Radius from the periphery of the project area. 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.
17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors,	There are No National Parks, Sanctuaries, Biosphere Reserves and Wildlife Corridors,

	Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 KM of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished	Tiger / Elephant Reserves areas within 10 km radius of the proposed project area.
18	A detailed biological study of the study area [core zone and buffer zone (10 KM radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	Detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] was carried out and discussed under Chapter No. 3, Page No. 74-78.
19	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravalli Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable. Project area / Study area is not declared in ‘Critically Polluted’ Area and does not come under ‘Aravalli Range.
20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	Not Applicable. The project doesn't attract The C. R. Z. Notification, 2018.
21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a	The proposed project area over an extent of 1.00.0 ha in Marapparai village is devoid of major cultivations and there are no habitation within a radius of 300 meters. Therefore, R&R Plan / Compensation details for the Project Affected People (PAP) is not anticipated and Not Applicable for this project.

	need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	
22	One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	Baseline Data were collected for One Season (Winter season) during December 2020 - February 2021 as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. 3, Page No. 52-72.
23	Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.	Air Quality Modeling for prediction of incremental GLC's of pollutant was carried out using AERMOD view 9.6.1 Model. Details in Chapter No. 4, Page No. 85-90.
24	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	Total Water Requirement: 3.0 KLD Chapter 4, Table No 4.1 and Page No 84.

25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Water for dust suppression, greenbelt development and domestic use will be obtained from accumulated rainwater/seepage water in mine pits. Drinking water will be sourced from the approved water vendors, Page No 84.
26	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	The rain water collected in the pits after rain will be used for greenbelt development and dust suppression.
27	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	Impact Studies and Mitigation Measures of Water Quality discussed in Chapter 4, Page No. 83-84.
28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	The ground water table is at 58-62m below ground level. The ultimate depth of mine working is 42m from the general ground profile the project will not intersect the ground water table, Chapter No 2, Page No 33
29	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	There is no stream, seasonal or other water bodies passing within the project area. Therefore no modification/ diversion of water bodies are anticipated.
30	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and Bgl. A schematic diagram may also be provided for the same.	Highest elevation of the project area is 205m AMSL. Ultimate depth of the mine is 42m Water level of the area is 58-62m BGL
31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater	Recommended Species proposed for Greenbelt Development are given in the Chapter 4, Table No 4.10, Page No. 95.

	ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	
32	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	Traffic density survey was carried out to analyse the impact of Transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no much significant impact due to the proposed transportation from the project area. Details in Chapter 2, Page No.41 - 43.
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Infrastructure & other facilities will be provided to the Mine Workers after the grant of quarry lease and the same has been discussed in the Chapter No. 2 Page No. 44.
34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	The details of conceptual plan is discussed in Chapter No 11, Page No 195
35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Details in Chapter 4, Page No. 98 - 99.
36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	Details in Chapter 4, Page No. 95.
37	Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Details in Chapter 4, Page No. 97
38	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any,	Environment Management Plan Chapter 10, Page No. 132-194

	occupational health impacts besides other impacts specific to the proposed Project.	
39	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	The outcome of public hearing will be updated in the final EIA/AMP report
40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation is pending in any court against this project.
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The proposed capital cost for Environmental Monitoring Programme is Rs 3,80,000/- and the recurring cost is Rs 6, 50,000/- per annum. Details in Chapter 6, Page No. 113
42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Details in Chapter 7.3, Page No. 109.
43	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Details in Chapter 8, Page No. 129-130.
	Besides the above, the below mentioned general points are also to be followed:-	
a	Executive Summary of the EIA/EMP Report	Page No. 1 –8
b	All documents to be properly referenced with index and continuous page numbering.	All the documents are properly referenced with index and continuous page numbering.
c	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	List of Tables and source of the data collected are given properly.
d	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project	Baseline monitoring reports are enclosed with This report in Chapter No – III. Baseline monitoring reports will be submitted in the final EIA report.
e	Where the documents provided are in a language other than English, an English translation should be provided.	Not Applicable.
f	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	
g	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J-	Instructions issued by MoEF & CC O.M. No. J-11013/41/2006-IA.II (I) Dated: 4th August, 2009 are followed.

	11013/41/2006-IA.II(I) Dated: 4th August, 2009, which are available on the website of this Ministry, should be followed.	
h	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation	It is a fresh proposal.
i	As per the circular no. J-11011/618/2010-IA.II(I) Dated: 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	Not applicable.
j	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	Surface Plan – Figure No. 2.3 Page No 34 Working Plan – Figure No 2.9A Page No. 48

"P2"– THIRU.K.PERIYASAMY

"ToR issued vide Letter No. SEIAA-TN/F.No7774/SEAC/ToR-818/2020 Dated 11.11.2020"

SPECIFIC CONDITIONS		
1	Restricting the depth of mining to ultimate of 37m and quantity of 1,14,385m^3 of Rough stone & 8,568m^3 of Gravel for a period of five years with a bench height of 5m as per approved mining plan considering the hydro geological regime of the surrounding area	Noted & Agreed
2	The Project proponent shall furnish the contour map of the water table detailing the number of wells located around the site and impacts on the wells due to mining activity.	Contour map of the water table showing nearby wells around the project site is provided in figure no: ,Chapter no:3, pg.no:49,51
3	The Project proponent shall carryout the hydro – geological study to evaluate the impact of proposed mining activity on the ground water table, agriculture activity, and water bodies such as rivers, tanks canals, ponds etc., located nearby the proposed mining area	Hydrogeological study was carried out in the core and buffer zone. The result and impacts of mining activity on ground water are discussed in chapter no: 3, Pg.No:50
4	The proponent shall furnish the detail on number of ground water pumping wells, open wells within the radius of 1km along with the water levels in both monsoon and Non-monsoon seasons. The proponent also shall collect the data of water table level from the PWD/TWAD in this area in both monsoon and non-monsoon seasons.	detail on number of ground water pumping wells, open wells within the radius of 1km along with the water levels in both monsoon and Non-monsoon seasons is provided in chapter no:3 , Table no:3.8 and 3.9 pg.no:49-51
5	The proponent shall conduct the cumulative impact study on the Agriculture area due to Mining, Crushers and other activities around the site area	The details of agriculture activity and livelihood of the people in the study area are studied and discussed under chapter No.3. pg.no:80
6	The details of surrounding well and the cumulative impact on the ground water shall be part of EIA study	Cumulative impact of ground water is discussed in chapter no:3 , Pg.no:50.
7	The Socio Economic studies should be carried out within 10km buffer zone from the mine	Socio-Economic Studies were carried out covering 10km radius from the periphery of the project area and identified 55 villages around the project area. The details are discussed in Chapter No. 3, Page No. 80.
8	A detailed report on the green belt development already undertaken is to be furnished. They also need to submit the proposal for green belt activities for the proposed mine(s).	Detailed report on the green belt development already undertaken is furnished. The green belt activities for the proposed mine is discussed in Chapter:4 , Pg:95
9	CER activities should be carried out taking in to consideration the requirement of the local habitants available within buffer zone as per Office Memorandum of MoEF & CC dated 01.05.2018	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. As per para 6 (II) of the office memorandum, being a green field project & Capital Investment is ≤ 100 crores, Thiru.

		K.Periyasamy shall contribute 2% of Capital Investment towards CER as per directions of EAC/SEAC. Capital cost is Rs. 27,82,400/- and 2% of the same works out to Rs 55,648/-. The detailed CER Activities is discussed under Chapter No. 2, Page No. 46
10	A detailed Mine- Closure plan for the proposed project shall be submitted.	Mine- Closure plan for the proposed project is discussed in chapter no:4 .Pg.no:99
11	A detailed report on the safety and health aspects of the workers and for the surrounding habitants during operation of mining for drilling and blasting shall be submitted	Standard Operating Procedures as per DGMS for Safety and Health aspects of the workers and for surrounding habitants during mining operations is to be followed. The details are discussed under Chapter No. 10, Page No. 137-140
12	The recommendation for the issue of Terms of Reference is subject to the final outcome of the Hon'ble NGT, Principal bench, New Delhi in O.A.No.186 of 2016 (M.A.No. 350/2016) and O.A.No.200/2016and O.A.No.580/2016(M.A.No.1182/2016)And O.A. No. 404/2016 (M.A.No758/2016, M.A.No 920/2016, M.A.No. 1122/2016, M.A.No.12/2017 & M.A.No. 843/2017) and O.A.No 405/2016 and O.A.No 520 of 2016 (M.A.No. 981/2016, M.A.No.982/2016 & M.A.No. 384/2017)	Agreed & Noted.
13	A detailed study of the lithology of the mining lease area shall be furnished	The lease applied area exhibits plain terrain covered by Gravel formation of 2m average thickness and massive Charnockite formation is notice below and sloping towards west. Ground Level is 205m AMSL.
14	A tree survey study shall be carried out (nos. name of the species, age) in the mining lease applied area and its management during mining activity.	No trees within the project area, thorny bushes and karuvelam trees are found within the project area.
15	Restricting the depth of mining to ultimate depth of 37m instead of 42m considering the hydro-geological regime of the surrounding area.	Noted & Agreed
16	The project Proponent shall furnish the following details along with the EIA report and AD/DD – mines of concern District to ensure no violation file is appraised under normal cases. a. Period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines. b. Quantum of minerals mined out including details of approved and actual depth of mining in the site.	

	c. Name of the person already mined in that lease area. d. Details of EC and CTO already obtained from completion authority	
ADDITIONAL CONDITIONS		
1	The ultimate depth of mining is restricted to 37m and quantity of 1,14,385m^3 of Rough stone & 8,568m^3 of Gravel for a period of five years with a bench height of 5m as per approved mining plan considering the hydro geological regime of the surrounding area	Noted & Agreed
2	As per the MoEF&CC office Memorandum F.No.22-65/2017-IA.III dated .30.09.2020, the proponent shall furnish the Proposal to address the concerns raised during public hearing and shall be part of EMP.	The outcome of public hearing detailed under Chapter No. 7, Page No. 107 There were no objections during public hearing and the Environment Management Plan is prepared based on the outcome of public hearing.
3	Details of study on social impacts, including livelihood of local people.	The details of agriculture activity and livelihood of the people in the study area are studied and Discussed under chapter No.3. pg.no:80
4	A specific study should include impact on flora & fauna, disturbance to migratory pattern of animals	Most of the study area is dry barren land, no forest land and seasonal cultivation activities are carried out. The flora and fauna study is discussed under Chapter No. 3, Page No .74-78.
5	Reserve funds should be earmarked for proper closure plan	The mine closure plan was prepared along with mining plan and the same has been enclosed as Annexure No 3
6	A detailed plan on plastic waste management shall be furnished. Further, the proponent should strictly comply with Tamil Nadu Government Order (Ms) No. 84 Environment and forest (EC.2) Department dated 25.06.2018 regarding ban on one time use and throw away plastics irrespective of thickness with effect from 01.01.2019 under Environment (Protection) Act, 1986. In this connection, the project proponent has to furnish the action plan.	The mine management shall strictly adhere to and comply with Tamil Nadu Government Order (Ms) No. 84 Environment and forest (EC.2) Department dated 25.06.2018.
7	A detailed post-COVID health management plan for workers as per ICMR and MHA guidelines or the state Govt. guidelines may be followed and report shall be furnished,	Health Management plan for the workers in post COVID – is detailed in Chapter No 7.0, Page No 127
STANDARD TERMS OF REFERENCE		

1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	Not applicable. This is not a Violation Category Project. This proposal is for Environmental Clearance for B1 Category Cluster Situation.
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	The applied land for quarrying is patta land owned by Proponent. Patta copy, other land documents are enclosed as Annexure – 2, Page No 161 - 163 .
3	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	Noted & agreed.
4	All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Map showing – Project area is superimposed on Satellite imagery is enclosed in Figure No. 2.2 page No. 32 Toposheet of the project area covering 10km radius – Figure No. 1.2, Page No. 10 Geology map of the project area covering 10km radius - Figure No. 2.8, Page No. 47.
5	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	Geomorphological features are incorporated in the Toposheet map covering 10km radius around the project area Figure No. 1.2, Page No. 10
6	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	The applied area is inspected by the VAO, Revenue Inspector of Mines, Assistant Director and confirmed the land is suitable for Rough stone quarrying operation with the land use policy of the state.
7	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of	The proponent has framed its Environmental Policy and the same is discussed in the Chapter No 10.1, Page No132

	environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	
8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	It is an opencast quarrying operation proposed to operate in Mechanized method. The rough stone formation is a hard, compact and homogeneous body. The height and width of the bench is maintained as 5m with 900 bench slope.
9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc., should be for the life of the mine / lease period.	Noted & Agreed.
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use and land cover of the study area is discussed in Chapter No. 3, Page No. 39. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 2, Table No 2.3, Page No 29
11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given	Not Applicable. There are no wastages anticipated during this quarry operation. The entire quarried out materials will be transported to the needy customers.
12	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	Not Applicable. There is no Forest Land involved in the proposed project area. The proposed project area is a Patta Land registered in the name of Proponent The Patta copy is enclosed in Approved Mining Plan as Annexure – 2.
13	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	Not Applicable. The proposed project area does not involve any Forest Land.
14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers	Not Applicable. The project doesn't attract Recognition of Forest Rights Act, 2006.

	(Recognition of Forest Rights) Act, 2006 should be indicated.	
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	There is no Reserve forest within 10km radius
16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	There are No National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Tiger / Elephant Reserves within 10 km Radius from the periphery of the project area. 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.
17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 KM of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished	There are No National Parks, Sanctuaries, Biosphere Reserves and Wildlife Corridors, Tiger / Elephant Reserves areas within 10 km radius of the proposed project area.
18	A detailed biological study of the study area [core zone and buffer zone (10 KM radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	Detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] was carried out and discussed under Chapter No. 3, Page No. 74-78.
19	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravalli Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and	Not Applicable. Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range.

	furnished to the effect that the proposed mining activities could be considered.	
20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	Not Applicable. The project doesn't attract The C. R. Z. Notification, 2018.
21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	The proposed project area over an extent of 1.00.0 ha in Marapparai village is devoid of major cultivations and there are no habitations within a radius of 300 meters. Therefore, R&R Plan / Compensation details for the Project Affected People (PAP) is not anticipated and Not Applicable for this project.
22	One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	Baseline Data were collected for One Season (Winter season) during December 2020 - February 2021 as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. 3, Page No. 52-72.
23	Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into	Air Quality Modeling for prediction of incremental GLC's of pollutant was carried out using AERMOD view 9.6.1 Model.

	account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.	Details in Chapter No. 4, Page No. 85 - 90.
24	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	Total Water Requirement: 3.0 KLD Chapter 4, Table No 4.1 and Page No 84.
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Water for dust suppression, greenbelt development and domestic use will be obtained from accumulated rainwater/seepage water in mine pits. Drinking water will be sourced from the approved water vendors, Page No 84.
26	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	The rain water collected in the pits after rain will be used for greenbelt development and dust suppression.
27	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	Impact Studies and Mitigation Measures of Water Quality discussed in Chapter 4, Page No. 83-84.
28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	The ground water table is at 58-62m below ground level. The ultimate depth of mine working is 37m from the general ground profile the project will not intersect the ground water table, Chapter No 2, Page No 33
29	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	There is no stream, seasonal or other water bodies passing within the project area. Therefore no modification/ diversion of water bodies are anticipated.
30	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and Bgl. A schematic diagram may also be provided for the same.	Highest elevation of the project area is 205m AMSL. Ultimate depth of the mine is 37mWater level of the area is 58 - 62m BGL

31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	Recommended Species proposed for Greenbelt Development are given in the Chapter 4, Table No 4.10, Page No. 95.
32	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	Traffic density survey was carried out to analyse the impact of Transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no much significant impact due to the proposed transportation from the project area. Details in Chapter 2, Page No.41 - 43.
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Infrastructure & other facilities will be provided to the Mine Workers after the grant of quarry lease and the same has been discussed in the Chapter No. 2 Page No. 44.
34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	The details of conceptual plan is discussed in Chapter No 11, Page No 134
35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Details in Chapter 4, Page No. 98 – 99.
36	Public health implications of the Project and related activities for the population in the impact zone should be systematically	Details in Chapter 4, Page No. 95.

	evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	
37	Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Details in Chapter 4, Page No. 97
38	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	Environment Management Plan Chapter 10, Page No. 117-122
39	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	The outcome of public hearing will be updated in the final EIA/AMP report
40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation is pending in any court against this project.
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Monitoring Programme is Rs 3,80,000/- Details in Chapter 6, Page No. 113
42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Details in Chapter 7.3, Page No. 109.
43	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Details in Chapter 8, Page No. 129-130.
44	Besides the above, the below mentioned general points are also to be followed:-	
a	Executive Summary of the EIA/EMP Report	Page No. 1 –8
b	All documents to be properly referenced with index and continuous page numbering.	All the documents are properly referenced with index and continuous page numbering.
c	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	List of Tables and source of the data collected are given properly.
d	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project	Baseline monitoring reports are enclosed with This report in Chapter No – III. Baseline monitoring reports will be submitted in the final EIA report.

e	Where the documents provided are in a language other than English, an English translation should be provided.	Not Applicable.
f	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	
g	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J-11013/41/2006-IA.II(I) Dated: 4th August, 2009, which are available on the website of this Ministry, should be followed.	Instructions issued by MoEF & CC O.M. No. J-11013/41/2006-IA.II (I) Dated: 4th August, 2009 are followed.
h	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation	It is a fresh proposal.
i	As per the circular no. J-11011/618/2010-IA.II(I) Dated: 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	Not applicable.
j	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	Surface Plan – Figure No. 2.3 Page No 34 Working Plan – Figure No 2.9A Page No. 48

1.6 POST ENVIRONMENT CLEARANCE MONITORING

All the Project Proponent in the Cluster shall submit a half-yearly compliance report in respect of stipulated Environmental Clearance terms and conditions to MoEF & CC Regional Office& SEIAA after grant of EC on 1stJune and 1stDecember of each calendar year as per MoEF & CC Notification S.O. 5845 (E) Dated: 26.11.2018.

1.7 GENERIC STRUCTURE OF EIA DOCUMENT

The overall contents of the EIA report follow the list of contents prescribed in the EIA Notification 2006 and the "Environmental Impact Assessment Guidance Manual for Mining of Minerals" published by MoEF & CC. A brief description of each Chapter is presented in Table No. 1.3.

TABLE 1.11: STRUCTURE OF THE EIA REPORT

S. No	Chapters	Title	Particulars
1	Chapter 1	Introduction	Presents, an Introduction along with Scope and Objective of this EIA/EMP Study
2	Chapter 2	Project Description	Presents the Technical Details of the Project

3	Chapter 3	Description of Environment	Presents the Baseline Status for various Environmental Parameters in the Study Area for One Season (3 Months)
4	Chapter 4	Anticipated Environmental Impacts and Mitigation Measures	Presents the Identification, Prediction and Evaluation of Environmental Impacts due to the Proposed Project Activities. Also presents Proposed Mitigation Measures.
5	Chapter 5	Analysis of Alternatives (Technology & Site)	Presents Analysis of alternatives with respect to site
6	Chapter 6	Environment Monitoring Programme	Present details of post project environment monitoring
7	Chapter 7	Additional Studies	Presents Public Consultation, Risk Assessment and Disaster Management Plan
8	Chapter 8	Project Benefits	Presents project benefits as: Improvements in the Physical Infrastructure, Social Infrastructure Employment Potential – Skilled; Semi-Skilled and Unskilled etc.,
9	Chapter 9	Cost Benefit Analysis	Environmental Cost Benefit Analysis has not been recommended at Scoping Stage – thus no analysis carried out separately in this EIA/EMP Report
10	Chapter 10	Environmental Management Plan	Description of the administrative aspects to ensure the Mitigation Measures is implemented and their effectiveness monitored, after approval of the project.
11	Chapter 11	Summary & Conclusion	Summary of the EIA Report
12	Chapter 12	Disclosure of Consultants Engaged	Disclosure of the Consultants

Source:

1.8 THE SCOPE OF THE STUDY

The State Expert Appraisal Committee (SEAC) – Tamil Nadu considered the project during its meeting. Based on the information furnished in the documents and by presentation made, the SEIAA prescribed the Terms of Reference (ToR). The present EIA/EMP study has been prepared based on the ToR points as issued by SEAC / SEIAA.

This report contains information on the existing environmental attributes including Land, Soil, Water, Air Biological, Ecology and Socio-economic patterns. The report also evaluates the predicted impact of the proposed mining activities on the environment. It covers the various remedial measures proposed by the mine management like Air pollution control systems, recycling of water, Green belt development plans and other environmental management system, which are useful for controlling environmental degradation due to the proposed quarry project. A detailed account of the emission sources, emissions control equipment, background Air quality levels, Meteorological measurements, Dispersion model and all other aspects of pollution like effluent discharge, aquifer characteristics etc., have been discussed in this report.

The baseline monitoring study has been carried out during the non-monsoon season (December 2020 – February 2021) for various environmental components (Refer Table 1.4) so as to assess the existing environmental scenario and predict impact due to implementation of the projects in the cluster on the environment and suggest suitable mitigation measures for likely adverse impacts due to the proposed project.

TABLE 1.12: ENVIRONMENT ATTRIBUTES

Sl.No.	Attributes	Parameters	Source and Frequency
1	Ambient Air Quality	PM10, PM 2.5, SO2, NO2	Continuous 24 hourly samples twice a week for three months at 7 locations
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 ground water and 2 surface water locations 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)	11 locations – data monitored once for 24 hours during EIA study
6	Soil Characteristics	Physical and Chemical Parameters	Once at 5 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 Modelling done for the risk associated with mining.

Source: Field Monitoring Data

The data has been collected as per the requirement of the ToR issued by SEIAA – TN. The compliance of the ToR has been given in Chapter 1, Section 1.5.

1.8.1 Regulatory Compliance & Applicable Laws/Regulations

- Application for Quarrying Lease as per Tamil Nadu Minor Mineral Concession Rules, 1959
- Obtained Precise Area Communication Letter as per Tamil Nadu Minor Mineral Concession Rules, 1959 for Preparation of Mining Plan and obtaining Environmental Clearance
- The Mining Plan of Rough Stone and Gravel quarry has been approved under Rule 41 & 42as amended of Tamil Nadu Minor Mineral Concession Rules, 1959
- ToR from SEIAA - TN for the project P1, P2,P4,P5,P6 was granted .

2. PROJECT DESCRIPTION

2.0 GENERAL

The Proposed Rough Stone and Gravel Quarry in the Cluster require Prior Environmental Clearance. The total Extent of the quarries within the radius of 500m is 16.09.28 ha; hence the project falls under B1 Category.

2.1 DESCRIPTION OF THE PROJECT

The area is rocky barren land, no major vegetation or trees within the project area, the project is site specific and there is no additional area required for this project. There is no effluent generation/discharge from the proposed quarry.

Rough Stone and Gravel 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.

2.2 LOCATION OF THE PROJECT

- The project areas are located in Marapparai & Paruthipalli Village, Tiruchengode Taluk & Namakkal District, and Tamil Nadu State.
- The project falls in Toposheet No: 58-I/03
- Latitude between 11°25'02.29"N to 11°25'07.64"N
- Longitude between 78°02'52.79"E to 78°02'59.16"E

The project area is patta land (Non-Forest Land) & does not fall within 10 km radius of any Eco – sensitive zone, Wild life Sanctuary, National Park, Tiger Reserve, Elephant Corridor and Biosphere Reserves.

TABLE 2.1: SITE CONNECTIVITY TO THE PROJECT AREA

Nearest Village/Habitation	Marapparai Village – 1 km SE
Nearest Town	Tiruchengode – 16.5km - SW
Nearest Roadway	Village road–Paruthipalli to Vaippamalai 300m North (NH 7) Salem – Kanniyakumari 12.0km East (SH 79) Rasipuram – Tiruchengode 1.5 km South
Nearest Railway	Rasipuram – 15.5km - NE
Nearest Airport	Coimbatore – 22 km NE
Seaport	Cochin -142 Km SW

Source: Survey of India Toposheet

The area is bounded by boundary pillars the co ordinates for all the boundary pillars are given below –

TABLE 2.2: BOUNDARY CO-ORDINATES OF PROJECT "P1"

Proposal – P1		
Boundary Pillar No.	**Latitude**	**Longitude**
1	11° 25' 02.29"N	78° 02' 59.01"E
2	11° 25' 02.64"N	78° 02' 56.78"E
3	11° 25' 02.80"N	78° 02' 56.81"E
4	11° 25' 03.22"N	78° 02' 55.42"E
5	11° 25' 06.70"N	78° 02' 56.69"E
6	11° 25' 06.05"N	78° 02' 58.08"E
7	11° 25' 04.98"N	78° 02' 59.16"E
Proposal – P2		
Boundary Pillar No.	**Latitude**	**Longitude**
1	11° 25' 04.04"N	78° 02' 52.79"E
2	11° 25' 07.41"N	78° 02' 53.95"E
3	11° 25' 07.64"N	78° 02' 54.66"E
4	11° 25' 06.70"N	78° 02' 56.69"E
5	11° 25' 03.22"N	78° 02' 55.42"E
6	11° 25' 03.87"N	78° 02' 53.22"E
Proposal – P3		
Boundary Pillar No.	**Latitude**	**Longitude**
1	11° 25' 00.26"N	78° 02' 52.58"E
2	11° 24' 59.38"N	78° 02' 55.98"E
3	11° 24' 58.80"N	78° 02' 56.10"E
4	11° 24' 56.51"N	78° 02' 55.03"E
5	11° 24' 55.47"N	78° 02' 54.78"E
6	11° 24' 56.10"N	78° 02' 52.65"E
7	11° 24' 56.28"N	78° 02' 52.30"E
8	11° 24' 55.59"N	78° 02' 51.08"E
Proposal – P4		
Boundary Pillar No.	**Latitude**	**Longitude**
1	11° 24' 38.31"N	78° 02' 31.05"E
2	11° 24' 39.37"N	78° 02' 31.01"E
3	11° 24' 39.50"N	78° 02' 31.23"E
4	11° 24' 40.22"N	78° 02' 31.20"E
5	11° 24' 40.71"N	78° 02' 33.63"E
6	11° 24' 40.51"N	78° 02' 34.75"E
7	11° 24' 40.07"N	78° 02' 34.70"E
8	11° 24' 39.28"N	78° 02' 35.72"E
9	11° 24' 38.36"N	78° 02' 35.97"E
Proposal – P5		
Boundary Pillar No.	**Latitude**	**Longitude**
1	11° 25' 02.67"N	78° 02' 44.17"E
2	11° 25' 03.35"N	78° 02' 44.90"E
3	11° 25' 03.91"N	78° 02' 45.02"E
4	11° 25' 01.80"N	78° 02' 53.07"E
5	11° 25' 00.40"N	78° 02' 52.54"E
Proposal – P6		
Boundary Pillar No.	**Latitude**	**Longitude**
1	11° 24' 45.66"N	78° 02' 36.90"E
2	11° 24' 45.16"N	78° 02' 34.46"E
3	11° 24' 44.84"N	78° 02' 32.92"E
4	11° 24' 44.15"N	78° 02' 30.91"E
5	11° 24' 43.69"N	78° 02' 29.43"E
6	11° 24' 43.54"N	78° 02' 29.22"E

7	11° 24' 48.09"N	78° 02' 29.59"E
8	11° 24' 46.86"N	78° 02' 33.39"E
9	11° 24' 47.37"N	78° 02' 33.52"E
10	11° 24' 48.67"N	78° 02' 34.91"E
11	11° 24' 49.04"N	78° 02' 35.85"E
12	11° 24' 47.87"N	78° 02' 36.21"E
Proposal – P7		
Boundary Pillar No.	**Latitude**	**Longitude**
1	11° 24' 33.40"N	78° 02' 28.07"E
2	11° 24' 36.85"N	78° 02' 27.38"E
3	11° 24' 37.58"N	78° 02' 31.06"E
4	11° 24' 37.36"N	78° 02' 31.21"E
5	11° 24' 36.84"N	78° 02' 31.65"E
6	11° 24' 35.28"N	78° 02' 32.09"E
7	11° 24' 34.09"N	78° 02' 32.33"E
8	11° 24' 33.20"N	78° 02' 32.29"E
9	11° 24' 32.43"N	78° 02' 31.84"E
10	11° 24' 32.75"N	78° 02' 31.38"E
11	11° 24' 32.48"N	78° 02' 30.06"E
12	11° 24' 32.46"N	78° 02' 29.71"E
13	11° 24' 33.58"N	78° 02' 29.50"E

Source: Quarry Lease Plan

FIGURE 2.1: PHOTOGRAPHS OF THE PROJECT AREA

P1

P2

P3

P4

P5

P6

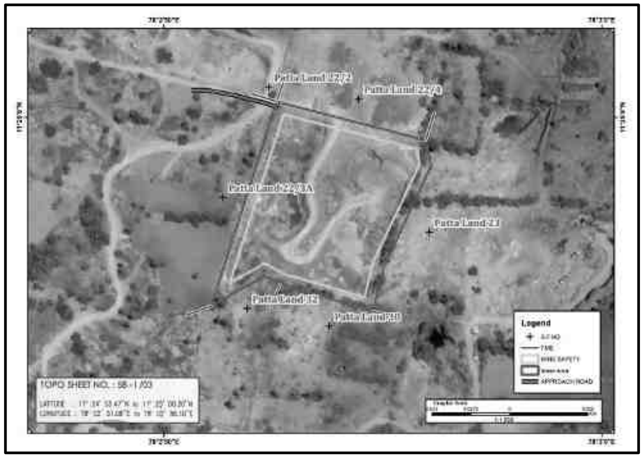
P7

Source: Digital Camera Photographs Shot at Project Area

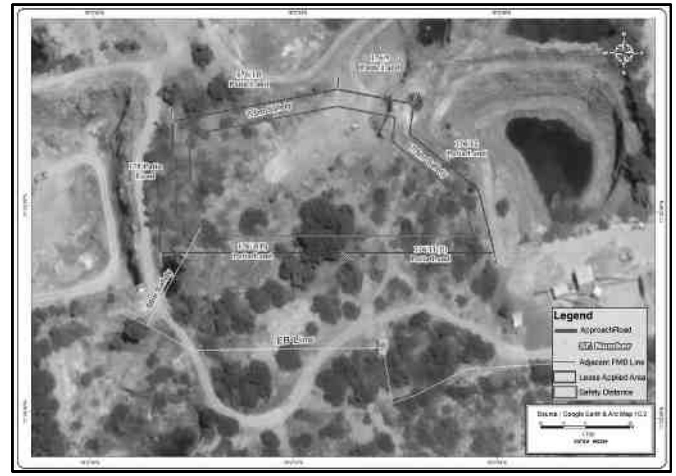
FIGURE 2.2: GOOGLE IMAGE SHOWING APPLIED QUARRY LEASE AREA

P1 P2

P3 P4


Patta Land 22/2
Patta Land 22/4
Patta Land 22/3A
Patta Land 23
Patta Land 32
Patta Land 30
Legend
APPROACH ROAD

P6


EB Line
Legend
ApproachRoad
Adjacent FMB Line
Lease Applied Area
Safety Distance

P5


Paruthipalli 200/4
Patta Land 22/1A & 22/1B
Patta Land 22/3A
Patta Land 22/4
Legend

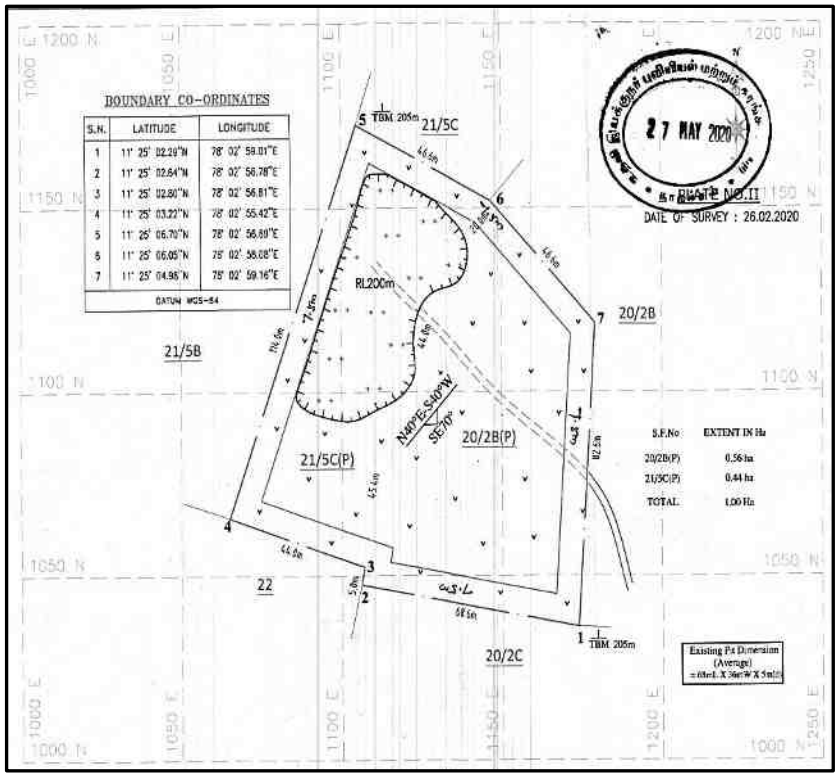
P7


Patta Land 316/1
316/2A Patta Land
176/7 Patta Land
Patta Land 178
Legend
TOPO SHEET NO. : 58 I/13

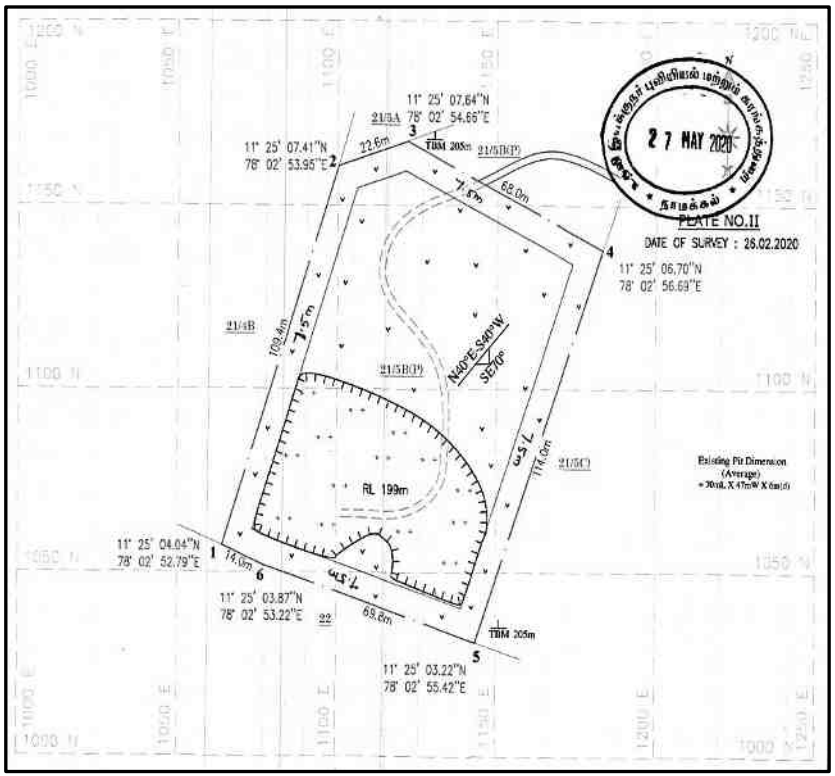
Source: Superimposed on Google Earth Imagery

FIGURE 2.3 A: QUARRY LEASE PLAN& SURFACE PLAN

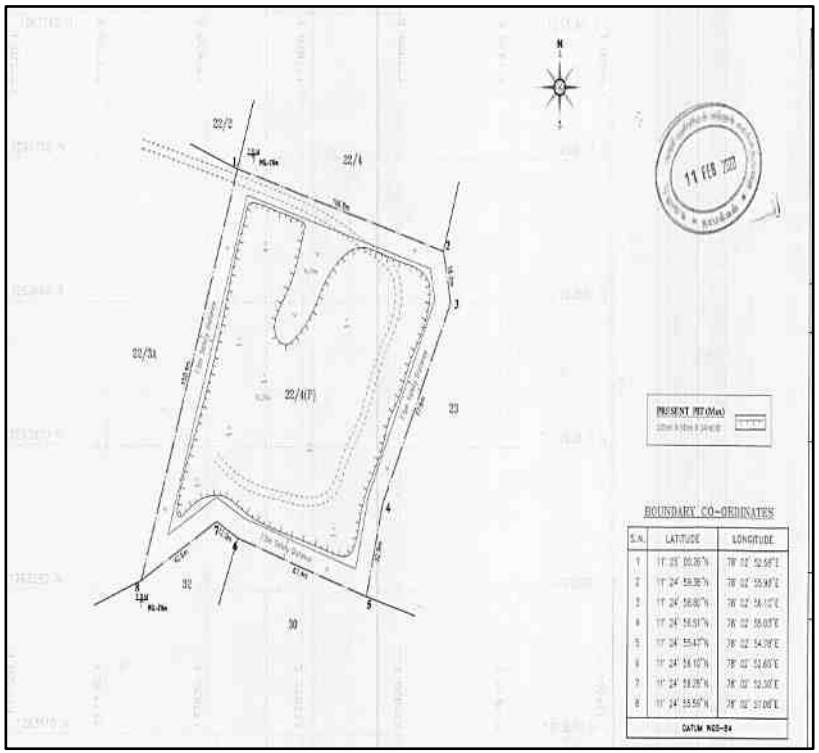
P1



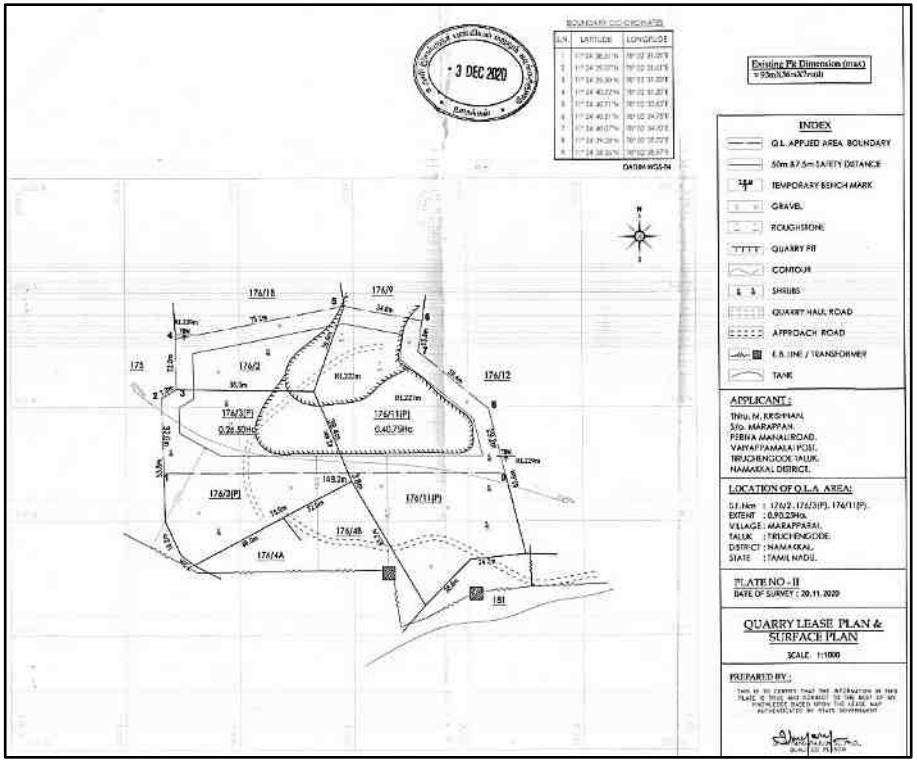
P2



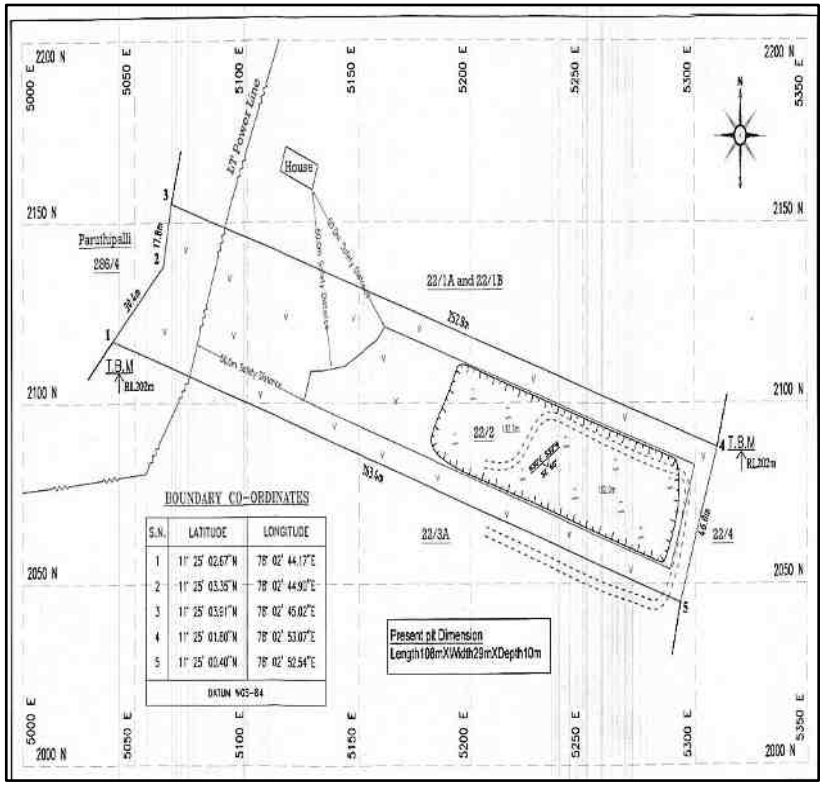
P3


22/2
22/1
22/3A
22/4(P)
23
32
30
PRESENT PIT (Max)
BOUNDARY CO-ORDINATES
S.N.
LATITUDE
LONGITUDE
DATUM WGS-84

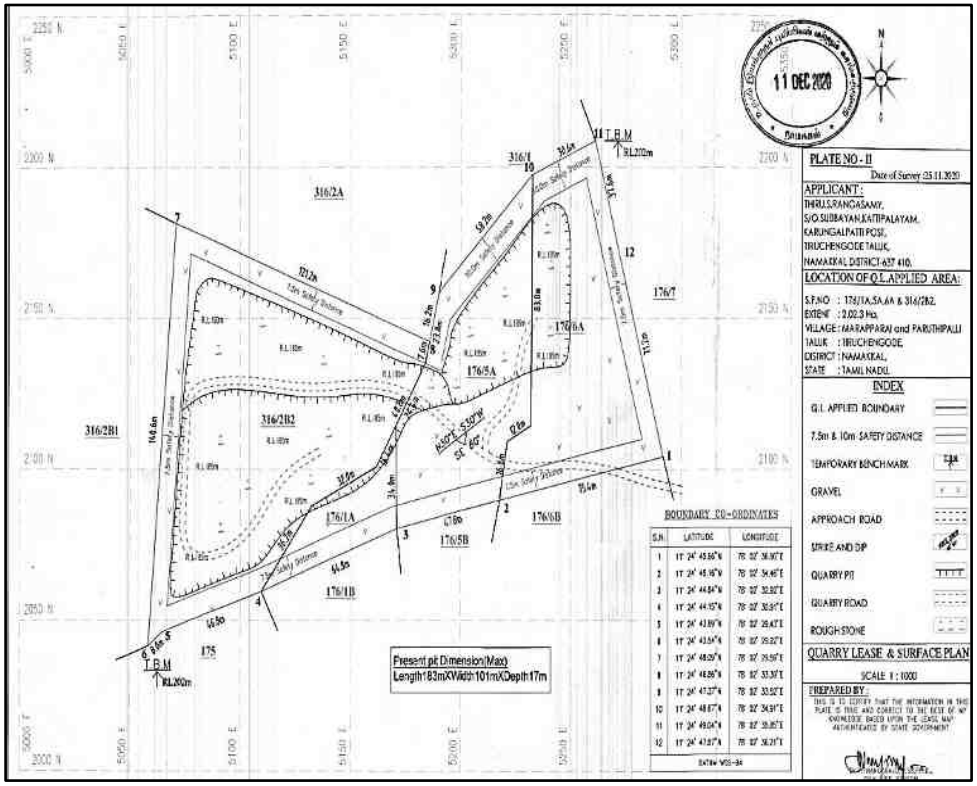
P4


3 DEC 2020
BOUNDARY CO-ORDINATES
S.N.
LATITUDE
LONGITUDE
DATUM WGS-84
Existing Pit Dimension (max)
INDEX
G.L. APPLIED AREA BOUNDARY
50m &7.5m SAFETY DISTANCE
TEMPORARY BENCH MARK
GRAVEL
ROUGHSTONE
QUARRY PIT
CONTOUR
SHRUBS
QUARRY HAUL ROAD
APPROACH ROAD
E.B.LINE / TRANSFORMER
TANK
APPLICANT :
Thiru. M. KRISHNAN,
S/o. MARAPPAN,
PERIYA MANALIROAD,
VAIYAPPAMALAI POST,
TIRUCHENGODE TALUK,
NAMAKKAL DISTRICT.
LOCATION OF Q.L.A. AREA:
S.F.Nos : 176/2, 176/3(P), 176/11(P).
EXTENT : 0.90.2Hrs.
VILLAGE : MARAPPARAI.
TALUK : TIRUCHENGODE.
DISTRICT : NAMAKKAL.
STATE : TAMILNADU.
PLATE NO - II
DATE OF SURVEY : 20.11.2020
QUARRY LEASE PLAN & SURFACE PLAN
SCALE : 1:1000
PREPARED BY :
176/1B
176/9
176/2
176/12
176/3(P)
0.26.50Hc
176/11(P)
0.40.75Hc
176/3(P)
176/11(P)
176/4B
176/4A
181

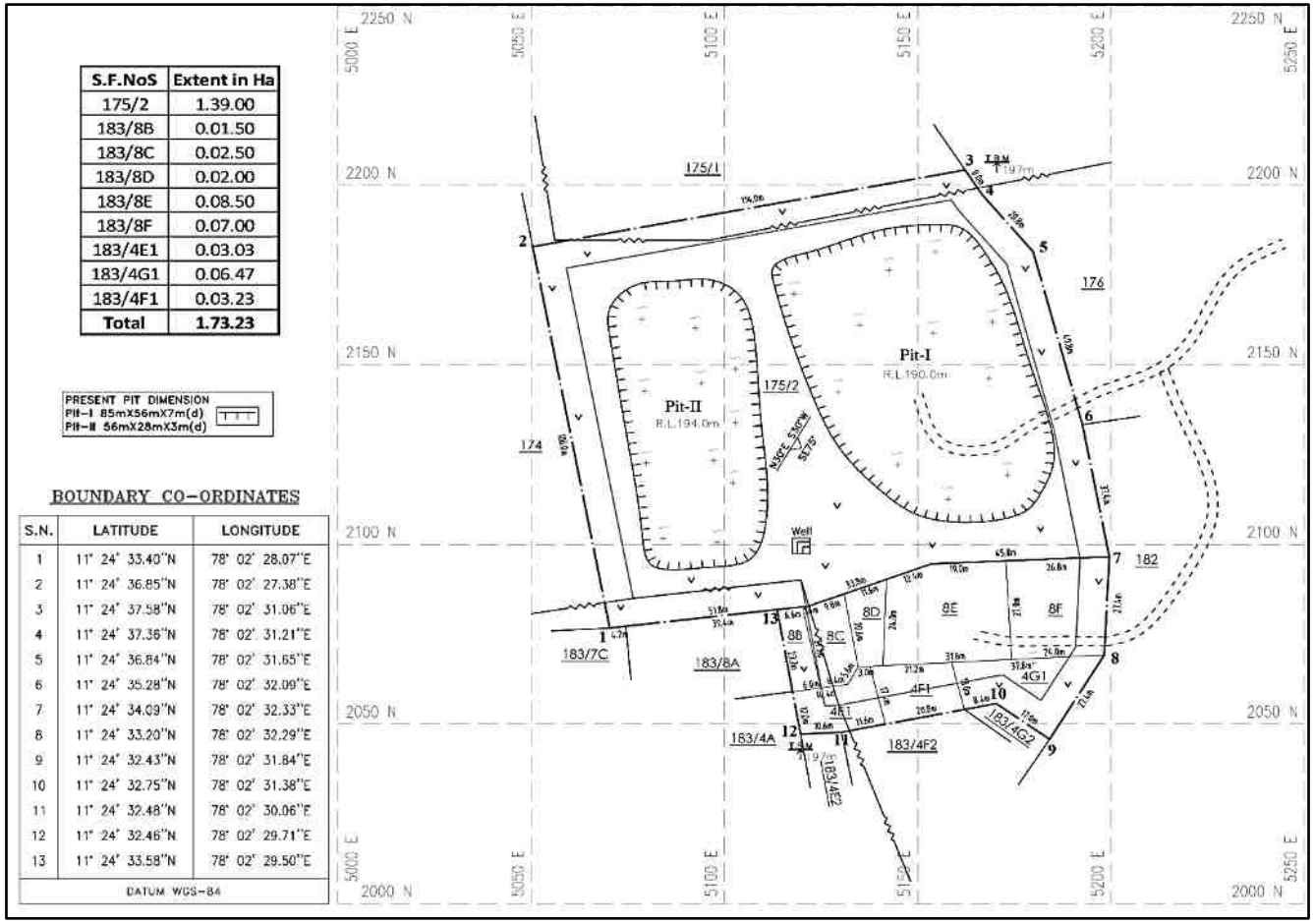
P5


2200 N
2150 N
2100 N
2050 N
2000 N
5000 E
5050 E
5100 E
5150 E
5200 E
5250 E
5300 E
5350 E
N
11 KV Power Line
House
Paruthipalli
286/4
22/1A and 22/1B
22/2
22/3A
22/4
T.B.M
RL202m
BOUNDARY CO-ORDINATES
S.N. LATITUDE LONGITUDE
1 11° 25' 02.67"N 78° 02' 44.17"E
2 11° 25' 03.35"N 78° 02' 44.90"E
3 11° 25' 03.91"N 78° 02' 45.02"E
4 11° 25' 01.80"N 78° 02' 53.07"E
5 11° 25' 02.40"N 78° 02' 52.54"E
DATUM WGS-84
Present pit Dimension
Length106mXWidth29mXDepth10m

P6

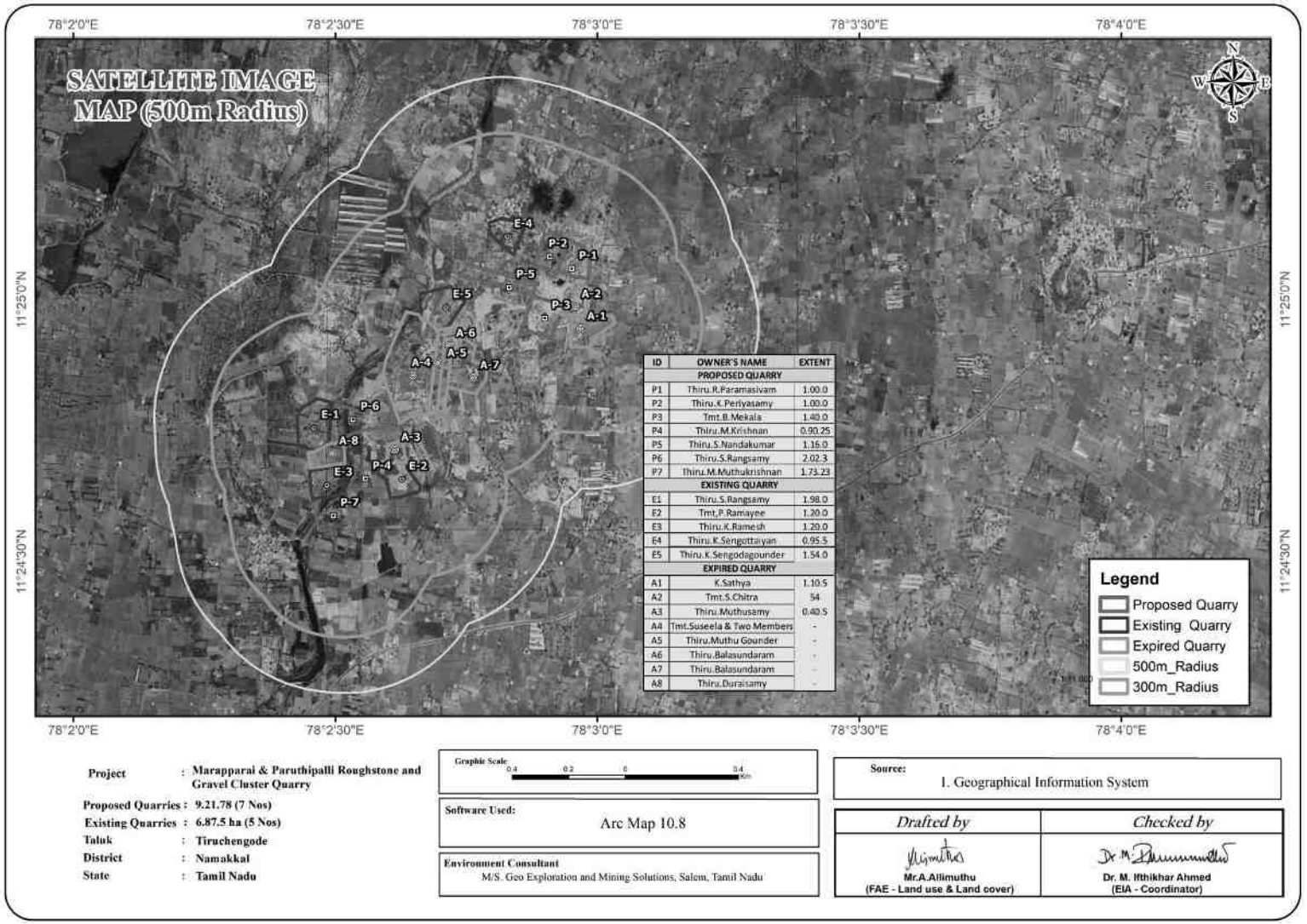

11 DEC 2020
PLATE NO - II
Date of Survey 25.11.2020
APPLICANT :
THIRU.S.RANGASAMY,
S/O.SUBBAYAN,KATTIPALAYAM,
KARUNGALPATTI POST,
TIRUCHENGODE TALUK,
NAMAKKAL DISTRICT-637 410.
LOCATION OF Q.L.APPLIED AREA:
S.F.NO : 176/1A,5A,4A & 316/2B2.
EXTENT : 2.02.0 Ha.
VILLAGE : MARAPPARAI and PARUTHIPALLI
TALUK : TIRUCHENGODE.
DISTRICT : NAMAKKAL.
STATE : TAMIL NADU.
INDEX
G.L APPLIED BOUNDARY
7.5m & 10m SAFETY DISTANCE
TEMPORARY BENCH MARK
GRAVEL
APPROACH ROAD
STRIKE AND DIP
QUARRY PIT
QUARRY ROAD
ROUGH STONE
QUARRY LEASE & SURFACE PLAN
SCALE 1 : 1000
PREPARED BY :
316/1
316/2A
316/2B1
316/2B2
176/7
176/6A
176/5A
176/1A
176/5B
176/6B
176/1B
175
T.B.M
RL202m
BOUNDARY CO-ORDINATES
S.N. LATITUDE LONGITUDE
1 11° 24' 45.66"N 78° 02' 36.80"E
2 11° 24' 45.18"N 78° 02' 34.48"E
3 11° 24' 44.84"N 78° 02' 32.82"E
4 11° 24' 44.15"N 78° 02' 30.69"E
5 11° 24' 43.89"N 78° 02' 29.47"E
6 11° 24' 43.64"N 78° 02' 28.32"E
7 11° 24' 48.05"N 78° 02' 29.59"E
8 11° 24' 48.86"N 78° 02' 33.39"E
9 11° 24' 47.27"N 78° 02' 33.62"E
10 11° 24' 48.67"N 78° 02' 34.91"E
11 11° 24' 49.04"N 78° 02' 36.85"E
12 11° 24' 47.87"N 78° 02' 36.21"E
DATUM WGS-84
Present pit Dimension(Max)
Length183mXWidth101mXDepth17m

P-7



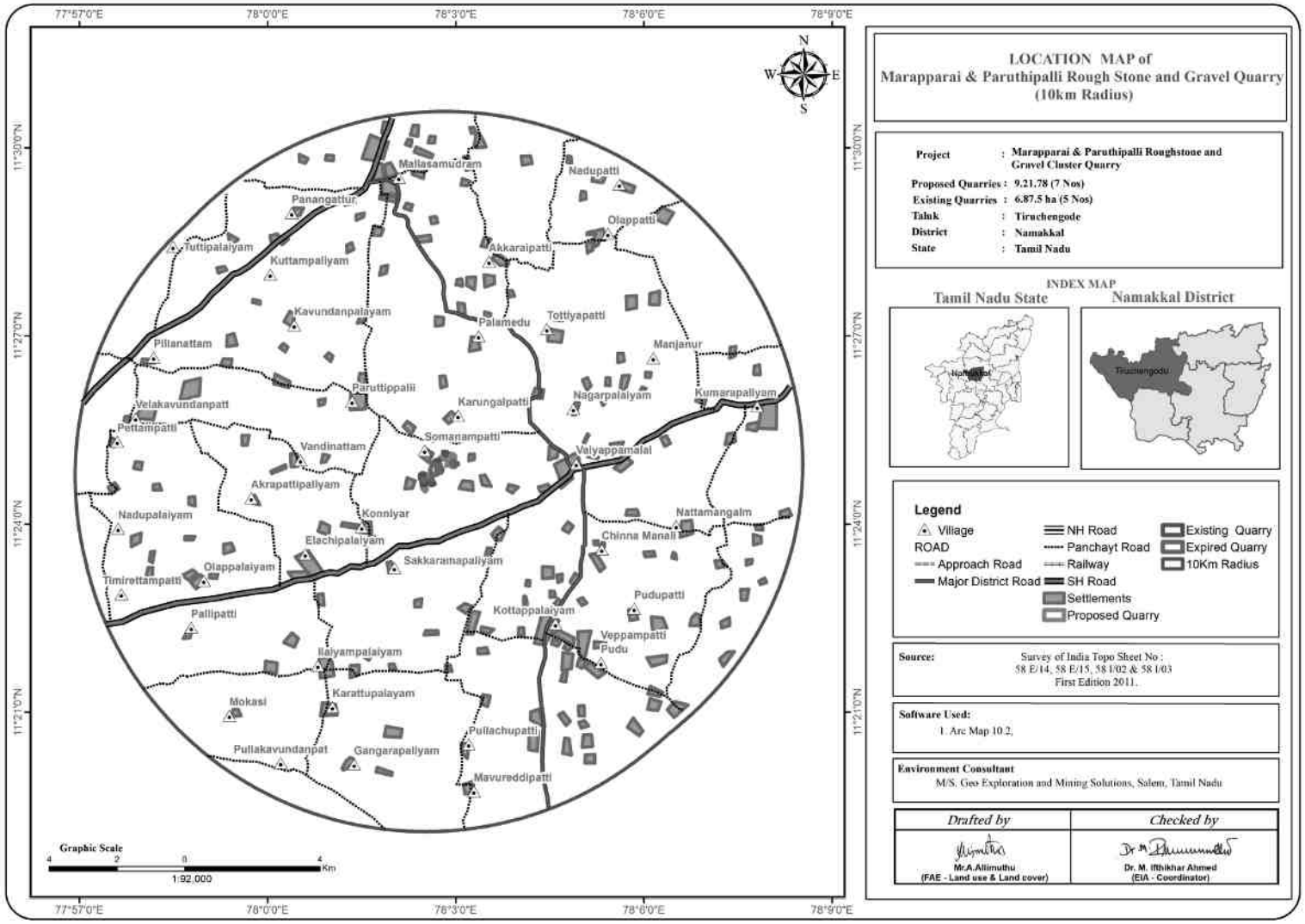
Source: Approved Mining Plan

FIGURE 2.4: GOOGLE EARTH IMAGE SHOWING 300 AND 500M RADIUS FROM CLUSTER QUARRIES



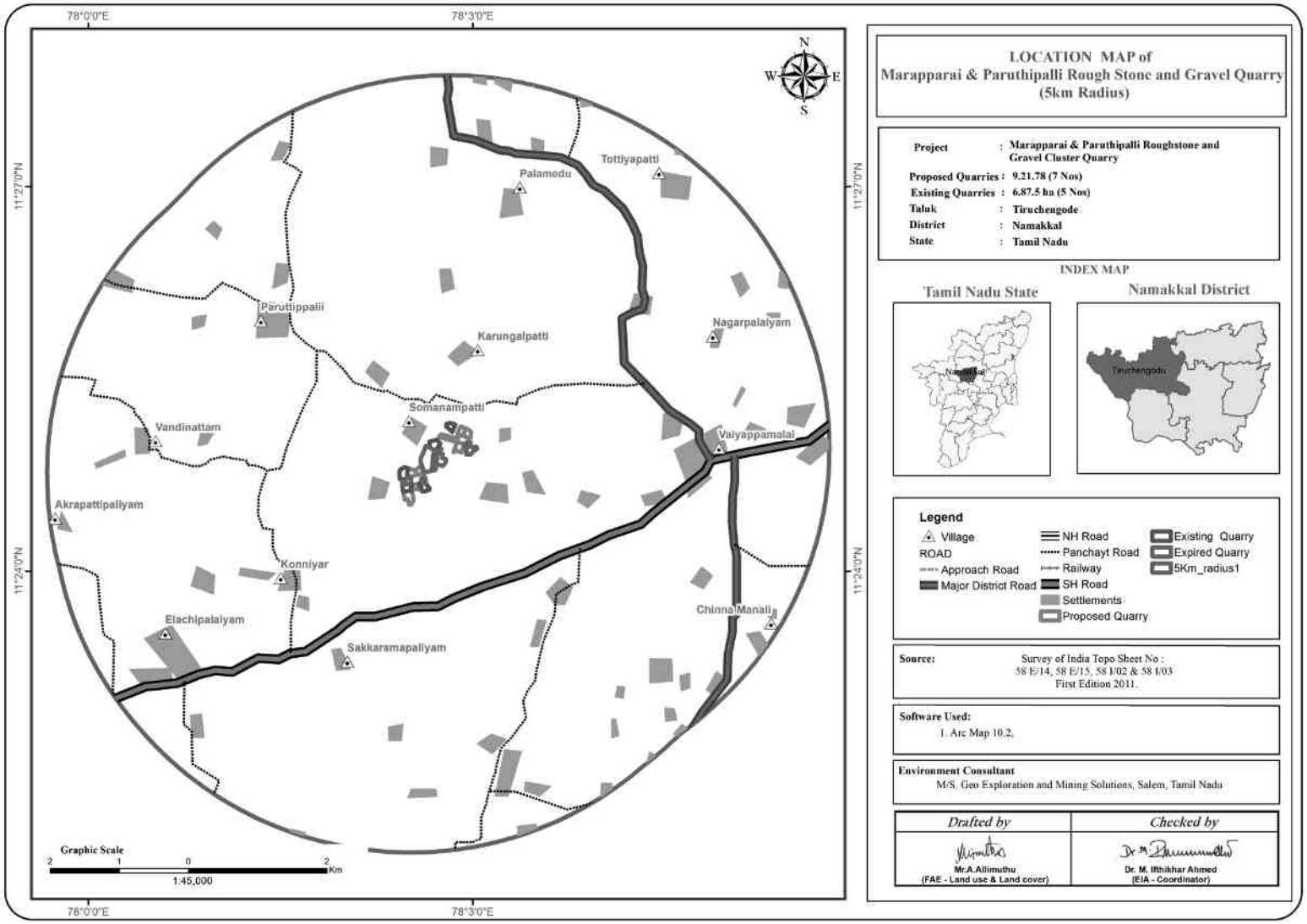
ID	OWNER'S NAME	EXTENT
	PROPOSED QUARRY	
P1	Thiru.R.Paramasivam	1.00.0
P2	Thiru.K.Periyasamy	1.00.0
P3	Tmt.B.Mekala	1.40.0
P4	Thiru.M.Krishnan	0.90.25
P5	Thiru.S.Nandakumar	1.16.0
P6	Thiru.S.Rangsamy	2.02.3
P7	Thiru.M.Muthukrishnan	1.73.23
	EXISTING QUARRY	
E1	Thiru.S.Rangsamy	1.98.0
E2	Tmt.P.Ramayee	1.20.0
E3	Thiru.K.Ramesh	1.20.0
E4	Thiru.K.Sengottaiyan	0.95.5
E5	Thiru.K.Sengodagounder	1.54.0
	EXPIRED QUARRY	
A1	K.Sathya	1.10.5
A2	Tmt.S.Chitra	54
A3	Thiru.Muthusamy	0.40.5
A4	Tmt.Suseela & Two Members	-
A5	Thiru.Muthu Gounder	-
A6	Thiru.Balasundaram	-
A7	Thiru.Balasundaram	-
A8	Thiru.Duraisamy	-

FIGURE 2.5: IMAGE SHOWING SURFACE FEATURES AROUND 10 KM RADIUS FROM CLUSTER SITE



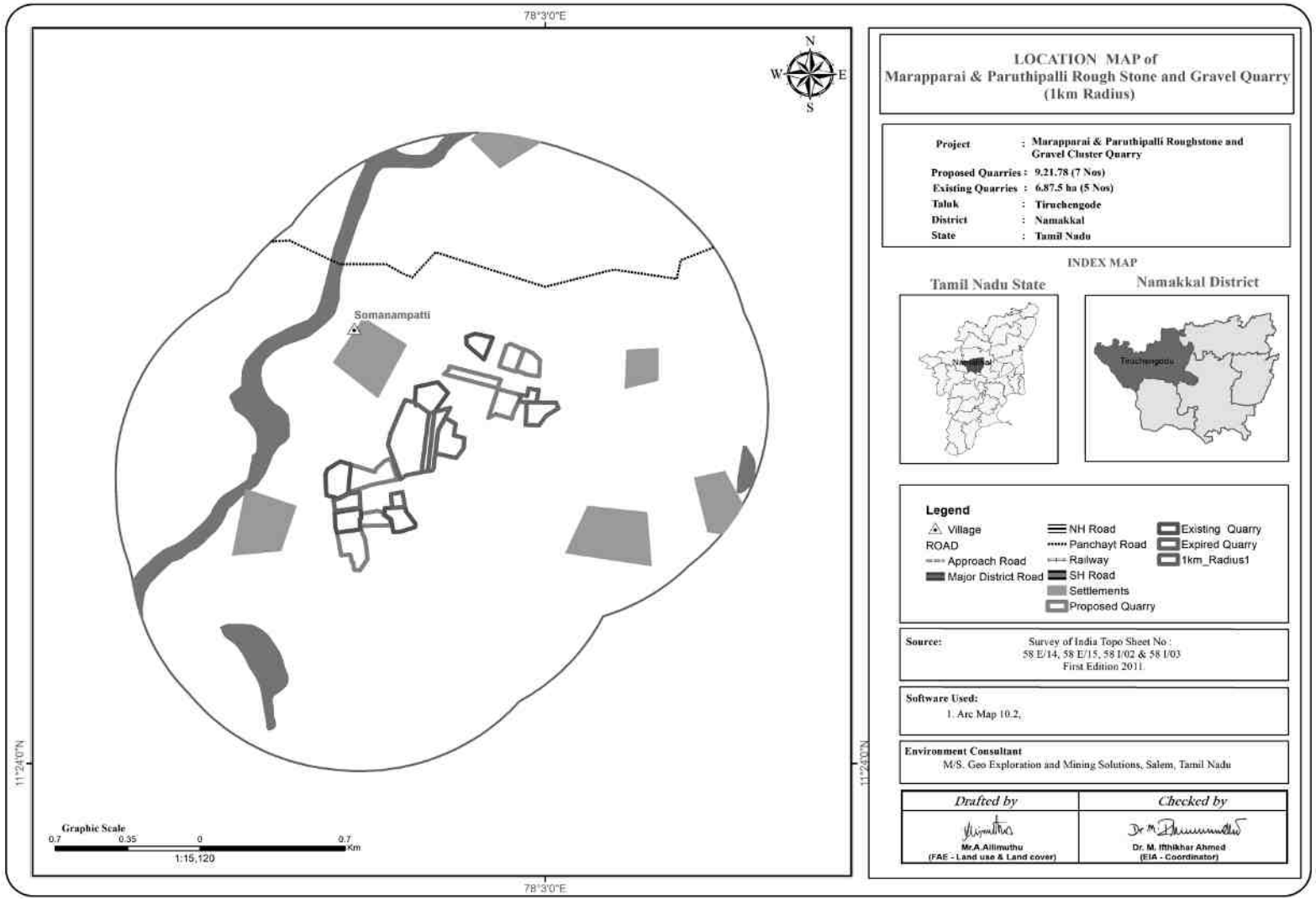
Source:

FIGURE 2.6: IMAGE SHOWING SURFACE FEATURES AROUND 5KM RADIUS FROM CLUSTER AREA



Source:

FIGURE 2.7: IMAGE SHOWING SURFACE FEATURES AROUND 1 KM RADIUS FROM THE CLUSTER AREA



Source:

2.2.1 Project Area

- The cluster consist of 5 Existing and 7 proposals for quarrying Rough Stone & Gravel by opencast mechanized method of mining and the project is site specific
- There is No beneficiation or processing proposed inside the project area.
- Highest elevation is 229m AMSL. The general Gradient of the area is west
- There is no forest land involved in the proposed project area and the area is devoid of major cultivation and trees.

TABLE 2.3A: LAND USE PATTERN OF THE CORE ZONE (P1)

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	0.20.4	0.72.6
Infrastructure	Nil	0.01.0
Roads	0.01.0	0.02.0
Green Belt	Nil	0.11.0
Un – utilized area	0.78.6	0.11.9
Grand Total	**1.00.0**	**1.00.0**

TABLE 2.3B: LAND USE PATTERN OF THE CORE ZONE (P2)

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	0.28.6	0.72.6
Infrastructure	Nil	0.01.0
Roads	0.01.0	0.02.0
Green Belt	Nil	0.12.0
Un – utilized area	0.70.4	0.12.4
Grand Total	**1.00.0**	**1.00.0**

TABLE 2.3C: LAND USE PATTERN OF THE CORE ZONE (P3)

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	0.88.0	1.02.0
Infrastructure	Nil	0.01.0
Roads	0.02.0	0.02.0
Green Belt	Nil	0.35.0
Un – utilized area	0.50.0	Nil
Grand Total	**1.40.0**	**1.40.0**

TABLE 2.3D: LAND USE PATTERN OF THE CORE ZONE (P4)

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	0.37.0	0.57.70
Infrastructure	Nil	0.01.00
Roads	0.02.0	0.02.00
Green Belt	Nil	0.15.00
Un – utilized area	0.51.25	0.14.55
Grand Total	**0.90.25**	**0.90.25**

TABLE 2.3E: LAND USE PATTERN OF THE CORE ZONE (P5)

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	0.30.8	0.47.4
Infrastructure	Nil	0.01.0
Roads	0.01.0	0.02.0
Green Belt	Nil	0.41.7
Un – utilized area	0.84.2	0.23.9
Grand Total	**1.16.0**	**1.16.0**

TABLE 2.3F: LAND USE PATTERN OF THE CORE ZONE (P6)

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	0.98.0	1.45.8
Infrastructure	Nil	0.01.0
Roads	0.01.0	0.02.0
Green Belt	Nil	0.28.8
Un – utilized area	1.03.3	0.24.7
Grand Total	**2.02.3**	**2.02.3**

TABLE 2.3G: LAND USE PATTERN OF THE CORE ZONE (P6)

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	0.70.10	1.34.0
Infrastructure	Nil	0.01.0
Roads	0.01.0	0.02.0
Green Belt	Nil	0.22.12
Un – utilized area	1.02.13	0.14.11
Grand Total	**1.73.23**	**1.73.23**

Source: Approved Mining plan

2.2.2 Size or Magnitude of Operation

TABLE 2.4: OPERATIONAL DETAILSFOR P1 (Thiru. R.Paramasivam)

PARTICULARS	DETAILS	
	Rough Stone (5Year Plan period)	**Gravel (3 Years Plan period)**
Geological Resources	4,58,850m^3	14,644m^3
Mineable Reserves	1,15,372m^3	10,048m^3
Maximum Production	28,785m^3	4,000m^3
Mining Plan Period / Lease Applied Period	5 Years	
Number of Working Days	300 Days	
Production per day	96 m^3	13 m^3
No of Lorry loads (6m^3 per load)	16 Nos	2 Nos
Proposed Depth for Mining Plan Period	40m Rough stone	2m Gravel
Total Depth of Mining	42 meters (2m Gravel + 40m Roughstone)	

TABLE 2.4A: OPERATIONAL DETAILSFOR P2 (THIRU. K.PERIYASAMY)

PARTICULARS	DETAILS	
	Rough Stone (5Year Plan period)	**Gravel (3 Years Plan period)**
Geological Resources	3,85,812m^3	8,568m^3
Mineable Reserves	1,14,385m^3	10,048m^3
Maximum Production	30,345m^3	8,568m^3
Mining Plan Period / Lease Applied Period	5 Years	
Number of Working Days	300 Days	
Production per day	101 m^3	28 m^3
No of Lorry loads (6m^3 per load)	17 Nos	5 Nos
Proposed Depth for Mining Plan Period	35m Rough stone	2m Gravel
Total Depth of Mining	37 meters (2m Gravel + 35m Rough stone)	

TABLE 2.4B: OPERATIONAL DETAILSFOR P3 (TMT. B.MEKALA)

PARTICULARS	DETAILS	
	Rough Stone (5Year Plan period)	**Gravel (3 Years Plan period)**
Geological Resources	6,15,465m^3	13,677m^3
Mineable Reserves	86,650m^3	608m^3
Maximum Production	17,840m^3	608m^3
Mining Plan Period / Lease Applied Period	5 Years	
Number of Working Days	300 Days	
Production per day	59 m^3	2 m^3
No of Lorry loads (6m^3 per load)	10 Nos	1No
Proposed Depth for Mining Plan Period	45m Rough stone	1m topsoil
Total Depth of Mining	46 meters (1m topsoil + 45m Rough stone)	

TABLE 2.4C: OPERATIONAL DETAILSFOR P4 (THIRU.M.KRISHNAN)

PARTICULARS	DETAILS	
	Rough Stone (5Year Plan period)	**Gravel (3 Years Plan period)**
Geological Resources	3,07,900m^3	10,100m^3
Mineable Reserves	1,09,075m^3	3,102m^3
Maximum Production	22,870m^3	1,222m^3
Mining Plan Period / Lease Applied Period	5 Years	
Number of Working Days	300 Days	
Production per day	76 m^3	4 m^3
No of Lorry loads (6m^3 per load)	13 Nos	1No
Proposed Depth for Mining Plan Period	35m Rough stone	2m Gravel
Total Depth of Mining	37 meters (2 m Gravel + 35m Rough stone)	

TABLE 2.4D: OPERATIONAL DETAILSFOR P5 (THIRU.S.NANDHAKUMAR)

PARTICULARS	DETAILS	
	Rough Stone (5Year Plan period)	**Gravel (3 Years Plan period)**
Geological Resources	2,38,925m^3	12,110m^3
Mineable Reserves	34,603m^3	2,520m^3
Maximum Production	6,983m^3	840m^3
Mining Plan Period / Lease Applied Period	5 Years	
Number of Working Days	300 Days	
Production per day	23 m^3	3 m^3
No of Lorry loads (6m^3 per load)	4 Nos	1No
Proposed Depth for Mining Plan Period	25m Rough stone	2m Gravel
Total Depth of Mining	27 meters (2 m Gravel + 25m Rough stone)	

TABLE 2.4E: OPERATIONAL DETAILSFOR P6 (THIRU.S.RANGASAMY)

PARTICULARS	DETAILS	
	Rough Stone (5Year Plan period)	**Gravel (3 Years Plan period)**
Geological Resources	6,84,560m^3	14,996m^3
Mineable Reserves	1,31,800m^3	8,050m^3
Production(5 years)	72,370m^3	8,050m^3
Maximum Production	16,590m^3	2,704m^3
Mining Plan Period / Lease Applied Period	5 Years	
Number of Working Days	300 Days	
Production per day	55 m^3	9 m^3
No of Lorry loads (6m^3 per load)	9 Nos	2 Nos
Proposed Depth for Mining Plan Period	40m Rough stone	2m Gravel
Total Depth of Mining	42 meters (2 m Gravel + 40m Rough stone)	

TABLE 2.4E: OPERATIONAL DETAILSFOR P7 (THIRU.M.MUTHUKRISHNAN)

PARTICULARS	DETAILS	
	Rough Stone (5Year Plan period)	**Gravel (3 Years Plan period)**
Geological Resources	6,92,480m^3	51,936m^3
Mineable Reserves	1,99,770m^3	8,985m^3
Maximum Production	67,935m^3	8,190m^3
Mining Plan Period / Lease Applied Period	5 Years	
Number of Working Days	300 Days	
Production per day	226 m^3	27 m^3
No of Lorry loads (6m^3 per load)	38 Nos	5 Nos
Proposed Depth for Mining Plan Period	40m Rough stone	3m Gravel
Total Depth of Mining	43 meters (3 m Gravel + 40m Rough stone)	

Source: and estimation of resources

2.3 GEOLOGY

2.3.1 Regional Geology

Peninsular gneiss forms the oldest rock formations, in which the massive formation of Charnockite lies over with rich accumulation of recent quaternary formation. On regional scale the Charnockite body N30ºE – S30ºW with SE75º dipping.

The general geological sequences of the rocks in this area are given below:

AGE	FORMATION
Recent	- Quaternary formation (Gravel)
---------Unconformity----------	
Archaean	- Charnockite
	Peninsular Gneiss complex

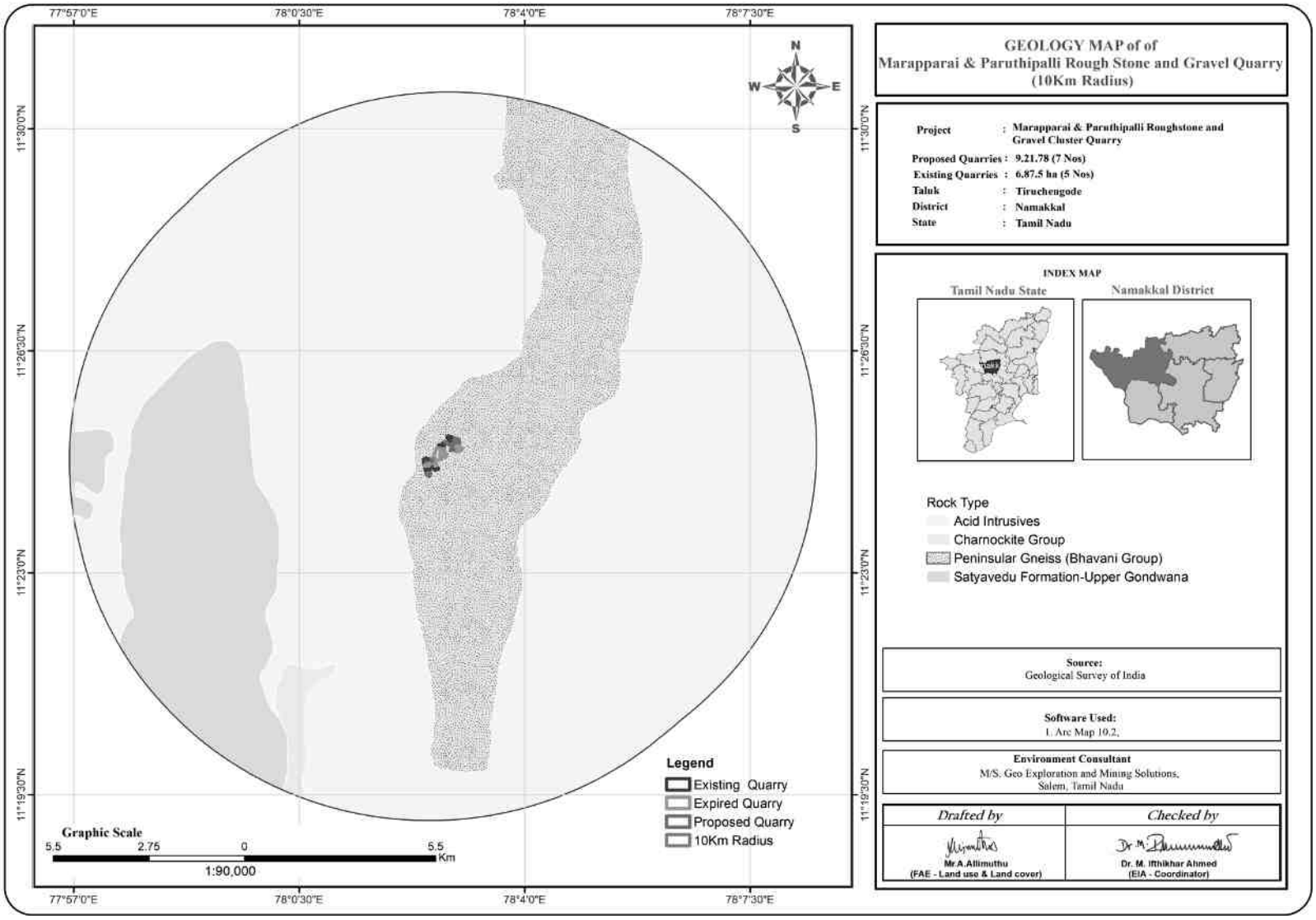
2.3.2 Local Geology:-

The study area follows the regional trend and mainly comprises of Hard Rock Formation as a homogeneous formation / Batholith formation of Charnockite. The lease applied area is exhibits elevated terrain. The area has gentle sloping towards southwestern side. The maximum altitude of the area is 216m above Mean sea level. The area is covered by the Gravel which is maximum thickness of 3m depth. Massive Charnockite is found after 3m (Gravel formation) which is clearly inferred from the existing quarry pits in the cluster.

2.3.3 Hydrogeology

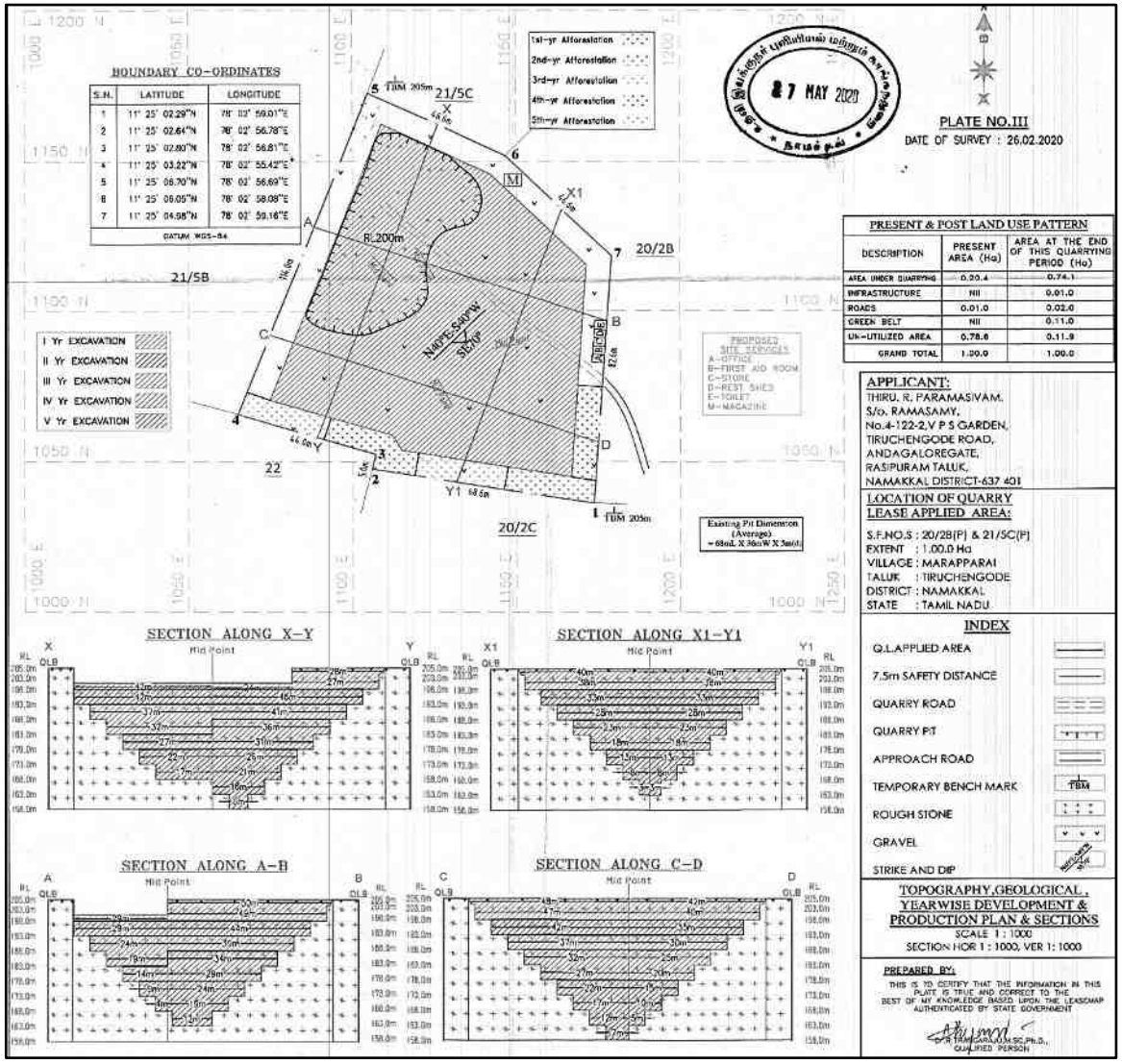
Namakkal district is underlined by Archaean crystalline formations with recent alluvial deposits of limited areal extent and thickness along the courses of major rivers. The occurrence and movement of ground water are controlled by various factors such as physiography, climate, geology and structural features. Weathered and fractured crystalline rocks constitute the important aquifer systems in the district. Ground water generally occurs under phreatic conditions in the weathered mantle and under semi-confined conditions in the fractured zones at deeper levels. The thickness of weathered zones in the district ranges from less than a meter to more than 15 m (Source Central Ground Water Board – Namakkal).

FIGURE 2.8: REGIONAL GEOLOGY MAP



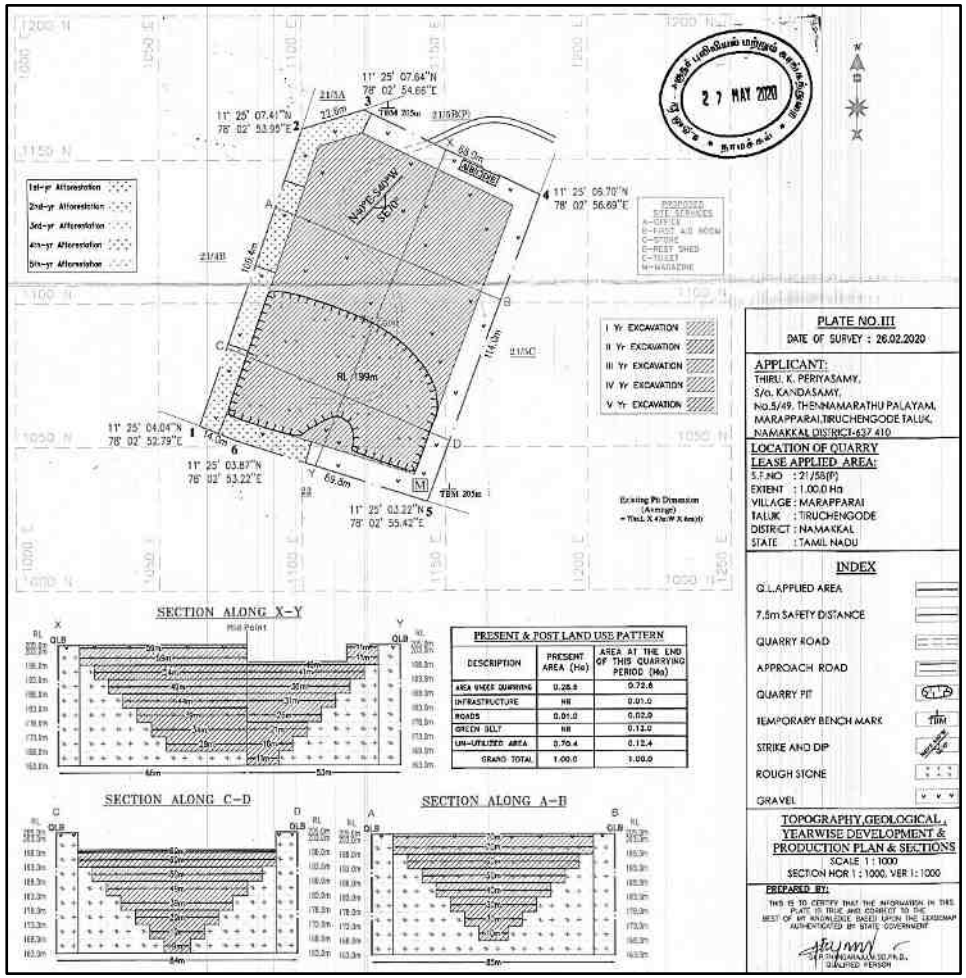
Source:

FIGURE 2.9 A: TOPOGRAPHY, GEOLOGICAL, YEAR-WISE DEVELOPMENTPRODUCTION PLAN AND SECTIONS – "P1"



Source: Approved Mining plan

FIGURE 2.9 B: TOPOGRAPHY, GEOLOGICAL, YEAR-WISE DEVELOPMENT PRODUCTION PLAN AND SECTIONS – "P2"



Source: Approved Mining plan

FIGURE 2.9 C: TOPOGRAPHY, GEOLOGICAL, YEAR-WISE DEVELOPMENTPRODUCTION PLAN AND SECTIONS – "P3"

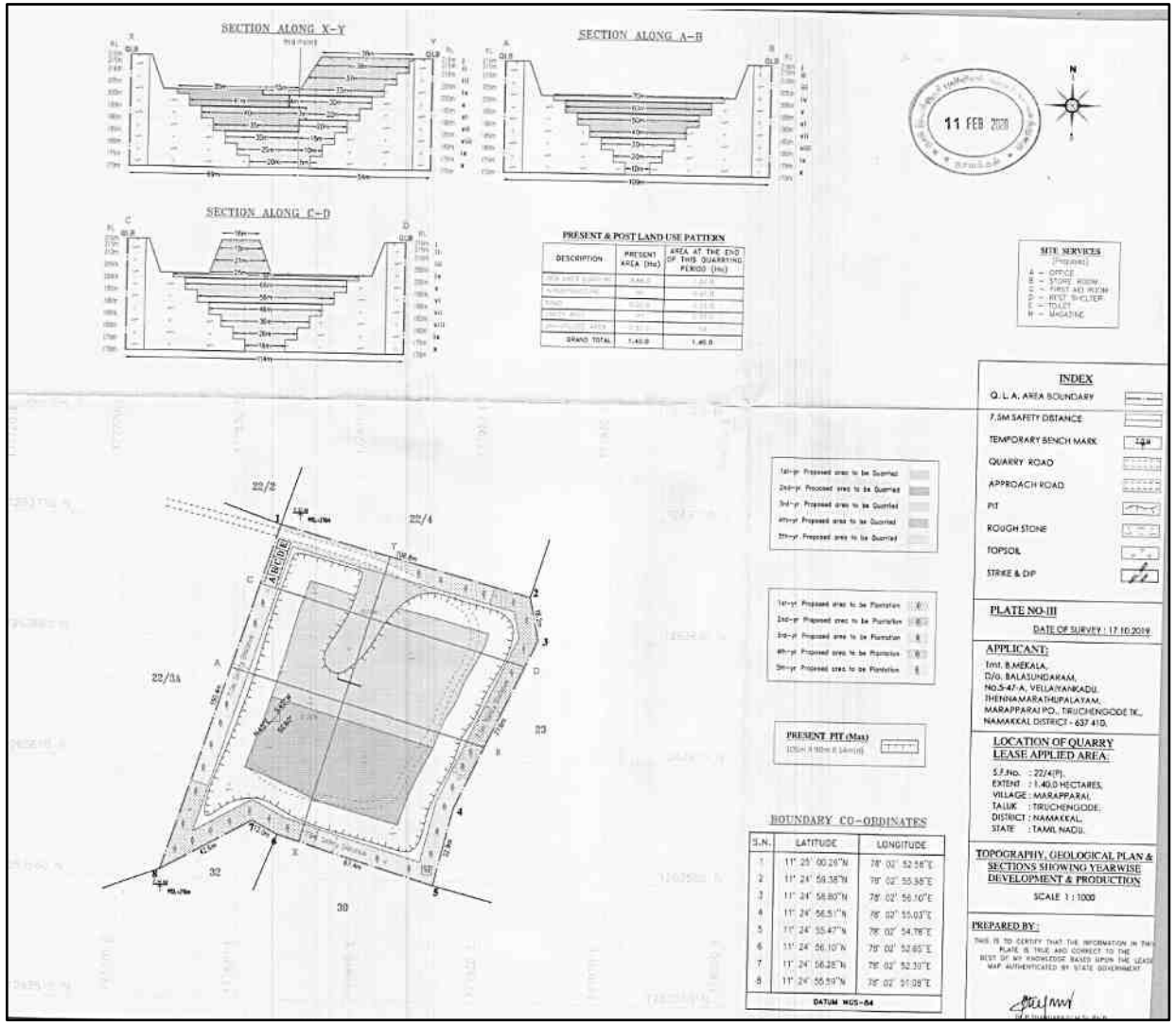


FIGURE 2.9 C: TOPOGRAPHY, GEOLOGICAL, YEAR-WISE DEVELOPMENTPRODUCTION PLAN AND SECTIONS – "P4"

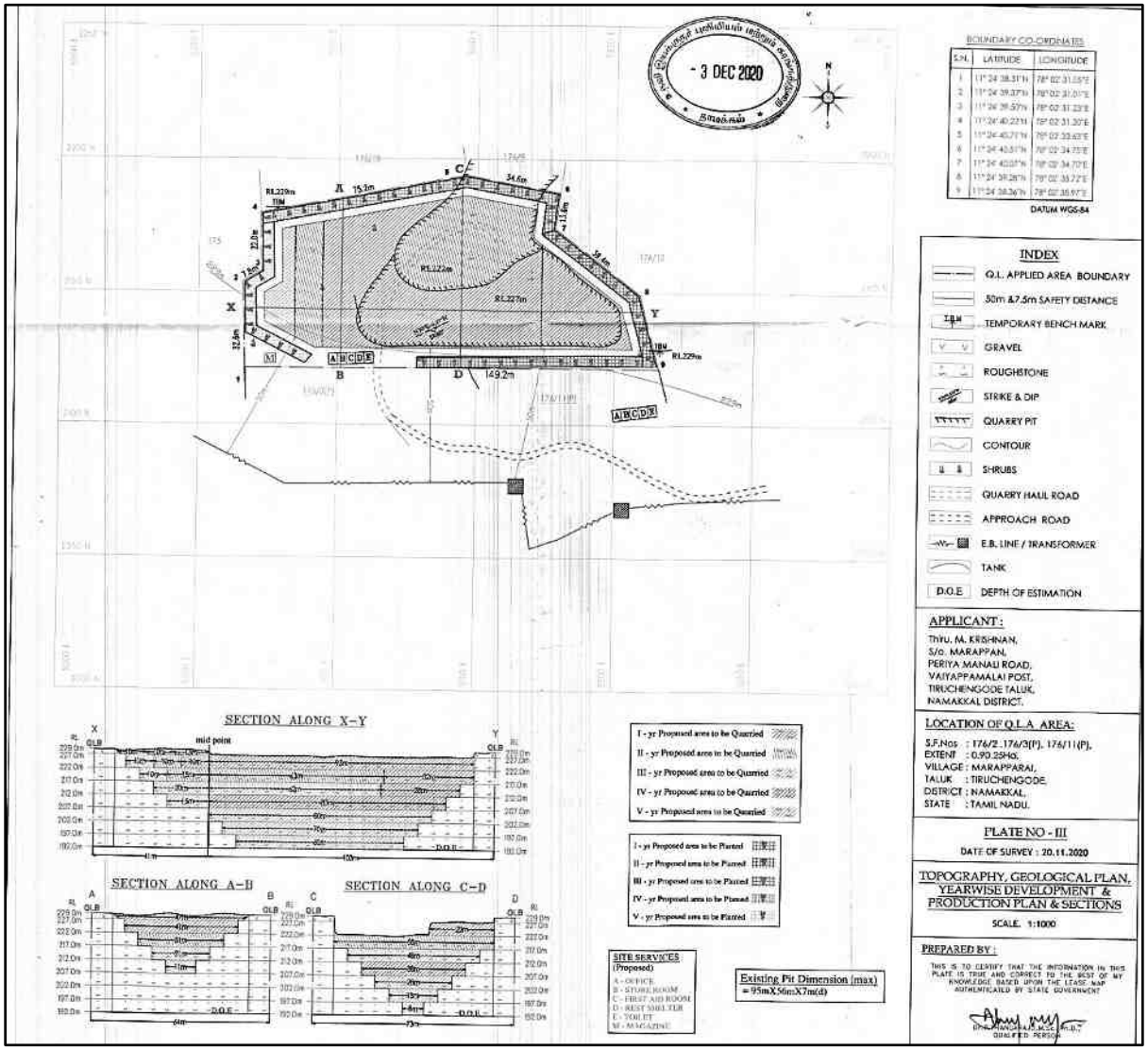


FIGURE 2.9D: TOPOGRAPHY, GEOLOGICAL, YEAR-WISE DEVELOPMENTPRODUCTION PLAN AND SECTIONS – "P5"

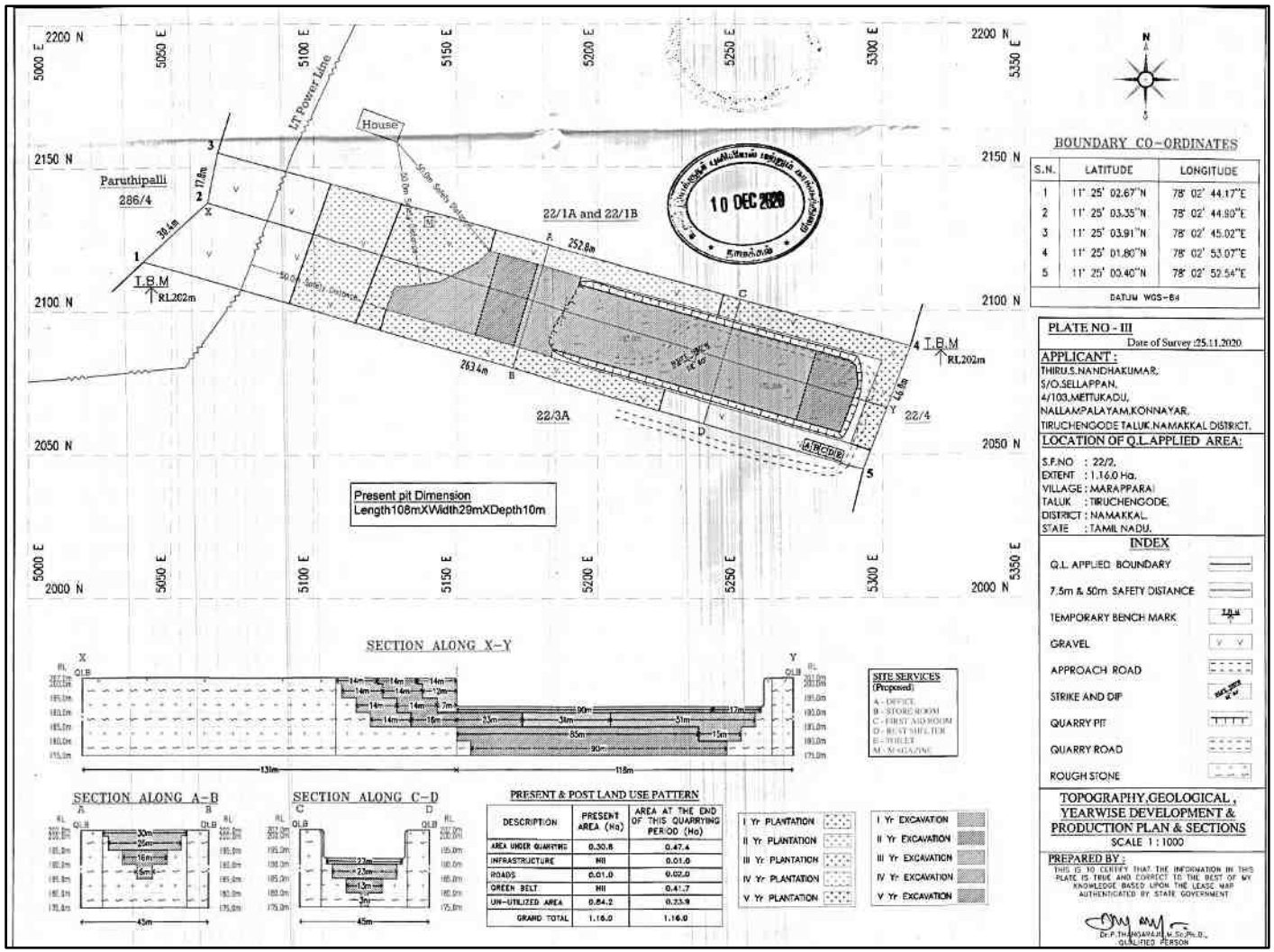
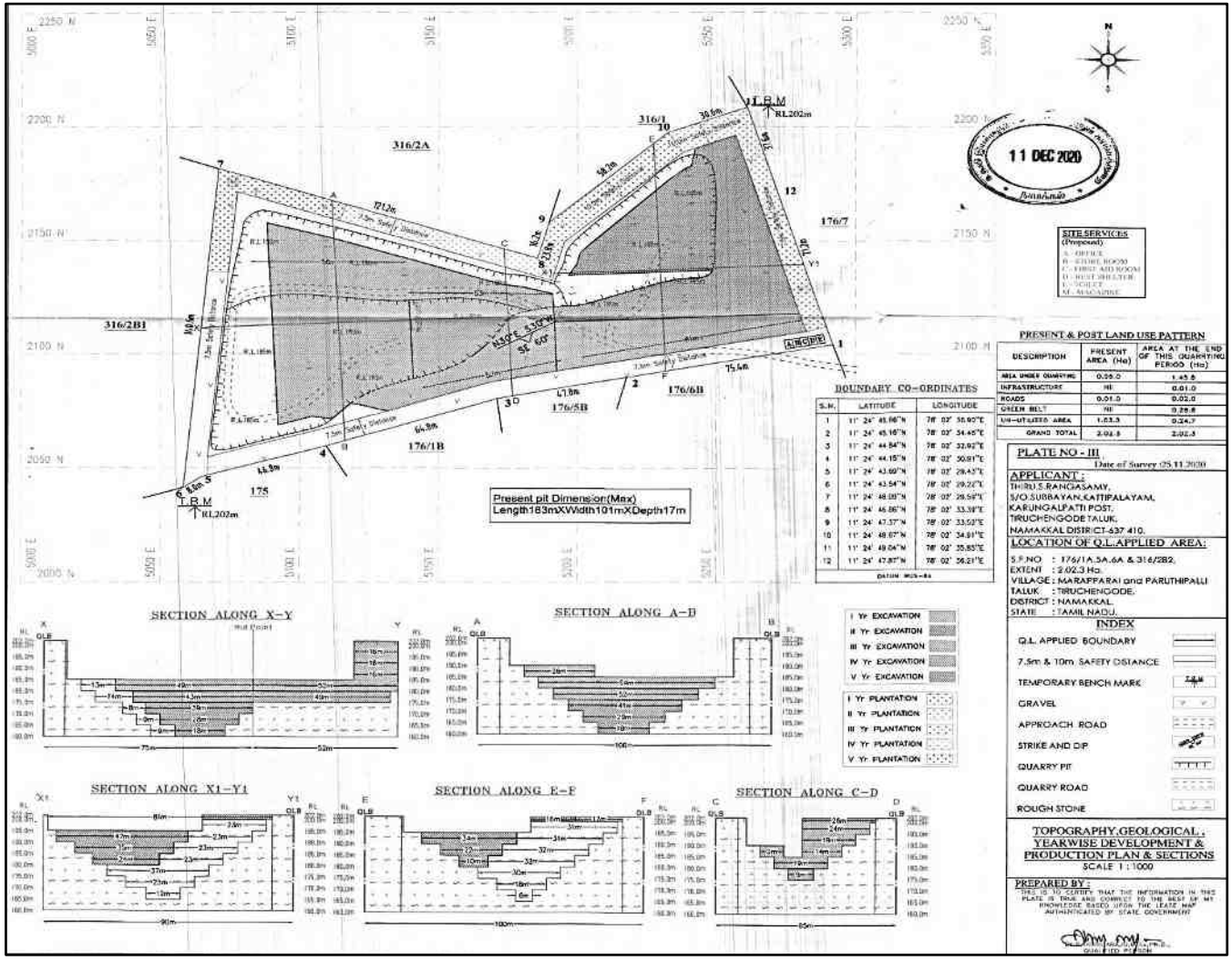
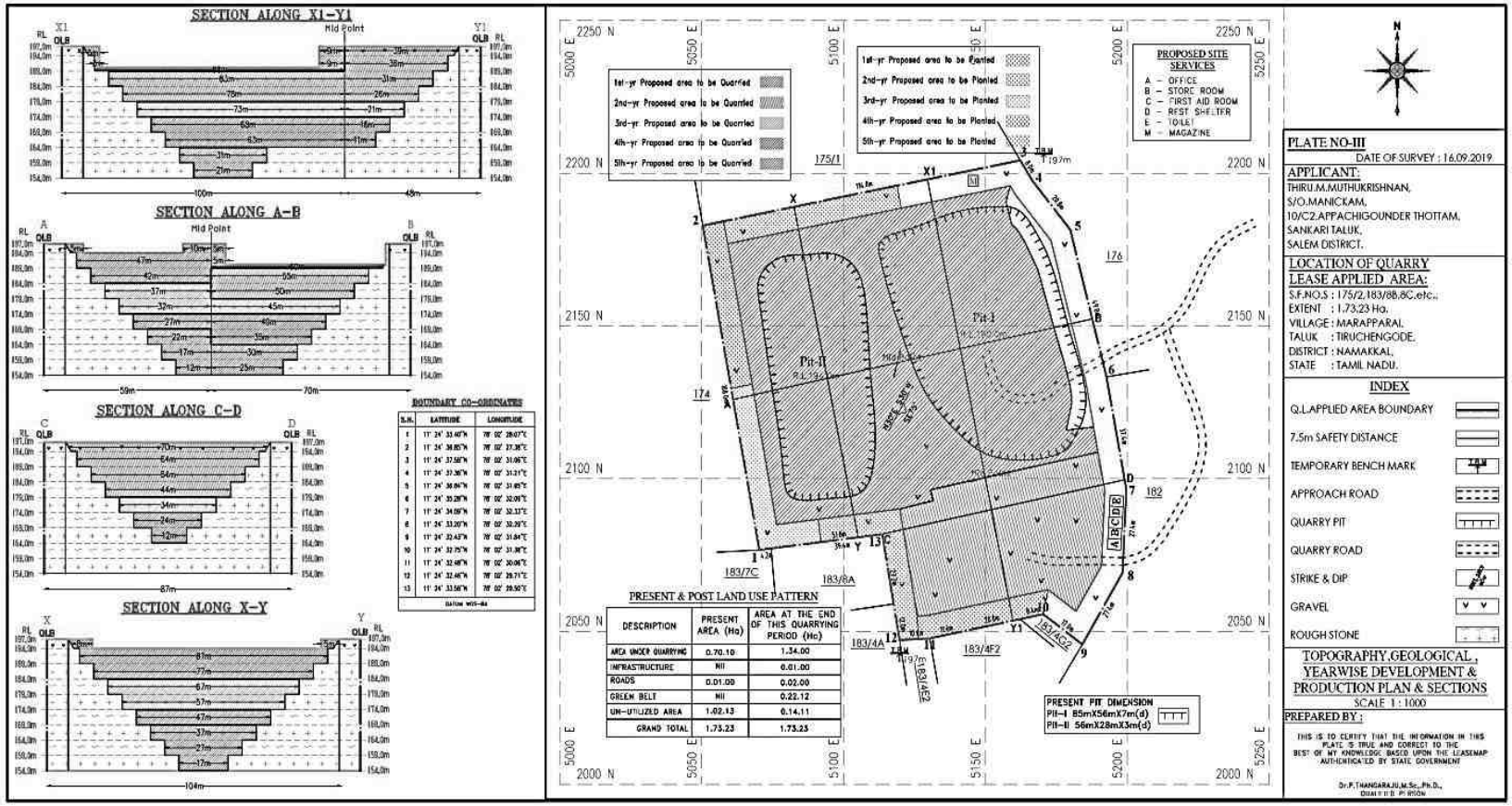


FIGURE 2.9E: TOPOGRAPHY, GEOLOGICAL, YEAR-WISE DEVELOPMENTPRODUCTION PLAN AND SECTIONS – "P6"



Source: Approved Mining Plan

FIGURE 2.9F: TOPOGRAPHY, GEOLOGICAL, YEAR-WISE DEVELOPMENTPRODUCTION PLAN AND SECTIONS – "P7"



Source: Approved Mining Plan

2.4 RESOURCES AND RESERVES

The Resources and Reserves of Rough Stone and Gravel were calculated based on Cross-Section Method by plotting sections to cover the maximum lease area for all the proposed projects.

Based on the availability of Geological Resources the Mineable Reserves are calculated by considering excavation system of bench formation and leaving essential safety distance of 7.5 m (Safety Barrier all around the applied area) and safety distance as per precise area communication letter and deducting the locked up reserves during bench formation (Also called as Bench Loss) and the Mineable Reserves is calculated considering there is no waste / overburden / side burden (100% Recovery Anticipated) for all the proposed projects.

TABLE 2.5: AVAILABLE GEOLOGICAL RESOURCES OF PROPOSED PROJECT

PROPOSAL – P1		
	Rough Stone	Gravel
Geological Resource in m^3	4,58,850	14,644
Mineable Resource in m^3	1,15,372	10,048
PROPOSAL – P2		
	Rough Stone	Gravel
Geological Resource in m^3	3,85,812	11,790
Mineable Resource in m^3	1,14,385	8,658
PROPOSAL – P3		
	Rough Stone	Topsoil
Geological Resource in m^3	6,15,465	13,677
Mineable Resource in m^3	86,650	608
PROPOSAL – P4		
	Rough Stone	Gravel
Geological Resource in m^3	3,07,900	10,100
Mineable Resource in m^3	1,09,075	3,102
PROPOSAL – P5		
	Rough Stone	Gravel
Geological Resource in m^3	2,38,925	12,110
Mineable Resource in m^3	34,603	2,520
PROPOSAL – P6		
	Rough Stone	Gravel
Geological Resource in m^3	6,84,560	14,996
Mineable Resource in m^3	1,31,800	8,050
PROPOSAL – P7		
	Rough Stone	Gravel
Geological Resource in m^3	6,92,480	51,936
Mineable Resource in m^3	1,99,770	8,985

Source: Approved Mining Plan

TABLE 2.6: YEAR-WISE PRODUCTION PLAN

PROPOSAL – P1		
YEAR	**ROUGH STONE (m^3)**	**GRAVEL (m^3)**
I	27,947	10,048
II	28,785	-
III	24,725	-
IV	23,030	-
V	10,885	-
TOTAL	**1,15,372**	**10,048**
PROPOSAL – P2		
YEAR	**ROUGH STONE (m^3)**	**GRAVEL (m^3)**
I	24,440	8,568
II	30,345	-
III	22,870	-
IV	21,465	-
V	15,265	-
TOTAL	**1,14,385**	**8,568**
PROPOSAL – P3		
YEAR	**ROUGH STONE (m^3)**	**GRAVEL (m^3)**
I	17,350	608
II	17,200	-
III	17,260	-
IV	17,840	-
V	17,000	-
TOTAL	**86,650**	**608**
PROPOSAL – P4		
YEAR	**ROUGH STONE (m^3)**	**GRAVEL (m^3)**
I	22,255	1,222
II	22,645	940
III	21,405	940
IV	22,870	-
V	19,900	-
TOTAL	**1,09,075**	**3,102**
PROPOSAL – P5		
YEAR	**ROUGH STONE (m^3)**	**GRAVEL (m^3)**
I	6,980	840
II	6,983	840
III	6,925	840
IV	6,840	-
V	6,875	-
TOTAL	**34,603**	**2,520**
PROPOSAL – P6		
YEAR	**ROUGH STONE (m^3)**	**GRAVEL (m^3)**
I	16,590	2,704
II	13,040	2,592
III	15,680	2,754
IV	13,385	-
V	13,675	-
TOTAL	**72,370**	**8,050**
PROPOSAL – P7		
YEAR	**ROUGH STONE (m^3)**	**GRAVEL (m^3)**
I	42,115	**795**
II	67,935	**8,190**
III	41,510	**-**
IV	33,550	**-**
V	14,660	**-**
TOTAL	**1,99,770**	**8,985**

Source: Approved Mining plan

Disposal of Waste

There is no waste anticipated in this Rough Stone and Gravel quarrying operation. The entire quarried out materials will be utilized (100%).

Conceptual Mining Plan/ Final Mine Closure Plan

Conceptual mining plan is prepared with an object of long term systematic development of benches, layouts, selection of permanent structures, depth of quarrying and ultimate pit dimensions, selection of sites for construction of infrastructure, etc.,

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

TABLE 2.7: ULTIMATE PIT DIMENSIONS

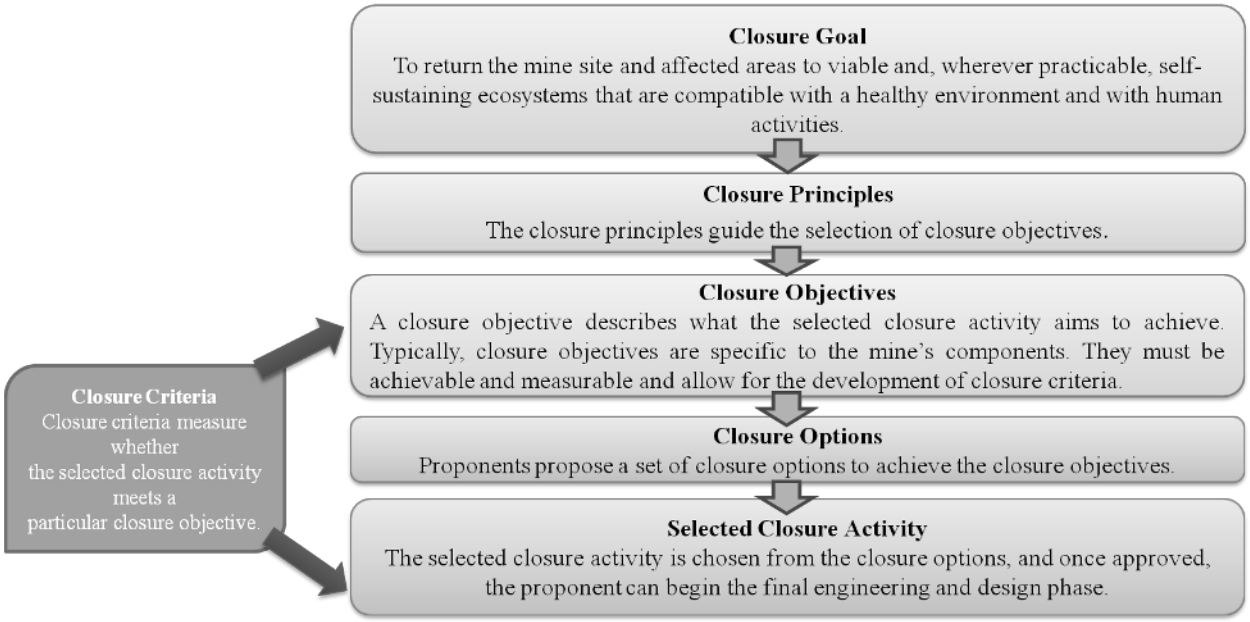
Proposal – P1			
Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max) (m)
I	95	90	42m below ground level
Proposal – P2			
Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max) (m)
I	104	70	37m below ground level
Proposal – P3			
Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max) (m)
I	106	97	46m below ground level
Proposal – P4			
Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max) (m)
I	129	58	37m below ground level
Proposal – P5			
Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max) (m)
I	150	30	27m below ground level
Proposal – P6			
Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max) (m)
I	200	101	42m below ground level
Proposal – P7			
Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max) (m)
I	131	112	43m below ground level

Source: Approved Mining Plan

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

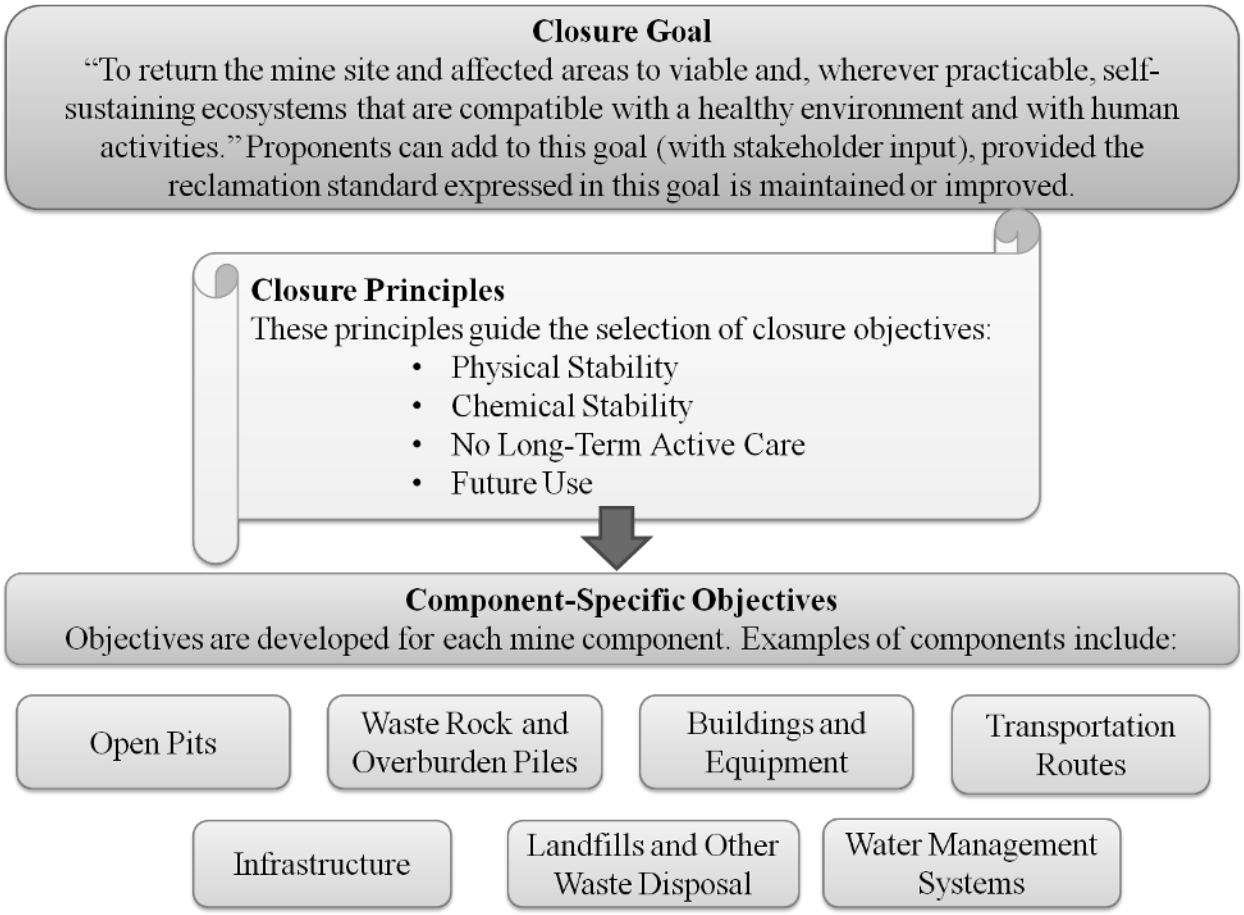
Closure Objectives –

- Access to be limited, for the safety of humans and wildlife.
- The open pit mine workings and pit boundary are physically and geo-technically stable.
- Water quality in flooded pits is safe for humans, aquatic life, and wildlife.
- Discharge of contaminated drainage has been minimized and controlled.
- Original or desired new surface drainage patterns have been established.
- For flooded pits, in-pit aquatic habitat has been established where practical and feasible.
- Emergency access and escape routes from flooded pits for humans and wildlife are in place.
- Dust levels are safe for people, vegetation, aquatic life, and wildlife.



Closure Planning & Options Considerations in Mine Design –

- The closure of mine is well planned at the initial stage of planning & design consideration by the internal and external stake holders
- Construction of 2m height bund all along the mine pit boundary and ensure its stability all time & construction of garland drain along the natural slope to avoid sliding and collection of soil to the pit & surface runoff during rainfall
- After complete exploitation of mineral, the lowest bench foot wall side will be maintained as plain surface without any sump pits to avoid any accidents
- All the sharp edges will be dressed to smoother face before the closure of mine and ensure no loose debris on hanging wall side
- There is a river on southern side of the project area. The river will not be hindered by any of mine closure activities
- The project proponent as a part of social responsibilities assures to supply the stored mine pit water to the nearby villages after effective treatment process as per the standards of TNPCB & TWAD
- Native species will be planted in 3 row patterns on the boundary barriers and 1st bench, a full-time sentry will be appointed at the gate to prevent inherent entry of public & cattle.
- The access road to the quarry will be cut-off immediately after the closure
- The layout design shall be prepared and get approved from Department of Geology and Mining.
- The proponent is instructed to construct as per the layout approved
- Physical and chemical stability of structures left in place at the site, the natural rehabilitation of a biologically diverse, stable environment, the ultimate land use is optimized and is compatible with the surrounding area and the requirements of the local community, and taking the needs of the local community into account and minimizing the socio-economic impact of closure
- There will be a positive change in the environmental and ecology due to the mine closure



Post-Closure Monitoring –

The purpose of post-closure monitoring with respect to open pit mine workings is to ensure the attainment of closure objectives.

- Monitor physical and geotechnical stability of remnant pit walls.
- Monitor the ground regime in pit walls to confirm achievement of design objectives.
- Monitor water level in pit to confirm closure objectives regarding fish, fish habitat, and wildlife safety are being achieved.
- Sample water quality and quantity at controlled pit discharge points.
- Identify and test unanticipated areas where water management is an issue.
- Inspect integrity of barriers such as berms & fences.
- Monitor wildlife interactions with barriers to determine effectiveness.
- Inspect aquatic habitat in flooded pits where applicable.
- Monitor dust levels.

TABLE 2.8: MINE CLOSURE BUDGET

PROPOSAL – P1							
Activity	**Year**					**Cost**	**Total Cost**
	I	**II**	**III**	**IV**	**V**		
Plantation in Nos	25	25	25	25	25	@ 100 Rs/ Saplings including maintenance	Rs 12,500
Plantation cost	2500	2500	2500	2500	2500		
Renovation of Wire Fencing (399 meters)	-	-	-	-	1,19,700	@ 300Rs per meter	Rs 1,19,700
Renovation of Garland Drain (352 meters)	-	-	-	-	1,05,600	@ 300Rs per meter	Rs 1, 05,600
Cost for plantation in worked out benches	-	-	-	-	30,000	@ 100 Rs/ Saplings including maintenance	Rs. 30,000
TOTAL							**Rs 2,67,800**
PROPOSAL – P2							
Activity	**Year**					**Cost**	**Total Cost**
	I	**II**	**III**	**IV**	**V**		
Plantation in Nos	25	25	25	25	25	@ 100 Rs/ Saplings including maintenance	Rs 12,500
Plantation cost	2500	2500	2500	2500	2500		
Renovation of Wire Fencing (390 meters)	-	-	-	-	1,17,000	@ 300Rs per meter	Rs 1, 17,000
Renovation of Garland Drain (348 meters)	-	-	-	-	1,04,400	@ 300Rs per meter	Rs 1, 04,400
Cost for plantation in worked out benches	-	-	-	-	30,000	@ 100 Rs/ Saplings including maintenance	Rs. 30,000
TOTAL							**Rs 2,63,900**
PROPOSAL – P3							
Activity	**Year**					**Cost**	**Total Cost**
	I	**II**	**III**	**IV**	**V**		
Plantation in Nos	75	75	75	75	75	@ 100 Rs/ Saplings including maintenance	Rs 37,500
Plantation cost	7500	7500	7500	7500	7500		
Renovation of Wire Fencing (498 meters)	-	-	-	-	1,49,400	@ 300Rs per meter	Rs 1,49,400
Renovation of Garland Drain (443 meters)	-	-	-	-	1,32,900	@ 300Rs per meter	Rs 1,32,900
Cost for plantation in worked out benches	-	-	-	-	30,000	@ 100 Rs/ Saplings including maintenance	Rs. 30,000
TOTAL							**Rs 3,49,800**
PROPOSAL – P4							
Activity	**Year**					**Cost**	**Total Cost**
	I	**II**	**III**	**IV**	**V**		
Plantation in Nos	30	30	30	30	30	@ 100 Rs/ Saplings including maintenance	Rs 15,000
Plantation cost	3000	3000	3000	3000	3000		
Renovation of Wire Fencing(360 meters)	-	-	-	-	1,08,000	@ 300Rs per meter	Rs 1, 08,000
Renovation of Garland Drain (300 meters)	-	-	-	-	90,000	@ 300Rs per meter	Rs 90,000
Cost for plantation in worked out benches	-	-	-	-	20,000	@ 100 Rs/ Saplings including maintenance	Rs. 20,000
TOTAL							**Rs 2,33,000**

PROPOSAL – P5							
Activity	**Year**					**Cost**	**Total Cost**
	I	**II**	**III**	**IV**	**V**		
Plantation in Nos	90	90	90	90	90	@ 100 Rs/ Saplings including maintenance	Rs 45,000
Plantation cost	9000	9000	9000	9000	9000		
Renovation of Wire Fencing (600 meters)	-	-	-	-	1,80,000	@ 300Rs per meter	Rs. 1,80,000
Renovation of Garland Drain (400 meters)	-	-	-	-	1,20,000	@ 300Rs per meter	Rs. 1,20,000
Cost for plantation in worked out benches	-	-	-	-	15,000	@ 100 Rs/ Saplings including maintenance	Rs. 15,000
TOTAL							**Rs 3,60,000**
PROPOSAL – P6							
Activity	**Year**					**Cost**	**Total Cost**
	I	**II**	**III**	**IV**	**V**		
Plantation in Nos	64	64	64	64	64	@ 100 Rs/ Saplings including maintenance	Rs 32,000
Plantation cost	6,400	6,400	6,400	6,400	6,400		
Renovation of Wire Fencing (710 meters)	-	-	-	-	2,13,000	@ 300Rs per meter	Rs. 2,13,000
Renovation of Garland Drain (650 meters)	-	-	-	-	1,95,000	@ 300Rs per meter	Rs. 1,95,000
Cost for plantation in worked out benches	-	-	-	-	20,000	@ 100 Rs/ Saplings including maintenance	Rs. 20,000
TOTAL							**Rs 4,60,000**
PROPOSAL – P7							
Activity	**Year**					**Cost**	**Total Cost**
	I	**II**	**III**	**IV**	**V**		
Plantation in Nos	50	50	50	50	50	@ 200 Rs/ Saplings including maintenance	Rs 25,000
Plantation cost	5000	5000	5000	5000	5000		
Renovation of Wire Fencing (490 meters)	-	-	-	-	1,47,000	@ 300Rs per meter	Rs 1, 47,000
Renovation of Garland Drain (528 meters)	-	-	-	-	1,58,400	@ 300Rs per meter	Rs 1, 58,400
Cost for plantation in worked out benches	-	-	-	-	40,000	@ 100 Rs/ Saplings including maintenance	Rs. 40,000
TOTAL							**Rs 3,70,400**

TABLE 2.9: CUMULATIVE PRODUCTION OF GRAVEL IN CLUSTER QUARRIES

Quarry	Mineable Reserves in m^3	Maximum Production in m^3	Per Day Production in m^3	Number of Lorry Load Per Day
P1	10,048	4,000	13	2 Trips/day
P2	8,568	8,568	28	5 Trips /day
P3	608	608	2	1 Trips /day
P4	3,102	1,222	4	1 Trips /day
P5	2,520	840	3	1 Trips /day
P6	8,050	2,754	9	2 Trips /day
P7	8,985	8,190	27	5 Trips /day
E1	48,720	26,796	89	15 Trips/day
E2	-	-	-	-
E3	-	-	-	-
E4	13,300	13,300	44	7 Trips/day
E5	-	-	-	-
Total	**1,03,901**	**66,278**	**219**	**39 Trips/day**

TABLE 2.10: CUMULATIVE PRODUCTION OF ROUGH STONE IN CLUSTER QUARRIES

Quarry	Mineable Reserves in m^3	Maximum Production in m^3	Per Day Production in m^3	Number of Lorry Load Per Day
P1	1,15,372	28,785(2^{nd} year)	96	16 Trips/day
P2	1,14,385	30,345 (2^{nd} year)	101	17 Trips /day
P3	86,650	17,840 (4^{th} year)	59	10 Trips /day
P4	1,09,075	22,870 (4^{th} year)	76	13 Trips /day
P5	34,603	6,983 (2^{nd} year)	23	4 Trips /day
P6	1,31,800	16,590 (1^{st} year)	55	9 Trips /day
P7	1,99,770	67,935(2^{nd} year)	226	38 Trips /day
E1	1,54,190	38,840(4^{th} year)	129	21 Trips/day
E2	20,583	4,482 (3^{rd} year)	15	3 Trips/day
E3	1,62,707	19,000 (5^{th} year)	63	11 Trips/day
E4	75,020	19,050 (5^{th} year)	63	11 Trips/day
E5	-	-	-	-
Total	**12,04,155**	**2,72,720**	906	**153 Trips/day**

METHOD OF MINING

The method of mining is common for all the Cluster quarries, Opencast Mechanized Mining Method is being proposed by formation of 5.0 meter height bench with a bench width not less than the bench height. However, as far as the quarrying of Rough Stone is concerned, observance of the provisions of Regulation 106 (2) (b) as above is seldom possible due to various inherent petro genetic factors coupled with mining difficulties. Hence it is proposed to obtain relaxation to the provisions of the above regulation from the Director of Mines Safety for which necessary provision is available with the Regulation 106 (2) (b) of MMR-1961, under Mine Act – 1952.

The top layer of overburden (Gravel) will be directly excavated by Hydraulic Excavators and loaded into tippers directly and sold to needy customers. The Rough Stone is a batholith formation and the splitting of rock mass of considerable volume from the parent rock mass will be carried out by deploying jackhammer drilling and Slurry Explosives will be used for blasting. Hydraulic Excavators attached with Rock Breakers unit will be deployed for breaking large boulders to required fragmented sizes to avoid secondary blasting and hydraulic excavators attached with bucket unit will be deployed for loading the Rough Stone into the tippers and then the stone is transported from pithead to the nearby crushers.

2.5.1 Drilling & Blasting Parameters

Drilling & Blasting will be carried out as per parameters given below:-

Spacing	–	1.2m
Burden	–	1.0 m
Depth of hole	–	1.5 m
Charge per hole	–	0.5kg
Powder factor	–	6.0 tonnes/kg
Diameter of hole	–	32mm

Type of Explosives to be used –

Slurry explosives (An explosive material containing substantial portions of a liquid, oxidizers, and fuel, plus a thickener), NONEL / Electric Detonator &Detonating Fuse

Storage of Explosives –

No proposal for storage of explosives within the project area, the proponent will engage blasting agency on daily basis and the blasting will be carried out under the supervision of competent qualified Blaster and it will be ensured that there shall be no balance of explosive stock; any balance stock will be taken back by the supplier.

Precaution during Drilling and Blasting –

- Preparation of charge and stemming of holes will be done by a qualified person
- Before the shot holes are charged, adequate warning signals will be given
- Controlled blasting will be carried out using Delay detonator to prevent fly rocks and control the ground vibrations
- Proper inspection will be carried out by the blaster at the blasted site (before & after blasting)before giving clearance signal
- The blasting will be taken up at appointed timing only with sufficient caution to the public, sentries will be posted in haul roads to regulate and restrict the public during blasting hours

2.5.2 Extent of Mechanization

TABLE 2.11 PROPOSED MACHINERY DETAILSFOR PROPOSED QUARRIES

PROPOSAL – P1				
S.NO.	**TYPE**	**NOS**	**SIZE/CAPACITY**	**MOTIVE POWER**
1	Jack hammers	3	1.2m to 2.0m	Compressed air
2	Compressor	1	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker Unit	1	300 HP	Diesel Drive
4	Tippers	2	20 Tonnes	Diesel Drive
PROPOSAL – P2				
S.NO.	**TYPE**	**NOS**	**SIZE/CAPACITY**	**MOTIVE POWER**
1	Jack hammers	3	1.2m to 2.0m	Compressed air
2	Compressor	1	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker Unit	1	300 HP	Diesel Drive
4	Tippers / Dumpers	2	20 Tonnes	Diesel Drive
PROPOSAL – P3				
S.NO.	**TYPE**	**NOS**	**SIZE/CAPACITY**	**MOTIVE POWER**
1	Jack hammers	3	1.2m to 2.0m	Compressed air
2	Compressor	1	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker Unit	1	300 HP	Diesel Drive
4	Tippers / Dumpers	2	20 Tonnes	Diesel Drive
PROPOSAL – P4				
S.NO.	**TYPE**	**NOS**	**SIZE/CAPACITY**	**MOTIVE POWER**
1	Jack hammers	3	1.2m to 2.0m	Compressed air
2	Compressor	1	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker Unit	1	300 HP	Diesel Drive
4	Tippers / Dumpers	2	20 Tonnes	Diesel Drive
PROPOSAL – P5				
S.NO.	**TYPE**	**NOS**	**SIZE/CAPACITY**	**MOTIVE POWER**
1	Jack hammers	1	1.2m to 2.0m	Compressed air
2	Compressor	1	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker Unit	1	300 HP	Diesel Drive
4	Tippers / Dumpers	1	20 Tonnes	Diesel Drive

PROPOSAL – P6				
S.NO.	**TYPE**	**NOS**	**SIZE/CAPACITY**	**MOTIVE POWER**
1	Jack hammers	2	1.2m to 2.0m	Compressed air
2	Compressor	1	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker Unit	1	300 HP	Diesel Drive
4	Tippers / Dumpers	1	20 Tonnes	Diesel Drive
PROPOSAL – P7				
S.NO.	**TYPE**	**NOS**	**SIZE/CAPACITY**	**MOTIVE POWER**
1	Jack hammers	4	1.2m to 2.0m	Compressed air
2	Compressor	1	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker Unit	1	300 HP	Diesel Drive
4	Tippers / Dumpers	2	20 Tonnes	Diesel Drive

Source: Approved Mining Plan

2.6 GENERAL FEATURES

2.6.1 Existing Infrastructures

Infrastructures like Mine office, Temporary Rest shelters for workers, Latrine and Urinal Facilities, First Aid Station will be constructed after the grant of quarry lease.

2.6.2 Drainage Pattern

There are no streams, canals or water bodies crossing within the project area, hence there is no requirement of stream or canals diversion.

2.6.3 Traffic Density

The traffic survey conducted based on the transportation route of material, the Rough Stone and Gravel is proposed to be transported mainly through the SH 79 Rasipuram - Tiruchengode highway located 2.5Km East of the project area. Major District Road located 1.80 Km South.

Traffic density measurements were performed at three locations

1. MDR road located 1.8m South side
2. SH 79 Rasipuram - Tiruchengode highway located 2.5Km East

Traffic density measurement were made continuously for 24 hours by visual observation and counting of vehicles under three categories, viz., Heavy motor vehicles, light motor vehicles and two/three wheelers. As traffic densities on the roads are high, two skilled persons were deployed simultaneously at each station during each shift- one person on either direction for counting the traffic. At the end of each hour, fresh counting and recording was undertaken.

FIGURE.2.10: MINERAL TRANSPORTATION ROUTE MAP

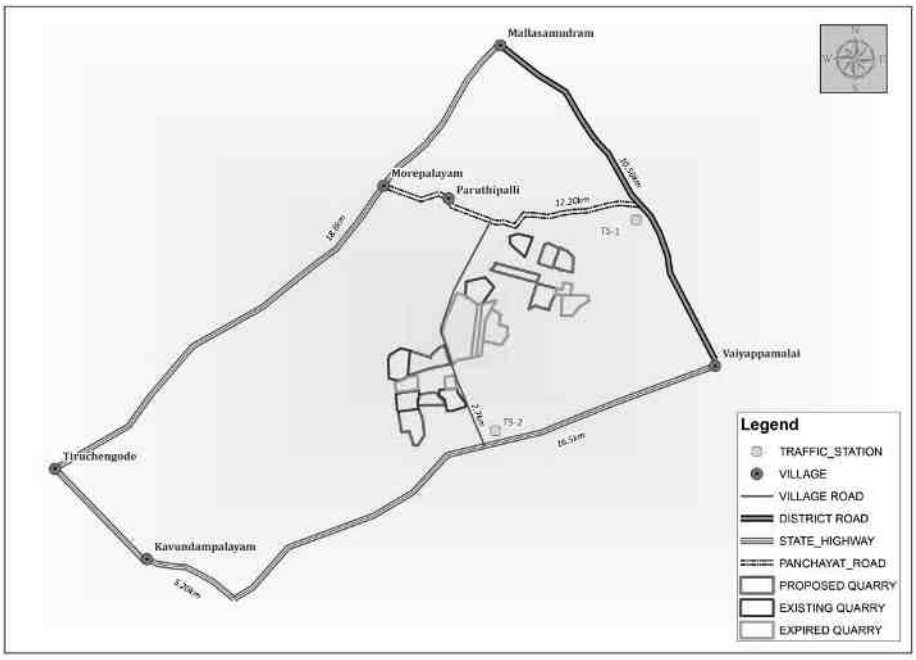


TABLE.2.12: TRAFFIC SURVEY LOCATIONS

Station Code	Road Name	Distance and Direction	Type of Road
TS1	MDR Road (Mallasamuthiram-vaippamalai)	2.5Km East	Major District Road (Two Lane)
TS2	SH 79 Rasipuram - Tiruchengode	1.8Km South	State Highway Road (Two Lane)

Source: On-site monitoring by GEMS FAE & TM

TABLE 2.13: EXISTING TRAFFIC VOLUME

Station code	HMV		LMV		2/3 Wheelers		Total PCU
	No	PCU	No	PCU	No	PCU	
TS1	215	645	157	157	425	212	1014
TS2	245	735	182	182	466	233	1150

Source: On-site monitoring by GEMS FAE & TM

* PCU conversion factor: HMV (Trucks and Bus) = 3, LMV (Car, Jeep and Auto) = 1 and 2/3 Wheelers = 0.5

TABLE 2.14: ROUGH STONE HOURLY TRANSPORTATION REQUIREMENT

Transportation of Rough Stone and Gravel per day			
Capacity of trucks	No Trips per day Cumulatively	Volume in PCU	PCU Per hour considering 8 Hours
20 tonnes	134	134	17

Source: Data analysed from Approved Mining plan

TABLE 2.15: SUMMARY OF TRAFFIC VOLUME

Route	Existing Traffic volume in PCU	Incremental traffic due to the project	Total traffic volume	Hourly Capacity in PCU as per IRC – 1960guidelines
MDR Road (Mallasamuthiram-vaippamalai)	1014	17	1031	1500
SH 79 Rasipuram - Tiruchengode	1150	17	1167	1500

Source: On-site monitoring analysis summary by GEMS FAE & TM

- Due to this project the existing traffic volume will not exceed
- As per the IRC 1960 this existing village road can handle 1,200 PCU in hour and Major district road can handle 1500 PCU in hour hence there will not be any conjunction due to this proposed transportation.

2.6.4 Mineral Beneficiation and Processing

There is no proposal for the mineral processing or ore beneficiation in this project

2.7 PROJECT REQUIREMENT

2.7.1 Water Source & Requirement

Detail of water requirements in KLD as given below:

TABLE 2.16 WATER REQUIREMENT FOR THE PROJECT

PROPOSAL – P1		
*Purpose	Quantity	Source
Dust Suppression	1.8 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	0.7 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.6 KLD	Water Tankers
Total	**3.0 KLD**	
PROPOSAL – P2		
*Purpose	Quantity	Source
Dust Suppression	1.8 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	0.37 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.74 KLD	Water Tankers
Total	**2.9 KLD**	
PROPOSAL – P3		
*Purpose	Quantity	Source
Dust Suppression	1.8 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	1.2 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.65 KLD	Water Tankers
Total	**3.7 KLD**	
PROPOSAL – P4		
*Purpose	Quantity	Source
Dust Suppression	1.80 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	0.27 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.64 KLD	Water Tankers
Total	**2.71 KLD**	
PROPOSAL – P5		
*Purpose	Quantity	Source
Dust Suppression	0.5 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	1.5 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.5 KLD	Water Tankers

Total	**2.5 KLD**	
PROPOSAL – P6		
*Purpose	Quantity	Source
Dust Suppression	1.0 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	1.0 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.5 KLD	Water Tankers
Total	**2.5 KLD**	
PROPOSAL – P7		
*Purpose	Quantity	Source
Dust Suppression	1.0 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	0.5 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.5 KLD	Water Tankers
Total	2 KLD	

Source: Prefeasibility report

* Drinking water will be sourced from Approved Water Vendors

2.7.2 Power and Other Infrastructure Requirement

The project does not require power supply for the mining operations. The quarrying activity is proposed during day time only (General Shift 8 AM – 5 PM, Lunch Break 1 PM – 2 PM). Electricity for use in office and other internal infrastructure will be obtained from SEB.

The temporary infrastructures such as Mine Office, First Aid Room, Rest Shelter etc., already available in the Existing quarries for the new proposals the infrastructures will be constructed within the project area before commencing the quarry operation. No workshops are proposed inside the project area hence there will not be any process effluent generation from the project area. Domestic effluent from the mine office will be discharged to septic tank and soak pit. There is no toxic effluent expected to generate in the form of solid, liquid or gaseous form hence there is no requirement of waste treatment plant.

2.7.3 Fuel Requirement

High speed Diesel (HSD) will be used for mining machineries. Diesel will be brought from nearby Fuel Stations.
Total diesel consumption is around = 500 Litters of HSD / day

2.8 EMPLOYMENT REQUIREMENT:

The skilled, competent qualified statutory persons will be engaged for quarrying operation, preference will be given to the local community.

TABLE 2.17: EMPLOYMENT POTENTIAL FOR CLUSTER QUARRIES

PROPOSAL – P1	
Mines Manager/Mines Foreman	1
Mate/Blaster	1
Jack hammer operator	9
Excavator Operator	3
Helper	3
Cleaner & Co-operator	3
Security	1
Total	**21**
PROPOSAL – P2	
Mines Manager/Mines Foreman	1
Mate/Blaster	1
Excavator Operator	3
Jack hammer operator	9
Security	1

labour & helper	3
Cleaner & Co-operator	3
Total	**21**
PROPOSAL – P3	
Mines Manager/Mines Foreman	1
Mate/Blaster	1
Excavator Operator & Driver	3
Jack hammer operator	6
Security	1
labour & helper	2
Cleaner & Co-operator	3
Total	**17**
PROPOSAL – P4	
Mines Manager/Mines Foreman	1
Mate/Blaster	1
Excavator Operator & Driver	3
Jack hammer operator	6
Security	1
labour & helper	2
Cleaner & Co-operator	3
Total	**17**
PROPOSAL – P5	
Mines Manager/Mines Foreman	1
Mate/Blaster	1
Jack hammer operator	2
Excavator Operator	1
Tipper Driver	1
Helper	3
Cleaner & Co-operator	2
Security	1
Total	**12**
PROPOSAL – P6	
Mines Manager/Mines Foreman	1
Mate/Blaster	1
Jack hammer operator	4
Excavator Operator	1
Tipper Driver	1
Helper	3
Cleaner & Co-operator	2
Security	1
Total	**14**
PROPOSAL – P7	
Mines Manager/Mines Foreman	1
Mate and Blaster	2
Jack hammer operator	8
Excavator Operator	1
Tipper Driver	2
Helper	3
Cleaner & Co-operator	2
Security	1
Total	**20**

A total of 122 people will get employment due to these 12 mines in cluster

2.9 PROJECT IMPLEMENTATION SCHEDULE

The commercial operation will commence after the grant of Environmental Clearance. CTO and CTE will be obtained from the Tamil Nadu State Pollution Control Board. The conditions imposed during the Environmental Clearance will be compiled before the start of mining operation.

TABLE 2.18 EXPECTED TIME SCHEDULE FOR THE PROJECT

Sl.No.	Particulars	Time Schedule (In Month)					Remarks if any
		1st	2nd	3rd	4th	5th	
1	Environmental Clearance						
2	Consent to Establish						Project Establishment Period
3	Consent to Operate						Production Start Period
Time line may vary; subjected to rules and regulations /& other unforeseen circumstances							

Source: Anticipated based on Timelines framed in EIA Notification & CPCB Guidelines

TABLE 2.19 CAPITAL COST ESTIMATION

PROPOSAL – P1	
Project Cost	Rs. 27,86,300/-
PROPOSAL – P2	
Project Cost	Rs. 27,82,400/-
PROPOSAL – P3	
Project Cost	Rs. 29,83,700 /-
PROPOSAL – P4	
Project Cost	Rs. 27,77,000/-
PROPOSAL – P5	
Project Cost	Rs. 22,65,000/-
PROPOSAL – P6	
Project Cost	Rs. 29,63,000/-
PROPOSAL – P7	
Project Cost	Rs. 43,90,400/-

Source: Approved Mining Plan &Prefeasibility Report

3. DESCRIPTION OF ENVIRONMENT

3.0 GENERAL

This chapter presents a regional background to the baseline data at the very onset, which will help in better appreciation of micro-level field data, generated on several environmental and ecological attributes of the study area. The baseline status of the project environment is described section wise for better understanding of the broad spectrum conditions. The baseline environment quality represents the background environmental scenario of various environmental components such as Land, Water, Air, Noise, Biological and Socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out covering December 2020, January 2021 & February 2021 as per CPCB guidelines. Environmental Monitoring data has been collected with reference to proposed mine by OMEGAA LABORATORIES ISO 9001: 2008, OHSAS 18001: 2007 Certified & MoEF Notified Laboratory, for the below attributes –

- Land
- Water
- Air
- Noise
- Biological
- Socio-economic status

Study Area

An area of 10 km radius (aerial distance) from the boundary of the cluster area is considered for EIA study. The data collection has been used to understand the existing environment scenario around the proposed project against which the potential impacts of the project can be assessed. The study area has been divided into two zones viz **core zone** and **buffer zone** where core zone is the proposed project area cluster and buffer zone taken as 10km radius from the periphery of the cluster area. Both Core zone and Buffer zone is taken as the study area.

Study Period

The baseline study was conducted during the non-monsoon season i.e. December 2020 – February 2021.

Study Methodology

- The project area was surveyed in detail with the help of Total Station and the boundary pillars were picked up with the help of GPS. The boundary coordinates were superimposed on the satellite imagery to understand the relief of the area, besides Land use pattern of the area was studied through the Bhuvan (ISRO)
- Soil samples were collected and analysed for relevant physio-chemical characteristics, exchangeable Cations, nutrients & micro nutrients etc., in order to assess the impact due to mining activities and to recommend saplings for Greenbelt development
- Ground water samples were collected during the study period from the existing open wells and borewells, while surface water was collected from ponds in the buffer zone. The samples were analyzed for parameters necessary to determine water quality (based on IS: 10500:2012 criteria) and those which are relevant from the point of view of environmental impact of the proposed mines
- A onsite meteorological station was setup in cluster area, to collect data about wind speed, wind direction, temperature, relative humidity, rainfall and general weather conditions were recorded throughout the study period
- In order to assess the Ambient Air Quality (AAQ), samples of ambient air were collected by installation of Respiratory Dust Samplers (RDS) for Fugitive dust, PM_{10} and SO_2, NO_X with gaseous attachments & Fine

Dust Samplers (FDS) for $PM_{2.5}$ and other parameters as per NAAQ norms and analysed for primary air pollutants to work out the existing status of air quality

- The Noise level measurements were also made at various locations in different intervals of time with the help of sound level meter to establish the baseline noise levels in the impact zone
- Baseline biological studies were carried out to assess the ecology of the study area to study the existing flora and fauna pattern of the area
- Socio-Economic survey was conducted at village and household level in the study area to understand the present socio-economic conditions and assess the extent of impact due to the proposed mining project

The sampling methodologies for the various environmental parameters required for the study, frequency of sampling, method of samples analysis, etc., are given below Table 3.1.

TABLE 3.1: MONITORING ATTRIBUTES AND FREQUENCY OF MONITORING

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	7 (3 surface water & 4 ground water)	IS 10500& CPCB Standards
Meteorology	Wind Speed Wind Direction Temperature Cloud cover Dry bulb temperature Rainfall	1 Hourly Continuous Mechanical/Automatic Weather Station	1	Site specific primary data& Secondary Data from IMD Station
Ambient Air Quality	PM10 PM2.5 SO2 NOX Fugitive Dust	24 hourly twice a week (March – May 2019)	7 (2 core & 5 buffer)	IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB
Noise Levels	Ambient Noise	Hourly observation for 24 Hours per location	7 (2 core & 5 buffer zone)	IS 9989 As per CPCB Guidelines
Ecology	Existing Flora and Fauna	Through field visit during the study period	Study Area	Primary Survey by Quadrate & Transect Study Secondary Data – Forest Working Plan
Socio Economic Aspects	Socio–Economic Characteristics, Population Statistics and Existing Infrastructure in the study area	Site Visit & Census Handbook, 2011	Study Area	Primary Survey, census handbook & need based assessments.

Source: On-site monitoring/sampling by Omegaa Laboratories in association with GEMS

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

3.1 LAND ENVIRONMENT

The mining operation is proposed to carry out by opencast mining method; studies on land environment of eco-system play an imperative role in identifying susceptible issues and taking appropriate action to uphold ecological equilibrium in the region. The main objective of this section is to provide a baseline status of the study area covering 10km radius around the proposed mine site so that temporal changes due to the mining activities on the surroundings can be assessed in future.

3.1.1 Land Use/ Land Cover

A visual interpretation technique has been adopted for land use classification based on the keys suggested in the chapter – V of the guidelines issued by NNRMS Bangalore & Level III classification with 1:50,000 scale for the preparation of land use mapping.

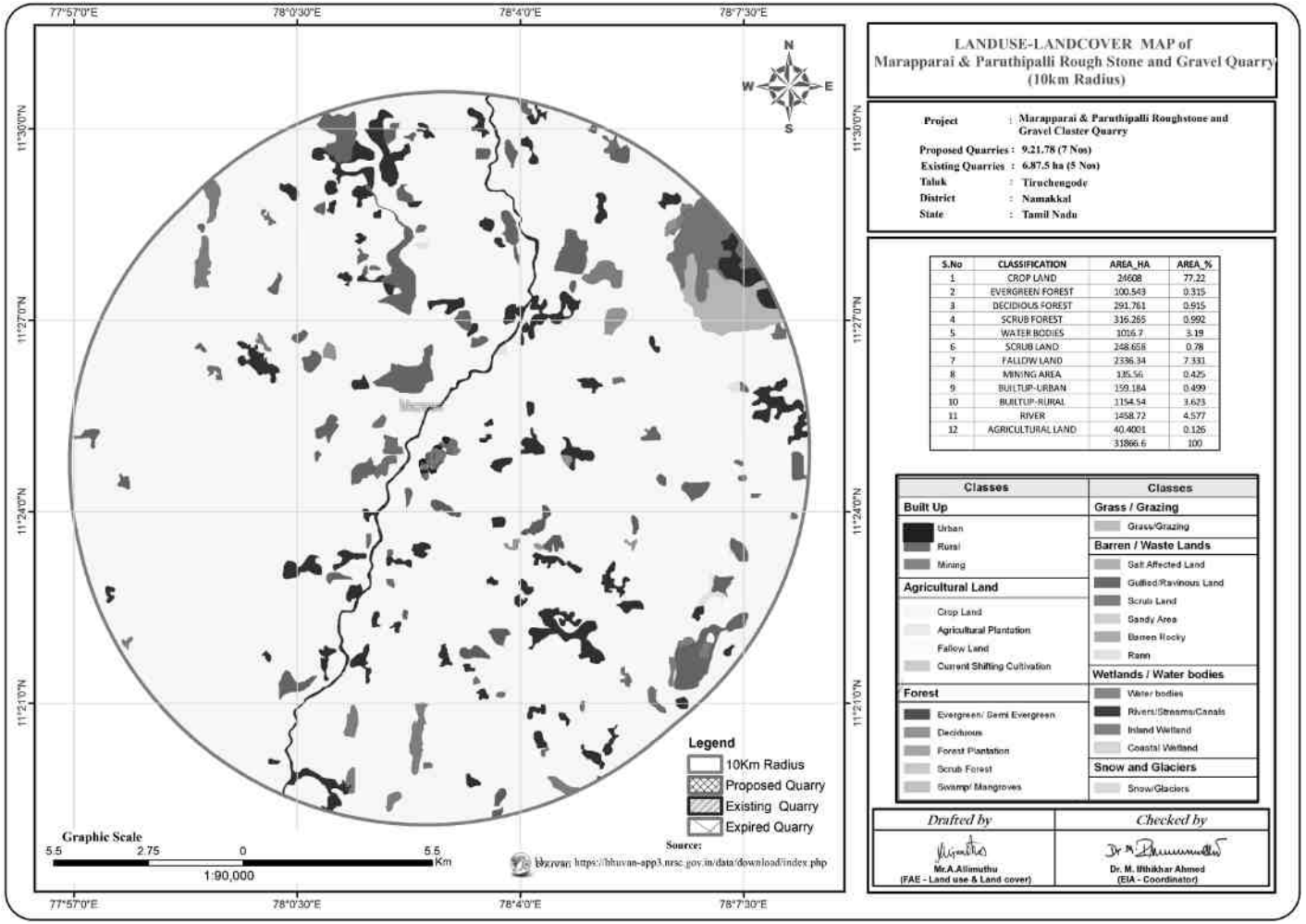
Land use pattern of the area was studied through LISS III imagery of Bhuvan (ISRO). The 10 km radius map of study area was taken for analysis of Land use cover. The main objective of this section is to provide a baseline status of the study area covering 10 km radius around the mine site so that temporal changes due to the mining activities on the surroundings can be assessed in future.

TABLE 3.2: LAND USE / LAND COVER TABLE 10 KM RADIUS

S.No	CLASSIFICATION	AREA_HA	AREA_%
1	Crop Land	24608	77.22
2	Evergreen Forest	100.543	0.315
3	Deciduous Forest	291.761	0.915
4	scrub forest	316.265	0.992
5	Water Bodies	1016.7	3.19
6	Scrub Land	248.658	0.78
7	Fallow Land	2336.34	7.331
8	Mining Area	135.56	0.425
9	Builtup-Urban	159.184	0.499
10	Builtup-Rural	1154.54	3.623
11	River	1458.72	4.577
12	Agricultural Land	40.4001	0.126
Total		**31866.6**	**100**

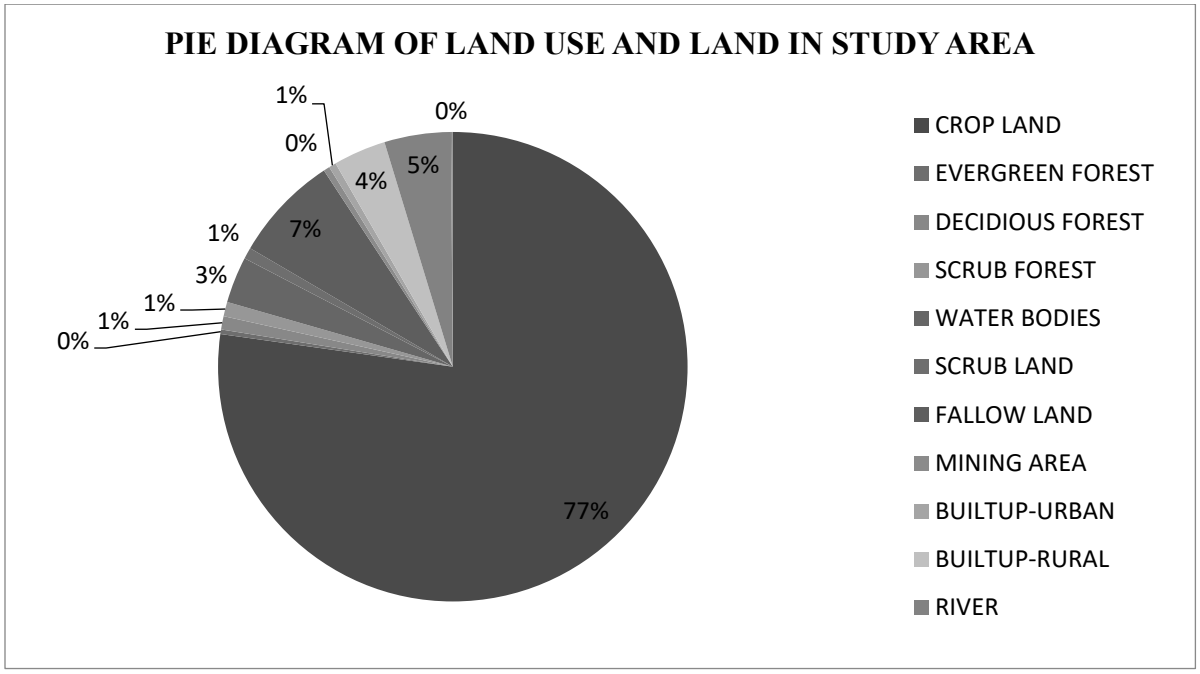
Source: Survey of India Toposheet and Landsat Satellite Imagery

FIGURE 3.1: LAND USE LAND COVER MAP 10KM RADIUS



Source:

FIGURE 3.2: PIE DIAGRAM OF LAND USE AND LAND IN STUDY AREA



Source: Table 3.2

From the above table and pie diagram it is inferred that the majority of the land in the study area is Agriculture land (includes crop land) 84.67 % followed by water bodies (Rivers Stream Canals) 7.76 %.

The total mining area within the study area is 135.56 ha ie., 0.425 %. The cluster area 16.09.28 ha contributes about 11.87 % of the total mining area within the study area. This small percentage of Mining Activities shall not have any significant impact on the environment.

3.1.2 Topography

The lease applied area is exhibits plain terrain. The area has gentle sloping towards western side. The altitude of the area is 216m above mean sea level.

3.1.3 Drainage Pattern of the Area

There are no developed surface drainage channels in the study area. One river is passing within the study area (Thirumanimuthar River – west 950m). The area is studded with few tanks that serve as the source of drinking water and also their surplus feeds adjoining tanks. The area is mostly dry in all seasons except rainy seasons.

The general drainage pattern of the area is of sub dendritic and dendritic pattern. No prominent water course or nallah is inferred. During rainy season the surface runoff flows in W to E direction. The drainage pattern of the study area is given in Fig. 3.5. The quarrying activity will not hinder the natural flow of rainwater.

3.1.4 Seismic Sensitivity

The proposed project site falls in the seismic Zone II, low damage risk zone as per BMTPC, Vulnerability Atlas of Seismic zone of India IS: 1893 – 2002. The project area falls in the hard rock terrain on the peninsular shield of south India which is highly stable.

3.1.5 Environmental Features in the Study Area

There is no Wildlife Sanctuaries, National Park and Archaeological monuments within project area. No Protected and Reserved forest area is involved in the project area. Therefore, there will be no need to acquisition/diversion of forest land. The details related to the environment sensitivity around the proposed mine lease area i.e. 10 km radius, are given in the below Table 3.3.

TABLE 3.3: DETAILS OF ENVIRONMENT SENSITIVITY AROUND THE CLUSTER

Sl.No	Sensitive Ecological Features	Name	Arial Distance in km from Mine Lease Boundary
1	National Park / Wild life Sanctuaries	None	Nil within 10 km Radius
2	Reserve Forest	None	Nil within 10 km Radius
3	Lakes/Reservoir/ Dams/Stream/Rivers	Thirumanimuthar River –950m– Northwest	
		Kattipalayam kuttai – 960m – SW	
		Paruthipalli lake – 1.8km NW	
		Konnayar Tank – 1.7km SW	
		Ramapuram lake – 4.5km NW	
		Natramangalam lake – 6.6km SE	
		Elur lake – 9.0km SE	
4	Tiger Reserve/ Elephant Reserve/ Biosphere Reserve	None	Nil within 10KM Radius
5	Critically Polluted Areas	None	Nil within 10km Radius
6	Mangroves	None	Nil within 10km Radius
7	Mountains/Hills	None	Nil within 10km Radius
8	Notified Archaeological Sites	None	Nil within 10km Radius
9	Industries/ Thermal Power Plants	None	Nil within 10km Radius
10	Defence Installation	None	Nil within 10km Radius

Source: Approved Mining plan and Village map of the area

3.1.6 Soil Environment

Soil quality of the study area is one of the important components of the land environment. The composite soil samples were collected from the study area and analysed for different parameters. The locations of the monitoring sites are detailed in Table 3.4 and Figure 3.3.

The objective of the soil sampling is -

- To determine the baseline soil characteristics of the study area;
- To determine the impact of proposed activity on soil characteristics and;

To determine the impact on soil more importantly agriculture production point of view.

TABLE 3.4: SOIL SAMPLING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	S1	Project Area	Core Zone	11°25'5.02"N 78° 2'58.24"E
2	S2	Project Area	Core Zone	11°24'40.09"N 78° 2'31.82"E
3	S3	Paruthipalli	2.5km North West	11°25'53.91"N 78° 1'35.48"E
4	S4	Periamanali	4.5km South East	11°22'39.70"N 78° 4'23.34"E
5	S5	Elachipalayam	4km South West	11°23'23.01"N 78°00'40.35"E
6	S6	Nagarpalayam	4km North East	11°25'48.35"N 78° 4'57.46"E

Source: On-site monitoring/sampling by Omegaa Laboratories in association with GEMS

Methodology –

For studying soil quality, sampling locations were selected to assess the existing soil conditions in and around the proposed quarry site representing various land use conditions. The samples were collected by auger boring into the soil up to 90-cm depth. Six (6) locations were selected for soil sampling on the basis of soil types, vegetative cover, industrial & residential activities including infrastructure facilities, which would accord an overall idea of the soil characteristics. The samples were analysed for physical and chemical characteristics. The samples were sent to laboratory for analysis. The samples were filled in Polythene bags, coded and sent to laboratory for analysis and the details of methodology in respect are given in below Table 3.5.

TABLE 3.5: METHODOLOGY OF SAMPLING COLLECTION

Particulars	Details
Frequency	One grab sample from each station-once during the study period
Methodology	Composite grab samples of the topsoil were collected from 3 depths, and mixed to provide a representative sample for analysis. They were stored in airtight Polythene bags and analysed at the laboratory.

Source: On-site monitoring/sampling by Omegaa Laboratories in association with GEMS

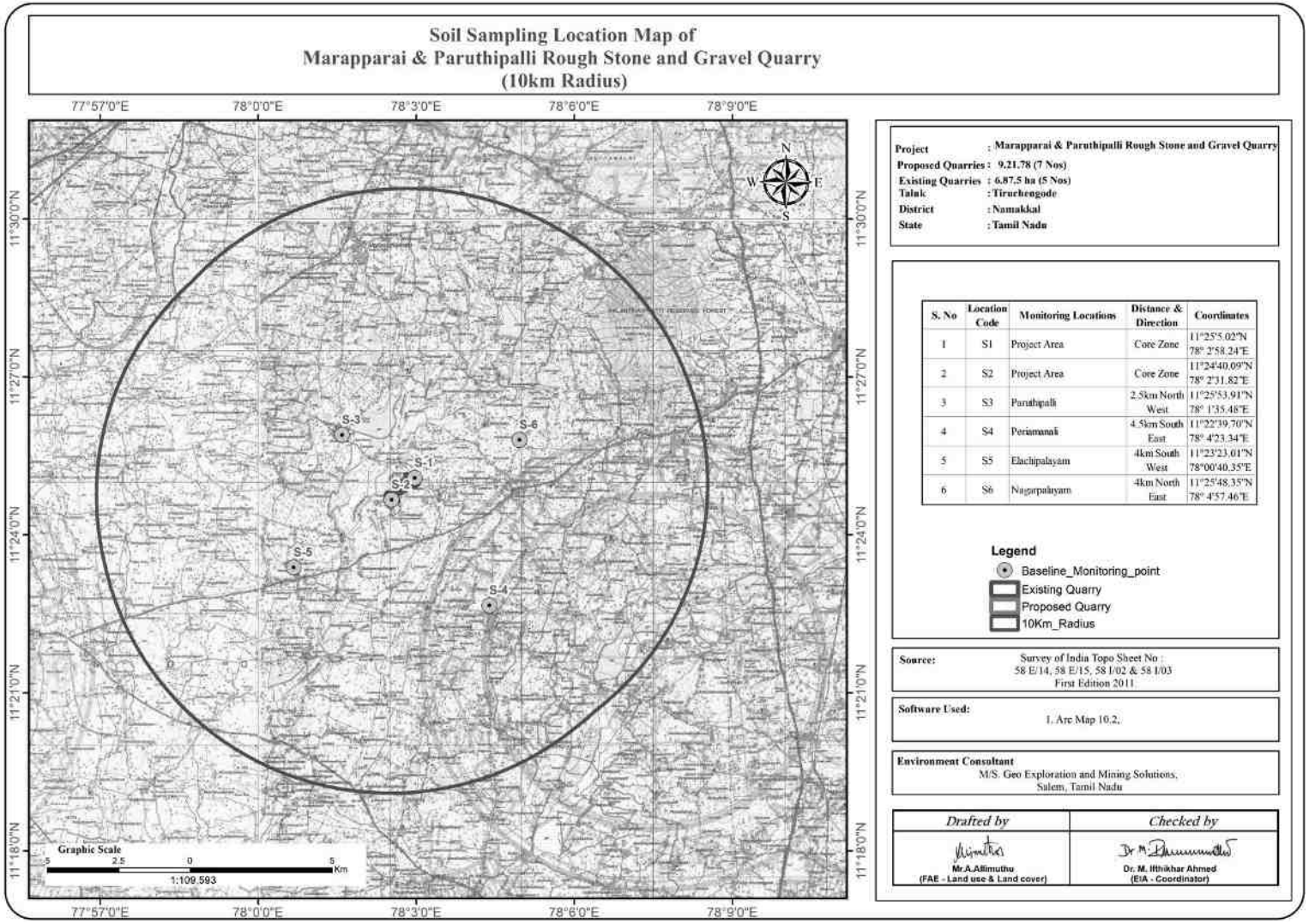
The samples were analysed as per the standard methods prescribed in "Soil Chemical Analysis (M.L. Jackson, 1967) & Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India". The important properties analysed for soil are bulk density, porosity, infiltration rate, pH and Organic matter, kjeldahl Nitrogen, Phosphorous and Potassium. The standard classifications of soil and physio-chemical characteristics of the soils are presented below in Table 3.6 & Test Results in Table 3.7.

TABLE 3.6: SOIL QUALITY STANDARD

Sl. No.	Soil Test	Remarks
1	pH	<4.5 Extremely acidic 4.51- 5.50 Very strongly acidic 5.51-6.0 moderately acidic 6.01-6.50 slightly acidic 6.51-7.30 Neutral 7.31-7.80 slightly alkaline 7.81-8.50 moderately alkaline 8.51-9.0 strongly alkaline 9.01 very strongly alkaline
2	Electrical Conductivity (in µmohs/cm)	Normal <1000, Critical for germination 1000 – 2000, Critical for growth 2000- 4000, Injurious to most crops > 4000
3	Organic Carbon (in %)	Upto 0.2: very less 0.21-0.4: less 0.41-0.5 medium, 0.51-0.8: on an average sufficient 0.81-1.00: sufficient >1.0 more than sufficient
4	Nitrogen (in Kg/ha)	Upto 50 very less 51-100 less 101-150 good 151-300 Better >300 sufficient
5	Phosphorus (in Kg/ha)	Upto 15 very less 16-30 less 31-50 medium, 51-65 on an average sufficient 66-80 sufficient >80 more than sufficient
6	Potash (in Kg/ha)	0 -120 very less 120-180 less 181-240 medium 241-300 average 301-360 better >360 more than sufficient

Source: Handbook of Agriculture, Indian Council of Agriculture Research, New Delhi

FIGURE 3.3: SOIL SAMPLING LOCATIONS AROUND 10 KM RADIUS



Source:

FIGURE 3.4: SOIL MAP

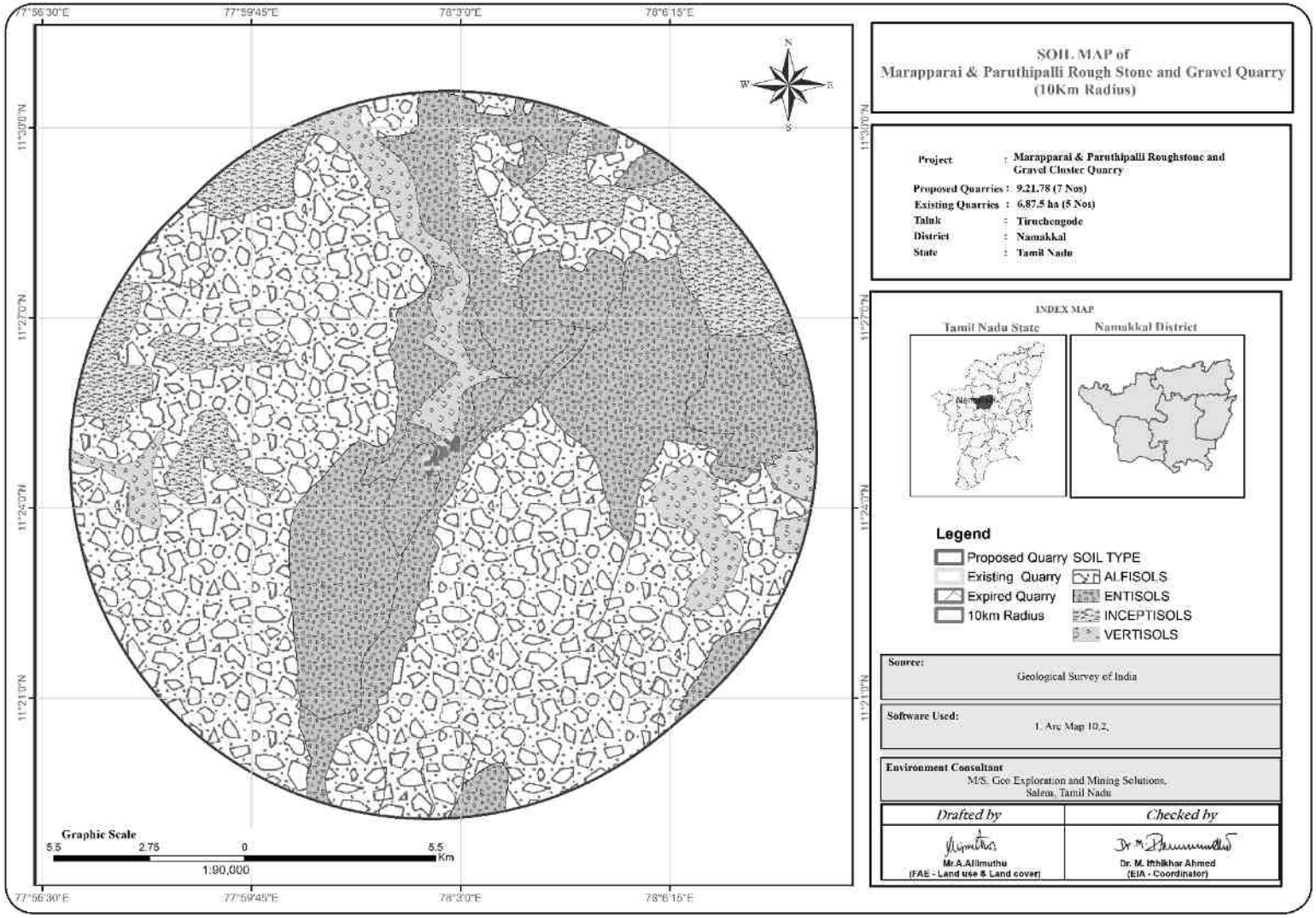


TABLE 3.7: SOIL QUALITY OF THE STUDY AREA

Parameter		Unit	S-1 Project Area	S-2 Project Area	S-3 Paruthipalli	S-4 Periamanali	S-5 Elachipalayam	S-6 Nagarpalyam
1	pHat27°C	-	7.12	8.35	8.02	7.96	7.62	7.50
2	ElectricalConductivityat25°C	µs/cm	388	415	476	397	450	323
3	Texture	-	Clay Loam					
4	Sand	%	39.8	42.3	43.5	45.9	40.5	37.2
5	Slit	%	35.5	32.4	30.5	31.2	27.7	34.4
6	Clay	%	24.5	25.3	25.6	22.7	31.7	
7	Water Holding Capacity	%	48.2	44.3	46	43.5	49.4	45.5
8	Bulk Density	g/cc	0.96	1.02	1.23	0.99	1.02	1.06
9	Porosity	%	30.2	28	31.4	32.4	34.5	32.5
10	Exchangeable Calcium(asCa)	mg/Kg	172.1	187	156	160	176.2	168
11	Exchangeable Magnesium(asMg)	mg/Kg	28	20.6	25.2	22.7	12.7	30.2
12	Exchangeable Manganese(asMn)	mg/Kg	32	39	35	38.5	38.5	36
13	Exchangeable Zinc as Zn	mg/Kg	0.84	0.77	0.43	0.85	0.93	0.83
14	Available Boron (as B)	mg/Kg	0.41	0.55	0.39	0.62	0.73	0.23
15	Soluble Chloride(as Cl)	mg/Kg	155	191	187	162.3	199	160
16	Soluble Sulphate(as S04)	mg/Kg	135	112	135	155.3	140	146
17	Available Potassium(as K)	mg/Kg	34	35.3	41.2	39	36	42.3
18	Available Phosphorous(as P)	Kg/hec	0.73	1.02	0.88	1.52	1.44	0.98
19	Available Nitrogen(as N)	Kg/hec	152	186.2	178.3	210	175	199
20	Cadmium (as Cd)	mg/Kg	BDL(DL:0.003)	BDL (DL:0.003)	BDL (DL:0.003)	BDL (DL:0.003)	BDL (DL:0.003)	BDL (DL:0.003)
21	Chromium (asCr)	mg/Kg	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)
22	Copper(asCu)	mg/Kg	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)
23	Lead (asPb)	mg/Kg	0.79	0.83	0.68	0.95	0.61	0.82
24	Total Iron	mg/Kg	2.85	2.97	2.54	2.31	2.10	2.63
25	Organic Matter	%	1.36	2.10	1.77	1.89	1.67	1.63
26	Organic Carbon	%	0.79	1.22	1.03	1.10	0.97	0.95
27	CEC	meq/l00g	46.5	42.1	42.5	48.3	41.0	42.1

Source:Sampling Results by Omegaa Laboratories

INTERPRETATION

- Variation in pH of the soil in the study area was found to be moderately alkaline to strongly alkaline in nature (7.12-8.35).
- Mostly the soils collected from different location in the study area are Clay loam in texture.
- The bulk density of the soil in the study area ranged between 0.99 – 1.23 g/cc.
- Organic carbon was found to be medium which is between 0.79 – 1.22%.
- Available Nitrogen, available phosphorous and potassium content is very low.

3.2 WATER ENVIRONMENT

The water resources, both surface and groundwater play a significant role in the development of the area. Selected water quality parameters of surface and ground water resources in the study area have been studied for assessing the water environment and evaluate anticipated impact due to the cluster quarry projects. Understanding the water quality is essential in preparation of Environmental Impact Assessment Report and to identify critical issues with a view to suggest appropriate mitigation measures for implementation. The purpose of this study is to assess the water quality characteristics for critical parameters and evaluate the impacts on agricultural productivity, domestic community usage, recreational resources and aesthetics in the vicinity. The water samples were collected and transported as per the norms in pre-treated sampling cans to laboratory for analysis.

3.2.1 Surface Water Resources:

S.No	Name	Distance & Direction
1	Thirumanimutharu River	950m NW
2	Kattipalayam Kuttati	960m SW
3	Paruthipalli Lake	1.8km NW
4	Konnayar Tank	1.7km SW
5	Ramapuram Lake	4.5km NW
6	Natramangalam Lake	6.6km SE
7	Elur Lake	9.0km SE

The 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, trenches is in practice over the area and the stored water acts as source of freshwater for couple of months after rainy season.

3.2.2 Ground Water Resources:

Namakkal district is underlain entirely by Archaean Crystalline formations with recent alluvial deposits occurring along the river and streams courses and colluvium of valley-fills. The important aquifer systems in the district are constituted by weathered, fissured and fractured crystalline rocks and the recent alluvial deposits. Ground water occurs under phreatic conditions. The maximum saturated thickness of these aquifers is upto 5 m depending upon the topographic conditions. The study area falls in the Namakkal which is categorized as Safe (< 70%) as per G.O (MS) No 113 dated 09.06.2016.

There are 16 open wells and 13 borewell water within the radius of 1km Most of the wells are almost in dry conditions:- The details of the well and depth in monsoon and non monsoon is described below:

TABLE 3.8 : DETAILS OF OPEN WELL IN 1km RADIUS

S.No	Name	Latitude	Longitude	Dec	Jan	Feb
1	BW1	11° 25' 02.47"N	78° 02' 34.07"E	58	60	62
2	BW2	11° 24' 50.81"N	78° 03' 07.45"E	65	67	69
3	BW3	11° 25' 16.39"N	78° 02' 43.22"E	62	64	66
4	BW4	11° 25' 17.36"N	78° 03' 02.16"E	63	65	67
5	BW5	11° 25' 28.03"N	78° 02' 43.20"E	64	66	68
6	BW6	11° 24' 44.53"N	78° 02' 50.21"E	60	62	64
7	BW7	11° 24' 56.27"N	78° 03' 10.09"E	59	61	63
8	BW8	11° 25' 13.77"N	78° 03' 14.13"E	65	67	69
9	BW9	11° 24' 53.20"N	78° 02' 27.21"E	62	64	66
10	BW10	11° 24' 26.61"N	78° 02' 44.20"E	61	63	65
11	BW11	11° 24' 27.30"N	78° 02' 12.32"E	64	66	68
12	BW12	11° 24' 18.82"N	78° 02' 29.15"E	59	61	63
13	BW13	11° 24' 34.04"N	78° 02' 13.11"E	60	62	64

FIGURE 3.5: POST MONSOON WATER LEVEL OF OPEN WELL 1 KM RADIUS

December – 2020

January - 2021

February - 2021

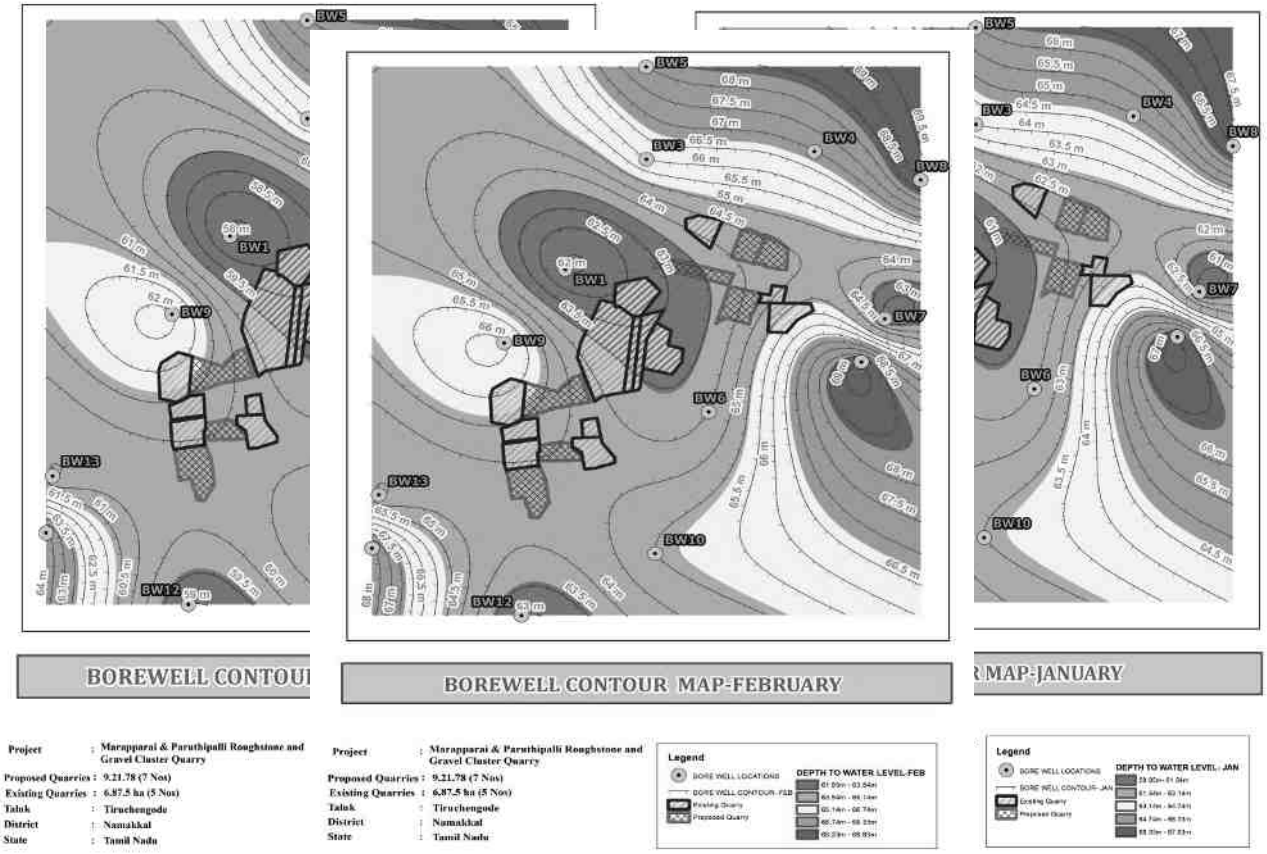
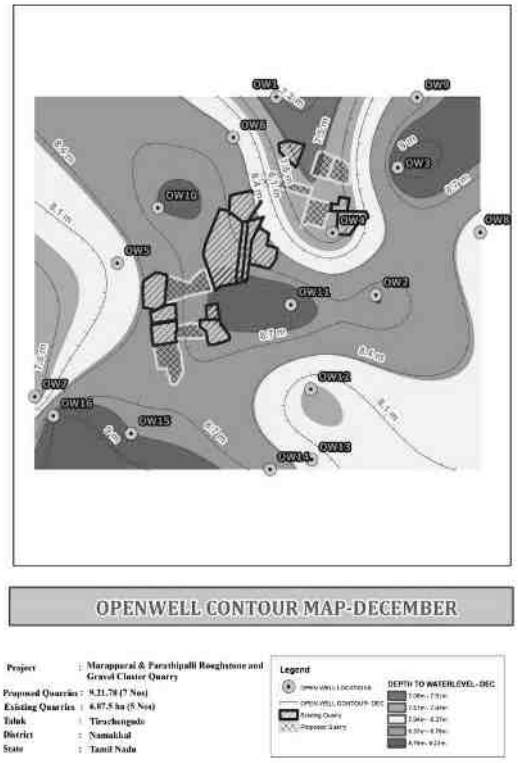


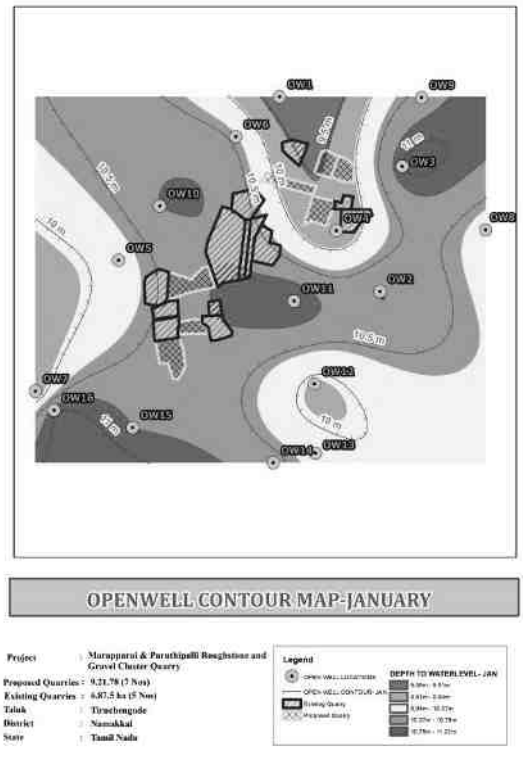
TABLE 3.9 : DETAILS OF OPEN WELL IN 1KM RADIUS

S.No	Name	Latitude	Longitude	Dec	Jan	Feb
1	OW1	11° 25' 16.13"N	78° 02' 47.21"E	7.2	9.2	11.2
2	OW2	11° 24' 45.11"N	78° 03' 03.26"E	8.8	10.8	12.8
3	OW3	11° 25' 05.05"N	78° 03' 06.81"E	9	11	13
4	OW4	11° 24' 54.83"N	78° 02' 56.27"E	7.6	9.6	11.6
5	OW5	11° 24' 50.09"N	78° 02' 21.58"E	8.2	10.2	12.2
6	OW6	11° 25' 09.79"N	78° 02' 40.26"E	8.4	10.4	12.4
7	OW7	11° 24' 29.21"N	78° 02' 08.28"E	7.6	9.6	11.6
8	OW8	11° 24' 54.94"N	78° 03' 20.10"E	8.2	10.2	12.2
9	OW9	11° 25' 16.04"N	78° 03' 09.89"E	8.6	10.6	12.6
10	OW10	11° 24' 58.74"N	78° 02' 28.14"E	8.8	10.8	12.8
11	OW11	11° 24' 43.61"N	78° 02' 49.53"E	9	11	13
12	OW12	11° 24' 30.37"N	78° 02' 52.76"E	7.9	9.9	11.9
13	OW13	11° 24' 19.35"N	78° 02' 52.91"E	8.2	10.2	12.2
14	OW14	11° 24' 17.82"N	78° 02' 46.20"E	8.6	10.6	12.6
15	OW15	11° 24' 23.42"N	78° 02' 23.80"E	8.8	10.8	12.8
16	OW16	11° 24' 26.18"N	78° 02' 11.28"E	9	11	13

December – 2020 January - 2021

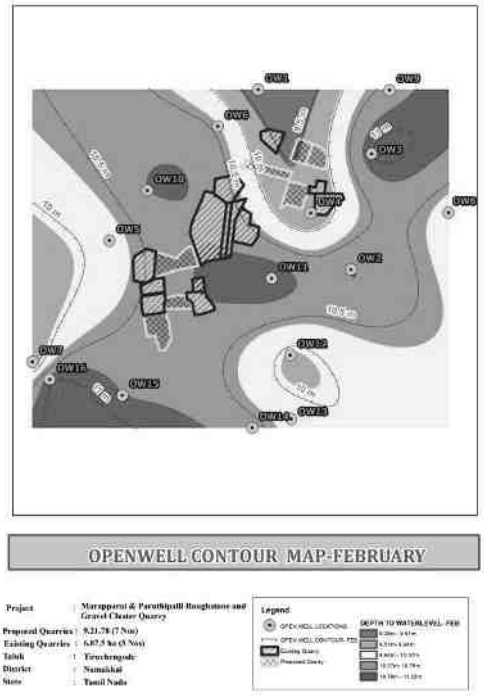


OPENWELL CONTOUR MAP-DECEMBER



OPENWELL CONTOUR MAP-JANUARY

February - 2021



OPENWELL CONTOUR MAP-FEBRUARY

3.2.3 Methodology

Reconnaissance survey was undertaken and monitoring locations were finalized based on;

- Drainage pattern;
- Location of Residential areas representing different activities/likely impact areas; and
- Likely areas, which can represent baseline conditions

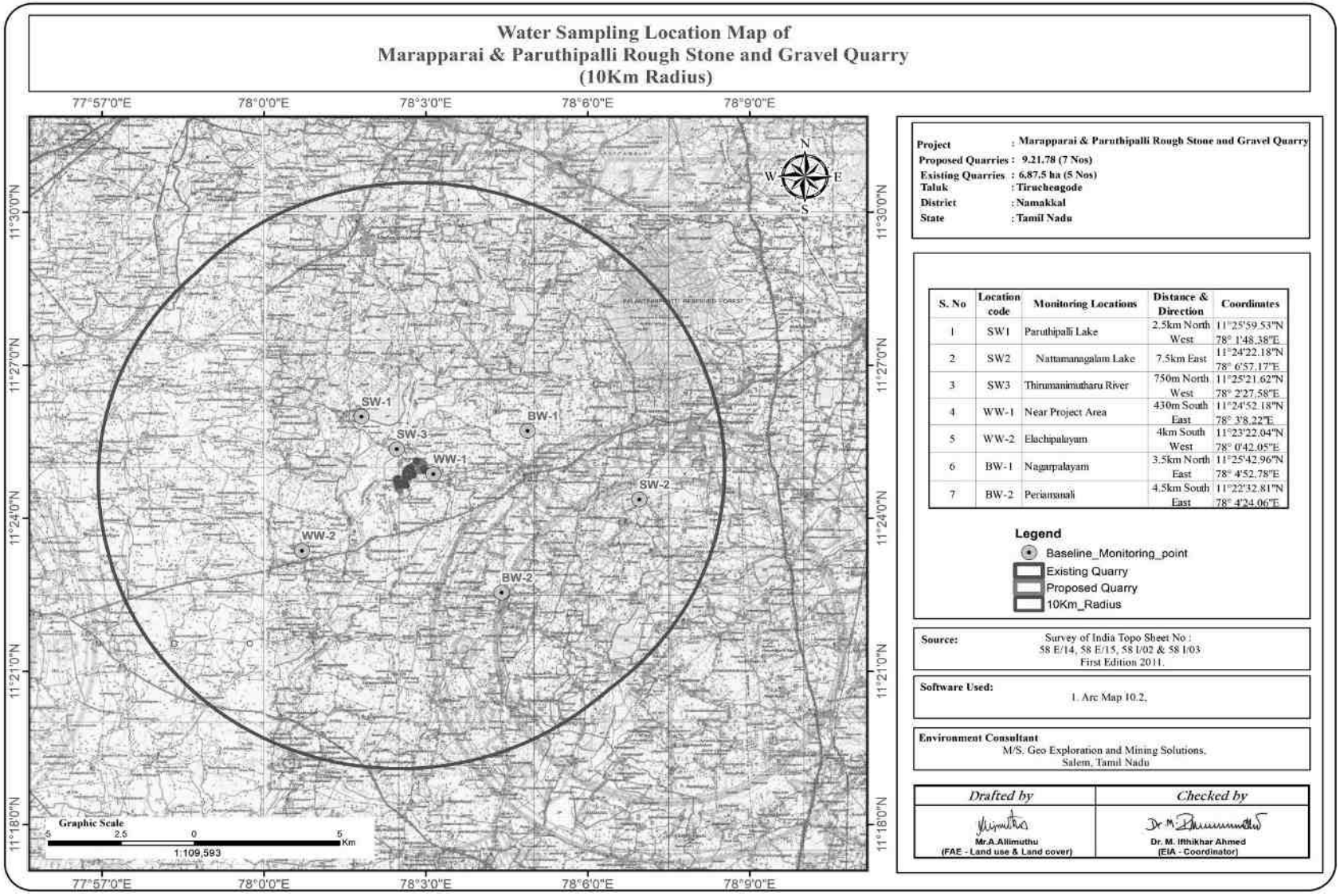
Three (3) surface water and Four (4) ground water samples were collected in the study area and physio-chemical, heavy metals and bacteriological parameters were analysed in order to assess the effect of mining and other activities on surface and ground water. The samples were analysed as per the procedures specified by CPCB, IS-10500:2012 and 'Standard methods for the Examination of Water and Wastewater' published by American Public Health Association (APHA). The water sampling locations are given in Table 3.8 and shown as Figure 3.5.

TABLE 3.10: WATER SAMPLING LOCATIONS

S. No	Location code	Monitoring Locations	Distance & Direction	Coordinates
Surface water				
1	SW1	Paruthipalli Lake	2.5km North West	11°25'59.53"N 78°1'48.38"E
2	SW2	Nattamanagalam Lake	7.5km East	11°24'22.18"N 78° 6'57.17"E
3	SW3	Thirumanimutharu River	750m North West	11°25'21.62"N 78° 2'27.58"E
Ground water				
4	WW-1	Near Project Area	430m South East	11°24'52.18"N 78° 3'8.22"E
5	WW-2	Elachipalayam	4km South West	11°23'22.04"N 78° 0'42.05"E
6	BW-1	Nagarpalayam	3.5km North East	11°25'42.96"N 78° 4'52.78"E
7	BW-2	Periamanali	4.5km South East	11°22'32.81"N 78° 4'24.06"E

Source: On-site monitoring/sampling by Omegaa Laboratories in association with GEMS

FIGURE 3.5: SITE PHOTOGRAPHS OF WATER SAMPLING LOCATIONS



Source:

TABLE 3.11: SURFACE WATER SAMPLING RESULTS

S.NO	Parameter	UNIT	SW1 - Paruthipalli Lake	SW2 - Nattamanagalam Lake	SW3 - Thirumanimutharu River
1	Color	Hazen	10	5	5
2	Odour	-	Agreeable	Agreeable	Agreeable
3	pH@ 25ºC	-	7.53	7.26	7.82
4	Electrical Conductivity @ 25ºC	µs/cm	994	814	950
5	Turbidity	NTU	16.9	11	14.7
6	Total Dissolved Solids	mg /l	586	480	560
7	Total Hardness as $CaCO_3$	mg/l	188.8	129.7	152.9
8	Calcium as Ca	mg/l	38.6	28.6	30.5
9	Magnesium as Mg	mg/l	22.5	14.2	18.7
10	Total Alkalinity as $CaCO_3$	mg/l	198	175.6	159
11	Chloride as Cl^-	mg/l	175.2	154	188
12	Sulphate as SO_4^-	mg/l	38.2	32.1	41.2
13	Iron as Fe	mg/l	0.19	0.11	0.15
14	Free Residual Chlorine	mg/l	BDL(DL: 2.0)	BDL(DL: 2.0)	BDL(DL: 2.0)
15	Fluoride as F	mg/l	0.12	0.16	0.22
16	Nitrates as NO_3	mg/l	11.3	8.6	10
17	Copper as Cu	mg/l	BDL (DL:0.2)	BDL (DL:0.2)	BDL (DL:0.2)
18	Manganese as Mn	mg/l	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)
19	Mercury as Hg	mg/l	(BDL (DL: 0.0005)	(BDL (DL: 0.0005)	(BDL (DL: 0.0005)
20	Cadmium as Cd	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)
21	Selenium as Se	mg/l	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)
22	Aluminium as Al	mg/l	BDL (DL: 0.03)	BDL (DL: 0.03)	BDL (DL: 0.03)
23	Lead as Pb	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)
24	Zinc as Zn	mg/l	BDL (DL:0.02)	BDL (DL:0.02)	BDL (DL:0.02)
25	Total Chromium	mg/l	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)
26	Boron as B	mg/l	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)
27	Mineral Oil	mg/l	BDL (DL:1.0)	BDL (DL:1.0)	BDL (DL:1.0)
28	Phenolic Compunds as	mg/l	Absent	Absent	Absent
29	Anionic Detergents as	mg/l	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)
30	Cynaide as CN	mg/l	Absent	Absent	Absent
31	Biological Oxygen	mg/l	12	5.6	7.2
32	Chemical Oxygen	mg/l	35	20	24
33	Dissolved Oxygen	mg/l	5.6	5.7	5.2
34	Total Coliform	Per 100ml	present	present	present
35	E-Coli	Per 100ml	present	present	present
36	Barium as Ba	mg/l	BDL (DL:0.5)	BDL (DL:0.5)	BDL (DL:0.5)
37	Ammonia-n (as Total	mg/l	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)
38	Sulphide as H_2S	mg/l	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)
39	Molybdenum as Mo	mg/l	BDL (DL:0.5)	BDL (DL:0.5)	BDL (DL:0.5)
40	Total Arsenic as As	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)
41	Total Suspended Solids	mg/l	25.7	17.6	19

TABLE 3.12: SURFACE WATER SAMPLING RESULTS

S.NO	Parameter	Unit	WW4 Near Project Area	WW5 Elachipalayam	BW6 Nagarpalayam	BW7 Periamanali
1	Color	Hazen	< 5	< 5	< 5	< 5
2	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable
3	pH@ 25ºC	-	7.65	7.95	7.11	7.39
4	Electrical Conductivity @ 25ºC	µs/cm	1051	1018	696	740
5	Turbidity	NTU	< 1	< 1	< 1	< 1
6	Total Dissolved Solids	mg /l	619	600	410	435
7	Total Hardness as $CaCO_3$	mg/l	201	168.5	106.8	126.9
8	Calcium as Ca	mg/l	41.2	32.6	17.6	28.3
9	Magnesium as Mg	mg/l	23.9	21.2	15.3	13.7
10	Total Alkalinity	mg/l	189	174.2	112	146
11	Chloride as Cl^-	mg/l	195	213	146	185.2
12	Sulphate as SO_4^-	mg/l	37.1	40.2	32.5	39.3
13	Iron as Fe	mg/l	BDL(DL:0.1)	BDL(DL:0.1)	BDL(DL:0.1)	BDL(DL:0.1)
14	Free Residual Chlorine	mg/l	BDL(DL: 2.0)	BDL(DL: 2.0)	BDL(DL: 2.0)	BDL(DL: 2.0)
15	Fluoride as F	mg/l	0.26	0.15	0.17	0.23
16	Nitrates as NO_3	mg/l	7.5	6.5	5.5	8.2
17	Copper as Cu	mg/l	BDL (DL:0.2)	BDL (DL:0.2)	BDL (DL:0.2)	BDL (DL:0.2)
18	Manganese as Mn	mg/l	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)
19	Mercury as Hg	mg/l	(BDL (DL: 0.0005)	(BDL (DL: 0.0005)	(BDL (DL: 0.0005)	(BDL (DL: 0.0005)
20	Cadmium as Cd	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)
21	Selenium as Se	mg/l	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)
22	Aluminium as Al	mg/l	BDL (DL: 0.03)	BDL (DL: 0.03)	BDL (DL: 0.03)	BDL (DL: 0.03)
23	Lead as Pb	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)
24	Zinc as Zn	mg/l	BDL (DL:0.02)	BDL (DL:0.02)	BDL (DL:0.02)	BDL (DL:0.02)
25	Total Chromium	mg/l	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)	BDL (DL: 0.05)
26	Boron as B	mg/l	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)
27	Mineral Oil	mg/l	BDL (DL:1.0)	BDL (DL:1.0)	BDL (DL:1.0)	BDL (DL:1.0)
28	Phenolic Compunds as C_6H_5OH	mg/l	Absent	Absent	Absent	Absent
29	Anionic Detergents	mg/l	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)
30	Cynaide as CN	mg/l	Absent	Absent	Absent	Absent
31	Total Coliform	Per 100ml	< 2	< 2	< 2	< 2
32	E-Coli	Per 100ml	< 2	< 2	< 2	< 2
33	Barium as Ba	mg/l	BDL (DL:0.5)	BDL (DL:0.5)	BDL (DL:0.5)	BDL (DL:0.5)
34	Ammonia (as Total	mg/l	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)
35	Sulphide as H_2S	mg/l	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)
36	Molybdenum as Mo	mg/l	BDL (DL:0.5)	BDL (DL:0.5)	BDL (DL:0.5)	BDL (DL:0.5)
37	Total Arsenic as As	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)
38	Total Suspended Solids	mg/l	BDL(DL:2)	BDL(DL:2)	BDL(DL:2)	BDL(DL:2)

* IS: 10500:2012-Drinking Water Standards; # within the permissible limit as per the WHO Standard. The water can be used for drinking purpose in the absence of alternate sources. Note: SW- Surface water, GW – Ground water

3.2.4 INTERPRETATION

Surface Water

The analysis results indicate that the pH is between 7.26 – 7.82, which is well within the specified standard of 6.5 to 8.5. Total hardness was observed to be 129.7 – 188.8mg/l. The Total Dissolved Solids (TDS) concentrations were found to be 480-586 mg/l.

Chloride and fluoride concentrations are found to be 154 - 188 mg/l and 0.4 mg/l respectively. Nitrates were observed to be 8.6-11.3 mg/l. Bacteriological studies reveal that coli form bacteria are not present in the samples. The heavy metal content is below detectable limits.

Ground Water

The analysis results indicate that the pH ranges in between 7.11 to 7.95, which is well within the specified standard of 6.5 to 8.5. Total hardness was observed to be ranging from 106.8 to 201 mg/l. The incidence of high total hardness is attributed to the composition of litho units constituting the aquifers in the district. The Total Dissolved Solids (TDS) concentrations were found to be ranging in between 410 to 619 mg/l.

Chlorides at all the locations were within the permissible limit, ranging in between 146-189 mg/l. Fluorides are ranging in between 0.15 to 0.26 mg/l and are found to be within the permissible limit. Nitrates were found to be in the range of from 5.5 mg/l to 8.2 mg/l. Bacteriological studies reveal that coliform bacteria is not present in the samples. The heavy metal content is below detectable limits.

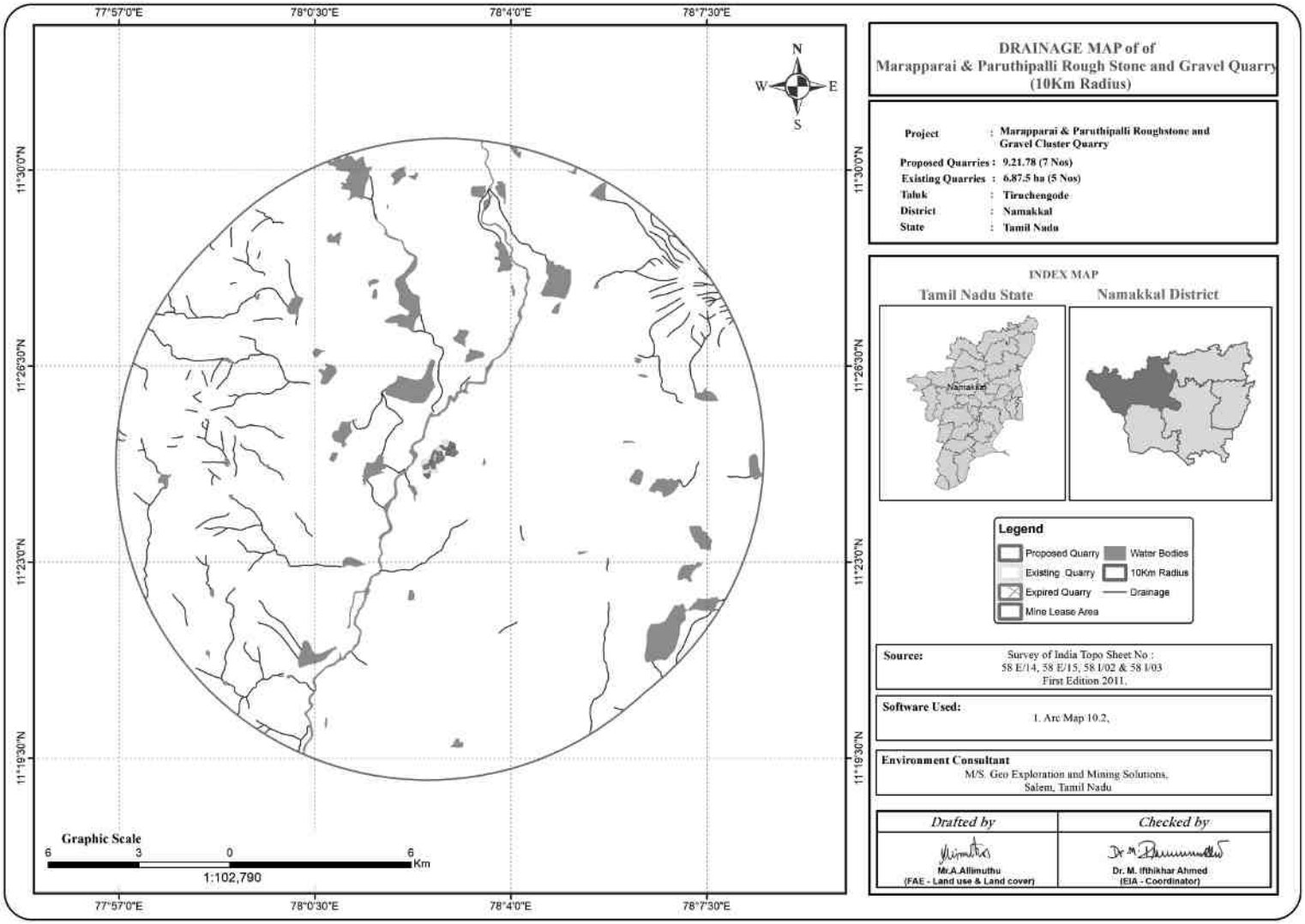
3.2.5 Hydrology and Hydrogeological studies

The district is underlain by both porous and fissured formations. The important aquifer systems in the district are constituted by i) unconsolidated formations and ii) weathered and fractured crystalline rocks. The porous formations in the district are represented by alluvium and colluvium. The Colluvial formations are occurring in the western boarder of Namakkal district

The porous formations in the district include sandstones and clays of Recent to sub recent and Tertiary age (Quaternary).The alluvial formations comprising mainly sands, clays and gravels are confined to major drainage courses in the district. The maximum thickness of alluvium is 35.0m whereas the average thickness is about 25.0m.

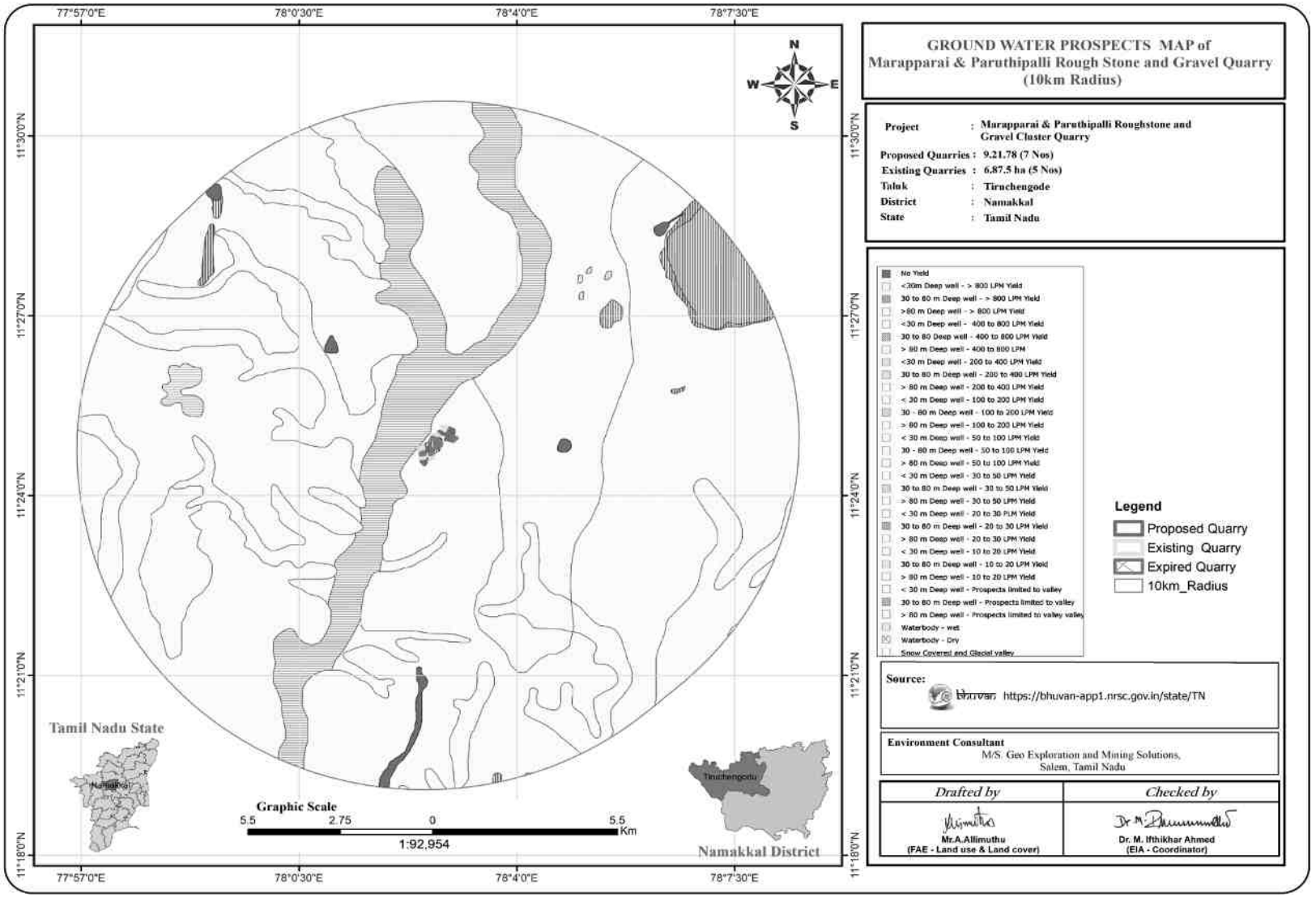
The area falls in one major river basins namely Thirumanimuthar River. River Thirumanimuthar originates from the Shevroy hills in Salem District, Tamilnadu State and flows in the south and south-eastern direction before it debouches into Gulf of Mannar. The river connecting of Cauvery River.

FIGURE 3.6: DRAINAGE MAP AROUND 10 KM RADIUS FROM PROJECT SITE



Source:

FIGURE 3.7: GROUND WATER PROSPECT MAP



Source: Bhuvan

3.2.5.1 Methodology and Data Acquisition

Electric Resistivity Method is well established for delineating lateral as well vertical discontinuities in the resistive structure of the Earth's subsurface. The present study makes use of vertical electric sounding (VES) to delineate the Vertical Resistivity structure at depth. Schlumberger electrode set up was employed for making sounding measurements. Since it is least influenced by lateral in homogeneities and is capable of providing higher depth of investigation. This is four electrodes collinear set up where in the outer electrodes send current into the ground and the inner electrodes measure the potential difference.

The present study utilizes maximum current electrode separation AB/2. The data from this survey are commonly arranged and contoured in the farm of Pseudo-section that gives an approximate of the subsurface resistivity. This technique is used for the inversion of Schlumberger VES data to predict the layer parameter namely layer resistivity and Geo electric layer thickness. The main goal of the present study is to search the vertical in homogeneities that is consistent with the measured data.

For a Schlumberger among the Apparent resistivity can be calculated as follows

$$\rho_a = \frac{G\Delta V}{I}$$

ΔV = potential difference between receiving electrodes

G = Geometric Factor.

Rocks show wide variation in resistivity ranging from 10-8 more than 10+14 ohmmeter. On a broad classification, one can group the rocks falling in the range of 10-8 to 1 ohmmeter as good conductors. 1 to 106 ohmmeter as intermediate conductors and 106 to 1012 ohmmeter as more as poor conductor. The resistivity of rocks and subsurface lithology, which is mostly dependent on its porosity and the pore fluid resistivity is defined by Archie's Law,

$$\rho_r = F\rho_w = a\,\emptyset^m\rho_w$$

ρr = Resistivity of Rocks

ρw = Resistivity of water in pores of rock

F = Formation Factor

Ø = Fractional pore volume

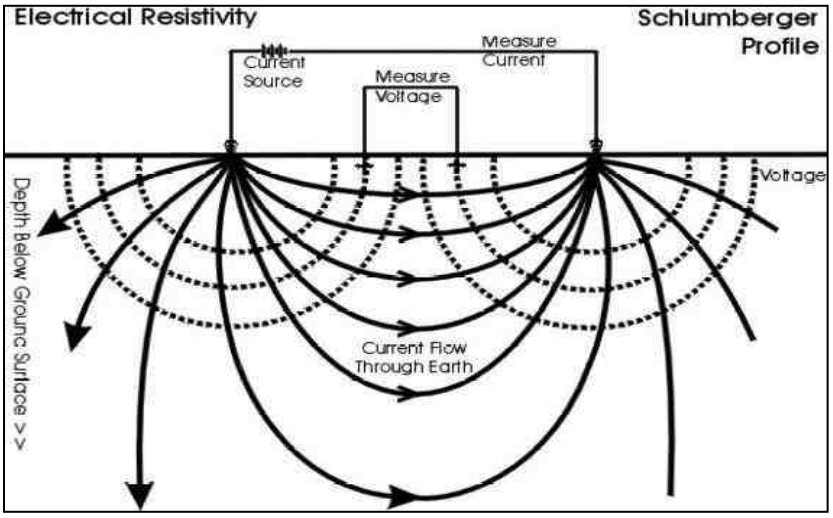
A = Constants with values ranging from 0.5 to 2.5

3.2.5.2 Survey Layout

The layout for a resistivity survey depends on the choice of the current and potential electrode arrangement, which is called electrode array. Here the present study is considered with Schlumberger array. In which the distance may be used for current electrode separation while potential electrode separation is kept on third to one fifth of the same. One interesting aspect in VES is the principle of reciprocity, which permits interchange of the potential and current electrode without any effect on the measured apparent resistivity.

The field equipment deployed for the study is in a deep resistivity meter with a model of SSR – MP – AT. This Signal stacking Resistivity meter is a high quality data acquisition system incorporating several innovation features for Earth resistivity. In the presence of random earth Noises the signal to nose ration can be enhanced by √N where N is the number of stacked readings. This SSR meter in which running averages of measurements [1, (1+2)/2, (1+2+3)/3 … (1+2...+16/16)] up to the chosen stacks are displayed and the final average is stored automatically, in memory utilizing the principles of stacking to achieve the benefit of high signals to noise ratio. Based on these above significations the signal stacking resistivity meter was used for (VES) Vertical Electric Resistivity Sounding.

FIGURE 3.8: MEASUREMENTS



Measurements of ground Resistivity is essentially done by sending a current through two electrodes called current electrodes (C_1& $C_{2)}$ and measuring the resulting potential by two other electrodes called potential electrode (P_1& P_2). The amount of current required to be sent into the ground depends on the contact resistance at the current electrode, the ground resistivity and the depth of interest.

3.2.5.3 Data Presentation

The field data obtained from a Vertical Electrical Resistivity Sounding is conventionally plotted on a paper with the help of slum software. (A computer aided diagram).

3.2.5.4 Geophysical Data Interpretation

The geophysical data's was obtained to study the lateral variations, vertical in homogeneities in the sub – surface with respect to the availability of groundwater. From the interpreted data, it has inferred that the area has moderate groundwater potential in the investigated area. This small quarrying operation will not have any significant impact on the natural water bodies.

3.3 AIR ENVIRONMENT

The existing ambient air quality of the area is important for evaluating the impact of mining activities on the ambient air quality.

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. The sources of air pollution in the region are mostly due to other operating quarries in the cluster, vehicular traffic, dust arising from unpaved village road and domestic & agricultural activities. The prime objective of the baseline air quality study was to establish the existing ambient air quality of the study area. These will also be useful for assessing the conformity to standards of the ambient air quality during the operation of proposed mine.

This section describes the identification of sampling locations, methodology adopted during the monitoring period and sampling frequency.

3.3.1 Meteorology & Climate

Meteorology is the key to understand the Air quality. The essential relationship between meteorological condition and atmospheric dispersion involves the wind in the broadest sense. Wind fluctuations over a very wide range of time, accomplish dispersion and strongly influence other processes associated with them.

A temporary meteorological station was installed at project site by covering cluster quarries. The station was installed at a height of 3 m above the ground level in such a way that there are no obstructions facilitating flow of wind, wind speed, wind direction, humidity and temperature are recorded on hourly basis.

The district enjoys a tropical climate. The weather is pleasant during the period from November to January. Mornings in general are more humid than the afternoons, with the humidity exceeding 78% on an average. In the period June to November the afternoon humidity exceeds 66% on an average. In the rest of the year the afternoons are drier, the summer afternoons being the driest.

The district receives the rain under the influence of both southwest and northeast monsoons. The northeast monsoon chiefly contributes to the rainfall in the district and summer rains are negligible. The average annual rainfall and the 5 years rainfall collected from IMD, Chennai is as follows:

TABLE 3.13: RAINFALL DATA

Actual Rainfall In Mm						Normal Rainfall In Mm
2013	2014	2015	2016	2017	2018	
622.30	589.30	818.6	388.2	783.7	649.3	793.4

Source: https://www.twadboard.tn.gov.in/content/namakkal

The average annual rainfall in the plains is around 800 mm with the northeast and the southwest monsoons contributing to 47% and 28% respectively to the total rainfall. Projections of rainfall over Coimbatore for the periods 2010-2040 (2020s), 2040-2070 (2050s) and 2070-2100 (2080s) with reference to the baseline (1970-2000) indicate an increase of 0.1%, 4.0% and 11.0 % respectively.

The southwestern and northern parts are hilly, part of the Western Ghats, and enjoys pleasant climate all throughout the year. To the west is the Palghat Gap, the only major pass in the long stretch of the ghats abutting Tamil Nadu and Kerala. The Palghat Gap, connecting Coimbatore city and Palakkad city, serves as an important transit link for both the states. The rest of the district lies in the rain shadow region of the Western Ghats and experiences salubrious climate most parts of the year. The mean maximum and minimum temperatures for Coimbatore city during summer and winter vary between 35 °C to 18 °C.

TABLE 3.14: METEOROLOGICAL DATA RECORDED AT SITE

S.No	Parameters		Dec– 2020	Jan– 2021	Feb - 2021
1	Temperature (^{0}C)	Max	26.1	27.6	27.1
		Min	23.0	23.8	24.3
		Avg	24.5	25.7	25.7
2	Relative Humidity (%)	Avg	82.5	81.7	66.2
3	Wind Speed (m/s)	Max	4.792	4.375	4.306
		Min	2.500	2.083	1.875
		Avg	3.646	3.229	3.090
4	Cloud Cover (OKTAS)		0-8	0-8	0-8
5	Wind Direction		SE,SSW	ENE,SSE	S,SW

Source: On-site monitoring/sampling by Omegaa Laboratories in association with GEMS

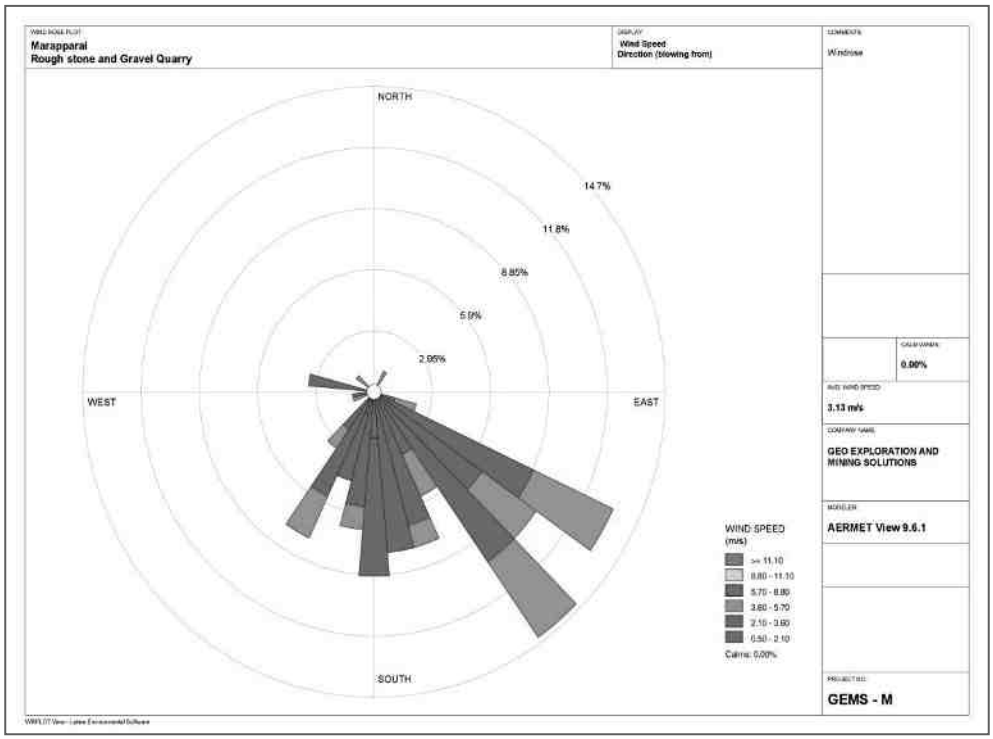
Comparison between Secondary and Primary Data

The meteorological data collected at the site is almost similar to that of secondary data collected from IMD AGRO station, Coimbatore. A comparison of site data generated during the three months with that of IMD, AGRO station, Coimbatore reveals the following:

- The average maximum and minimum temperatures of IMD, AGRO station, Coimbatore showed a lower in respect of on-site data i.e. in Marapparai & Paruthipalli village.
- The relative humidity levels were lesser at site as compared to IMD, AGRO station, Coimbatore.
- The wind speed and direction at site shows similar trend that of IMD, AGRO station, Coimbatore.

Windrose diagram of the study site is depicted in Figure. 3.15. Predominant downwind direction of the area during study season is South-East to North West.

FIGURE 3.9: WINDROSE DIAGRAM



Environmental In the abstract of collected data wind rose were drawn on presented in figure No.3.15 during the monitoring period in the study area

- This wind rose shows that the winds during study period blow from South and South East much of the time.
- In fact, the 2 spokes around the East direction comprise 19.94% of the hourly wind directions.
- This also shows that the wind rarely blows from the South West.
- It is also observed that during study period 74.3% of the windblown in the range of 0.5-2.1 m/s and 21.2% of the windblown in the range of 2.1-3.6 m/s.

3.3.2 Methodology and Objective

The prime objective of the ambient air quality study is to assess the existing air quality of study area and its conformity to NAAQS. The observed sources of air pollution in the study area are industrial, traffic and domestic activities. The baseline status of the ambient air quality has been established through a scientifically designed ambient air quality monitoring network considering the followings:

- Meteorological condition on synoptic scale;
- Topography of the study area;
- Representatives of regional background air quality for obtaining baseline status;
- Location of residential areas representing different activities;
- Accessibility and power availability; etc

3.3.3 Sampling and Analytical Techniques

TABLE 3.15: METHODOLOGY AND INSTRUMENT USED FOR AIR QUALITY ANALYSIS

Parameter	Method	Instrument
PM2.5	Gravimetric Method Beta attenuation Method	Fine Particulate Sampler Make – Thermo Environmental Instruments – TEI 121
PM10	Gravimetric Method Beta attenuation Method	Respirable Dust Sampler Make –Thermo Environmental Instruments – TEI 108
SO2	IS-5182 Part II (Improved West & Gaeke method)	Respirable Dust Sampler with gaseous attachment
NOx	IS-5182 Part II (Jacob & Hochheiser modified method)	Respirable Dust Sampler with gaseous attachment
Free Silica	NIOSH – 7601	Visible Spectrophotometry

Source: Sampling Methodology followed by Omegaa Laboratories & CPCB Notification

Filter papers 8 x 10 inch (20.3 x 25.4 cm) were used for the collection of PM_{10}& $PM_{2.5}$. SO_2 was collected by drawing air at a flow-rate of 0.5 liters per minute (lpm) through an absorbing solution i.e., Sodium tetra chloromercurate (TCM) (West and Gaek Method) and, NO_2 were collected by drawing air at a flow rate of 0.4 liters per minute (lpm) through the mixture of absorbing solutions i.e. sodium hydroxide and sodium arsenite (Jacobs and Hochheiser Method). The details of National Ambient Air Quality Standards are described in below Table 3.12.

TABLE 3.16: NATIONAL AMBIENT AIR QUALITY STANDARDS

Sl. No.	Pollutant	Time Weighted Average	Concentration in ambient air	
			Industrial, Residential, Rural & other areas	Ecologically Sensitive area (Notified by Central Govt.)
1	Sulphur Dioxide (µg/m^3)	Annual Avg.* 24 hours**	50.0 80.0	20.0 80.0
2	Nitrogen Dioxide (µg/m^3)	Annual Avg. 24 hours	40.0 80.0	30.0 80.0
3	Particulate matter (size less than 10µm) PM10 (µg/m^3)	Annual Avg. 24 hours	60.0 100.0	60.0 100.0
4	Particulate matter (size less than 2.5 µm PM2.5 (µg/m^3)	Annual Avg. 24 hours	40.0 60.0	40.0 60.0

Source: NAAQS CPCB Notification No. B-29016/20/90/PCI-I Dated: 18th Nov 2009

*Annual Arithmetic mean of minimum 104 measurements in a year taken twice a Week 24 hourly at uniform interval,

** 24 hourly / 8 hourly or 1 hourly monitored values as applicable shall be complied with 98 % of the time in a year. However, 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

3.3.4 Frequency & Parameters for Sampling

Ambient air quality monitoring has been carried out with a frequency of two samples per week at seven (7) locations, adopting a continuous 24 hourly (3 shift of 8-hour) schedule for the period December, 2020 to February 2020. The baseline data of ambient air has been generated for PM_{10}, $PM_{2.5}$, Sulphur Dioxide (SO_2) & Nitrogen Dioxide (NO_2).

It was ensured that the equipment was placed preferably at a height of at least 2.5 m above the ground level at each monitoring station, for negating the effects of wind-blown ground dust. The equipment was placed at open space free from trees and vegetation which otherwise act as a sink of pollutants resulting in lower levels in monitoring results. Monitoring has been carried out as per the CPCB, MoEF guidelines and notifications

3.3.5 Ambient Air Quality Monitoring Stations

Seven (7) monitoring stations were set up in the study area as depicted in Figure 3.6.1 for assessment of the existing ambient air quality. Details of the sampling locations are as per given below.

TABLE 3.17: AMBIENT AIR QUALITY (AAQ) MONITORING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	AAQ1	Project Area	Core Zone	11°25'2.71"N 78°02'58.70"E
2	AAQ2	Project Area	Core Zone	11°24'38.77"N 78°02'31.61"E
3	AAQ3	Marapparai	1km South East	11°24'38.94"N 78°03'24.21"E
4	AAQ4	Paruthipalli	2.5km North West	11°25'57.11"N 78°01'34.86"E
5	AAQ5	Elachipalayam	4km South West	11°23'20.91"N 78°00'40.25"E
6	AAQ6	Periamanali	4.5km South East	11°22'39.64"N 78°04'22.45"E
7	AAQ7	Nagarpalayam	4km North East	11°25'48.51"N 78°4'58.08"E

Source: On-site monitoring/sampling by Omegaa Laboratories in association with GEMS

FIGURE 3.10: SITE PHOTOGRAPHS OF AMBIENT AIR QUALITY MONITORING

FIGURE 3.11: AMBIENT AIR QUALITY LOCATIONS AROUND 10 KM RADIUS

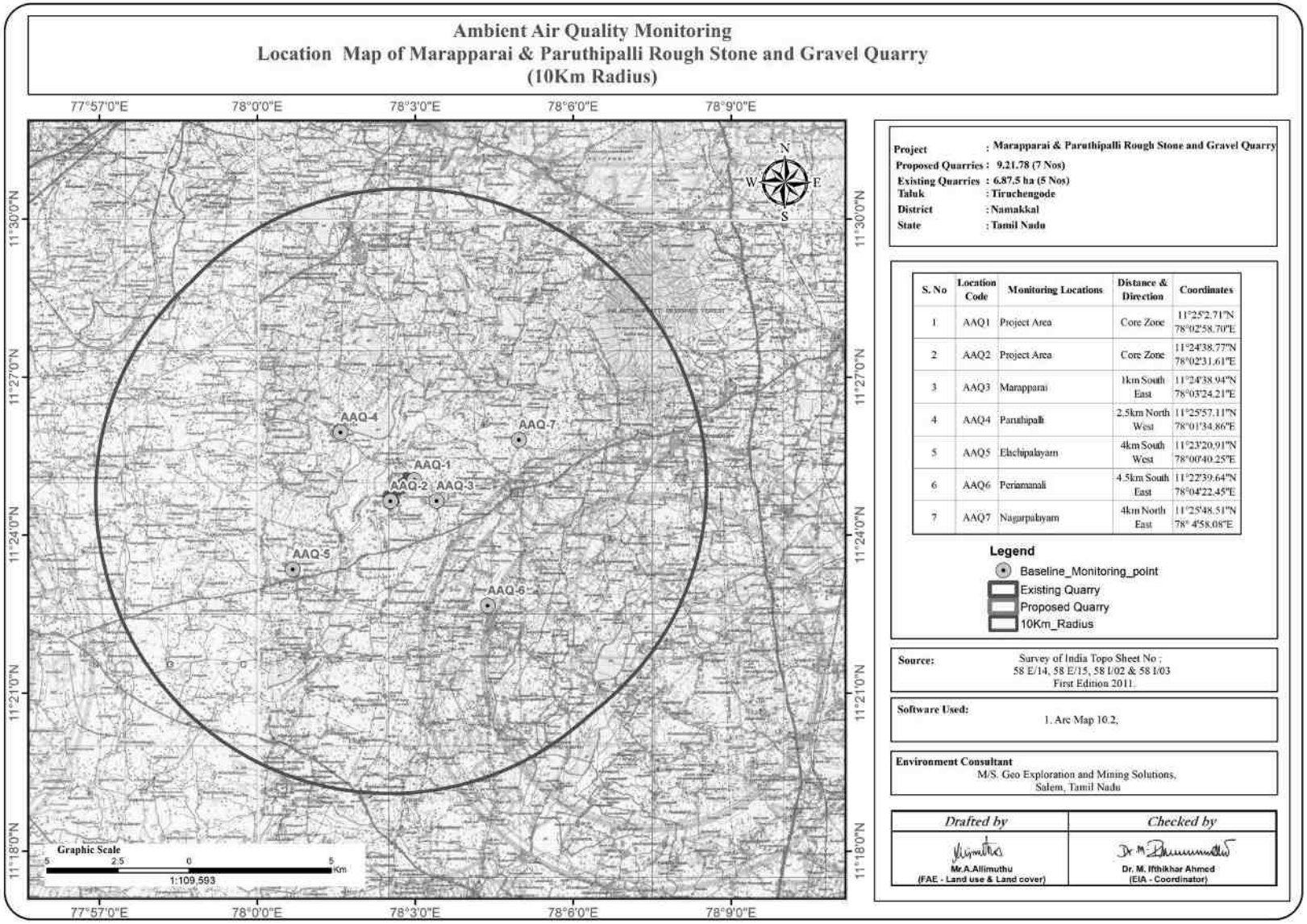


TABLE 3.18: AAQ1- CORE ZONE

Period: December 2020–February-21 *Location: AAQ1- Project Area* Sampling Time: 24-hourly

Monitoring			Particulates, µg/m³		Gaseous Pollutants, µg/m³					Other Pollutants (Particulate Phase) , µg/m³				
Date	Period, hrs.	SPM	$PM_{2.5}$	PM_{10}	SO_2	NO_2	NH_3	O_3 (8-hly Avg.)	CO (8-hly Avg.)	Pb, µg/m³	As, ng/m³	Ni, ng/m³	C_6H_6, ng/m³	BaP, ng/m³
NAAQ Norms*		(24 hrs.)	60(24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2.0 (8hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)
03.12.2020	07.00-07.00	69.5	22.1	46.5	7.5	24.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
04.12.2020	07.15-07.15	70.2	22.6	45.9	7.2	25.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
10.12.2020	07.00-07.00	68.5	23.1	44.6	7.6	23.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
11.12.2020	07.15-07.15	69.2	22.4	46.2	7.5	24.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
17.12.2020	07.00-07.00	67.5	21.8	45.6	7.9	24.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
18.12.2020	07.15-07.15	68.5	22.1	45.1	7.1	25.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
24.12.2020	07.00-07.00	69.4	21.6	44.9	8.2	24.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
25.12.2020	07.15-07.15	69.2	20.1	45.1	8.4	24.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
31.12.2020	07.00-07.00	68.0	19.8	46.6	8.6	23.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
01.01.2020	07.15-07.15	69.9	19.1	46.6	8.6	23.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
07.01.2020	07.00-07.00	70.2	21.2	45.8	8.4	24.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
08.01.2020	07.15-07.15	71.2	18.9	45.5	8.2	24.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
14.01.2020	07.00-07.00	71.5	18.6	46.3	8.7	24.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
15.01.2020	07.15-07.15	71.5	19.8	46.6	7.6	23.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
21.01.2020	07.00-07.00	69.9	20.3	45.5	7.9	23.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
22.01.2020	07.15-07.15	69.8	21.5	45.6	7.8	23.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
28.01.2020	07.00-07.00	71.0	22.3	45.4	7.3	24.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
29.01.2020	07.15-07.15	70.5	22.8	44.8	7.9	25.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
04.02.2020	07.00-07.00	71.9	23.1	45.3	8.5	23.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
05.02.2020	07.15-07.15	68.5	22.7	44.9	8.8	24.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
11.02.2020	07.00-07.00	67.2	23.6	45.5	8.6	25.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
12.02.2020	07.15-07.15	67.2	23.1	44.9	7.3	25.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
18.02.2020	07.00-07.00	68.5	22.7	46.6	7.5	25.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
19.02.2020	07.15-07.15	69.9	22.5	44.1	7.7	23.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
25.02.2020	07.00-07.00	67.5	23.5	45.3	7.9	25.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
26.02.2020	07.15-07.15	68.8	24.5	46.2	8.5	25.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0

TABLE 3.19: AAQ2 – Project Area

Period: December 2020 –February-21 *Location: AAQ2-Project Area* Sampling Time: 24-hourly

Monitoring			Particulates, µg/m³		Gaseous Pollutants, µg/m³					Other Pollutants (Particulate Phase) , µg/m³				
Date	Period, hrs.	SPM	PM2.5	PM10	SO_2	NO_2	NH_3	O_3 (8-hly Avg.)	CO (8-hly Avg.)	Pb, µg/m³	As, ng/m³	Ni, ng/m³	C_6H_6, ng/m³	BaP, ng/m³
NAAQ Norms*		(24 hrs.)	60(24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2.0 (8hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)
03.12.2020	07.15-07.15	62.9	24.5	43.5	6.8	19.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
04.12.2020	07.30-07:30	65.5	23.6	44.4	7.1	19.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
10.12.2020	07.15-07.15	64.7	23.1	43.8	7.2	18.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
11.12.2020	07.30-07:30	65.4	24.5	44.3	6.9	19.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
17.12.2020	07.15-07.15	66.6	24.1	45.5	7.5	20.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
18.12.2020	07.30-07:30	64.5	25.3	45.1	7.6	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
24.12.2020	07.15-07.15	63.2	24.9	45.9	7.3	21.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
25.12.2020	07.30-07:30	64.5	24.1	45.5	7.2	21.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
31.12.2020	07.15-07.15	66.5	23.6	45.6	7.8	20.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
01.01.2020	07.30-07:30	67.8	23.5	46.3	7.4	20.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
07.01.2020	07.15-07.15	68.2	24.1	46.2	7.1	21.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
08.01.2020	07.30-07:30	67.9	24.6	44.8	7.5	20.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
14.01.2020	07.15-07.15	66.2	23.5	45.9	7.3	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
15.01.2020	07.15-07.15	67.8	24.1	44.5	7.4	20.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
21.01.2020	07.00-07.00	65.5	23.6	44.8	7.2	19.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
22.01.2020	07.15-07.15	64.8	23.8	43.5	7.6	20.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
28.01.2020	07.00-07.00	68.2	24.7	43.6	7.1	20.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
29.01.2020	07.15-07.15	68.1	24.1	45.1	7.2	19.7	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
04.02.2020	07.00-07.00	67.2	23.6	44.2	7.0	19.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
05.02.2020	07.15-07.15	68.2	24.5	44.7	7.2	20.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
11.02.2020	07.00-07.00	68.4	23.4	43.8	6.1	19.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
12.02.2020	07.15-07.15	68.9	23.9	43.5	6.6	20.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
18.02.2020	07.00-07.00	69.4	23.7	43.3	7.1	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
19.02.2020	07.15-07.15	69.7	24.1	44.1	6.8	20.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
25.02.2020	07.00-07.00	69.8	22.3	45.6	8.1	20.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
26.02.2020	07.15-07.15	68.2	24.5	44.3	7.8	20.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0

TABLE 3.20: AAQ3 - MARAPPARAI (BUFFER ZONE)

Period: December 2020 –February-2021 *: AAQ3-Marapparai* Sampling Time: 24-hourly

Monitoring			Particulates, µg/m³		Gaseous Pollutants, µg/m³					Other Pollutants (Particulate Phase) , µg/m³				
Date	Period, hrs.	SPM	PM2.5	PM10	SO_2	NO_2	NH_3	O_3 (8-hly Avg.)	CO (8-hly Avg.)	Pb, µg/m³	As, ng/m³	Ni, ng/m³	C_6H_6, ng/m³	BaP, ng/m³
NAAQ Norms*		(24 hrs.)	60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2.0 (8hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)
03.12.2020	07.15-07.15	63.2	19.6	43.9	6.3	17.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
04.12.2020	07.30-07:30	64.5	19.1	42.7	6.7	17.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
10.12.2020	07.15-07.15	65.9	19.7	43.3	6.8	17.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
11.12.2020	07.30-07:30	67.2	19.1	42.7	6.3	16.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
17.12.2020	07.15-07.15	65.8	19.3	43.1	6.4	16.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
18.12.2020	07.30-07:30	63.2	19.5	43.5	6.9	15.7	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
24.12.2020	07.15-07.15	65.4	19.8	42.0	6.7	16.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
25.12.2020	07.30-07:30	68.2	18.9	42.3	6.3	17.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
31.12.2020	07.15-07.15	65.5	19.3	43.7	6.7	18.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
01.01.2020	07.30-07:30	64.5	19.5	43.6	6.5	17.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
07.01.2020	07.15-07.15	66.5	19.0	44.4	6.9	17.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
08.01.2020	07.30-07:30	65.4	19.3	43.3	6.1	17.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
14.01.2020	07.15-07.15	62.2	19.6	43.7	6.8	18.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
15.01.2020	07.15-07.15	67.4	19.8	43.6	6.0	16.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
21.01.2020	07.00-07.00	68.2	19.9	44.9	6.2	17.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
22.01.2020	07.15-07.15	68.7	19.5	44.1	6.8	16.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
28.01.2020	07.00-07.00	65.6	19.2	43.0	6.1	18.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
29.01.2020	07.15-07.15	67.2	19.7	42.7	6.4	17.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
04.02.2020	07.00-07.00	67.2	19.8	42.3	6.2	18.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
05.02.2020	07.15-07.15	67.9	19.1	42.9	6.4	18.7	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
11.02.2020	07.00-07.00	65.5	19.3	43.1	6.0	18.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
12.02.2020	07.15-07.15	64.8	19.8	43.3	6.7	18.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
18.02.2020	07.00-07.00	65.5	19.6	42.7	6.3	19.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
19.02.2020	07.15-07.15	66.7	19.4	41.4	6.8	18.7	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
25.02.2020	07.00-07.00	65.8	19.9	42.5	6.9	18.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
26.02.2020	07.15-07.15	64.8	18.5	41.9	6.7	18.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0

TABLE 3.21: AAQ4 – PARUTHIPALLI (BUFFER ZONE)

Period: December 2020 –February-2021 Location: AAQ4 -Paruthipalli Sampling Time: 24-hourly

Monitoring			Particulates, µg/m³		Gaseous Pollutants, µg/m³					Other Pollutants (Particulate Phase) , µg/m³				
Date	Period, hrs.	SPM	PM2.5	PM10	SO_2	NO_2	NH_3	O_3 (8-hly Avg.)	CO (8-hly Avg.)	Pb, µg/m³	As, ng/m³	Ni, ng/m³	C_6H_6, ng/m³	BaP, ng/m³
NAAQ Norms*		(24 hrs.)	60(24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2.0 (8hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)
03.12.2020	07.00-07.00	61.2	19.9	44.2	7.1	18.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
04.12.2020	07.15-07:15	65.7	19.7	44.5	6.9	18.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
10.12.2020	07.00-07.00	64.3	19.6	43.2	6.2	17.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
11.12.2020	07.15-07:15	65.2	19.4	43.8	6.4	17.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
17.12.2020	07.00-07.00	66.7	19.3	43.5	6.5	18.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
18.12.2020	07.15-07:15	68.2	19.1	43.2	6.9	17.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
24.12.2020	07.00-07.00	65.4	19.5	43.8	6.7	18.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
25.12.2020	07.15-07:15	66.3	19.2	43.5	6.0	19.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
31.12.2020	07.00-07.00	61.2	18.9	43.2	7.2	18.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
01.01.2020	07.15-07:15	64.8	18.3	42.9	7.6	18.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
07.01.2020	07.00-07.00	66.4	20.2	42.2	6.6	18.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
08.01.2020	07.15-07:15	65.2	19.5	43.2	7.5	19.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
14.01.2020	07.00-07.00	64.9	18.9	42.8	6.5	16.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
15.01.2020	07.15-07.15	66.3	19.1	43.5	6.1	17.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
21.01.2020	07.00-07.00	64.5	19.0	43.1	6.5	17.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
22.01.2020	07.15-07.15	65.5	19.7	44.8	6.3	16.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
28.01.2020	07.00-07.00	67.2	19.9	43.2	6.5	18.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
29.01.2020	07.15-07.15	67.8	19.5	45.6	6.9	17.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
04.02.2020	07.00-07.00	66.2	19.6	45.5	6.7	18.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
05.02.2020	07.15-07.15	64.7	19.3	45.1	6.4	18.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
11.02.2020	07.00-07.00	67.5	19.2	44.5	6.1	17.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
12.02.2020	07.15-07.15	65.2	19.3	44.0	6.5	17.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
18.02.2020	07.00-07.00	66.8	19.4	44.3	6.6	18.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
19.02.2020	07.15-07.15	67.5	19.6	43.6	6.2	19.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
25.02.2020	07.00-07.00	68.5	19.5	44.6	6.5	18.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
26.02.2020	07.15-07.15	68.9	19.2	44.2	6.8	19.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0

TABLE 3.22: AAQ5 - ELACHIPALAYAM (BUFFER ZONE)

Period: December 2020–February-2021 *: AAQ5- Elachipalayam* Sampling Time: 24-hourly

Monitoring			Particulates, µg/m³		Gaseous Pollutants, µg/m³					Other Pollutants (Particulate Phase) , µg/m³				
Date	Period, hrs.	SPM	PM2.5	PM10	SO_2	NO_2	NH_3	O_3 (8-hly Avg.)	CO (8-hly Avg.)	Pb, µg/m³	As, ng/m³	Ni, ng/m³	C_6H_6, ng/m³	BaP, ng/m³
NAAQ Norms*		(24 hrs.)	60(24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2.0 (8hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)
03.12.2020	07:30-07:30	56.9	17.2	41.2	5.8	21.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
04.12.2020	07:45-07:45	58.6	17.6	42.9	6.1	20.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
10.12.2020	07:30-07:30	59.4	18.5	42.7	6.3	20.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
11.12.2020	07:45-07:45	59.8	19.5	42.6	6.8	19.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
17.12.2020	07:30-07:30	60.2	18.9	41.1	6.2	18.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
18.12.2020	07:45-07:45	61.5	20.5	41.3	6.1	19.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
24.12.2020	07:30-07:30	62.5	19.5	41.7	5.8	18.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
25.12.2020	07:45-07:45	64.2	18.6	42.5	6.3	18.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
31.12.2020	07:30-07:30	65.5	18.5	42.3	6.0	18.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
01.01.2020	07:45-07:45	64.8	18.6	42.7	5.8	18.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
07.01.2020	07:30-07:30	66.5	18.9	43.2	5.3	18.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
08.01.2020	07:45-07:45	68.2	19.6	42.0	6.1	19.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
14.01.2020	07:30-07:30	67.9	19.2	43.4	6.8	19.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
15.01.2020	07.15-07.15	69.0	19.0	43.5	5.6	21.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
21.01.2020	07.00-07.00	68.5	18.5	43.3	5.4	20.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
22.01.2020	07.15-07.15	67.2	18.9	43.2	5.8	19.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
28.01.2020	07.00-07.00	67.5	18.2	42.4	5.3	18.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
29.01.2020	07.15-07.15	66.5	18.7	43.8	5.9	18.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
04.02.2020	07.00-07.00	65.4	18.9	42.3	6.3	19.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
05.02.2020	07.15-07.15	65.9	19.5	42.0	6.7	19.7	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
11.02.2020	07.00-07.00	62.2	19.7	44.7	6.3	19.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
12.02.2020	07.15-07.15	64.6.	18.2	43.9	6.1	20.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
18.02.2020	07.00-07.00	65.5	18.8	43.2	5.8	21.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
19.02.2020	07.15-07.15	66.2	19.5	42.7	5.5	20.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
25.02.2020	07.00-07.00	64.5	19.9	43.2	5.8	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
26.02.2020	07.15-07.15	68.5	19.6	41.5	5.6	18.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0

TABLE 3.23: AAQ6 - PERIAMANALI (BUFFER ZONE)

Period: December 2020–February-2021 *Location: AAQ6 –Periamanali* Sampling Time: 24-hourly

Monitoring			Particulates, µg/m³		Gaseous Pollutants, µg/m³					Other Pollutants (Particulate Phase) , µg/m³				
Date	Period, hrs.	SPM	PM2.5	PM10	SO_2	NO_2	NH_3	O_3 (8-hly Avg.)	CO (8-hly Avg.)	Pb, µg/m³	As, ng/m³	Ni, ng/m³	C_6H_6, ng/m³	BaP, ng/m³
NAAQ Norms*		(24 hrs.)	60(24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2.0 (8hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)
03.12.2020	08:00-08:00	56.5	18.2	39.5	4.3	17.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
04.12.2020	08:15-08:15	54.5	18.4	38.9	4.8	17.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
10.12.2020	08:00-08:00	56.8	18.6	39.1	4.1	16.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
11.12.2020	08:15-08:15	56.7	18.7	38.6	4.5	16.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
17.12.2020	08:00-08:00	56.9	18.2	37.6	4.7	15.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
18.12.2020	08:15-08:15	57.5	18.6	38.3	4.5	16.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
24.12.2020	08:00-08:00	58.6	18.2	38.2	4.3	16.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
25.12.2020	08:15-08:15	57.2	18.7	39.1	4.6	16.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
31.12.2020	08:00-08:00	56.9	16.6	39.8	4.8	16.7	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
01.01.2020	08:15-08:15	57.6	16.9	38.5	4.2	16.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
07.01.2020	08:00-08:00	58.5	17.5	39.7	4.1	17.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
08.01.2020	08:15-08:15	59.5	17.8	40.2	4.7	17.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
14.01.2020	08:00-08:00	60.2	15.9	40.6	4.4	16.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
15.01.2020	07.15-07.15	61.4	16.7	39.2	4.3	16.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
21.01.2020	07.00-07.00	62.8	17.9	39.8	4.8	17.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
22.01.2020	07.15-07.15	65.5	17.2	40.8	4.5	17.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
28.01.2020	07.00-07.00	64.8	18.6	41.3	4.8	16.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
29.01.2020	07.15-07.15	65.5	17.6	39.5	4.9	16.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
04.02.2020	07.00-07.00	67.3	18.2	38.9	4.2	16.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
05.02.2020	07.15-07.15	65.9	18.9	37.1	4.5	16.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
11.02.2020	07.00-07.00	66.8	18.7	39.5	4.3	16.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
12.02.2020	07.15-07.15	67.8	19.5	40.1	4.7	16.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
18.02.2020	07.00-07.00	65.5	17.5	41.5	4.2	16.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
19.02.2020	07.15-07.15	64.8	18.6	42.7	4.6	17.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
25.02.2020	07.00-07.00	66.5	17.6	39.8	4.9	18.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
26.02.2020	07.15-07.15	65.8	18.6	38.5	4.5	18.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0

TABLE 3.24 AAQ7 - NAGARPALAYAM (BUFFER ZONE)

Period: December2020 –February-2021 *Location: AAQ7–Nagarpalayam* Sampling Time: 24-hourly

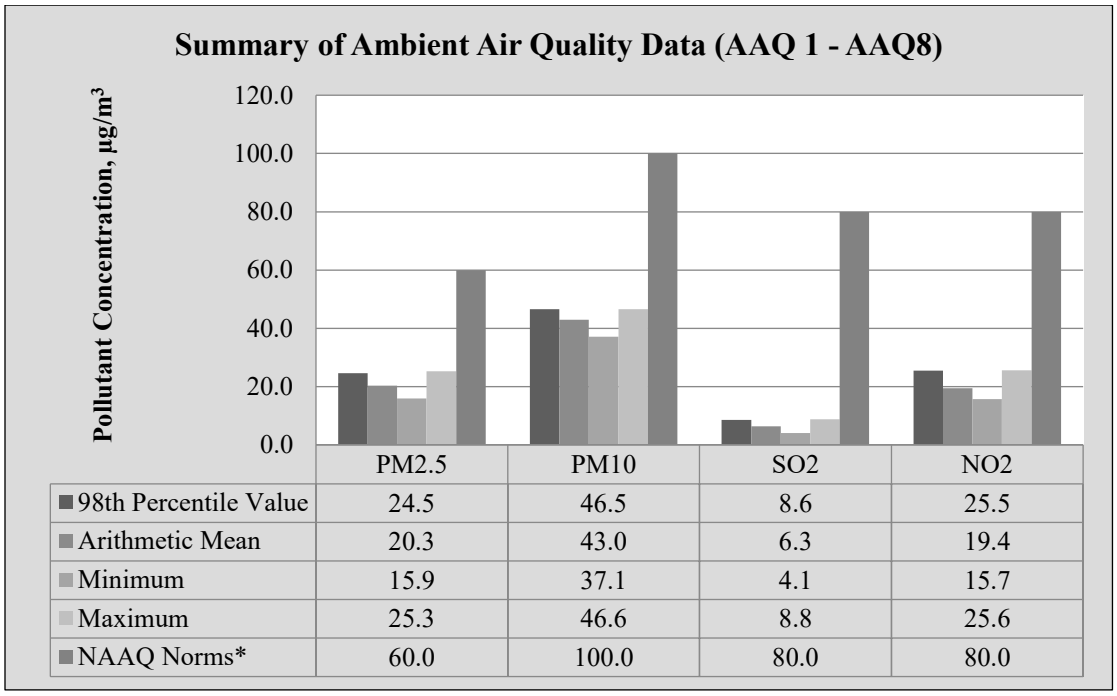
Monitoring			Particulates, µg/m³		Gaseous Pollutants, µg/m³					Other Pollutants (Particulate Phase) , µg/m³				
Date	Period, hrs.	SPM	PM2.5	PM10	SO_2	NO_2	NH_3	O_3 (8-hly Avg.)	CO (8-hly Avg.)	Pb, µg/m³	As, ng/m³	Ni, ng/m³	C_6H_6, ng/m³	BaP, ng/m³
NAAQ Norms*		(24 hrs.)	60(24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2.0 (8hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)
03.12.2020	08:00-08:00	60.8	19.6	40.3	5.3	18.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
04.12.2020	08:15-08:15	61.9	19.2	40.8	5.7	18.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
10.12.2020	08:00-08:00	62.5	20.1	41.7	5.1	19.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
11.12.2020	08:15-08:15	62.4	21.3	41.1	5.4	19.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
17.12.2020	08:00-08:00	62.7	21.6	41.9	5.6	19.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
18.12.2020	08:15-08:15	63.2	20.6	42.5	5.1	18.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
24.12.2020	08:00-08:00	64.8	20.5	42.2	5.8	18.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
25.12.2020	08:15-08:15	62.5	21.4	41.6	5.3	19.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
31.12.2020	08:00-08:00	61.5	19.8	40.7	5.1	18.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
01.01.2020	08:15-08:15	61.0	19.1	41.1	5.4	18.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
07.01.2020	08:00-08:00	62.2	19.6	42.2	5.6	18.9	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
08.01.2020	08:15-08:15	63.2	19.8	41.3	5.3	19.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
14.01.2020	08:00-08:00	64.2	19.7	41.1	5.7	18.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
15.01.2020	07.15-07.15	65.5	20.5	42.6	5.5	19.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
21.01.2020	07.00-07.00	61.6	21.3	41.2	5.9	18.7	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
22.01.2020	07.15-07.15	63.2	20.4	40.9	5.3	19.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
28.01.2020	07.00-07.00	62.4	19.6	41.2	5.5	17.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
29.01.2020	07.15-07.15	65.8	19.2	41.8	5.7	17.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
04.02.2020	07.00-07.00	64.5	20.1	41.7	5.2	18.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
05.02.2020	07.15-07.15	62.5	21.6	40.1	5.7	19.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
11.02.2020	07.00-07.00	60.2	20.8	42.0	5.1	17.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
12.02.2020	07.15-07.15	61.9	20.3	42.5	5.7	18.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
18.02.2020	07.00-07.00	62.9	21.4	41.8	5.4	18.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
19.02.2020	07.15-07.15	61.5	20.6	41.3	5.6	19.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
25.02.2020	07.00-07.00	60.2	19.5	40.2	5.7	18.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0
26.02.2020	07.15-07.15	64.5	19.6	40.5	5.5	18.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<3.0

TABLE 3.25: ABSTRACT OF AMBIENT AIR QUALITY DATA

Sl.No	Parameter	Pollutant Concentration, µg/m³			
		PM_{10}	$PM_{2.5}$	SO_2	NO_2
1	No. of Observations	182	182	182	182
2	10th Percentile Value	18.2	39.8	4.7	16.8
3	20th Percentile Value	18.7	41.2	5.3	17.3
4	30th Percentile Value	19.1	42.0	5.7	18.1
5	40th Percentile Value	19.4	42.7	6.1	18.4
6	50th Percentile Value	19.6	43.2	6.3	18.8
7	60th Percentile Value	19.8	43.6	6.7	19.1
8	70th Percentile Value	20.5	44.2	6.9	19.8
9	80th Percentile Value	22.4	44.9	7.3	20.9
10	90th Percentile Value	23.6	45.6	7.8	23.9
11	95th Percentile Value	24.1	46.2	8.2	24.8
12	98th Percentile Value	24.5	46.5	8.6	25.5
13	Arithmetic Mean	20.3	43.0	6.3	19.4
14	Geometric Mean	20.2	42.9	6.2	19.3
15	Standard Deviation	2.0	2.1	1.1	2.5
16	Minimum	15.9	37.1	4.1	15.7
17	Maximum	25.3	46.6	8.8	25.6
18	**NAAQ Norms***	**100.0**	**60.0**	**80.0**	**80.0**
	% Values exceeding Norms*	0.0	0.0	0.0	0.0

Legend: $PM_{2.5}$-Particulate Matter size less than 2.5 µm; PM_{10}-Respirable Particulate Matter size less than 10 µm; SO_2-Sulphur dioxide; NO_2-Nitrogen Dioxide; CO-Carbon monoxide; O_3-Ozone; NH_3-Ammonia; Pb-Particulate Lead; As-Particulate Arsenic; Ni-Particulate Nickel; C_6H_6-Benzene & BaP- Benzo (a) pyrene in particulate phase levels were monitored below their respective detectable limits.

* NAAQ Norms-National Ambient Air Quality Norms-Revised as per GSR 826(E) dated 16.11.2009 for Industrial, Residential, Rural and other Area.



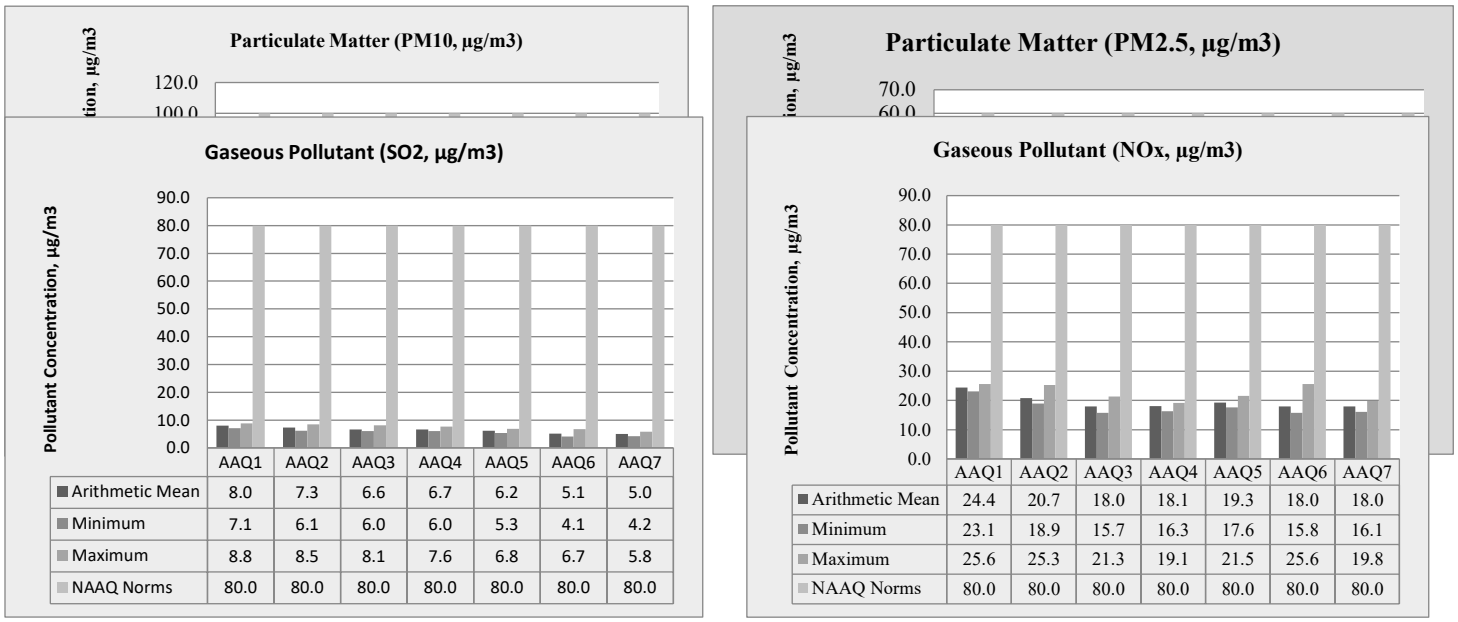


FIGURE 3.12: BAR DIAGRAM OF PARTICULATE MATTER (PM_{10}& $PM_{2.5}$)

FIGURE 3.13: BAR DIAGRAM OF PARTICULATE MATTER (SO_2& NO_2)

3.3.6 Interpretations & Conclusion

As per monitoring data, PM_{10} ranges from 37.1 µg/m^3 to 46.6 µg/m^3, $PM_{2.5}$ data ranges from 15.9 µg/m^3 to 25.3 µg/m^3, SO_2 ranges from 4.1 µg/m^3 to 8.8 µg/m^3 and NO_2 data ranges from 15.7 µg/m^3 to 25.6 µg/m^3.

The minimum & maximum concentrations of PM_{10} were found to be 37.1 µg/m^3 in Peiyamanali & 46.6 µg/m^3 in Project area respectively. The average concentrations were ranged between 39.4 and 45.5 µg/m^3. The minimum & maximum concentrations of $PM_{2.5}$ were found to be 15.9 µg/m^3 in Periamanali & 25.3 µg/m^3 in Project area respectively. The average concentrations were ranged between 17.9 and 23.9 µg/m^3.

The maximum concentration in the core zone is due to the quarrying activity of the cluster of quarries situated within 500m radius. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB.

3.3.7 FUGITIVE DUST EMISSION –

- Instruments used for air monitoring –
    - Fugitive dust samples was collected by using APM 860 (Respirable Dust Sampler)
    - Fugitive dust was recorded at 7AAQ monitoring stations during the study period.
- Fugitive dust emission is predicted by the standard equations given in The Indian Mining & Engineering Journal and by US-EPA (Emission Factors as referred in AP - 42), powered by AERMOD ver. 9.6.1 of lakes Environment.

Emission Estimation –

The emission estimation is dependent of parameters such as meteorological, topographic conditions and the material characteristics. The amount of emission rate for the source on site into the atmosphere needs to be calculated.

Different Dust Sources –

- **Drilling Source –**

  The drilling source is most representative for a point source; this is an emission with a very small opening such as a stack or vent.

- **Haul roads and waste dump Source –**

  For haul roads the most representative dust source is assumed to be a volume source just above the ground surface and waste dump is assumed to be an area source.

- **Open pit Source –**

  It considers a dust source all over the quarry area.

3.4 NOISE ENVIRONMENT

The vehicular movement on road and mining activities is the major sources of noise in study area, the environmental assessment of noise from the mining activity and vehicular traffic can be undertaken by taking into consideration various factors like potential damage to hearing, physiological responses, and annoyance and general community responses.

The main objective of noise monitoring in the study area is to establish the baseline noise level and assess the impact of the total noise expected to be generated during the project operations around the project site.

3.4.1 Identification of Sampling Locations

In order to assess the ambient noise levels within the study area, noise monitoring was carried out at seven (7) locations. The noise level monitoring locations were carried out by covering commercial, residential, rural areas within the radius of 10km. A noise monitoring methodology was chosen such that it best suited the purpose and objectives of the study.

TABLE 3.26: DETAILS OF SURFACE NOISE MONITORING LOCATIONS

S. No	Location code	Monitoring Locations	Distance & Direction	Coordinates
1	N1	Prjoct Area	Core Zone	11°25'2.63"N 78°02'58.49"E
2	N2	Prjoct Area	Core Zone	11°24'38.65"N 78° 2'35.55"E
3	N3	Marapparai	1km South East	11°24'39.12"N 78°03'24.00"E
4	N4	Periamanali	4.5km South East	11°22'39.42"N 78° 4'22.36"E
5	N5	Elachipalayam	4km South West	11°23'21.01"N 78° 0'40.11"E
6	N6	Nagarpalayam	4km North East	11°25'48.37"N 78° 4'58.10"E
7	N7	Ramapuram	4.5km North West	11°26'13.89"N 78°00'19.32"E

Source: On-site monitoring/sampling by Omegaa Laboratories in association with GEMS

3.4.2 Method of Monitoring

Digital Sound Level Meter was used for the study. All reading was taken on the 'A-Weighting' frequency network, at a height of 1.5 meters from ground level. The sound level meter does not give a steady and consistent reading and it is quite difficult to assess the actual sound level over the entire monitoring period. To mitigate this shortcoming, the Continuous Equivalent Sound level, indicated by Leq, is used. Equivalent sound level, 'Leq', can be obtained from variable sound pressure level, 'L', over a time period by using following equation.

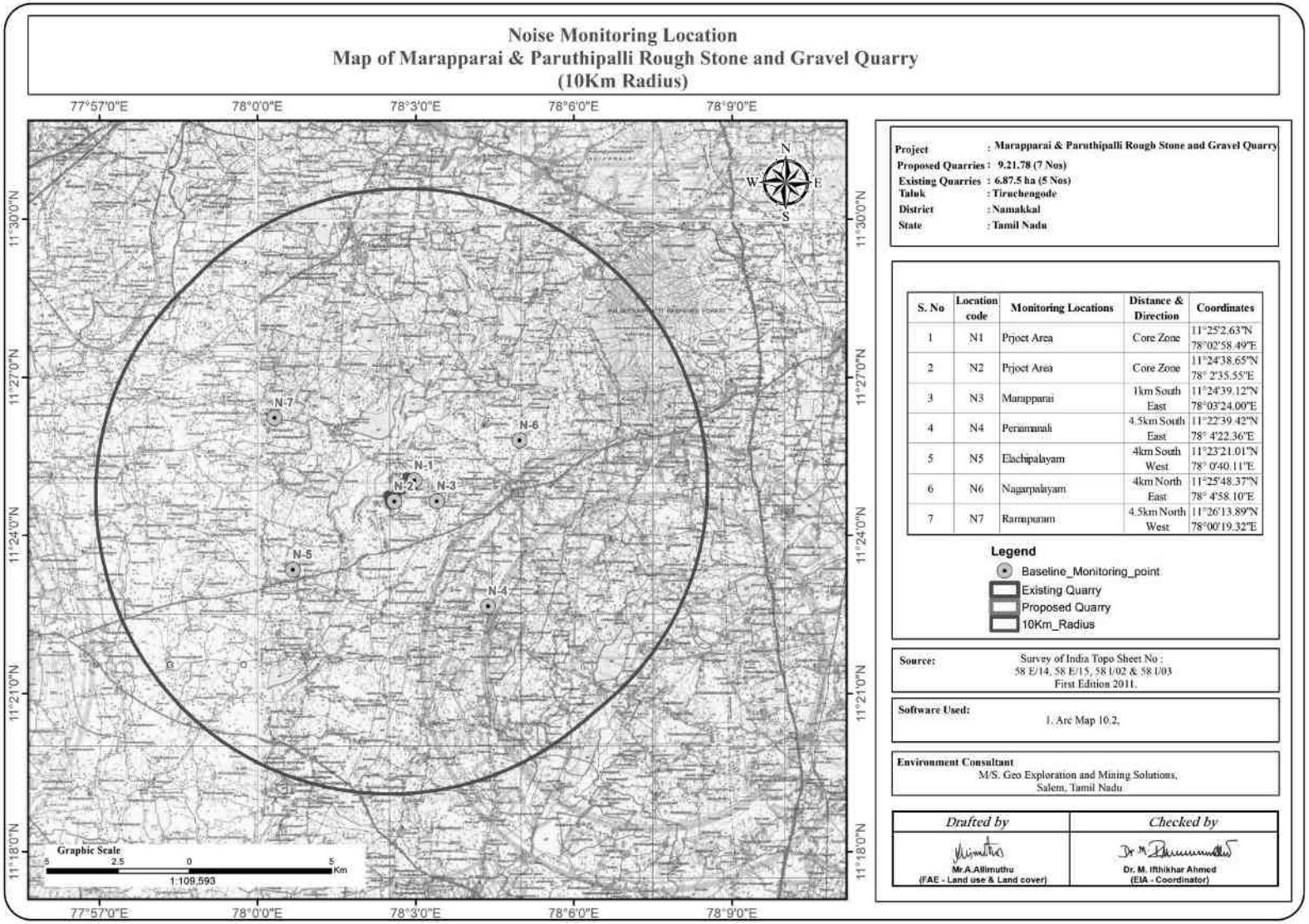
Measured noise levels, displayed as a function of time, is useful for describing the acoustical climate of the community. Noise levels recorded at each station with a time interval of about 60 minutes are computed for equivalent noise levels. Equivalent noise level is a single number descriptor for describing time varying noise levels. The equivalent noise level is defined mathematically as

Leq = 10 Log L / T$\sum$ (10Ln/10)

Where L = Sound pressure level at function of time dB (A)

T = Time interval of observation

FIGURE 3.14: NOISE MONITORING STATIONS AROUND 10 KM RADIUS



Source:

3.4.3 Analysis of Ambient Noise Level in the Study Area

The Digital Sound pressure level has been measured by a sound level meter (Model : HTC SL-1352)

An analysis of the different Leq data obtained during the study period has been made. Variation was noted during the day-time as well as night-time. The results are presented in below Table 3.6

Day time: 6:00 hours to 22.00 hours.

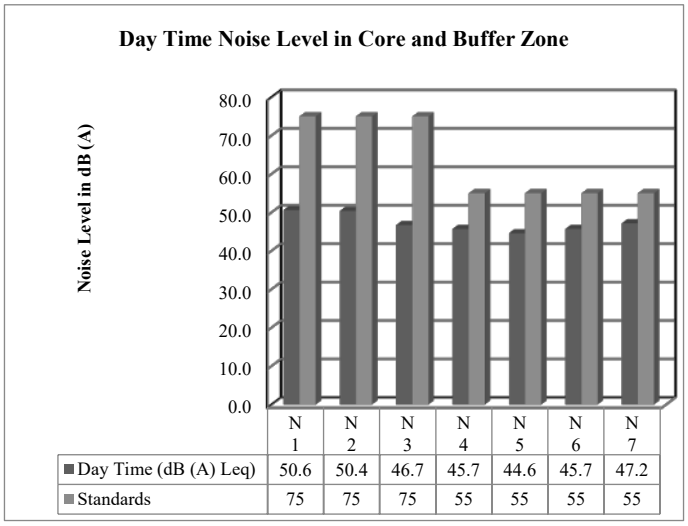
Night time: 22:00 hours to 6.00 hours.

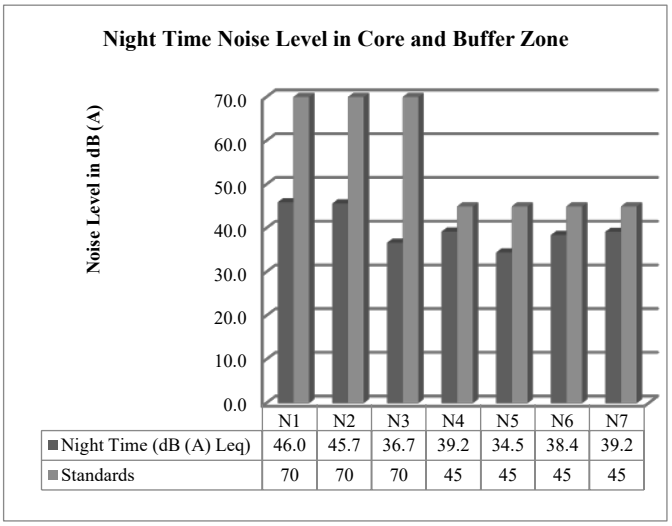
TABLE 3.27: AMBIENT NOISE QUALITY RESULT

S. No	Locations	Noise level (dB (A) Leq)		Ambient Noise Standards
		Day Time	Night Time	
1	South side	50.6	46.0	**Industrial Day Time- 75 dB (A) Night Time- 70 dB (A)**
2	North Side	50.4	45.7	
3	Marapparai	46.7	36.7	**Residential Day Time– 55 dB (A) Night Time- 45 dB (A)**
4	Periyamanali	45.7	39.5	
5	Elachipalayam	44.6	34.5	
6	Nagarpalayam	45.7	38.4	
7	Ramapuram	47.2	38.6	

Source: On-site monitoring/sampling by Omegaa Laboratories in association with GEMS

FIGURE 3.15: DAY AND NIGHT TIME NOISE LEVELS IN CORE AND BUFFER ZONE





3.4.4 INTERPRETATION:

Ambient noise levels were measured at 7 locations around the proposed quarry lease area. Noise levels recorded in core zone during day time were from 50.4 – 50.6 dB (A) Leq and during night time were from 45.7 – 46.0 dB (A) Leq. Noise levels recorded in buffer zone during day time were from 44.6 – 47.2 dB (A) Leq and during night time were from 34.2 – 39.2dB (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. Noise monitoring results reveal that the maximum & minimum noise levels at day time were recorded in the range of 15.8 dB(A) in core zone and 59.6 dB(A) in Nagarpalayam and 36.1 dB(A) in Core zone & 44.3 dB(A) in Periamanali at night time.

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

3.5 ECOLOGICAL ENVIRONMENT

There is no National Parks, Eco sensitive areas, Wild life sanctuaries, Reserve forest within the radius of 10km. An ecological survey of the study area was conducted particularly with reference to the listing of species and assessment of the existing baseline ecological (terrestrial) condition in the study area.

3.5.1 Methodology Adopted & Objective

To achieve the above objective, a detailed study of the area was undertaken in 10 km radius from the proposed project area. The different methods adopted were as follows:

- Primary field surveys to establish primary baseline of the study area; and
- Compilation of information available in published literatures and as obtained from Forest survey of India, Environmental Information Centre, Botanical Survey of India and Zoological Survey of India.

The present report gives the review of published secondary data and the results of field sampling conducted during post-monsoon, 2020 i.e. December 2020 to February 2021 and there are no forest blocks in study area. The detailed ecological assessment of the study area has been carried out with the following objectives:

- Identification of flora and fauna within the study area;
- Preparation of checklist of species which also include endangered, endemic and protected (both floral and faunal categories); and
- Evaluation of impact of proposed expansion on flora and fauna of the area.

TABLE 3.28: FLORA AND FAUNA OF THE AREA

GRASS			
S.No	Scientific Name	Family	Local Name
1	Heteropogon contorlus	Poaceae	Oosipullu
2	Arundo donax	Poaceae	Common needle, grass
3	Dendrocalamus strictus	Poaceae	Kalamungil
4	Digitaria cliaris	Poaceae	Arisipul
TREES			
S.No	Scientific Name	Family	Local Name
1	Borassus flabellifer	Arecaceae	Palmyra palm
2	Euphorbia antiquorum	Euphorbiaceae	Kalli, triangular, spurge
3	Lannea coromandelica	Anacardiaceae	Indian Ash Tree, Moya, Wodier
4	Morinda tinctoria	Rubiaceae	Nuna
5	Prosopis juliflora	Fabaceae	Algaroba, Mesquite
6	Pongamia pinnata	Fabaceae	Indian beech, pungam
7	Tamarindus indica	Caesalpiniaceae	Puli
8	Cocus nucifera	Arecaceae	Coconut,thennai
9	musa paradisiaca	Musaceae	Plantain, vazhai
10	Cocus nucifera	Arecaceae	Coconut, thennai
11	Musa paradisiaca	Musaceae	Plantain, vazhai
12	Tectona grandis	Lamiaceae	Teak
13	Acacia chundra	Fabaceae	
14	Acacia ferruginea	Fabaceae	Parambai
15	Acacia leucophloea.	Mimosaceae	velvelam
16	Acacia nilotica	Mimosaceae	kaRuvELai
17	Adina cordifolia	Rubiaceae	Manjakadambu

18	Ailanthus excelsa	Simaroubaceae	Perumaram, perumaruntu
19	Albizia lebbeck	Mimosaceae	Siridam
20	Azadirachta indica	Meliaceae	Veppai,
21	Citrus limon	Rutaceae	Lemon
22	Dalbergia paniculata	Fabaceae	Porapachalai
23	Dalbergia sissoo	Fabaceae	nukkam totakatti
24	Delonix regia	Caesalpiniaceae	Flame Tree, Royal Poinciana
25	Erythrina indica	Fabaceae	Mullu murungai
26	Erythrina variegata	Fabaceae	Kalyana murungai
27	Eucalyptus globulus	Mytaceae	Blue gum
28	Ficus benghalensis	Moraceae	Krishna Fig, Krishna's
29	Ficus religiosa	Moraceae	Peepal, arasamaram
30	Psidium gujava	Myrtaceae	Guava
31	Punica granatum	Lythraceae	Pomegranate, mathulai
32	Samanea saman	Mimosodeae	Thoongumoonjj maram
33	Syzygium cumini	Myrtaceae	Nagai
34	Terminalia chebula	Combretaceae	kaDukkaay
35	Thespesia lampas	Malvaceae	Common mallow,kattupparuthi
		HERB	
S.No	Scientific Name	Family	Local Name
1	Abutilon indicum	Malvaceae	Country Mallow, Tutti Herb
2	Acalypha indica	Euphorbiaceae	koli-p-puntu, kuppai-meni
3	Achchyranthes aspera	Amaranthaceae	Prickly chaff flower, nayuruvi
4	Aerva lanata	Amaranthaceae	ciru-pula,ulinai
5	Agave americana	Agavaceae	Anaikathalai
6	Amaranthus spinosus	Amaranthaceae	mullukkeerai
7	Amaranthus viridis	Amaranthaceae	kuppai-k-kirai
8	Cleome viscosa	Cleomaceae	Tickweed, naikkaduku
9	Cynodon dactylon	Poaceae	Bermuda, grass, arugampul
10	Datura metal	Solanaceae	Thom, apple, oomathai
11	Euphorbia hirta	Euphorbiaceae	Ammam Paccharisi
12	Leucas aspera	Lamiaceae	Thumbai
13	Mimosa pudica	Mimosaceae	Sensitive Plant, Touch-me-not
14	Phyllanthus nirurii	Phyllanthaceae	Keelanelli, seed under leaf
15	Tribulus terrestris	Zygophyllaceae	Puncture vine, nerunji
16	Tridax procumbens	Asteraceae	Tridax daisy, vettukkaayapoondu
17	Vemonia cinerea	Asteraceae	Purplefleabane, mookuthipoondu
18	Oryza sativa	Poaceae	Rice
19	Phaseolus mango	Fabaceae	Black gram
20	Zea mays	Poaceae	Maize, Corn
21	Capsicum frutescens	Solanaceae	Tezpur Chilli
22	Acalypha indica	Euphorbiaceae	koli-p-puntu, kuppai-meni
23	Aerva lanata	Amaranthaceae	ciru-pula,ulinai
24	Agave angustifolia	Asparagaceae	Caribbean agave
25	Agave sisalana Perrine	Agavaceae	Sisal Agave, agave, century plant
26	Aloe vera	Liliaceae	Kathalai
27	Amaranthus viridis	Amaranthaceae	kuppai-k-kirai
28	Bauhinia racemose	Fabaceae	Athi, jhinja
29	Blumea lacera	Asteraceae	Kattumullangi, narakkarandai
30	Boerhavia diffusa	Nyctaginaceae	Red hogweed, Tar Vine
31	Bulbostylis barbatta	Cyperaceae	Mukkutikorei
32	Chloris dolichostachya	Poaceae	Finger grass, kuruthupillu
33	Croton saparsiflorus	Euphorbiaceae	Reilpoondu

34	Helianthus annus	Asteraceae	Sunflower
35	Ocimum americanum	Lamiaceae	Hoary basil, nai thulasi
36	Ocimum sanctum	Lamiaceae	Holy basil, thulasi
37	Partheniumhysterophorus	Asteraceae	Congress grass
38	Sesamum indicum	Pedaliaceae	Korai, pullu
39	Sida cordifolia L.	Malvaceae	Heart-Leaf Sida
40	Thespesia populnea	Malvaceae	Indian tulip tree poovarasu
41	Vinca rosea	Apocynaceae	Nithyakalyani
		SHRUB	
S.No	Scientific Name	Family	Local Name
1	Argemone Mexicana	Papaveraceae	Prickly poppy, kudiyotti
2	Capparis sepiaria	Capparaceae	Karindu
3	Cassia auriculata	Fabaceae	Aavarampoo
4	Gossyplum arboretum	Malvaceae	Cotton, paruthi
5	Opuntia vulgaris	Cactaceae	Sappattukkalli
6	Solanum trilobatum	Solanaceae	Thoodhuvalai
7	Vitex negundo.	Verbenaceae	Nocchi
8	Ziziphus oenoplia.	Rhamnaceae	Suraimullu, Surai ilantai
9	Calotropis gigantea R.Br.	Fabaceae	tuvarai,adhaki, iruppuli,
10	Calotropis procera	Asclepiadaeae	Vellerukku
11	Canna indica	Cannaceae	Indian Shot, Wild canna
12	Carica papaya	Caricaceae	pappALi
13	Jasminum angustilfolium	Oleaceae	Kundumlligai
14	Jasminum arborescens		
15	Jatropha glandulifera	Euphorbiaceae	Kaatuamanakku
16	Lantana camara	Verbenaceae	Unnichedi
17	Lawsonia inermis	Lythraceae	Henna, maruthondri
18	leucaena		
19	Phoenix acaulis	Arecaceae	Stemiess date palm
20	Ricinus communis	Euphorbiaceae	Castor bean plant
21	Solanum torvum	Solanaceae	Sundaikkai
22	Tabernaemontana coronarial	Apocynaceae	Nandiyarvattam
		CLIMBER	
S.No	Scientific Name	Family	Local Name
1	Cissus quadrangularis	Vitaceae	Perandai
2.	Abrus precatorius	Fabaceae	Coral bead, vine, rosary pea
3	Cucurbita pepo	Cucurbitaceae	Parangi
4	Cucurbita pepo	Cucurbitaceae	Parangi
5	Ipomea hederifolia	Convolvulaceae	Kanavali kkodi
6	Passiflora foetida	Passifloraceae	Stinking passionflower
7	Pergularia daemia	Asclepiadaceae	Uttamani, Seendhal kodi

TABLE 3.28: LIST OF FAUNA

MAMMALS				
S.No.	Scientific name	Family	Common name	IUCN /WPA Schedule
1	Felis rubiginosa	Felidae	Rusty spotted Cat	LC – IV
2	Funambulus palmarum	Squirrel	Indian Palm squirrel	LC – IV
3	Herpertes edwardrii	Mongoose	Indian grey mongoose	LC – IV
4	Macaca radiata	Cercopithecidae	Bonnet macaque	LC – IV
5	Cynopterus brachyotis	Old World fruit bats	Short nosed fruit bat	LC – V
6	Lepus nigricollis	Leporids	Hare	LC – IV
7	Ovis aries	Bovidae	Sheep	-
8	Paradoxurushermaphroditus	Viverrids	Common palm civet	LC – II
9	Rattus norvegicus	Murids	Field mouse	LC – IV
10	Rattus rattus	Murids	House rat	LC – IV
11	Sorex caerulescens	Soricidae	Common mush shrew	LC – IV
12	Sus scrofa	Suidae	Wild boar	--
13	Indian fox	Canidae	Vulpus benfhalensis	LC – II
14	Eryx johni	Boidae	Mannuli paambu	--
BIRDS				
S.No	Scientific name	Family	Common name	IUCN /WPA Schedule
1	Dicrurus macrocerus	Drongos	Black Drongo	LC – IV
2	Egretta garzetta	Heron	Little egret	LC – IV
3	Eudynamys scolopacea	Cuckoos	Koel	LC – IV
4	Francolinus pondicerianus	Phasianidae	Grey Partridge	LC – IV
5	Passer domesticus	Sparrow	House Sparrow	LC – IV
6	Ploceus Philippines	Ploceidae	Weaver bird	LC – IV
7	Prinia subflava	Cisticolidae	Plain Wren-Warbler	LC – IV
8	Psittacula krameri	Parrots	Rose Ringed Parakeet	LC – IV
9	Pycnonotus cafer	Bulbul	Redvented BulBul	LC – IV
10	Quills contronix	Bulbul	Grey qua	LC – IV
11	Saxicoloides fulicata	Muscicapidae	Indian Robin	LC – IV
12	Streptopelia decaocto	Pigeons and doves	Indian Ring Dove	LC – IV
13	Streptopelia tranquebarica	Pigeons and doves	Red collared dove	LC – IV
14	Sturnus pagodarum	Starling	Brahminy starling	LC – IV
15	Merops orinetalis	Bee-eater	Common bee eater	LC – IV
16	Nectarinia asiatica	Sunbird	Purple sunbird	LC – IV
17	Shikra	Accipitridae	Astur badius	LC – IV
REPTILES				
S.No	Scientific name	Family	Common name	IUCN /WPA Schedule
1	Ahaetulla nasuta	Colubridae	Common Green Whip Snake	LC – IV
2	Bangarus caeruleus	Elapid snakes	Acrid weed, kalluruvi	LC – II
3	Boiga spp.	Colubridae	Cat snake	
4	Calotes versicolor	Agamid lizards	Common Garden lizard	LC – IV
5	Chameleon zeylanicus	Chameleons	Indian chamaeleon	LC – II
6	Daboia russelii	Vipers	Russels viper	LC – III
7	Gongylophis conicus	Boidae	Rough tailed Sand boa	LC – IV
8	Hemidactylus flaviviridis	Geckos	House gecko	LC – IV
9	Lissemys punctata	Softshell turtles	Indian mud turtle	LC – IV
10	Naja naja	elapid snakes	Indian Cobra	LC – IV
11	Passerita mycterizaris	Colubrid Snakes	Common Green Snake	LC – IV
12	Ptyas mucosus	Colubrid Snakes	Common rat snake	LC – IV

13	Dendrelaphis	Colubrid Snakes	Common Bronzeback	LC – IV
14	Brahminy skink	Scincidae	Mabuya carinata	LC – II
15	Varanus benegaiensis	Varanidae	Udumbu	LC – IV
INSECTS				
S.No	Scientific name	Family	Common name	IUCN /WPA Schedule
1	Agrion sp & Petalura sp	Anisoptera	Dragon fly	LC - IV
2	Apis indica	Apidae	Honey bee	LC - IV
3	Aranea sp	Crambidae	Spider	LC - IV
4	Carausius sp	Lonchodinae	Stick insect	LC - IV
5	Coccinella septenpunctata	Ladybird beetle	Lady bird beetle	LC - IV
6	Eumenus	Vespidae	Wasp	LC - IV
7	Hamitermes silvestri		Termite	LC - IV
8	Hieroglyphus sp	Acrididae	Grasshopper	LC - IV
9	Praying mantis	Mantids	Mantis religiosa	LC - IV
10	Ant	Formicidae	Monomorium indicum	LC - IV
11	Scorpion	Scorpionoidea	Palamnaeus swammerdam	LC - IV
12	Centipede	House Centipedes	Scolopendra	LC - IV
13	Cicada sp	Cicadidae	Cicade	LC - IV
14	Coenagrion sp & ischnura	Coenagrionidae	Damsel fly	LC IV
15	Mantis religiosa	Mantids	Praying mantis	LC IV
BUTTERFLIES				
S.No	Scientific name	Family	Common name	IUCN /WPA Schedule
1	Acraea terpsicore	Nymphalidae	Tawny coster	LC - IV
2	Danaus chiysippus	Brush-footed butterflies	Plain tiger	LC - IV
3	Danaus plexipppus	Brush-footed butterflies	Striped tiger	LC - IV
4	Euthalia nais	Nymphalidae	Baronet	LC - IV
5	Graphium Agamemnon	Swallowtail butterfly	Tailed jay	LC - IV
6	Ixias marianne	Pieridae	White orange tip	LC - IV
7	Juninia almanac	Nymphalidae	Peacock pansey	LC - IV
8	Junonia atlites	Nymphalidae	Grey pansey	LC - IV
9	Neptis hylas	Brush-footed butterflies	Common sailor	LC - IV
10	Pachiopta hector	Swallowtail butterfly	Crimson rose	LC - IV
11	Papilio demoleus	Swallowtail butterfly	Lime butterfly	LC - IV
12	Parantica aglea	Brush-footed butterflies	Glassy tiger	LC - IV
13	Precis hierta	Violaceae	Yellow pansy	LC - IV
14	Terias hecabe	Pieridae	Grass yellow	LC - IV
15	Triodes minos	Papilionidae	Southern birdwing	LC - IV
16	Papilio polytes	Swallowtail butterfly	Common Mormon	LC - IV
17	Papilo polymnstor	Papilionidae	Blue Mormon	LC – IV
FISH				
S.No	Scientific name	Family	Common name	IUCN /WPA Schedule
1	Amblypharyngodon Sp	Cyprinidae	Carplet	LC – IV
2	la catla	Minnows and Carps	Catta	LC – IV
3	Chela sp		Trout	LC – IV
4	Cirthinus mrigala	Minnows and Carps	Mrigal	LC – IV
5	Cyprirus earpio	Minnows and Carps	Common carp	LC – IV
6	Labeo rohita	Cyprinidae	Rohu	LC – IV
7	Ophiocephalus	Snakehead	punctatus	LC – IV
8	Oreochromis mossambicus	Cichlid	Tilapia	LC – IV

3.5.2 Interpretation& Conclusion:

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 mining operation over short period of time will not have any significant impact on the surrounding flora and fauna.

3.6 SOCIO ECONOMIC ENVIRONMENT

There is no habitation/ village within the radius of 1km from the cluster area. Socio-economic study is an essential part of environmental study. 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.

It is expected that the Socio Economic Status of the area will substantially improve because of this proposed project. As the proposed project will provide direct and indirect employment and improve the infrastructural facilities in that area and, thus, improve their standard of living.

3.6.1 Objectives of the Study

The objectives of the socio-economic study are as follows:

- To study the socio-economic status of the people living in the study area of the proposed mining project
- To assess the impact of the project on Quality of life of the people in the study area
- To recommend Community Development measures needs to be taken up in the study Area.

3.6.2 Scope of Work

- To study the Socio-economic Environment of the area from the secondary sources;
- Data Collection & Analysis
- Prediction of project impact
- Mitigation Measures

3.6.3 Administrative Setup of Namakkal District

Namakkal district includes 2 Revenue Divisions, 8 Taluks, 7 Town Panchayats. There are 391 Revenue Villages, 322 Village panchayats in this district.

In 2011, Namakkal had population of 1,726,601 of which male and female were 869,280 and 857,321 respectively

3.6.4 Study area

As per the Population Census 2011, there are total 1497 families residing in the village Marapparai. The **total population of** Marapparai **is 5424 o**ut of which 2757 are males and 2667 are females thus the **Average Sex Ratio of Marapparai is 967**.The population of Children of age 0-6 years in **Marapparai** village is 462 which is 8.52 % of the total population.

TABLE 3.29: POPULATION CHARACTERISTICS AROUND 10KM RADIUS

Total No of Villages	No. of Households	Total Population	Population Male	Population female	SC Population Male	SC Population female	Total Literates Male	Total Literates Female	Total Illiterates Male	Total Illiterates Female
55	36,847	1,31,464	66,148	65,316	19208	18760	1950	1413	18477	29270

TABLE 3.30: OCCUPATIONAL CHARACTERISTICS AROUND 10KM RADIUS

Total Worker Population Male	Total Worker Population Female	Main Working Population Male	Main Working Population Female	Main Cultivator Population Male	Main Cultivator Population Female	Main Agricultural Labourers Population Male	Main Agricultural Labourers Population Female	Non Working Population Male	Non Working Population Female
40764	34033	39253	31679	9371	9042	10927	14879	25384	31283

3.6.5 Basic Amenities

A better network of physical infrastructure facilities (well-built roads, rail links, irrigation, power and telecommunication, information technology, market-network and social infrastructure support, viz. health and education, water and sanitation, veterinary services and co-operative) is essential for development of the rural economy.

A review of infrastructure facilities available in the area has been given on the basis of field survey. In this study the villages which fall within 10 km radius around the site has been covered. Infrastructure facilities available in the area are presented below.

All basic amenities Education (higher education, colleges, universities, Medical college, Transport facilities, Railway station, Bus station area available in the district head quarters Namakkal at a distance of 25km – Southwest)

3.6.6 Recommendation and Suggestion

- Awareness program should be conducted to make the population aware to get education and a better livelihood.
- Health care centre and ambulance facility can be provided to the population to get easy and accessible medical facilities.
- Vocational training programme can be organized to make the people self - employed, particularly for women and unemployed youth.
- On the basis of qualification and skills local youths may be employed.
- Long term and short term employments can be generated.
- Maternity facility should be made available at the place to avoid going too far off places for treatment which involves risks. Apart from that as these areas are prone to various diseases a hospital with modern facilities should be opened on a priority basis in a central place to provide better health facilities to the villagers around the project.
- While developing an Action Plan, it is very important to identify the population who falls under the marginalized and vulnerable groups. So that special attention can be given to these groups with special provisions while making action plans.

3.6.7 Conclusion

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 employment to the local people there by improving the employment opportunity in the area and in turn the social standards will improve.

The nearby villages within 5kms radius has PHC, Anganwadi school, post office, telegram, Government and Private school, bus connectivity besides.

4. ANTICIPATED ENVIRONMENTAL IMPACTS ANDMITIGATION MEASURES

4.0 GENERAL

Environmental impacts both direct and indirect on various environmental attributes due to proposed mining activity will be created in the surrounding environment, during the operational and post–operational phases. The occurrence of mineral deposits, being site specific, their exploitation, often, does not allow for any choice except adoption of eco-friendly operation. The methods are required to be selected in such a manner, so as to maintain environmental equilibrium ensuring sustainable development.

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.

Several scientific techniques and methodologies are available to predict impacts of physical environment. Mathematical models are the best tools to quantitatively describe the cause and effect relationships between sources of pollution and different components of environment. In cases where it is not possible to identify and validate a model for a particular situation, predictions have been arrived at based on logical reasoning /consultation / extrapolation.

The following parameters are of significance in the Environmental Impact Assessment and are being discussed in detail

- Land environment
- Soil environment

Water Environment
Air Environment
Noise Environment
Socio economic environment
Biological Environment

Based on the baseline environmental status at the project site, the environmental factors that are likely to be affected (Impacts) are identified, quantified and assessed.

4.1 LAND ENVIRONMENT

4.1.1 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

4.1.2 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

4.1.3 Soil Environment

4.1.4 Impact on Soil Environment

Mining operations routinely modify the surrounding landscape by exposing previously undisturbed earthen materials. Erosion of top layer (gravel), extracted fine material can result in substantial sediment loading to surface waters and drainage ways. During rainy season surface run off may cause siltation in low lying areas. The top layer of the project site in the form of Gravel formation, the Gravel will be directly loaded into tippers and sold. There is no removal of topsoil anticipated.

4.1.5 Mitigation measures for Soil Erosion and Soil Conservation

- Garland drains will be constructed around the project area with silt traps to control the soil erosion during rainy seasons.
- Greenbelt development all along the periphery of the project area (i.e., 7.5 m and 10 m safety barrier) will ensure binding strength and minimizes soil erosion.
- Soil sampling will be carried out every six months to ensure the soil quality is not affected due to the quarrying activities.

4.2 WATER ENVIRONMENT

4.2.1 Anticipated Impact on Surface and ground water

The impact due to quarrying on the water quality is expected to be insignificant because of no use of chemicals or hazardous substances during quarrying process. The quarrying activity will not intersect ground water table as quarrying is proposed in the cluster quarries is 27m - 46m and water table is found at a depth of 55-60mBGL.

The quarrying operation will be carried out well above the water table. There is no intersection of surface water bodies (Streams, Canal, Odai etc.,) in the project area. During rainy season rain water will be collected in the quarry pit and later used for greenbelt development and for the water sprinkling in the haul roads. There is no proposal for discharging of quarry pit water outside the project area Rough stone processing

Detail of water requirements in KLD as given below:

TABLE 4.1: WATER REQUIREMENTSFOR THE CLUSTER

PROPOSAL – P1		
*Purpose	Quantity	Source
Dust Suppression	1.8 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	0.7 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.6 KLD	Water Tankers
Total	**3.0 KLD**	
PROPOSAL – P2		
*Purpose	Quantity	Source
Dust Suppression	1.8 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	0.37 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.74 KLD	Water Tankers
Total	**2.9 KLD**	
PROPOSAL – P3		
*Purpose	Quantity	Source
Dust Suppression	1.8 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	1.2 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.65 KLD	Water Tankers
Total	**3.7 KLD**	
PROPOSAL – P4		
*Purpose	Quantity	Source
Dust Suppression	1.80 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	0.27 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.64 KLD	Water Tankers
Total	**2.71 KLD**	
PROPOSAL – P5		
*Purpose	Quantity	Source
Dust Suppression	0.5 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	1.5 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.5 KLD	Water Tankers
Total	**2.5 KLD**	
PROPOSAL – P6		
*Purpose	Quantity	Source
Dust Suppression	1.0 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	1.0 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.5 KLD	Water Tankers
Total	**2.5 KLD**	
PROPOSAL – P7		
*Purpose	Quantity	Source
Dust Suppression	1.0 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	0.5 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.5 KLD	Water Tankers
Total	2 KLD	

* Water for drinking purpose will be brought from approved water vendors

4.2.2 Mitigation measures

- The following mitigation measures are suggested for water management for the cluster quarries Rainwater will be collected in lower part of the quarry pit by construction of garland drains to divert surface run-off and will be connected to setting tank of 5 m (l) x 5m (w) x 3m (d) to allow suspended solids to settle down if any. This collected water will act as a rain water harvesting system and will be used for dust suppression and greenbelt development.
- Six month once analysis of quarry pit water and ground water quality in nearby villages will be carried out to ensure the water quality is not affected due to the quarrying activities..
- Domestic sewage from site office & urinals/latrines provided in project area will be discharged through septic tank followed by soak pit system.
- Only clear and settled water free from silt content will be used for dust suppression and plantation purposes.
- De-silting will be carried out before and immediately after the monsoon season and the settling tank and drains will be cleaned weekly, especially during monsoons.
- Tippers & HEMM will be washed in a designated area and the washed water will be routed through drains to a settling tank, which has an oil & grease trap, only clear water will be reused for greenbelt development.

4.3 AIR ENVIRONMENT

The air borne particulate matter is the main air pollutant in this opencast mining. The mining operation will be carried out by jackhammer drilling (35mm dia) and Hydraulic Excavators will be utilized for excavation of Rough Stone and Gravel.

4.3.1. Anticipated Impact

Wind erosion of the exposed areas and the air borne particulate matter generated by quarrying operation, and transportation are mainly PM_{10}& $PM_{2.5}$ and emissions of Sulphur dioxide (SO_2) & Oxides of Nitrogen (NOx) due to excavation/loading equipment and vehicles plying on haul roads are the cause of air pollution in the project area.

Similarly, loading - unloading and transportation of Rough Stone and Gravel, wind erosion of the exposed area and movement of light vehicles will be a cause of pollution due to quarrying activities within a radius of 500 meters from the project area. This leads to a cumulative impact on the ambient air environment around the project area.

Anticipated incremental concentration due to this quarrying activity and net increase in emissions due to quarrying activities within 500 meters around the project area is predicted by Open Pit Source modelling using AERMOD Software.

4.3.2.1 Emission Estimation

An emissions factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant.
The general equation for emissions estimation is:

$$E = A \times EF \times (1-ER/100)$$

Where:
E = emissions;
A = activity rate;
EF = emission factor, and
ER =overall emission reduction efficiency, %

The proposed mining activity includes various activities like ground preparation, excavation, handling and transport of ore. These activities have been analysed systematically basing on USEPA-Emission Estimation Technique

Manual, for Mining AP-42, to arrive at possible emissions to the atmosphere and estimated emissions are given in Table 4-2.

TABLE 4.2: ESTIMATED EMISSION RATE FOR PM_{10}

Activity	Source type	Value							Unit
		P1	P2	P3	P4	P5	P6	P7	
Drilling	Point Source	0.071115466	0.067708712	0.061607366	0.066176819	0.046497200	0.060279287	0.092011532	g/s
Blasting	Point Source	0.000439982	0.000344221	0.000214673	0.000307004	0.000052571	0.000192511	0.001595239	g/s
Mineral Loading	Point Source	0.040379086	0.039728147	0.037482739	0.038460610	0.034401210	0.037660928	0.043190588	g/s
Haul Road	Line Source	0.002488186	0.002487282	0.002485022	0.002485863	0.002483373	0.002485161	0.002493974	g/s/m
Overall Mine	Area Source	0.038912854	0.038781411	0.044015799	0.037047186	0.040557139	0.051013014	0.049593217	g/s

TABLE 4.3: ESTIMATED EMISSION RATE FOR SO_2

Activity	Source type	Value							Unit
		P1	P2	P3	P4	P5	P6	P7	
Overall Mine	Area Source	0.0003754	0.000319738	0.000194657	0.000239624	8.01372E-05	0.000207061`	0.000790404	g/s

TABLE 4.4: ESTIMATED EMISSION RATE FOR NO_X

Activity	Source type	Value							Unit
		P1	P2	P3	P4	P5	P6	P7	
Overall Mine	Area Source	0.000009064	0.000007703	0.000006316	0.000005248	0.000002186	0.000009359	0.000031763	g/s

4.3.2 Frame work of Computation & Model details

By using the above-mentioned inputs, ground level concentrations due to the quarrying activities have been estimated to know the incremental concentration in ambient air quality and impact in the study area. The effect of air pollutants upon receptors are influenced by concentration of pollutants and their dispersion in the atmosphere. Air quality modelling is an important tool for prediction, planning and evaluation of air pollution control activities besides identifying the requirements for emission control to meet the regulatory standards and to apply mitigation measures to reduce impact caused by quarrying activities. PM_{10} was the major pollutant occurred during quarrying activities. The prediction included the impact of Excavation, Drilling, Blasting, loading and movement of vehicles during transportation and meteorological parameters such as wind speed, wind direction, temperature, rainfall, humidity and Cloud cover.

Impact was predicted over the distance of 10 km around the source to assess the impact at each receptor separately at the various locations and maximum incremental GLC value at the project site. Maximum impact of PM_{10} was observed close to the source due to low to moderate wind speeds. Incremental value of PM_{10} was superimposed on the base line data monitored at the proposed site to predict total GLC of PM_{10} due to combined impacts

FIGURE 4.1: AERMOD TERRAIN MAP

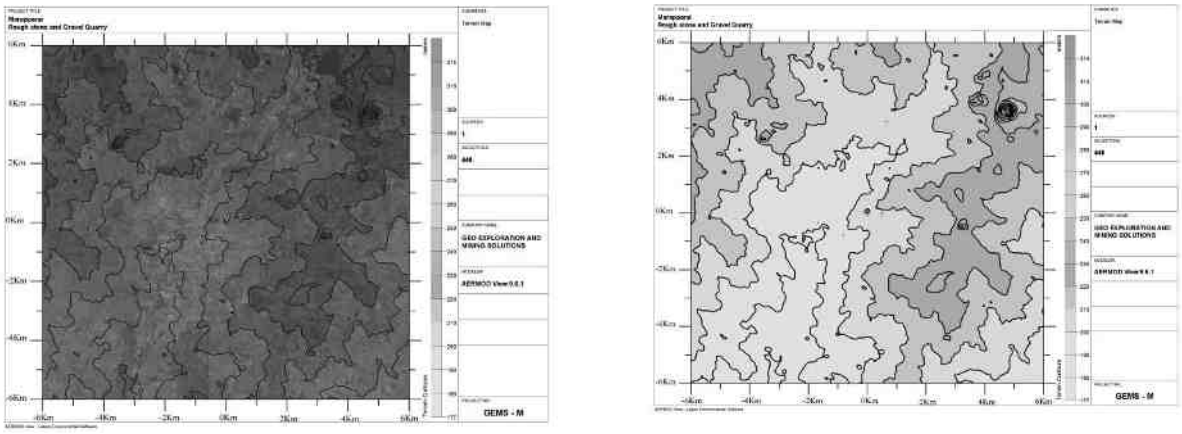


FIGURE 4.2: PREDICTED INCREMENTAL CONCENTRATION OF PM_{10}

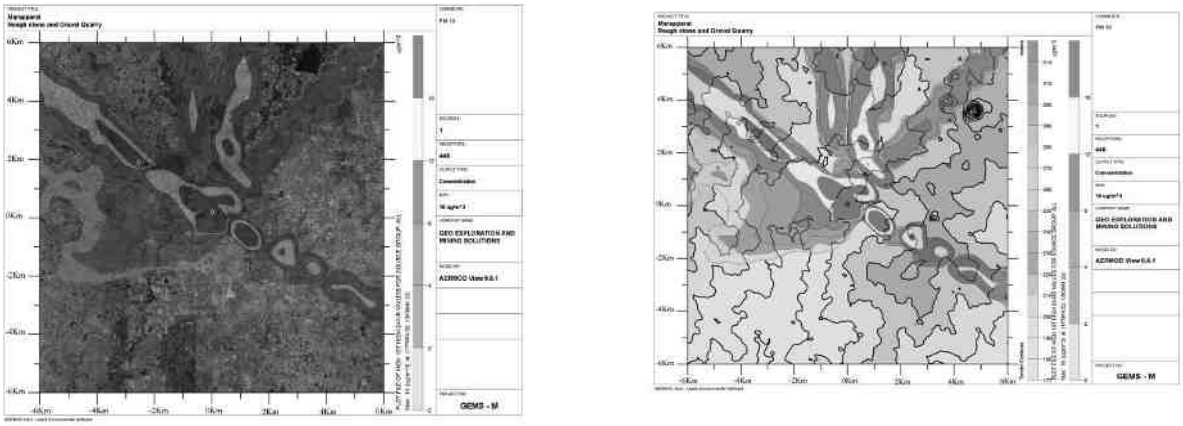


FIGURE 4.3: PREDICTED INCREMENTAL CONCENTRATION OF SO_2

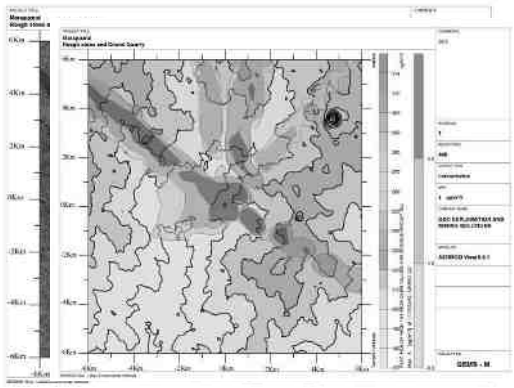
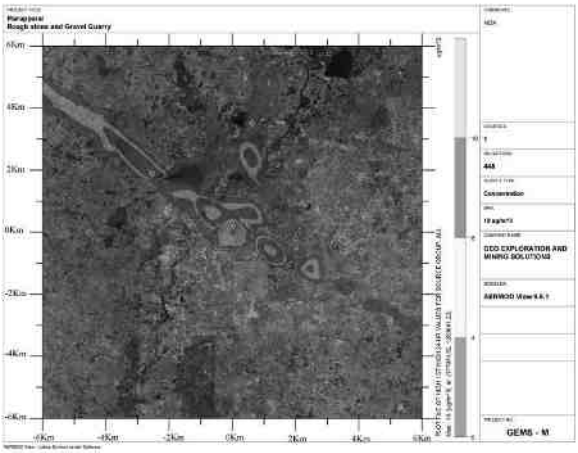
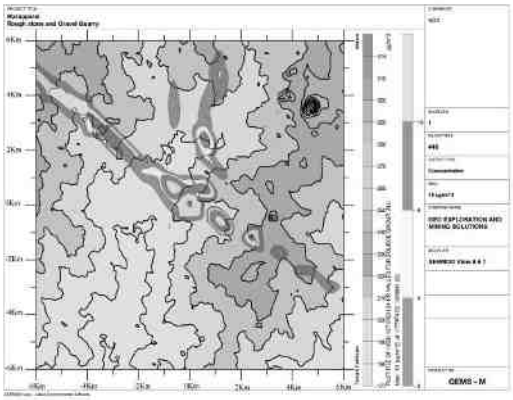


FIGURE 4.4: PREDICTED INCREMENTAL CONCENTRATION OF NO_x





4.3.2.1 Model Results

The post project Resultant Concentrations of PM10, PM2.5, SO2& NOX (GLC) is given in Table below:

TABLE 4.5: INCREMENTAL & RESULTANT GLC OF PM_{10}

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline PM_{10} ($\mu g/m^3$)	Incremental value of PM_{10} due to mining ($\mu g/m^3$)	Total PM_{10} ($\mu g/m^3$) (5+6)
AAQ1	11°25'2.71"N 78°02'58.70"E	32	-60	45.59	16.89	62.48
AAQ2	11°24'38.77"N 78°02'31.61"E	-794	-799	44.68	7.62	52.3
AAQ3	11°25'3.89"N 78° 3'13.88"E	498	-19	43.10	16.05	59.15
AAQ4	11°25'57.11"N 78°01'34.86"E	-2534	1632	43.84	10.23	54.07
AAQ5	11°24'55.85"N 78° 0'29.46"E	-4538	-273	42.66	1.12	43.78
AAQ6	11°22'39.64"N 78°04'22.45"E	2601	-4499	39.49	0	39.49
AAQ7	11°26'49.32"N 78° 3'17.90"E	556	3253	41.39	14.56	55.95

TABLE 4.6: INCREMENTAL & RESULTANT GLC OF $PM_{2.5}$

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline $PM_{2.5}$ ($\mu g/m^3$)	Incremental value of $PM_{2.5}$ due to mining ($\mu g/m^3$)	Total $PM_{2.5}$ ($\mu g/m^3$) (5+6)
AAQ1	11°25'2.71"N 78°02'58.70"E	32	-60	21.76	9.87	31.63
AAQ2	11°24'38.77"N 78°02'31.61"E	-794	-799	23.98	6.18	30.16
AAQ3	11°25'3.89"N 78° 3'13.88"E	498	-19	19.43	9.06	28.49
AAQ4	11°25'57.11"N 78°01'34.86"E	-2534	1632	19.37	8.12	27.49
AAQ5	11°24'55.85"N 78° 0'29.46"E	-4538	-273	18.94	1.25	20.19
AAQ6	11°22'39.64"N 78°04'22.45"E	2601	-4499	17.99	0	17.99
AAQ7	11°26'49.32"N 78° 3'17.90"E	556	3253	20.27	7.89	28.16

TABLE 4.7: INCREMENTAL & RESULTANT GLC OF SO_2

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline So_2 ($\mu g/m^3$)	Incremental value of So_2 due to mining ($\mu g/m^3$)	Total So_2 ($\mu g/m^3$) (5+6)
AAQ1	11°25'2.71"N 78°02'58.70"E	32	-60	7.96	3.46	11.42
AAQ2	11°24'38.77"N 78°02'31.61"E	-794	-799	7.22	1.25	8.47
AAQ3	11°25'3.89"N 78° 3'13.88"E	498	-19	6.49	3.0	9.49
AAQ4	11°25'57.11"N 78°01'34.86"E	-2534	1632	6.62	2.25	8.87
AAQ5	11°24'55.85"N 78° 0'29.46"E	-4538	-273	5.98	0	5.98
AAQ6	11°22'39.64"N 78°04'22.45"E	2601	-4499	4.50	0	4.50
AAQ7	11°26'49.32"N 78° 3'17.90"E	556	3253	5.46	1.76	7.22

TABLE 4.8: INCREMENTAL & RESULTANT GLC OF NO_X

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline Nox ($\mu g/m^3$)	Incremental value of Nox due to mining ($\mu g/m^3$)	Total Nox ($\mu g/m^3$) (5+6)
AAQ1	11°25'2.71"N 78°02'58.70"E	32	-60	24.45	10.36	34.81
AAQ2	11°24'38.77"N 78°02'31.61"E	-794	-799	20.39	0	20.39
AAQ3	11°25'3.89"N 78° 3'13.88"E	498	-19	17.66	9.01	26.67
AAQ4	11°25'57.11"N 78°01'34.86"E	-2534	1632	18.09	3.52	21.61
AAQ5	11°24'55.85"N 78° 0'29.46"E	-4538	-273	19.68	0	19.68
AAQ6	11°22'39.64"N 78°04'22.45"E	2601	-4499	16.86	0	16.86
AAQ7	11°26'49.32"N 78° 3'17.90"E	556	3253	18.67	2.69	21.36

TABLE 4.8: INCREMENTAL & RESULTANT GLC OF Of FUGITIVE

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline Fugitive ($\mu g/m^3$)	Incremental value of Fugitive due to mining ($\mu g/m^3$)	Total Fugitive ($\mu g/m^3$) (5+6)
AAQ1	11°25'2.71"N 78°02'58.70"E	32	-60	69.42	30.05	99.47
AAQ2	11°24'38.77"N 78°02'31.61"E	-794	-799	66.85	0	66.85
AAQ3	11°25'3.89"N 78° 3'13.88"E	498	-19	65.87	7.39	73.26
AAQ4	11°25'57.11"N 78°01'34.86"E	-2534	1632	65.85	0	65.85
AAQ5	11°24'55.85"N 78° 0'29.46"E	-4538	-273	64.51	0	64.51
AAQ6	11°22'39.64"N 78°04'22.45"E	2601	-4499	**61.45**	0	61.45
AAQ7	11°26'49.32"N 78° 3'17.90"E	556	3253	**62.67**	0	62.67

From the resultant of cumulative concentration i.e., Background + Incremental Concentration of pollutant in all the receptor locations without effective mitigation measures are still within the prescribed NAAQ limits of 100, 80 & 80 $\mu g/m^3$ for PM_{10},SO_2 & NO_X respectively. By adopting suitable mitigation measures, the pollutant levels in the atmosphere can be further being controlled.

4.3.4. 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 include 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 taurpaulin
- 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 road 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 area

Occupational Health –

- Dust mask will be provided to the workers and their use will be strictly monitored
- Annual medical checkups, trainings and campaigns will be arranged to ensure awareness about importance of wearing dust masks among all mine workers & tipper drivers
- Ambient Air Quality Monitoring will be conducted six month once to assess effectiveness of mitigation measures proposed

4.4 NOISE ENVIRONMENT

Noise pollution is mainly due to operation like drilling & blasting and plying of trucks& HEMM. These activities will not cause any problem to the inhabitants of this area because there is no human settlement in close proximity to the project area. Noise modelling has been carried out considering blasting and compressor operation (drilling) and transportation activities.

Predictions have been carried out to compute the noise level at various distances around the working pit due to these major noise-generating sources. Noise modelling has been carried out to assess the impact on surrounding ambient noise levels.

Basic phenomenon of the model is the geometric attenuation of sound. Noise at a point generates spherical wave, which are propagated outwards from the source through the air at a speed of 1,100 ft/sec, with the first wave making an ever-increasing sphere with time. As the wave spreads the intensity of noise diminishes as the fixed amount of energy is spread over an increasing surface area of the sphere. The assumption of the model is based on point source relationship i.e., for every doubling of the distance the noise levels are decreased by 6 dB(A).

For hemispherical sound wave propagation through homogeneous loss free medium, one can estimate noise levels at various locations at different sources using model based on first principle.

$$Lp_2 = Lp_1 - 20 \log (r_2/r_1) - Ae_{1,2}$$

Where:

Lp_1& Lp_2 are sound levels at points located at distances r_1& r_2 from the source.

$Ae_{1,2}$ is the excess attenuation due to environmental conditions. Combined effect of all sources can be determined at various locations by logarithmic addition.

$$Lp_{total} = 10 \log \{10^{(Lp1/10)} + 10^{(Lp2/10)} + 10^{(Lp3/10)} + \ldots\ldots\}$$

4.4.1Anticipated Impact

Attenuation due to Green Belt has been taken to be 4.9 dB (A).The inputs required for the model are:

- Source data
- Receptor data
- Attenuation factor

Source data has been computed taking into account of all the machinery and activities used in the mining process. Same has been listed in Table 4-8.

TABLE 4.9: ACTIVITY AND NOISE LEVEL PRODUCED BYMACHINERY

Sl.No.	Machinery / Activity	Impact on Environment?	Noise Produced in dB(A) at 50 ft from source*
1	Blasting	Yes	94
2	Jack Hammer	Yes	88
3	Compressor	No	81
4	Excavator	No	85
5	Tipper	No	84
Total Noise Produced			95.8

*50 feet from source = 15.24 meters

Source: U.S. Department of Transportation (Federal Highway Administration) – Construction Noise Handbook

The total noise to be produced by mining activity is calculated to be 95.8 dB(A). Generally most mining operations produce noise between 100-109 dB(A). We have considered equipment and operation noise levels (max) to be approx. 109 dB(A) for nose prediction modelling.

TABLE 4.10: PREDICTED NOISE INCREMENTAL VALUES

Location ID	N1	N2	N3	N4	N5	N6	N7
Maximum Monitored Value (Day) dB(A)	56.7	58.1	55.2	52.4	49.5	59.6	51.8
Incremental Value dB(A)	46.8	47.8	44.3	47.4	50.3	48.1	50.3
Total Predicted Noise level dB(A)	57.1	58.5	55.5	53.6	52.9	59.9	54.1

The incremental noise level is found within the range of 46.8 – 47.8 dB (A) in Core Zone and 44.3 –50.3 dB(A) in Buffer zone. The noise level at different receptors in buffer zone is lower due to the distance involved and other topographical features adding to the noise attenuation. The resultant Noise level due to monitored values and calculated values at the receptors are based on the mathematical formula considering attenuation due to Green Belt as 4.9 dB (A)the barrier effect. From the above table, it can be seen that the ambient noise levels at all the locations are within permissible limits of Industrial area (core zone) &Residential area (buffer zone) as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000(The Principal Rules were published in the Gazette of India, vide S.O.123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E),dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment(Protection) Act, 1986.).

4.4.2 Mitigation measures for Control of Noise

The following noise mitigation measures are proposed for control of Noise

- 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 though training and awareness.
- Regular medical check–up and proper training to personnel to create awareness about adverse noise level effects.

4.4.3 Ground Vibrations

Ground vibrations due to the proposed mining activities are anticipated due to operation of Mining Machines like Excavators, drilling and blasting, transportation vehicles, etc., However, the major source of ground vibration from the quarry is blasting. The major impact of the ground vibrations is observed on the domestic houses located in the villages nearby the mine lease area. The kuchha houses are more prone to cracks and damage due to the vibrations induced by blasting whereas RCC framed structures can withstand more ground vibrations. Apart from this, the ground vibrations may develop a fear factor in the nearby settlements.

Another impact due to blasting activities is fly rocks. These may fall on the houses or agricultural fields nearby the mining lease area and may cause injury to persons or damage to the structures. Nearest habitation from the proposed project areas are listed in below table. The ground vibrations due to the blasting in the quarry are calculated using the empirical equation.

The empirical equation for assessment of peak particle velocity (PPV) is:

$$V = K [R/Q^{0.5}]^{-B}$$

Where –

V = peak particle velocity (mm/s)

K = site and rock factor constant

Q = maximum instantaneous charge (kg)

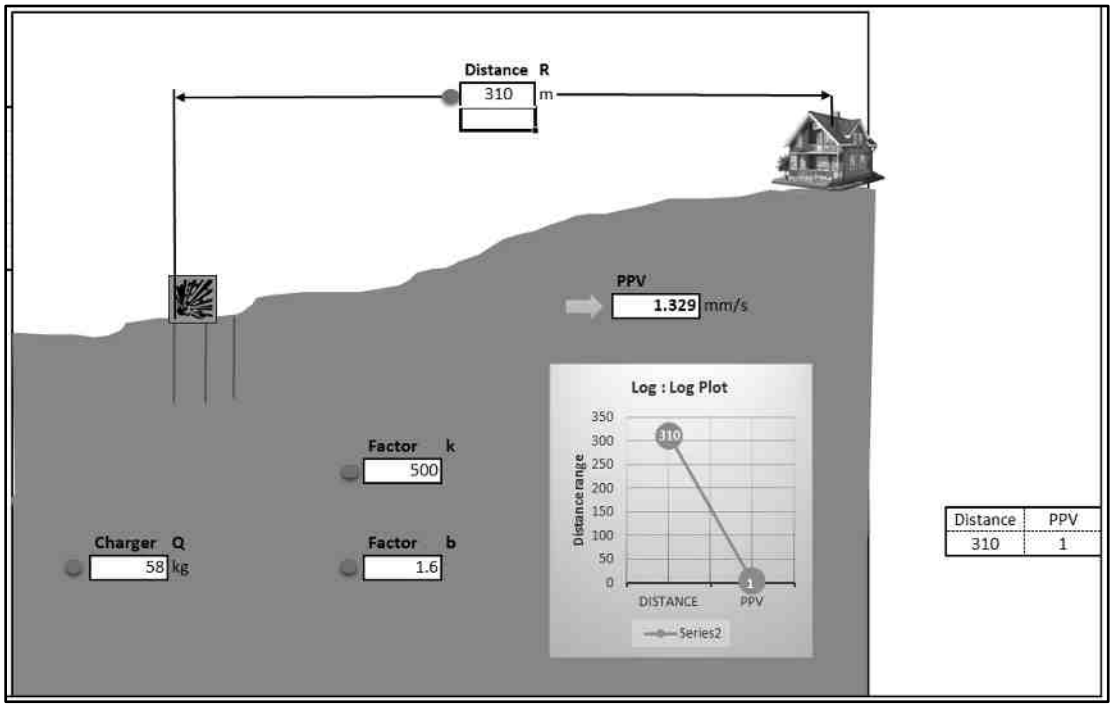
B = constant related to the rock and site (usually 1.6)

R = distance from charge (m)

TABLE 4.11: PREDICTED PPV VALUES DUE TO BLASTING

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	33	460	0.450
P2	33	410	0.541
P3	25	620	0.224
P4	31	430	0.477
P5	10	310	0.326
P6	21	400	0.392
P7	58	310	1.329

FIGURE 4.5: GROUND VIBRATION PREDICTION



From the above graph, the charge per blast of 58 kg is well below the Peak Particle Velocity of 8 mm/s as per Directorate General of Mines Safety for safe level criteria through Circular No. 7 dated 29/8/1997. But the proponent ensures that the charge per blast shall be less than 100 kg. However, as per statutory requirement control measures will be adopted to avoid the impacts due to ground vibrations and fly rocks due to blasting.

4.4.3.1 Mitigation measures for Control of Vibration

- The blasting operations in the mine are proposed to be carried out without deep hole drilling and blasting using delay detonators, which reduces the ground vibrations;
- Proper quantity of explosive, suitable stemming materials and appropriate delay system will be adopted to avoid overcharging and for safe blasting;
- Adequate safe distance from blasting will be maintained as per DGMS guidelines;
- Blasting shelter will be provided as per DGMS guidelines;
- Blasting operations will be carried out only during day time;
- The charge per delay will be minimized and preferably more number of delays will be used per blasts;
- During blasting, other activities in the immediate vicinity will be temporarily stopped;
- Drilling parameters like depth, diameter and spacing will be properly designed to give proper blast;
- A fully trained explosives blast man (Mining Mate, Mines Foreman, 2ndClass Mines Manager/ 1stClass Mines Manager) will be appointed.
- A set of shot firing rules will be drawn up and blasting shall commence outlining the detailed operating procedures that will be followed to ensure that shot firing operations on site take place without endangering the workforce or public.
- Sufficient angular stemming material will be used to confine the explosive force and minimise environmental disturbance caused by venting / misfire.
- The detonators will be connected in a predetermined sequence to ensure that only one charge is detonated at any one time and a NONEL or similar type initiation system will be used.
- The detonation delay sequence shall be designed so as to ensure that firing of the holes is in the direction of free faces so as to minimise vibration effects.
- Appropriate blasting techniques shall be adopted such that the predicted peak particle velocity shall not exceed 8 Hz.
- Vibration monitoring will be carried out every 6 months to check the efficacy of blasting practices .

4.5 ECOLOGY AND BIODIVERSITY

4.5.1 Impact on Ecology and Biodiversity

The impact on biodiversity is difficult to quantify because of its diverse and dynamic characteristics, mining activities generally result in the deforestation, land degradation, water, air and noise pollution which directly or indirectly affect the faunal and floral status of the project area. However, occurrence and magnitude of these impacts are entirely dependent upon the project location, mode of operation and technology involved. Impact prediction is the main footstep in impact evaluation and identifies project actions that are likely to bring significant changes in the project environment. The present study was carried out to predict the likely impacts of the cluster quarries at Marapparai & Paruthipalli village and the surrounding environment with special reference to biological attributes covering habitats/ecosystems and associated biodiversity.

The Existing and proposed mining activities include removal of some scattered bushes and other thorny species. Although impacts on key habitat elements will occur on a local scale, but on a regional scale they would not be critical for the life cycle needs of the species observed or expected. Moreover during conceptual stage, the mined out areas on the top bench will be re-vegetated by planting local /native species and lower benches will be converted into rainwater harvesting structure following completion of mining activities, which will replace habitat resources for fauna species in this locality over a longer time. Existing roads will be used; new roads will not be constructed to reduce impact on flora.

Wild life is not commonly found in the cluster area and its immediate environs because of lack of vegetal cover and surface water. Except few domestic animals, reptiles, hares and some common birds are observed in the study area.

4.5.2 Mitigation measures

Keeping all this in mind the mitigations have been suggested under environmental management plan. With the understanding of the role of plant species as bio-filter to control air pollution, appropriate plant species (mainly tree species) have been suggested conceding the area/site requirements and needed performance of specific species. The details of year wise proposed plantation program are given in Table 4.10.

In order to compensate the loss of vegetation cover, it is suggested to carry out afforestation program mainly in proposed mine lease area earmarked for plantation program as per Approved Mining Plan in different phases. This habitat improvement program would ensure the faunal species to re-colonize and improve the abundance status in the core zone.

4.5.2.1. Species Recommendation for Plantation granted in the District

Following points have been considered while recommending the species for plantation:

- Natural growth of existing species and survival rate of various species.
- Suitability of a particular plant species for a particular type of area.
- Creating of biodiversity.
- Fast growing, thick canopy copy, perennial and evergreen large leaf area.
- Efficient in absorbing pollutants without major effects of natural growth.
- The following species may be considering primary for plantation best suited for the prevailing climate condition in the area.

TABLE 4.12: RECOMMENDED SPECIES FOR GREENBELT DEVELOPMENT PLAN

SI.No	Name of the plant (Botanical)	Family Name	Common Name	Habit
1	*Azadirachta indica*	Meliaceae	Neem, Vembu	Tree
2	*Albiziafalcatoria*	Fabaceae	Tamarind, Puliyamaram	Tree
3	*Polyalthialongifolia*	Annonaceae	Kattumaram	Tree
4	*Borassus Flabellifer*	Arecaceae	Palmyra Palm	Tree

The 7.5m Safety distance along the boundary has been identified to be utilized for subsequent Afforestation. However, the afforestation should always be carried out in a systematic and scientific manner. Regional trees like Neem, Pongamia, Pinnata, and Casuarina will be planted along the Lease boundary and avenue plantation will be carried out in respective proposed projects. The rate of survival expected to be 80% in this area. Afforestation Plan is given in Table No.4.13 and budget of green belt development plan are given in Table No.4.14.

TABLE 4.13: GREEN BELT DEVELOPMENT PROGRAMME

PROPOSAL – P1					
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
I	25	80%	220	Neem, Pongamia Pinnata, Casuarina etc.,	20
II	25	80%	220		20
III	25	80%	220		20
IV	25	80%	220		20
V	25	80%	220		20
PROPOSAL – P2					
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
I	25	80%	240	Neem, Pongamia Pinnata, Casuarina etc.,	20
II	25	80%	240		20
III	25	80%	240		20
IV	25	80%	240		20
V	25	80%	240		20
PROPOSAL – P3					

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
I	75	80%	700	Neem, Pongamia Pinnata, Casuarina etc.,	60
II	75	80%	700		60
III	75	80%	700		60
IV	75	80%	700		60
V	75	80%	700		60
PROPOSAL – P4					
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
I	30	80%	300	Neem, Pongamia Pinnata, Casuarina etc.,	24
II	30	80%	300		24
III	30	80%	300		24
IV	30	80%	300		24
V	30	80%	300		24
PROPOSAL – P5					
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
I	90	80%	834	Neem, Pongamia Pinnata, Casuarina etc.,	72
II	90	80%	834		72
III	90	80%	834		72
IV	90	80%	834		72
V	90	80%	834		72
PROPOSAL – P6					
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
I	64	80%	576	Neem, Pongamia Pinnata, Casuarina etc.,	51
II	64	80%	576		51
III	64	80%	576		51
IV	64	80%	576		51
V	64	80%	576		51
PROPOSAL – P7					
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
I	50	80%	442	Neem, Pongamia Pinnata, Casuarina etc.,	40
II	50	80%	442		40
III	50	80%	442		40
IV	50	80%	442		40
V	50	80%	442		40

Source: Approved Mining Plan

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.

During plantation development, the following aspects are considered in different areas:

A) Green belt around safety barriers:

- Tall growing, closely spaced, evergreen trees native to the area.
- Easy, quick early growth and establishment.
- Uniform spreading of crown habit.
- Trees with high foliage density, with long canopy leaves
- Attractive appearance with both good flowering and fruit bearing.
- Bird and insect attracting species.
- Suitable green cover with minimal maintenance.

B) Avenue Trees on Haul road:

- Trees with conical canopy and with attractive flowering.
- Trees with medium spreading branches to avoid obstruction to the traffic.
- Trees with branching at 10 feet and above.

4.6 SOCIO ECONOMIC

The socio-economic impacts of mining are many. Impacts of a mine project may be positive or Negative. The adverse impacts attribute to physical displacement due to land acquisition, which is followed by loss of livelihood, mental agony, changes in social structure, and risk to food security etc., People are also directly affected due to pollution. Social Impact Assessment (SIA) is a process of analysis, monitoring and managing the social consequences of a project. Study on Socio-economic status has already been carried out using primary socio-economic survey for generating the baseline data of Socio-economic status.

4.6.1 Anticipated Impact

From the primary Socio-economic survey & through secondary data available from established literature and census data 2011, it is found that there would be positive impact on Socio-economic condition of the nearby area. There is no habitation within 300 m of the proposed mining lease area. Therefore, no major impact is anticipated on the nearby habitation during the entire life of the mine

4.6.2 Mitigation Measures

- Mining in this cluster quarries area will give job opportunities to122 Nos of the local people. Local people mainly depend upon agricultural and horticultural productions, where the income is irregular and low. Jobs in the mines will increase their per capita income and improve the life style of the people.
- With the operation of proposed mining lease, various indirect employment opportunities will also be generated. Several persons of the neighbouring villages will be benefited with contract works, employment through contractors, running jeeps, trucks, tractors and buses on hire, running canteens, different kinds of shops and transport related business avenues.
- Local Villagers will be provided with either direct employment or indirect employment such as business, contract works and development work like roads etc. Villagers also get access to the other welfare amenities such as drinking water, foods and provisions, shed etc.,
- .Benefit to the State and the Central governments through financial revenues by way of royalty, tax, duties, etc.., from this project directly and indirectly.
- Proper arrangements will be made for safe and healthy conditions such as dust suppression during loading, unloading & transporting, etc. Development of allied business centres and other small scale industries will help to improve social standards of the surrounding villagers
- Mine management will contribute for the upliftment of these villages by conducting regular medical camps, assistance in developing necessary infrastructure facilities like maintenance of schools, village roads, drinking water supply, etc**.**

4.7 OCCUPATIONAL HEALTH AND SAFETY

Occupational health and safety hazards occur during the operational phase of mining and primarily include the following:

- Respiratory hazards
- Noise
- Physical hazards
- Explosive storage and handling

4.7.1 Respiratory Hazards

Long-term exposure to silica dust may cause silicosis the following measures are proposed:

- Cabins of excavators and tippers will be enclosed with AC and sound proof
- Use of personal dust masks will be made compulsory

4.7.2 Noise

Workers are likely to get exposed to excessive noise levels during mining activities. The following measures are proposed for implementation

- No employee will be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection
- The use of hearing protection will be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound levels reach 140 dB(C), or the average maximum sound level reaches 110 dB(A)
- Ear muffs provided will be capable of reducing sound levels at the ear to at least 85 dB(A)
- Periodic medical hearing checks will be performed on workers exposed to high noise levels

4.7.3 Physical Hazards

The following measures are proposed for control of physical hazards

- Specific personnel training on work-site safety management will be taken up;
- Work site assessment will be done by rock scaling of each surface exposed to workers to prevent accidental rock falling and / or landslide, especially after blasting activities;
- Natural barriers, temporary railing, or specific danger signals will be provided along rock benches or other pit areas where work is performed at heights more than 2m from ground level;
- Maintenance of yards, roads and footpaths, providing sufficient water drainage and preventing slippery surfaces with an all-weather surface, such as coarse gravel will be taken up

4.7.4 Occupational Health Survey

All the persons will undergo pre-employment and periodic medical examination. Employees will be monitored for occupational diseases by conducting the following tests

- General physical tests
- Audiometric tests
- Full chest, X-ray, Lung function tests, Spirometric tests
- Periodic medical examination – yearly
- Lung function test – yearly, those who are exposed to dust
- Eye test

Essential medicines will be provided at the site. The medicines and other test facilities will be provided at free of cost. The first aid box will be made available at the mine for immediate treatment.

First aid training will be imparted to the selected employees regularly. The lists of first aid trained members shall be displayed at strategic places.

4.8 MINE WASTE MANAGEMENT

As per approved mining plan there is practically no solid waste and overburden in present mining area. The mining area lies on plain terrain having rocky exposure and has no soil cover; therefore storage of soil is not required. And the proposed recovery is 100% and there is no waste anticipated for storage or removal.

4.9 MINE CLOSURE

Mine closure plan is the most important environmental requirement in mineral mining projects. The mine closure plan should cover technical, environmental, social, legal and financial aspects dealing with progressive and post closure activities. The closure operation is a continuous series of activities starting from the decommissioning of the project. Therefore, progressive mine closure plan should be specifically dealt with in the mining plan and is to be reviewed every five years in the scheme of mining. As progressive mine closure is a continuous series of activities, it is obvious that the proposals of scientific mining have included most of the activities to be included in the closure plan. While formulating the closure objectives for the site, it is important to consider the existing or the pre-mining land use of the site; and how the operation will affect this activity.

The primary aim is to ensure that the following broad objectives along with the abandonment of the mine can be successfully achieved:

- To create a productive and sustainable after-use for the site, acceptable to mine owners, regulatory agencies, and the public
- To protect public health and safety of the surrounding habitation
- To minimize environmental damage
- To conserve valuable attributes and aesthetics
- To overcome adverse socio-economic impacts.

4.9.1 Mine Closure criteria

The criteria involved in mine closure are discussed below:

4.9.1.1 Physical Stability

All anthropogenic structures, which include mine workings, buildings, rest shelters etc., remaining after mine decommissioning should be physically stable. They should present no hazard to public health and safety as a result of failure or physical deterioration and they should continue to perform the functions for which they were designed. The design periods and factors of safety proposed should take full account of extreme events such as floods, hurricane, winds or earthquakes, etc. and other natural perpetual forces like erosion, etc.

4.9.1.2 Chemical Stability

The solid wastes on the mine site should be chemically stable. This means that the consequences of chemical changes or conditions leading to leaching of metals, salts or organic compounds should not endanger public health and safety nor result in the deterioration of environmental attributes. If the pollutant discharge likely to cause adverse impacts is predicted in advance, appropriate mitigation measures like settling of suspended solids or passive treatment to improve water quality as well as quantity, etc. could be planned. Monitoring should demonstrate that there is no adverse effect of pollutant concentrations exceeding the statutory limits for the water, soil and air qualities in the area around the closed mine.

4.9.1.3 Biological Stability

The stability of the surrounding environment is primarily dependent upon the physical and chemical characteristics of the site, whereas the biological stability of the mine site itself is closely related to rehabilitation and final land use. Nevertheless, biological stability can significantly influence physical or chemical stability by stabilizing soil cover, prevention of erosion/wash off, leaching, etc.

A vegetation cover over the disturbed site is usually one of the main objectives of the rehabilitation programme, as vegetation cover is the best long-term method of stabilizing the site. When the major earthwork components of the rehabilitation programme have been completed, the process of establishing a stable vegetation community begins. For re-vegetation, management of soil nutrient levels is an important consideration. Additions of nutrients are useful under three situations.

- Where the nutrient level of spread topsoil is lower than material in-situ e.g. for development of social forestry
- Where it is intended to grow plants with a higher nutrient requirement than those occurring naturally e.g. planning for agriculture
- Where it is desirable to get a quick growth response from the native flora during those times when moisture is not a limiting factor e.g. development of green barriers

The Mine closure plan should be as per the approved mine plan. The mine closure is a part of approved mine plan and activities of closure shall be carried out as per the process described in mine closure plan (Annexure I)

5. ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

5.1 INTRODUCTION

Consideration of alternatives to a project proposal is a requirement of EIA process. During the scoping process, alternatives to a proposal can be considered or refined, either directly or by reference to the key issues identified. A comparison of alternatives help to determine the best method of achieving the project objectives with minimum environmental impacts or indicates the most environmentally friendly and cost effective options.

5.2 FACTORS BEHIND THE SELECTION OF PROJECT SITE

Marapparai & Paruthipalli Rough Stone and Gravel Quarry Project at Marapparai & Paruthipalli Village is a mining project for excavation of Charnockite deposit, which is mineral specific. The proposed mining lease area has following advantages:-

- The mineral deposit occurs in a non-forest area.
- There is no habitation within the applied lease area; hence no R & R issues exist.
- There are no river, stream, nallah and water bodies in the applied mine lease area.
- Availability of skilled, semi-skilled and unskilled workers in this region.
- All the basic amenities such as medical, firefighting, education, transportation, communication and infrastructural facilities are accessible.
- Mine connectivity through road and rail is good.
- The proposed mining operations do not intersect the ground water level. Hence, no impact on ground water environment.
- Study area falls in seismic zone – III, however there is no major history of landslides, earthquake, subsidence etc.

5.3 ANALYSIS OF ALTERNATIVE SITE

No alternatives are suggested as the mine site is mineral specific

5.4 FACTORS BEHIND SELECTION OF PROPOSED TECHNOLOGY

Mechanized open cast mining operation with drilling and blasting method will be used to extract Rough Stone and Gravel in the area. The applied mining lease area has following advantages –

- There is practically very thin or negligible soil cover and overburden is in form of Gravel formation which is also saleable; and the Charnockite can be extracted by small scale drilling (5ft drill holes) and blasting .
- As the mineral deposition is homogeneous and batholith formation, therefore opencast method of working out deposit is preferred over underground method
- There is lesser chance of subsidence in case of opencast mining.
- The material will be loaded with the help of excavators into dumpers / trippers and transported to the needy customers.
- The production levels projected in the mining plan requires mechanization to cater these volumes. This technology is economically viable.
- Blasting and availability of drills along with controlled blasting technology gives desired fragmentation so that the mineral is handled safely and used without secondary blasting.
- Availability of power resources in the region makes mechanization a preferred technology over manual method.
- Human resource is easily available from the nearby villages because of presence of other mines in the area.

5.5 ANALYSIS OF ALTERNATIVE TECHNOLOGY

Open cast mechanized method has been selected for this project. This technology is having least gestation period, economically viable, safest and less labour intensive. The method has inbuilt flexibility for increasing or decreasing the production as per market condition.

6. ENVIRONMENTAL MONITORING PROGRAMME

6.0 GENERAL

The monitoring and evaluation of environmental parameters indicates potential changes occurring in the environment, which paves way for implementation of rectifying measures wherever required to maintain the status of the natural environment. Evaluation is also a very effective tool to judge the effectiveness or deficiency of the measures adopted and provides insight for future corrections.

The main objective of environmental monitoring is to ensure that the obtained results in respect of environmental attributes and prevailing conditions during operation stage are in conformity with the prediction during the planning stage. In case of substantial deviation from the earlier prediction of results, this forms as base data to identify the cause and suggest remedial measures. Environmental monitoring is also mandatory to meet compliance of statutory provisions under the Environment (Protection) Act, 1986, relevant conditions regarding monitoring covered under EC orders issued by the SEIAA as well as the conditions set forth under the order issued by Tamil Nadu Pollution Control Board while granting CTE/CTO.

6.1 METHODOLOGY OF MONITORING MECHANISM

Implementation of EMP and periodic monitoring will be carried out by Project Proponent. A comprehensive monitoring mechanism has been devised for monitoring of impacts due to proposed project; Environmental protection measures like dust suppression, control of noise and blast vibrations, maintenance of machinery and vehicles, housekeeping in the mine premises, plantation, implementation of Environmental Management Plan and environmental clearance conditions will be monitored by the Mine Management. On the other hand, implementation of area level protection measures like plantation and green belt development, environmental quality monitoring etc., are taken up by a senior executive who reports Mine Management.

An Environment monitoring cell (EMC) will be constituted to monitor the implementation of EMP and other environmental protection measures.

The responsibilities of this cell will be:

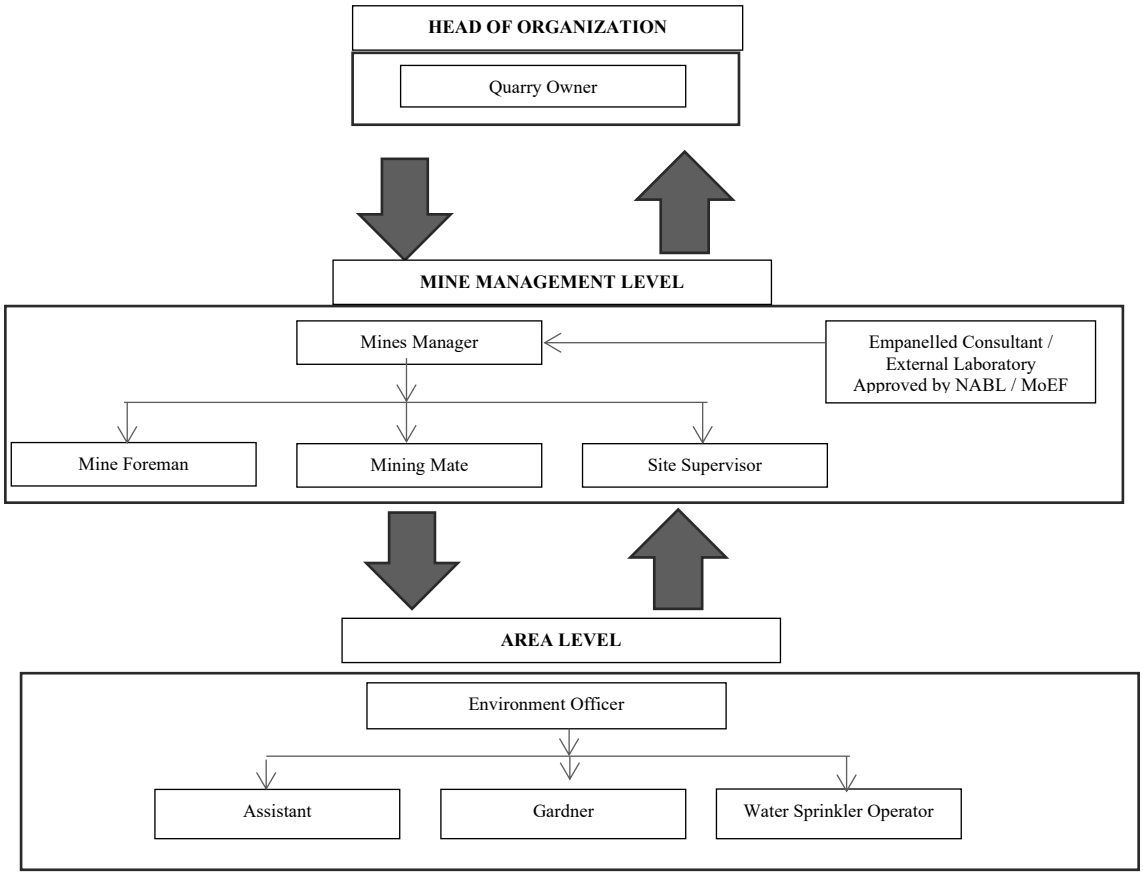
- Implementation of pollution control measures
- Monitoring programme implementation
- Post-plantation care
- To check the efficiency of pollution control measures taken
- Any other activity as may be related to environment
- Seeking expert’s advice when needed.

The environmental monitoring cell will co-ordinate all monitoring programs at site and data thus generated will be regularly furnished to the State regulatory agencies as compliance status reports.

The sampling and analysis report of the monitored environmental attributes will be submitted to the Tamil Nadu Pollution Control Board (TNPCB) at a frequency of half-yearly and yearly. The half-yearly reports are submitted to Ministry of Environment and Forest, Regional Office and SEIAA as well.

The sampling and analysis of the environmental attributes will be as per the guidelines of Central Pollution Control Board (CPCB)/Ministry of Environment, Forest and Climate Change (MoEF & CC).

FIGURE 6.1: ENVIRONMENTAL MONITORING CELL



6.2 IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES

The mitigation measures proposed in Chapter-4 will be implemented so as to reduce the impact on the environment due to the operations of the proposed project. Implementation schedule of mitigation measures is given in Table 6.1.

TABLE 6.1 IMPLEMENTATION SCHEDULE

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

6.3 MONITORING SCHEDULE AND FREQUENCY

Monitoring shall confirm that commitments are being met. This may take the form of direct measurement and recording of quantitative information, such as amounts and concentrations of discharges, emissions and wastes, for measurement against statutory standards. Monitoring may include socio-economic interaction, through local liaison activities or even assessment of complaints.

The environmental monitoring will be conducted in the mine operations as follows:

- Air quality;
- Water and wastewater quality;
- Noise levels;
- Soil Quality; and
- Greenbelt Development

The details of monitoring is detailed in Table 6.2

TABLE 6.2 MONITORING SCHEDULE

S. No.	Environment Attributes		Monitoring		Parameters
			Duration	Duration	
1	Air Quality	8 locations (One station in the core zone and one in 500 m radius, two stations in the upwind, three stations on the downwind direction)	24 hours	Twice in a week for every 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	Mine Pit Water, Nearby project area (Surface water and ground water)	-	Once in 6 months	Parameters specified under IS:10500, 1993 & CPCB Norms
4	Hydrology	Water level in open wells in buffer zone around 1km at specific wells	-	Once in 6months	Depth in BGL
5	Noise	Near Mine Equipment / machineries, Mines Office, Operator Cabin, Surrounding Villages in Buffer Area	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	Core Zone and Buffer zone (Grab samples)	–	Once In six months	Physical And Chemical Characteristics
8	Greenbelt	Within the Project Area	Daily	Monthly	Maintenance

Source: Guidance of manual for mining of minerals, February 2010

6.4 BUDGETARY PROVISION FOR EMP

The cost in respect of monitoring of environmental attributes, parameter to be monitored, sampling/monitoring locations with frequency and cost provision against each is shown in Table 6.3. Monitoring work will be outsourced to external laboratory approved by NABL / MoEF.

The proposed capital cost for Environmental Monitoring Programme is Rs 76,000/- and the recurring cost is Rs 76,000/- per annum for each Proposed Project

TABLE 6.3 ENVIRONMENT MONITORING BUDGET

PROPOSAL – P1			
Sl.No.	**Parameter**	**Capital Cost**	**Recurring Cost per annum**
1	Air Quality	Rs. 76,000/-	Rs. 76,000/-
2	Meteorology		
3	Water Quality		
4	Hydrology		
5	Soil Quality		
6	Noise Quality		
7	Vibration Study		
Total		**Rs 76,000/-**	**Rs 76,000/-**
PROPOSAL – P2			
Sl.No.	**Parameter**	**Capital Cost**	**Recurring Cost per annum**
1	Air Quality	Rs. 76,000/-	Rs. 76,000/-
2	Meteorology		
3	Water Quality		
4	Hydrology		
5	Soil Quality		
6	Noise Quality		
7	Vibration Study		
Total		**Rs 76,000/-**	**Rs 76,000/-**
PROPOSAL – P3			
Sl.No.	**Parameter**	**Capital Cost**	**Recurring Cost per annum**
1	Air Quality	Rs. 76,000/-	Rs. 76,000/-
2	Meteorology		
3	Water Quality		
4	Hydrology		
5	Soil Quality		
6	Noise Quality		
7	Vibration Study		
Total		**Rs 76,000/-**	**Rs 76,000/-**
PROPOSAL – P4			
Sl.No.	**Parameter**	**Capital Cost**	**Recurring Cost per annum**
1	Air Quality	Rs. 76,000/-	Rs. 76,000/-
2	Meteorology		
3	Water Quality		
4	Hydrology		
5	Soil Quality		
6	Noise Quality		
7	Vibration Study		
Total		**Rs 76,000/-**	**Rs 76,000/-**
PROPOSAL – P5			
Sl.No.	**Parameter**	**Capital Cost**	**Recurring Cost per annum**
1	Air Quality	Rs. 76,000/-	Rs. 76,000/-
2	Meteorology		
3	Water Quality		
4	Hydrology		
5	Soil Quality		
6	Noise Quality		
7	Vibration Study		
Total		**Rs 76,000/-**	**Rs 76,000/-**
PROPOSAL – P6			
Sl.No.	**Parameter**	**Capital Cost**	**Recurring Cost per annum**

1	Air Quality	Rs. 76,000/-	Rs. 76,000/-
2	Meteorology		
3	Water Quality		
4	Hydrology		
5	Soil Quality		
6	Noise Quality		
7	Vibration Study		
Total		**Rs 76,000/-**	**Rs 76,000/-**
PROPOSAL – P7			
Sl.No.	**Parameter**	**Capital Cost**	**Recurring Cost per annum**
1	Air Quality	Rs. 76,000/-	Rs. 76,000/-
2	Meteorology		
3	Water Quality		
4	Hydrology		
5	Soil Quality		
6	Noise Quality		
7	Vibration Study		

Source:

6.5 REPORTING SCHEDULES OF MONITORED DATA

The monitored data on air quality, water quality, noise levels and other environmental attributes will be periodically examined by the Mine Management level and Head of Organization for taking necessary corrective measures. The monitoring data will be submitted to Tamil Nadu State Pollution Control Board in the Compliance to CTO Conditions & environmental audit statements every year to MoEF & CC and Half-Yearly Compliance Monitoring Reports to MoEF & CC Regional Office and SEIAA.

Periodical reports to be submitted to:-

- MoEF & CC – Half yearly status report
- TNPCB - Half yearly status report
- Department of Geology and Mining: quarterly, half yearly annual reports

Besides the Mines Manager/Agent will submit the periodical reports to –

- Director of mines safety,
- Labour enforcement officer,
- Controller of explosives as per the norms stipulated by the department.

7. ADDITIONAL STUDIES

7.0 GENERAL

The following Additional Studies were done as per items identified by project proponent and items identified by regulatory authority. And items identified by public and other stakeholders will be incorporated after Public Hearing.

- Public Consultation
- Risk Assessment
- Disaster Management Plan
- Cumulative Impact Study

7.1. PUBLIC CONSULTATION

Application to The Member Secretary of the Tamil Nadu Pollution Control Board (TNPCB) to conduct Public Hearing in a systematic, time bound and transparent manner ensuring widest possible public participation at the project site or in its close proximity in the District is submitted along with this Draft EIA / EMP Report and the outcome of public hearing proceedings will be detailed in the Final EIA/EMP Report.

7.2 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.

Factors of risks involved due to human induced activities in connection with this proposed mining & allied activities with detailed analysis of causes and control measures for the mine is given in below Table 7.1.

TABLE 7.1 RISK ASSESSMENT& CONTROL MEASURES

S.No	Risk factors	Causes of risk	Control measures
1	Accidents due to explosives and heavy mining machineries	Improper handling and unsafe working practice	All safety precautions and provisions of Mine Act, 1952, Metalliferous Mines Regulation, 1961 and Mines Rules, 1955 will be strictly followed during all mining operations; Workers will be sent to the Training in the nearby Group Vocational Training Centre Entry of unauthorized persons will be prohibited; Fire-fighting and first-aid provisions in the mine office complex and mining area; Provisions of all the safety appliances such as safety boot, helmets, goggles etc. will be made available to the employees and regular check for their use Working of quarry, as per approved plans and regularly updating the mine plans; Cleaning of mine faces on daily basis shall be daily done in order to avoid any overhang or undercut; Handling of explosives, charging and firing shall be carried out by competent persons only under the supervision of a Mine Manager; Maintenance and testing of all mining equipment as per manufacturer‘s guidelines.

2	Drilling	Improper and unsafe practices Due to high pressure of compressed air, hoses may burst Drill Rod may break	Safe operating procedure established for drilling (SOP) will be strictly followed. Only trained operators will be deployed. No drilling shall be commenced in an area where shots have been fired until the blaster/blasting foreman has made a thorough Examination of all places, Drilling shall not be carried on simultaneously on the benches at places directly one above the other. Periodical preventive maintenance and replacement of worn out accessories in the compressor and drill equipment as per operator manual. All drills unit shall be provided with wet drilling shall be maintained in efficient working in condition. Operator shall regularly use all the personal protective equipment.
4	Blasting	Fly rock, ground vibration, Noise and dust. Improper charging, stemming & Blasting/ fining of blast holes Vibration due to movement of vehicles	Restrict maximum charge per delay as per regulations and by optimum blast hole pattern, vibrations will be controlled within the permissible limit and blasting can be conducted safely. SOP for Charging, Stemming & Blasting/Firing of Blast Holes will be followed by blasting crew during initial stage of operation Shots are fired during daytime only. All holes charged on any one day shall be fired on the same day. The danger zone will be distinctly demarcated (by means of red flags)
5	Transportation	Potential hazards and unsafe workings contributing to accident and injuries Overloading of material While reversal & overtaking of vehicle Operator of truck leaving his cabin when it is loaded.	Before commencing work, drivers personally check the dumper/truck/tipper for oil(s), fuel and water levels, tyre inflation, general cleanliness and inspect the brakes, steering system, warning devices including automatically operated audio visual reversing alarm, rear view mirrors , side indicator lights etc., are in good condition. Not allow any unauthorized person to ride on the vehicle nor allow any unauthorized person to operate the vehicle. Concave mirrors should be kept at all corners All vehicles should be fitted with reverse horn with one spotter at every tipping point Loading according to the vehicle capacity Periodical maintenance of vehicles as per operator manual
6	Natural calamities	Unexpected happenings	Escape Routes will be provided to prevent inundation of storm water Fire Extinguishers & Sand Buckets
7	Failure of Mine Benches and Pit Slope	Slope geometry, Geological structure	Ultimate or over all pit slope shall be below 60° and each bench height shall be 5m height.

Source:

7.3 DISASTER MANAGEMENT PLAN

The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities.

The objective of the Disaster Management Plan is to make use of the combined resources of the mine and the outside services to achieve the following:

- Rescue and medical treatment of casualties;
- Safeguard other people;
- Minimize damage to property and the environment;
- Initially contain and ultimately bring the incident under control;
- Secure the safe rehabilitation of affected area; and
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency.

It is to optimize operational efficiency to rescue rehabilitation and render medical help and to restore normalcy. To tackle the consequences of a major emergency inside the mines or immediate vicinity of the mines, a Disaster Management Plan must be formulated, and this planned emergency document is called “Disaster Management Plan”.

In case a disaster takes place, despite preventive actions, disaster management will have to be done in line with the descriptions below. There is an organization proposed for dealing with the emergency situations and the coordination among key personnel and their team has been shown in Fig 7.1.

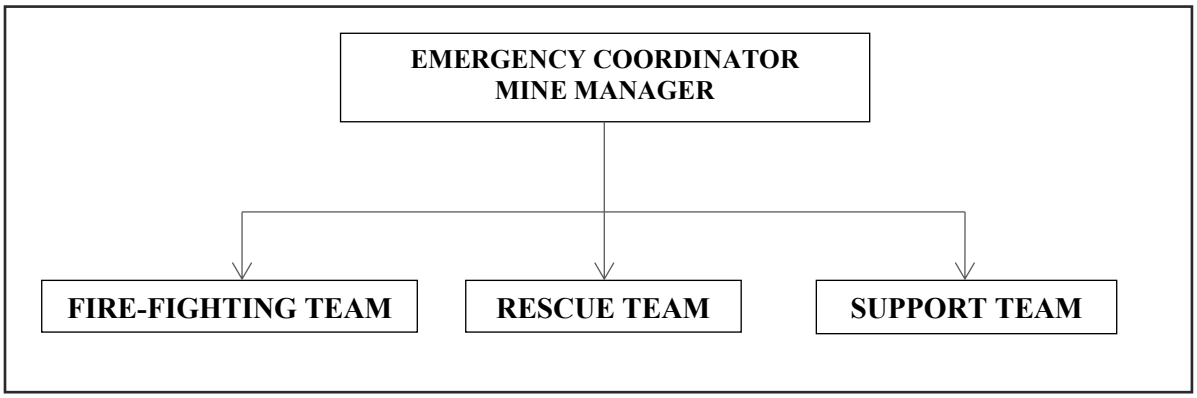


FIGURE 7.1: DISASTER MANAGEMENT TEAM LAYOUT

The emergency organization shall be headed by emergency coordinator who will be qualified competent mine manager. In his absence senior most people available at the mine shall be emergency coordinator till arrival of mine manager. There would be three teams for taking care of emergency situations – Fire-Fighting Team, Rescue Team and Support Team. The proposed composition of the teams is given in Table 7.2.

TABLE 7.2: PROPOSED TEAMS TO DEAL WITH EMERGENCY SITUATION

DESIGNATION	QUALIFICATION
FIRE-FIGHTING TEAM	
Team Leader/ Emergency Coordinator (EC)	Mines Manager
Team Member	Mines Foreman
Team Member	Mining Mate
RESCUE TEAM	
Team Leader/ Emergency Coordinator (EC)	Mines Manager
Team Member/ Incident Controller (IC)	Environment Officer
Team Member	Mining Foreman
SUPPORT TEAM	
Team Leader/ Emergency Coordinator (EC)	Mines Manager
Assistant Team Leader	Environment Officer
Team Member	Mining Mate
Security Team Leader/ Emergency Security Controller	Mines Foreman

Once the mine becomes operational, the above table along with names of personnel will be prepared and made easily available to workers. A mobile communication network and wireless shall connect Mine Emergency Control Room (MECR) to control various departments of the mine, fire station and neighbouring industrial units/mines.

Roles and responsibilities of emergency team –

(a) Emergency coordinator (EC)
The emergency coordinator shall assume absolute control of site and shall be located at MECR.
(b) Incident controller (IC)
Incident controller shall be a person who shall go to the scene of emergency and supervise the action plan to overcome or contain the emergency. Shift supervisor or Environmental Officer shall assume the charge of IC.
(c) Communication and advisory team
The advisory and communication team shall consist of heads of Mining Departments i.e., Mines Manager
(d) Roll call coordinator
The Mine Foreman shall be RollCall Coordinator. The roll call coordinator will conduct the roll call and will evacuate the mine personnel to assembly point. His prime function shall be to account for all personnel on duty.
(e) Search and rescue team
There shall be a group of people trained and equipped to carryout rescue operation of trapped personnel. The people trained in first aid and fire-fighting shall be included in search and rescue team.
(f) Emergency security controller
Emergency Security Controller shall be senior most security person located at main gate office and directing the outside agencies e.g. fire brigade, police, doctor and media men etc.,

Emergency control procedure –

The onset of emergency, will in all probability, commence with a major fire or explosion or collapse of wall along excavation and shall be detected by various safety devices and also by members of operational staff on duty. If located by a staff member on duty, he (as per site emergency procedure of which he is adequately briefed) will go to nearest alarm call point, break glass and trigger off the alarms. He will also try his best to inform about location and nature of accident to the emergency control room. In accordance with work emergency procedure the following key activities will immediately take place to interpret and take control of emergency.

- On site fire crew led by a fireman will arrive at the site of incident with fire foam tenders and necessary equipment.
- Emergency security controller will commence his role from main gate office

- Incident controller shall rush to the site of emergency and with the help of rescue team and will start handling the emergency.
- Site main controller will arrive at MECR with members of his advisory and communication team and will assume absolute control of the site.
    - He will receive information continuously from incident controller and give decisions and directions to:
        - Incident controller
        - Mine control rooms
        - Emergency security controller

Proposed fire extinguishers at different locations –

The following type of fire extinguishers has been proposed at strategic locations within the mine.

TABLE 7.3: PROPOSED FIRE EXTINGUISHERS AT DIFFERENT LOCATIONS

LOCATION	TYPE OF FIRE EXTINGUISHERS
Electrical Equipment's	CO_2 type, foam type, dry chemical powder type
Fuel Storage Area	CO_2 type, foam type, dry chemical powder type, Sand bucket
Office Area	Dry chemical type, foam type

Alarm system to be followed during disaster –

On receiving the message of disaster from Site Controller, fire-fighting team, the mine control room attendant will sound siren wailing for 5 minutes. Incident controller will arrange to broadcast disaster message through public address system.

On receiving the message of "Emergency Over" from Incident Controller the emergency control room attendant will give "All Clear Signal", by sounding alarm straight for 2 minutes.

The features of alarm system will be explained to one and all to avoid panic or misunderstanding during disaster.

In order to prevent or take care of hazard / disasters if any the following control measures have been adopted.

- All safety precautions and provisions of Metalliferous Mines Regulations (MMR), 1961 is strictly followed during all mining operations.
- Observance of all safety precautions for blasting and storage of explosives as per MMR 1961.
- Entry of unauthorized persons into mine & allied areas is completely prohibited.
- Fire-fighting and first-aid provisions in the mines office complex and mining area are provided.
- Provisions of all the safety appliances such as safety boot, helmets, goggles, dust masks, ear plugs and ear muffs etc. are made available to the employees and the use of same is strictly adhered to through regular monitoring.
- Training and refresher courses for all the employees working in hazardous premises.
- Working of mine, as per approved plans and regularly updating the mine plans.
- Cleaning of mine faces is regularly done.
- Handling of explosives, charging and blasting are carried out only by qualified persons following SOP.
- Checking and regular maintenance of garland drains and earthen bunds to avoid any inflow of surface water in the mine pit.
- Provision of high capacity standby pumps with generator sets with enough quantity of diesel for emergency pumping especially during monsoon.
- A blasting SIREN is used at the time of blasting for audio signal.
- Before blasting and after blasting, red and green flags are displayed as visual signals.
- Warning notice boards indicating the time of blasting and NOT TO TRESPASS are displayed at prominent places.
- Regular maintenance and testing of all mining equipment were carried out as per manufacturer's guidelines.

7.4 CUMULATIVE IMPACT STUDY

There are 5 existing quarries and 7 proposed quarry within a radius of 500 meters. The list of quarries is as below –

TABLE 7.4: LIST OF QUARRIES WITHIN 500 METER RADIUS FROM THIS PROPOSAL

PROPOSED QUARRIES				
CODE	**Name of the Owner**	**S.F.Nos**	**Extent**	**Lease period**
P1	Thiru. R.Paramasivam, S/o. Ramasamy, No.4-122/2, V.P.S.Garden, Tiruchengode Road, Andagalur Gate, Rasipuram Taluk, Namakkal District, Tamil Nadu	20/2B (Part) and 21/5C (part)	1.00.0 ha	Received for ToR vide Lr.No. SEIAA-TN/F.No.7773/SEAC/ToR-811/2020 Dated :09.11.2020
P2	Thiru.K.Periyasamy, S/o. Kandasamy, No.5/49, Thennamarathupalayam, Marapparai, Tiruchengode Taluk, Namakkal District, Tamil Nadu State – 637 410	21/5B(Part)	1.00.0 ha	Received for ToR vide Lr.No. SEIAA-TN/F.No.7774/SEAC/ToR-818/2020 Dated :11.11.2020
P3	Tmt.B.Megala, D/o.Balasundaram, Thennamarathupalayam, Marapparai, Tiruchengode Taluk, Namakkal District, Tamil Nadu State – 637 410	224(Part)	1.40.0ha	Under examination of SEIAA
P4	Thiru.M.Krishnan, S/o. Marappan, Periya manali Road, Vaiyappamalai Post, Tiruchengode Taluk, Namakkal District – 637 410	176/2, 173/3(P), & 176/11(P)	0.90.25ha	Under examination of SEIAA
P5	Thiru. S.Nandhakumar, S/o. Sellappan, No.4/103, Mettukadu, Nallampalayam, Konnayar, Tiruchengode Taluk, Namakkal District – 637 202	22/2	1.16.0ha	Under examination of SEIAA
P6	Thiru.S.Rangasamy, S/o. Subbayan, Kattipalayam, Karungalpatti (Post), Tiruchengode Taluk, Namakkal District – 637 410	176/1A, 176/5A, 176/6A & 316/2B2	2.02.3 ha	Under examination of SEIAA
P7	Thiru. Muthukrishnan, S/o. Marappan, Periya Manali Road, Vaiyappamalai Post, Tiruchengode Taluk, Namakkal District – 637 410	175/2, 183/8B, 183/8C,183/8D, 183/8E,183/8F, 183/4E1, 183/4G1, & 183/4F1	1.73.23	Under examination of Department of Geology and Mining, Namakkal
TOTAL			**9.21.78 ha**	
EXISTING QUARRIES				
CODE	**Name of the Owner**	**S.F.Nos**	**Extent**	**Lease Period**
E1	Thiru. S.Rangasamy S/o.Subbaiyan, Kattipalayam, Karungalpatti Post, Tiruchengode Taluk,Namakkal District	316/2B1	1.98.0 ha	03.02.2017 to 02.02.2022
E2	Tmt.P.Ramayee, W/o.Ponnusamy, 1/60, Nehru, Nagar, Mallasamudram main Road, Marapparai, Vaiyappmalai Post,	176/12	1.20.0 ha	06.09.2017 to 05.09.2022

	Tiruchengode Taluk, Namakkal District.			
E3	Thiru.K.Ramesh S/o.Kailasamm, 2/19, Kudi Street North, Sullipalauyam, Uppupalayam Post, Paramathi –Velur Taluk, Namakkal District	175/1B	1.20.0ha	09.01.2019 to 08.01.2024
E4	Thiru.K.Sengottaiyan S/o. Kandhasamy, Elavadi, Moongilpadi Post, Chinnasalem Taluk, Viluppuram District	21/4A	0.95.5ha	09.01.2018 to 08.01.2023
E5	Thiru.K.Sengodagounder	22/3B1 & 22/3B2	1.54.0ha	23.02.2018 to 22.02.2023
TOTAL			**6.87.5 ha**	
GRAND TOTAL OF PROPOSED & EXISTING QUARRIES			**16.09.28 ha**	

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

TABLE 7.5: SALIENT FEATURES OF PROPOSAL "P1"

SALIENT FEATURES OF PROPOSAL "P1"		
Name of the Mine	Thiru.R.Paramasivam stone and Gravel quarry	
Land Type	Patta Land	
S.F. No.	20/2B(Part) and 21/5C (part)	
Village	Marapparai	
Extent	1.00.0 ha	
Geological Reserves	Rough Stone	Gravel
	4,58,850 m^3	14,644 m^3
Mineable Reserves	Rough Stone	Gravel
	1,15,372m^3	10,048m^3
Proposed Mining Plan Period / Lease Period	5 Years	
Ultimate Pit Dimension	95 m (L) * 90 m (W) * 42m (D) (2m Gravel + 40m Rough stone)	
Toposheet No	58-I/03	
Latitude	11°25'02.29"N to 11°25'06.70"N	
Longitude	78°02'55.42"E to 78°02'59.16"E	
Highest Elevation	205 m AMSL	
Water Level	58 – 62 m	
Machinery	Jack Hammer Drills	3 Nos.
	Compressor	1 No.
	Hydraulic Excavator	1 No
	Tippers	2 Nos.
Blasting	Usage of Slurry Explosive with MSD detonators	
Nearest Water Body	Thirumanimutharu River	950m NW
	Kattipalayam Kuttati	960m SW
	Paruthipalli Lake	1.8km NW
	Konnayar Tank	1.7km SW
	Ramapuram Lake	4.5km NW
	Natramangalam Lake	6.6km SE
	Elur Lake	9.0km SE
Manpower Deployment	21 Nos	
Project Cost	Project Cost	Rs 24, 06,300/-
	EMP Cost	Rs 3, 80,000/-
	Total	Rs 27,86,300/-
Depth of Mining	42m (D) (2m Gravel + 40m Rough stone)	

Source: Approved Mining Plan

TABLE 7.6: SALIENT FEATURES OF PROPOSAL "P2"

SALIENT FEATURES OF PROPOSAL "P2"		
Name of the Mine	Thiru.K.Periyasamy stone and Gravel quarry	
Land Type	Patta Land	
S.F. No.	21/5B (part)	
Village	Marapparai	
Extent	1.00.0 ha	
Geological Reserves	Rough Stone	Gravel
	3,85,812 m^3	11,790 m^3
Mineable Reserves	Rough Stone	Gravel
	1,14,385m^3	8,568m^3
Proposed Mining Plan Period / Lease Period	5 Years	
Ultimate Pit Dimension	104 m (L) * 70 m (W) * 37m (D) (2m Gravel + 35m Rough stone)	
Toposheet No	58-I/03	
Latitude	11°25'03.22"N to 11°25'07.64"N	
Longitude	78°02'52.79"E to 78°02'56.69"E	
Highest Elevation	205 m AMSL	
Water Level	58 – 62 m	
Machinery	Jack Hammer Drills	3 Nos.
	Compressor	1 No.
	Hydraulic Excavator	1 No
	Tippers	2 Nos.
Blasting	Usage of Slurry Explosive with MSD detonators	
Nearest Water Body	Thirumanimutharu River	870m NW
	Kattipalayam Kuttati	950m SW
	Paruthipalli Lake	1.7km NW
	Konnayar Tank	1.7km SW
	Ramapuram Lake	4.5km NW
	Natramangalam Lake	6.6km SE
	Elur Lake	8.8km SE
Manpower Deployment	21 Nos	
Project Cost	Project Cost	Rs 24, 02,400/-
	EMP Cost	Rs 3, 80,000/-
	Total	Rs 27,82,400/-
Depth of Mining	37m (D) (2m Gravel + 35m Rough stone)	

Source: Approved Mining Plan

TABLE 7.7: SALIENT FEATURES OF PROPOSAL "P3"

SALIENT FEATURES OF PROPOSAL "P3"		
Name of the Mine	Tmt.B.Makala Rough stone quarry	
Land Type	Patta Land	
S.F. No.	22/4 (Part)	
Village	Marapparai	
Extent	1.40.0 ha	
Geological Reserves	Rough Stone	Topsoil
	6,15,465 m^3	13,677 m^3
Mineable Reserves	Rough Stone	Topsoil
	86,650m^3	608m^3
Proposed Mining Plan Period / Lease Period	5 Years	
Ultimate Pit Dimension	106 m (L) * 97 m (W) * 46m (D) (1m topsoil + 40m Rough stone)	
Toposheet No	58-I/03	
Latitude	11°24'55.47"N to 11°25'00.26"N	
Longitude	78°02'51.08"E to 78°02'56.10"E	
Highest Elevation	216 m AMSL	
Water Level	71 – 76 m	
Machinery	Jack Hammer Drills	3 Nos.
	Compressor	1 No.
	Hydraulic Excavator	1 No
	Tippers	2 Nos.
Blasting	Usage of Slurry Explosive with MSD detonators	
Nearest Water Body	Thirumanimutharu River	900m NW
	Kattipalayam Kuttati	680m SW
	Konnayar Tank	1.5km SW
	Paruthipalli Lake	1.8km NW
	Ramapuram Lake	4.5km NW
	Natramangalam Lake	6.5km SE
	Elur Lake	9.0km SE
Manpower Deployment	17 Nos	
Project Cost	Project Cost	Rs 26,03,700/-
	EMP Cost	Rs 3, 80,000/-
	Total	Rs 29,83,700/-
Depth of Mining	46m (D) (1m topsoil + 40m Rough stone)	

Source: Approved Mining Plan

TABLE 7.8: SALIENT FEATURES OF PROPOSAL "P4"

SALIENT FEATURES OF PROPOSAL "P4"		
Name of the Mine	Thiru.M.Krishnan Rough stone and Gravel quarry	
Land Type	Patta Land	
S.F. No.	176/2, 176/3(P) & 176/11(P)	
Village	Marapparai	
Extent	0.90.25 ha	
Geological Reserves	Rough Stone	Gravel
	3,07,900 m^3	10,100 m^3
Mineable Reserves	Rough Stone	Gravel
	1,09,075m^3	3,102m^3
Proposed Mining Plan Period / Lease Period	5 Years	
Ultimate Pit Dimension	129 m (L) * 58 m (W) * 37m (D) (2m Gravel + 35m Rough stone)	
Toposheet No	58-I/03	
Latitude	11°24'38.31"N to 11°24'40.71"N	
Longitude	78°02'31.01"E to 78°02'35.97"E	
Highest Elevation	229 m AMSL	
Water Level	62 – 67 m	
Machinery	Jack Hammer Drills	3 Nos.
	Compressor	1 No.
	Hydraulic Excavator	1 No
	Tippers	2 Nos.
Blasting	Usage of Slurry Explosive with MSD detonators	
Nearest Water Body	Kattipalayam Kuttati	70m South
	Thirumanimutharu River	530m NW
	Konnayar Tank	700m SW
	Paruthipalli Lake	2.2km NW
	Ramapuram Lake	4.3km NW
	Natramangalam Lake	7.0km SE
	Elur Lake	9.0km SE
Manpower Deployment	17 Nos	
Project Cost	Project Cost	Rs 20,97,000/-
	EMP Cost	Rs 3, 80,000/-
	Total	Rs 24,77,000/-
Depth of Mining	37m (D) (2m Gravel + 35m Rough stone)	

Source: Approved Mining Plan

TABLE 7.9: SALIENT FEATURES OF PROPOSAL "P5"

SALIENT FEATURES OF PROPOSAL "P5"		
Name of the Mine	Thiru.S.Nandhakumar Rough stone and Gravel quarry	
Land Type	Patta Land	
S.F. No.	22/2	
Village	Marapparai	
Extent	1.16.0 ha	
Geological Reserves	Rough Stone	Gravel
	2,38,925 m^3	12,110 m^3
Mineable Reserves	Rough Stone	Gravel
	34,603m^3	2,520m^3
Proposed Mining Plan Period / Lease Period	5 Years	
Ultimate Pit Dimension	150 m (L) * 30 m (W) * 27m (D) (2m Gravel + 25m Rough stone)	
Toposheet No	58-I/03	
Latitude	11°25'00.40"N to 11°25'03.91"N	
Longitude	78°02'44.17"E to 78°02'53.07"E	
Highest Elevation	202 m AMSL	
Water Level	63 – 68 m	
Machinery	Jack Hammer Drills	1 No.
	Compressor	1 No.
	Hydraulic Excavator	1 No
	Tippers	1 No.
Blasting	Usage of Slurry Explosive with MSD detonators	
Nearest Water Body	Thirumanimutharu River	640m NW
	Kattipalayam Kuttati	780m SW
	Konnayar Tank	1.5km SW
	Paruthipalli Lake	1.6km NW
	Ramapuram Lake	4.2km NW
	Natramangalam Lake	6.7km SE
	Elur Lake	9.0km SE
Manpower Deployment	12 Nos	
Project Cost	Project Cost	Rs 18,85,000/-
	EMP Cost	Rs 3, 80,000/-
	Total	Rs 22,65,000/-
Depth of Mining	37m (D) (2m Gravel + 35m Rough stone)	

Source: Approved Mining Plan

TABLE 7.10: SALIENT FEATURES OF PROPOSAL "P6"

SALIENT FEATURES OF PROPOSAL "P6"		
Name of the Mine	Thiru.S.Rangasamy Rough stone and Gravel quarry	
Land Type	Patta Land	
S.F. No.	176/1A, 5A, 6A & 316/2B2	
Village	Marapparai & Paruthipalli	
Extent	2.02.30ha	
Geological Reserves	Rough Stone	Gravel
	6,84,560 m^3	14,996m^3
Mineable Reserves	Rough Stone	Gravel
	1,31,800m^3	8,050m^3
Proposed Mining Plan Period / Lease Period	5 Years	
Ultimate Pit Dimension	200 m (L) * 101 m (W) * 42m (D) (2m Gravel + 40m Rough stone)	
Toposheet No	58-I/03	
Latitude	11°24'43.54"N to 11°24'49.04"N	
Longitude	78°02'29.22"E to 78°02'36.90"E	
Highest Elevation	202 m AMSL	
Water Level	63 – 68 m	
Machinery	Jack Hammer Drills	2 Nos.
	Compressor	1 No.
	Hydraulic Excavator	1 No
	Tippers	1 No.
Blasting	Usage of Slurry Explosive with MSD detonators	
Nearest Water Body	Thirumanimutharu River	640m NW
	Kattipalayam Kuttati	300m SE
	Konnayar Tank	800m SW
	Paruthipalli Lake	2.0km NW
	Ramapuram Lake	4.0km NW
	Natramangalam Lake	7.0km SE
	Elur Lake	9.0km SE
Manpower Deployment	14 Nos	
Project Cost	Project Cost	Rs 25,83,000/-
	EMP Cost	Rs 3, 80,000/-
	Total	Rs 29,63,000/-
Depth of Mining	42m (D) (2m Gravel + 40m Rough stone)	

Source: Approved Mining Plan

TABLE 7.11: SALIENT FEATURES OF PROPOSAL "P7"

SALIENT FEATURES OF PROPOSAL "P7"		
Name of the Mine	Thiru. M.Muthukrishnan Rough stone and Gravel quarry	
Land Type	Patta Land	
S.F. No.	175/2, 183/8B, 183/8C, 183/8D, 183/8E, 183/8F, 183/4E1, 183/4G1 and 183/4F1	
Village	Marapparai	
Extent	1.73.23ha	
Geological Reserves	Rough Stone	Gravel
	6,92,480 m^3	51,936m^3
Mineable Reserves	Rough Stone	Gravel
	1,99,770m^3	8,985m^3
Proposed Mining Plan Period / Lease Period	5 Years	
Ultimate Pit Dimension	131 m (L) * 112 m (W) * 43m (D) (3m Gravel + 40m Rough stone)	
Toposheet No	58-I/03	
Latitude	11°24'32.43"N to 11°24'37.58"N	
Longitude	78°02'27.38"E to 78°02'32.33"E	
Highest Elevation	197 m AMSL	
Water Level	58 – 63 m	
Machinery	Jack Hammer Drills	4 Nos.
	Compressor	1 No.
	Hydraulic Excavator	1 No
	Tippers	12 Nos.
Blasting	Usage of Slurry Explosive with MSD detonators	
Nearest Water Body	Kattipalayam Kuttati	100m East
	Thirumanimutharu River	500m NW
	Konnayar Tank	500m SW
	Paruthipalli Lake	2.2km NW
	Ramapuram Lake	4.3km NW
	Natramangalam Lake	7.0km SE
	Elur Lake	9.0km SE
Manpower Deployment	20 Nos	
Project Cost	Project Cost	Rs 40,10,400/-
	EMP Cost	Rs 3, 80,000/-
	Total	Rs 43,90,400/-
Depth of Mining	43m (D) (3m Gravel + 40m Rough stone)	

Source: Approved Mining Plan

TABLE 7.12: SALIENT FEATURES OF PROPOSAL "E1"

SALIENT FEATURES OF PROPOSAL "E1"		
Name of the Mine	Thiru.S.Rangasamy Rough stone and Gravel quarry	
Land Type	Patta Land	
S.F. No.	316/2B1	
Village	Paruthipalli	
Extent	1.98.0ha	
Geological Reserves	Rough Stone	Gravel
	5,94,000 m^3	1,98,000m^3
Mineable Reserves	Rough Stone	Gravel
	1,54,190m^3	48,720m^3
Proposed Mining Plan Period / Lease Period	5 Years	
Ultimate Pit Dimension	155 m (L) * 100m (W) * 40m (D) (10m Gravel + 30m Rough stone)	
Toposheet No	58-I/03	
Latitude	11°24'42"N to 11°24'49"N	
Longitude	78°02'26"E to 78°02'30"E	
Highest Elevation	196m AMSL	
Water Level	45 – 50 m	
Machinery	Jack Hammer Drills	1 No.
	Compressor	1 No.
	Hydraulic Excavator	1 No
	Tippers	1 No.
Blasting	Usage of Slurry Explosive with MSD detonators	
Manpower Deployment	13 Nos	
Project Cost	Project Cost	Rs 29,94,000/-
	EMP Cost	Rs 8,60,000/-
	Total	Rs 38,54,000/-
Depth of Mining	40m (D) (10m Gravel + 30m Rough stone)	

Source: Approved Mining Plan

TABLE 7.13: SALIENT FEATURES OF PROPOSAL "E2"

SALIENT FEATURES OF PROPOSAL "E2"		
Name of the Mine	Tmt.P.Ramayee Rough stone and Gravel quarry	
Land Type	Patta Land	
S.F. No.	176/12	
Village	Marapparai	
Extent	1.20.0ha	
Geological Reserves	Rough Stone	Gravel
	5,94,000 m^3	36,000m^3
Mineable Reserves	Rough Stone	Gravel
	20,583m^3	-
Proposed Mining Plan Period / Lease Period	5 Years	
Ultimate Pit Dimension	78 m (L) * 70m (W) * 48m (D) (3m Gravel + 40m Rough stone)	
Toposheet No	58-I/03	
Latitude	11°24'37.29"N to 11°24'41.34"N	
Longitude	78°02'34.86"E to 78°02'39.69"E	
Highest Elevation	198m AMSL	
Water Level	57 – 60 m	
Machinery	Jack Hammer Drills	1 No.
	Compressor	1 No.
	Hydraulic Excavator	1 No

	Tippers	1 No.
Blasting	Usage of Slurry Explosive with MSD detonators	
Manpower Deployment	11 Nos	
Project Cost	Project Cost	Rs 25,90,000/-
	EMP Cost	Rs 7,10,000/-
	Total	Rs 33,00,000/-
Depth of Mining	40m (D) (10m Gravel + 30m Rough stone)	

Source: Approved Mining Plan

TABLE 7.14: SALIENT FEATURES OF PROPOSAL "E3"

SALIENT FEATURES OF PROPOSAL "E3"		
Name of the Mine	Thiru. K.Ramesh Rough stone and Gravel quarry	
Land Type	Patta Land	
S.F. No.	175/1B	
Village	Marapparai	
Extent	1.20.0ha	
Geological Reserves	Rough Stone	Gravel
	6,16,275 m^3	-
Mineable Reserves	Rough Stone	Gravel
	1,62,707m^3	-
Proposed Mining Plan Period / Lease Period	5 Years	
Ultimate Pit Dimension	102 m (L) * 85m (W) * 22m (D) (2m Gravel + 20m Rough stone)	
Toposheet No	58-I/03	
Latitude	11°24'37"N to 11°24'41"N	
Longitude	78°02'27"E to 78°02'31"E	
Highest Elevation	197m AMSL	
Water Level	60 – 65 m	
Machinery	Jack Hammer Drills	6 Nos.
	Compressor	2 Nos.
	Hydraulic Excavator	2 Nos
	Tippers	2 Nos.
Blasting	Usage of Slurry Explosive with MSD detonators	
Manpower Deployment	12 Nos	
Project Cost	Project Cost	Rs 18,60,000/-
	EMP Cost	Rs 7,05,000/-
	Total	Rs 25,65,000/-
Depth of Mining	22m (D) (2m Gravel + 20m Rough stone)	

Source: Approved Mining Plan

TABLE 7.15: SALIENT FEATURES OF PROPOSAL "E4"

SALIENT FEATURES OF PROPOSAL "E4"		
Name of the Mine	Thiru. K.Sengottaiyan Rough stone and Gravel quarry	
Land Type	Patta Land	
S.F. No.	21/4A	
Village	Marapparai	
Extent	0.95.5ha	
Geological Reserves	Rough Stone	Gravel
	6,16,275 m^3	13,300 m^3
Mineable Reserves	Rough Stone	Gravel
	1,91,000m^3	19,100m^3
Proposed Mining Plan Period / Lease Period	5 Years	
Ultimate Pit Dimension	95m (L) * 73m (W) * 22m (D) (2m Gravel + 20m Rough stone)	

Toposheet No	58-I/03	
Latitude	11°25'05.13"N to 11°25'09.31"N	
Longitude	78°02'47.62"E to 78°02'51.80"E	
Highest Elevation	208m AMSL	
Water Level	57 – 60 m	
Machinery	Jack Hammer Drills	2 Nos.
	Compressor	1 No.
	Hydraulic Excavator	1 No
	Tippers	1 No.
Blasting	Usage of Slurry Explosive with MSD detonators	
Manpower Deployment	11 Nos	
Project Cost	Project Cost	Rs 35,41,000 /-
	EMP Cost	Rs 7,10,000/-
	Total	Rs 41,61,000/-
Depth of Mining	22m (D) (2m Gravel + 20m Rough stone)	

Source: Approved Mining Plan

TABLE 7.15: SALIENT FEATURES OF PROPOSAL "E5"

SALIENT FEATURES OF PROPOSAL "E5"		
Name of the Mine	Thiru. .Sengoda Gounder Rough stone and Gravel quarry	
Land Type	Patta Land	
S.F. No.	22/3B1 & 22/3B2	
Village	Marapparai	
Extent	1.54.0ha	
Geological Reserves	Rough Stone and Gravel	
	5,60,470 m^3	
Mineable Reserves	Rough Stone	Gravel
	1,66,532m^3	12,312m^3
Yearwise Production	67,534m^3	11,688m^3
Proposed Mining Plan Period / Lease Period	5 Years	
Ultimate Pit Dimension	117m (L) * 103m (W) * 12m (D) (2m Gravel + 10m Rough stone)	
Toposheet No	58-I/03	
Latitude	11°24'56"N to 11°25'01"N	
Longitude	78°02'40"E to 78°02'44"E	
Highest Elevation	205m AMSL	
Water Level	35 – 40 m	
Machinery	Jack Hammer Drills	2 Nos.
	Compressor	1 No.
	Hydraulic Excavator	1 No
	Tippers	2 Nos.
Blasting	Usage of Slurry Explosive with MSD detonators	
Manpower Deployment	14 Nos	
Project Cost	Project Cost	Rs 30,70,000 /-
	EMP Cost	Rs 5,30,000/-
	Total	Rs 36,00,000/-
Depth of Mining	12m (D) (2m Gravel + 00m Rough stone)	

Source: Approved Mining Plan

The Cumulative Impact is mainly anticipated due to drilling & blasting and excavation and transportation activities in all the mines within the 500 meter radius from the proposed mines and major impact anticipated is on Air & Noise Environment and Ground Vibrations due to blasting.

Air Environment –

Calculating the Cumulative Load of Mining within the 500 meters radius from the proposal (including this proposal) is as shown in table 7.12 & 7.13.

TABLE 7.12: CUMULATIVE PRODUCTION LOAD OF ROUGH STONE

Quarry	Mineable Reserves in m^3	Maximum Production in m^3	Per Day Production in m^3	Number of Lorry Load Per Day
P1	1,15,372	28,785(2^{nd} year)	96	16 Trips/day
P2	1,14,385	30,345 (2^{nd} year)	101	17 Trips /day
P3	86,650	17,840 (4^{th} year)	59	10 Trips /day
P4	1,09,075	22,870 (4^{th} year)	76	13 Trips /day
P5	34,603	6,983 (2^{nd} year)	23	4 Trips /day
P6	1,31,800	16,590 (1^{st} year)	55	9 Trips /day
P7	1,99,770	67,935(2^{nd} year)	226	38 Trips /day
E1	1,54,190	38,840(4^{th} year)	129	21 Trips/day
E2	20,583	4,482 (3^{rd} year)	15	3 Trips/day
E3	1,62,707	19,000 (5^{th} year)	63	11 Trips/day
E4	75,020	19,050 (5^{th} year)	63	11 Trips/day
E5	1,66,532	15,741 (4^{th} year)	52	9 trip day
Total	**13,70,687**	**1,57,410**	**958**	**162 Trips/day**

TABLE 7.13: CUMULATIVE PRODUCTION LOAD OF GRAVEL

Quarry	Mineable Reserves in m^3	Maximum Production in m^3	Per Day Production in m^3	Number of Lorry Load Per Day
P1	10,048	4,000	13	2 Trips/day
P2	8,568	8,568	28	5 Trips /day
P3	608	608	2	1 Trips /day
P4	3,102	1,222	4	1 Trips /day
P5	2,520	840	3	1 Trips /day
P6	8,050	2,754	9	2 Trips /day
P7	8,985	8,190	27	5 Trips /day
E1	48,720	26,796	89	15 Trips/day
E2	-	-	-	-
E3	-	-	-	-
E4	13,300	13,300	44	7 Trips/day
E5	12,312	6,254	21	4 Trips/day
Total	**1,16,213**	**72,532**	**240**	**43 Trips/day**

On a cumulative basis considering all the 12 quarries it can be seen that the overall production of Rough Stone is 958 m^3 per day and overall production of Gravel is 240 m^3 per day with an capacity of 162 trips of Rough Stone per day and 43 Trips per day of Gravel from the 500 meters radius cluster.

Note: the per day production of Rough Stone is Calculated for 5 Years Lease Period and for Gravel production with variable of 1,2 and 3 years of production period

Based on the above production quantities the emissions due to various activities in all the 3mines includes various activities like ground preparation, excavation, handling and transport of ore. These activities have been analysed systematically basing on USEPA-Emission Estimation Technique Manual, for Mining AP-42, to arrive at possible emissions to the atmosphere and estimated emissions are given in Table 7.14.

TABLE 7.14: EMISSION ESTIMATION FROM QUARRIES WITHIN 500 METER RADIUS

Activity	Source type	Value							Unit
		P1	P2	P3	P4	P5	P6	P7	
Drilling	Point Source	0.071115466	0.067708712	0.061607366	0.066176819	0.046497200	0.060279287	0.092011532	g/s
Blasting	Point Source	0.000439982	0.000344221	0.000214673	0.000307004	0.000052571	0.000192511	0.001595239	g/s
Mineral Loading	Point Source	0.040379086	0.039728147	0.037482739	0.038460610	0.034401210	0.037660928	0.043190588	g/s
Haul Road	Line Source	0.002488186	0.002487282	0.002485022	0.002485863	0.002483373	0.002485161	0.002493974	g/s/m
Overall Mine	Area Source	0.038912854	0.038781411	0.044015799	0.037047186	0.040557139	0.051013014	0.049593217	g/s

TABLE 7.14A: ESTIMATED EMISSION RATE FOR SO_2

Activity	Source type	Value							Unit
		P1	P2	P3	P4	P5	P6	P7	
Overall Mine	Area Source	0.0003754	0.000319738	0.000194657	0.000239624	8.01372E-05	0.000207061`	0.000790404	g/s

TABLE 7.14B: ESTIMATED EMISSION RATE FOR NO_X

Activity	Source type	Value							Unit
		P1	P2	P3	P4	P5	P6	P7	
Overall Mine	Area Source	0.000009064	0.000007703	0.000006316	0.000005248	0.000002186	0.000009359	0.000031763	g/s

Source:

TABLE 7.15: INCREMENTAL & RESULTANT GLCWITHIN 500 METER RADIUS

PM_{10} in µg/m^3	
Background	45.59
Incremental	16.89
Resultant	62.48
NAAQ Norms	100 µg/m^3
$PM_{2.5}$ in µg/m^3	
Background	23.98
Incremental	9.87
Resultant	33.85
NAAQ Norms	100 µg/m^3
SO_2 in µg/m^3	
Background	7.96
Incremental	3.46
Resultant	11.42
NAAQ Norms	80 µg/m^3
NO_x in µg/m^3	
Background	24.45
Incremental	10.36
Resultant	34.81
NAAQ Norms	80 µg/m^3

Noise Environment –

Noise pollution is mainly due to operation like drilling & blasting and plying of trucks& HEMM. Cumulative Noise modelling has been carried out considering blasting and compressor operation (drilling) and transportation activities. Predictions have been carried out to compute the noise level at various distances around the different quarries within the 500 m radius.

For hemispherical sound wave propagation through homogeneous loss free medium, one can estimate noise levels at various locations at different sources using model based on first principle.

$$\mathbf{Lp_2 = Lp_1 - 20 \log (r_2/r_1) - Ae_{1,2}}$$

Where:

Lp_1& Lp_2 are sound levels at points located at distances r_1& r_2 from the source.

$Ae_{1,2}$ is the excess attenuation due to environmental conditions. Combined effect of all sources can be determined at various locations by logarithmic addition.

$$Lp_{total} = 10 \log \{10^{(Lp1/10)} + 10^{(Lp2/10)} + 10^{(Lp3/10)} + \ldots\ldots\}$$

Attenuation due to Green Belt has been taken to be 4.9 dB (A).The inputs required for the model are:

Source data has been computed taking into account of all the machinery and activities used in the mining process.

TABLE 7.16: PREDICTED NOISE INCREMENTAL VALUES IN 500 M RADIUS QUARRIES

Location ID	Background Value (Day) dB(A)	Incremental Value dB(A)	Total Predicted dB(A)	Residential Area Standards dB(A)
Habitation Near P1	53.7	46.8	54.5	55
Habitation Near P2	52.8	47.8	54.0	
Habitation Near P3	52.2	44.3	52.8	
Habitation Near P4	52.4	47.4	53.6	
Habitation Near P5	49.5	50.3	52.9	
Habitation Near P6	52.7	48.1	54.0	
Habitation Near P7	51.8	48.1	53.3	
Habitation Near E1	48.7	50.3	52.6	
Habitation Near E2	49.5	50.0	52.8	
Habitation Near E3	47.6	47.8	50.7	
Habitation Near E4	51.2	49.5	53.4	
Habitation Near E5	52.2	50.3	54.4	

The incremental noise level is found within the range of 44.3 – 50.3 dB (A) in Buffer zone. The noise level at different receptors in buffer zone is lower due to the distance involved and other topographical features adding to the noise attenuation. The resultant Noise level due to monitored values and calculated values at the receptors are based on the mathematical formula considering attenuation due to Green Belt as 4.9 dB (A)the barrier effect. From the above table, it can be seen that the ambient noise levels at all the locations near habitations are within permissible limits of Residential Area (buffer zone) as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000(The Principal Rules were published in the Gazette of India, vide S.O.123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E),dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment(Protection) Act, 1986.).

Ground Vibrations

Ground vibrations due to mining activities in the all the 12 Mines within 500 meters radius from the proposed mines are anticipated due to operation of Mining Machines like Excavators, drilling and blasting, transportation vehicles, etc. However, the major source of ground vibration from the all the 12 mines is blasting. The major impact of the ground vibrations is observed on the domestic houses located in the villages nearby the mine lease area. The kuchha houses are more prone to cracks and damage due to the vibrations induced by blasting whereas RCC framed structures can withstand more ground vibrations. Apart from this, the ground vibrations may develop a fear factor in the nearby settlements.

Another impact due to blasting activities is fly rocks. These may fall on the houses or agricultural fields nearby the mining areas and may cause injury to persons or damage to the structures.

Nearest Habitations from 12 mines respectively are as in below Table 7.17

TABLE 7.17: NEAREST HABITATION FROM EACH MINE

Location ID	Distance in Meters
Habitation Near P1	460 Northwest
Habitation Near P2	410 Northwest
Habitation Near P3	620 West
Habitation Near P4	430 South
Habitation Near P5	310 South
Habitation Near P6	400 North
Habitation Near P7	400South
Habitation Near E1	310 Southwest
Habitation Near E2	320 South
Habitation Near E3	410 Southwest
Habitation Near E4	340 North
Habitation Near E5	310 west

The ground vibrations due to the blasting in all the mines are calculated using the empirical equation for assessment of peak particle velocity (PPV) is:

$$V = K\,[R/Q^{0.5}]^{-B}$$

Where –
V = peak particle velocity (mm/s)
K = site and rock factor constant
Q = maximum instantaneous charge (kg)
B = constant related to the rock and site (usually 1.6)
R = distance from charge (m)

TABLE 7.18: GROUND VIBRATIONS AT 12 MINES

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	33	460	0.450
P2	33	410	0.541
P3	25	510	0.306
P4	32	510	0.372
P5	10	310	0.326
P6	21	430	0.349
P7	58	420	0.818
E1	44	320	1.013
E2	6	490	0.104
E3	47	330	1.016
E4	22	340	0.528
E5	20	320	0.539

Source:

From the above table, the charge per blast of 100kg in each mine is well below the Peak Particle Velocity of 8 mm/s as per Directorate General of Mines Safety for safe level criteria through Circular No. 7 dated 29/8/1997.

Socio Economic Environment –

The 7 mines shall provide employment and revenue will be created to government

TABLE 7.19: SOCIO ECONOMIC BENEFITS FROM 7 MINES

Code	Employment	Project Cost	CER @ 2%
P1	21	Rs 27,86,300/-	Rs 55,726/-
P2	21	Rs 27,82,400/-	Rs 55,648/-
P3	17	Rs 29,83,700 /-	Rs 59,674/-
P4	17	Rs. 27,77,000/-	Rs.55,540/-
P5	12	Rs. 22,65,000/-	Rs.45,300/-
P6	14	Rs. 29,63,000/-	Rs.59,260/-
P7	20	Rs. 43,90,400/-	Rs.87,808/-
Total	**122**	**Rs.2,09,47,800**	**Rs.4,18,956/-**
E1	13	Rs.38,54,000	Rs.77.080/-
E2	11	Rs.33,00,000	Rs.66.000/-
E3	12	Rs.25,65,000	Rs.51,300/-
E4	11	Rs.42,51,000	Rs.85,020/-
E5	14	Rs.30,70,000	Rs.61,400/-
Total	**61**	**1,70,40,000**	**3,40,800**

<

As per para 6 (II) of the office memorandum, all the mines being a green field project & Capital Investment is ≤ 100 crores, they shall contribute 2% of Capital Investment towards CER as per directions of EAC/SEAC.

- 7 Proposed Projects shall fund towards CER – **Rs 4,18,956/-/-**
- Existing Projects shall fund towards CER – **Rs 3,40,800/-**
- 12 Projects in Cluster shall fund towards CER – **Rs 7,59,756/-**

7.5 POST COVID HEALTH MANAGEMENT PLAN FOR P1 TO P7

COVID – 19 disease caused by SARS-CoV-2 Coronavirus is relatively a new disease, with fresh information being known on a dynamic basis about the natural history of the disease, especially in terms of post-recovery events.

After acute COVID-19 illness, recovered patients may continue to report wide variety of signs and symptoms including fatigue, body ache, cough, sore throat, difficulty in breathing, etc. As of now there is limited evidence of post-COVID sequalae and further research is required and is being actively pursued. A holistic approach is required for follow up care and well-being of all post COVID recovering patients.

Post-COVID Follow Up Protocol –

- Continue COVID appropriate behaviour (use of mask, hand & respiratory hygiene, physical distancing).
- Drink adequate amount of warm water (if not contra-indicated).
- Make sure your workplaces are clean and hygienic
- Surfaces (e.g. desks and tables) and objects (e.g. telephones, helmet) need to be wiped with disinfectant regularly
- Put sanitizing hand rub dispensers in prominent places around the workplace. Make sure these dispensers are regularly refilled
- Display posters promoting hand-washing
- Make sure that staff, contractors and customers have access to places where they can wash their hands with soap and water
- Display posters promoting respiratory hygiene.

- Brief your employees, contractors and customers that if COVID-19 starts spreading in your community anyone with even a mild cough or low-grade fever (37.3°C or more) need to stay at home. They should also stay home (or work from home) if they have had to take simple medications, such as paracetamol/acetaminophen, ibuprofen or aspirin, which may mask symptoms of infection
- Keep communicating and promoting the message that people need to stay at home even if they have just mild symptoms of COVID-19.
- Consider whether a face-to-face meeting or event is needed. Could it be replaced by a teleconference or online event?
- Could the meeting or event be scaled down so that fewer people attend?
- Pre-order sufficient supplies and materials, including tissues and hand sanitizer for all employees. Have surgical masks available to offer anyone who develops respiratory symptoms.
- It is also suggested by the Ministry of AYUSH that the use of Chyawanprash in the morning (1 teaspoonful) with luke warm water/milk is highly recommended (under the direction of Registered Ayurveda physician) as in the clinical practice Chyawanprash is believed to be effective in post-recovery period.
- If there is persistent dry cough / sore throat, do saline gargles and take steam inhalation. The addition of herbs/spices for gargling/steam inhalation. Cough medications, should be taken on advice of medical doctor or qualified practitioner of Ayush.
- Look for early warning signs like high grade fever, breathlessness, $Sp0_2 < 95\%$, unexplained chest pain, new onset of confusion, focal weakness.
- Avoid smoking and consumption of alcohol.
- Communicate to your employees and contractors about the plan and make sure they are aware of what they need to do – or not do – under the plan. Emphasize key points such as the importance of staying away from work even if they have only mild symptoms or have had to take simple medications (e.g. paracetamol, ibuprofen) which may mask the symptoms
- The plan should address how to keep your business running even if a significant number of employees, contractors and suppliers cannot come to your place of business - either due to local restrictions on travel or because they are ill.

8. PROJECT BENEFITS

8.0 GENERAL

Seven Proposed Project for quarrying Rough Stone and Gravel Quarry aims to produce about 7,32,225 m^3 Rough Stone & 41,881m^3 Gravel over a period of 5 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

8.1 EMPLOYMENT POTENTIAL

It is proposed to provide employment to about 122 persons for carrying out mining operations and give preference to the local people in providing employment. In addition there will be opportunity for indirect employment to many people in the form of contractual jobs, business opportunities, service facilities etc. the economic status of the local people will be enhanced due to mining project.

8.2 SOCIO-ECONOMIC WELFARE MEASURES PROPOSED

The impact of mining activity in the area will be more positive on the socio-economic environment in the immediate project impact area. The employment opportunities both direct and indirect will contribute to enhanced money incomes to job seekers with minimal skill sets especially among the local communities.

8.3 IMPROVEMENT IN PHYSICAL INFRASTRUCTURE

The proposed mine is located in Marapparai & Paruthipalli Village, Tiruchengode Taluk and Namakkal District of Tamil Nadu and the area have communications, roads and other facilities already well established. The following physical infrastructure facilities will further improve due to proposed mine.

- Road Transport facilities
- Communications
- Medical, Educational and social benefits will be made available to the nearby civilian population in addition to the workmen employed in the mine.

8.4 IMPROVEMENT IN SOCIAL INFRASTRUCTURE

Employment is expected during civil construction period, in trade, garbage lifting, sanitation and other ancillary services, Employment in these sectors will be primarily temporary or contractual and involvement of unskilled labour will be more. A major part of the labour force will be mainly from local villagers who are expected to engage themselves both in agriculture and mining activities. This will enhance their income and lead to overall economic growth of the area.

8.5 OTHER TANGIBLE BENEFITS

The proposed mine is likely to have other tangible benefits as given below.

- Indirect employment opportunities to local people in contractual works like construction of infrastructural facilities, transportation, sanitation, for supply of goods and services to the mine and other community services.
- Additional housing demand for rental accommodation will increase
- Cultural, recreation and aesthetic facilities will also improve
- Improvement in communication, transport, education, community development and medical facilities and overall change in employment and income opportunity
- The State Government will also benefit directly from the proposed mine, through increased revenue from royalties, cess, DMF, GST etc.,

CORPORATE SOCIAL RESPONSIBILITY

The Proponent will take responsibility to develop awareness among all levels of their staff about CSR activities and the integration of social processes with business processes. Those involved with the undertaking of CSR activities will be provided with adequate training and re-orientation.

Under this programme, the project proponent will take-up following programmes for social and economic development of villages within 10 km of the project site. For this purpose, separate budget will be provided every year. For finalization of these schemes, proponent will interact with LSG. The schemes will be selected from the following broad areas –

- Health Services
- Social Development
- Infrastructure Development
- Education & Sports
- Self-Employment

CSR Cost Estimation

- CSR activities will be taken up in the Marapparai & Paruthipalli village mainly contributing to education, health, training of women self-help groups and contribution to infrastructure etc., CSR budget is allocated as 2.5% of the profit.

CORPORATE ENVIRONMENT RESPONSIBILITY–

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.

As per para 6 (II) of the office memorandum, being a green field project & Capital Investment is ≤ 100 crores, All the proposed projects shall contribute 2% of Capital Investment towards CER as per directions of EAC/SEAC. Capital cost is Rs. **2,09,47,000**/- and 2% of the same works out to **Rs 4,18,956**.

TABLE 8.1: CER – YEARS ACTION PLAN

Activity	Beneficiaries	Total
Construction of Rainwater harvesting Structures at prominent places of Marapparai village roads	Marapparai villagers	Rs. 1,00,000/-
Avenue Plantation along Marapparai village roads	Marapparai villagers	Rs.1,00,000/-
Providing funds for improving Sanitation facilities at Marapparai village Government School	Marapparai villagers	Rs. 1,00,000/-
Providing funds for smart class facilities at Marapparai village Government School	Marapparai villagers	Rs. 1,18,956 /-
TOTAL		**Rs.4,18,956/-**

Source: Field survey conducted by FAE, consultation with project proponent

9. ENVIRONMENTAL COST BENEFIT ANALYSIS

Not Applicable, Since Environmental Cost Benefit Analysis not recommended at the Scoping stage.

10. ENVIRONMENTAL MANAGEMENT PLAN – "P1"

10.0 GENERAL

Environment Management Plan (EMP) aims at the preservation of ecological system by considering in-built pollution abatement facilities at the proposed site. Good practices of Environmental Management plan will ensure to keep all the environmental parameters of the project in respect of Ambient Air quality, Water quality, Socio – economic improvement standards.

Mitigation measures at the source level and an overall environment management plan at the study area are elicited so as to improve the supportive capacity of the receiving bodies. The EMP presented in this chapter discusses the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored after approval of the EIA.

10.1 ENVIRONMENTAL POLICY

The Proponent is committed to conducting all its operations and activities in an environmentally responsible manner and to continually improve environmental performance.

The Proponent will –

- Meet the requirements of all laws, acts, regulations, and standards relevant to its operations and activities
- Implement a program to train employees in general environmental issues and individual workplace environmental responsibilities
- Allocate necessary resources to ensure the implementation of the environmental policy
- Ensure that an effective closure strategy is in place at all stages of project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts
- Implement monitoring programmes to provide early warning of any deficiency or unanticipated performance in environmental safeguards
- Conduct periodic reviews to verify environmental performance and to continuously strive towards improvement

Description of the Administration and Technical Setup –

The Environment Monitoring Cell discussed under Chapter 6 will ensure effective implementation of environment management plan and to ensure compliance of environmental statutory guidelines through Mine Management Level.

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.

10.2 LAND ENVIRONMENT MANAGEMENT –

Landscape of the area will be changed due to the quarrying operation, restoration of the land by converting the quarry pit into temporary reservoir about (0.74.1 ha), the remaining part of the area i.e., 0.25.9 ha (un utilized areas, infrastructure, haul Roads) will be utilized for greenbelt development. Aesthetic of the Environment will not be affected. There is no major vegetation in the project area during the course of quarrying operation and after completion of the quarrying operation thick plantation.

TABLE 10.1: PROPOSED CONTROLS FOR LAND ENVIRONMENT

CONTROL	RESPONSIBILITY
Design vehicle wash-down areas so that all runoff water is captured and passed through oil water separators and sediment catchment devices.	Mines Manager
Refuelling to be undertaken in a safe location, away from vehicle movement pathways&100 m away of any watercourse Refuelling activity to be under visual observation at all times. Drainage of refuelling areas to sumps with oil/water separation	Mine Foreman & Mining Mate
Soil and groundwater testing as required following up a particular incident of contamination.	Mines Manager
At conceptual stage, the mining pits will cover 0.74.1 ha of the project area which will be converted into Rain Water Harvesting. Remaining extent of 0.25.9ha will be converted into greenbelt area	Mines Manager
No external dumping i.e., outside the project area	Mine Foreman
Garland drains with catch pits / settlement traps to be provided all around the project area to prevent run off affecting the surrounding lands.	Mines Manager
The periphery of Project area will be planted with thick plantation to arrest the fugitive dust, which will also act as acoustic barrier.	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.3 SOIL MANAGEMENT

Top Soil Management –

- There is no topsoil for this project site.

Overburden / Waste and Side Burden Management –

- The overburden in the form of Gravel formation, the Gravel will be directly loaded into tippers and sold.

TABLE 10.2: PROPOSED CONTROLS FOR SOILMANAGEMENT

CONTROL	RESPONSIBILITY
Surface run-off from the project boundary via garland drains will be diverted to the mine pits	Mine Foreman & Mining Mate
Design haul roads and other access roads with drainage systems to minimize concentration of flow and erosion risk	Mines Manager
Empty sediment from sediment traps Maintain, repair or upgrade garland drain system	Mines Manager
Test soils for pH, EC, chloride, size & water holding capacity	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.4 WATER MANAGEMENT

In the proposed quarrying project no process is involved for the effluent generation, effluent is mainly containing Oil & grease from the workshop, No workshops is proposed inside the project area. Thirumanimutharu River is located on the west side at distance 900m from the lease area the water flows in the Thirumanimuthar River during rainy season only. No other surface water bodies within the project area.

The quarrying operation is proposed upto a depth of 42 meters (2m Gravel + 40m Rough stone), the water table in the area is 58m – 62m below ground level, hence the proposed project will not intersect the Ground water table during entire quarry period.

TABLE 10.3: PROPOSED CONTROLS FOR WATER ENVIRONMENT

CONTROL	RESPONSIBILITY
To maximize the reuse of pit water for water supply	Mines Foreman
Temporary and permanent garland drain will be constructed to contain the catchments of the mining area and to divert runoff from undisturbed areas through the mining areas	Mines Manager
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations	Mines Manager
Ensure there is no process effluent generation or discharge from the project area into water bodies	Mines Foreman
Domestic sewage generated from the project area will be disposed in septic tank and soak pit system	Mines Foreman
Monthly or after rainfall, inspection for performance of water management structures and systems	Mines Manager
Conduct ground water and surface water monitoring for parameters specified by CPCB	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.5 AIR QUALITY MANAGEMENT

The proposed quarrying activity would result in the increase of particulate matter concentrations due to fugitive dust. Daily water sprinkling on the haul roads, approach roads in the vicinity would be undertaken and will be continued as there is possibility for dust generation due to truck mobility. It will be ensured that vehicles are properly maintained to comply with exhaust emission requirements

TABLE 10.4: PROPOSED CONTROLS FOR AIR ENVIRONMENT

CONTROL	RESPONSIBILITY
Generation of dust during excavation is minimized by daily (twice) water sprinkling on working face and daily (twice) water sprinkling on haul road	Mines Manager
Wet drilling procedure /drills with dust extractor system to control dust generation during drilling at source itself is implemented	Mines Manager
Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution	Mines Manager
Ambient Air Quality Monitoring carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted air pollution control measures	Mines Manager
Provision of Dust Mask to all workers	Mines Manager
Greenbelt development all along the periphery of the project area	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.6 NOISE POLLUTION CONTROL

There will be intermittent noise levels due to vehicular movement, trucks loading, drilling and blasting and cutting activities. No mining activities are planned during night time.

TABLE 10.5: PROPOSED CONTROLS FOR NOISE ENVIRONMENT

CONTROL	RESPONSIBILITY
Development of thick greenbelt all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Preventive maintenance of mining machinery and replacement of worn out accessories to control noise generation	Mines Foreman
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Mines Manager
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Mining Mate
Provision of effective silencers for mining machinery and transport vehicles	Mines Manager
Provision of sound proof AC operator cabins to HEMM	Mines Manager
Sharp drill bits are used to minimize noise from drilling	Mines Foreman
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring are carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted noise control measures. Additional noise control measures will be adopted if required as per the observations during monitoring	Mines Manager
Reduce maximum instantaneous charge using delays while blasting	Mining Mate
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination	Mines Manager
Undertake noise or vibration monitoring	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.7 GROUND VIBRATION AND FLY ROCK CONTROL

The Rough stone and Gravel quarry operation creates vibration due to the blasting and movement of Heavy Earth moving machineries, fly rocks due to the blasting.

TABLE 10.6: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK

CONTROL	RESPONSIBILITY
Controlled blasting using delay detonators will be carried out to maintain the PPV value (below 8Hz) well within the prescribed standards of DGMS	Mines Manager
Drilling and blasting will be carried under the supervision of qualified persons	Mines Manager
Proper stemming of holes should be carried out with statutory competent qualified blaster under the supervision of statutory mines manager to avoid any anomalies during blasting	Mines Manager
Suitable spacing and burden will be maintained to avoid misfire / fly rocks	Manager Mines
Number of blast holes will be restricted to control ground vibrations	Manager Mines
Blasting will be carried out only during noon time	Mining Mate
Undertake noise or vibration monitoring	Mines Manager
ensure blast holes are adequately stemmed for the depth of the hole and stemmed with suitable angular material	Mines Foreman

Source: Proposed by FAE's & EIA Coordinator

10.8 BIOLOGICAL ENVIRONMENT MANAGEMENT

The proponent's will take all necessary steps to avoid the impact on the ecology of the area by adopting suitable management measures in the planning and implementation stage. During mining, thick plantation will be carried out around the project periphery, on safety barrier zone, on top benches of quarried out area etc.,

Following control measures are proposed for its management and will be the responsibility of the Mines Manager.

- Greenbelt development all along the safety barrier of the project area
- It is also proposed to plant around 0.11.0 hectare during the present plan period. Post plantation status will be regularly checked for every season.
- The main attributes that retards the survival of sapling is fugitive dust, this fugitive dust can be controlled by water sprinkling on the haul roads and installing a sprinkler unit near the newly planted area.
- Year wise plantation will be recorded and monitored
    - Based on the area of plantation.
    - Period of plantation
    - Type of plantation
    - Spacing between the plants
    - Type of manuring and fertilizers and its periods
    - Lopping period, interval of watering
    - Survival rate
    - Density of plantation
- The ultimate reclamation planned leaves a congenial environment for development of flora & immigration of small fauna through green belt and water reservoir. The green belt and water reservoir developed within the Project at the end of mine life will attract the birds and animals towards the project area in the post mining period.

10.8.1 Green Belt Development Plan

About 125 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier i.e., 0.11.0 ha with survival rate 80% and about 50 nos. of fruit bearing and avenue plants are proposed to be developed around the mines office. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

TABLE 10.7 PROPOSED GREENBELT ACTIVITIES FOR 5 YEAR PLAN PERIOD

Year	No of trees proposed to planted	Area to be covered in m^2	Survival Rate %
I	25	220	80
II	25	220	80
III	25	220	80
IV	25	220	80
V	25	220	80

Source: Conceptual Plan of Approved Mining plan& Proposed by FAE's & EIA Coordinator

The objectives of the greenbelt development plan are –

- Provide a green belt around the periphery of the quarry area to combat the dispersal of dust in the adjoining areas,
- Protect the erosion of the soil, Conserve moisture for increasing ground water recharging,
- Restore the ecology of the area, Restore aesthetic beauty of the locality and meet the requirement of fodder, fuel and timber of the local community.

A well planned Green Belt with multi rows (three tiers) preferably with long canopy leaves shall be developed with dense plantations around the boundary and haul roads to prevent air, dust noise propagation to undesired places and efforts will be taken for the enhancement of survival rate.

10.8.2 Species Recommended for Plantation

Following points have been considered while recommending the species for plantation:

- Creating of bio-diversity.
- Fast growing, thick canopy cover, perennial and evergreen large leaf area,
- Efficient in absorbing pollutants without major effects on natural growth

TABLE 10.8: RECOMMENDED SPECIES TO PLANT IN THE GREENBELT

S.No	Botanical Name	Local Name	Importance
1.	Azadirachta indica	Neem, Vembu	Neem oil & neem products
2.	Millettia pinnata	Pungan	landscaping purposes as a windbreak or for shade
3.	Tamarindusindica	Tamarind	Edible & Medicinal and other Uses
4.	Achras sapota	Sapota	Edible fruits
5.	Ficus benghalensis	Alai	Shade and a source of food for birds
6.	Ficus religiosa	araca-maram	Shade and a source of food for birds
7.	Mangifera indica	Mango/ Ma	Edible fruit
8.	Terminalia catappa	nattuvadumai	Edible nuts
9.	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree

Source: Proposed by FAE's & EIA Coordinator

10.9 OCCUPATIONAL SAFETY & HEALTH MANAGEMENT

Occupational safety and health is very closely related to productivity and good employer-employee relationship. The main factors of occupational health impact in quarries are fugitive dust and noise. Safety of employees during quarrying operation and maintenance of mining equipment will be taken care as per Mines Act 1952 and Rule 29 of Mines Rules 1955. To avoid any adverse effect on the health of workers due to dust, noise and vibration sufficient measures have been provided.

10.9.1 Medical Surveillance and Examinations –

- Identifying workers with conditions that may be aggravated by exposure to dust & noise and establishing baseline measures for determining changes in health.
- Evaluating the effect of noise on workers
- Enabling corrective actions to be taken when necessary
- Providing health education

The health status of workers in the mine shall be regularly monitored under an occupational surveillance program. Under this program, all the employees are subjected to a details medical examination at the time of employment. The medical examination covers the following tests under mines act 1952.

- General Physical Examination and Blood Pressure
- X-ray Chest and ECG
- Sputum test
- Detailed Routine Blood and Urine examination

The medical histories of all employees will be maintained in a standard format annually. Thereafter, the employees will be subject to medical examination annually. The below tests keep upgrading the database of medical history of the employees.

TABLE 10.9: MEDICAL EXAMINATION SCHEDULE

Sl.No	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year
1	Initial Medical Examination (Mine Workers)					

A	Physical Check-up					
B	Psychological Test					
C	Audiometric Test					
D	Respiratory Test					
2	Periodical Medical Examination (Mine Workers)					
A	Physical Check - up					
B	Audiometric Test					
C	Eye Check – up					
D	Respiratory Test					
3	Medical Camp (Mine Workers & Nearby Villagers)					
4	Training (Mine Workers)					

Medical Follow ups:- Work force will be divided into three targeted groups age wise as follows:-		
Age Group	**PME as per Mines Rules 1955**	**Special Examination**
Less than 25 years	Once in a Three Years	In case of emergencies
Between 25 to 40 Years	Once in a Three Years	In case of emergencies
Above 40 Years	Once in a Three Years	In case of emergencies
Medical help on top priority immediately after diagnosis/ accident is the essence of preventive aspects.		

10.9.2 Proposed Occupational Health and Safety Measures –

- The mine site will have adequate drinking water supply so that workers do not get dehydrated.
- Lightweight and loose fitting clothes having light colors will be preferred to wear.
- Noise exposure measurements will be taken to determine the need for noise control strategies.
- The personal protective equipment will be provided for mine workers.
- Supervisor will be instructed for reporting any problems with hearing protectors or noise control equipment.
- At noisy working activity, exposure time will be minimized.
- Dust generating sources will be identified and proper control measure will be adopted.
- Periodic medical examinations will be provided for all workers.
- Strict observance of the provisions of DGMS Acts, Rules and Regulations in respect of safety both by management and the workers.
- The width of road will be maintained more than thrice the width of the vehicle. A code of traffic rules will be implemented.
- In respect of contract work, safety code for contractors and workers will be implemented. They will be allowed to work under strict supervision of statutory person/officials only after they will impart training at vocational training centres. All personal protective equipment's will be provided to them.
- A safety committee meeting every month will be organized to discuss the safety of the mines and the persons employed.
- Celebration of annual mines safety week and environmental week in order to develop safety awareness amongst employees.

FIGURE 10.1: PERSONAL PROTECTIVE EQUIPMENT TO THE MINE WORKERS

10.9.3 Health and Safety Training Programme

The Proponent will provide special induction program along with machinery manufacturers for the operators and co-operators to run and maintain the machinery effectively and efficiently. The training program for the supervisors and office staffs will be arranged in the Group Vocational Training Centres in the State. And engage an Environmental Consultants to provide periodical training to all the employees to carry out the mining operation in and eco-friendly manner.

TABLE 10.10: LIST OF PERIODICAL TRAININGS PROPOSED FOR EMPLOYEES

Course	Personnel	Frequency	Duration	Instruction
New-Employee Training	All new employees exposed to mine hazards	Once	One week	Employee rights Supervisor responsibilities Self-rescue Respiratory devices Transportation controls Communication systems Escape and emergency evacuation Ground control hazards Occupational health hazards Electrical hazards First aid Explosives
Task Training Like Drilling, Blasting, Stemming, safety, Slope stability, Dewatering, Haul road maintenance,	Employees assigned to new work tasks	Before new Assignments	Variable	Task-specific health &safety procedures and SOP for various mining activity. Supervised practice in assigned work tasks.
Refresher Training	All employees who received new-hire training	Yearly	One week	Required health and safety standards Transportation controls Communication systems

				Escape ways, emergency evacuations Fire warning Ground control hazards First aid Electrical hazards Accident prevention Explosives Respirator devices
Hazard Training	All employees exposed to mine hazards	Once	Variable	Hazard recognition and avoidance Emergency evacuation procedures Health standards Safety rules Respiratory devices

Source: Proposed by FAE's & EIA Coordinator as per DGMS Norms

10.9.4 Budgetary Provision for Environmental Management –

Adequate budgetary provision has been made by the Company for execution of Environmental Management Plan. The Table 10.12 gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE 10.11: EMP BUDGET

Sl.No.	Description	Item	Capital cost(Rs. In Lakhs)	Recurring cost per annum (Rs. in Lakhs)
1	Occupational health & safety	Dust Mask, Safety Shoes, Helmets Ear Plugs, Gloves, Goggles Reflector jacket, Safety Belt, Medical check ups	3.00	0.30
2	Environmental Monitoring	Air, Water, Noise & Vibration, Soil Parameters	3.00	3.00
3	Water & Soil erosion	Garland drains &Settling tanks,check dam/gully plugs, etc	2.00	0.20
4	Haul Road Maintenance		1.00	0.10
5	Green belt Development & Plantation		2.00	0.50
6	Environmental Awareness Programme		0.50	0.10
7	Fencing, Fertilizer, Manure, Manpower, etc.		1.50	0.10
Total			**13.0**	**4.30**

In order to implement the environmental protection measures, an amount of Rs. 13.00 lakhs as capital cost and recurring cost as Rs. 4.30 lakhs as recurring cost is proposed considering present market price considering present market scenario.

10.10 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.

10. ENVIRONMENTAL MANAGEMENT PLAN – "P2"

10.0 GENERAL

Environment Management Plan (EMP) aims at the preservation of ecological system by considering in-built pollution abatement facilities at the proposed site. Good practices of Environmental Management plan will ensure to keep all the environmental parameters of the project in respect of Ambient Air quality, Water quality, Socio – economic improvement standards.

Mitigation measures at the source level and an overall environment management plan at the study area are elicited so as to improve the supportive capacity of the receiving bodies. The EMP presented in this chapter discusses the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored after approval of the EIA.

10.1 ENVIRONMENTAL POLICY

The Proponent is committed to conducting all its operations and activities in an environmentally responsible manner and to continually improve environmental performance.

The Proponent will –

- Meet the requirements of all laws, acts, regulations, and standards relevant to its operations and activities
- Implement a program to train employees in general environmental issues and individual workplace environmental responsibilities
- Allocate necessary resources to ensure the implementation of the environmental policy
- Ensure that an effective closure strategy is in place at all stages of project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts
- Implement monitoring programmes to provide early warning of any deficiency or unanticipated performance in environmental safeguards
- Conduct periodic reviews to verify environmental performance and to continuously strive towards improvement

Description of the Administration and Technical Setup –

The Environment Monitoring Cell discussed under Chapter 6 will ensure effective implementation of environment management plan and to ensure compliance of environmental statutory guidelines through Mine Management Level.

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.

10.2 LAND ENVIRONMENT MANAGEMENT –

Landscape of the area will be changed due to the quarrying operation, restoration of the land by converting the quarry pit into temporary reservoir about (0.72.6 ha), the remaining part of the area i.e., 0.27.4 ha (un utilized areas, infrastructure, haul Roads) will be utilized for greenbelt development. Aesthetic of the Environment will not be affected. There is no major vegetation in the project area during the course of quarrying operation and after completion of the quarrying operation thick plantation.

TABLE 10.1: PROPOSED CONTROLS FOR LAND ENVIRONMENT

CONTROL	RESPONSIBILITY
Design vehicle wash-down areas so that all runoff water is captured and passed through oil water separators and sediment catchment devices.	Mines Manager
Refuelling to be undertaken in a safe location, away from vehicle movement pathways&100 m away of any watercourse Refuelling activity to be under visual observation at all times. Drainage of refuelling areas to sumps with oil/water separation	Mine Foreman & Mining Mate
Soil and groundwater testing as required following up a particular incident of contamination.	Mines Manager
At conceptual stage, the mining pits will cover 0.72.6 ha of the project area which will be converted into Rain Water Harvesting. Remaining extent of 0.27.4ha will be converted into greenbelt area	Mines Manager
No external dumping i.e., outside the project area	Mine Foreman
Garland drains with catch pits / settlement traps to be provided all around the project area to prevent run off affecting the surrounding lands.	Mines Manager
The periphery of Project area will be planted with thick plantation to arrest the fugitive dust, which will also act as acoustic barrier.	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.3 SOIL MANAGEMENT

Top Soil Management –

- There is no topsoil for this project site.

Overburden / Waste and Side Burden Management –

- The overburden in the form of Gravel formation, the Gravel will be directly loaded into tippers and sold.

TABLE 10.2: PROPOSED CONTROLS FOR SOILMANAGEMENT

CONTROL	RESPONSIBILITY
Surface run-off from the project boundary via garland drains will be diverted to the mine pits	Mine Foreman & Mining Mate
Design haul roads and other access roads with drainage systems to minimize concentration of flow and erosion risk	Mines Manager
Empty sediment from sediment traps Maintain, repair or upgrade garland drain system	Mines Manager
Test soils for pH, EC, chloride, size & water holding capacity	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.4 WATER MANAGEMENT

In the proposed quarrying project no process is involved for the effluent generation, effluent is mainly containing Oil & grease from the workshop, No workshops is proposed inside the project area. Thirumanimuthar River is located on the west side at distance 900m from the lease area the water flows in the Thirumanimuthar River during rainy season only. No other surface water bodies within the project area.

The quarrying operation is proposed upto a depth of 32 meters (2m Gravel + 35m Rough stone), the water table in the area is 58m – 62m below ground level, hence the proposed project will not intersect the Ground water table during entire quarry period.

TABLE 10.3: PROPOSED CONTROLS FOR WATER ENVIRONMENT

CONTROL	RESPONSIBILITY
To maximize the reuse of pit water for water supply	Mines Foreman
Temporary and permanent garland drain will be constructed to contain the catchments of the mining area and to divert runoff from undisturbed areas through the mining areas	Mines Manager
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations	Mines Manager
Ensure there is no process effluent generation or discharge from the project area into water bodies	Mines Foreman
Domestic sewage generated from the project area will be disposed in septic tank and soak pit system	Mines Foreman
Monthly or after rainfall, inspection for performance of water management structures and systems	Mines Manager
Conduct ground water and surface water monitoring for parameters specified by CPCB	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.5 AIR QUALITY MANAGEMENT

The proposed quarrying activity would result in the increase of particulate matter concentrations due to fugitive dust. Daily water sprinkling on the haul roads, approach roads in the vicinity would be undertaken and will be continued as there is possibility for dust generation due to truck mobility. It will be ensured that vehicles are properly maintained to comply with exhaust emission requirements

TABLE 10.4: PROPOSED CONTROLS FOR AIR ENVIRONMENT

CONTROL	RESPONSIBILITY
Generation of dust during excavation is minimized by daily (twice) water sprinkling on working face and daily (twice) water sprinkling on haul road	Mines Manager
Wet drilling procedure /drills with dust extractor system to control dust generation during drilling at source itself is implemented	Mines Manager
Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution	Mines Manager
Ambient Air Quality Monitoring carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted air pollution control measures	Mines Manager
Provision of Dust Mask to all workers	Mines Manager
Greenbelt development all along the periphery of the project area	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.6 NOISE POLLUTION CONTROL

There will be intermittent noise levels due to vehicular movement, trucks loading, drilling and blasting and cutting activities. No mining activities are planned during night time.

TABLE 10.5: PROPOSED CONTROLS FOR NOISE ENVIRONMENT

CONTROL	RESPONSIBILITY
Development of thick greenbelt all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Preventive maintenance of mining machinery and replacement of worn out accessories to control noise generation	Mines Foreman
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Mines Manager
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Mining Mate
Provision of effective silencers for mining machinery and transport vehicles	Mines Manager
Provision of sound proof AC operator cabins to HEMM	Mines Manager
Sharp drill bits are used to minimize noise from drilling	Mines Foreman
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring are carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted noise control measures. Additional noise control measures will be adopted if required as per the observations during monitoring	Mines Manager
Reduce maximum instantaneous charge using delays while blasting	Mining Mate
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination	Mines Manager
Undertake noise or vibration monitoring	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.7 GROUND VIBRATION AND FLY ROCK CONTROL

The Rough stone and Gravel quarry operation creates vibration due to the blasting and movement of Heavy Earth moving machineries, fly rocks due to the blasting.

TABLE 10.6: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK

CONTROL	RESPONSIBILITY
Controlled blasting using delay detonators will be carried out to maintain the PPV value (below 8Hz) well within the prescribed standards of DGMS	Mines Manager
Drilling and blasting will be carried under the supervision of qualified persons	Mines Manager
Proper stemming of holes should be carried out with statutory competent qualified blaster under the supervision of statutory mines manager to avoid any anomalies during blasting	Mines Manager
Suitable spacing and burden will be maintained to avoid misfire / fly rocks	Manager Mines
Number of blast holes will be restricted to control ground vibrations	Manager Mines
Blasting will be carried out only during noon time	Mining Mate
Undertake noise or vibration monitoring	Mines Manager
ensure blast holes are adequately stemmed for the depth of the hole and stemmed with suitable angular material	Mines Foreman

Source: Proposed by FAE's & EIA Coordinator

10.8 BIOLOGICAL ENVIRONMENT MANAGEMENT

The proponent's will take all necessary steps to avoid the impact on the ecology of the area by adopting suitable management measures in the planning and implementation stage. During mining, thick plantation will be carried out around the project periphery, on safety barrier zone, on top benches of quarried out area etc.,

Following control measures are proposed for its management and will be the responsibility of the Mines Manager.

- Greenbelt development all along the safety barrier of the project area
- It is also proposed to plant around 0.12.00 hectare during the present plan period. Post plantation status will be regularly checked for every season.
- The main attributes that retards the survival of sapling is fugitive dust, this fugitive dust can be controlled by water sprinkling on the haul roads and installing a sprinkler unit near the newly planted area.
- Year wise plantation will be recorded and monitored
    - Based on the area of plantation.
    - Period of plantation
    - Type of plantation
    - Spacing between the plants
    - Type of manuring and fertilizers and its periods
    - Lopping period, interval of watering
    - Survival rate
    - Density of plantation
- The ultimate reclamation planned leaves a congenial environment for development of flora & immigration of small fauna through green belt and water reservoir. The green belt and water reservoir developed within the Project at the end of mine life will attract the birds and animals towards the project area in the post mining period.

10.8.1 Green Belt Development Plan

About 125 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier i.e., 0.12.00 ha with survival rate 80% and about 50 nos. of fruit bearing and avenue plants are proposed to be developed around the mines office. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

TABLE 10.7 PROPOSED GREENBELT ACTIVITIES FOR5 YEAR PLAN PERIOD

Year	No of trees proposed to planted	Area to be covered in m^2	Survival Rate %
I	25	240	80
II	25	240	80
III	25	240	80
IV	25	240	80
V	25	240	80

Source: Conceptual Plan of Approved Mining plan& Proposed by FAE's & EIA Coordinator

The objectives of the greenbelt development plan are –

- Provide a green belt around the periphery of the quarry area to combat the dispersal of dust in the adjoining areas,
- Protect the erosion of the soil, Conserve moisture for increasing ground water recharging,
- Restore the ecology of the area, Restore aesthetic beauty of the locality and meet the requirement of fodder, fuel and timber of the local community.

A well planned Green Belt with multi rows (three tiers) preferably with long canopy leaves shall be developed with dense plantations around the boundary and haul roads to prevent air, dust noise propagation to undesired places and efforts will be taken for the enhancement of survival rate.

10.8.2 Species Recommended for Plantation

Following points have been considered while recommending the species for plantation:

- Creating of bio-diversity.
- Fast growing, thick canopy cover, perennial and evergreen large leaf area,
- Efficient in absorbing pollutants without major effects on natural growth

TABLE 10.8: RECOMMENDED SPECIES TO PLANT IN THE GREENBELT

S.No	Botanical Name	Local Name	Importance
10.	Azadirachta indica	Neem, Vembu	Neem oil & neem products
11.	Millettia pinnata	Pungan	landscaping purposes as a windbreak or for shade
12.	Tamarindusindica	Tamarind	Edible & Medicinal and other Uses
13.	Achras sapota	Sapota	Edible fruits
14.	Ficus benghalensis	Alai	Shade and a source of food for birds
15.	Ficus religiosa	araca-maram	Shade and a source of food for birds
16.	Mangifera indica	Mango/ Ma	Edible fruit
17.	Terminalia catappa	nattuvadumai	Edible nuts
18.	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree

Source: Proposed by FAE's & EIA Coordinator

10.9 OCCUPATIONAL SAFETY & HEALTH MANAGEMENT

Occupational safety and health is very closely related to productivity and good employer-employee relationship. The main factors of occupational health impact in quarries are fugitive dust and noise. Safety of employees during quarrying operation and maintenance of mining equipment will be taken care as per Mines Act 1952 and Rule 29 of Mines Rules 1955. To avoid any adverse effect on the health of workers due to dust, noise and vibration sufficient measures have been provided.

10.9.1 Medical Surveillance and Examinations –

- Identifying workers with conditions that may be aggravated by exposure to dust & noise and establishing baseline measures for determining changes in health.
- Evaluating the effect of noise on workers
- Enabling corrective actions to be taken when necessary
- Providing health education

The health status of workers in the mine shall be regularly monitored under an occupational surveillance program. Under this program, all the employees are subjected to a details medical examination at the time of employment. The medical examination covers the following tests under mines act 1952.

- General Physical Examination and Blood Pressure
- X-ray Chest and ECG
- Sputum test
- Detailed Routine Blood and Urine examination

The medical histories of all employees will be maintained in a standard format annually. Thereafter, the employees will be subject to medical examination annually. The below tests keep upgrading the database of medical history of the employees.

TABLE 10.9: MEDICAL EXAMINATION SCHEDULE

Sl.No	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year
1	Initial Medical Examination (Mine Workers)					

A	Physical Check-up					
B	Psychological Test					
C	Audiometric Test					
D	Respiratory Test					
2	Periodical Medical Examination (Mine Workers)					
A	Physical Check - up					
B	Audiometric Test					
C	Eye Check – up					
D	Respiratory Test					
3	Medical Camp (Mine Workers & Nearby Villagers)					
4	Training (Mine Workers)					

Medical Follow ups:- Work force will be divided into three targeted groups age wise as follows:-		
Age Group	**PME as per Mines Rules 1955**	**Special Examination**
Less than 25 years	Once in a Three Years	In case of emergencies
Between 25 to 40 Years	Once in a Three Years	In case of emergencies
Above 40 Years	Once in a Three Years	In case of emergencies
Medical help on top priority immediately after diagnosis/ accident is the essence of preventive aspects.		

10.9.2 Proposed Occupational Health and Safety Measures –

- The mine site will have adequate drinking water supply so that workers do not get dehydrated.
- Lightweight and loose fitting clothes having light colors will be preferred to wear.
- Noise exposure measurements will be taken to determine the need for noise control strategies.
- The personal protective equipment will be provided for mine workers.
- Supervisor will be instructed for reporting any problems with hearing protectors or noise control equipment.
- At noisy working activity, exposure time will be minimized.
- Dust generating sources will be identified and proper control measure will be adopted.
- Periodic medical examinations will be provided for all workers.
- Strict observance of the provisions of DGMS Acts, Rules and Regulations in respect of safety both by management and the workers.
- The width of road will be maintained more than thrice the width of the vehicle. A code of traffic rules will be implemented.
- In respect of contract work, safety code for contractors and workers will be implemented. They will be allowed to work under strict supervision of statutory person/officials only after they will impart training at vocational training centres. All personal protective equipment's will be provided to them.
- A safety committee meeting every month will be organized to discuss the safety of the mines and the persons employed.
- Celebration of annual mines safety week and environmental week in order to develop safety awareness amongst employees.

FIGURE 10.1: PERSONAL PROTECTIVE EQUIPMENT TO THE MINE WORKERS

10.9.3 Health and Safety Training Programme

The Proponent will provide special induction program along with machinery manufacturers for the operators and co-operators to run and maintain the machinery effectively and efficiently. The training program for the supervisors and office staffs will be arranged in the Group Vocational Training Centres in the State. And engage an Environmental Consultants to provide periodical training to all the employees to carry out the mining operation in and eco-friendly manner.

TABLE 10.10: LIST OF PERIODICAL TRAININGS PROPOSED FOR EMPLOYEES

Course	Personnel	Frequency	Duration	Instruction
New-Employee Training	All new employees exposed to mine hazards	Once	One week	Employee rights Supervisor responsibilities Self-rescue Respiratory devices Transportation controls Communication systems Escape and emergency evacuation Ground control hazards Occupational health hazards Electrical hazards First aid Explosives
Task Training Like Drilling, Blasting, Stemming, safety, Slope stability, Dewatering, Haul road maintenance,	Employees assigned to new work tasks	Before new Assignments	Variable	Task-specific health &safety procedures and SOP for various mining activity. Supervised practice in assigned work tasks.
Refresher Training	All employees who received new-hire training	Yearly	One week	Required health and safety standards Transportation controls Communication systems

				Escape ways, emergency evacuations Fire warning Ground control hazards First aid Electrical hazards Accident prevention Explosives Respirator devices
Hazard Training	All employees exposed to mine hazards	Once	Variable	Hazard recognition and avoidance Emergency evacuation procedures Health standards Safety rules Respiratory devices

Source: Proposed by FAE's & EIA Coordinator as per DGMS Norms

10.9.4 Budgetary Provision for Environmental Management –

Adequate budgetary provision has been made by the Company for execution of Environmental Management Plan. The Table 10.12 gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE 10.11: EMP BUDGET

Sl.No.	Description	Item	Capital cost (Rs. In Lakhs)	Recurring cost per annum (Rs. in Lakhs)
1	Occupational health & safety	Dust Mask, Safety Shoes, Helmets Ear Plugs, Gloves, Goggles Reflector jacket, Safety Belt, Medical check ups	2.50	0.25
2	Environmental Monitoring	Air, Water, Noise & Vibration, Soil Parameters	3.00	3.00
3	Water & Soil erosion	Garland drains &Settling tanks,check dam/gully plugs, etc	2.00	0.20
4	Haul Road Maintenance		1.00	0.10
5	Green belt Development & Plantation		2.00	0.50
6	Environmental Awareness Programme		0.50	0.10
7	Fencing, Fertilizer, Manure, Manpower, etc.		2.00	0.10
Total			**13.0**	**4.15**

In order to implement the environmental protection measures, an amount of Rs. 13.00 lakhs as capital cost and recurring cost as Rs. 4.15 lakhs as recurring cost is proposed considering present market price considering present market scenario.

10.10 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.

10. ENVIRONMENTAL MANAGEMENT PLAN – "P3"

10.0 GENERAL

Environment Management Plan (EMP) aims at the preservation of ecological system by considering in-built pollution abatement facilities at the proposed site. Good practices of Environmental Management plan will ensure to keep all the environmental parameters of the project in respect of Ambient Air quality, Water quality, Socio – economic improvement standards.

Mitigation measures at the source level and an overall environment management plan at the study area are elicited so as to improve the supportive capacity of the receiving bodies. The EMP presented in this chapter discusses the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored after approval of the EIA.

10.1 ENVIRONMENTAL POLICY

The Proponent is committed to conducting all its operations and activities in an environmentally responsible manner and to continually improve environmental performance.

The Proponent will –

- Meet the requirements of all laws, acts, regulations, and standards relevant to its operations and activities
- Implement a program to train employees in general environmental issues and individual workplace environmental responsibilities
- Allocate necessary resources to ensure the implementation of the environmental policy
- Ensure that an effective closure strategy is in place at all stages of project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts
- Implement monitoring programmes to provide early warning of any deficiency or unanticipated performance in environmental safeguards
- Conduct periodic reviews to verify environmental performance and to continuously strive towards improvement

Description of the Administration and Technical Setup –

The Environment Monitoring Cell discussed under Chapter 6 will ensure effective implementation of environment management plan and to ensure compliance of environmental statutory guidelines through Mine Management Level.

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.

10.2 LAND ENVIRONMENT MANAGEMENT –

Landscape of the area will be changed due to the quarrying operation, restoration of the land by converting the quarry pit into temporary reservoir about (1.02.0 ha), the remaining part of the area i.e., 0.53.0 ha (un utilized areas, infrastructure, haul Roads) will be utilized for greenbelt development. Aesthetic of the Environment will not be affected. There is no major vegetation in the project area during the course of quarrying operation and after completion of the quarrying operation thick plantation.

TABLE 10.1: PROPOSED CONTROLS FOR LAND ENVIRONMENT

CONTROL	RESPONSIBILITY
Design vehicle wash-down areas so that all runoff water is captured and passed through oil water separators and sediment catchment devices.	Mines Manager
Refuelling to be undertaken in a safe location, away from vehicle movement pathways&100 m away of any watercourse Refuelling activity to be under visual observation at all times. Drainage of refuelling areas to sumps with oil/water separation	Mine Foreman & Mining Mate
Soil and groundwater testing as required following up a particular incident of contamination.	Mines Manager
At conceptual stage, the mining pits will cover 1.02.0 ha of the project area which will be converted into Rain Water Harvesting. Remaining extent of 0.53.0ha will be converted into greenbelt area	Mines Manager
No external dumping i.e., outside the project area	Mine Foreman
Garland drains with catch pits / settlement traps to be provided all around the project area to prevent run off affecting the surrounding lands.	Mines Manager
The periphery of Project area will be planted with thick plantation to arrest the fugitive dust, which will also act as acoustic barrier.	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.3 SOIL MANAGEMENT

Top Soil Management –

- The quarried out topsoil (608m^3) will be safety preserve all along the boundary barrier to facilitate the Greenbelt development.

Overburden / Waste and Side Burden Management –

- There is no overburden in this lease area.

TABLE 10.2: PROPOSED CONTROLS FOR SOILMANAGEMENT

CONTROL	RESPONSIBILITY
Surface run-off from the project boundary via garland drains will be diverted to the mine pits	Mine Foreman & Mining Mate
Design haul roads and other access roads with drainage systems to minimize concentration of flow and erosion risk	Mines Manager
Empty sediment from sediment traps Maintain, repair or upgrade garland drain system	Mines Manager
Test soils for pH, EC, chloride, size & water holding capacity	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.4 WATER MANAGEMENT

In the proposed quarrying project no process is involved for the effluent generation, effluent is mainly containing Oil & grease from the workshop, No workshops is proposed inside the project area. Thirumanimuthar River is located on the west side at distance 920m from the lease area the water flows in the Thirumanimuthar River during rainy season only. No other surface water bodies within the project area.

The quarrying operation is proposed upto a depth of 46 meters (1m topsoil + 45m Rough stone), the water table in the area is 71m – 76m below ground level, hence the proposed project will not intersect the Ground water table during entire quarry period.

TABLE 10.3: PROPOSED CONTROLS FOR WATER ENVIRONMENT

CONTROL	RESPONSIBILITY
To maximize the reuse of pit water for water supply	Mines Foreman
Temporary and permanent garland drain will be constructed to contain the catchments of the mining area and to divert runoff from undisturbed areas through the mining areas	Mines Manager
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations	Mines Manager
Ensure there is no process effluent generation or discharge from the project area into water bodies	Mines Foreman
Domestic sewage generated from the project area will be disposed in septic tank and soak pit system	Mines Foreman
Monthly or after rainfall, inspection for performance of water management structures and systems	Mines Manager
Conduct ground water and surface water monitoring for parameters specified by CPCB	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.5 AIR QUALITY MANAGEMENT

The proposed quarrying activity would result in the increase of particulate matter concentrations due to fugitive dust. Daily water sprinkling on the haul roads, approach roads in the vicinity would be undertaken and will be continued as there is possibility for dust generation due to truck mobility. It will be ensured that vehicles are properly maintained to comply with exhaust emission requirements

TABLE 10.4: PROPOSED CONTROLS FOR AIR ENVIRONMENT

CONTROL	RESPONSIBILITY
Generation of dust during excavation is minimized by daily (twice) water sprinkling on working face and daily (twice) water sprinkling on haul road	Mines Manager
Wet drilling procedure /drills with dust extractor system to control dust generation during drilling at source itself is implemented	Mines Manager
Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution	Mines Manager
Ambient Air Quality Monitoring carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted air pollution control measures	Mines Manager
Provision of Dust Mask to all workers	Mines Manager
Greenbelt development all along the periphery of the project area	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.6 NOISE POLLUTION CONTROL

There will be intermittent noise levels due to vehicular movement, trucks loading, drilling and blasting and cutting activities. No mining activities are planned during night time.

TABLE 10.5: PROPOSED CONTROLS FOR NOISE ENVIRONMENT

CONTROL	RESPONSIBILITY
Development of thick greenbelt all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Preventive maintenance of mining machinery and replacement of worn out accessories to control noise generation	Mines Foreman
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Mines Manager
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Mining Mate
Provision of effective silencers for mining machinery and transport vehicles	Mines Manager
Provision of sound proof AC operator cabins to HEMM	Mines Manager
Sharp drill bits are used to minimize noise from drilling	Mines Foreman
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring are carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted noise control measures. Additional noise control measures will be adopted if required as per the observations during monitoring	Mines Manager
Reduce maximum instantaneous charge using delays while blasting	Mining Mate
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination	Mines Manager
Undertake noise or vibration monitoring	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.7 GROUND VIBRATION AND FLY ROCK CONTROL

The Rough stone and Gravel quarry operation creates vibration due to the blasting and movement of Heavy Earth moving machineries, fly rocks due to the blasting.

TABLE 10.6: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK

CONTROL	RESPONSIBILITY
Controlled blasting using delay detonators will be carried out to maintain the PPV value (below 8Hz) well within the prescribed standards of DGMS	Mines Manager
Drilling and blasting will be carried under the supervision of qualified persons	Mines Manager
Proper stemming of holes should be carried out with statutory competent qualified blaster under the supervision of statutory mines manager to avoid any anomalies during blasting	Mines Manager
Suitable spacing and burden will be maintained to avoid misfire / fly rocks	Manager Mines
Number of blast holes will be restricted to control ground vibrations	Manager Mines
Blasting will be carried out only during noon time	Mining Mate
Undertake noise or vibration monitoring	Mines Manager
ensure blast holes are adequately stemmed for the depth of the hole and stemmed with suitable angular material	Mines Foreman

Source: Proposed by FAE's & EIA Coordinator

10.8 BIOLOGICAL ENVIRONMENT MANAGEMENT

The proponent's will take all necessary steps to avoid the impact on the ecology of the area by adopting suitable management measures in the planning and implementation stage. During mining, thick plantation will be carried out around the project periphery, on safety barrier zone, on top benches of quarried out area etc.,

Following control measures are proposed for its management and will be the responsibility of the Mines Manager.

- Greenbelt development all along the safety barrier of the project area
- It is also proposed to plant around 0.35.00 hectare during the present plan period. Post plantation status will be regularly checked for every season.
- The main attributes that retards the survival of sapling is fugitive dust, this fugitive dust can be controlled by water sprinkling on the haul roads and installing a sprinkler unitnear the newly planted area.
- Year wise plantation will be recorded and monitored
    - Based on the area of plantation.
    - Period of plantation
    - Type of plantation
    - Spacing between the plants
    - Type of manuring and fertilizers and its periods
    - Lopping period, interval of watering
    - Survival rate
    - Density of plantation
- The ultimate reclamation planned leaves a congenial environment for development of flora & immigration of small fauna through green belt and water reservoir. The green belt and water reservoir developed within the Project at the end of mine life will attract the birds and animals towards the project area in the post mining period.

10.8.1 Green Belt Development Plan

About 375 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier i.e., 0.35.00 ha with survival rate 80% and about 100 nos. of fruit bearing and avenue plants are proposed to be developed around the mines office. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

TABLE 10.7 PROPOSED GREENBELT ACTIVITIES FOR5 YEAR PLAN PERIOD

Year	No of trees proposed to planted	Area to be covered in m^2	Survival Rate %
I	75	700	80
II	75	700	80
III	75	700	80
IV	75	700	80
V	75	700	80

Source: Conceptual Plan of Approved Mining plan& Proposed by FAE's & EIA Coordinator

The objectives of the greenbelt development plan are –

- Provide a green belt around the periphery of the quarry area to combat the dispersal of dust in the adjoining areas,
- Protect the erosion of the soil, Conserve moisture for increasing ground water recharging,
- Restore the ecology of the area, Restore aesthetic beauty of the locality and meet the requirement of fodder, fuel and timber of the local community.

A well planned Green Belt with multi rows (three tiers) preferably with long canopy leaves shall be developed with dense plantations around the boundary and haul roads to prevent air, dust noise propagation to undesired places and efforts will be taken for the enhancement of survival rate.

10.8.2 Species Recommended for Plantation

Following points have been considered while recommending the species for plantation:

- Creating of bio-diversity.
- Fast growing, thick canopy cover, perennial and evergreen large leaf area,
- Efficient in absorbing pollutants without major effects on natural growth

TABLE 10.8: RECOMMENDED SPECIES TO PLANT IN THE GREENBELT

S.No	Botanical Name	Local Name	Importance
19.	Azadirachta indica	Neem, Vembu	Neem oil & neem products
20.	Millettia pinnata	Pungan	landscaping purposes as a windbreak or for shade
21.	Tamarindusindica	Tamarind	Edible & Medicinal and other Uses
22.	Achras sapota	Sapota	Edible fruits
23.	Ficus benghalensis	Alai	Shade and a source of food for birds
24.	Ficus religiosa	araca-maram	Shade and a source of food for birds
25.	Mangifera indica	Mango/ Ma	Edible fruit
26.	Terminalia catappa	nattuvadumai	Edible nuts
27.	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree

Source: Proposed by FAE's & EIA Coordinator

10.9 OCCUPATIONAL SAFETY & HEALTH MANAGEMENT

Occupational safety and health is very closely related to productivity and good employer-employee relationship. The main factors of occupational health impact in quarries are fugitive dust and noise. Safety of employees during quarrying operation and maintenance of mining equipment will be taken care as per Mines Act 1952 and Rule 29 of Mines Rules 1955. To avoid any adverse effect on the health of workers due to dust, noise and vibration sufficient measures have been provided.

10.9.1 Medical Surveillance and Examinations –

- Identifying workers with conditions that may be aggravated by exposure to dust & noise and establishing baseline measures for determining changes in health.
- Evaluating the effect of noise on workers
- Enabling corrective actions to be taken when necessary
- Providing health education

The health status of workers in the mine shall be regularly monitored under an occupational surveillance program. Under this program, all the employees are subjected to a details medical examination at the time of employment. The medical examination covers the following tests under mines act 1952.

- General Physical Examination and Blood Pressure
- X-ray Chest and ECG
- Sputum test
- Detailed Routine Blood and Urine examination

The medical histories of all employees will be maintained in a standard format annually. Thereafter, the employees will be subject to medical examination annually. The below tests keep upgrading the database of medical history of the employees.

TABLE 10.9: MEDICAL EXAMINATION SCHEDULE

Sl.No	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year
1	Initial Medical Examination (Mine Workers)					

A	Physical Check-up					
B	Psychological Test					
C	Audiometric Test					
D	Respiratory Test					
2	Periodical Medical Examination (Mine Workers)					
A	Physical Check - up					
B	Audiometric Test					
C	Eye Check – up					
D	Respiratory Test					
3	Medical Camp (Mine Workers & Nearby Villagers)					
4	Training (Mine Workers)					

Medical Follow ups:- Work force will be divided into three targeted groups age wise as follows:-		
Age Group	**PME as per Mines Rules 1955**	**Special Examination**
Less than 25 years	Once in a Three Years	In case of emergencies
Between 25 to 40 Years	Once in a Three Years	In case of emergencies
Above 40 Years	Once in a Three Years	In case of emergencies
Medical help on top priority immediately after diagnosis/ accident is the essence of preventive aspects.		

10.9.2 Proposed Occupational Health and Safety Measures –

- The mine site will have adequate drinking water supply so that workers do not get dehydrated.
- Lightweight and loose fitting clothes having light colors will be preferred to wear.
- Noise exposure measurements will be taken to determine the need for noise control strategies.
- The personal protective equipment will be provided for mine workers.
- Supervisor will be instructed for reporting any problems with hearing protectors or noise control equipment.
- At noisy working activity, exposure time will be minimized.
- Dust generating sources will be identified and proper control measure will be adopted.
- Periodic medical examinations will be provided for all workers.
- Strict observance of the provisions of DGMS Acts, Rules and Regulations in respect of safety both by management and the workers.
- The width of road will be maintained more than thrice the width of the vehicle. A code of traffic rules will be implemented.
- In respect of contract work, safety code for contractors and workers will be implemented. They will be allowed to work under strict supervision of statutory person/officials only after they will impart training at vocational training centres. All personal protective equipment's will be provided to them.
- A safety committee meeting every month will be organized to discuss the safety of the mines and the persons employed.
- Celebration of annual mines safety week and environmental week in order to develop safety awareness amongst employees.

FIGURE 10.1: PERSONAL PROTECTIVE EQUIPMENT TO THE MINE WORKERS

10.9.3 Health and Safety Training Programme

The Proponent will provide special induction program along with machinery manufacturers for the operators and co-operators to run and maintain the machinery effectively and efficiently. The training program for the supervisors and office staffs will be arranged in the Group Vocational Training Centres in the State. And engage an Environmental Consultants to provide periodical training to all the employees to carry out the mining operation in and eco-friendly manner.

TABLE 10.10: LIST OF PERIODICAL TRAININGS PROPOSED FOR EMPLOYEES

Course	Personnel	Frequency	Duration	Instruction
New-Employee Training	All new employees exposed to mine hazards	Once	One week	Employee rights Supervisor responsibilities Self-rescue Respiratory devices Transportation controls Communication systems Escape and emergency evacuation Ground control hazards Occupational health hazards Electrical hazards First aid Explosives
Task Training Like Drilling, Blasting, Stemming, safety, Slope stability, Dewatering, Haul road maintenance,	Employees assigned to new work tasks	Before new Assignments	Variable	Task-specific health &safety procedures and SOP for various mining activity. Supervised practice in assigned work tasks.
Refresher Training	All employees who received new-hire training	Yearly	One week	Required health and safety standards Transportation controls Communication systems Escape ways, emergency evacuations Fire warning Ground control hazards First aid Electrical hazards

				Accident prevention Explosives Respirator devices
Hazard Training	All employees exposed to mine hazards	Once	Variable	Hazard recognition and avoidance Emergency evacuation procedures Health standards Safety rules Respiratory devices

Source: Proposed by FAE's & EIA Coordinator as per DGMS Norms

10.9.4 Budgetary Provision for Environmental Management –

Adequate budgetary provision has been made by the Company for execution of Environmental Management Plan. The Table 10.12 gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE 10.11: EMP BUDGET

Sl.No.	Description	Item	Capital cost(Rs. In Lakhs)	Recurring cost per annum (Rs. in Lakhs)
1	Occupational health & safety	Dust Mask, Safety Shoes, Helmets Ear Plugs, Gloves, Goggles Reflector jacket, Safety Belt, Medical check ups	3.00	0.30
2	Environmental Monitoring	Air, Water, Noise & Vibration, Soil Parameters	2.50	2.50
3	Water & Soil erosion	Garland drains &Settling tanks,check dam/gully plugs, etc	2.00	0.20
4	Haul Road Maintenance		1.00	0.10
5	Green belt Development & Plantation		2.00	0.50
6	Environmental Awareness Programme		0.50	0.10
7	Fencing, Fertilizer, Manure, Manpower, etc.		1.50	0.10
Total			**10.0**	**3.80**

In order to implement the environmental protection measures, an amount of Rs. 10.00 lakhs as capital cost and recurring cost as Rs. 3.80 lakhs as recurring cost is proposed considering present market price considering present market scenario.

10.10 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.

10. ENVIRONMENTAL MANAGEMENT PLAN – "P4"

10.0 GENERAL

Environment Management Plan (EMP) aims at the preservation of ecological system by considering in-built pollution abatement facilities at the proposed site. Good practices of Environmental Management plan will ensure to keep all the environmental parameters of the project in respect of Ambient Air quality, Water quality, Socio – economic improvement standards.

Mitigation measures at the source level and an overall environment management plan at the study area are elicited so as to improve the supportive capacity of the receiving bodies. The EMP presented in this chapter discusses the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored after approval of the EIA.

10.1 ENVIRONMENTAL POLICY

The Proponent is committed to conducting all its operations and activities in an environmentally responsible manner and to continually improve environmental performance.

The Proponent will –

- Meet the requirements of all laws, acts, regulations, and standards relevant to its operations and activities
- Implement a program to train employees in general environmental issues and individual workplace environmental responsibilities
- Allocate necessary resources to ensure the implementation of the environmental policy
- Ensure that an effective closure strategy is in place at all stages of project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts
- Implement monitoring programmes to provide early warning of any deficiency or unanticipated performance in environmental safeguards
- Conduct periodic reviews to verify environmental performance and to continuously strive towards improvement

Description of the Administration and Technical Setup –

The Environment Monitoring Cell discussed under Chapter 6 will ensure effective implementation of environment management plan and to ensure compliance of environmental statutory guidelines through Mine Management Level.

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.

10.2 LAND ENVIRONMENT MANAGEMENT –

Landscape of the area will be changed due to the quarrying operation, restoration of the land by converting the quarry pit into temporary reservoir about (0.57.70 ha), the remaining part of the area i.e., 0.32.55 ha (un utilized areas, infrastructure, haul Roads) will be utilized for greenbelt development. Aesthetic of the Environment will not be affected. There is no major vegetation in the project area during the course of quarrying operation and after completion of the quarrying operation thick plantation.

TABLE 10.1: PROPOSED CONTROLS FOR LAND ENVIRONMENT

CONTROL	RESPONSIBILITY
Design vehicle wash-down areas so that all runoff water is captured and passed through oil water separators and sediment catchment devices.	Mines Manager
Refuelling to be undertaken in a safe location, away from vehicle movement pathways&100 m away of any watercourse Refuelling activity to be under visual observation at all times. Drainage of refuelling areas to sumps with oil/water separation	Mine Foreman & Mining Mate
Soil and groundwater testing as required following up a particular incident of contamination.	Mines Manager
At conceptual stage, the mining pits will cover 0.57.7 ha of the project area which will be converted into Rain Water Harvesting. Remaining extent of 0.32.55ha will be converted into greenbelt area	Mines Manager
No external dumping i.e., outside the project area	Mine Foreman
Garland drains with catch pits / settlement traps to be provided all around the project area to prevent run off affecting the surrounding lands.	Mines Manager
The periphery of Project area will be planted with thick plantation to arrest the fugitive dust, which will also act as acoustic barrier.	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.3 SOIL MANAGEMENT

Top Soil Management –

- There is no topsoil for this project site.

Overburden / Waste and Side Burden Management –

- The overburden in the form of Gravel formation, the Gravel will be directly loaded into tippers and sold.

TABLE 10.2: PROPOSED CONTROLS FOR SOILMANAGEMENT

CONTROL	RESPONSIBILITY
Surface run-off from the project boundary via garland drains will be diverted to the mine pits	Mine Foreman & Mining Mate
Design haul roads and other access roads with drainage systems to minimize concentration of flow and erosion risk	Mines Manager
Empty sediment from sediment traps Maintain, repair or upgrade garland drain system	Mines Manager
Test soils for pH, EC, chloride, size & water holding capacity	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.4 WATER MANAGEMENT

In the proposed quarrying project no process is involved for the effluent generation, effluent is mainly containing Oil & grease from the workshop, No workshops is proposed inside the project area. Thirumanimuthar River is located on the west side at distance 92.0m from the lease area the water flows in the Thirumanimuthar River during rainy season only. No other surface water bodies within the project area.

The quarrying operation is proposed upto a depth of 46 meters (1m topsoil + 45m Rough stone), the water table in the area is 71m – 76m below ground level, hence the proposed project will not intersect the Ground water table during entire quarry period.

TABLE 10.3: PROPOSED CONTROLS FOR WATER ENVIRONMENT

CONTROL	RESPONSIBILITY
To maximize the reuse of pit water for water supply	Mines Foreman
Temporary and permanent garland drain will be constructed to contain the catchments of the mining area and to divert runoff from undisturbed areas through the mining areas	Mines Manager
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations	Mines Manager
Ensure there is no process effluent generation or discharge from the project area into water bodies	Mines Foreman
Domestic sewage generated from the project area will be disposed in septic tank and soak pit system	Mines Foreman
Monthly or after rainfall, inspection for performance of water management structures and systems	Mines Manager
Conduct ground water and surface water monitoring for parameters specified by CPCB	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.5 AIR QUALITY MANAGEMENT

The proposed quarrying activity would result in the increase of particulate matter concentrations due to fugitive dust. Daily water sprinkling on the haul roads, approach roads in the vicinity would be undertaken and will be continued as there is possibility for dust generation due to truck mobility. It will be ensured that vehicles are properly maintained to comply with exhaust emission requirements

TABLE 10.4: PROPOSED CONTROLS FOR AIR ENVIRONMENT

CONTROL	RESPONSIBILITY
Generation of dust during excavation is minimized by daily (twice) water sprinkling on working face and daily (twice) water sprinkling on haul road	Mines Manager
Wet drilling procedure /drills with dust extractor system to control dust generation during drilling at source itself is implemented	Mines Manager
Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution	Mines Manager
Ambient Air Quality Monitoring carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted air pollution control measures	Mines Manager
Provision of Dust Mask to all workers	Mines Manager
Greenbelt development all along the periphery of the project area	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.6 NOISE POLLUTION CONTROL

There will be intermittent noise levels due to vehicular movement, trucks loading, drilling and blasting and cutting activities. No mining activities are planned during night time.

TABLE 10.5: PROPOSED CONTROLS FOR NOISE ENVIRONMENT

CONTROL	RESPONSIBILITY
Development of thick greenbelt all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Preventive maintenance of mining machinery and replacement of worn out accessories to control noise generation	Mines Foreman
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Mines Manager
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Mining Mate
Provision of effective silencers for mining machinery and transport vehicles	Mines Manager
Provision of sound proof AC operator cabins to HEMM	Mines Manager
Sharp drill bits are used to minimize noise from drilling	Mines Foreman
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring are carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted noise control measures. Additional noise control measures will be adopted if required as per the observations during monitoring	Mines Manager
Reduce maximum instantaneous charge using delays while blasting	Mining Mate
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination	Mines Manager
Undertake noise or vibration monitoring	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.7 GROUND VIBRATION AND FLY ROCK CONTROL

The Rough stone and Gravel quarry operation creates vibration due to the blasting and movement of Heavy Earth moving machineries, fly rocks due to the blasting.

TABLE 10.6: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK

CONTROL	RESPONSIBILITY
Controlled blasting using delay detonators will be carried out to maintain the PPV value (below 8Hz) well within the prescribed standards of DGMS	Mines Manager
Drilling and blasting will be carried under the supervision of qualified persons	Mines Manager
Proper stemming of holes should be carried out with statutory competent qualified blaster under the supervision of statutory mines manager to avoid any anomalies during blasting	Mines Manager
Suitable spacing and burden will be maintained to avoid misfire / fly rocks	Manager Mines
Number of blast holes will be restricted to control ground vibrations	Manager Mines
Blasting will be carried out only during noon time	Mining Mate
Undertake noise or vibration monitoring	Mines Manager
ensure blast holes are adequately stemmed for the depth of the hole and stemmed with suitable angular material	Mines Foreman

Source: Proposed by FAE's & EIA Coordinator

10.8 BIOLOGICAL ENVIRONMENT MANAGEMENT

The proponent's will take all necessary steps to avoid the impact on the ecology of the area by adopting suitable management measures in the planning and implementation stage. During mining, thick plantation will be carried out around the project periphery, on safety barrier zone, on top benches of quarried out area etc.,

Following control measures are proposed for its management and will be the responsibility of the Mines Manager.

- Greenbelt development all along the safety barrier of the project area
- It is also proposed to plant around 0.35.00 hectare during the present plan period. Post plantation status will be regularly checked for every season.
- The main attributes that retards the survival of sapling is fugitive dust, this fugitive dust can be controlled by water sprinkling on the haul roads and installing a sprinkler unitnear the newly planted area.
- Year wise plantation will be recorded and monitored
    - Based on the area of plantation.
    - Period of plantation
    - Type of plantation
    - Spacing between the plants
    - Type of manuring and fertilizers and its periods
    - Lopping period, interval of watering
    - Survival rate
    - Density of plantation
- The ultimate reclamation planned leaves a congenial environment for development of flora & immigration of small fauna through green belt and water reservoir. The green belt and water reservoir developed within the Project at the end of mine life will attract the birds and animals towards the project area in the post mining period.

10.8.1 Green Belt Development Plan

About 375 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier i.e., 0.35.00 ha with survival rate 80% and about 100 nos. of fruit bearing and avenue plants are proposed to be developed around the mines office. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

TABLE 10.7 PROPOSED GREENBELT ACTIVITIES FOR5 YEAR PLAN PERIOD

Year	No of trees proposed to planted	Area to be covered in m^2	Survival Rate %
I	75	700	80
II	75	700	80
III	75	700	80
IV	75	700	80
V	75	700	80

Source: Conceptual Plan of Approved Mining plan& Proposed by FAE's & EIA Coordinator

The objectives of the greenbelt development plan are –

- Provide a green belt around the periphery of the quarry area to combat the dispersal of dust in the adjoining areas,
- Protect the erosion of the soil, Conserve moisture for increasing ground water recharging,
- Restore the ecology of the area, Restore aesthetic beauty of the locality and meet the requirement of fodder, fuel and timber of the local community.

A well planned Green Belt with multi rows (three tiers) preferably with long canopy leaves shall be developed with dense plantations around the boundary and haul roads to prevent air, dust noise propagation to undesired places and efforts will be taken for the enhancement of survival rate.

10.8.2 Species Recommended for Plantation

Following points have been considered while recommending the species for plantation:

- Creating of bio-diversity.
- Fast growing, thick canopy cover, perennial and evergreen large leaf area,
- Efficient in absorbing pollutants without major effects on natural growth

TABLE 10.8: RECOMMENDED SPECIES TO PLANT IN THE GREENBELT

S.No	Botanical Name	Local Name	Importance
28.	Azadirachta indica	Neem, Vembu	Neem oil & neem products
29.	Millettia pinnata	Pungan	landscaping purposes as a windbreak or for shade
30.	Tamarindusindica	Tamarind	Edible & Medicinal and other Uses
31.	Achras sapota	Sapota	Edible fruits
32.	Ficus benghalensis	Alai	Shade and a source of food for birds
33.	Ficus religiosa	araca-maram	Shade and a source of food for birds
34.	Mangifera indica	Mango/ Ma	Edible fruit
35.	Terminalia catappa	nattuvadumai	Edible nuts
36.	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree

Source: Proposed by FAE's & EIA Coordinator

10.9 OCCUPATIONAL SAFETY & HEALTH MANAGEMENT

Occupational safety and health is very closely related to productivity and good employer-employee relationship. The main factors of occupational health impact in quarries are fugitive dust and noise. Safety of employees during quarrying operation and maintenance of mining equipment will be taken care as per Mines Act 1952 and Rule 29 of Mines Rules 1955. To avoid any adverse effect on the health of workers due to dust, noise and vibration sufficient measures have been provided.

10.9.1 Medical Surveillance and Examinations –

- Identifying workers with conditions that may be aggravated by exposure to dust & noise and establishing baseline measures for determining changes in health.
- Evaluating the effect of noise on workers
- Enabling corrective actions to be taken when necessary
- Providing health education

The health status of workers in the mine shall be regularly monitored under an occupational surveillance program. Under this program, all the employees are subjected to a details medical examination at the time of employment. The medical examination covers the following tests under mines act 1952.

- General Physical Examination and Blood Pressure
- X-ray Chest and ECG
- Sputum test
- Detailed Routine Blood and Urine examination

The medical histories of all employees will be maintained in a standard format annually. Thereafter, the employees will be subject to medical examination annually. The below tests keep upgrading the database of medical history of the employees.

TABLE 10.9: MEDICAL EXAMINATION SCHEDULE

Sl.No	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year
1	Initial Medical Examination (Mine Workers)					

A	Physical Check-up					
B	Psychological Test					
C	Audiometric Test					
D	Respiratory Test					
2	Periodical Medical Examination (Mine Workers)					
A	Physical Check - up					
B	Audiometric Test					
C	Eye Check – up					
D	Respiratory Test					
3	Medical Camp (Mine Workers & Nearby Villagers)					
4	Training (Mine Workers)					

Medical Follow ups:- Work force will be divided into three targeted groups age wise as follows:-		
Age Group	**PME as per Mines Rules 1955**	**Special Examination**
Less than 25 years	Once in a Three Years	In case of emergencies
Between 25 to 40 Years	Once in a Three Years	In case of emergencies
Above 40 Years	Once in a Three Years	In case of emergencies
Medical help on top priority immediately after diagnosis/ accident is the essence of preventive aspects.		

10.9.2 Proposed Occupational Health and Safety Measures –

- The mine site will have adequate drinking water supply so that workers do not get dehydrated.
- Lightweight and loose fitting clothes having light colors will be preferred to wear.
- Noise exposure measurements will be taken to determine the need for noise control strategies.
- The personal protective equipment will be provided for mine workers.
- Supervisor will be instructed for reporting any problems with hearing protectors or noise control equipment.
- At noisy working activity, exposure time will be minimized.
- Dust generating sources will be identified and proper control measure will be adopted.
- Periodic medical examinations will be provided for all workers.
- Strict observance of the provisions of DGMS Acts, Rules and Regulations in respect of safety both by management and the workers.
- The width of road will be maintained more than thrice the width of the vehicle. A code of traffic rules will be implemented.
- In respect of contract work, safety code for contractors and workers will be implemented. They will be allowed to work under strict supervision of statutory person/officials only after they will impart training at vocational training centres. All personal protective equipment's will be provided to them.
- A safety committee meeting every month will be organized to discuss the safety of the mines and the persons employed.
- Celebration of annual mines safety week and environmental week in order to develop safety awareness amongst employees.

FIGURE 10.1: PERSONAL PROTECTIVE EQUIPMENT TO THE MINE WORKERS

10.9.3 Health and Safety Training Programme

The Proponent will provide special induction program along with machinery manufacturers for the operators and co-operators to run and maintain the machinery effectively and efficiently. The training program for the supervisors and office staffs will be arranged in the Group Vocational Training Centres in the State. And engage an Environmental Consultants to provide periodical training to all the employees to carry out the mining operation in and eco-friendly manner.

TABLE 10.10: LIST OF PERIODICAL TRAININGS PROPOSED FOR EMPLOYEES

Course	Personnel	Frequency	Duration	Instruction
New-Employee Training	All new employees exposed to mine hazards	Once	One week	Employee rights Supervisor responsibilities Self-rescue Respiratory devices Transportation controls Communication systems Escape and emergency evacuation Ground control hazards Occupational health hazards Electrical hazards First aid Explosives
Task Training Like Drilling, Blasting, Stemming, safety, Slope stability, Dewatering, Haul road maintenance,	Employees assigned to new work tasks	Before new Assignments	Variable	Task-specific health &safety procedures and SOP for various mining activity. Supervised practice in assigned work tasks.
Refresher Training	All employees who received new-hire training	Yearly	One week	Required health and safety standards Transportation controls Communication systems Escape ways, emergency evacuations Fire warning

				Ground control hazards First aid Electrical hazards Accident prevention Explosives Respirator devices
Hazard Training	All employees exposed to mine hazards	Once	Variable	Hazard recognition and avoidance Emergency evacuation procedures Health standards Safety rules Respiratory devices

Source: Proposed by FAE's & EIA Coordinator as per DGMS Norms

10.9.4 Budgetary Provision for Environmental Management –

Adequate budgetary provision has been made by the Company for execution of Environmental Management Plan. The Table 10.12 gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE 10.11: EMP BUDGET

Sl.No.	Description	Item	Capital cost(Rs. In Lakhs)	Recurring cost per annum (Rs. in Lakhs)
1	Occupational health & safety	Dust Mask, Safety Shoes, Helmets Ear Plugs, Gloves, Goggles Reflector jacket, Safety Belt, Medical check ups	3.00	0.30
2	Environmental Monitoring	Air, Water, Noise & Vibration, Soil Parameters	2.50	2.50
3	Water & Soil erosion	Garland drains &Settling tanks,check dam/gully plugs, etc	2.00	0.20
4	Haul Road Maintenance		1.00	0.10
5	Green belt Development & Plantation		2.00	0.50
6	Environmental Awareness Programme		0.50	0.10
7	Fencing, Fertilizer, Manure, Manpower, etc.		1.50	0.10
Total			**10.0**	**3.80**

In order to implement the environmental protection measures, an amount of Rs. 10.00 lakhs as capital cost and recurring cost as Rs. 3.80 lakhs as recurring cost is proposed considering present market price considering present market scenario.

10.10 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.

10. ENVIRONMENTAL MANAGEMENT PLAN – "P5"

10.0 GENERAL

Environment Management Plan (EMP) aims at the preservation of ecological system by considering in-built pollution abatement facilities at the proposed site. Good practices of Environmental Management plan will ensure to keep all the environmental parameters of the project in respect of Ambient Air quality, Water quality, Socio – economic improvement standards.

Mitigation measures at the source level and an overall environment management plan at the study area are elicited so as to improve the supportive capacity of the receiving bodies. The EMP presented in this chapter discusses the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored after approval of the EIA.

10.1 ENVIRONMENTAL POLICY

The Proponent is committed to conducting all its operations and activities in an environmentally responsible manner and to continually improve environmental performance.

The Proponent will –

- Meet the requirements of all laws, acts, regulations, and standards relevant to its operations and activities
- Implement a program to train employees in general environmental issues and individual workplace environmental responsibilities
- Allocate necessary resources to ensure the implementation of the environmental policy
- Ensure that an effective closure strategy is in place at all stages of project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts
- Implement monitoring programmes to provide early warning of any deficiency or unanticipated performance in environmental safeguards
- Conduct periodic reviews to verify environmental performance and to continuously strive towards improvement

Description of the Administration and Technical Setup –

The Environment Monitoring Cell discussed under Chapter 6 will ensure effective implementation of environment management plan and to ensure compliance of environmental statutory guidelines through Mine Management Level.

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.

10.2 LAND ENVIRONMENT MANAGEMENT –

Landscape of the area will be changed due to the quarrying operation, restoration of the land by converting the quarry pit into temporary reservoir about (0.47.4 ha), the remaining part of the area i.e., 0.68.6ha (un utilized areas, infrastructure, haul Roads) will be utilized for greenbelt development. Aesthetic of the Environment will not be affected. There is no major vegetation in the project area during the course of quarrying operation and after completion of the quarrying operation thick plantation.

TABLE 10.1: PROPOSED CONTROLS FOR LAND ENVIRONMENT

CONTROL	RESPONSIBILITY
Design vehicle wash-down areas so that all runoff water is captured and passed through oil water separators and sediment catchment devices.	Mines Manager
Refuelling to be undertaken in a safe location, away from vehicle movement pathways&100 m away of any watercourse Refuelling activity to be under visual observation at all times. Drainage of refuelling areas to sumps with oil/water separation	Mine Foreman & Mining Mate
Soil and groundwater testing as required following up a particular incident of contamination.	Mines Manager
At conceptual stage, the mining pits will cover 0.47.4 ha of the project area which will be converted into Rain Water Harvesting. Remaining extent of 0.68.6ha will be converted into greenbelt area	Mines Manager
No external dumping i.e., outside the project area	Mine Foreman
Garland drains with catch pits / settlement traps to be provided all around the project area to prevent run off affecting the surrounding lands.	Mines Manager
The periphery of Project area will be planted with thick plantation to arrest the fugitive dust, which will also act as acoustic barrier.	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.3 SOIL MANAGEMENT

Top Soil Management –

- There is no topsoil for this project site.

Overburden / Waste and Side Burden Management –

- The overburden in the form of Gravel formation, the Gravel will be directly loaded into tippers and sold.

TABLE 10.2: PROPOSED CONTROLS FOR SOILMANAGEMENT

CONTROL	RESPONSIBILITY
Surface run-off from the project boundary via garland drains will be diverted to the mine pits	Mine Foreman & Mining Mate
Design haul roads and other access roads with drainage systems to minimize concentration of flow and erosion risk	Mines Manager
Empty sediment from sediment traps Maintain, repair or upgrade garland drain system	Mines Manager
Test soils for pH, EC, chloride, size & water holding capacity	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.4 WATER MANAGEMENT

In the proposed quarrying project no process is involved for the effluent generation, effluent is mainly containing Oil & grease from the workshop, No workshops is proposed inside the project area. Thirumanimuthar River is located on the west side at distance 650m from the lease area the water flows in the Thirumanimuthar River during rainy season only. No other surface water bodies within the project area.

The quarrying operation is proposed upto a depth of 27 meters (2m Gravel + 25m Rough stone), the water table in the area is 63m – 68m below ground level, hence the proposed project will not intersect the Ground water table during entire quarry period.

TABLE 10.3: PROPOSED CONTROLS FOR WATER ENVIRONMENT

CONTROL	RESPONSIBILITY
To maximize the reuse of pit water for water supply	Mines Foreman
Temporary and permanent garland drain will be constructed to contain the catchments of the mining area and to divert runoff from undisturbed areas through the mining areas	Mines Manager
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations	Mines Manager
Ensure there is no process effluent generation or discharge from the project area into water bodies	Mines Foreman
Domestic sewage generated from the project area will be disposed in septic tank and soak pit system	Mines Foreman
Monthly or after rainfall, inspection for performance of water management structures and systems	Mines Manager
Conduct ground water and surface water monitoring for parameters specified by CPCB	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.5 AIR QUALITY MANAGEMENT

The proposed quarrying activity would result in the increase of particulate matter concentrations due to fugitive dust. Daily water sprinkling on the haul roads, approach roads in the vicinity would be undertaken and will be continued as there is possibility for dust generation due to truck mobility. It will be ensured that vehicles are properly maintained to comply with exhaust emission requirements

TABLE 10.4: PROPOSED CONTROLS FOR AIR ENVIRONMENT

CONTROL	RESPONSIBILITY
Generation of dust during excavation is minimized by daily (twice) water sprinkling on working face and daily (twice) water sprinkling on haul road	Mines Manager
Wet drilling procedure /drills with dust extractor system to control dust generation during drilling at source itself is implemented	Mines Manager
Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution	Mines Manager
Ambient Air Quality Monitoring carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted air pollution control measures	Mines Manager
Provision of Dust Mask to all workers	Mines Manager
Greenbelt development all along the periphery of the project area	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.6 NOISE POLLUTION CONTROL

There will be intermittent noise levels due to vehicular movement, trucks loading, drilling and blasting and cutting activities. No mining activities are planned during night time.

TABLE 10.5: PROPOSED CONTROLS FOR NOISE ENVIRONMENT

CONTROL	RESPONSIBILITY
Development of thick greenbelt all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Preventive maintenance of mining machinery and replacement of worn out accessories to control noise generation	Mines Foreman
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Mines Manager
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Mining Mate
Provision of effective silencers for mining machinery and transport vehicles	Mines Manager
Provision of sound proof AC operator cabins to HEMM	Mines Manager
Sharp drill bits are used to minimize noise from drilling	Mines Foreman
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring are carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted noise control measures. Additional noise control measures will be adopted if required as per the observations during monitoring	Mines Manager
Reduce maximum instantaneous charge using delays while blasting	Mining Mate
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination	Mines Manager
Undertake noise or vibration monitoring	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.7 GROUND VIBRATION AND FLY ROCK CONTROL

The Rough stone and Gravel quarry operation creates vibration due to the blasting and movement of Heavy Earth moving machineries, fly rocks due to the blasting.

TABLE 10.6: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK

CONTROL	RESPONSIBILITY
Controlled blasting using delay detonators will be carried out to maintain the PPV value (below 8Hz) well within the prescribed standards of DGMS	Mines Manager
Drilling and blasting will be carried under the supervision of qualified persons	Mines Manager
Proper stemming of holes should be carried out with statutory competent qualified blaster under the supervision of statutory mines manager to avoid any anomalies during blasting	Mines Manager
Suitable spacing and burden will be maintained to avoid misfire / fly rocks	Manager Mines
Number of blast holes will be restricted to control ground vibrations	Manager Mines
Blasting will be carried out only during noon time	Mining Mate
Undertake noise or vibration monitoring	Mines Manager
ensure blast holes are adequately stemmed for the depth of the hole and stemmed with suitable angular material	Mines Foreman

Source: Proposed by FAE's & EIA Coordinator

10.8 BIOLOGICAL ENVIRONMENT MANAGEMENT

The proponent's will take all necessary steps to avoid the impact on the ecology of the area by adopting suitable management measures in the planning and implementation stage. During mining, thick plantation will be carried out around the project periphery, on safety barrier zone, on top benches of quarried out area etc.,

Following control measures are proposed for its management and will be the responsibility of the Mines Manager.

- Greenbelt development all along the safety barrier of the project area
- It is also proposed to plant around 0.35.00 hectare during the present plan period. Post plantation status will be regularly checked for every season.
- The main attributes that retards the survival of sapling is fugitive dust, this fugitive dust can be controlled by water sprinkling on the haul roads and installing a sprinkler unitnear the newly planted area.
- Year wise plantation will be recorded and monitored
    - Based on the area of plantation.
    - Period of plantation
    - Type of plantation
    - Spacing between the plants
    - Type of manuring and fertilizers and its periods
    - Lopping period, interval of watering
    - Survival rate
    - Density of plantation
- The ultimate reclamation planned leaves a congenial environment for development of flora & immigration of small fauna through green belt and water reservoir. The green belt and water reservoir developed within the Project at the end of mine life will attract the birds and animals towards the project area in the post mining period.

10.8.1 Green Belt Development Plan

About 450 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier i.e., 0.35.0 ha with survival rate 80% and about 100 nos. of fruit bearing and avenue plants are proposed to be developed around the mines office. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

TABLE 10.7 PROPOSED GREENBELT ACTIVITIES FOR5 YEAR PLAN PERIOD

Year	No of trees proposed to planted	Area to be covered in m^2	Survival Rate %
I	90	834	80
II	90	834	80
III	90	834	80
IV	90	834	80
V	90	834	80

Source: Conceptual Plan of Approved Mining plan& Proposed by FAE's & EIA Coordinator

The objectives of the greenbelt development plan are –

- Provide a green belt around the periphery of the quarry area to combat the dispersal of dust in the adjoining areas,
- Protect the erosion of the soil, Conserve moisture for increasing ground water recharging,
- Restore the ecology of the area, Restore aesthetic beauty of the locality and meet the requirement of fodder, fuel and timber of the local community.

A well planned Green Belt with multi rows (three tiers) preferably with long canopy leaves shall be developed with dense plantations around the boundary and haul roads to prevent air, dust noise propagation to undesired places and efforts will be taken for the enhancement of survival rate.

10.8.2 Species Recommended for Plantation

Following points have been considered while recommending the species for plantation:

- Creating of bio-diversity.
- Fast growing, thick canopy cover, perennial and evergreen large leaf area,
- Efficient in absorbing pollutants without major effects on natural growth

TABLE 10.8: RECOMMENDED SPECIES TO PLANT IN THE GREENBELT

S.No	Botanical Name	Local Name	Importance
37.	Azadirachta indica	Neem, Vembu	Neem oil & neem products
38.	Millettia pinnata	Pungan	landscaping purposes as a windbreak or for shade
39.	Tamarindusindica	Tamarind	Edible & Medicinal and other Uses
40.	Achras sapota	Sapota	Edible fruits
41.	Ficus benghalensis	Alai	Shade and a source of food for birds
42.	Ficus religiosa	araca-maram	Shade and a source of food for birds
43.	Mangifera indica	Mango/ Ma	Edible fruit
44.	Terminalia catappa	nattuvadumai	Edible nuts
45.	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree

Source: Proposed by FAE's & EIA Coordinator

10.9 OCCUPATIONAL SAFETY & HEALTH MANAGEMENT

Occupational safety and health is very closely related to productivity and good employer-employee relationship. The main factors of occupational health impact in quarries are fugitive dust and noise. Safety of employees during quarrying operation and maintenance of mining equipment will be taken care as per Mines Act 1952 and Rule 29 of Mines Rules 1955. To avoid any adverse effect on the health of workers due to dust, noise and vibration sufficient measures have been provided.

10.9.1 Medical Surveillance and Examinations –

- Identifying workers with conditions that may be aggravated by exposure to dust & noise and establishing baseline measures for determining changes in health.
- Evaluating the effect of noise on workers
- Enabling corrective actions to be taken when necessary
- Providing health education

The health status of workers in the mine shall be regularly monitored under an occupational surveillance program. Under this program, all the employees are subjected to a details medical examination at the time of employment. The medical examination covers the following tests under mines act 1952.

- General Physical Examination and Blood Pressure
- X-ray Chest and ECG
- Sputum test
- Detailed Routine Blood and Urine examination

The medical histories of all employees will be maintained in a standard format annually. Thereafter, the employees will be subject to medical examination annually. The below tests keep upgrading the database of medical history of the employees.

TABLE 10.9: MEDICAL EXAMINATION SCHEDULE

Sl.No	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year
1	Initial Medical Examination (Mine Workers)					

A	Physical Check-up					
B	Psychological Test					
C	Audiometric Test					
D	Respiratory Test					
2	Periodical Medical Examination (Mine Workers)					
A	Physical Check - up					
B	Audiometric Test					
C	Eye Check – up					
D	Respiratory Test					
3	Medical Camp (Mine Workers & Nearby Villagers)					
4	Training (Mine Workers)					

Medical Follow ups:- Work force will be divided into three targeted groups age wise as follows:-		
Age Group	**PME as per Mines Rules 1955**	**Special Examination**
Less than 25 years	Once in a Three Years	In case of emergencies
Between 25 to 40 Years	Once in a Three Years	In case of emergencies
Above 40 Years	Once in a Three Years	In case of emergencies
Medical help on top priority immediately after diagnosis/ accident is the essence of preventive aspects.		

10.9.2 Proposed Occupational Health and Safety Measures –

- The mine site will have adequate drinking water supply so that workers do not get dehydrated.
- Lightweight and loose fitting clothes having light colors will be preferred to wear.
- Noise exposure measurements will be taken to determine the need for noise control strategies.
- The personal protective equipment will be provided for mine workers.
- Supervisor will be instructed for reporting any problems with hearing protectors or noise control equipment.
- At noisy working activity, exposure time will be minimized.
- Dust generating sources will be identified and proper control measure will be adopted.
- Periodic medical examinations will be provided for all workers.
- Strict observance of the provisions of DGMS Acts, Rules and Regulations in respect of safety both by management and the workers.
- The width of road will be maintained more than thrice the width of the vehicle. A code of traffic rules will be implemented.
- In respect of contract work, safety code for contractors and workers will be implemented. They will be allowed to work under strict supervision of statutory person/officials only after they will impart training at vocational training centres. All personal protective equipment's will be provided to them.
- A safety committee meeting every month will be organized to discuss the safety of the mines and the persons employed.
- Celebration of annual mines safety week and environmental week in order to develop safety awareness amongst employees.

FIGURE 10.1: PERSONAL PROTECTIVE EQUIPMENT TO THE MINE WORKERS

10.9.3 Health and Safety Training Programme

The Proponent will provide special induction program along with machinery manufacturers for the operators and co-operators to run and maintain the machinery effectively and efficiently. The training program for the supervisors and office staffs will be arranged in the Group Vocational Training Centres in the State. And engage an Environmental Consultants to provide periodical training to all the employees to carry out the mining operation in and eco-friendly manner.

TABLE 10.10: LIST OF PERIODICAL TRAININGS PROPOSED FOR EMPLOYEES

Course	Personnel	Frequency	Duration	Instruction
New-Employee Training	All new employees exposed to mine hazards	Once	One week	Employee rights Supervisor responsibilities Self-rescue Respiratory devices Transportation controls Communication systems Escape and emergency evacuation Ground control hazards Occupational health hazards Electrical hazards First aid Explosives
Task Training Like Drilling, Blasting, Stemming, safety, Slope stability, Dewatering, Haul road maintenance,	Employees assigned to new work tasks	Before new Assignments	Variable	Task-specific health &safety procedures and SOP for various mining activity. Supervised practice in assigned work tasks.
Refresher Training	All employees who received new-hire training	Yearly	One week	Required health and safety standards Transportation controls Communication systems Escape ways, emergency evacuations Fire warning

				Ground control hazards First aid Electrical hazards Accident prevention Explosives Respirator devices
Hazard Training	All employees exposed to mine hazards	Once	Variable	Hazard recognition and avoidance Emergency evacuation procedures Health standards Safety rules Respiratory devices

Source: Proposed by FAE's & EIA Coordinator as per DGMS Norms

10.9.4 Budgetary Provision for Environmental Management –

Adequate budgetary provision has been made by the Company for execution of Environmental Management Plan. The Table 10.12 gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE 10.11: EMP BUDGET

Sl.No.	Description	Item	Capital cost(Rs. In Lakhs)	Recurring cost per annum (Rs. in Lakhs)
1	Occupational health & safety	Dust Mask, Safety Shoes, Helmets Ear Plugs, Gloves, Goggles Reflector jacket, Safety Belt, Medical check ups	3.00	0.30
2	Environmental Monitoring	Air, Water, Noise & Vibration, Soil Parameters	3.00	3.00
3	Water & Soil erosion	Garland drains &Settling tanks,check dam/gully plugs, etc.,	2.00	0.20
4	Haul Road Maintenance		1.00	0.10
5	Green belt Development & Plantation		2.00	0.50
6	Environmental Awareness Programme		0.50	0.10
7	Fencing, Fertilizer, Manure, Manpower, etc.		2.00	0.10
Total			**13.5**	**4.30**

In order to implement the environmental protection measures, an amount of Rs. 13.50 lakhs as capital cost and recurring cost as Rs. 4.30 lakhs as recurring cost is proposed considering present market price considering present market scenario.

10.10 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.

10. ENVIRONMENTAL MANAGEMENT PLAN – "P6"

10.0 GENERAL

Environment Management Plan (EMP) aims at the preservation of ecological system by considering in-built pollution abatement facilities at the proposed site. Good practices of Environmental Management plan will ensure to keep all the environmental parameters of the project in respect of Ambient Air quality, Water quality, Socio – economic improvement standards.

Mitigation measures at the source level and an overall environment management plan at the study area are elicited so as to improve the supportive capacity of the receiving bodies. The EMP presented in this chapter discusses the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored after approval of the EIA.

10.1 ENVIRONMENTAL POLICY

The Proponent is committed to conducting all its operations and activities in an environmentally responsible manner and to continually improve environmental performance.

The Proponent will –

- Meet the requirements of all laws, acts, regulations, and standards relevant to its operations and activities
- Implement a program to train employees in general environmental issues and individual workplace environmental responsibilities
- Allocate necessary resources to ensure the implementation of the environmental policy
- Ensure that an effective closure strategy is in place at all stages of project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts
- Implement monitoring programmes to provide early warning of any deficiency or unanticipated performance in environmental safeguards
- Conduct periodic reviews to verify environmental performance and to continuously strive towards improvement

Description of the Administration and Technical Setup –

The Environment Monitoring Cell discussed under Chapter 6 will ensure effective implementation of environment management plan and to ensure compliance of environmental statutory guidelines through Mine Management Level.

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.

10.2 LAND ENVIRONMENT MANAGEMENT –

Landscape of the area will be changed due to the quarrying operation, restoration of the land by converting the quarry pit into temporary reservoir about (1.45.8 ha), the remaining part of the area i.e., 0.56.5ha (un utilized areas, infrastructure, haul Roads) will be utilized for greenbelt development. Aesthetic of the Environment will not be affected. There is no major vegetation in the project area during the course of quarrying operation and after completion of the quarrying operation thick plantation.

TABLE 10.1: PROPOSED CONTROLS FOR LAND ENVIRONMENT

CONTROL	RESPONSIBILITY
Design vehicle wash-down areas so that all runoff water is captured and passed through oil water separators and sediment catchment devices.	Mines Manager
Refuelling to be undertaken in a safe location, away from vehicle movement pathways&100 m away of any watercourse Refuelling activity to be under visual observation at all times. Drainage of refuelling areas to sumps with oil/water separation	Mine Foreman & Mining Mate
Soil and groundwater testing as required following up a particular incident of contamination.	Mines Manager
At conceptual stage, the mining pits will cover 1.45.8 ha of the project area which will be converted into Rain Water Harvesting. Remaining extent of 0.56.5ha will be converted into greenbelt area	Mines Manager
No external dumping i.e., outside the project area	Mine Foreman
Garland drains with catch pits / settlement traps to be provided all around the project area to prevent run off affecting the surrounding lands.	Mines Manager
The periphery of Project area will be planted with thick plantation to arrest the fugitive dust, which will also act as acoustic barrier.	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.3 SOIL MANAGEMENT

Top Soil Management –

- There is no topsoil for this project site.

Overburden / Waste and Side Burden Management –

- The overburden in the form of Gravel formation, the Gravel will be directly loaded into tippers and sold.

TABLE 10.2: PROPOSED CONTROLS FOR SOILMANAGEMENT

CONTROL	RESPONSIBILITY
Surface run-off from the project boundary via garland drains will be diverted to the mine pits	Mine Foreman & Mining Mate
Design haul roads and other access roads with drainage systems to minimize concentration of flow and erosion risk	Mines Manager
Empty sediment from sediment traps Maintain, repair or upgrade garland drain system	Mines Manager
Test soils for pH, EC, chloride, size & water holding capacity	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.4 WATER MANAGEMENT

In the proposed quarrying project no process is involved for the effluent generation, effluent is mainly containing Oil & grease from the workshop, No workshops is proposed inside the project area. Thirumanimuthar River is located on the west side at distance 410m from the lease area the water flows in the Thirumanimuthar River during rainy season only. No other surface water bodies within the project area.

The quarrying operation is proposed upto a depth of 42 meters (2m Gravel + 40m Rough stone), the water table in the area is 63m – 68m below ground level, hence the proposed project will not intersect the Ground water table during entire quarry period.

TABLE 10.3: PROPOSED CONTROLS FOR WATER ENVIRONMENT

CONTROL	RESPONSIBILITY
To maximize the reuse of pit water for water supply	Mines Foreman
Temporary and permanent garland drain will be constructed to contain the catchments of the mining area and to divert runoff from undisturbed areas through the mining areas	Mines Manager
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations	Mines Manager
Ensure there is no process effluent generation or discharge from the project area into water bodies	Mines Foreman
Domestic sewage generated from the project area will be disposed in septic tank and soak pit system	Mines Foreman
Monthly or after rainfall, inspection for performance of water management structures and systems	Mines Manager
Conduct ground water and surface water monitoring for parameters specified by CPCB	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.5 AIR QUALITY MANAGEMENT

The proposed quarrying activity would result in the increase of particulate matter concentrations due to fugitive dust. Daily water sprinkling on the haul roads, approach roads in the vicinity would be undertaken and will be continued as there is possibility for dust generation due to truck mobility. It will be ensured that vehicles are properly maintained to comply with exhaust emission requirements

TABLE 10.4: PROPOSED CONTROLS FOR AIR ENVIRONMENT

CONTROL	RESPONSIBILITY
Generation of dust during excavation is minimized by daily (twice) water sprinkling on working face and daily (twice) water sprinkling on haul road	Mines Manager
Wet drilling procedure /drills with dust extractor system to control dust generation during drilling at source itself is implemented	Mines Manager
Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution	Mines Manager
Ambient Air Quality Monitoring carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted air pollution control measures	Mines Manager
Provision of Dust Mask to all workers	Mines Manager
Greenbelt development all along the periphery of the project area	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.6 NOISE POLLUTION CONTROL

There will be intermittent noise levels due to vehicular movement, trucks loading, drilling and blasting and cutting activities. No mining activities are planned during night time.

TABLE 10.5: PROPOSED CONTROLS FOR NOISE ENVIRONMENT

CONTROL	RESPONSIBILITY
Development of thick greenbelt all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Preventive maintenance of mining machinery and replacement of worn out accessories to control noise generation	Mines Foreman
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Mines Manager
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Mining Mate
Provision of effective silencers for mining machinery and transport vehicles	Mines Manager
Provision of sound proof AC operator cabins to HEMM	Mines Manager
Sharp drill bits are used to minimize noise from drilling	Mines Foreman
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring are carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted noise control measures. Additional noise control measures will be adopted if required as per the observations during monitoring	Mines Manager
Reduce maximum instantaneous charge using delays while blasting	Mining Mate
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination	Mines Manager
Undertake noise or vibration monitoring	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.7 GROUND VIBRATION AND FLY ROCK CONTROL

The Rough stone and Gravel quarry operation creates vibration due to the blasting and movement of Heavy Earth moving machineries, fly rocks due to the blasting.

TABLE 10.6: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK

CONTROL	RESPONSIBILITY
Controlled blasting using delay detonators will be carried out to maintain the PPV value (below 8Hz) well within the prescribed standards of DGMS	Mines Manager
Drilling and blasting will be carried under the supervision of qualified persons	Mines Manager
Proper stemming of holes should be carried out with statutory competent qualified blaster under the supervision of statutory mines manager to avoid any anomalies during blasting	Mines Manager
Suitable spacing and burden will be maintained to avoid misfire / fly rocks	Manager Mines
Number of blast holes will be restricted to control ground vibrations	Manager Mines
Blasting will be carried out only during noon time	Mining Mate
Undertake noise or vibration monitoring	Mines Manager
ensure blast holes are adequately stemmed for the depth of the hole and stemmed with suitable angular material	Mines Foreman

Source: Proposed by FAE's & EIA Coordinator

10.8 BIOLOGICAL ENVIRONMENT MANAGEMENT

The proponent's will take all necessary steps to avoid the impact on the ecology of the area by adopting suitable management measures in the planning and implementation stage. During mining, thick plantation will be carried out around the project periphery, on safety barrier zone, on top benches of quarried out area etc.,

Following control measures are proposed for its management and will be the responsibility of the Mines Manager.

- Greenbelt development all along the safety barrier of the project area
- It is also proposed to plant around 0.28.80 hectare during the present plan period. Post plantation status will be regularly checked for every season.
- The main attributes that retards the survival of sapling is fugitive dust, this fugitive dust can be controlled by water sprinkling on the haul roads and installing a sprinkler unitnear the newly planted area.
- Year wise plantation will be recorded and monitored
    - Based on the area of plantation.
    - Period of plantation
    - Type of plantation
    - Spacing between the plants
    - Type of manuring and fertilizers and its periods
    - Lopping period, interval of watering
    - Survival rate
    - Density of plantation
- The ultimate reclamation planned leaves a congenial environment for development of flora & immigration of small fauna through green belt and water reservoir. The green belt and water reservoir developed within the Project at the end of mine life will attract the birds and animals towards the project area in the post mining period.

10.8.1 Green Belt Development Plan

About 320 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier i.e., 0.28.80ha with survival rate 80% and about 50 nos. of fruit bearing and avenue plants are proposed to be developed around the mines office. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

TABLE 10.7 PROPOSED GREENBELT ACTIVITIES FOR5 YEAR PLAN PERIOD

Year	No of trees proposed to planted	Area to be covered in m^2	Survival Rate %
I	64	576	80
II	64	576	80
III	64	576	80
IV	64	576	80
V	64	576	80

Source: Conceptual Plan of Approved Mining plan& Proposed by FAE's & EIA Coordinator

The objectives of the greenbelt development plan are –

- Provide a green belt around the periphery of the quarry area to combat the dispersal of dust in the adjoining areas,
- Protect the erosion of the soil, Conserve moisture for increasing ground water recharging,
- Restore the ecology of the area, Restore aesthetic beauty of the locality and meet the requirement of fodder, fuel and timber of the local community.

A well planned Green Belt with multi rows (three tiers) preferably with long canopy leaves shall be developed with dense plantations around the boundary and haul roads to prevent air, dust noise propagation to undesired places and efforts will be taken for the enhancement of survival rate.

10.8.2 Species Recommended for Plantation

Following points have been considered while recommending the species for plantation:

- Creating of bio-diversity.
- Fast growing, thick canopy cover, perennial and evergreen large leaf area,
- Efficient in absorbing pollutants without major effects on natural growth

TABLE 10.8: RECOMMENDED SPECIES TO PLANT IN THE GREENBELT

S.No	Botanical Name	Local Name	Importance
46.	Azadirachta indica	Neem, Vembu	Neem oil & neem products
47.	Millettia pinnata	Pungan	landscaping purposes as a windbreak or for shade
48.	Tamarindusindica	Tamarind	Edible & Medicinal and other Uses
49.	Achras sapota	Sapota	Edible fruits
50.	Ficus benghalensis	Alai	Shade and a source of food for birds
51.	Ficus religiosa	araca-maram	Shade and a source of food for birds
52.	Mangifera indica	Mango/ Ma	Edible fruit
53.	Terminalia catappa	nattuvadumai	Edible nuts
54.	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree

Source: Proposed by FAE's & EIA Coordinator

10.9 OCCUPATIONAL SAFETY & HEALTH MANAGEMENT

Occupational safety and health is very closely related to productivity and good employer-employee relationship. The main factors of occupational health impact in quarries are fugitive dust and noise. Safety of employees during quarrying operation and maintenance of mining equipment will be taken care as per Mines Act 1952 and Rule 29 of Mines Rules 1955. To avoid any adverse effect on the health of workers due to dust, noise and vibration sufficient measures have been provided.

10.9.1 Medical Surveillance and Examinations –

- Identifying workers with conditions that may be aggravated by exposure to dust & noise and establishing baseline measures for determining changes in health.
- Evaluating the effect of noise on workers
- Enabling corrective actions to be taken when necessary
- Providing health education

The health status of workers in the mine shall be regularly monitored under an occupational surveillance program. Under this program, all the employees are subjected to a details medical examination at the time of employment. The medical examination covers the following tests under mines act 1952.

- General Physical Examination and Blood Pressure
- X-ray Chest and ECG
- Sputum test
- Detailed Routine Blood and Urine examination

The medical histories of all employees will be maintained in a standard format annually. Thereafter, the employees will be subject to medical examination annually. The below tests keep upgrading the database of medical history of the employees.

TABLE 10.9: MEDICAL EXAMINATION SCHEDULE

Sl.No	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year
1	Initial Medical Examination (Mine Workers)					

A	Physical Check-up					
B	Psychological Test					
C	Audiometric Test					
D	Respiratory Test					
2	Periodical Medical Examination (Mine Workers)					
A	Physical Check - up					
B	Audiometric Test					
C	Eye Check – up					
D	Respiratory Test					
3	Medical Camp (Mine Workers & Nearby Villagers)					
4	Training (Mine Workers)					

Medical Follow ups:- Work force will be divided into three targeted groups age wise as follows:-		
Age Group	**PME as per Mines Rules 1955**	**Special Examination**
Less than 25 years	Once in a Three Years	In case of emergencies
Between 25 to 40 Years	Once in a Three Years	In case of emergencies
Above 40 Years	Once in a Three Years	In case of emergencies
Medical help on top priority immediately after diagnosis/ accident is the essence of preventive aspects.		

10.9.2 Proposed Occupational Health and Safety Measures –

- The mine site will have adequate drinking water supply so that workers do not get dehydrated.
- Lightweight and loose fitting clothes having light colors will be preferred to wear.
- Noise exposure measurements will be taken to determine the need for noise control strategies.
- The personal protective equipment will be provided for mine workers.
- Supervisor will be instructed for reporting any problems with hearing protectors or noise control equipment.
- At noisy working activity, exposure time will be minimized.
- Dust generating sources will be identified and proper control measure will be adopted.
- Periodic medical examinations will be provided for all workers.
- Strict observance of the provisions of DGMS Acts, Rules and Regulations in respect of safety both by management and the workers.
- The width of road will be maintained more than thrice the width of the vehicle. A code of traffic rules will be implemented.
- In respect of contract work, safety code for contractors and workers will be implemented. They will be allowed to work under strict supervision of statutory person/officials only after they will impart training at vocational training centres. All personal protective equipment's will be provided to them.
- A safety committee meeting every month will be organized to discuss the safety of the mines and the persons employed.
- Celebration of annual mines safety week and environmental week in order to develop safety awareness amongst employees.

FIGURE 10.1: PERSONAL PROTECTIVE EQUIPMENT TO THE MINE WORKERS

10.9.3 Health and Safety Training Programme

The Proponent will provide special induction program along with machinery manufacturers for the operators and co-operators to run and maintain the machinery effectively and efficiently. The training program for the supervisors and office staffs will be arranged in the Group Vocational Training Centres in the State. And engage an Environmental Consultants to provide periodical training to all the employees to carry out the mining operation in and eco-friendly manner.

TABLE 10.10: LIST OF PERIODICAL TRAININGS PROPOSED FOR EMPLOYEES

Course	Personnel	Frequency	Duration	Instruction
New-Employee Training	All new employees exposed to mine hazards	Once	One week	Employee rights Supervisor responsibilities Self-rescue Respiratory devices Transportation controls Communication systems Escape and emergency evacuation Ground control hazards Occupational health hazards Electrical hazards First aid Explosives
Task Training Like Drilling, Blasting, Stemming, safety, Slope stability, Dewatering, Haul road maintenance,	Employees assigned to new work tasks	Before new Assignments	Variable	Task-specific health &safety procedures and SOP for various mining activity. Supervised practice in assigned work tasks.
Refresher Training	All employees who received new-hire training	Yearly	One week	Required health and safety standards Transportation controls Communication systems Escape ways, emergency evacuations Fire warning

				Ground control hazards First aid Electrical hazards Accident prevention Explosives Respirator devices
Hazard Training	All employees exposed to mine hazards	Once	Variable	Hazard recognition and avoidance Emergency evacuation procedures Health standards Safety rules Respiratory devices

Source: Proposed by FAE's & EIA Coordinator as per DGMS Norms

10.9.4 Budgetary Provision for Environmental Management –

Adequate budgetary provision has been made by the Company for execution of Environmental Management Plan. The Table 10.12 gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE 10.11: EMP BUDGET

Sl.No.	Description	Item	Capital cost(Rs. In Lakhs)	Recurring cost per annum (Rs. in Lakhs)
1	Occupational health & safety	Dust Mask, Safety Shoes, Helmets Ear Plugs, Gloves, Goggles Reflector jacket, Safety Belt, Medical check ups	3.00	0.30
2	Environmental Monitoring	Air, Water, Noise & Vibration, Soil Parameters	3.00	3.00
3	Water & Soil erosion	Garland drains &Settling tanks,check dam/gully plugs, etc.,	1.50	0.15
4	Haul Road Maintenance		1.00	0.10
5	Green belt Development & Plantation		2.00	0.50
6	Environmental Awareness Programme		0.50	0.10
7	Fencing, Fertilizer, Manure, Manpower, etc.		2.00	0.10
Total			**13.0**	**4.25**

In order to implement the environmental protection measures, an amount of Rs. 13.00 lakhs as capital cost and recurring cost as Rs. 4.25 lakhs as recurring cost is proposed considering present market price considering present market scenario.

10.10 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.

10. ENVIRONMENTAL MANAGEMENT PLAN – "P7"

10.0 GENERAL

Environment Management Plan (EMP) aims at the preservation of ecological system by considering in-built pollution abatement facilities at the proposed site. Good practices of Environmental Management plan will ensure to keep all the environmental parameters of the project in respect of Ambient Air quality, Water quality, Socio – economic improvement standards.

Mitigation measures at the source level and an overall environment management plan at the study area are elicited so as to improve the supportive capacity of the receiving bodies. The EMP presented in this chapter discusses the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored after approval of the EIA.

10.1 ENVIRONMENTAL POLICY

The Proponent is committed to conducting all its operations and activities in an environmentally responsible manner and to continually improve environmental performance.

The Proponent will –

- Meet the requirements of all laws, acts, regulations, and standards relevant to its operations and activities
- Implement a program to train employees in general environmental issues and individual workplace environmental responsibilities
- Allocate necessary resources to ensure the implementation of the environmental policy
- Ensure that an effective closure strategy is in place at all stages of project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts
- Implement monitoring programmes to provide early warning of any deficiency or unanticipated performance in environmental safeguards
- Conduct periodic reviews to verify environmental performance and to continuously strive towards improvement

Description of the Administration and Technical Setup –

The Environment Monitoring Cell discussed under Chapter 6 will ensure effective implementation of environment management plan and to ensure compliance of environmental statutory guidelines through Mine Management Level.

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.

10.2 LAND ENVIRONMENT MANAGEMENT –

Landscape of the area will be changed due to the quarrying operation, restoration of the land by converting the quarry pit into temporary reservoir about (1.34.0 ha), the remaining part of the area i.e., 0.39.23ha (un utilized areas, infrastructure, haul Roads) will be utilized for greenbelt development. Aesthetic of the Environment will not be affected. There is no major vegetation in the project area during the course of quarrying operation and after completion of the quarrying operation thick plantation.

TABLE 10.1: PROPOSED CONTROLS FOR LAND ENVIRONMENT

CONTROL	RESPONSIBILITY
Design vehicle wash-down areas so that all runoff water is captured and passed through oil water separators and sediment catchment devices.	Mines Manager
Refuelling to be undertaken in a safe location, away from vehicle movement pathways&100 m away of any watercourse Refuelling activity to be under visual observation at all times. Drainage of refuelling areas to sumps with oil/water separation	Mine Foreman & Mining Mate
Soil and groundwater testing as required following up a particular incident of contamination.	Mines Manager
At conceptual stage, the mining pits will cover 1.34.0 ha of the project area which will be converted into Rain Water Harvesting. Remaining extent of 0.39.23 ha will be converted into greenbelt area	Mines Manager
No external dumping i.e., outside the project area	Mine Foreman
Garland drains with catch pits / settlement traps to be provided all around the project area to prevent run off affecting the surrounding lands.	Mines Manager
The periphery of Project area will be planted with thick plantation to arrest the fugitive dust, which will also act as acoustic barrier.	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.3 SOIL MANAGEMENT

Top Soil Management –

- There is no topsoil for this project site.

Overburden / Waste and Side Burden Management –

- The overburden in the form of Gravel formation, the Gravel will be directly loaded into tippers and sold.

TABLE 10.2: PROPOSED CONTROLS FOR SOILMANAGEMENT

CONTROL	RESPONSIBILITY
Surface run-off from the project boundary via garland drains will be diverted to the mine pits	Mine Foreman & Mining Mate
Design haul roads and other access roads with drainage systems to minimize concentration of flow and erosion risk	Mines Manager
Empty sediment from sediment traps Maintain, repair or upgrade garland drain system	Mines Manager
Test soils for pH, EC, chloride, size & water holding capacity	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.4 WATER MANAGEMENT

In the proposed quarrying project no process is involved for the effluent generation, effluent is mainly containing Oil & grease from the workshop, No workshops is proposed inside the project area. Thirumanimuthar River is located on the west side at distance 500m from the lease area the water flows in the Thirumanimuthar River during rainy season only. No other surface water bodies within the project area.

The quarrying operation is proposed upto a depth of 43 meters (3m Gravel + 40m Rough stone), the water table in the area is 58m – 63m below ground level, hence the proposed project will not intersect the Ground water table during entire quarry period.

TABLE 10.3: PROPOSED CONTROLS FOR WATER ENVIRONMENT

CONTROL	RESPONSIBILITY
To maximize the reuse of pit water for water supply	Mines Foreman
Temporary and permanent garland drain will be constructed to contain the catchments of the mining area and to divert runoff from undisturbed areas through the mining areas	Mines Manager
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations	Mines Manager
Ensure there is no process effluent generation or discharge from the project area into water bodies	Mines Foreman
Domestic sewage generated from the project area will be disposed in septic tank and soak pit system	Mines Foreman
Monthly or after rainfall, inspection for performance of water management structures and systems	Mines Manager
Conduct ground water and surface water monitoring for parameters specified by CPCB	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.5 AIR QUALITY MANAGEMENT

The proposed quarrying activity would result in the increase of particulate matter concentrations due to fugitive dust. Daily water sprinkling on the haul roads, approach roads in the vicinity would be undertaken and will be continued as there is possibility for dust generation due to truck mobility. It will be ensured that vehicles are properly maintained to comply with exhaust emission requirements

TABLE 10.4: PROPOSED CONTROLS FOR AIR ENVIRONMENT

CONTROL	RESPONSIBILITY
Generation of dust during excavation is minimized by daily (twice) water sprinkling on working face and daily (twice) water sprinkling on haul road	Mines Manager
Wet drilling procedure /drills with dust extractor system to control dust generation during drilling at source itself is implemented	Mines Manager
Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution	Mines Manager
Ambient Air Quality Monitoring carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted air pollution control measures	Mines Manager
Provision of Dust Mask to all workers	Mines Manager
Greenbelt development all along the periphery of the project area	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.6 NOISE POLLUTION CONTROL

There will be intermittent noise levels due to vehicular movement, trucks loading, drilling and blasting and cutting activities. No mining activities are planned during night time.

TABLE 10.5: PROPOSED CONTROLS FOR NOISE ENVIRONMENT

CONTROL	RESPONSIBILITY
Development of thick greenbelt all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Preventive maintenance of mining machinery and replacement of worn out accessories to control noise generation	Mines Foreman
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Mines Manager
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Mining Mate
Provision of effective silencers for mining machinery and transport vehicles	Mines Manager
Provision of sound proof AC operator cabins to HEMM	Mines Manager
Sharp drill bits are used to minimize noise from drilling	Mines Foreman
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring are carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted noise control measures. Additional noise control measures will be adopted if required as per the observations during monitoring	Mines Manager
Reduce maximum instantaneous charge using delays while blasting	Mining Mate
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination	Mines Manager
Undertake noise or vibration monitoring	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.7 GROUND VIBRATION AND FLY ROCK CONTROL

The Rough stone and Gravel quarry operation creates vibration due to the blasting and movement of Heavy Earth moving machineries, fly rocks due to the blasting.

TABLE 10.6: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK

CONTROL	RESPONSIBILITY
Controlled blasting using delay detonators will be carried out to maintain the PPV value (below 8Hz) well within the prescribed standards of DGMS	Mines Manager
Drilling and blasting will be carried under the supervision of qualified persons	Mines Manager
Proper stemming of holes should be carried out with statutory competent qualified blaster under the supervision of statutory mines manager to avoid any anomalies during blasting	Mines Manager
Suitable spacing and burden will be maintained to avoid misfire / fly rocks	Manager Mines
Number of blast holes will be restricted to control ground vibrations	Manager Mines
Blasting will be carried out only during noon time	Mining Mate
Undertake noise or vibration monitoring	Mines Manager
ensure blast holes are adequately stemmed for the depth of the hole and stemmed with suitable angular material	Mines Foreman

Source: Proposed by FAE's & EIA Coordinator

10.8 BIOLOGICAL ENVIRONMENT MANAGEMENT

The proponent's will take all necessary steps to avoid the impact on the ecology of the area by adopting suitable management measures in the planning and implementation stage. During mining, thick plantation will be carried out around the project periphery, on safety barrier zone, on top benches of quarried out area etc.,

Following control measures are proposed for its management and will be the responsibility of the Mines Manager.

- Greenbelt development all along the safety barrier of the project area
- It is also proposed to plant around 0.22.12 hectare during the present plan period. Post plantation status will be regularly checked for every season.
- The main attributes that retards the survival of sapling is fugitive dust, this fugitive dust can be controlled by water sprinkling on the haul roads and installing a sprinkler unitnear the newly planted area.
- Year wise plantation will be recorded and monitored
    - Based on the area of plantation.
    - Period of plantation
    - Type of plantation
    - Spacing between the plants
    - Type of manuring and fertilizers and its periods
    - Lopping period, interval of watering
    - Survival rate
    - Density of plantation
- The ultimate reclamation planned leaves a congenial environment for development of flora & immigration of small fauna through green belt and water reservoir. The green belt and water reservoir developed within the Project at the end of mine life will attract the birds and animals towards the project area in the post mining period.

10.8.1 Green Belt Development Plan

About 250 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier i.e., 0.22.12ha with survival rate 80% and about 50 nos. of fruit bearing and avenue plants are proposed to be developed around the mines office. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

TABLE 10.7 PROPOSED GREENBELT ACTIVITIES FOR5 YEAR PLAN PERIOD

Year	No of trees proposed to planted	Area to be covered in m^2	Survival Rate %
I	250	442	80
II	250	442	80
III	250	442	80
IV	250	442	80
V	250	442	80

Source: Conceptual Plan of Approved Mining plan& Proposed by FAE's & EIA Coordinator

The objectives of the greenbelt development plan are –

- Provide a green belt around the periphery of the quarry area to combat the dispersal of dust in the adjoining areas,
- Protect the erosion of the soil, Conserve moisture for increasing ground water recharging,
- Restore the ecology of the area, Restore aesthetic beauty of the locality and meet the requirement of fodder, fuel and timber of the local community.

A well planned Green Belt with multi rows (three tiers) preferably with long canopy leaves shall be developed with dense plantations around the boundary and haul roads to prevent air, dust noise propagation to undesired places and efforts will be taken for the enhancement of survival rate.

10.8.2 Species Recommended for Plantation

Following points have been considered while recommending the species for plantation:

- Creating of bio-diversity.
- Fast growing, thick canopy cover, perennial and evergreen large leaf area,
- Efficient in absorbing pollutants without major effects on natural growth

TABLE 10.8: RECOMMENDED SPECIES TO PLANT IN THE GREENBELT

S.No	Botanical Name	Local Name	Importance
55.	Azadirachta indica	Neem, Vembu	Neem oil & neem products
56.	Millettia pinnata	Pungan	landscaping purposes as a windbreak or for shade
57.	Tamarindusindica	Tamarind	Edible & Medicinal and other Uses
58.	Achras sapota	Sapota	Edible fruits
59.	Ficus benghalensis	Alai	Shade and a source of food for birds
60.	Ficus religiosa	araca-maram	Shade and a source of food for birds
61.	Mangifera indica	Mango/ Ma	Edible fruit
62.	Terminalia catappa	nattuvadumai	Edible nuts
63.	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree

Source: Proposed by FAE's & EIA Coordinator

10.9 OCCUPATIONAL SAFETY & HEALTH MANAGEMENT

Occupational safety and health is very closely related to productivity and good employer-employee relationship. The main factors of occupational health impact in quarries are fugitive dust and noise. Safety of employees during quarrying operation and maintenance of mining equipment will be taken care as per Mines Act 1952 and Rule 29 of Mines Rules 1955. To avoid any adverse effect on the health of workers due to dust, noise and vibration sufficient measures have been provided.

10.9.1 Medical Surveillance and Examinations –

- Identifying workers with conditions that may be aggravated by exposure to dust & noise and establishing baseline measures for determining changes in health.
- Evaluating the effect of noise on workers
- Enabling corrective actions to be taken when necessary
- Providing health education

The health status of workers in the mine shall be regularly monitored under an occupational surveillance program. Under this program, all the employees are subjected to a details medical examination at the time of employment. The medical examination covers the following tests under mines act 1952.

- General Physical Examination and Blood Pressure
- X-ray Chest and ECG
- Sputum test
- Detailed Routine Blood and Urine examination

The medical histories of all employees will be maintained in a standard format annually. Thereafter, the employees will be subject to medical examination annually. The below tests keep upgrading the database of medical history of the employees.

TABLE 10.9: MEDICAL EXAMINATION SCHEDULE

Sl.No	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year
1	Initial Medical Examination (Mine Workers)					

A	Physical Check-up					
B	Psychological Test					
C	Audiometric Test					
D	Respiratory Test					
2	Periodical Medical Examination (Mine Workers)					
A	Physical Check - up					
B	Audiometric Test					
C	Eye Check – up					
D	Respiratory Test					
3	Medical Camp (Mine Workers & Nearby Villagers)					
4	Training (Mine Workers)					

Medical Follow ups:- Work force will be divided into three targeted groups age wise as follows:-		
Age Group	**PME as per Mines Rules 1955**	**Special Examination**
Less than 25 years	Once in a Three Years	In case of emergencies
Between 25 to 40 Years	Once in a Three Years	In case of emergencies
Above 40 Years	Once in a Three Years	In case of emergencies
Medical help on top priority immediately after diagnosis/ accident is the essence of preventive aspects.		

10.9.2 Proposed Occupational Health and Safety Measures –

- The mine site will have adequate drinking water supply so that workers do not get dehydrated.
- Lightweight and loose fitting clothes having light colors will be preferred to wear.
- Noise exposure measurements will be taken to determine the need for noise control strategies.
- The personal protective equipment will be provided for mine workers.
- Supervisor will be instructed for reporting any problems with hearing protectors or noise control equipment.
- At noisy working activity, exposure time will be minimized.
- Dust generating sources will be identified and proper control measure will be adopted.
- Periodic medical examinations will be provided for all workers.
- Strict observance of the provisions of DGMS Acts, Rules and Regulations in respect of safety both by management and the workers.
- The width of road will be maintained more than thrice the width of the vehicle. A code of traffic rules will be implemented.
- In respect of contract work, safety code for contractors and workers will be implemented. They will be allowed to work under strict supervision of statutory person/officials only after they will impart training at vocational training centres. All personal protective equipment's will be provided to them.
- A safety committee meeting every month will be organized to discuss the safety of the mines and the persons employed.
- Celebration of annual mines safety week and environmental week in order to develop safety awareness amongst employees.

FIGURE 10.1: PERSONAL PROTECTIVE EQUIPMENT TO THE MINE WORKERS

10.9.3 Health and Safety Training Programme

The Proponent will provide special induction program along with machinery manufacturers for the operators and co-operators to run and maintain the machinery effectively and efficiently. The training program for the supervisors and office staffs will be arranged in the Group Vocational Training Centres in the State. And engage an Environmental Consultants to provide periodical training to all the employees to carry out the mining operation in and eco-friendly manner.

TABLE 10.10: LIST OF PERIODICAL TRAININGS PROPOSED FOR EMPLOYEES

Course	Personnel	Frequency	Duration	Instruction
New-Employee Training	All new employees exposed to mine hazards	Once	One week	Employee rights Supervisor responsibilities Self-rescue Respiratory devices Transportation controls Communication systems Escape and emergency evacuation Ground control hazards Occupational health hazards Electrical hazards First aid Explosives
Task Training Like Drilling, Blasting, Stemming, safety, Slope stability, Dewatering, Haul road maintenance,	Employees assigned to new work tasks	Before new Assignments	Variable	Task-specific health &safety procedures and SOP for various mining activity. Supervised practice in assigned work tasks.
Refresher Training	All employees who received new-hire training	Yearly	One week	Required health and safety standards Transportation controls Communication systems Escape ways, emergency evacuations Fire warning Ground control hazards

				First aid Electrical hazards Accident prevention Explosives Respirator devices
Hazard Training	All employees exposed to mine hazards	Once	Variable	Hazard recognition and avoidance Emergency evacuation procedures Health standards Safety rules Respiratory devices

Source: Proposed by FAE's & EIA Coordinator as per DGMS Norms

10.9.4 Budgetary Provision for Environmental Management –

Adequate budgetary provision has been made by the Company for execution of Environmental Management Plan. The Table 10.12 gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE 10.11: EMP BUDGET

Sl.No.	Description	Item	Capital cost(Rs. In Lakhs)	Recurring cost per annum (Rs. in Lakhs)
1	Occupational health & safety	Dust Mask, Safety Shoes, Helmets Ear Plugs, Gloves, Goggles Reflector jacket, Safety Belt, Medical check ups	3.00	0.30
2	Environmental Monitoring	Air, Water, Noise & Vibration, Soil Parameters	3.00	3.00
3	Water & Soil erosion	Garland drains &Settling tanks,check dam/gully plugs, etc.,	1.50	0.15
4	Haul Road Maintenance		1.00	0.10
5	Green belt Development & Plantation		2.00	0.50
6	Environmental Awareness Programme		0.50	0.10
7	Fencing, Fertilizer, Manure, Manpower, etc.		2.00	0.10
Total			**13.0**	**4.25**

In order to implement the environmental protection measures, an amount of Rs. 13.00 lakhs as capital cost and recurring cost as Rs. 4.25 lakhs as recurring cost is proposed considering present market price considering present market scenario.

10.10 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.

11. SUMMARY AND CONCLUSION

11.0 INTRODUCTION

This EIA report is prepared by considering Cumulative load of all proposed & existing quarries of Marapparai & Paruthipalli Rough Stone & Gravel Cluster Quarries consisting of 7 Proposed and 5 Existing Quarries with total extent of Cluster of 16.09.28 ha in Marapparai & Paruthipalli Village, Tiruchengode Taluk, Namakkal 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 –

- ToR Lr.No. SEIAA-TN/F.No.7773/SEAC/TOR-811/2020 Dated :09.11.2020 – P1
- ToR Lr.No. SEIAA-TN/F.No.7774/SEAC/TOR-818/2020 Dated :11.11.20202 – P2

And the Baseline Monitoring study has been carried out during the period of December 2020 – February 2021.

11.1 PROJECT DESCRIPTION

TABLE 11.1A: BRIEF DESCRIPTION OF THE PROJECT – P1

Name of the Quarry	R.Paramasivam Rough stone and Gravel Quarry	
Toposheet No	58-I/03	
Latitude between	11°25'02.29"N to 11°25'06.70"N	
Longitude between	78°02'55.42"E to 78°02'59.16"E	
Highest Elevation	205m AMSL	
Proposed Depth of Mining	47 m bgl (2m Gravel + 40m Rough Stone)	
Geological Resources	Rough Stone in m^3	Gravel m^3
	4,58,850	14,644
Mineable Reserves	Rough Stone in m^3	Gravel m^3
	1,15,582	10,048
Ultimate Pit Dimension	95 m (L)* 90 m (W)*47 m (D)	
Water Level in the surrounds area	58 – 62 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards southwestern side. The altitude of the area is 205 m (max) above mean sea level. The area is covered by 2 m thickness of Gravel Formation. Massive Charnockite is found after 2m (Gravel Formation) which is clearly inferred from the nearby existing mine pit.	
Machinery proposed	Jack Hammer	3 Nos
	Compressor	1 No
	Hydraulic Excavator	1 No
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	21 Nos	
Project Cost	Rs.27, 86,300/-	
CER Cost @ 2% of Project Cost	Rs.55,700/-	
Nearby Water Bodies	Thirumanimutharu River	950m NW
	Kattipalayam Kuttai	960m SW

	Paruthipalli Lake	1.8km km NW
	Konnayar tank	1.7km SW
	Ramapuram Lake	4.5km NW
	Natramangalam Lake	6.6km SE
	Elur Lake	9.0km SE
Greenbelt Development Plan	Proposed to plant 125 trees in 1100 Sq.m area in the 7.5 m Safety Zone	
Proposed Water Requirement	3.0 KLD	
Nearest Habitation	460m Northwest	

Source: Approved Mining Plan

TABLE 11.1B: BRIEF DESCRIPTION OF THE PROJECT – P2

Name of the Quarry	K.Periyasamy Rough stone and Gravel Quarry	
Toposheet No	58-I/03	
Latitude between	11°25'03.22"N to 11°25'07.64"N	
Longitude between	78°02'52.79"E to 78°02'56.69"E	
Highest Elevation	205m AMSL	
Proposed Depth of Mining	42 m bgl (2m Gravel + 40m Rough Stone)	
Geological Resources	Rough Stone in m^3	Gravel m^3
	3,85,812	11,790
Mineable Reserves	Rough Stone in m^3	Gravel m^3
	1,14,880	8,568
Ultimate Pit Dimension	104 m (L)* 70 m (W)*42 m (D)	
Water Level in the surrounds area	58 – 62 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards southwestern side. The altitude of the area is 205 m (max) above mean sea level. The area is covered by 2 m thickness of Gravel Formation. Massive Charnockite is found after 2m (Gravel Formation) which is clearly inferred from the nearby existing mine pit.	
Machinery proposed	Jack Hammer	3 Nos
	Compressor	1 No
	Hydraulic Excavator	1 No
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	21 Nos	
Project Cost	Rs.27, 82,400/-	
CER Cost @ 2% of Project Cost	Rs.55,600/-	
Nearby Water Bodies	Thirumanimutharu River	870m NW
	Kattipalayam Kuttai	680m SW
	Paruthipalli Lake	1.7km NW
	Konnayar tank	1.7km SW
	Ramapuram Lake	4.5km NW
	Natramangalam Lake	6.6km SE
	Elur Lake	8.8km SE
Greenbelt Development Plan	Proposed to plant 125 trees in 1200 Sq.m area in the 7.5 m Safety Zone	
Proposed Water Requirement	2.9 KLD	
Nearest Habitation	410m Northwest	

Source: Approved Mining Plan

TABLE 11.1C: BRIEF DESCRIPTION OF THE PROJECT – P3

Name of the Quarry	B.Megala Rough stone and Gravel Quarry	
Toposheet No	58-I/03	
Latitude between	11°24'55.47"N to 11°25'00.26"N	
Longitude between	78°02'51.08"E to 78°02'56.10"E	
Highest Elevation	216m AMSL	
Proposed Depth of Mining	46 m bgl (1m Topsoil + 45m Rough Stone)	
Geological Resources	Rough Stone in m^3	Topsoil m^3
	6,15,465	13,677
Mineable Reserves	Rough Stone in m^3	Topsoil m^3
	86,650	608
Ultimate Pit Dimension	106 m (L)* 97 m (W)*46 m (D	
Water Level in the surrounds area	71 – 76 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards southwestern side. The altitude of the area is 205 m (max) above mean sea level. The area is covered by 2 m thickness of Gravel Formation. Massive Charnockite is found after 2m (Gravel Formation) which is clearly inferred from the nearby existing mine pit.	
Machinery proposed	Jack Hammer	3 Nos
	Compressor	1 No
	Hydraulic Excavator	1 No
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	17 Nos	
Project Cost	Rs.26,03,700/-	
CER Cost @ 2% of Project Cost	Rs.52,000/-	
Nearby Water Bodies	Thirumanimutharu River	900m NW
	Kattipalayam Kuttai	680m SW
	Paruthipalli Lake	1.8km NW
	Konnayar tank	1.7km SW
	Ramapuram Lake	4.5km NW
	Natramangalam Lake	6.5km SE
	Elur Lake	9.0km SE
Greenbelt Development Plan	Proposed to plant 375 trees in 35 00 Sq.m area in the 7.5 m Safety Zone	
Proposed Water Requirement	3.7 KLD	
Nearest Habitation	640m Northwest	

Source: Approved Mining Plan

TABLE 11.1D: BRIEF DESCRIPTION OF THE PROJECT – P4

Name of the Quarry	M.Krishnan Rough stone and Gravel Quarry	
Toposheet No	58-I/03	
Latitude between	11°24'38.31"N to 11°25'40.71"N	
Longitude between	78°02'31.01"E to 78°02'35.97"E	
Highest Elevation	229m AMSL	
Proposed Depth of Mining	37 m bgl (2m Gravel + 35m Rough Stone)	
Geological Resources	Rough Stone in m^3	Gravel m^3
	3,07,900	10,100

Mineable Reserves	Rough Stone in m^3	Topsoil m^3
	1,09,075	3,102
Ultimate Pit Dimension	129 m (L)* 58 m (W)*37 m (D	
Water Level in the surrounds area	62 – 67 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards southwestern side. The altitude of the area is 205 m (max) above mean sea level. The area is covered by 2 m thickness of Gravel Formation. Massive Charnockite is found after 2m (Gravel Formation) which is clearly inferred from the nearby existing mine pit.	
Machinery proposed	Jack Hammer	3 Nos
	Compressor	1 No
	Hydraulic Excavator	1 No
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	17 Nos	
Project Cost	Rs.27,77,000/-	
CER Cost @ 2% of Project Cost	Rs.50,000/-	
Nearby Water Bodies	Thirumanimutharu River	530m NW
	Kattipalayam Kuttai	70m South
	Paruthipalli Lake	2.2km NW
	Konnayar tank	700m South
	Ramapuram Lake	4.3km NW
	Natramangalam Lake	7.0km SE
	Elur Lake	9.0km SE
Greenbelt Development Plan	Proposed to plant 150 trees in 1500 Sq.m area in the 7.5 m Safety Zone	
Proposed Water Requirement	2.7 KLD	
Nearest Habitation	510m Southeast	

Source: Approved Mining Plan

TABLE 11.1E: BRIEF DESCRIPTION OF THE PROJECT – P5

Name of the Quarry	S.Nandhakumar Rough stone and Gravel Quarry	
Toposheet No	58-I/03	
Latitude between	11°25'00.40"N to 11°25'03.91"N	
Longitude between	78°02'44.17"E to 78°02'53.07"E	
Highest Elevation	202m AMSL	
Proposed Depth of Mining	27 m bgl (2m Gravel + 25m Rough Stone)	
Geological Resources	Rough Stone in m^3	Gravel m^3
	2,38,925	12,110
Mineable Reserves	Rough Stone in m^3	Topsoil m^3
	34,603	3,102
Ultimate Pit Dimension	150 m (L)* 30 m (W)*27 m (D	
Water Level in the surrounds area	63 – 68m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards southwestern side. The altitude of the area is 205 m (max) above mean sea level. The area is covered by 2m thickness of Gravel Formation. Massive Charnockite is found after 2m (Gravel Formation) which is clearly inferred from the nearby existing mine pit.	
Machinery proposed	Jack Hammer	1 No
	Compressor	1 No

	Hydraulic Excavator	1 No
	Tippers	1 No
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	12 Nos	
Project Cost	Rs.22,65,000/-	
CER Cost @ 2% of Project Cost	Rs. 46,000/-	
Nearby Water Bodies	Thirumanimutharu River	640m NW
	Kattipalayam Kuttai	780m South
	Paruthipalli Lake	2.2km NW
	Konnayar tank	1.5km SW
	Ramapuram Lake	4.2km NW
	Natramangalam Lake	6.7km SE
	Elur Lake	9.0km SE
Greenbelt Development Plan	Proposed to plant 150 trees in 4170 Sq.m area in the 7.5m Safety Zone	
Proposed Water Requirement	2.5 KLD	
Nearest Habitation	520m Northeast	

Source: Approved Mining Plan

TABLE 11.1F: BRIEF DESCRIPTION OF THE PROJECT – P6

Name of the Quarry	S.Rangasamy Rough stone and Gravel Quarry	
Toposheet No	58-I/03	
Latitude between	11°24'43.54"N to 11°24'49.04"N	
Longitude between	78°02'29.22"E to 78°02'36.90"E	
Highest Elevation	202m AMSL	
Proposed Depth of Mining	42 m bgl (2m Gravel + 40m Rough Stone)	
Geological Resources	Rough Stone in m^3	Gravel m^3
	6,84,560	14,996
Mineable Reserves	Rough Stone in m^3	Topsoil m^3
	1,31,800	8,050
Ultimate Pit Dimension	200m (L)* 101 m (W)*42 m (D	
Water Level in the surrounds area	63 – 68m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards southwestern side. The altitude of the area is 205 m (max) above mean sea level. The area is covered by 2m thickness of Gravel Formation. Massive Charnockite is found after 2m (Gravel Formation) which is clearly inferred from the nearby existing mine pit.	
Machinery proposed	Jack Hammer	2 Nos
	Compressor	1 No
	Hydraulic Excavator	1 No
	Tippers	1 No
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	14 Nos	
Project Cost	Rs.29,63,000/-	
CER Cost @ 2% of Project Cost	Rs. 60,000/-	
Nearby Water Bodies	Thirumanimutharu River	640m NW
	Kattipalayam Kuttai	300 SE
	Paruthipalli Lake	2.2km NW

	Konnayar tank	800m NW
	Ramapuram Lake	4.0km NW
	Natramangalam Lake	7.0km SE
	Elur Lake	9.0km SE
Greenbelt Development Plan	Proposed to plant 150 trees in 4170 Sq.m area in the 7.5m Safety Zone	
Proposed Water Requirement	2.5 KLD	
Nearest Habitation	410m Northwest	

Source: Approved Mining Plan

TABLE 11.G: BRIEF DESCRIPTION OF THE PROJECT – P7

Name of the Quarry	M.Muthukrishnan Rough stone and Gravel Quarry	
Toposheet No	58-I/03	
Latitude between	11°24'32.43"N to 11°24'37.58"N	
Longitude between	78°02'27.38"E to 78°02'32.33"E	
Highest Elevation	197m AMSL	
Proposed Depth of Mining	43 m bgl (3m Gravel + 40m Rough Stone)	
Geological Resources	Rough Stone in m^3	Gravel m^3
	6,92,480	51,936
Mineable Reserves	Rough Stone in m^3	Topsoil m^3
	1,99,770	8,985
Ultimate Pit Dimension	131m (L)* 112 m (W)*43 m (D	
Water Level in the surrounds area	58 – 63m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards southwestern side. The altitude of the area is 205 m (max) above mean sea level. The area is covered by 2m thickness of Gravel Formation. Massive Charnockite is found after 2m (Gravel Formation) which is clearly inferred from the nearby existing mine pit.	
Machinery proposed	Jack Hammer	4 Nos
	Compressor	1 No
	Hydraulic Excavator	1 No
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	20 Nos	
Project Cost	Rs. 43,90,400/-	
CER Cost @ 2% of Project Cost	Rs. 87,800/-	
Nearby Water Bodies	Thirumanimutharu River	500m NW
	Kattipalayam Kuttai	100 East
	Paruthipalli Lake	2.2km NW
	Konnayar tank	500m SW
	Ramapuram Lake	4.3km NW
	Natramangalam Lake	7.0km SE
	Elur Lake	9.0km SE
Greenbelt Development Plan	Proposed to plant 250 trees in 2212 Sq.m area in the 7.5m Safety Zone	
Proposed Water Requirement	2.5 KLD	
Nearest Habitation	300m Southeast	

Source: Approved Mining Plan

- The project area is a fresh proposal, which is site specific, opencast mechanized quarry
- No beneficiation or processing unit inside the project area.
- Highest elevation is 229m AMSL. The general Gradient of the area is west.
- There is no forest land involved in the study area, the area is devoid of major cultivation and trees.

TABLE 11.2A: LAND USE PATTERN OF THE CORE ZONE (P1)

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	0.20.4	0.7.1
Infrastructure	Nil	0.01.0
Roads	0.01.0	0.02.0
Green Belt	Nil	0.11.0
Un – utilized area	0.78.6	0.11.9
Grand Total	**1.00.0**	**1.00.0**

TABLE 11.2B: LAND USE PATTERN OF THE CORE ZONE (P2)

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	0.28.6	0.72.6
Infrastructure	Nil	0.01.0
Roads	0.01.0	0.02.0
Green Belt	Nil	0.12.0
Un – utilized area	0.70.4	0.12.4
Grand Total	**1.00.0**	**1.00.0**

TABLE 11.2C: LAND USE PATTERN OF THE CORE ZONE (P3)

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	0.88.0	1.02.0
Infrastructure	Nil	0.01.0
Roads	0.02.0	0.02.0
Green Belt	Nil	0.35.0
Un – utilized area	0.50.0	Nil
Grand Total	**1.40.0**	**1.40.0**

TABLE 11.2D: LAND USE PATTERN OF THE CORE ZONE (P4)

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	0.37.0	0.57.70
Infrastructure	Nil	0.01.00
Roads	0.02.0	0.02.00
Green Belt	Nil	0.15.00
Un – utilized area	0.51.25	0.14.55
Grand Total	**0.90.25**	**0.90.25**

TABLE 11.2E: LAND USE PATTERN OF THE CORE ZONE (P5)

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	0.30.8	0.47.4
Infrastructure	Nil	0.01.0
Roads	0.01.0	0.02.0
Green Belt	Nil	0.41.7
Un – utilized area	0.84.2	0.23.9
Grand Total	**1.16.0**	**1.16.0**

TABLE 11.2F: LAND USE PATTERN OF THE CORE ZONE (P6)

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	0.98.0	1.45.8
Infrastructure	Nil	0.01.0
Roads	0.01.0	0.02.0
Green Belt	Nil	0.28.8
Un – utilized area	1.03.3	0.24.7
Grand Total	**2.02.3**	**2.02.3**

Source: Approved Mining plan

TABLE 11.2G: LAND USE PATTERN OF THE CORE ZONE (P7)

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	0.70.10	1.34.0
Infrastructure	Nil	0.01.0
Roads	0.01.0	0.02.0
Green Belt	Nil	0.22.12
Un – utilized area	1.02.13	0.14.11
Grand Total	**1.73.23**	**1.73.23**

TABLE 11.3: OPERATIONAL DETAILSFOR P1 (Thiru. R.Paramasivam)

PARTICULARS	**DETAILS**	
	Rough Stone (5Year Plan period)	**Gravel (3 Years Plan period)**
Geological Resources	4,58,850m^3	14,644m^3
Mineable Reserves	1,15,372m^3	10,048m^3
YEAR WISE PRODUCTION SCHEDULE		
Particulars	**Rough Stone (in m^3)**	**Gravel (in m^3)**
1st year	27,947	10048
2nd year	28,785	-
3rd year	24,725	-
4th year	23,030	-
5th year	10,885	-
Total	**1,15,372**	**10,048**

TABLE 2.4A: OPERATIONAL DETAILSFOR P2 (Thiru. K.Periyasamy)

PARTICULARS	**DETAILS**	
	Rough Stone (5Year Plan period)	**Gravel (3 Years Plan period)**
Geological Resources	3,85,812m^3	8,568m^3
Mineable Reserves	1,14,385m^3	10,048m^3
YEAR WISE PRODUCTION SCHEDULE		
Particulars	**Rough Stone (in m^3)**	**Gravel (in m^3)**
1st year	24440	8,568
2nd year	30345	-
3rd year	22870	-
4th year	21465	-
5th year	15265	-
Total	**1,14,385**	**8,568**

TABLE 2.4B: OPERATIONAL DETAILSFOR P3 (Tmt. B.Mekala)

PARTICULARS	DETAILS	
	Rough Stone (5Year Plan period)	Gravel (3 Years Plan period)
Geological Resources	6,15,465m^3	13,677m^3
Mineable Reserves	86,650m^3	608m^3
YEAR WISE PRODUCTION SCHEDULE		
Particulars	Rough Stone (in m^3)	Topsoil (in m^3)
1st year	17,350	608
2nd year	17,200	-
3rd year	17,260	-
4th year	17,840	-
5th year	17,000	-
Total	86,650	608

TABLE 2.4C: OPERATIONAL DETAILSFOR P4 (Thiru.M.Krishnan)

PARTICULARS	DETAILS	
	Rough Stone (5Year Plan period)	Gravel (3 Years Plan period)
Geological Resources	3,07,900m^3	10,100m^3
Mineable Reserves	1,09,075m^3	3,102m^3
YEAR WISE PRODUCTION SCHEDULE		
Particulars	Rough Stone (in m^3)	Gravel (in m^3)
1st year	22255	1222
2nd year	22645	940
3rd year	21405	940
4th year	22870	-
5th year	19900	-
Total	109075	3102

TABLE 2.4D: OPERATIONAL DETAILSFOR P5 (Thiru.S.Nandhakumar)

PARTICULARS	DETAILS	
	Rough Stone (5Year Plan period)	Gravel (3 Years Plan period)
Geological Resources	2,38,925m^3	12,110m^3
Mineable Reserves	34,603m^3	2,520m^3
YEAR WISE PRODUCTION SCHEDULE		
Particulars	Rough Stone (in m^3)	Gravel (in m^3)
1st year	6980	840
2nd year	6983	840
3rd year	6925	840
4th year	6840	-
5th year	6875	-
Total	34603	2520

TABLE 2.4E: OPERATIONAL DETAILSFOR P6 (Thiru.S.Rangasamy)

PARTICULARS	DETAILS	
	Rough Stone (5Year Plan period)	Gravel (3 Years Plan period)
Geological Resources	6,84,560m^3	14,996m^3
Mineable Reserves	1,31,800m^3	8,050m^3
YEAR WISE PRODUCTION SCHEDULE		

Particulars	Rough Stone (in m^3)	Gravel (in m^3)
1st year	16590	2704
2nd year	13040	2592
3rd year	15680	2754
4th year	13385	-
5th year	13675	-
Total	**72370**	**8050**

TABLE 2.4E: OPERATIONAL DETAILSFOR P7 (Thiru.M.Muthukrishnan)

PARTICULARS	DETAILS	
	Rough Stone (5Year Plan period)	**Gravel (3 Years Plan period)**
Geological Resources	6,92,480m^3	51,936m^3
Mineable Reserves	1,99,770m^3	8,985m^3
YEAR WISE PRODUCTION SCHEDULE		
Particulars	**Rough Stone (in m^3)**	**Gravel (in m^3)**
1st year	42115	795
2nd year	67935	8190
3rd year	41510	-
4th year	33550	-
5th year	14660	-
Total	**199770**	**8985**

Source: and estimation of resources

TABLE 11.4: ULTIMATE PIT DIMENSIONS

Proposal – P1			
Pit	**Length (Max) (m)**	**Width (Max) (m)**	**Depth (Max) (m)**
I	95	90	42m below ground level
Proposal – P2			
Pit	**Length (Max) (m)**	**Width (Max) (m)**	**Depth (Max) (m)**
I	104	70	37m below ground level
Proposal – P3			
Pit	**Length (Max) (m)**	**Width (Max) (m)**	**Depth (Max) (m)**
I	106	97	46m below ground level
Proposal – P4			
Pit	**Length (Max) (m)**	**Width (Max) (m)**	**Depth (Max) (m)**
I	129	58	37m below ground level
Proposal – P5			
Pit	**Length (Max) (m)**	**Width (Max) (m)**	**Depth (Max) (m)**
I	150	30	27m below ground level
Proposal – P6			
Pit	**Length (Max) (m)**	**Width (Max) (m)**	**Depth (Max) (m)**
I	200	101	42m below ground level
Proposal – P7			
Pit	**Length (Max) (m)**	**Width (Max) (m)**	**Depth (Max) (m)**
I	131	112	43m below ground level

TABLE 11.5: WATER REQUIREMENT OF THE PROJECT

PROPOSAL – P1		
*Purpose	Quantity	Source
Dust Suppression	1.8 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	0.7 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.6 KLD	Water Tankers
Total	**3.0 KLD**	
PROPOSAL – P2		
*Purpose	Quantity	Source
Dust Suppression	1.8 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	0.37 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.74 KLD	Water Tankers
Total	**2.9 KLD**	
PROPOSAL – P3		
*Purpose	Quantity	Source
Dust Suppression	1.8 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	1.2 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.65 KLD	Water Tankers
Total	**3.7 KLD**	
PROPOSAL – P4		
*Purpose	Quantity	Source
Dust Suppression	1.80 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	0.27 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.64 KLD	Water Tankers
Total	**2.71 KLD**	
PROPOSAL – P5		
*Purpose	Quantity	Source
Dust Suppression	0.5 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	1.5 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.5 KLD	Water Tankers
Total	**2.5 KLD**	
PROPOSAL – P6		
*Purpose	Quantity	Source
Dust Suppression	1.0 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	1.0 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.5 KLD	Water Tankers
Total	**2.5 KLD**	
PROPOSAL – P7		
*Purpose	Quantity	Source
Dust Suppression	1.0 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	0.5 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.5 KLD	Water Tankers
Total	2 KLD	

Source: Prefeasibility report

11.3 DESCRIPTION OF THE ENVIRONMENT

The baseline monitoring study was carried out during December 2020 - February 2021 to assess the existing environmental scenario in the area. For the purpose of EIA studies, project area was considered as the core zone and area outside the project area up to 10km radius from the periphery of the project site was considered as buffer zone.

Baseline Environmental data has been collected with reference to proposed mine for:-

a) Land

b) Water

c) Air

d) Noise

e) Biological

f) Socio-economic status

11.3.1 Land Environment

The existing land use pattern of the study area based on the latest satellite imagery is given below:

TABLE 11.6: LAND USE / LAND COVER TABLE 10 KM RADIUS

S.No	Classification	Area_HA	Area_%
1	Crop Land	24608	77.22
2	Evergreen Forest	100.543	0.315
3	Deciduous Forest	291.761	0.915
4	scrub forest	316.265	0.992
5	Water Bodies	1016.7	3.19
6	Scrub Land	248.658	0.78
7	Fallow Land	2336.34	7.331
8	Mining Area	135.56	0.425
9	Builtup-Urban	159.184	0.499
10	Builtup-Rural	1154.54	3.623
11	River	1458.72	4.577
12	Agricultural Land	40.4001	0.126
Total		**31866.6**	**100**

Source: Survey of India Toposheet and Landsat Satellite Imagery

The proposed project site falls in the seismicZone II, low damage risk zone as per BMTPC, Vulnerability Atlas of Seismic zone of India IS: 1893 – 2002. The project area falls in the hard rock terrain on the peninsular shield of south India which is highly stable.

SOIL CHARACTERISTICS

- Variation in pH of the soil in the study area was found to be moderately alkaline to strongly alkaline in nature (7.12-8.35).
- Mostly the soils collected from different location in the study area are Clay loam in texture.
- The bulk density of the soil in the study area ranged between 0.99 – 1.23 g/cc.
- Organic carbon was found to be medium which is between 0.79 – 1.22%.
- Available Nitrogen, available phosphorous and potassium content is very low.

11.3.2 Water Environment

Surface Water

The analysis results indicate that the pH is between 7.26 – 7.82, which is well within the specified standard of 6.5 to 8.5. Total hardness was observed to be 129.7 – 188.8mg/l. The Total Dissolved Solids (TDS) concentrations were found to be 480-586 mg/l.

Chloride and fluoride concentrations are found to be 154 - 188 mg/l and 0.4 mg/l respectively. Nitrates were observed to be 8.6-11.3 mg/l. Bacteriological studies reveal that coli form bacteria are not present in the samples. The heavy metal content is below detectable limits.

Ground Water

The analysis results indicate that the pH ranges in between 7.11 to 7.95, which is well within the specified standard of 6.5 to 8.5. Total hardness was observed to be ranging from 106.8 to 201 mg/l. The incidence of high total hardness is attributed to the composition of litho units constituting the aquifers in the district. The Total Dissolved Solids (TDS) concentrations were found to be ranging in between 410 to 619 mg/l.

Chlorides at all the locations were within the permissible limit, ranging in between 146-189 mg/l. Fluorides are ranging in between 0.15 to 0.26 mg/l and are found to be within the permissible limit. Nitrates were found to be in the range of from 5.5 mg/l to 8.2 mg/l. Bacteriological studies reveal that coliform bacteria is not present in the samples. The heavy metal content is below detectable limits.

11.3.3 Air Environment

Site Specific Meteorology –

Site specific meteorology during the study period was recorded by an automated weather station.

TABLE 11.7: METEOROLOGICAL DATA RECORDED AT SITE

S.No	Parameters		Dec– 2020	Jan– 2021	Feb - 2021
1	Temperature (^{0}C)	Max	26.1	27.6	27.1
		Min	23.0	23.8	24.3
		Avg	24.5	25.7	25.7
2	Relative Humidity (%)	Avg	82.5	81.7	66.2
3	Wind Speed (m/s)	Max	4.792	4.375	4.306
		Min	2.500	2.083	1.875
		Avg	3.646	3.229	3.090
4	Cloud Cover (OKTAS)		0-8	0-8	0-8
5	Wind Direction		SE,SSW	ENE,SSE	S,SW

Source: On-site monitoring/sampling by Omegaa Laboratories in association with GEMS

Ambient Air Quality Results –

As per monitoring data, PM_{10} ranges from 37.1 µg/m^3 to 46.6 µg/m^3, $PM_{2.5}$ data ranges from 15.9 µg/m^3 to 25.3 µg/m^3, SO_2 ranges from 4.1 µg/m^3 to 8.8 µg/m^3 and NO_2 data ranges from 15.7 µg/m^3 to 25.6 µg/m^3.

The minimum & maximum concentrations of PM_{10} were found to be 37.1 µg/m^3 in Peiyamanali & 46.6 µg/m^3 in Project area respectively. The average concentrations were ranged between 39.4 and 45.5 µg/m^3. The minimum & maximum concentrations of $PM_{2.5}$ were found to be 15.9 µg/m^3 in Periamanali & 25.3 µg/m^3 in Project area respectively. The average concentrations were ranged between 17.9 and 23.9 µg/m^3.

The maximum concentration in the core zone is due to the quarrying activity of the cluster of quarries situated within 500m radius. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB.

11.3.4 Noise Environment

Ambient noise levels were measured at 7 locations around the proposed quarry lease area. Noise levels recorded in core zone during day time were from 50.4 – 50.6 dB (A) Leq and during night time were from 45.7 – 46.0 dB (A) Leq. Noise levels recorded in buffer zone during day time were from 44.6 – 47.2 dB (A) Leq and during night time were from 34.2 – 39.2dB (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. Noise monitoring results reveal that the maximum & minimum noise levels at day time were recorded in the range of 15.8 dB(A) in core zone and 59.6 dB(A) in Nagarpalayam and 36.1 dB(A) in Core zone & 44.3 dB(A) in Periamanali at night time.

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

11.3.5 Biological Environment

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 mining operation over short period of time will not have any significant impact on the surrounding flora and fauna.

11.3.6 Socio-Economic Environment

An attempt has been made to assess the impact of the proposed mining project at Karunsamy Goundanpalayam Villageon Socio-economic aspect of the study area. The various attributes that have been taken into account are population composition, employment generation, occupational shift, household income and consumption pattern. Implementation of the Proposed Mine Project will generate both direct and indirect employment. Besides, Mining operation will be legally valid and it will bring income to the state exchequer. At present seasonal agriculture is the main occupation of the people as more than half of the population depends on it. With the implementation of the proposed mining project the occupational pattern of the people in the area will change making more people engaged in mining based activities rather in seasonal agriculture.

11.4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The summary of anticipated adverse environmental impacts due to the proposed project and mitigation measures are given below:-

TABLE 11.8: ANTICIPATED IMPACTS & MITIGATION MEASURES

Impact	Mitigation Measure
Land Environment	
▪ Destruction of natural landscapes ▪ Changes in soil characteristics ▪ Soil erosion and slope instability	▪ Mining will be carried out as per approved mine plan in scientific and systematic way ▪ Safety Zone or Buffer area will be maintained and will not be mined and instead plantation will be carried out in the safety zone ▪ Barbed wire fencing will be provided all along the proposed mine boundary ▪ At conceptual stage, the land use pattern of the quarry will be changed into Greenbelt area and temporary reservoir ▪ Construction of garland ▪ Construction of garland drains all around the quarry pit and construction of settling traps 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
Water Environment	

▪ Decrease in aquifer recharge and increase in surface runoff; ▪ Disturbance to land drainage, overload and erosion of watercourses; ▪ Changes to the surface over which water flows; ▪ Changes to surface and groundwater resources quantity and quality due to stream blockage and contamination by particulate matter or waste; ▪ Contamination of aquifers due to removal of the natural filter medium.	▪ Construction of garland drains all around the quarry pit and construction of settling traps 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 ▪ De-silting will be carried out before and immediately after the monsoon season and the settling tank and drains will be cleaned weekly, especially during monsoons ▪ Domestic sewage from site office & urinals/latrines provided in project area will be discharged through septic tank followed by soak pit system. ▪ Tippers & HEMM will be washed in a designated area and the washed water will be routed through drains to a settling tank, which has an oil & grease trap, only clear water will be reused for greenbelt development.
Air Environment	
▪ Generation of Fugitive Dust ▪ Dust will be generated mainly during excavation, loading &unloading activities. ▪ Gaseous pollutants will bygenerated mostly by the traffic. ▪ Reduction in visibility due to dust plumes. ▪ Coating of surfaces leading to annoyance and loss of amenity. ▪ Physical and/or chemical contamination and corrosion. ▪ Increase in the concentration of suspended particles in runoff water. ▪ Coating of vegetation leading to reduced photosynthesis, ▪ Inhibited growth, destroying of foliage, degradation of crops; ▪ Increase in health hazards due to inhalation of dust.	▪ Haul roads will be well maintained by sprinkling water twice a day ▪ The access road will be cleaned and brushed to ensure that mud and dust deposits do not accumulate. ▪ To ensure that dust and debris is minimised on the access road, all the tipper drivers will be instructed to use water spray system on all the tyres and spray water on the loaded material that is provided at the compound area before leaving the site ▪ Speed restrictions will be imposed to avoid spillage of loaded materials upon the road and to reduce wear and tear of the road. ▪ Weekly inspections of the condition of the access road by competent person employed, and immediate action will be taken to address any potholes or damage to the road surface. ▪ Dust wetting agents can be mixed with the water applied to haul roads during hot, dry weather conditions to increase the duration that the road surface remains damp. ▪ Personal Protective Equipment's will be provided to all workers ▪ All drilling rods used will have dust suppression systems fitted which injects water into the hole. ▪ Wet gunny bags will be used as a cover while drilling. ▪ The blast zone will be kept damp by the application of water from the rain gun fitted to the water tanker prior to each blast to control any fugitive dust emissions that could arise from the surface during detonation. ▪ A daily visual inspection shall be conducted by the site manager who will keep a daily log of all process operations and site activities and note any malfunctions which could lead to abnormal emissions from the quarry operations. ▪ A site speed limit of 20 km/h will be set to minimise the potential for dust generation ▪ Weekly maintenance programme to identify machinery due for maintenance, based on the number of hours it has been in operation. ▪ Air filters are renewed after every 1000 hours of use, unless otherwise indicated by an on board computer system. ▪ All site machineries & tippers will be serviced and maintained 6 month once and drivers will report any defects

	immediately to the site manager to enable repairs to be carried out promptly.
Noise & Vibration	
▪ Annoyance and deterioration of the quality of life; ▪ Propelling of rocks fragments by blasting. ▪ Shaking of buildings and people due to blasting;	▪ 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 favorable 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 though training and awareness.
Biological Environment	
▪ Direct impacts include land clearance and excavation causing destruction of flora and fauna and loss of habitats; ▪ Indirect impacts include habitat degradation due to noise, dust, and human activity.	▪ Only some common herbs, shrubs and grass will be cleared. So there will be no impact on the biodiversity. ▪ Green belt development with suitable species will enhance the biodiversity of the project area. ▪ The core zone or buffer zone does not encompass any threatened flora or fauna species.
Socio-Economic Environment	
▪ Health and safety of workers and the general public; ▪ Increase in traffic volumes and sizes of road vehicles; ▪ Economic issues, including the increase in employment opportunities;	▪ The mining activity puts negligible change in the socio economic profile. ▪ No displacing (0) is proposed due to the proposed mine. ▪ Around 23 local workers will get employment opportunities along with periodical training to generate local skills. ▪ New patterns of indirect employment/ income will generate. ▪ Regular health check-up camp. ▪ Assistance to schools and scholarship to children will be provided.
Occupational Health & Safety	
▪ Exposure to Dust ▪ Noise and Vibration Exposure ▪ Physical Hazards ▪ Respiratory hazards due to Dust exposure	▪ Provision of rest shelters for mine workers with amenities like drinking water etc. ▪ All safety measures like use of safety appliances, such as dust masks, helmets, shoes, safety awareness programs, awards, posters, slogans related to safety etc. ▪ Training of employees for use of safety appliances and first aid in vocational training center. ▪ Weekly maintenance and testing of all equipment as per manufacturers' guidelines. ▪ Pre placement and Yearly Medical Examination of all workers by a medical Officer ▪ First Aid facility will be provided at the mine site.

	▪ Close surveillance of the factors in working environment and work practices which may affect environment and worker's health by the mines manager employed. ▪ Working of mine as per approved mining plan and environmental plans

11.5 ANALYSIS OF ALTERNATIVES

There are no alternatives suggested as the proposed mining area has the following advantages –

- The mineral deposit occurs in a non-forest area.
- There is no habitation within the applied lease area; hence no R & R issues exist.
- There are no river, stream, nallas and water bodies in the or passing through the applied mine lease area.
- Availability of skilled, semi-skilled and unskilled workers in this region.
- All the basic amenities such as medical, firefighting, education, transportation, communication and infrastructural facilities are accessible.
- Mine connectivity through road and rail is good.
- The proposed mining operations do not intersect the ground water level. Hence, no impact on ground water environment.

11.6 ENVIRONMENTAL MONITORING PROGRAM

Environmental Monitoring program will be conducted for various environmental components as per conditions stipulated in Environmental Clearance Letter issued by SEIAA & Consent to Operate issued by TNPCB.

TABLE 11.9: POST PROJECT MONITORING PROGRAM

Sl.No.	ACTIVITY	SCHEDULE
	AIR POLLUTION MONITORING	
1	Ambient Air Monitoring of parameters specified by TNPCB/SEIAA in their CTO/EC Order within the Applied Area	Once in every Six Months
2	Ambient Air Monitoring of parameters specified by TNPCB/SEIAA in their CTO/EC Order outside the Applied Area	Once in every Six Months
	WATER QUALITY MONITORING	
3	Monitoring water quality of rain water collected in mine pit area. Rain water will be used for plantation purpose.	Once in every Six Months
4	Monitoring of samples of tube well and open well or Surface Water bodies in nearby location. Parameters as per IS: 10500:1991	Once in every Six Months
5	Monitoring of water spray units	Log-sheet of water spray will be maintained on daily basis
	NOISE QUALITY MONITORING	
6	Noise in the ambient atmosphere within and outside the applied area	Once in every Six Months
	GREENBELT MAINTENANCE	
7	Monitor schedule for Greenbelt development as per approved mining plan	Once in every Six Months
	SOIL QUALITY MONITORING	
8	Grab Samples within and around the applied area	Once in every Six Months

11.7 ADDITIONAL STUDIES

11.7.1 Public Consultation

Application to The Member Secretary of the Tamil Nadu Pollution Control Board (TNPCB) to conduct Public Hearing in a systematic, time bound and transparent manner ensuring widest possible public participation at the project site or in its close proximity in the District is submitted along with this Draft EIA / EMP Report and the outcome of public hearing proceedings will be detailed in the Final EIA/EMP Report.

11.7.2 Risk Analysis & Disaster Management Plan

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.

In the unlikely event that a consequence has occurred, disaster management kicks in. This includes instituting procedures pertaining to a number of issues such as communication, rescue, and rehabilitation. These are addressed in the disaster management plan.

Both, the RA and DMP, are living documents and need to be updated whenever there are changes in operations, equipment, or procedures Assessment is all about preventing accidents and taking necessary steps to prevent it from happening.

The Disaster Management Plan (DMP) is a guide, giving general considerations, directions, and procedures for handling emergencies likely to arise from planned operations. The DMP has been prepared on the basis of the Risk Assessment and related findings covered in the report.

11.8 PROJECT BENEFITS

Various benefits are envisaged due to the proposed mine and a comprehensive description of various advantages and benefits anticipated from the proposed project to the locality, neighborhood, region and nation as a whole are –

- Improved road communication
- Rain water harvesting structures to augment the water availability for irrigation and plantation and ground water recharge
- Creation of community assets (infrastructure) like school buildings, village roads/ linked roads, dispensary & health Centre, community Centre, market place etc.,
- Strengthening of existing community facilities through the Community Development Programme
- Skill development & capacity building like vocational training
- Awareness program and community activities, like health camps, medical aids, sports & cultural activities, plantation etc.

11.9 ENVIRONMENTAL MANAGEMENT PLAN

In order to implement the environmental protection measures, an amount of Rs. 16.50 lakhs as capital cost and recurring cost as Rs. 4.50 lakhs as recurring cost is proposed considering present market price considering present market scenario.

TABLE 11.10: EMP BUDGET

Sl.No.	Description	Item	Capital cost(Rs. In Lakhs)	Recurring cost per annum (Rs. in Lakhs)
1	Occupational health & safety	Dust Mask, Safety Shoes, Helmets Ear Plugs, Gloves, GogglesReflector jacket, Safety Belt, Medical check ups	3.00	0.30
2	Environmental Monitoring	Air, Water, Noise & Vibration, Soil Parameters	3.00	3.00
3	Water & Soil erosion	Garland drains &Settling tanks,check dam/gully plugs, etc	4.00	0.20
4	Haul Road Maintenance		1.00	0.30
5	Green belt Development & Plantation		2.00	0.50
6	Environmental Awareness Programme		0.50	0.10
7	Fencing, Fertilizer, Manure, Manpower, etc.		3.00	0.10
Total			**16.50**	**4.50**

11.10 CONCLUSION

EIA study was performed as per the approved ToR. Various environmental attributes were studied relating with aspects of mining activities. The related impacts were identified and evaluated. Considering all the possible ways to mitigate the environmental concerns Environmental Management Plan was prepared and accordingly fund was allocated. The EMP has been dynamic, flexible and subject to periodic review. CER activities were identified and for its time bound implementation, fund has been allocated.

The project will increase the revenue of the State Govt. as well as it will help in the social upliftment of the local people. The green belt development programme will help in increasing the green cover in the area. Thus, the proposed project is not likely to affect the environment or adjacent ecosystem adversely.

The Mine Management will be responsible for the project 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.

12. DISCLOSURE OF CONSULTANTS

The project Proponet's

Thiru.R.Paramasivam,
Thiru.K.Periyasamy,
Tmt.B.Mekala,
Thiru.M.Krishnan,
Thiru.S.Nandhakumar,
Thiru.S.Rangasamy,
Thiru.M.Muthukrishnan

have engaged M/s Geo Exploration and Mining Solutions, an Accredited Organization under Quality Council of India – National Accreditation Board for Education & Training, New Delhi, for carrying out the EIA Study as per the ToR Issued.

Name and address of the consultancy:

GEO EXPLORATION AND MINING SOLUTIONS
No 17, Advaitha Ashram Road,
Alagapuram, Salem – 636 004
Tamil Nadu, India
Email:infogeoexploration@gmail.com
Web: www.gemssalem.com
Phone: 0427 2431989.

The Accredited Experts and associated members who were engaged for this EIA study as given below –

Sl.No.	Name of the expert	In house/ Empanelled	EIA Coordinator		FAE	
			Sector	Category	Sector	Category
1	**Dr. M. Ifthikhar Ahmed**	**In-house**	**1**	**A**	WP GEO SC	B A A
2	Dr. P. Thangaraju	In-house	-	-	HG GEO	A A
3	Mr. A. Jagannathan	In-house	-	-	AP NV SHW	B A B
4	Mr. N. Senthilkumar	Empanelled	38 28	B B	AQ WP RH	B B A
5	Mrs. Jisha parameswaran	In-house	-	-	SW	B
6	Mr. Govindasamy	In-house	-	-	WP	B
7	Mrs. K. Anitha	In-house	-	-	SE	A
8	Mrs. Amirtham	In-house	-	-	EB	B
9	Mr. Alagappa Moses	Empanelled	-	-	EB	A
10	Mr. A. Allimuthu	In-house	-	-	LU	B
11	Mr. S. Pavel	Empanelled	-	-	RH	B
12	Mr. J. R. Vikram Krishna	Empanelled	-	-	SHW RH	A A

Abbreviations	
EC	EIA Coordinator
AEC	Associate EIA Coordinator
FAE	Functional Area Expert
FAA	Functional Area Associates
TM	Team Member
GEO	Geology
WP	Water pollution monitoring, prevention and control
AP	Air pollution monitoring, prevention and control
LU	Land Use
AQ	Meteorology, air quality modeling, and prediction
EB	Ecology and bio-diversity
NV	Noise and vibration
SE	Socio economics
HG	Hydrology, ground water and water conservation
SC	Soil conservation
RH	Risk assessment and hazard management
SHW	Solid and hazardous wastes
MSW	Municipal Solid Wastes
ISW	Industrial Solid Wastes
HW	Hazardous Wastes

DECLARATION BY EXPERTS CONTRIBUTING TO THE EIA/EMP

Declaration by experts contributing to the EIA/EMP for Marapparai & Paruthipalli Rough Stone & Gravel Quarry Project over a cluster Extent of 16.09.28, ha in Marapparai & Paruthipalli Village of Tiruchengode Taluk, Namakkal District of Tamil Nadu.It is also certified that information furnished in the above EIA study are true and correct to the best of our Knowledge.

I, hereby, certify that I was a part of the EIA team in the following capacity that developed the EIA/EMP Report.

Name**:** **Dr. M. Ifthikhar Ahmed**

Designation**:** **EIA Coordinator**

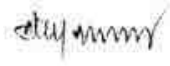
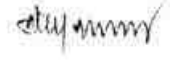
Date & Signature:

Period of Involvement: **July 2020 to till date**

Associated Team Member with EIA Coordinator:

1. **Mr. S. Nagamani**
2. **Mr. P.Viswanathan**
3. **Mr. M.Santhoshkumar**
4. **Mr. S. Ilavarasan**

FUNCTIONAL AREA EXPERTS ENGAGED IN THE PROJECT

Sl. No.	Functional Area	Involvement	Name of the Expert/s	Signature
1	AP	▪ Identification of different sources of air pollution due to the proposed mine activity ▪ Prediction of air pollution and propose mitigation measures / control measures	Mr. A. Jagannathan	
2	WP	▪ Suggesting water treatment systems, drainage facilities ▪ Evaluating probable impacts of effluent/waste water discharges into the receiving environment/water bodies and suggesting control measures.	Dr. M. Ifthikhar Ahmed	
			Mr. N. Senthilkumar	
			Mr. Govindasamy	
3	HG	▪ Interpretation of ground water table and predict impact and propose mitigation measures. ▪ Analysis and description of aquifer Characteristics	Dr. P. Thangaraju	
4	GEO	▪ Field Survey for assessing the regional and localgeology of the area. ▪ Preparation of mineral and geological maps. ▪ Geology and Geo morphological analysis/description and Stratigraphy/Lithology.	Dr. M. Ifthikhar Ahmed	
			Dr. P. Thangaraju	
5	SE	▪ Revision in secondary data as per Census ofIndia, 2011. ▪ Impact Assessment & Preventive ManagementPlan ▪ Corporate Environment Responsibility.	Mrs. K. Anitha	
6	EB	▪ Collection of Baseline data of Flora and Fauna. ▪ Identification of species labelled as Rare, Endangered and threatened as per IUCN list.	Mrs. Amirtham	

		▪ Impact of the project on flora and fauna. ▪ Suggesting species for greenbelt development.	Mr. Alagappa Moses	
7	RH	▪ Identification of hazards and hazardous substances ▪ Risks and consequences analysis ▪ Vulnerability assessment ▪ Preparation of Emergency Preparedness Plan ▪ Management plan for safety.	Mr. N. Senthilkumar	
			Mr. S. Pavel	
			Mr. J. R. Vikram Krishna	
8	LU	▪ Construction of Land use Map ▪ Impact of project on surrounding land use ▪ Suggesting post closure sustainable land use and mitigative measures.	Mr. A. Allimuthu	
9	NV	▪ Identify impacts due to noise and vibrations ▪ Suggesting appropriate mitigation measures for EMP.	Mr. A. Jagannathan	
10	AQ	▪ Identifying different source of emissions and propose predictions of incremental GLC using AERMOD. ▪ Recommending mitigations measures for EMP	Mr. N. Senthilkumar	
11	SC	▪ Assessing the impact on soil environment and proposed mitigation measures for soil conservation	Dr. M. Ifthikhar Ahmed	
12	SHW	▪ Identify source of generation of non-hazardous solid waste and hazardous waste. ▪ Suggesting measures for minimization of generation of waste and how it can be reused or recycled.	Mr. A. Jagannathan	
			Mr. J. R. Vikram Krishna	

LIST OF TEAM MEMBERS ENGAGED IN THIS PROJECT

Sl.No.	Name	Functional Area	Involvement	Signature
1	Mr. S. Nagamani	AP; GEO; AQ	▪ Site Visit with FAE ▪ Provide inputs & Assisting FAE with sources of Air Pollution, its impact and suggest control measures ▪ Provide inputs on Geological Aspects ▪ Analyse & provide inputs and assist FAE with meteorological data, emission estimation, AERMOD modelling and suggesting control measures	
2	Mr. P.Viswanathan	AP; WP; LU	▪ Site Visit with FAE ▪ Provide inputs & Assisting FAE with sources of Air Pollution, its impact and suggest control measures ▪ Assisting FAE on sources of water pollution, its impacts and suggest control measures ▪ Assisting FAE in preparation of land use maps	
3	Mr. Santhoshkumar	GEO; SC	▪ Site Visit with FAE ▪ Provide inputs on Geological Aspects ▪ Assist in Resources & Reserve Calculation and preparation of Production Plan & Conceptual Plan ▪ Provide inputs & Assisting FAE with soil conservation methods and identifying impacts	
4	Mr. Umamahesvaran	GEO	▪ Site Visit with FAE ▪ Provide inputs on Geological Aspects ▪ Assist in Resources & Reserve Calculation and preparation of Production Plan & Conceptual Plan	

5	Mr. A. Allimuthu	SE	▪ Site Visit with FAE ▪ Assist FAE with collection of data's ▪ Provide inputs by analysing primary and secondary data	
6	Mr. S. Ilavarasan	LU; SC	▪ Site Visit with FAE ▪ Assisting FAE in preparation of land use maps ▪ Provide inputs & Assisting FAE with soil conservation methods and identifying impacts	
7	Mr. E. Vadivel	HG	▪ Site Visit with FAE ▪ Assist FAE & provide inputs on aquifer characteristics, ground water level/table ▪ Assist with methods of ground water recharge and conduct pump test, flow rate	
8	Mr. D. Dinesh	NV	▪ Site Visit with FAE ▪ Assist FAE and provide inputs on impacts due to proposed mine activity and suggest mitigation measures ▪ Assist FAE with prediction modelling	
9	Mr. Panneer Selvam	EB	▪ Site Visit with FAE ▪ Assist FAE with collection of baseline data ▪ Provide inputs and assist with labelling of Flora and Fauna	
10	Mrs. Nathiya	EB	▪ Site Visit with FAE ▪ Assist FAE with collection of baseline data ▪ Provide inputs and assist with labelling of Flora and Fauna	

DECLARATION BY THE HEAD OF THE ACCREDITED CONSULTANT ORGANIZATION

I, Dr. M. Ifthikhar Ahmed, Managing Partner, Geo Exploration and Mining Solutions, hereby, confirm that the above mentioned Functional Area Experts and Team Members prepared the EIA/EMP Report for mining of Marapparai & Paruthipalli Rough Stone & Gravel Quarry Project over a Cluster Extent of 16.09.28 ha in Marapparai & Paruthipalli Village of Tiruchengode Taluk, Namakkal District of Tamil Nadu. It is also certified that information furnished in the EIA study are true and correct to the best of our Knowledge.

Signature& Date:

Name: **Dr. M. Ifhikhar Ahmed**

Designation: **Managing Partner**

Name of the EIA Consultant Organization: **M/s. Geo Exploration and Mining Solutions**

NABET Certificate No & Issue Date: **NABET/EIA/1821/RA0123 Dated: 27-03-2019**
Minutes of 186th Accreditation Committee Meeting for Re-Accreditation held on Jan. 18, 2019.