DRAFT ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PLAN REPORT

(Submitted for Public Hearing as per the provisions of EIA Notification 2006 & amendments thereof)

FOR

OBTAINING

Environmental Clearance

Schedule Sl. No. 1 (a) (i): Mining Project

(Category B1-Minor Mineral-Cluster-Non Forest Land)

Cluster Extent: 9.36.5 Ha

THAMBAGOUNDANPALAYAM ROUGH STONE AND GRAVEL QUARRY PROJECT CLUSTER

(2 PROPOSED & 1 EXISTING)

STUDY PERIOD - October 2021 to December 2021

Located at

S.F.No. 54/2, 55/1, 57/2, Thambagoundanpalayam Village

MADUKKARAI TALUK, COIMBATORE DISTRICT, TAMIL NADU

Project Proponent: Lessee

K.Ravikumar,

S/o. Krishnaswamy,

No. 15/156-B, Palakkad Road,

Marapalam, Madukkarai Taluk,

Coimbatore District - 641 105

ENVIRO RESOURCES

(NABET Certificate No: NABET/EIA/1922/SA0133)

Reg. Add. 1904 Roopnagar CHS, S V Road, Kandivali West,

Mumbai 400067, Maharashtra

E-mail: ecenviroresource@gmail.com, Telephone: +91 8087985556

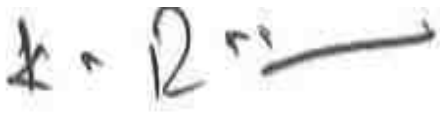
February 2023

UNDERTAKING BY CLIENT

I lessee as K. Ravikumar of Proposed Rough Stone Quarry at S.F. NO. 54/2, 55/1, 57/2, Thambagoundanpalayam Rough stone and Gravel Quarry Cluster with new proposed area of 3.62.0 Ha, while total cluster area is 9.36.5 Ha located in Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu. give this undertaking to the effect that the conditions laid down in Terms of Reference by SEIAA, Tamil Nadu vide Letter no. SEIAA/TN/F.No.9047/SEAC/ToR-1164/2022 dated 06.06.2022 for the proposed quarry.

The report has been complied with, and the data submitted, and the information presented in the report are factually correct.

Date: 14/02/2023



K. Ravikumar,
S/o. Krishnaswamy,
No. 15/156-B, Palakkad Road,
Marapalam, Madukkarai Taluk,
Coimbatore District - 641 105

Declaration by Expert

Declaration by Experts contributing to the EIA "Thambagoundanpalayam Rough stone and Gravel Quarry Cluster with new proposed area of 3.62.0 Ha, while total cluster area is 9.36.5 Ha located in Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu. Lessee: Thiru. K. Ravikumar (Lease Area: 3.62.0 Ha)**, Study Period October to December 2021 (Post -Monsoon Season).**

I, hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.

EIA coordinator:
Name: **Dr. Milind P. Kundal**

Signature and Date: ……
Period of involvement: February 2021 to Till Date
Contact information:
Email id.: info@enviroresources.in
Tel. No. +91-9867898844

Functional area experts:

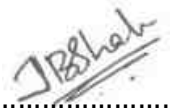
S. No.	Functional areas	Name of the expert/s	Involvement (Period and task**)	Signature and date
1.	AP*	Timir Shah	February 2021 to Till Date (Identification & Assessment of Impact, Suggestion Mitigation Measures)	
2.	WP*	Pritam Kadam	February 2021 to July 2022 (Identification & Assessment of Impact, Suggestion Mitigation Measures).	
3.	SE*	Anil Shende	February 2021 to Till Date (Identification & Assessment of Impact, Suggestion Mitigation Measures)	
4.	EB*	Bhaskar Yengal	February 2021 to Till Date (Identification & Assessment of Impact, Suggestion Mitigation Measures)	
5.	HG*	Milind Kundal	February 2021 to Till Date (Identification & Assessment of Impact, Suggestion Mitigation Measures)	

S. No.	Functional areas	Name of the expert/s	Involvement (Period and task**)	Signature and date
6.	GEO*	Milind Kundal	February 2021 to Till Date (Identification & Assessment of Impact, Suggestion Mitigation Measures)	
7.	SC*	Bhaskar Yengal	February 2021 to Till Date (Identification & Assessment of Impact, Suggestion Mitigation Measures)	
8.	AQ*	Pritam Kadam	February 2021 to July 2022 (Identification & Assessment of Impact, Suggestion Mitigation Measures)	
9.	NV*	Partho Mukherjee	February 2021 to July 2022 (Identification & Assessment of Impact, Suggestion Mitigation Measures)	
10.	LU*	Milind Kundal	February 2021 to Till Date (Identification & Assessment of Impact, Suggestion Mitigation Measures)	
11.	RH*	Santosh Gupta	February 2021 to July 2022 (Identification & Assessment of Impact, Suggestion Mitigation Measures)	

Declaration by the Head of the accredited consultant organization/ authorized person

I, Timir Shah, hereby, confirm that the above-mentioned experts prepared the EIA Proposed Rough Stone Quarry at S.F. NO. 54/2, 55/1, 57/2, Thambagoundanpalayam Rough stone and Gravel Quarry Cluster with new proposed area of 3.62.0 Ha, While total cluster area is 9.36.5 Ha located in Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu. Lessee: Thiru. K. Ravikumar (Lease Area: 3.62.0 Ha). ***Study Period October to December 2021 (Post-Monsoon Season)***. I also confirm that the consultant organization shall be fully accountable for any misleading information mentioned in this statement.

It is certified that no unethical practices, plagiarism involved in carrying out the work, and external data / text have not been used without proper acknowledgment while preparing this EIA report.

Signature:…  ……

Name: Mr. Timir Shah

Designation: Head of ACO & MD

Name of the EIA consultant organization: Enviro Resources, Mumbai .

NABET Certificate No. & Issue Date: **NABET/EIA/1922/SA 0133 and issue date June 12, 2021**

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ABBREVIATIONS

AAQ	:	Ambient Air Quality
AAQM	:	Ambient Air Quality Monitoring
AAQS	:	Ambient Air Quality Standards
AIS & LUS	:	All India Soil and Land Use Survey
AMSL	:	Above Mean Sea Level
ANFO	:	Ammonium Nitrate - Fuel Oil
BH	:	Business Head
BHs	:	Bore Holes
BIS	:	Bureau of Indian Standards
bgl	:	Below Ground Level
CC	:	Calcium Carbonate
CFM	:	Cubic Feet per Minute
CWC	:	Central Water Commission
CPCB	:	Central Pollution Control Board
CSR	:	Corporate Social Responsibility
DGMS	:	Directorate General of Mines Safety
DMP	:	Disaster Management Plan
DMG	:	Department of Mines and Geology
DTH	:	Down the Hole
E	:	East
EAC	:	Expert Appraisal Committee
EC	:	Environmental Clearance
EHS	:	Environmental, Health and Safety
EIA	:	Environmental Impact Assessment
EMC	:	Environment Management Cell
EMP	:	Environmental Management Plan
ESE	:	East of South East
ENE	:	East of North East
EPA	:	Environmental Protection Act
ERDAS	:	Earth Resources Data Analysis System
EPO	:	Emergency planning officer
FPS	:	Fine Particulate Sampler
FCC	:	False Color Composite
Govt.	:	Government
GCP	:	Ground Control Points
GLC	:	Ground Level Concentration
GOI	:	Government of India
GPS	:	Global Positioning System
GSI	:	Geological Survey of India
GWEC	:	Ground Water Estimation Committee
Ha	:	Hectare

HIV	:	Human Immunodeficiency Virus
IBM	:	Indian Bureau of Mines
IMD	:	India Meteorological Department
IS	:	Indian Standards
ISO	:	International Organization of Standardization
IUCN	:	International Union for Conservation of Nature
KLD	:	Kilo Litre Per Day
LOI	:	Letter of Intent
LU/LC	:	Land Use / Land Cover
mRL	:	Metre Reduced Level
MC	:	Magnesium Carbonate
ML	:	Mining Lease
MoEF	:	Ministry of Environment & Forests
MSL	:	Mean Sea Level
MT	:	Million Tonnes
MTPA	:	Metric Tonnes Per Annum
MW	:	Mega Watt
N	:	North
NAAQS	:	National Ambient Air Quality Standards
NABET	:	National Accreditation Board for Education & Training
NATMO	:	National Atlas & Thematic Mapping Organization
NABL	:	National Accreditation Board for Testing and Calibration Laboratories
NE	:	North East
NH	:	National Highway
NNE	:	North of North East
NGO	:	Non-Governmental Organization
NNW	:	North of North West
NRSA	:	National Remote Sensing Agency
NRSC	:	National Remote Sensing Centre
NW	:	North West
OB	:	Over Burden
OBC	:	Other Backward Classes
OHS	:	Occupational Health and Safety
OSHA	:	Occupational Safety and Health Administration
PFR	:	Pre-Feasibility Report
pH	:	Potential of Hydrogen
PHCS	:	Public Health Centers
PM	:	Particulate Matter
PPE	:	Personal Protective Equipment
PPV	:	Peak Particle Velocity
QCI	:	Quality Council of India

RSPM	:	Respirable Suspended Particulate Matter
SC	:	Scheduled Caste
SE	:	South East
SEIAA	:	State Environmental Impact Assessment Authority
SH	:	State Highway
SHE	:	Safety, Health & Environment
SI	:	Sustainability initiatives
SIA	:	Social Impact Assessment
SOI	:	Survey of India
TNPCB	:	State Pollution Control Board
SPM	:	Suspended Particulate Matter
SSW	:	South of South West
ST	:	Scheduled Tribe
SW	:	South West
TC	:	Total Carbonate
TDS	:	Total Dissolved Solids
ToR	:	Terms of Reference
TPD	:	Tonnes Per Day
UNFC	:	United Nations Framework Classification
USDA	:	United States Department of Agriculture
USEPA	:	United States Environmental Protection Agency
VT	:	Vocational Training
RF	:	Reserved Forest
PF	:	Protected Forest
W	:	West
WNW	:	West of North West
WSW	:	West of South West
µg/m^3	:	Micro gram per meter cube
µm	:	Micro Meter
cu. m	:	Cubic meter
dB	:	Decibel
gm/sec	:	Gram per second
gm/cc	:	Gram per cubic metre
hr/day	:	Hour per day
kg	:	Kilogram
Kg/hr	:	Kilogram per hour
Kg/ha	:	Kilogram per hectare
km	:	Kilometre
m	:	Metre
mg/l	:	Miligram per Litre
mm	:	Milimetre
Sq.km	:	Square Kilometre

TMT. P. RAJESWARI, I.F.S.,
MEMBER SECRETARY

STATE LEVEL ENVIRONMENT IMPACT ASSESSMENT AUTHORITY – TAMIL NADU
3rd Floor, Panagal Maaligai,
No.1 Jeenis Road, Saidapet,
Chennai-15.
Phone No.044-24359973
Fax No. 044-24359975

TERMS OF REFERENCE (ToR)

Lr No.SEIAA-TN/F.No.9047/SEAC/ToR- 1164 /2022 Dated: 06.06.2022

To

Thiru.K.Ravikumar
S/o.R.Krishnasamy
No.15/156-B, Palakkadu Road
Marappalam, Madukarai
Coimbatore District – 641 105

Sir / Madam,

Sub: SEIAA, Tamil Nadu – Terms of Reference with Public Hearing (ToR) for the Proposed Rough Stone & Gravel quarry lease over an extent of 3.62.0 Ha in, S.F.Nos. 54/2, 55/1 and 57/2 Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu by Thiru. K. Ravikumar - under project category – "B1" and Schedule S.No. 1(a) – ToR issued along with Public Hearing-preparation of EIA report – Regarding.

Ref: 1. Online proposal No.SIA/TN/MIN/ 72703/2022, dated: 26.02.2022
2. Your application seeking Terms of Reference submitted on: 03.03.2022
3. Minutes of the 273rd Meeting of SEAC held on 14.05.2022
4. Minutes of the 518th Meeting of SEIAA held on 06.06.2022.

Kindly refer to your proposal submitted to the State Level Environment Impact Assessment Authority for Terms of Reference.

MEMBER SECRETARY
SEIAA-TN

The project proponent, Thiru.K.Ravikumar has submitted application seeking ToR for B1 category project in Form-I, for the Proposed Rough Stone & Gravel quarry lease over an extent of 3.62.0 Ha in, S.F.Nos. 54/2, 55/1 and 57/2 Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu Tamil Nadu and has furnished Pre-feasibility report.

The proposal was placed in 273rd SEAC meeting held on 14.5.2022. The project proponent gave detailed presentation. SEAC noted the following:

1. The Project Proponent, Thiru. K. Ravikumar has applied for Terms for Reference for the proposed Rough stone & gravel quarry lease over an extent of 3.62.0 Ha in S.F.Nos. 54/2, 55/1 and 57/2 Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu.
2. The project/activity is covered under Category "B1" of Item 1(a) "Mining Projects" of the Schedule to the EIA Notification, 2006.
3. **As per the mining plan, the lease period is 5 year. The production as per mining plan for 5 years is not to exceed – 2,73,335 m3 of Rough Stone, 8648 m3 of gravel & 12880 m3 of existing gravel dump. The Annual peak production as per mining plan is 60550 m3 of Rough Stone(5th year) & 8648 m3 of gravel (3rd year) with ultimate depth of 42m (2m Gravel + 40m Rough Stone) BGL.**

Based on the presentation made by the proponent and the documents furnished, SEAC decided to recommend the proposal for the grant of Terms of Reference (TOR) with Public Hearing, subject to the following TORs, in addition to the standard terms of reference for EIA study for non-coal mining projects and details issued by the MOEF & CC to be included in EIA/EMP Report:

1. The Proponent shall carry out the cumulative & comprehensive impact study due to mining operations carried out in the quarry cluster specifically with reference to the environment in terms of air pollution, water pollution & health impacts, accordingly the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.
2. The PP shall carry out controlled blasting & vibration study with the reputed institution and furnish the same along with EIA report.
3. Certified EC compliance report shall be included in the EIA report.

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4. If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines,
    a) What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?
    b) Quantity of minerals mined out.
    c) Highest production achieved in any one year
    d) Detail of approved depth of mining.
    e) Actual depth of the mining achieved earlier.
    f) Name of the person already mined in that leases area.
    g) If EC and CTO already obtained, the copy of the same shall be submitted.
    h) Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.
5. All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology and geology of the mining lease 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).
6. The PP shall carry out Drone video survey covering the cluster, Green belt , fencing etc.,
7. The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.
8. The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment and the remedial measures for the same.
9. The Project Proponent shall provide the Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of Mines Act'1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.
10. The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and

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surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD / TWAD so as to assess the impacts on the wells due to mining activity. 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.

11. The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & flora/fauna including traffic/vehicular movement study.
12. A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.
13. A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.
14. The Public hearing advertisement shall be published in one major National daily and one most circulated vernacular daily.
15. The PP shall produce/display the EIA report, Executive summery and other related with respect to public hearing should in Tamil Language also.
16. The recommendation for the issue of "Terms of Reference" is subjected to the 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.200/2016 and O.A.No.580/2016 (M.A.No.1182/2016) and O.A.No.102/2017 and O.A.No.404/2016 (M.A.No. 758/2016, 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).
17. The purpose of Green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the **appendix** in consultation with the DFO, State Agriculture University and local school/college authorities. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.

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18. Taller/one year old Saplings raised in appropriate size of bags, preferably eco-friendly bags should be planted in proper espacement as per the advice of local forest authorities/botanist/Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner
19. A Disaster management Plan shall be prepared and included in the EIA/EMP Report.
20. A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report.
21. The specific flora & fauna studies shall be carry out with the help of local School/College students and the same shall be included in EIA Report.
22. The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. 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.
23. If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.
24. Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Reference besides attracting penal provisions in the Environment (Protection) Act, 1986.

Appendix -I
List of Native Trees Suggested for Planting

1. ***Aeglemarmelos***–Vilvam
2. ***Adenaantherapavonina***-Manjadi
3. ***Albizialebbeck***–Vaagai
4. ***Albiziaamara***-Usil
5. ***Bauhinia purpurea*** - Mantharai
6. ***Bauhinia racemosa*** - Aathi
7. ***Bauhinia tomentosa***–Iruvathi
8. ***Buchananiaaillaris***-Kattuma
9. ***Borassusflabellifer***- Panai
10. ***Buteamonosperma*** - Murukkamaram
11. ***Bobaxceiba***– Ilavu, Sevvilavu

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12. ***Calophylluminophyllum*** - Punnai
13. ***Cassia fistula***- Sarakondrai
14. ***Cassia roxburghii***- Sengondrai
15. ***Chloroxylonsweitenia*** - Purasamaram
16. ***Cochlospermumreligiosum***– Kongu, ManjalIlavu
17. ***Cordiadichotoma***– Mookuchalimaram
18. ***Cretevaadansonii***–Mavalingum
19. ***Dilleniaindica***– Uva, Uzha
20. ***Dilleniapentagyna***– SiruUva, Sitruzha
21. ***Diospyrosebenum***- Karungali
22. ***Diospyroschloroxylon***– Vaganai
23. ***Ficusamplissima***– KallIchi
24. ***Hibiscus tiliaceous***–Aatrupoovarasu
25. ***Hardwickiabinata***– Aacha
26. ***Holopteliaintegrifolia***-Aayili
27. ***Lanneacoromandelica*** - Odhiam
28. ***Lagerstroemia speciosa*** - Poo Marudhu
29. ***Lepisanthustetraphylla***- Neikottaimaram
30. ***Limoniaacidissima*** - Vila maram
31. ***Litseaglutinosa***–Pisinpattai
32. ***Madhucalongifolia*** - Illuppai
33. ***Manilkarahexandra***–UlakkaiPaalai
34. ***Mimusopselengi*** - Magizhamaram
35. ***Mitragynaparvifolia*** - Kadambu
36. ***Morindapubescens***–Nuna
37. ***Morindacitrifolia***– VellaiNuna
38. ***Phoenix sylvestre***-Eachai
39. **Pongamiapinnata**–Pungam
40. **Premnamollissima**– Munnai
41. **Premnaserratifolia**– Narumunnai
42. **Premnatomentosa**-PurangaiNaari, PudangaNaari
43. **Prosopiscinerea** - Vannimaram
44. **Pterocarpusmarsupium** - Vengai
45. **Pterospermumcanescens**–Vennangu, Tada
46. **Pterospermumxylocarpum** - Polavu
47. **Puthranjivaroxburghii**–Puthranjivi
48. **Salvadorapersica**– UgaaMaram
49. **Sapindusemarginatus**- Manipungan, Soapukai
50. **Saracaasoca** - Asoca
51. **Streblusasper**- Pirayamaram
52. **Strychnosnuxvomica**–Yetti

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53. **Strychnospotatorum** - TherthangKottai
54. **Syzygiumcumini** - Naval
55. **Terminaliabellerica**- Thandri
56. **Terminalia arjuna**- Venmarudhu
57. **Toona ciliate** – Sandhanavembu
58. **Thespesiapopulnea**- Puvarasu
59. **Walsuratrifoliata**–valsura
60. **Wrightiatinctoria**- Vep

Discussion by Authority and the Remarks

The proposal was placed in the 518th Authority meeting held on 06.06.2022. After detailed discussions, the Authority accepts the recommendation of SEAC and decided to grant Terms of Reference (ToR) along with Public Hearing under cluster for undertaking the combined Environment Impact Assessment Study and preparation of separate Environment Management Plan subject to the conditions as recommended by SEAC & normal condition in addition to the following conditions:

1. Detailed study shall be carried out regard to impact of mining around the proposed mine lease area on the nearby Villages, Water-bodies/ Rivers, & any ecological fragile areas.
2. The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological structures etc.
3. As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.
4. The Environmental Impact Assessment shall study in detail on the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities.
5. The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.
6. Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.
7. The project proponent shall study impact on fish habitats and the food WEB/ food chain in the nearby water body and Reservoir.

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8. The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.
9. The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.
10. The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.
11. The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.
12. The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan.
13. The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.
14. The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.
15. The project proponent shall study and furnish the impact of project on plantations in adjoin patta lands, Horticulture, Agriculture and livestock.
16. The project proponent shall study and furnish the details on potential fragmentation impact of natural environment, by the activities.
17. The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.
18. The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.
19. The project proponent shall study on impact of mining on Reserve forests free ranging wildlife.
20. Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise area communication order issued from reputed research institutions on the following
    a) Soil health & bio-diversity.
    b) Climate change leading to Droughts, Floods etc.

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c) Pollution leading to release of Greenhouse gases (GHG), rise in Temperature, & Livelihood of the local people.

d) Possibilities of water contamination and impact on aquatic ecosystem health.

e) Agriculture, Forestry & Traditional practices.

f) Hydrothermal/Geothermal effect due to destruction in the Environment.

g) Bio-geochemical processes and its foot prints including environmental stress.

h) Sediment geochemistry in the surface streams.

21. Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby water bodies due to mining activity. 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, covering the entire mine lease period.
22. To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.
23. To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.
24. Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.
25. Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.

A. 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.
2) A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.
3) All documents including approved mine plan, EIA and Public Hearing should be compatible

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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.

4) All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ topo sheet, 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).

5) Information should be provided in Survey of India Topo sheet 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.

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.

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.

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.

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.

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.

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Impact, if any, of change of land use should be given.

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.

12) 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.

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.

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.

15) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.

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.

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.

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

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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.

19) Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali 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.

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 with respect to 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).

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.

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

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silica, should be given.

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.

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.

25) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.

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.

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.

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.

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.

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.

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.

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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.

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.

33) Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.

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.

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.

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.

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.

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.

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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.

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.

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.

42) A Disaster management Plan shall be prepared and included in the EIA/EMP Report.

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.

44) Besides the above, the below mentioned general points are also to be followed:-

a) Executive Summary of the EIA/EMP Report

b) All documents to be 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.

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.

e) Where the documents provided are in a language other than English, an English translation should be provided.

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.

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.

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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.

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.

In addition to the above, the following shall be furnished:-

The Executive summary of the EIA/EMP report in about 8-10 pages should be prepared incorporating the information on following points:

1. Project name and location (Village, District, State, Industrial Estate (if applicable).
2. Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.
3. Measures for mitigating the impact on the environment and mode of discharge or disposal.
4. Capital cost of the project, estimated time of completion.
5. The 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.
6. A detailed study of the lithology of the mining lease area shall be furnished.
7. Details of village map, "A" register and FMB sketch shall be furnished.
8. Detailed mining closure plan for the proposed project approved by the Geology of Mining department shall be shall be submitted along with EIA report.
9. Obtain a letter /certificate from the Assistant Director of Geology and Mining standing that there is no other Minerals/resources like sand in the quarrying area within the approved depth of mining and below depth of mining and the same shall be furnished in the EIA report.
10. EIA report should strictly follow the Environmental Impact Assessment Guidance Manual for Mining of Minerals published February 2010.
11. Detail plan on rehabilitation and reclamation carried out for the stabilization and restoration of the mined areas.
12. The EIA study report shall include the surrounding mining activity, if any.
13. Modeling study for Air, Water and noise shall be carried out in this field and incremental

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increase in the above study shall be substantiated with mitigation measures.

14. A study on the geological resources available shall be carried out and reported.
15. A specific study on agriculture & livelihood shall be carried out and reported.
16. Impact of soil erosion, soil physical chemical and biological property changes may be assumed.
17. Site selected for the project - Nature of land - Agricultural (single/double crop), barren, Govt./ private land, status of is acquisition, nearby (in 2-3 km.) water body, population, with in 10km other industries, forest , eco-sensitive zones, accessibility, (note - in case of industrial estate this information may not be necessary)
18. Baseline environmental data - air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population
19. Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.
20. Likely impact of the project on air, water, land, flora-fauna and nearby population
21. Emergency preparedness plan in case of natural or in plant emergencies
22. Issues raised during public hearing (if applicable) and response given
23. CER plan with proposed expenditure.
24. Occupational Health Measures
25. Post project monitoring plan
26. The project proponent shall carry out detailed hydro geological study through intuitions/NABET Accredited agencies.
27. A detailed report on the green belt development already undertaken is to be furnished and also submit the proposal for green belt activities.
28. The proponent shall propose the suitable control measure to control the fugitive emissions during the operations of the mines.
29. A specific study should include impact on flora & fauna, disturbance to migratory pattern of animals.
30. Reserve funds should be earmarked for proper closure plan.
31. 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 forests (EC.2) Department dated 25.06.2018 regarding ban on one time use and throw away plastics

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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.

Besides the above, the below mentioned general points should also be followed:-

a. A note confirming compliance of the TOR, with cross referencing of the relevant sections / pages of the EIA report should be provided.

b. All documents may be properly referenced with index, page numbers 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.

d. 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 also be followed.

e. The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI)/National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organization/Laboratories including their status of approvals etc. In this regard circular no F. No.J -11013/77/2004-IA-II(I) dated 2nd December, 2009, 18th March 2010, 28th May 2010, 28th June 2010, 31st December 2010 & 30th September 2011 posted on the Ministry's website http://www.moef.nic.in/ may be referred.

- After preparing the EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned points, the proponent will take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.
- The final EIA report shall be submitted to the SEIAA, Tamil Nadu for obtaining Environmental Clearance.
- The TORs with public hearing prescribed shall be **valid for a period of three years** from the date of issue, for submission of the EIA/EMP report as per OMNo.J-11013/41/2006-IA-II(I)(part) dated 29th August, 2017.

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Copy to:

1. The Additional Chief Secretary to Government, Environment & Forests Department, Govt. of Tamil Nadu, Fort St. George, Chennai - 9
2. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD Cum-Office Complex, East Arjun Nagar, New Delhi 110032.
3. The Member Secretary, Tamil Nadu Pollution Control Board, 76, Mount Salai, Guindy, Chennai-600 032.
4. The APCCF (C), Regional Office, MoEF & CC (SZ), 34, Chennai -34.
5. Monitoring Cell, IA Division, Ministry of Environment, Forests & CC, Paryavaran Bhavan, CGO Complex, New Delhi 110003
6. The District Collector, Coimbatore District.
7. Stock File.

TOR COMPLIANCE

The point wise ToR compliances issued by SEIAA, Tamil Nadu for Proposed Thambagoundanpalayam Rough stone and Gravel quarry project of an area is 3.62.0 Ha, with cluster area 9.36.5 Ha, located in S.F.No. 54/2, 55/1 and 57/2 Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu. Details of ToR issued by SEIAA are as follows.

LESSEE	**Thiru. K. Ravikumar**
PROPOSAL NO	SIA/TN/MIN/72703/2022
TOR LETTER	SEIAA-TN/F.No.9047/SEAC/ToR-1164/2022, dated 06.06.2022

TERMS OF REFERENCE (ToR) for Thiru. K. Ravikumar

Sr. No.	Condition	Compliance
ADDITIONAL CONDITIONS BY SEAC		
1.	The Proponent shall carry out the cumulative & comprehensive impact study due to mining operations carried out in the quarry cluster specifically with reference to the environment in terms of air pollution, water pollution & health impacts, accordingly the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.	The anticipated impacts due to mining operations carried out in the quarry cluster and its mitigation measures have been discussed in Chapter 4 of Draft EIA Report.
2.	The PP shall carry out controlled blasting & vibration study with the reputed institution and furnish the same along with EIA report.	We will obtain blasting & vibration study from reputed institution and furnish the same along with final EIA report.
3.	The certified existing EC compliance report shall be included in the EIA Report.	The certified compliance is attached as **Annexure XII, Page No. 384-406.**
4.	If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent	It is an existing quarry. **Earlier Mining Details:** **Proponent:** K.Ravikumar

Sr. No.	Condition	Compliance
	shall furnish the following details from AD/DD, mines, a) What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines? b) Quantity of minerals mined out. c) Highest production achieved in any one year d) Detail of approved depth of mining. e) Actual depth of the mining achieved earlier. f) Name of the person already mined in that leases area. g) If EC and CTO already obtained, the copy of the same shall be submitted. h) Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	**Lease period:** 04.08.2016 to 03.08.2021 **Existing Pit Dimension**: 224m x 97m x 32m. While existing Pit Letter attached as **Annexure III, Page No. 238-239.** Earlier EC was Granted by SIEAA, Tamil Nadu Vide EC letter No. SEIAA-TN/F.No.3786/EC/1(a)/3077/2015 dated 02.03.2016. Earlier EC letter attached as **Annexure II, Page No. 236-237.**
5.	All corner coordinates of the mine lease area, superimposed on High Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology and geology of the mining lease 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).	All maps have been provided as. Topo map – **Chapter 1, Page No. 37, Figure No. 1.7** Geological map – **Chapter 2, Page No. 51, Figure No. 2.2** Geomorphology map – **Chapter 2, Page No. 51, Figure No. 2.3** Lithology map – **Chapter 2, Page No. 52, Figure No. 2.4** Landuse map – **Chapter 3, Page No. 79, Figure No. 3.6**
6.	The PP shall carry out Drone video survey covering the cluster, Green	The entire Cluster of mine lease area along with green belt will be video

Sr. No.	Condition	Compliance
	belt, fencing etc.,	graphed through Drone and the same will be attached along with Final EIA report.
7.	The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	The fencing and green belt photos is attached as **Annexure XIV, Page No. 411-414.**
8.	The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment and the remedial measures for the same.	The geological reserves, mineable reserves and Yearwise production details has been discussed in **Chapter 2, Table No. 2.6, 2.7, 2.8, Page Nos. 54, 55 and 57** The anticipated impacts due to mining operations carried out in the quarry cluster and its mitigation measures have been discussed in Chapter 4 of Draft EIA Report.
9.	The Project Proponent shall provide the Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of Mines Act'1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	The Organization chart has been discussed in **Chapter 2, Page No. 54, Table No. 2.3, Page No. 47.**
10.	The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open	The hydro-geological study has been conducted is Part of **Chapter 3, Section 3.10.4, Page Nos. 96 to 101 .**

Sr. No.	Condition	Compliance
	wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD/ TWAD so as to assess the impacts on the wells due to mining activity. 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.	
11.	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & flora/fauna including traffic/vehicular movement study.	The baseline data for the environmental and ecological parameters about surface water/ground water quality, air quality, soil quality & flora/fauna including traffic/vehicular movement study have been incorporated in Chapter 3.
12.	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	The list of trees in the core and buffer zone have been discussed in **Chapter 3 -Section, 3.11, Page No. 108-117**
13.	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	Progressive Mine closure plan is part of Mine Plan attached as **Annexure IX, Page No. 290-355**.
14.	The Public hearing advertisement shall be published in one major National daily and one most circulated vernacular daily.	The Public hearing advertisement will be published in one major National daily and one most circulated vernacular daily.

Sr. No.	Condition	Compliance
15.	The PP shall produce/display the EIA report, Executive summery and other related with respect to public hearing should in Tamil Language also.	Noted and will be complied.
16.	The recommendation for the issue of "Terms of Reference" is subjected to the 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.200/2016 and O.A.No.580/2016 (M.A.No.1182/2016) and O.A.No.102/2017 and O.A.No.404/2016 (M.A.No.758/2016, 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).	Noted.
17.	The purpose of Green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix in consultation with the DFO, State Agriculture University and local school/college authorities. The plant species with dense/moderate canopy of native	Around 1200 tress will be planted around the site. The list of trees to be planted are given below: Neem, Pungam, Poovarasu, Naval, Mantharai, Arasa Maram, Magizham, Vilvam, vaagai, Marudha maram, Thandri, Poovarasu, Quaker buttons, Thethankottai maram, Manjadi, Usil, Aathi, Panai, Uzha, Illuppai, Eachai, Vanni Maram

Sr. No.	Condition	Compliance
	origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.	
18.	Taller/one year old Saplings raised in appropriate size of bags, preferably eco-friendly bags should be planted in proper espacement as per the advice of local forest authorities/botanist/Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner.	The green belt plan is enclosed along with mining plates in **Annexure IX, page No. 290-355.**
19.	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	A Disaster management Plan is prepared and included in the **Chapter 7, Section 7.3, Page No. 177.**
20.	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report.	A Risk Assessment and management Plan is prepared and included in **Chapter 7, Section 7.2, Page No. 174.**
21.	The specific flora & fauna studies shall be carry out with the help of local School/College students and the same shall be included in EIA Report.	The specific flora & fauna studies has been carried out and attached in **Chapter 3 -Section, 3.11, Page No. 108-117**
22.	The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. 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	The socio-economic study has been carried out discussed in **Chapter 3 - Section, 3.12, Page No. 117-136.**

Sr. No.	Condition	Compliance
	may be given with time frames for implementation.	
23.	If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.	It is an existing quarry Certified EC Compliance Report is attached as **Annexure XII, Page No. 384-406.**
24.	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Reference besides attracting penal provisions in the Environment (Protection) Act, 1986.	Noted.
ADDITIONAL CONDITIONS BY SEIAA		
1.	Detailed study shall be carried out regard to impact of mining around the proposed mine lease area on the nearby villages, Water-bodies/Rivers, & any ecological fragile areas.	The detailed study is carried out and same details are furnished in Chapter 4
2.	The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological structures etc.	The VAO certificate is attached as **Annexure VII, page No. 278.**

Sr. No.	**Condition**	**Compliance**
3.	As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.	Noted and public hearing details will be included along with final EIA report of Chapter 7.
4.	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks, and temperature reduction including control of other emission and climate mitigation activities.	Noted and will be complied in Final EIA report.
5.	The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.	The biodiversity has been studied and discussed in **Chapter 3 -Section, 3.11, Page No. 108-117**
6.	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	It is a existing Rough Stone and Gravel Quarry with a proposed depth of 42m only and hence, no need of mitigation and restoration / reclamation of the applied lease area. The mined out area is fenced on top of open cast working with S1 fencing. Low lying areas with water logging shall be used for fish culture. No immediate proposals for closure of pit as the rough stone persist still at deeper level.

Sr. No.	Condition	Compliance
7.	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.	There is no water body within 1km surrounding the project site. Hence there won't be much impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.
8.	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.	The soil samples have been collected surrounding the project site and physical, chemical components and microbial components study has been carried out and the results are tabulated in **Chapter 3, Table No. 3.4, Page No. 82-83.**
9.	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	The biological environment impacts, and its mitigation measures has been given in **Chapter 4, Page No. 4.10, Page No. 163-164**
10.	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	There are trees within safety zone in the project site and surrounding the project site. Only thorny shrubs were present.
11.	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	The water environment impacts and its mitigation measures has been given in **Chapter 4, Section 4.5, Page No. 152.**
12.	The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan.	The EMP details has been given in Chapter 8
13.	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	Noted and will be complied in Final EIA report.

Sr. No.	**Condition**	**Compliance**
14.	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	There is Ettimadai Reserve Forest located at 4.5 km from the Project Site. Hence our project will not cause any damage to reserve forest. There is no protected areas, National Parks, Corridors and Wildlife pathways near project site.
15.	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock.	There is no plantation surrounding 500m from project site. Hence there won't be any impact in adjoining patta lands, Horticulture, Agriculture and livestock.
16.	The project proponent shall study and furnish the details on potential fragmentation impact of natural environment, by the activities.	Noted and will be complied in Final EIA report.
17.	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	The safety distance has been provided for Kumtipathi River. Hence there won't be much impact on aquatic plant and animals. There is no caves, heritage sites and archaeological sites near the project site.
18.	The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	There will not be any plastic and microplastic pollution due to mining activity. Also, we ensure that we won't use any single use plastics in the project site.

Sr. No.	Condition	Compliance
19.	The project proponent shall detailed study on impact of mining on Reserve forests free ranging wildlife.	There is Ettimadai Reserve Forest located at 4.5 km from the Project Site.
20.	Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise area communication order issued from reputed research institutions on the following. a. Soil Health & Biodiversity. b. Climate Change leading to Droughts, Floods etc. c. Pollution leading to release of Greenhouse gases (GHG), rise in Temperature & livelihood of the local people. d. Possibilities of water contamination and impact on aquatic ecosystem health. e. Agriculture, Forestry & Traditional practices. f. Hydrothermal/Geothermal effect due to destruction in the Environment. g. Bio-geochemical processes and its footprints including environmental stress. Sediment geochemistry in the surface streams.	The biodiversity has been studied and discussed in **Chapter 3, Section 3.11, Page No. 109.** The soil study will be carried out and is enclosed in **Chapter 3, Section 3.7, Page No. 79.**
21.	Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. withing 1	The hydro-geological study is provided in **Chapter 3, Section 3.10.4, Page Nos. 96 to 101 .**

Sr. No.	Condition	Compliance
	km (radius) to assess the impacts on the nearby water bodies due to mining activity. 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, covering the entire mine lease period.	
22.	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	Disaster Management and Risk Assessment has been incorporated in **Chapter-7, Section 7.3, Page No. 179**
23.	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of mining.	A Risk Assessment and management Plan has been incorporated in **Chapter-7, Section 7.2, Page No. 7.2**
24.	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	Mine closure plan has been attached along with mining plates **as Annexure IX, Page No. 290-355.**
25.	Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.	The EMP details has been given in Chapter 8.
STANDARD TOR		
1)	Year-wise production details	The mine has earlier with valid EC

Sr. No.	Condition	Compliance
	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.	having letter number SEIAA-TN/F.No.2580/EC/1(a)/0420/2014 dated 24.11.2015. Previous EC letter is attached **Annexure II, Page No. 236-237**
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 copy of LOI i.e. Precise Area Communication Letter in the name of all Lessee is attached as **Annexure I, Page No. 234-235.**
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).	All corner coordinates of the mine lease area are superimposed on High Resolution Imagery **Figure 1.4** in **Chapter 1**, **Page No. 35** The topo map showing mine lease area and land use and other ecological features of the study area (core and buffer zone)
5)	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area,	Geological map of Lease area 10km, radius is given**,** on **Chapter-2 Figure No.2.2, Page No. 51.**

Sr. No.	Condition	Compliance
	geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	
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. VAO Certificate is attached as **Annexure VII, Page No 278**
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	The proponent has framed its Environmental Policy and the same is Attached as **Annexure XI, Page No. 383.**

Sr. No.	Condition	Compliance
	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 open cast mining project. Blasting details are incorporated in **Chapter-2, Section 2.16, Page No. 60**
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.	The study area comprise of 10 km zone around the mine lease from lease periphery as mentioned and the data contained in the EIA such as waste generation etc. are for the life of the mine. in **Chapter 2, Table No.2.8, Page No. 57.**
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 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 is given in **Chapter 3, Section 3.2, Page No. 74-78.** There is no wildlife sanctuary and national park, migratory routes of fauna in the study area
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.	There is no proposal for use of land outside the mine lease area for OB dumps, etc. There are no R&R issues involved in the project.

Sr. No.	Condition	Compliance
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.	No forest land involved in the project.
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 since no forest land involved within mine lease area.
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 since no forest land involved in mine lease area.
15)	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	No wildlife sanctuary, national park or biosphere reserve within 10 m radius of mine lease area.
16)	A study shall be got done to	Impact on Biological Environment is

Sr. No.	Condition	Compliance
	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.	given in **Chapter 4, Section 4.10, Page No. 165.**
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.	Not Applicable since no National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/ (existing as well as proposed) within 10 km radius.
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	Details biological study (flora & fauna) within 10 km radius of the project site have been incorporated in **Chapter 3, Section 3.11, Page No. 109-119.**

Sr. No.	Condition	Compliance
	the fauna present. In case of any scheduled-l 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.	
19)	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the TNPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.	There is no critically polluted area within 10 km radius of the mining area. Also, the project does not come under the 'Aravali 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).	The project does not fall under CRZ.
21)	R&R Plan/compensation details	There is no Rehabilitation and

Sr. No.	Condition	Compliance
	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.	resettlement is involved. Land classified as Patta land
22)	One season (non-monsoon) [i.e. March-May (Summer Season); October-December (Pre 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	Baseline environmental monitoring was conducted in the core zone and buffer zone during **October 2021 to December 2021.** Site specific meteorological data was also collected during the study period. The monitoring location details and the monitoring results are discussed in **Chapter 3**.

Sr. No.	Condition	Compliance
	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.	
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 was carried out for the rough stone mining project using AERMOD as incorporated in **Chapter-4**, **Section 4.3, Page No. 140,** while Incremental due to mining is provided in **Table 4.2, Page No. 145.**
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.	Water requirement for the project and source are given in detail in **Table No.2.2** in **Chapter 2, Page No. 46**

Sr. No.	Condition	Compliance
25)	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the project should be provided.	Not Applicable Water will be taken from near by villages
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. 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.	Proposed water conservation measures including rainwater harvesting measures are discussed in **Chapter 10, Section No. 10.4.4., Page No. 194.**
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 of the project on the surface and ground water environment and necessary control measures are discussed in **Chapter 4**, **Section 4.5, Page No. 152.**
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	The mining activities will not intersect ground water during life of mine as per plan period and Conceptual Plan. Schematic Diagram Of Mine Workings W.R.T. Ground Water Table is shown in **Chapter 4, Figure 4.6, Page No, 141**

Sr. No.	Condition	Compliance
	ground water should also be obtained and copy furnished.	
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.	Details of water bodies is given in **Chapter-1, Table 1.7, Page No. 38.**
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: 305 AMSL Depth: 42m (2m Gravel + 40m Rough Stone) Further details are given in **Chapter-2.**
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.	Progressive green belt development plan is prepared and attached mining Plate no. IV. It is shown in **Chapter 2, Figure 2.5, Page No. 59** While details of Plantation is part of **Chapter 4, Section 4.11 Page No. 165.**

Sr. No.	Condition	Compliance
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.	Impact on local transport infrastructure due to the project has been assessed. There shall not be much impact on local transport. Traffic density from the proposed mining activity has been incorporated in **Chapter-4 section No.4.9, Page No. 160 of** EIA/EMP report.
33)	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Details of onsite facilities to be provided to the mine workers are given in **Section 2.19** in **Chapter 2**, **Page No. 64.**
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.	Conceptual Plan and Section of the mine lease area is given in **Chapter-2, Figure No. 2.6, Page No. 63**
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	Details of anticipated occupational health impacts and proposed preventive measures are discussed in **Section 4.8** in **Chapter 4, Page No. 157**

Sr. No.	Condition	Compliance
	measures with required facilities proposed in the mining area may be detailed.	
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.	The public health implications due to the project are discussed in **Section 4.8.3** in **Chapter 4, Page No. 160.**
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.	Will be done after the Public Hearing.
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.	Environmental Management Plan for the project is discussed in detail in **Chapter 9**.
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 draft EIA/EMP report is submitted for public hearing. Issues raised in the public hearing along with time bound action plan will be incorporated in the final EIA/EMP report.

<table>
<tr><th>Sr. No.</th><th>Condition</th><th>Compliance</th></tr>
<tr><td>40)</td><td>Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.</td><td>There is no litigation pending against the project.</td></tr>
<tr><td>41)</td><td>The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.</td><td><table><tr><th>S.No.</th><th>Description</th><th>Cost</th></tr><tr><td>1</td><td>Operational cost</td><td>86,14,000</td></tr><tr><td>2</td><td>EMP Cost</td><td>160,00,000</td></tr><tr><td></td><td>Total</td><td>2,46,14,000</td></tr></table></td></tr>
<tr><td>42)</td><td>A Disaster management Plan shall be prepared and included in the EIA/EMP Report.</td><td>Disaster Management Plan is included in Section 7.3 of Chapter 7, Page No. 180.</td></tr>
<tr><td>43)</td><td>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.</td><td>The Project benefits are clearly spelt out in Chapter 8.</td></tr>
<tr><td>44)</td><td>Besides the above, the below mentioned general points are also to be followed:-
Executive Summary of the EIA/EMP Report
All documents to be properly referenced with index and continuous page numbering.
Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.
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</td><td>All general are followed while preparing EIA/EMP.</td></tr>
</table>

Sr. No.	Condition	Compliance
	available during appraisal of the Project. Where the documents provided are in a language other than English, an English translation should be provided. The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted. While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J-11013/41/2006-1 A.ll (l)dated 4th August, 2009, which are available on the website of this Ministry, should be followed. 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. Changes if any made in the basic scope and project parameters (as submitted in Form-I and PFR for securing the TOR) should be	

Sr. No.	Condition	Compliance
	brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also to be altered. Post public hearing changes in structure and content of the draft EIA/EMP (Other the modifications arising out of the P.H. Process) will entail conducting the Ph again with the revised documentation. As per the circular no. J-11011/61S/2010-IA.ll(l) 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. . 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.	

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

Environmental Impact Assessment (EIA) is the basic management tool to ensure the sustainable development with proposed project implementation. In the process of EIA anticipated environmental impacts due to proposed project identified including social and economic impacts, prior to decision making for the project implementation. EIA is the decision-making tool, which guides the decision maker to take appropriate decisions for proposed project. EIA study systematically examines both beneficial and adverse impact due to proposed project to ensure that anticipated impacts can be mitigating during operational phase of the project with resilience to climate.

The Report is prepared by considering Cumulative load of all proposed & existing quarries of Thambagoundanpalayam Rough stone and Gravel quarry project Cluster Quarries consisting of two Proposed and one Existing Quarries with total extent of Cluster of 9.36.5 Ha at Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu, cluster area is calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016.

1.2 HISTORY OF THE PROJECT

Lessee Thiru. K. Ravikumar has applied for TOR in order to prepare EIA report for grant of Environmental Clearance for proposed Rough stone mine having an area of 3.62.0 Ha, with a cluster area of 9.36.5 Ha at Thambagoundanpalayam Village , Madukkarai Taluk, Coimbatore District, Tamil Nadu.

The lessee has sought TOR (Terms of Reference) to prepare Draft EIA report for grant of environmental clearance as per EIA notification 2006. As the total cluster comes to 9.36.5 Ha (1 Existing + 2 Proposed) as the cluster area more than 5 Ha but less than 100 Ha project falls in B1 Category.

Details of LOI and ToR of the mine are given in **Table 1.1** below.

TABLE 1.1: LOI & ToR DETAILS

Name of Lessee	LOI Letter No.	LOI Letter Date	Period of lease
Thiru. K.Ravikumar	Rc.No.525/Mines/2021	16.09.2021	5 years
	ToR Letter No.	**Letter Date**	**-**
	SEIAA-TN/F.No.9047/SEAC/ToR-1164/2022	06.06.2022	-

1.3 PURPOSE OF THE REPORT

The purpose of the EIA process is to inform decision-makers and the public of the environmental consequences of implementing a proposed project. The EIA document itself is a technical tool that identifies, predicts and analyses impacts on the physical environment, as well as social, cultural, and health impacts.

The purpose of this report is to assess the environment impact, suggest the environmental mitigation measures and to assess the technical feasibility, economic viability and sustainable development of the Rough stone Quarry over an area of 3.62.0 Ha, with cluster area 9.36.5 Ha, located in S.F.No. 54/2, 55/1 and 57/2 Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu.

The mined stone will be used for the setting up of the basic infrastructure facilities, roads, housing, ports, railways, irrigation, etc. It will generate employment and the overall development of the state while contributing to the state and central income. The proposed product from the mine will be utilized for private and government projects in and around the surrounding districts in Tamil Nadu. The abundance of rough stone & gravel and its growing demand in the state has prompted the entrepreneur for the mining quarry in this area.

The EIA/EMP has been prepared in accordance with the Standard ToR. Further to assess the impact on environment, it is necessary to as certain present status of environment prevailing at the project site and identification and Assessment of impact on the environment. Keeping these points and statutory requirement in view, this Environment Impact Assessment Report (EIA) and Environmental Management Plan (EMP) has been prepared. Environmental Study has been carried out within 10 km radius of proposed mine lease area for one season monitoring data from October 2021 to December 2021.

The application for TOR was submitted to prepare EIA report for grant of Environmental Clearance (Form-1, PFR and Approved Mine Plan) for this proposed mine was considered as per the provisions of EIA Notification dated 14th September 2006. The proposals were considered by the State Expert Appraisal SEAC. The proposal was recommended for TOR by SEAC, Tamil Nadu. The proposal was considered by SEIAA, Tamil Nadu in its meeting and granted Terms of Reference (ToR) to prepare the Environmental Impact Assessment and Environmental Management Plan. The cluster details are provided in **Table 1.2.**

TABLE 1.2: LIST OF QUARRIES WITHIN THE CLUSTER

Code	Name of the lessee	S.F.Nos	Extent Area (Ha)	Status
Proposed				
P1.	Thiru. K. Ravikumar	54/2, 55/1, 57/2 Thambagoundanpalayam Village	3.62.0	ToR Letter Number SEIAA-TN/F.No.9047/SEAC/ToR-1164/2022 Dated : 06.06.2022
P2	Thiru. K. Ravikumar	57/1 Thambagoundanpalayam Village	2.59.0	EC Granted
Existing				
Cod	**Name of the lessee**	**S.F.Nos**	**Extent Area (Ha)**	**Period of lease**
E1.	N.S.Manonmani	577/1A1A, 577/1A2, Arisipalayam	3.15.5	24.11.2018 to 23.11.2023
		Total Extent	**9.36.5**	

FIGURE 1.1: GOOGLE MAP OF CLUSTER MINES (EXISTING & PROPOSED)

The application for TOR was submitted to prepare EIA report for grant of Environmental Clearance (Form-1, PFR and Approved Mine Plan) for the rough stone mine was considered vide Application no. SIA/TN/MIN/72703/2022 by SEAC, as per the provisions

of EIA Notification dated 14th September 2006. Rough stone mine was considered by the State Expert Appraisal SEAC. The proposal was recommended for TOR by SEAC, Tamil Nadu.

This Environmental Impact Assessment (EIA) report is prepared for obtaining Environmental Clearance (EC) from the State Environmental Impact Assessment Authority, Tamil Nadu for open cast Rough stone mine.

M/s. Enviro Resources, Mumbai has been allocated work to undertake Environmental Impact Assessment (EIA) studies as per the Terms of Reference (ToR) for assessing the impacts due to Minor Mineral cluster project in the districts of Coimbatore. To assess the activities on various environmental parameters and prepare an Environment Management Plan for mitigating the adverse impacts of the project. The public hearing will be conducted in line with the EIA Notification dated 14th September 2006 and its amendments and as prescribed in ToR. The final report will be upgraded after public hearing incorporating concerns of public raised at the time of public hearing. 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.

1.4 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

- The lessee has applied for Rough Stone Quarry Lease Dated: 26.04.2021
- Precise Area Communication Letter was issued by the Assistant Director, Geology and Mining, Coimbatore District, Rc.No. 525/Mines/2021, Dated: 16.09.2021.
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Coimbatore District, Rc.No. 525/Mines/2021, Dated: 09.02.2022.
- 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/72703/2022 and ToR was granted by SEAC with letter no. SEIAA-TN/F.No.9047/SEAC/ToR-1164/2022, dated 06.06.2022.

A. Project Proposal

TABLE 1.3: PROJECT DETAILS

Proposed Project	Thambagoundanpalayam Rough stone and Gravel quarry project,– 3.62.0 Ha
Location of the Project	Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu

B. Screening Category

As per EIA Notification dated 14th September 2006 & subsequent amendments on 1st December 2009 and 4th April 2011; the proposed mining project falls under Activity(1a), namely Mining of Minerals. Such activities are further divided into category "A" and "B". The said project is for mining rough stone of area 3.62.0 Ha such projects are listed as category "B1" under the said notification, this project is categorized as 'B1' category project as the total cluster area is 9.36.5 Ha. This project comes into B1 Category due to Cluster situation. As per latest amended EIA Notification, dated 14.08.2018 lease area upto 100 Ha now falls under B category. The project falls in B1 category vide OM No F. NO. L-11011/175/2018-IA-II (M) dated 12th December 2018 as per order dated 4th September 2018 and 13th September 2018 passed by Ho'ble NGT, New Delhi in O.A. NO. 173 of 2018 and O.A. NO. 186 of 2016.

C. Mining Lease Status

Lease has obtained Letter of Intent from Assistant Director, Geology and Mining, Coimbatore District, Rc.No. 525/Mines/2021, Dated: 16.09.2021 for rough stone mine for a lease area of 3.62.0 Ha while cluster area 9.36.5 Ha located at S.F.No. 54/2, 55/1 and 57/2 of Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu for 5 years.

D. Status of approval of Mining Plan

Mining Plan for the proposed project has been approved for plan period 5 years by Assistant Geologist, Department of Geology and Mining, Coimbatore, Tamil Nadu. Copy of approval letter is enclosed as **Annexure V.**

TABLE 1.4: MINING PLAN DETAILS

Name of Lessee	S.F. Nos.	Approved Mine Plan Letter No.
Thiru. K. Ravikumar	54/2, 55/1 and 57/2 of Thambagoundanpalayam Village	Rc.No. 525/Mines/2021, Dated: 09.02.2022.

1.5 INTRODUCTION OF PROJECT PROPONENT

Details of the lessee are given below.

TABLE 1.5: PROJECT PROPONENT DETAILS

Lessee Name	Thiru. K. Ravikumar S/o. Krishnaswamy
Address	K.Ravikumar, S/o. Krishnaswamy, No. 15/156-B, Palakkad Road, Marapalam, Madukkarai Taluk, Coimbatore District - 641 105
Mobile No	9123571969
Email ID	ravikumar5150@gmail.com

1.6 BRIEF DESCRIPTION OF THE PROJECT

This is a case of proposed Thambagoundanpalayam Rough stone and Gravel quarry project (Cluster Area is 9.36.5 Ha) located in S.F.No. 54/2, 55/1 and 57/2 Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu. The project proponent has applied for Environmental clearance as per EIA notification dated 14th September 2006 and its amendments. The cost of project **Rs. 86.14** lakhs. A detail of mine is presented in **Table 1.6.**

TABLE 1.6: BRIEF DESCRIPTION OF THE PROJECT

Location of Project	S.F.No. 54/2, 55/1 and 57/2 Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu	
Topo sheet Number	58 - B/13	
Type of Mining	Open Cast Mechanized Mining	
Seismic Zone	Seismically, this area is categorized under Zone-III as per IS-1893 (Part-1)-2002. Hence, seismically the site is medium Damage Risk Zone. With MSK scale of VII.	
No of Working Days	300days/ year	
Mine Area	3.62.0 Ha	
Mine Location on WGS 1984 datum	**Latitude**	**Longitude**
	10°52'03.05''N to 10°52'13.95''N	76°57'21.81''E to 76°57'27.87''E

1.7 LOCATION OF THE PROJECT

The proposed mine is in Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu. The nearest railway station is Madukkarai -4.0km – Northwest. The Nearest National Highway (NH - 544) Coimbatore – Palakkad road is situated about 3.0km on the Northern side of the lease applied area. The State Highway (SH-26) K.G.Chavadi – Velanthavalam Road is about 6.0km on the Northwestern side of the lease applied area. The area is included in Survey of India Toposheet No. 58 - B/13 on R.F. 1:50,000. The location map of the project site is presented in **Figure:1.2**. Topographical map of study area of the project area (10 km radius) is shown in **Figure:1.7**. The environmental setting

and the project details is presented in **Table-1.8.** Photographs of the Rough stone Mine are given in **Figure: 1.6**. There is no critically polluted identified cluster by CPCB/MOEF in the vicinity of the project.

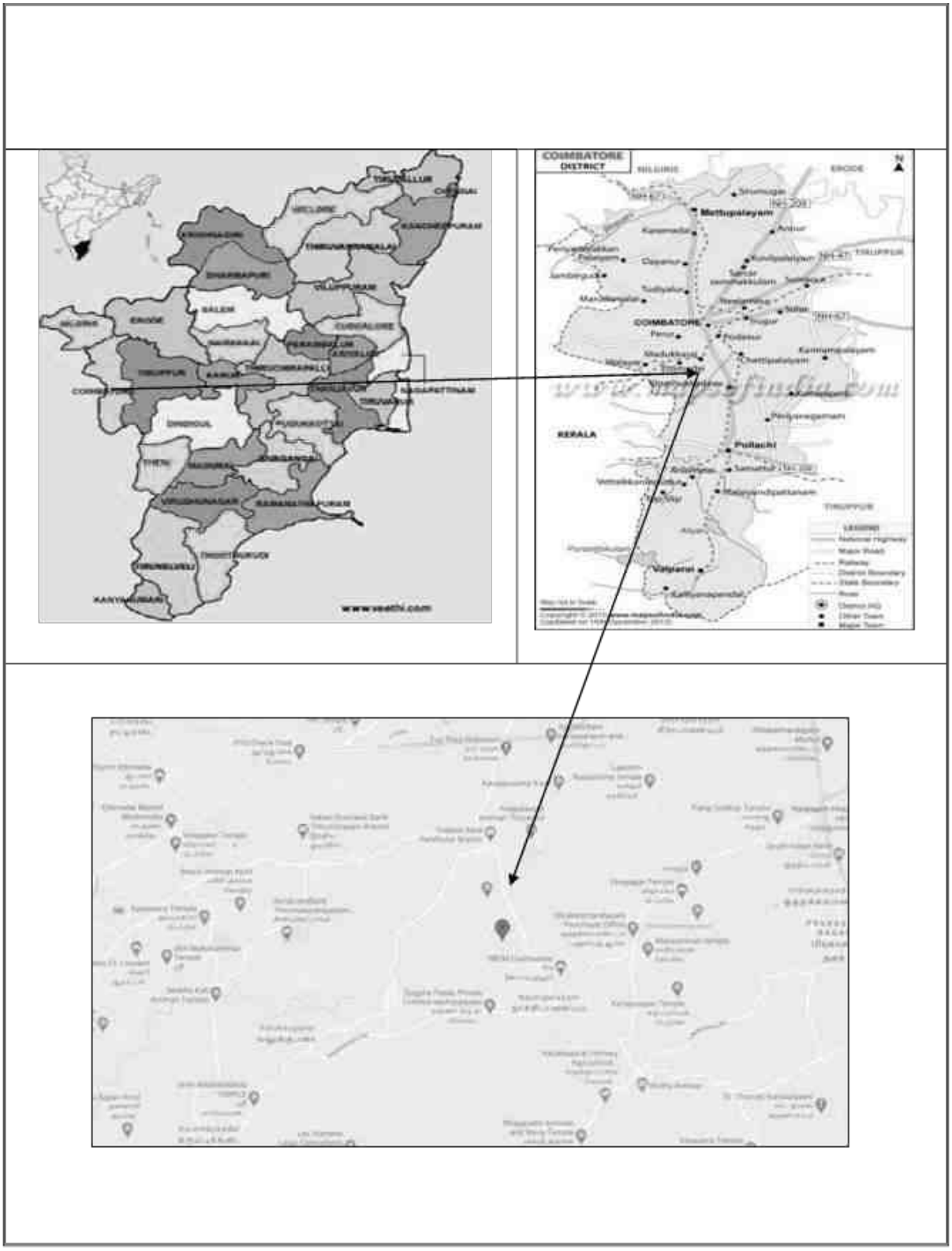


FIGURE 1.2: LOCATION MAP

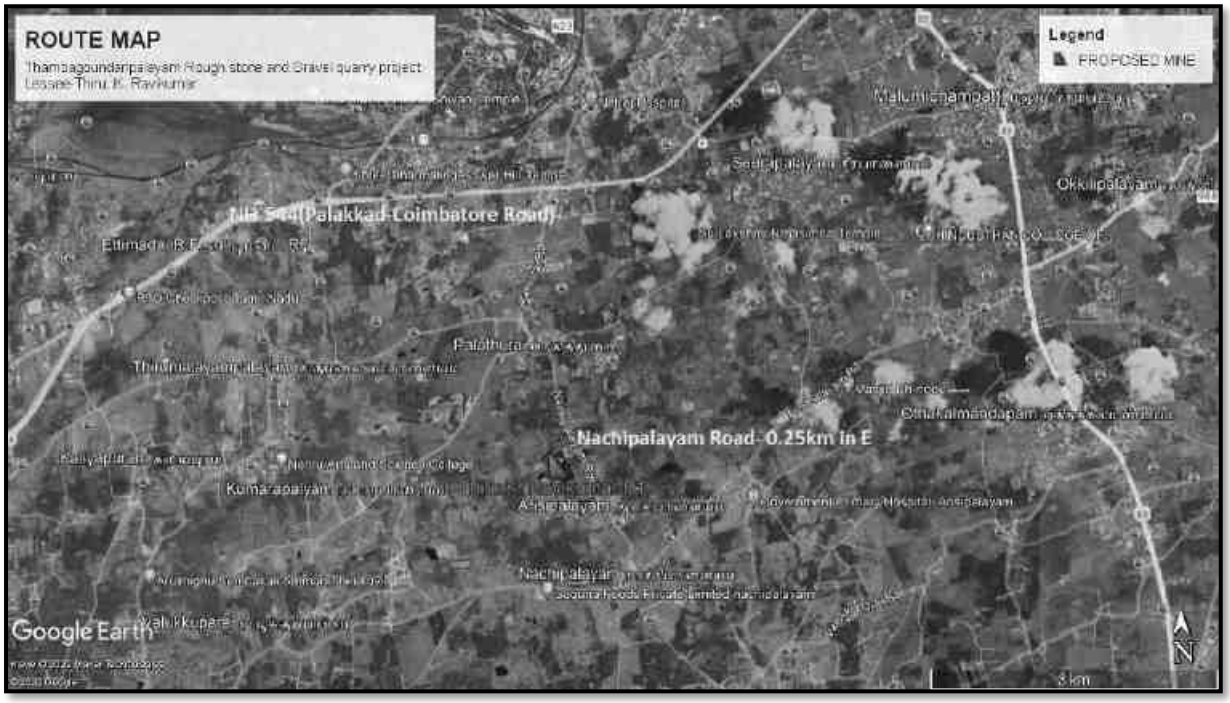


FIGURE 1.3: ROUTE CONNECTIVITY MAP

FIGURE 1.4: MINE LOCATION ON WGS 84 DATUM

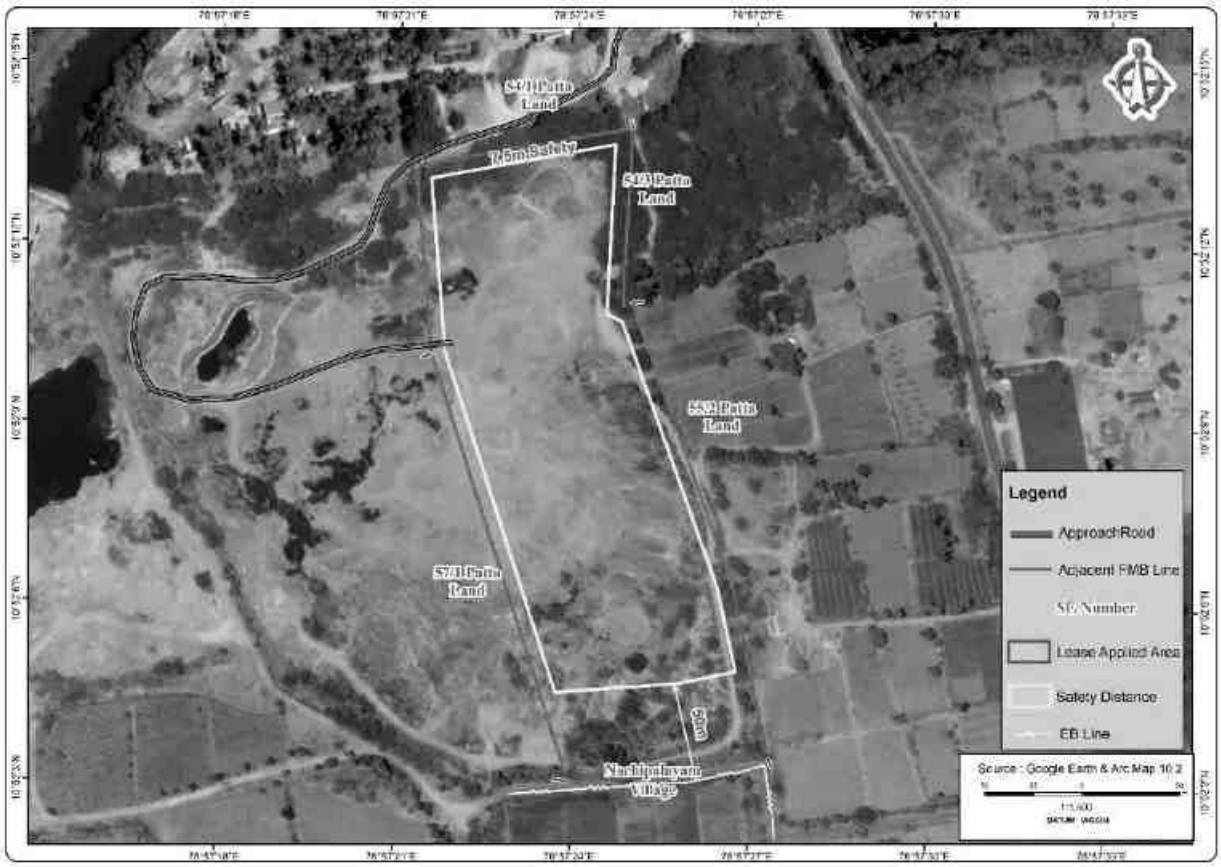


FIGURE 1.5: LEASE BOUNDARY

FIGURE 1.6: PHOTOGRAPHS OF MINE

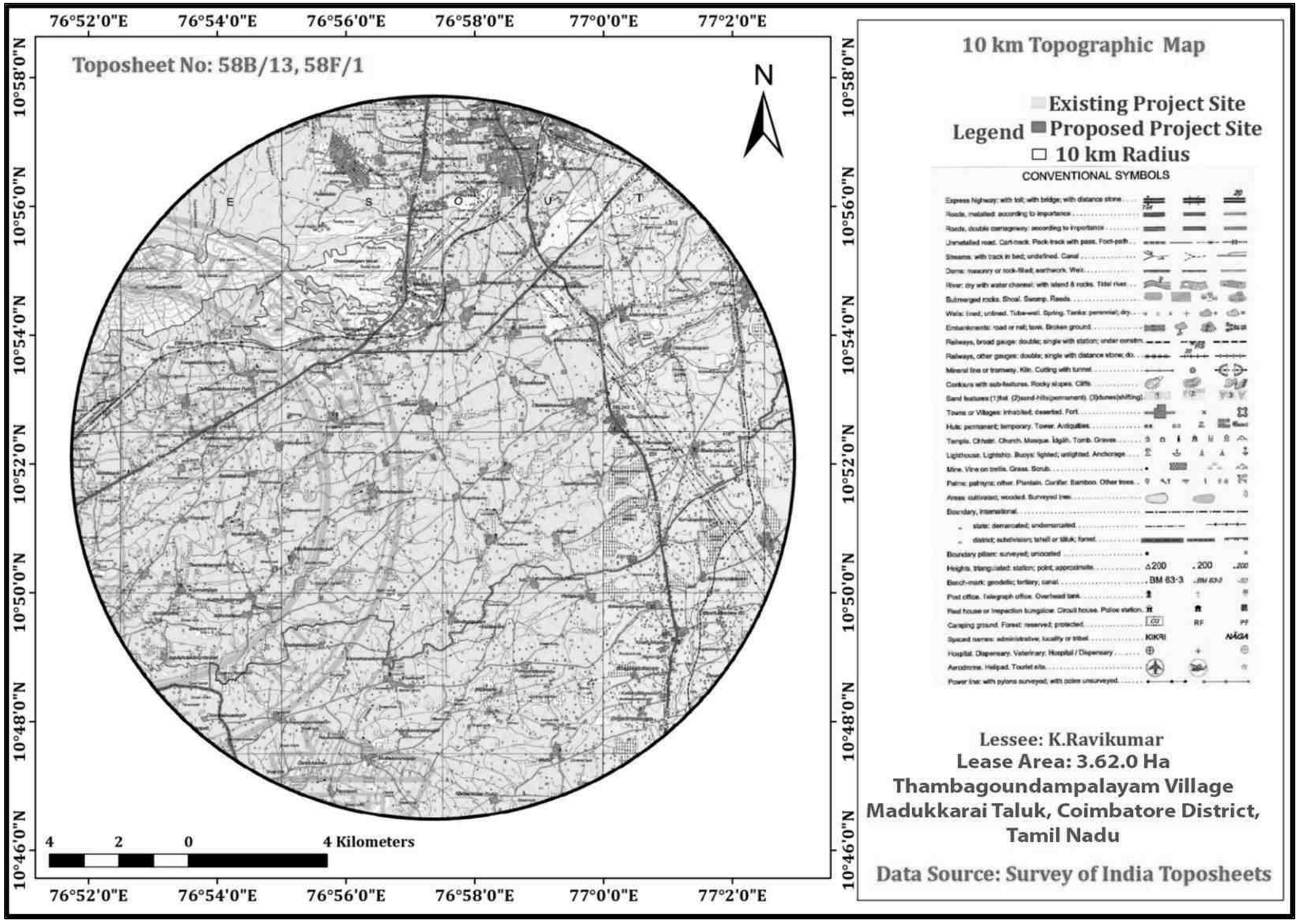


FIGURE 1.7: TOPOGRAPHICAL MAP OF STUDY AREA (10 KM RADIUS)

TABLE 1.7: PROJECT DETAILS

S. No.	Particulars	Details		
1.	Type of Project	Thambagoundanpalayam Rough stone and Gravel quarry project		
2.	Mine area applied	3.62.0 Ha		
3.	Project Location	S.F.No. 54/2, 55/1 & 57/2 Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu.		
4.	Mine Location on WGS 1984 datum	**Latitude**	**Longitude**	
		10°52'03.05''N to 10°52'13.95''N	76°57'21.81''E to 76°57'27.87''E	
5.	Topo sheet Number	58 - B/13		
6.	Land use at the proposed project site	Non-Forest Land / Patta Land Land Cover: Barren Land which is not fit for vegetation/cultivation		
7.	Site Topography	Flat terrain topography, the area has gentle sloping toward western side		
8.	Site elevation above Mean Sea Level	309 m (Max)		
9.	Reserves	**Description**	**Rough stone**	**Gravel in m^3**
		Geological Reserves	8,26,240 m^3	40,170 m^3
		Mineable	2,73,335 m^3	21,528 m^3
		Five years plan period As in the approved mining plan	2,73,335 m^3	21,528 m^3
10.	Lease period	5 years		
11.	Proposed depth of Mining	42 m		
12.	Existing Pit Dimension	224m (L) x 97m (W) x 32m (D) AGL		
13.	Ultimate Pit Dimension	269 m (L) x 101m (W) x 42m (D) BGL		
	Land Use Pattern	**Description**	**Percentage**	
		Quarry pits/Crusher	06%	
		Trees	27%	
		Seasonal Agri Land	32%	
		Roads	05%	
		Habitation	06%	

<table>
<tr><th>S. No.</th><th>Particulars</th><th colspan="2">Details</th></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>Barren land</td><td>24%</td></tr>
<tr><td>14.</td><td>Climatic Conditions</td><td colspan="2">IMD Data, Coimbatore (1971-2000)
• Rainfall - 689mm/annum
• Temperature - 42ºC - 21ºC</td></tr>
<tr><td>15.</td><td>Ground water level</td><td colspan="2">The Ground water is about 58 to 62 m depth from ground level.</td></tr>
<tr><td>16.</td><td>Seismic zone</td><td colspan="2">Seismically, this area is categorized under Zone-III as per IS-1893 (Part-1)-2002. Hence, seismically the site is High Damage Risk Zone. With MSK scale of VII.</td></tr>
<tr><td>17.</td><td>Nearest State/National Highway</td><td colspan="2">The Nearest National Highway (NH -544) Coimbatore – Palakkad road is situated about 3.0km on the Northern side of the lease applied area.
The State Highway (SH-26) K.G.Chavadi – Velanthavalam Road is about 6.0km on the North-western side of the lease applied area.</td></tr>
<tr><td>18.</td><td>Nearest Railway Station</td><td colspan="2">Madukkarai -4.0km – Northwest</td></tr>
<tr><td>19.</td><td>Nearest Air Port</td><td colspan="2">Coimbatore Airport – 21km – Northeast</td></tr>
<tr><td>20.</td><td>Nearest village/major town</td><td colspan="2">Thambagoundanpalayam :1.0Km - Southeast</td></tr>
<tr><td>21.</td><td>Nearest Town, city, District Headquarters along with distance in kms.</td><td colspan="2">Coimbatore : 16.18 Km, North Direction
Madukkarai : 4.0 Km, N Direction</td></tr>
<tr><td>22.</td><td>Ecologically sensitive zone</td><td colspan="2">No wildlife sanctuary, national park or biosphere reserve within 10m radius of mine lease area.</td></tr>
<tr><td>23.</td><td>Reserved/Protected forests</td><td colspan="2">No wildlife sanctuary, national park or biosphere reserve within 10m radius of mine lease area.</td></tr>
<tr><td>24.</td><td>Historical/tourist places</td><td colspan="2">None within 300m radius of mine lease area</td></tr>
<tr><td>25.</td><td>Water bodies within 10 Km Radius</td><td colspan="2"><table><tr><th>Water bodies</th><th>Distance (Km)</th><th>Direction</th></tr><tr><td>Kumittipathi River</td><td>0.130</td><td>N</td></tr><tr><td>Canal</td><td>1.80</td><td>SE</td></tr><tr><td>Odai</td><td>4.6</td><td>NW</td></tr></table></td></tr>
</table>

S. No.	Particulars	Details		
26.	Reserve Forest within 10Km Radius	**Reserve Forest**	**Distance (Km)**	**Direction**
		Ettimadai R.F	**4.5**	**NW**
27.	Nearest Hospital	Madukkarai -5.0km – Northwest		
28.	Details of other quarries for a radius of 500m around the quarry site	There are following quarries located within the radius of 500m from the proposed project site. Details: Abandoned quarry – Nil Expired quarry – Nil Existing Quarry – 1Nos (3.15.5Ha) Proposed quarry – 2Nos (6.21.0Ha) The total extent of the Existing and proposed quarry within the radius of 500m is **9.36.5Ha.** The project falls under the cluster situation.		
29.	Man power	Total Employees proposed for the quarry operation is **31 Nos.**		
30.	Water requirement & source	Total water requirement for **3.0 KLD** from water vendors & nearby Bore well.		
31.	Overburden /Waste	The overburden in the form of Gravel formation		
32.	Cost of the project	Project cost = Rs. 86,14,000/- EMP Cost = Rs. 160,00,000/-		

1.8 SUPPLY AND DEMAND DETAILS

There is a huge demand of rough stone for State and National Road projects is under massive development for its widening and strengthening operation, apart from this many bridges and fly overs are also being under construction. And, huge requirements of rough stone for Public and Private sector projects to infrastructure development of the state; hence the project is significant to the state.

Railway lines in the country also under progress where huge rough stone is required as Ballast. Other internal Panchayat Roads are also under progress, besides all these public works projects the rough stone is widely used for domestic construction project like Hospital, School, Gov Coimbatore District.

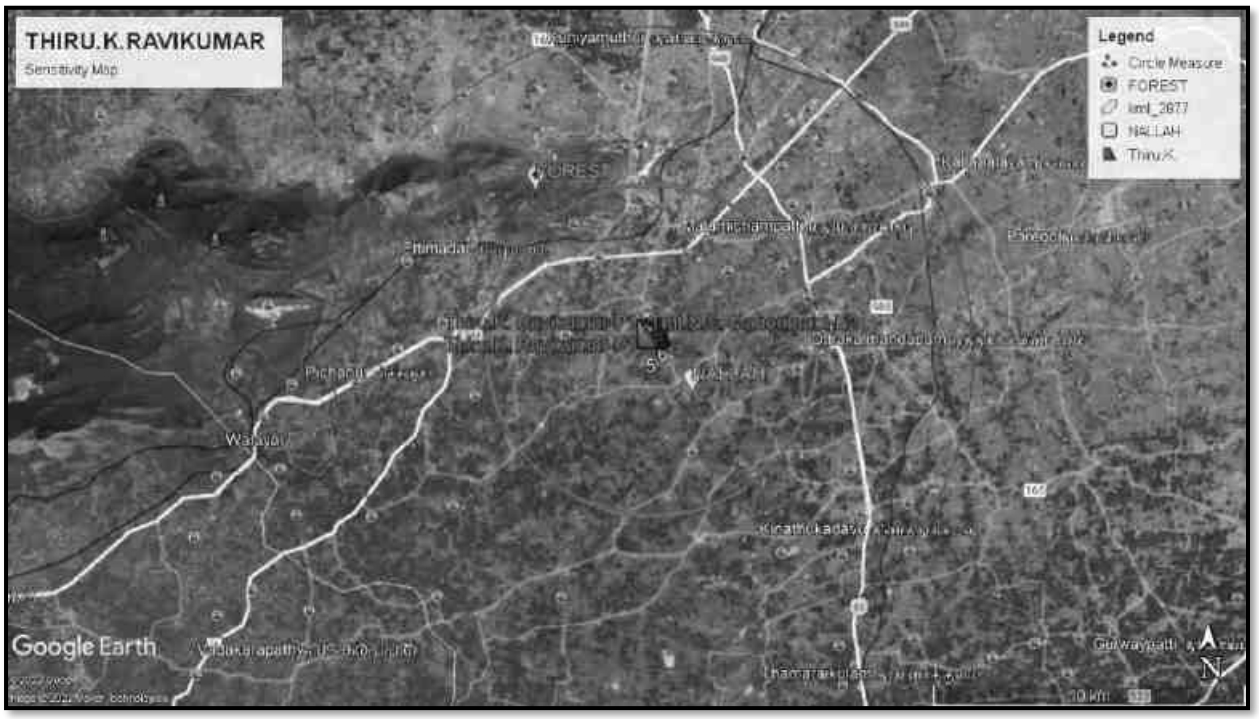


FIGURE 1.8: ENVIRONMENTAL SENSITIVITY MAP

1.9 SCOPE OF THE STUDY

The EIA study includes detailed characterization of various environmental components like Air, Noise, Water, Soil, Land and Socio-economics within 10 km radius around the study area. The SEAC, Tamil Nadu committee suggested us to focus on baseline data which includes Hydrology study, Ground water study, Biodiversity assessment and land use cover within in the 10km radius around the mining lease area. The EIA is done based on collection of one season data (From October -2021 to December - 2021).

1.10 DATA GENERATION

The data has been generated by Enviro Tech Services, Ghaziabad (U.P) in accordance with the requirement of statutory agencies from October -2021 to December - 2021. The monitoring and testing have been done as per the guidelines of MoEF&CC and the IS standards.

1.11 DATA COLLECTION

The EIA study is being done for the Mine Lease (core zone) and area within 10 km radius (buffer zone), both of which comprise the study area. The following data has been collected by Enviro Resources through field survey and other sources for preparing the EIA/EMP for the mining project.

- Details of wild fauna and flora within 10 km from the project site and information about forests, if any.

- Eco-sensitive places, sanctuaries, biosphere reserves within 10 km radius.
- Physical environment (Air, Water, Soil, & noise) baseline data.
- Religious places / historical monuments and tourist places within 10 km radius.
- Land use pattern within core zone and buffer zone (10 km radius around the core zone) based on Survey of India toposheet map and satellite image.
- Demography and Socio-economic based on last available Census data for entire study area.
- Relevant meteorological data, for previous decades from Indian Meteorological Department (IMD) and primary data.
- Study of present environmental protection and mitigation measures in nearby operating similar projects if any.
- Identification of water bodies, hills, roads etc. within 10 km radius.

1.12 GENERIC STRUCTURE OF ENVIRONMENTAL IMPACT ASSESSMENT DOCUMENT

As per EIA notification of the MoEF dated 14th September 2006 as amended Dec 2009, the generic structure of the EIA document will be as under:

- Introduction
- Project Description
- Analysis of Alternatives (Technology and site)
- Description of the Environment
- Anticipated Environmental Impact & Mitigation Measures
- Environmental Monitoring Programme
- Additional Studies
- Project Benefits
- Environmental Cost Benefit Analysis
- Environmental Management Plan
- Summary & Conclusion
- Disclosure of Consultants engaged

1.13 PREPARATION OF EIA/EMP

The EMP will include the following details:

- Present Environmental Setting.
- Identification, prediction, and evaluation of anticipated environmental impact due to the proposed mine and related facilities.
- The environmental impacts would be anticipated in core and buffer zone.
- Sensitive Places/Historical Monuments.
- Measures to control the surface and ground water pollution due to various effluents to be discharged, if any.
- Measures to control air pollution due to proposed activities/operation.
- Green belt development plan and reclamation plan of mine.

- Measures to contain noise pollution & mitigate adverse impact on workers and habitat in core and buffer zone.
- Pronounce the improvement in socio-economic conditions & benefits the people will get on implementation of the project.
- Total and specific cost of control measures.
- Environmental monitoring, implementation organization and feedback mechanism to effect mid-course corrections.
- Identification of flora species which can be planted in and around the project.

The field studies for baseline environmental studies were conducted for a period of three months representing to determine existing levels of various environmental attributes as outlined in **Table 1.8**. The scope also includes all the conditions outlined in the ToR's prescribed.

TABLE 1.8: ENVIRONMENTAL ATTRIBUTES AND FREQUENCY OF MONITORING

S. No.	Attributes	Parameters	Frequency
1	Ambient Air Quality	PM_{10}, SO_2, NO_X, & mineralogical composition of PM_{10}, particularly for free silica	24 hourly samples, twice a week for three months at 7 locations.
2	Meteorology	Wind speed, Wind direction, Temperature, Relative humidity and Rainfall	Continuous hourly recording (one season) at project site. Secondary data from the nearest IMD station.
3	Water quality	Physical and Chemical parameters.	Grab samples collected once during study period from 5 ground water locations.
4	Soil Quality	Physical and Chemical parameters.	Grab samples collected once during study period from 6 locations.
5	Ecology	• Existing terrestrial flora and fauna covering Core Zone (3.62.0 Ha) & Buffer Zone (10-Km radius). • Existing aquatic ecological status in Buffer Zone (10-Km radius).	Through field studies once during study period. Secondary data also collected.

S. No.	Attributes	Parameters	Frequency
6	Noise levels	Noise levels in dB (A) Day and Night.	Hourly Noise levels in and around the project area for 24 hours at each location once during study period at 7 locations.
7	Land use	Current land use scenario	Once during study period based on recent satellite imagery and ground-truthing at site.
8	Geology	Geological details	Once during study period. Data collected from secondary sources
9	Hydrogeology	Drainage area and pattern, nature of streams, aquifer characteristics, recharge and discharge areas, etc.	Based on primary and secondary sources, once during study period.
10	Socio-Economic aspects	Socio-economic aspects like demography, population dynamics, infrastructure resources, health status, economic resources, etc.	From primary and secondary sources (like census abstracts of census of India 2011) once during the study period.

1.14 TERMS OF REFERENCE

The EIA/EMP report is prepared for rough stone cluster Mine; which is classified as **"Category B"** by Ministry of Environment, Forest & Climate Change (MoEF & CC), New Delhi, as per the EIA notification dated on 14th September, 2006 and as the lease area is less than 100 Ha vide amended EIA Notification dated 14.08.2018. The project falls in B1 category vide OM No F. NO. L-11011/175/ 2018-IA-II (M) dated 12th December 2018 as per order dated 4th September 2018 and 13th September 2018 passed by Ho'ble NGT, New Delhi in O.A. NO. 173 of 2018 and O.A. NO. 186 of 2016.

The draft report is prepared incorporating the Terms of Reference (ToR's) granted by SEIAA, Tamil Nadu to prepare the Environmental Impact Assessment and Environmental Management Plan vide its letter No. SEIAA-TN/F.No.9047/SEAC/ToR-1164/2022, dated 06.06.2022.

CHAPTER 2: PROJECT DESCRIPTION

2.1 TYPE OF PROJECT

Lessee has applied for TOR to prepare EIA report for grant of Environmental Clearance for Rough stone Mine of area 3.62.0 Ha, with cluster area 9.36.5 Ha, located in S.F.No. 54/2, 55/1 & 57/2 Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu. Since the cluster extent is more than 5 ha, the proposal falls under B1 Category as per the 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, and requirement for EIA, EMP and Public Consultation for obtaining Environmental Clearance. Rough Stone is proposed to be excavated by opencast mechanized method involving splitting of rock mass of considerable volume from the parent rock mass by jackhammer drilling and blasting, hydraulic excavators are used for loading the Rough Stone from pithead to the needy crushers and rock breakers to avoid secondary blasting.

2.2 NEED FOR THE POJECT

The basic objective of the project is to have effective utilization of rough stone as a building material in this region and state. The spur in infrastructure development and construction industry has enhanced the demand of rough stone in past few years. Building stone, mine not only provides the building material but also employment and economic growth of the region that ultimately enhance the socio-economic status of the people of the region and the state. The mining activities shall provide socio-economic benefits to the local population with direct & indirect employment opportunities. The project also contributes to the regional and financial benefits in the form of Royalty, Cess, Taxes, DMF etc.

2.3 LOCATION

TABLE 2.1: LOCATION DETAILS

1	S.F. No.	S.F.No. 54/2, 55/1 & 57/2	
2	Village	Thambagoundanpalayam Village,	
3	Taluka and District	Madukkarai Taluk, Coimbatore District	
4	State	Tamil Nadu	
5	Toposheet No.	58 - B/13	
6	Latitude & Longitude	**Latitude**	**Longitude**
		10°52'03.05''N to 10°52'13.95''N	76°57'21.81''E to 76°57'27.87''E

The proposed area does not fall within 10 km radius of any eco – sensitive zone, Wild life Sanctuary, National Park, Tiger Reserve, Elephant Corridor and Biosphere Reserves.

2.4 REQUIREMENTS FOR THE PROJECT

2.4.1 Land Requirement

Lessee has obtained Letter of Intent by District Collector, Coimbatore district for rough stone mine for a lease area 3.62.0 Ha located at Survey Nos. 54/2, 55/1 & 57/2 in Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu. The LOI is provided for lease period of 5 years.

2.4.2 Water Requirement

Total water requirement for the project will be **3.0 KLD**, which will be met from mine pit water (when available) and by tankers from nearby bore wells**.** Water for drinking purposes will be supplied from nearby borewell. Details of water requirement in the project are presented in **Table 2.2**. Water balance diagram for the proposed mine is given in **Figure 2.1**

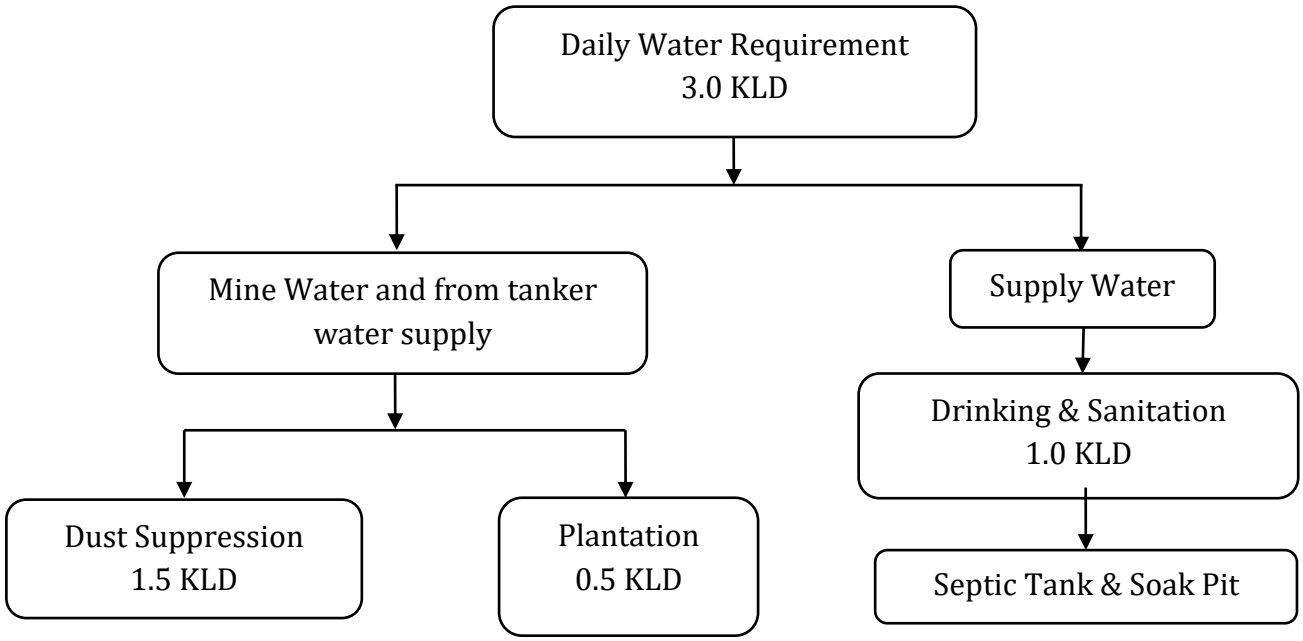


FIGURE 2.1: WATER BALANCE DIAGRAM

TABLE 2.2: DAILY WATER REQUIREMENT (KLD)

Particulars	Source	Quantity
Dust Suppression	From Existing bore wells from nearby area/Rain water harvesting pits	1.5
Green Belt & Plantation	From Existing bore wells from nearby area / Rain water harvesting pits	0.5
Domestic Use	From Existing, bore wells and drinking water will be sourced from Approved Water vendors.	1.0
	Total	**3.0**

2.4.3 Man Power Requirement

The mine will provide employment for activities such as excavation, transportation etc. The list of proposed manpower for rough stone mine is shown in **Table-2.3.**

TABLE 2.3: REQUIREMENT OF MANPOWER

S.No	Particulars	Nos
Mine Official & Competent Person		
1.	Mine Foreman/ Manager	1
2.	Blaster/mate	1
Machinery Operators		
3.	Excavator- Operator	2
4.	Jack hammer operator	14
5.	Tipper Driver	4
Ordinary Employee		
6.	Helper	2
7.	Cleaner & Co-Operator	6
8.	Security	1
Total		**31**

(Source: Approved Mining Plan)

2.4.4 Power Requirement

Most of the mine machinery will be operated on diesel and thus, no major electrical power will be required for mining. The proposed rough stone mine does not require any power supply for the Mining operation. Lightings on the Night will be taken from nearby electric poles after obtaining permission from concerned authorities. It is proposed to operate in day time only from 9 Am to 5 PM with 1 Hour lunch interval between 1PM to 2PM.

2.4.5 Diesel Requirement

Diesel (HSD) used for quarrying machineries will be around **2,22,262 Litres** of HSD for the entire project life. Diesel will be brought from nearby diesel pumps.

1. <u>For Gravel:</u>

Per hour Excavator will consume = 10 liters / hour
Per hour Excavator will excavate = 60$m^3$of Gravel
For = 21528/60 = 359 hours
Diesel consume working days = 359 hours x 10 litres
Total diesel consumption = 3590 Litres of HSD will be utilized for Gravel

2. **<u>For Rough Stone</u>**:

Per hour Excavator will consume	=	16 liters / hour
Per hour Excavator will excavate	=	20m^3 of Rough stone
For	=	273335/20 = 13667 hours
Diesel consume working hours	=	13667 hours x 16 litres

Total diesel consumption= 2,18,672 Litres of HSD will be utilized for Rough stone
Total diesel consumption= 2,22,262 Litres of HSD will be utilized for entire life.

2.4.6 Extent of Mechanization

Since the deposit in this area is massive in nature, it is proposed to carry out opencast mining for this plan period. The lists of machines to be used in the mine are given in **Table 2.4.** Mostly hired equipment's are utilized.

TABLE 2.4: LIST OF MACHINERY

S.No	Particulars	Size capacity	Motive Power	Nos
1.	Jack hammer (30-35mm dia hole)	1.2m to 2.0m	Compressed air	7
2.	Compressor	400 psi	Diesel drive	2
3.	Excavator with Bucket and Rock Breaker	300	Diesel drive	2
4.	Tippers	20 tonnes	Diesel drive	4

(Source: Approved Mining Plan)

2.4.7 Lorry Load Calculation

One lorry load	= 6m^3 (approx..)
Total No of working days	= 300 days per year
Total quantity to be removed in this five years plan period	= 2,73,335 m^3
Hence total lorry loads per day	= 2,73,335 m^3 / 6m^3
	= 45,556 Lorry loads
	= 45,556 / 5 years
	= 9111 / 300 days
Rough stone	**= 30 Lorry loads per day**
Total quantity to be removed in this five years plan period	= 21,528 m^3 Gravel
Hence total lorry loads per day	= 21,528 m^3 / 6m^3
	= 3,588 Lorry loads
	= 3,588 / 3 years
	= 1196 / 300 days
Gravel load per day	= 4 Lorry loads per day

2.5 PROJECT COST

The estimated cost of the proposed rough stone quarry is 86,14,000 proposed is given below in **Table. 2.5**

TABLE 2.5: ESTIMATION OF PROJECT COST

Description	Project
Project cost/ Investment	
Land cost	Rs.46,06,000/-
Machinery cost	Rs.30,00,000/-
Refilling/Fencing cost	Rs.1,95,000/-
Labourers shed	Rs. 2,00,000/-
Sanitary facility	Rs. 80,000/-
Others items (First aid room & accessories)	Rs. 40,000/-
Drinking water facility for the labourers	Rs.1,00,000/-
Sanitary arrangement	Rs. 50,000/-
Safety kit	Rs.40,000/-
Water sprinkling	Rs.1,00,000/-
Garland drain construction	Rs. 1,53,000/-
Greenbelt	Rs. 50,000/-
A. Total Project cost	**Rs. 86,14,000/-**

2.6 MAINTENANCE REQUIREMENT

Regularly maintenance will be carried out of all equipment's at service centers located in nearby Town. The proposed method of mining operation will be Open Pit Mine by using by deploying drilling and blasting method, loader and tipper/dumper combination. The machineries to be deployed are excavators, Water Tanker loading and transportation from mine head to destination will be done by hired tipper/dumper.

2.7 GEOLOGY OF THE AREA

2.7.1 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 $N30^0E$ – $S30^0W$ with dipping towards $SE60^0$. The general geological sequences of the rocks in this area are given below:

Regional stratigraphic sequence:

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

2.7.2 Local 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 is N30°E – S30°W with dipping towards SE60°.The area has gentle sloping towards western side. The maximum altitude of the area is 302m (max) above Mean Sea level. The area is covered by top soil which is maximum thickness of 1m depth. Massive Charnockite is found after 1m (top soil formation) which is clearly inferred from the existing quarry pits in the cluster. The Geological map is presented in **Figure 2.2.**

2.8 GEOMORPHOLOGY

Coimbatore district forms part of the upland plateau region of Tamil Nadu with many hill ranges, hillocks and undulating topography with a gentle slope towards east except for the hilly terrain in the west. The undulating topography with innumerable depressions, are used as tanks for storage of rainwater for agriculture.

The prominent geomorphic units identified in the district through interpretation of Satellite imagery are 1) Structural hills, 2) Ridges, 3) Inselbergs, 4) Bazada, 5) Valley fill, 6) Pediment, 7) Shallow Pediments and 8) Deep Pediments.

The Nilgiris on the northwest and Anamalai on the south are the important ranges, which attain a heights of over 2513m above mean sea level (MSL) and the highest elevation in the valleys adjoining the hills is 600 M above MSL. The 'Palghat Gap', which is an east-west trending mountain pass, is an important physiographic feature is in the western part of the district. **(Source: http://cgwb.gov.in/District_Profile/TamilNadu/Coimbatore.pdf)**

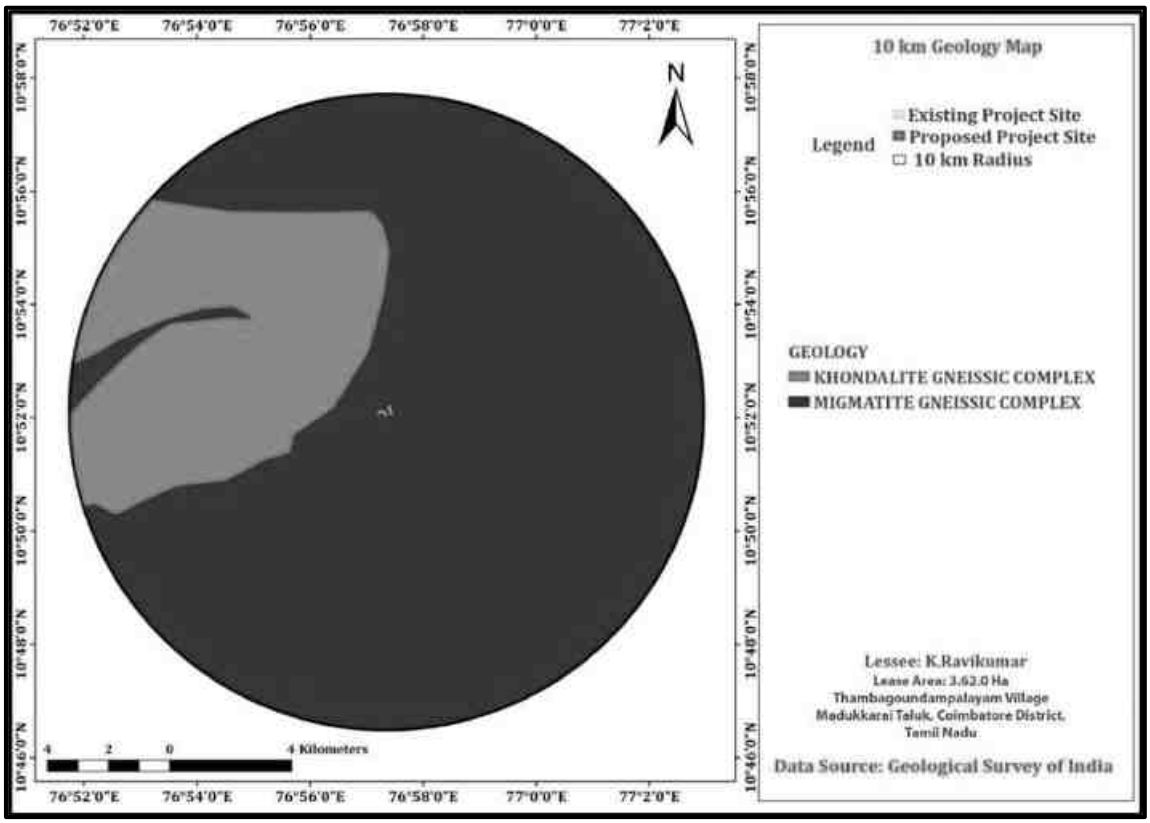


FIGURE 2.2: GEOLOGICAL OF STUDY AREA

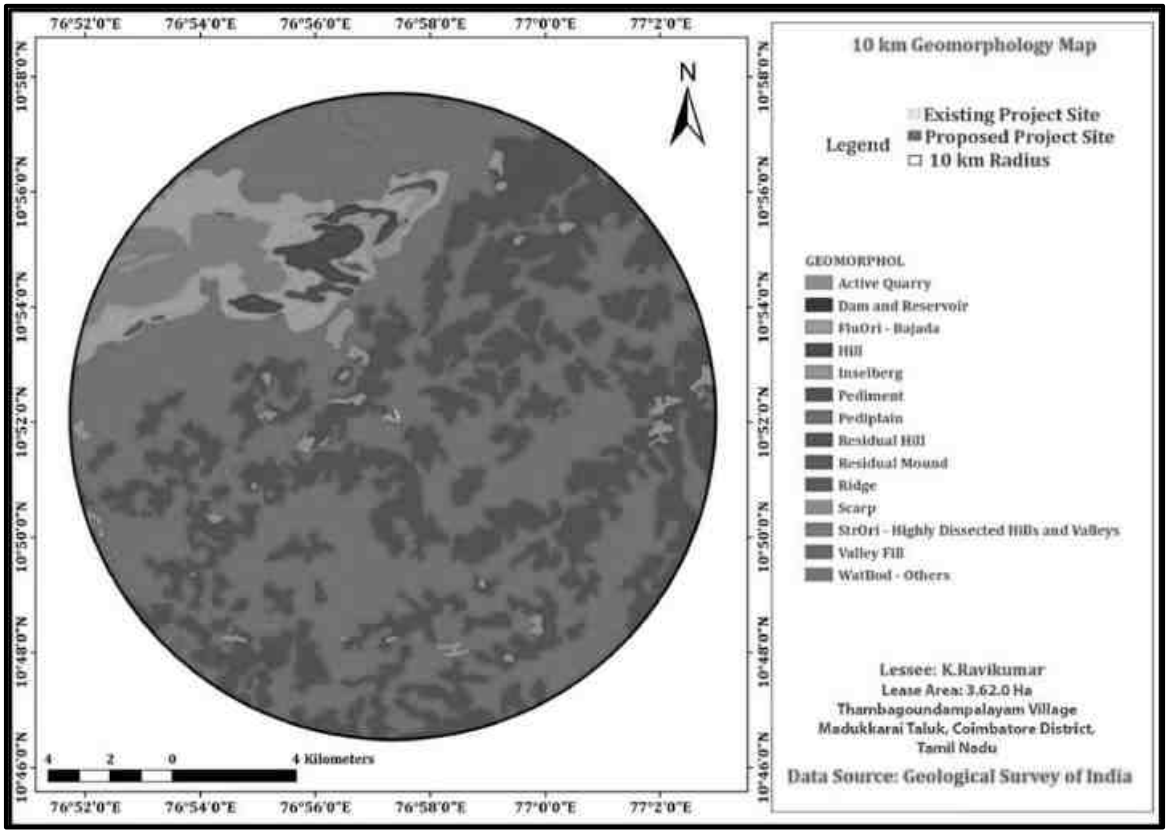


FIGURE 2.3: GEOMORPHOLOGY OF STUDY AREA

2.9 LITHOLOGY

The subsurface order of existence of different geological stratum in a particular locality is described with the term called as lithology. The study area is mostly covered with Hornblende Biotite Gneiss followed by Garnet Sillimanite Gneiss while small patches of Pink Megmatite, Pyroxene Granulite and quartzite are observed in patches. Small patch of Calac Granulite with limestone is also observed.

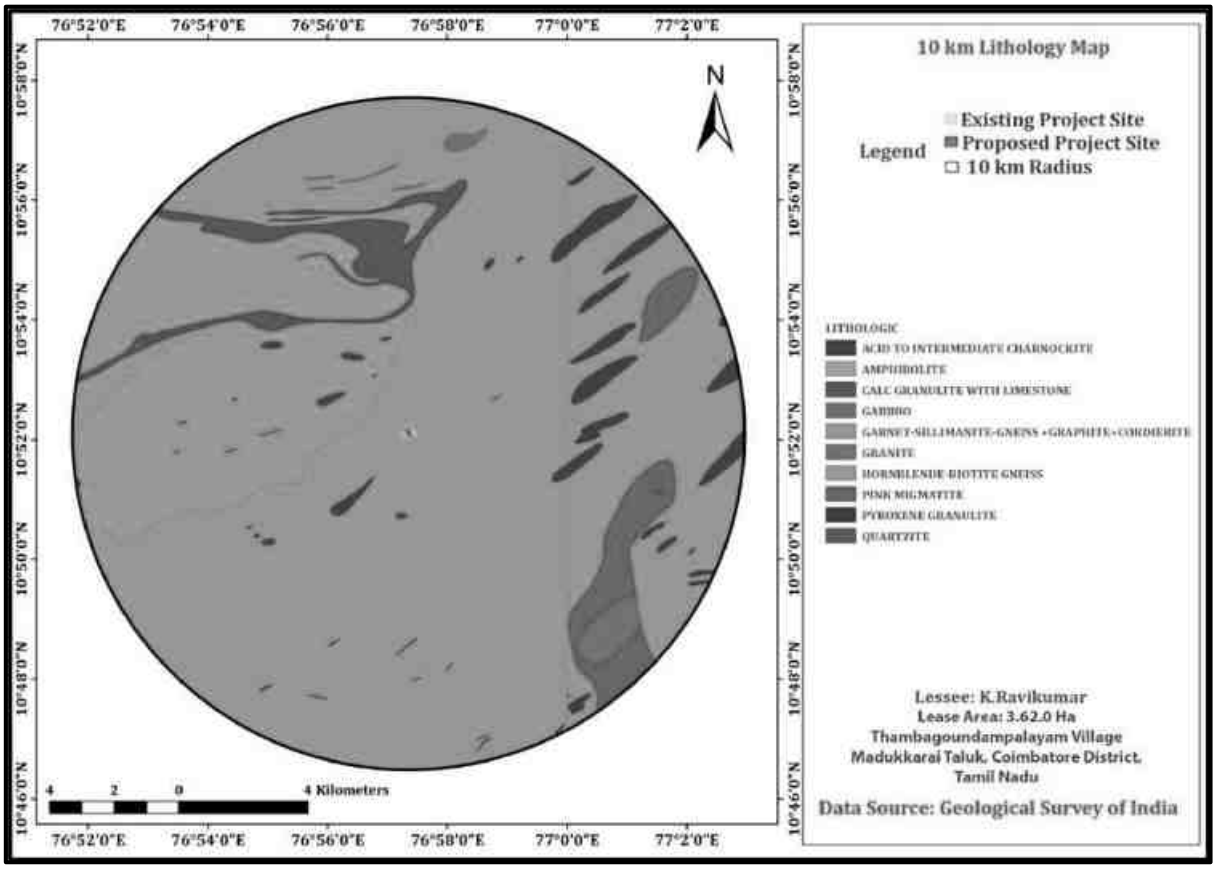


FIGURE 2.4: LITHOLOGY OF STUDY AREA

2.10 PHYSIOGRAPHY AND DRAINAGE PATTERN

The Bhavani river which has its origin in the silent valley ranges in Kerala state and enters in to Coimbatore district about 25 km west of Mettupalayam and flows in a northeast direction. The river drains an area of 1056 Sq.km with in this district.

The Noyil River has its origin in the Boluvampatty valley of the Vellingiri hills and comes to be called the Swami Mudiyar. Further south it is joined by the Periyar and Chinnar. The Amaravathi River rises in the Anjanad valley in the Kerala state between the Anamalai hills and the plains and flows in the northeastern direction. Amaravathi dam is located on this river.

The Palar, Aliyar and Upar which are the main steams of the river Ponnani are originating from the Anaimalai hills and flows in a north-northwest direction on the southern part of

the district, the Aliyar and Thirumoorthy dams are located on Aliyar and Palar respectively.

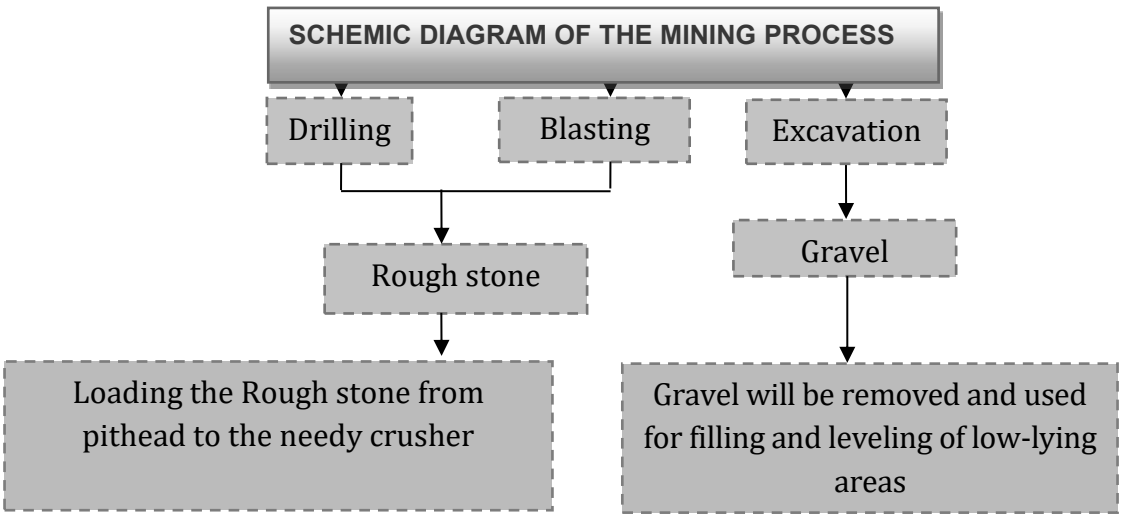
The Parambikulam and Sholaiyar streams, which are tributaries to the Periyar River has a southwesterly direction on the southwestern part of the district. Five surface reservoirs are located on this river, which form part of the Parambikulam Aliyar project.
Source: http://cgwb.gov.in/District_Profile/TamilNadu/Coimbatore.pdf

The lease applied area is exhibits elevated terrain. The area has gentle sloping towards western side. The maximum altitude of the area is 308m (max) above Mean Sea level. The area is covered by top soil which is maximum thickness of 1m depth. Massive Charnockite is found after 2m (top soil formation) which is clearly inferred from the existing quarry pits in the cluster.

The water table is found at a depth of 70m in summer and at 65m in rainy seasons. Average rainfall is about 989mm.

2.11 DETAILS OF MINING

The mine will be designed in such a way that the height of the bench is kept around 5m max and the width of benches will more than height, maintain a slope of 45° from the horizontal. Mining will be done with the help of drilling and blasting technique.



2.12 RESERVE ESTIMATION & LIFE OF THE MINE

2.12.1 Reserve Estimation

The estimation of ore reserves is made by conventional parallel cross section method using geological cross section. The geological cross sections are prepared across the

strike of the ore body. The area of individual litho units in each cross section is calculated separately. The volume between the cross section is arrived based on the average area of parallel cross section i.e. ((S1+S2)/2) and multiplying sectional interval. And tonnage is arrived at by multiplying by bulk density.

2.12.2 Geological Reserves

The geological cross sections are prepared across the strike of the ore body. The area of individual litho units in each cross section is calculated separately. Section wise sectional area is measured and multiplied by the influence to obtain the volume in m^3. The volume is multiplied by 2.5MT/m^3 (bulk density) to calculate the resource of Rough stone in MT. The total Geological resources are calculated after depletion of existing quarry pits. The total Geological reserves available in the mine lease area are given in **Table 2.6**.

TABLE 2.6: SUMMARY OF AVAILABLE GEOLOGICAL RESERVE

Section	Bench	Length (m)	Width Cm)	Depth Cm)	Geological Resources of Rough stone in (m^3)100%	Gravel (m^3)
XY-AB	I	15	107	2	-	3210
	II	15	107	5	8025	-
	III	15	107	5	8025	-
	IV	15	107	5	8025	-
	V	15	107	5	8025	-
	VI	15	107	5	8025	-
	VII	62	107	5	33170	
	VIII	62	107	5	33170	-
	IX	62	107	5	33170	-
	Total				**139635**	**3210**
XY-CD	I	173	11	2	-	3806
	II	173	11	5	9515	-
	III	173	11	5	9515	-
	IV	173	11	5	9515	-
	V	173	11	5	9515	-
	VI	173	11	5	9515	-
	VII	173	54	5	46710	-
	VIII	173	108	5	93420	-
	IX	173	108	5	93420	-
	Total				**281125**	**3806**
XY-EF	Dump	56	46	5	-	12880
	I	93	109	2	-	20274
	II	93	109	5	50685	-
	III	93	109	5	50685	-
	IV	93	109	5	50685	-

Section	Bench	Length (m)	Width Cm)	Depth Cm)	Geological Resources of Rough stone in (m^3)100%	Gravel (m^3)
	V	93	109	5	50685	-
	VI	93	109	5	50685	-
	VII	93	109	5	50685	-
	VIII	93	109	5	50685	-
	IX	93	109	5	50685	-
	Total				**405480**	**33154**
Grand Total					**826240**	**40170**

(Source: Approved Mining Plan)

Available Geological Resources of Top Soil : 40,170 m^3

Available Geological Resources of Rough stone : 8,26,240 m^3

2.12.3 Mineable Reserves

Mineable reserve is getting restricted due to the formation of benches, leaving the statutory safety distance in the inner boundary, mineral lock up in the benches itself, ultimate depth of mining, bench slope adopted etc. So, the mineable reserve is estimated after reducing the rough stone blocked in the safety distance, benches and existing pit. The Rough stone reserves are given below.

TABLE 2.7: SUMMARY OF MINEABLE RESERVE

Section	Bench	Length (m)	Width (m)	Depth (m)	Mineable Reserves of Rough stone in (m^3)100%	Gravel (m^3)
XY-AB	VII	43	85	5	18275	-
	VIII	38	75	5	14250	-
	IX	33	65	5	10725	-
	Total				**43250**	
XY-CD	VII	173	39	5	33735	-
	VIII	173	80	5	69200	-
	IX	173	70	5	60550	-
	Total				**163485**	
XY-EF	Dump	56	46	5	-	12880
	I	47	92	2	-	8648
	II	45	86	5	19350	-
	III	40	76	5	15200	-
	IV	35	66	5	11550	-
	V	30	56	5	8400	-

Section	Bench	Length (m)	Width (m)	Depth (m)	Mineable Reserves of Rough stone in (m^3)100%	Gravel (m^3)
	VI	25	46	5	5750	-
	VII	20	36	5	3600	-
	VIII	15	26	5	1950	-
	IX	10	16	5	800	-
	Total				**66600**	**21528**
Grand Total					**273335**	**21528**

(Source: Approved Mining Plan)

Total Mineable Recoverable Reserves of Rough stone @ 100% : 2,73,335 m^3

The mineable reserves have been computed as **2,73,335 m^3** of Rough Stone for five years at the rate of 100% recovery and **21,528 m^3** of Gravel upto a depth of 42m (2m Gravel + 40m Rough Stone) below from the general ground level.

2.12.4 Anticipated Life of The Mine

The estimated life of the proposed quarry is 5 years.

2.13 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 m 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 Regulation 106 (2) (b) of MMR-1961, under Mine Act – 1952.

Rough stone 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.

2.14 TOPSOIL, OVERBURDEN REMOVAL AND WASTEWATE

- **Topsoil / Waste**

There is no topsoil in this proposed site. The overburden is in the form of Gravel formation. The Gravel will be directly loaded into tippers for the filling and levelling of low-lying areas, this will be done only after obtaining permission and paying necessary seigniorage fee to the Government.

- **Overburden / Waste**

The no overburden generated during the mining plan period. Hence, there is no disposal of Top soil or waste. The excavated rough stone will be directly loaded into Tippers for the filling and levelling of low-lying areas. The excavated Rough Stone (100%) will be directly loaded into Tippers to the needy customers. There is no Waste anticipated during this plan period hence, disposal of waste does not arise.

- **Wastewater**

There will not be any process effluent generation from the quarry lease area. Domestic effluent from the mine office is discharged in septic tank and soak pit. There is no toxic effluent expected to generate in the form of solid liquid and gases and the no requirement of treatment of waste.

2.15 PRODUCTION DETAILS

Year wise Production of Rough stone from the area will be upto maximum capacity. The recovery factor is up to 100% hence no waste expected to be generated. All excavated quantity is saleable. The summary of proposed development and production during the mine plan period is given in **Table 2.8**. The Plan showing mine development during the plan period is given in **Figure 2.5.**

TABLE 2.8: YEAR- WISE DEVELOPMENT & PRODUCTION

Section	Year	Bench (m)	Length (m)	Width (m)	Depth (m)	Recoverable Reserve of Rough stone at 100% (m^3)	Gravel (m^3)
Dump	I	Dump	56	25	5	-	7000
XY-AB		VII	43	85	5	18275	-
XY-CD		VII	173	39	5	33735	-
		TOTAL				**52010**	**7000**
Dump	II	Dump	56	21	5	-	5880
XY-AB		VIII	38	75	5	14250	-

		IX	33	65	5	10725	-
XY-CD		VIII	73	80	5	29200	-
		TOTAL				**54175**	**5880**
XY-EF	III	I	47	92	2	-	8648
		II	45	86	5	19350	-
		III	40	76	5	15200	-
		IV	35	66	5	11550	-
		V	30	56	5	8400	-
		TOTAL				**54500**	**8648**
XY-EF	IV	VI	25	46	5	5750	-
		VII	20	36	5	3600	-
		VIII	15	26	5	1950	-
		IX	10	16	5	800	-
XY-CD		VIII	100	80	5	40000	-
		TOTAL				**52100**	**-**
XY-CD	V	IX	173	70	5	60550	-
		TOTAL				**60550**	**-**
		GRAND TOTAL				**273335**	**21528**

(Source: Approved Mining Plan)

Total Recoverable Reserves of Rough stone @ 100% : 2,73,335 m^3

Total Proposed Reserves of Gravel : 21528 m^3

The recoverable reserves have been computed as **2,73,335 m^3** of rough stone at the rate of 100% recovery for the period of five years upto a maximum depth of 42 m (2m Gravel + 40m Rough Stone) below ground level.

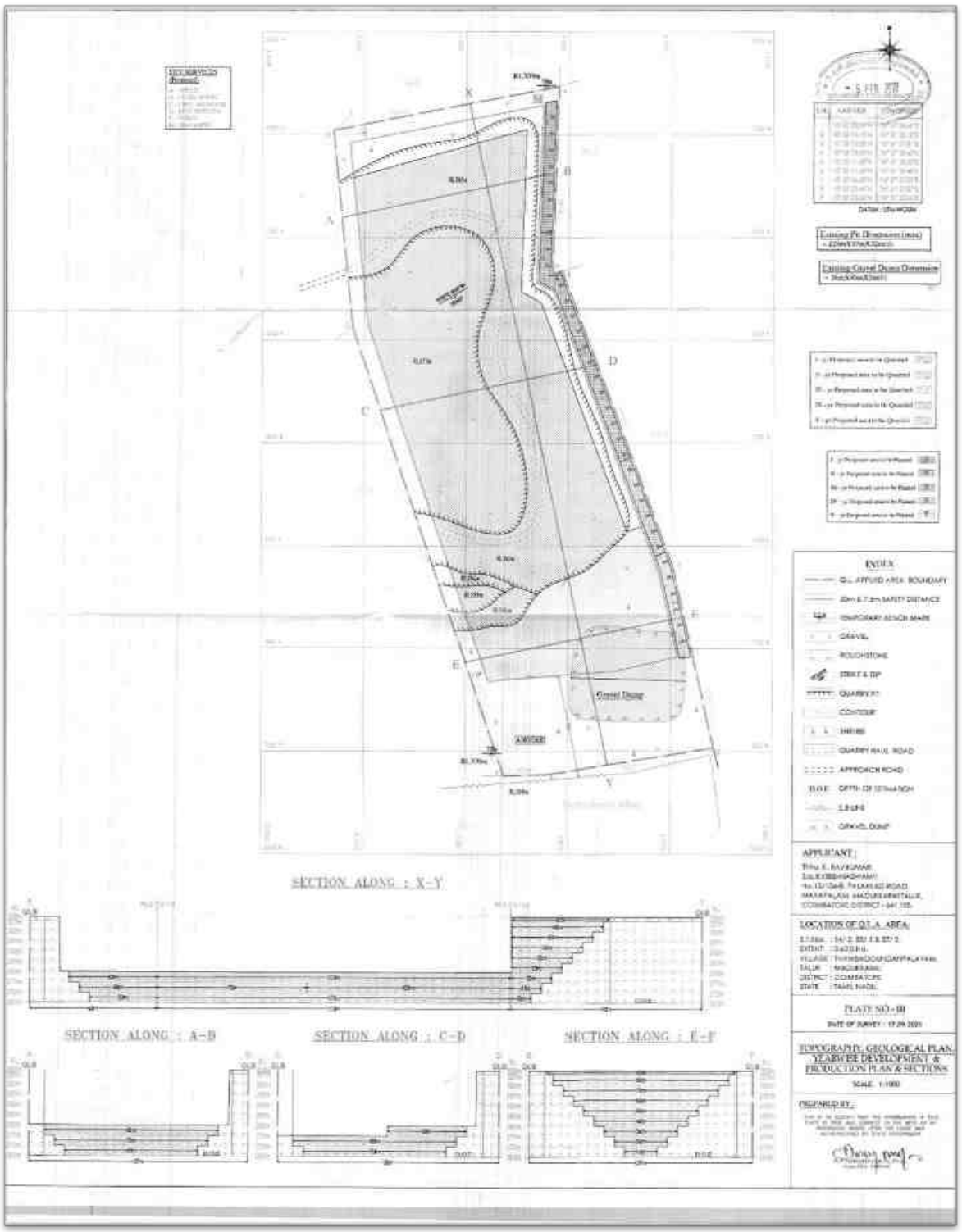


FIGURE 2.5: PRODUCTION AND DEVELOPMENT PLAN AND SECTION

2.16 DRILLING AND BLASTING PARAMETERS

Production from the fractured zone will be obtained with the help of excavator, whereas from compact zone the production will be obtained by drilling and blasting. Drilling will be done by jack hammer with the help of air compressor.

- Hole location will be properly dressed by excavator to remove the loose boulders for efficient drilling and for avoiding jamming of drilling hammer and bits.
- Drill holes of 32mm diameter and 1.5 m in depth will be made.
- To reduce the noise level the holes will be blasted by using nitrate mixture and Millisecond delay detonators.
- To maintain the bench height of 5m, sub bench of 2.5 m will be formed first, later on Two benches will be merged and one bench of 5m will be formed and maintained.
- The spacing and burden will be kept at 1.2 m and 1m respectively.
- About 30 to 50 holes will be blasted in one blast.
- Yield per hole will be 1.5 x 1 x 1=1.5m^3.

2.16.1 Blasting Pattern

The blasting pattern entirely depends about the joints present in the rocks. The drilling is done as per the requirement of the rock fragmentation with desired production of mineral.

TABLE 2.9: BLASTING PROGRAM FOR THE PRODUCTION PER DAY

Particulars	Qty
No. of holes	158
Pattern of hole	Zigzag- Multi-rows
Inclination of holes	80^0 from horizontal
Yield (Tons)	474
Powder factor (Tons/Kg of explosives)	6
Total explosive required (Kg-Slurry explosives)	79
Charge/hole (Kg)	0.5
Use of detonators	25millisecond relays
Detonating fuse	Detonating Cord

2.16.2 Frequency of Blasting

Blasting will be carried out only in Day time between 12.00 – 12.30P.M. whenever required.

2.16.3 Storages of Explosives

Licensed Portable explosive magazines will be utilized for storage of explosives. Blasting will be performed as per requirement on the face. The explosive will be handled by authorized blasting party himself and the blasting will be carried out by registered blasting contractor as per present practices. The controlled blasting is proposed by adopting all the safety measures as per "MMR 1961" and with the permission of DGMS.

2.16.4 Precautions

- ✓ Proper and safe storage of explosives in approved and Licensed Magazine.
- ✓ Proper, safe and careful handling and use of explosives by competent Blasters having Blaster's Certificate of Competency issued by DGMS.
- ✓ Proper security system to prevent theft/ pilferage, unauthorized entry into Magazine area and checking authorized persons to prevent carrying of match box, lights, mobile phones etc.
- ✓ The explosives of class 2 will be used in their original cartridge packing and such cartridge shall not be cut to remove explosive for making cartridge of different size.
- ✓ Detonators will be conveyed in special containers. These will not be carried with other explosives.
- ✓ The holes which have been charged with explosives will not be left unattended till blasting is completed.
- ✓ Before starting charging, clear audible warning signals by Sirens will be given so that people nearby can take shelter.
- ✓ Blasting operations will be carried out in day times only. Also, in this project, the mining operations are proposed to be carried out in day times.

2.16.5 Types of Explosives Used

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

2.17 CONCEPTUAL MINE PLAN

During conceptual stage the mined-out area will be converted into water reservoir and safety zone as well as upper benches will be used for plantation at the conceptual period. It will also serve the purpose as socio economic and corporate social responsibility of the lessee by way of supplying water for irrigation purpose or at will of the local people. This will help in ground water recharging as well. The conceptual plan and section of mine lease area is given in **Figure 2.6.**

2.18 LAND USE PATTERN OF MINE LEASE AREA

- ➢ **Land form:** The lease applied area is exhibits an undulated topography. Lease area is dry land. The area does not fall in forest land.

- **Land use:** The area is a dry barren land devoid of Agriculture and Habitations. The land is not used for any specific vegetation. Some thorny bushes and shrubs are observed.
- **Land Ownership:** It is a Patta land.

The existing and proposed land use pattern of the mine lease area upto conceptual stage is given in **Table 2.10.**

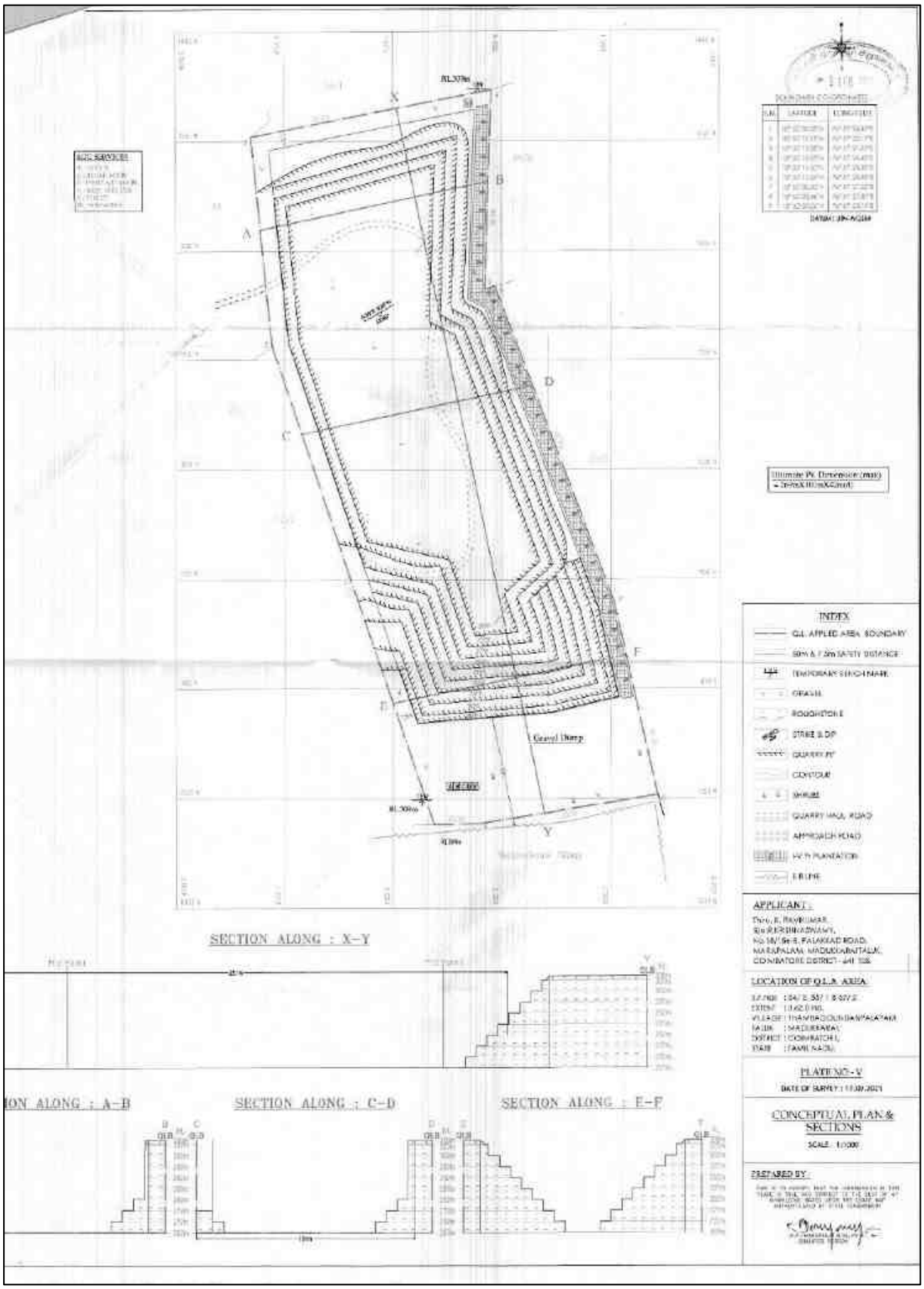


FIGURE 2.6: CONCEPTUAL PLAN

TABLE 2.10: EXISTING AND PROPOSED LAND USE PATTERN OF MINE LEASE AREA

S. No.	Description	Present area (Ha)	Area at the end of this quarrying period (Ha)
1.	Area under quarrying	2.18.0	2.55.0
2.	Dump	0.25.8	Nil
3.	Infrastructure	Nil	0.01.0
4.	Roads	0.02.0	0.02.0
5.	Green Belt	Nil	0.16.0
6.	Unutilized Area	1.16.2	0.87.5
Total		**3.62.0**	**3.62.0**

Plantation with suitable native species will be taken up along the safety zone and upper benches within mining lease area progressively with mine operation till mine closure.

2.19 SITE SERVICES

Following site services will be provided at the mine:

A centralized office cum store with minor maintenance shed is available near mine site outside lease area. A first aid box with necessary medical facility is available and maintained at the mine office.

- **Power supply:** The mine will work in one shift only in day time, so no electric power supply is required for mining operations. However eclectic connection and required transformer unit has been installed in the lease to support the crushing and screening unit.
- **Water supply:** There is no source of drinking water within the applied area. Drinking water & water for other purpose is brought from tube well situated outside the lease area. Drinking water stored in clean covered earthen pots and kept near working faces.
- **Latrine and Urinal**: latrine and urinal will be provided separately for male and female worker as per rule.
- **First-Aid Room**: A first-aid room with all necessary medical facilities will be provided as per mines act and mines rules.

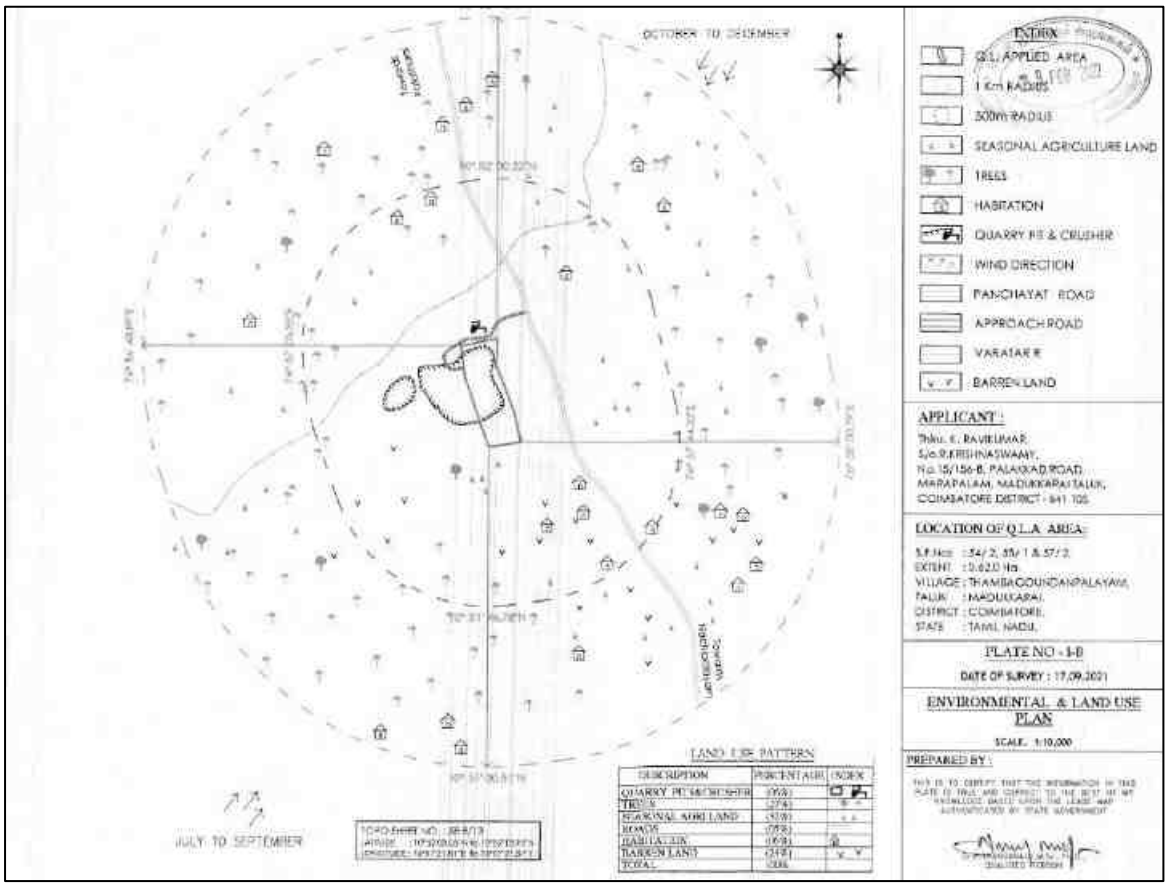


FIGURE 2.7: ENVIRONMENTAL & LAND USE PLAN

2.20 POTENTIAL IMPACTS & MITIGATION MEASURES

The expected anticipated adverse environmental impacts and mitigation measures are summarized in **Table-2.11**.

TABLE 2.11: ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES PROPOSED

Environmental Component	Project Activities	Impacts	Mitigation Measures
Air Quality	Drilling and Blasting	Dust is generated during drilling and blasting operations	• Use of dust aprons on drilling equipment and adopting wet drilling methods. • Avoiding blasting during adverse weather conditions. • Use of controlled blasting practice

Environmental Component	Project Activities	Impacts	Mitigation Measures
			• Development of greenbelt.
	Extraction of Mineral, Loading / unloading activities	Increase in SPM/RPM levels in ambient air and SO_2/NOx concentration levels in ambient air due to vehicular emissions.	• Exposed area will be limited to the minimum required for mining operations. • Periodic sprinkling of water on working faces, • Regular preventive maintenance of mine machinery
	Transportation of Mineral	Increase in SPM/RPM level due to dust generation and SO_2/NOx concentration levels in ambient air due to vehicular emissions.	• Regular sprinkling of water on haul and access roads. • Periodic maintenance of transport vehicles. • Periodic maintenance of haul roads • All tippers would be covered by tarpaulin sheets at top and avoid spillage.
	General equipment operations	Increased SPM/RPM and SO_2/NOx concentrations in ambient air.	• Regular maintenance of all equipment to minimize particulate matter and gaseous emissions from diesel engines.
	All activities	Excessive occupational exposures to airborne particulate matter.	• Provision of dust masks to workers exposed to dusty operations / areas.

Environmental Component	**Project Activities**	**Impacts**	**Mitigation Measures**
Noise Levels and Ground Vibrations	Blasting	High impulsive noise levels, overpressure and ground vibrations impacts and noise related community annoyance	• Small scale blasting will be carried out. • Controlled blasting using delay detonators will be carried out to minimize ground vibrations. • Charge per delay will be kept optimum. • Muffle blasting will be carried out in area facing habitation. • Blasting will be conducted during lunch (noon) time when no employees are present in mine working area.
	General activities including machine/ operations and transportation of Mineral.	Increase in noise levels occupational hazard due to noise exposures and increase in ambient noise levels.	• Periodic maintenance of all mining machinery and transport vehicles • Provision of effective silencers to all mine machinery • Provision of ear plugs/ear muffs to workers exposed to high noise generating operations • Development of thick plantation around mine lease boundary to act as a noise screen. • Regular noise monitoring will be carried-out.
Water Resources and Quality	Dewatering	Reduction in groundwater availability Deterioration in	• Surface run-off from mining area will be collected in settling tank / mine sump and will be used for dust suppression

Environmental Component	Project Activities	Impacts	Mitigation Measures
		surface/ground water quality of receiving body.	and plantation. • There may be impact of groundwater availability since the proposed working may intersect water table. • There will not be any process effluent discharge from the mine. • Domestic effluent will be discharged in septic tank and soak pit system. • At conceptual stage, mined out pit will be converted into water reservoir, which will help in recharging ground water table and will be available to nearby villagers as an additional surface water body.
	Water required in mine for dust suppression, plantation and domestic use.	Reduction in groundwater availability for domestic and for irrigation purposes.	• Surface run-off from mining area will be collected in settling tank / mine sump and will be used for dust suppression and plantation. • There may be impact of groundwater availability since the proposed working may intersect water table. • Water for drinking and domestic use will be supplied by tanker from nearby village. • At conceptual stage, mined out pit will be converted

Environmental Component	Project Activities	Impacts	Mitigation Measures
			into water reservoir, which will help in recharging ground water table and will be available to nearby villagers as an additional surface water body.
	Waste water generated from domestic usage at mine.	Deterioration in ground water and soil quality when discharged untreated for greenbelt development	• There will not be any process effluent discharge from the mine. • Rain water accumulated in mine pit will be discharged in nearby drainage after passing through settling pond. • Domestic effluent will be discharged in septic tank and soak pit system.
Geology	Mining activities	Change in Geomorphology of the area with disturbance of stratigraphic sequence.	• The impact will be confined to lease area. • Mining will be carried out as per guidelines with formation of proper benches and presence of non-disturbed safety zone of 10m from lease boundary. • No active faults present in the area hence the change in geomorphology will be limited to lease area.
Hydrogeology and Drainage pattern	Mining activities	May impact regional hydrology and drainage pattern of the area.	• There may be impact of groundwater availability since the proposed working may intersect water table. However, at conceptual stage, mined out pit will be converted

Environmental Component	**Project Activities**	**Impacts**	**Mitigation Measures**
			into water reservoir, which will help in recharging ground water table and will be available to nearby villagers as an additional surface water body. • Rainwater harvesting structures will be constructed in nearby villages.
Land use and Soil Characteristics	Mining operations.	Land use of the mine lease area will degrade. Impact due to settling of air borne dust on soil outside ML area. Land degradation due to disposal of solid wastes.	• Development of thick plantation around mine lease area, waste dump area and on undisturbed area. • Adoption of adequate air pollution control measures to control dust emissions. • At conceptual stage, mined out pit will be converted into water reservoir. Plantation will be developed on top benches of mined out pit. This will improve aesthetic view of the ML area.
Biological environment	Dust emission due to Rough stone mining activity.	Dust deposition on vegetation & agriculture paddy crop around periphery of ML area may reduce the crop productivity specifically within 500m from mine lease area.	• Development of thick green belt around mine lease boundary and plantation on undisturbed area, top benches of mined out area, waste dump area etc. using native flora species. • Transport through covered trucks. Sprinkler will be installed at loading &

Environmental Component	**Project Activities**	**Impacts**	**Mitigation Measures**
			unloading point; regular water sprinkling within the mining area and also on haulage road will be carried out. • The waste material/OB dumps will be covered with shrubs and grasses plantation.
Environmental Pollution, Health, Safety	Overall Mining operation	Occupational health issues, Community disturbance, risk of accidents, etc.	• Adoption of suitable pollution control measures in the mines • Provision of pre-employment and periodic training on health and safety to all the workers in the mine • Adoption of safe working practices • Maintaining proper housekeeping at working places. • Provision of necessary personal protective equipment's to all mine workers • Periodic maintenance of mine machinery and transport vehicles • Display of warning signals at strategic locations.
Socio-economic Aspects	Mining operations	Increase in employment opportunities both direct and indirect thereby increasing	• Will generate direct employment for persons. While secondary employment will be generated by other ancillary activities.

Environmental Component	**Project Activities**	**Impacts**	**Mitigation Measures**
		economic status of people of the region.	• Mostly local people will be employed in the mine. • Mine management will carry out CER activities in the nearby villages to improve conditions of the villages. • The Mine management will improve the basic facilities. in the nearby villages under CER.

CHAPTER 3: DESCRIPTION OF ENVIRONMENT

3.1 BASELINE ENVIRONMENTAL STUDIES

Baseline environmental studies were carried out within 10 km radius of the rough stone mine cluster area to assess the existing environmental scenario in the area. For EIA studies, Mine lease area of rough stone mine was considered as the core zone and area outside the mine upto 10 km radius was considered as buffer zone. The baseline environmental monitoring was conducted by **Enviro Tech Service (ETS), Ghaziabad** it is an NABL and MOEF recognized laboratory for various components of environment, viz. Air, Noise, Water, Land was carried out during **October 2021 to December 2021** in the study area covering 10 km radial distance from the rough stone mine. Other environmental data on flora and fauna, land-use pattern, forest etc. were also generated through field surveys and secondary information collected from different State Govt. departments. Sampling methods and analysis. Socio-economic survey was conducted, through interaction with the people, sarpanch and medical officers by floating questionnaires and collection of information are supported by census data for demographic structures, amenities, and infrastructure availability within the study area.

3.1.1 Methodology

Appropriate methodologies are followed in developing the EIA-EMP report. The methodology adopted for the study is outlined below:

- Conducting reconnaissance of the study area;
- Selecting sampling locations for conducting various environment baseline studies;

The sampling locations were selected on basis of the following:

- Predominant wind directions recorded by the nearest Indian Meteorological Department (IMD) observatory;
- Existing topography;
- Drainage pattern and location of existing surface water bodies like lakes, rivers and streams;
- Location of villages/towns/ sensitive areas, and;
- Areas, which represent baseline conditions;

The field observations were made to:

- Assess the positive and negative impacts due to the proposed project;
- Suggest appropriate mitigation measures for negating the adverse environmental impacts, if any, and;
- Suggest post-project monitoring;

3.2 LAND ENVIRONMENT

3.2.1 LAND USE OF STUDY AREA

The land-use & land cover map of the 10 km radial study area from the periphery of project site has been prepared using Resource Sentinel-2A having 10 m spatial resolution and date of pass 7th February 2022 satellite image with reference to Google Earth data and the IRS Cartosat having 2.45 m spatial resolution and date of pass September 2014. In order to strengthen the baseline information on existing land use pattern, the following data covering approx. the proposed project site as well as the 10 km radius from the periphery of the project site i.e. 10°52'03.05"N to 10°52'13.95"N latitude and 76°57'21.81"E to 76°57'27.87"E longitude and elevation 99 to 915 meter are observed. The project is in Survey of India topo sheet no 58B/13 while 10 km radius study area covers four topo sheets 58B/13 & 58F/1 as Figure 1: 10 Km radius topo map of study area.

Table 3.1: Data Specification Used for Presents Study

Satellite/ Image	Sensor	Spatial resolution	Date of Acquisition
Sentinel-2A	Sentinel-2	10 m	7th February 2022
Cartosat	IRS Cartosat I	2.45m	2014

Since, a major part of 10km study area comprises of Forest Area, Agricultural Area, Waste Land thus study on land environment of ecosystem 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 10 km radius around the project site so that temporal changes due to the industrial activities on the surroundings can be assessed in future.

3.2.2 Methodology

The land use pattern of the study area was studied by analysing the available secondary data published in the District Primary Census abstract of the year 2001 & 2011.

Salient features of the adopted methodology are given below:

- Acquisition of satellite data
- Preparation of base map from Survey of India topo sheets
- Data analysis using visual interpretation techniques
- Ground truth studies or field checks using GPS
- Finalization of the map
- Digitization using head up vectorisation method
- Topology construction in GIS
- Area calculation for statistics generation
- Masking

Four spectral bands provide high degree of measurability through band combination including FCC generation, bands rationing, classification etc. These features of the IRS data are particularity important for better comprehension and delineation of the land use classes. Hence, Sentinental 2A data and SRTM data having 30 m spatial resolution having pan chromatic imagery has been used for land use mapping.

The satellite data from the compact disc is loaded on the hard disk and by studying quick look (the sampled image of the appropriate area ;) the sub-scene of the study area is extracted.

Supervised classification using all the spectral bands can separate fairly accurately, the different land use classes at level II on the basis of the spectral responses, which involve the following three steps:

1. Acquisition of ground truth.
2. Calculation of the statistics of training area.
3. Classification using maximum likelihood algorithm.

The training areas for classification were homogeneous, well spread throughout the scene with bordering pixels excluded in processing. Several training sets have been used through the scene for similar land use classes. After evaluating the statistical parameters of training sets, the training areas were rectified by deleting no congruous training sets and creating new ones.

3.3 PRE-FIELD INTERPRETATION OF SATELLITE DATA

The False Color Composite (FCC) of Sentinel-2A satellite imagery having 10 m spatial resolution satellite data at 1:50,000 scale was used for pre-field interpretation work. Taking the help of topo sheets, geology, geo-morphology and by using the image elements, the features were identified and delineated the boundaries roughly. Each feature was identified on image by their image elements like tone, texture, color, shape, size, pattern and association. A tentative legend in terms of land cover and land use was formulated. The sample area for field check is selected covering all the physiographic, land use/land cover feature cum image characteristics. **Figure 3.1** shows the FCC of 10 KM radius of Sentinental imagery.

3.4 TOPOGRAPHY

The physical setting of study area shows a contrast of immense dimensions and reveals a variety of landscapes influenced by relief, climate, vegetation and economic use by man. But even then, regionally, there is considerable local variation. The area is sloping from south west to north east. The Surface elevation map of the study area is shown in **Figure 3.2** to **Figure 3.4**. The Elevation from 99 to 915m MSL are observed in the study area.

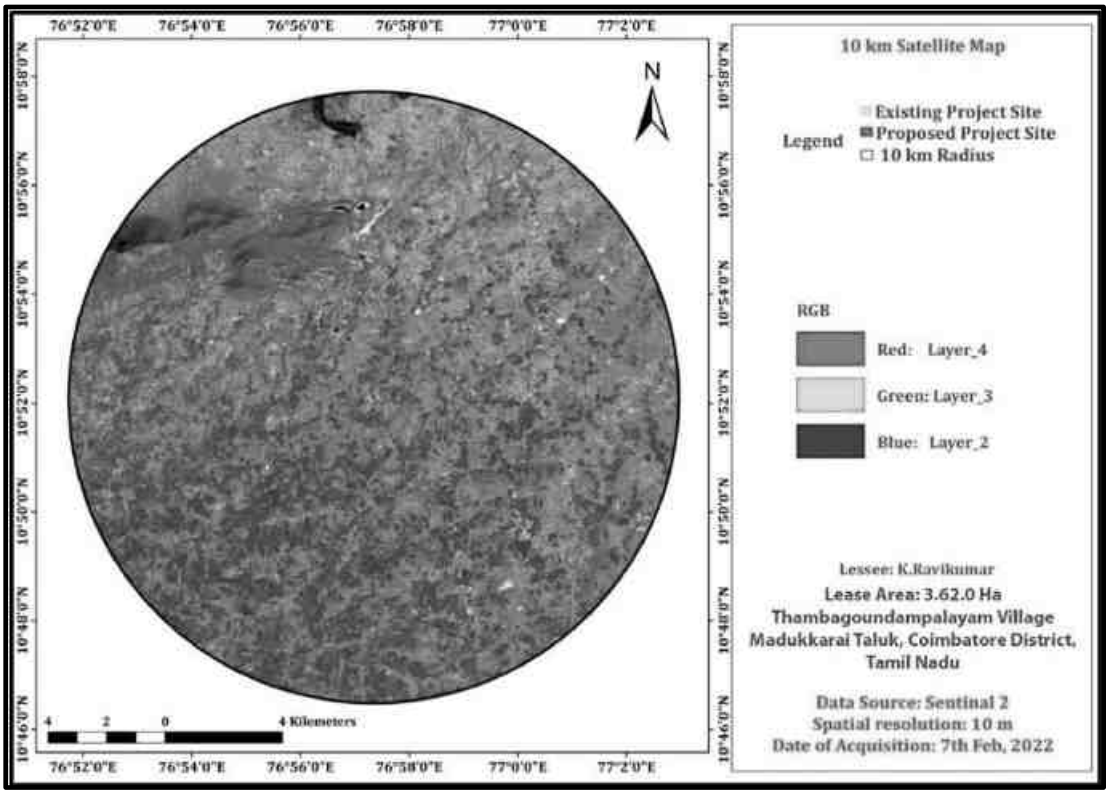


FIGURE 3.1: FCC OF THE 00-10 KM RADIUS WITH PROJECT LOCATION

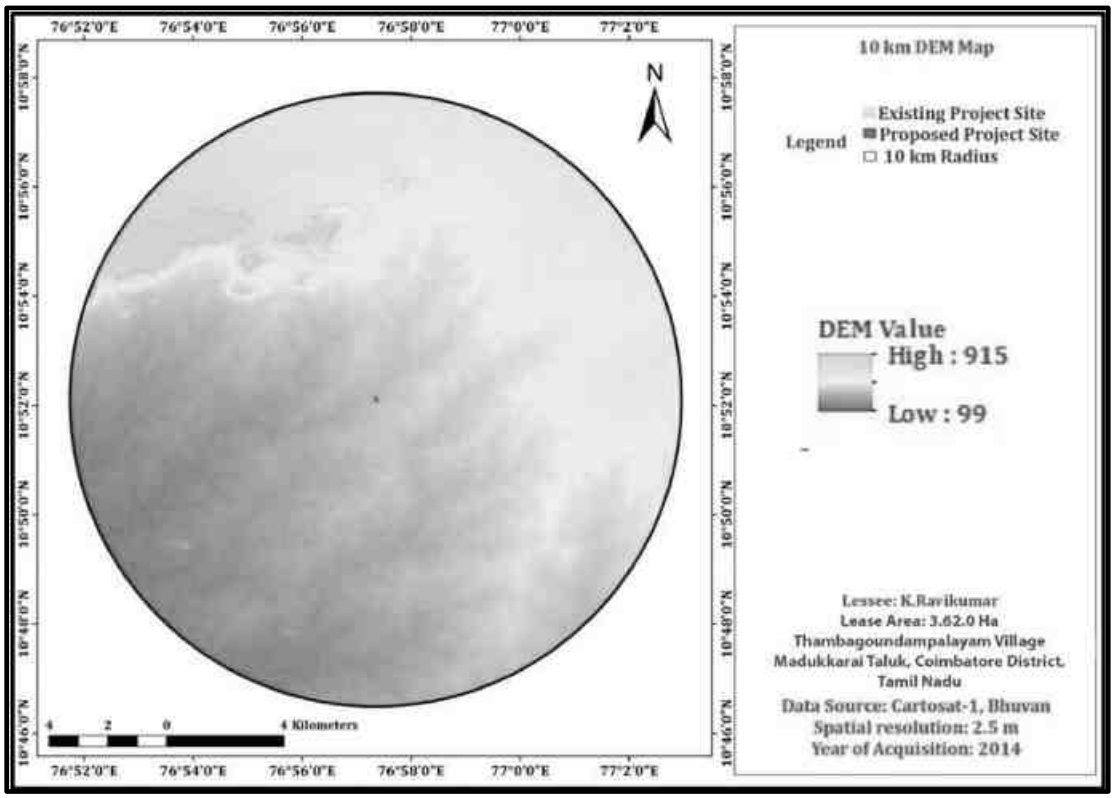


FIGURE 3.2: DIGITAL ELEVATION MODEL WITH IN 10 KM RADIUS

FIGURE 3.3: ELEVATION PROFILE OF NW-SE DIRECTION WITH IN 10 KM RADIUS

FIGURE 3.4: ELEVATION PROFILE OF SW-NE DIRECTION WITH IN 10 KM RADIUS

3.5 LAND USE/LAND COVER CLASSIFICATION

Total three major land use/land cover classes were demarcated in the study area following Level I classification furthermore a level II classification also adopted as per the requirement of **MoEF & CC** in which total 10 classifications has been classified in the study area. A thematic map of 1:50,000 scale was generated incorporating these classified categories considering the area of the project

Of the 6 LU/LC classes as per NRSA-TR-LU & CD-01-90 the 10 Km radius study area has presence of all 6 LU/LC classes are shown in **Table 3** of which the agricultural land has the highest category of land which is combination of coconut plantation, cultivated and Uncultivated crops 76.8 % (255.45 Km^2) followed by built-up land 12.96 % (43.1 Km^2), followed by forest land which comprises of 6% (19.96 km^2), followed by waste land which comprises of bare land 2.85 % (9.49 Km^2), followed by mining land 1% (3.35 km^2) and while water body comprises of 0.34 % (1.13 Km^2). Terrain presumably makes it difficult to visualize some of the other features of the total project area. It is also observed that the study area is well connected NH-544 which is passing under the 10 km radius of the study area. The presence of different land use is shown in **Figure 3.5** of the pie chart distribution.

TABLE 3.2: LU/LC AND ITS COVERAGE WITHIN 10 KM RADIUS

S.No	Level I	Level -II	Area (Km^2)	Percentage (%)
1	Built-up Land	Built-up Land	43.1	12.96
2	Forest	Dense Forest	19.96	6.00

S.No	Level I	Level -II	Area (Km^2)	Percentage (%)
3	Agricultural Land	Plantation - Coconut Trees	51.28	15.42
		Crops – Cultivated	20.45	6.15
		Crops - Uncultivated	183.72	55.26
4	Waste Land	Bare land	9.49	2.85
5	Water Body	Water Body	1.13	0.34
6	Others	Mining land	3.35	1.00
		Total	**332.48**	**100**

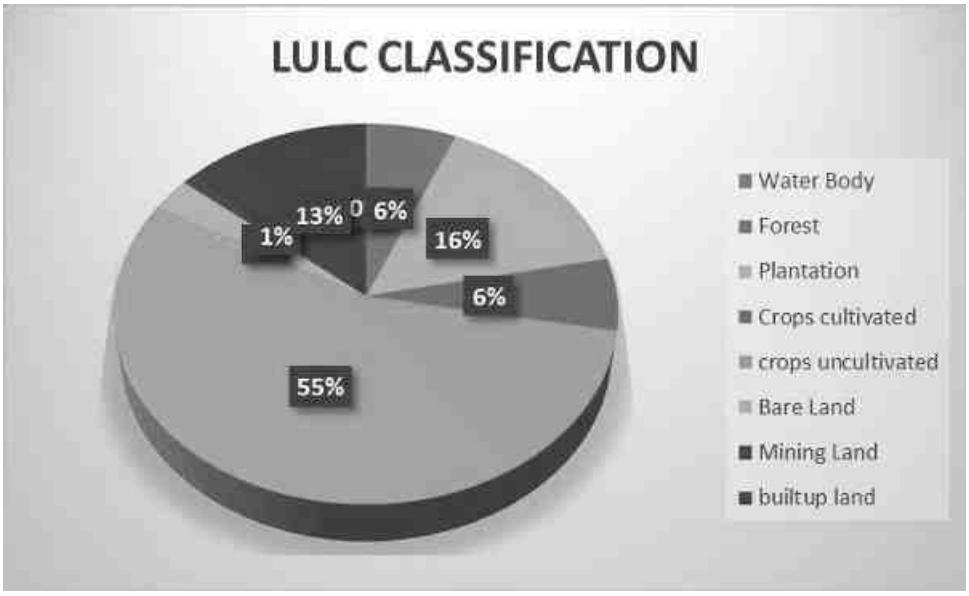


FIGURE 3.5: PIE CHART OF THE LU/LC CLASSIFICATION WITHIN 10 KM RADIUS

From the above table and pie diagram it is inferred that most of the land in the study area is Agriculture land (includes crop land) 76.83 % and by water bodies (Rivers Stream Canals) 0.34 %. The total mining area within the study area is 3.35 %. The cluster area 9.36.5 Ha contributes to the total mining area within the study area. This small percentage of Mining Activities shall not have any significant impact on the environment.

3.6 SPATIAL DATA FROM SOI TOPOGRAPHICAL SHEETS

Creating a GIS spatial database is a complex operation, and is the heart of the entire work; it involves data capture, verification and structuring processes. Raw geographical data are available in many different analogue and digital form such as toposheets, aerial photographs, satellite imageries and tables. Out of all these sources, the source of toposheets is of much concern to natural resource scientist and an environmentalist.

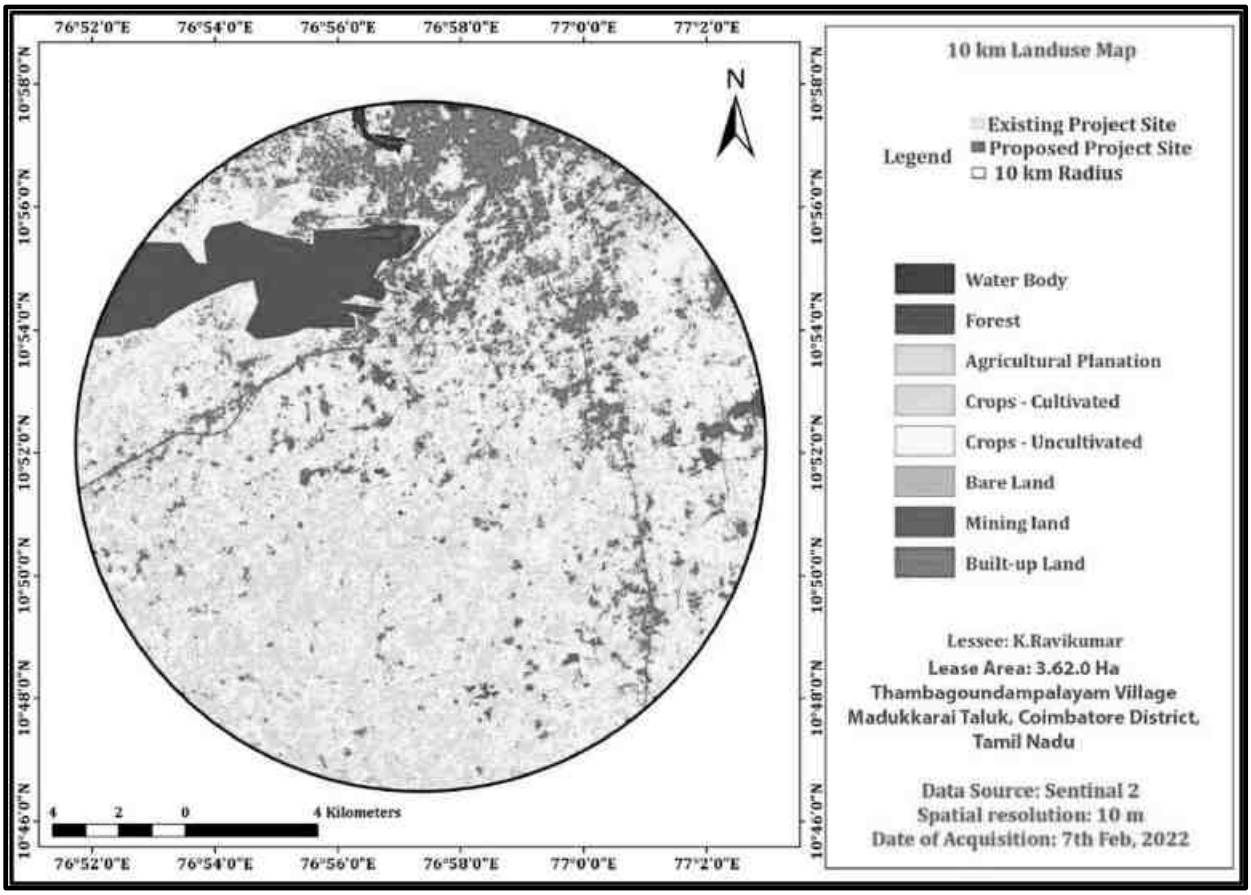


FIGURE 3.6: LU/LC DETAILS OF 10 KM RADIUS

In the present study, the essential maps generated from SOI topographical maps. Using the topographical maps, the drainage map and contour Map were also developed. The maps are prepared to a certain scale and with attributes complying with the requirement of terms of reference (ToR). The location of entities on the earth's surface is then specified by means of an agreed co-ordinate system. For most GIS, the common frame of co-ordinate system used for the study is UTM co-ordinates system. All the maps are first Geo-referenced. The same procedure is also applied on remote sensing data before it is used to prepare the Essential maps. There is a road network connecting built-up areas and industries. As the terrain conditions are black cotton soil and bit undulated terrain and there is a drainage network around the site location. No National parks and wild life sanctuaries located in the study area.

3.7 SOIL CHARACTERISTICS

The soils of Coimbatore district can be broadly classified into 6 major soils types viz., Red calcareous Soil, Black Soil, Red non-calcareous, Alluvial and Colluvial Soil, Brown Soil, and Forest Soil. About 60 per cent of the district is covered by red soils, of which red calcareous soil is predominant. They occupy most parts of Palladam, Coimbatore, Mettupalayam and

Udumalpet taluks. Medium to deep red calcareous soils are found mainly in Pollachi and Udumalpet taluks. Parts of Palladam, Avinashi and Udumalpet taluks are occupied by red non-calcareous soils.

For studying soil profile of the region, sampling locations were selected to assess the existing soil conditions in and around the stone mining area representing various land use conditions. The samples were collected by ramming a core-cutter into the soil up to a depth of 15-20 cm. Total 6 samples within the study area were collected and analyzed. The details of the soil sampling locations are given in **Table 3.3** and shown in **Figure-3.7**. The sampling was carried out once in the study period during Post Monsoon- season.

TABLE 3.3: DETAILS OF SOIL SAMPLING LOCATIONS

S. No	Monitoring locations (Soil)	Distance from the Project boundary (km)	Coordinate	Source
1.	Near Project Site	-	10°52'9.94"N 76°57'26.39"E	Agricultural Land
2.	Nachipalayam	0.4km SE	10°51'51.08"N 76°57'32.22"E	Agricultural Land
3.	Arisipalayam	1.28km SE	10°51'52.58"N 76°58'8.33"E	Agricultural Land
4.	Palathurai	1.25km N	10°52'53.57"N 76°57'26.31"E	Agricultural Land
5.	Kumarapalyam	1.3km W	10°52'4.90"N 76°56'39.66"E	Agricultural Land
6.	Muthukkarai Pachapalayam	2.8km SW	10°53'8.94"N 76°58'39.00"E	Agricultural Land

The collected soil samples were analyzed in the NABL/MOEF approved laboratory for physio-chemical and nutrition parameters. The physical, chemical properties and heavy metals concentrations were determined, and the results are given in **Table 3.4**.

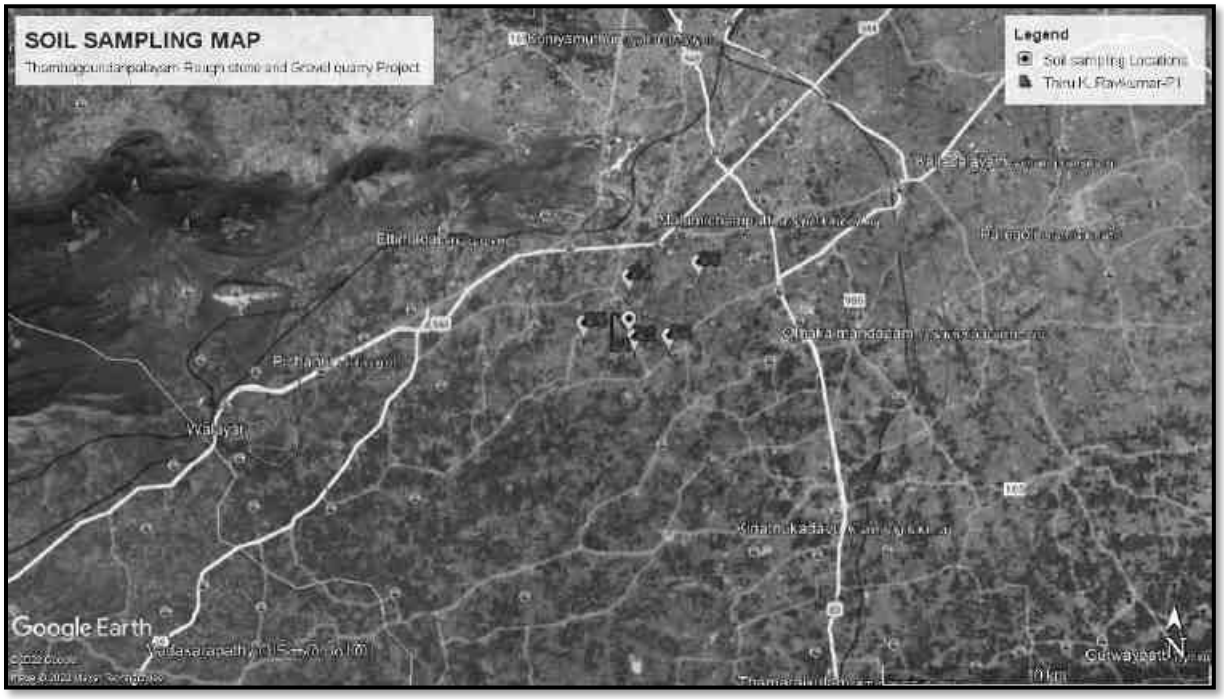


FIGURE 3.7: STUDY AREA MAP WITH SOIL SAMPLING LOCATIONS

TABLE 3.4: TEST RESULTS OF SOIL

Date of Sampling	20.12.2021	**Sampling Method**	ETS/STP/SOIL-01
Analysis Start Date	25.12.2021	**Sample Quantity**	2.0 Kg.
Analysis End Date	29.12.2021	**Packing Condition**	SEALED
Sampling Done By	ETS STAFF	**Packed In**	POLY BAG

S. No.	Test Parameter	Unit	S1 Results	S2 Results	S3 Results	S4 Results	S5 Results	S6 Results	Test Method
1	pH	…	7.57	8.02	7.54	7.28	7.40	7.80	IS 2720 (Part-26)
2	Electrical Conductivity (EC)	µs/cm	343	428	487	456	396	363	IS 14767
3	Texture	…	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Sandy Clay Loam	IS 2720 (Part-4)
4	Sand	%	42.2	43.7	38.8	47.2	48.0	52.4	IS 2720 (Part-4)
5	Silt	%	24.7	25.1	25.1	22.4	22.6	18.2	IS 2720 (Part-4)
6	Clay	%	33.1	31.2	36.1	30.4	30.4	29.2	IS 2720 (Part-4)
7	Water Holding Capacity (WHC)	%	42.0	42.5	33.7	28.0	28	40.7	IS 2720 (Part-2)
8	Bulk Density	g/cm^3	1.28	1.01	0.90	1.05	1.15	0.59	IS 2386 (Part-4)
9	Porosity	%	31.2	23.3	22.3	38.2	19	35.8	IS 13030
10	Calcium,(Ca)	mg/kg	153	186	175.8	228.6	153	141	IS 2720 (Part-23)
11	Magnesium,(Mg)	mg/kg	25.8	28.7	46.4	35	36	23.6	ETS/STP/SOIL-08
12	Manganese,(Mn)	mg/kg	33.2	38.3	30.2	23.3	25.8	19	ETS/STP/SOIL-18
13	Zinc,(Zn)	mg/kg	0.60	0.81	1.04	1.36	1.06	0.57	ETS/STP/SOIL-18
14	Boron (as B)	mg/kg	0.53	0.90	0.70	0.72	1.48	0.46	ETS/STP/SOIL-18

S. No.	Test Parameter	Unit	S1 Results	S2 Results	S3 Results	S4 Results	S5 Results	S6 Results	Test Method
15	Chloride,(Cl)	mg/kg	160	153	130.2	166	164	179	BS 1377 -3
16	Total Soluble Sulphate	%	124	141	138.5	128.2	148	163	IS 2720 (Part-27)
17	Potassium (K)	mg/kg	67.4	86.1	44.6	78.6	38.7	25.7	ETS/STP/SOIL-18
18	Phosphorus (PO4)	mg/kg	47.8	54.5	0.60	41.0	1.17	0.78	ETS/STP/SOIL-19
19	Total Nitrogen (N)	mg/kg	167	140.2	150.7	192	165.7	263	ETS/STP/SOIL-15
20	Cadmium,(Cd)	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ETS/STP/SOIL-18
21	Chromium,(Cr)	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ETS/STP/SOIL-18
22	Copper,(Cu)	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	ETS/STP/SOIL-18
23	Lead,(Pb)	mg/kg	0.81	0.66	0.77	1.40	1.31	0.48	ETS/STP/SOIL-18
24	Iron,(Fe)	mg/kg	2.37	2.21	2.48	2.54	2.01	2.76	ETS/STP/SOIL-18
25	Organic Matter,(OM)	%	1.30	1.60	2.02	1.67	1.56	1.63	IS 2720 (Part-22)
26	Organic Carbon,(OC)	%	0.55	1.03	1.50	1.13	0.91	1.09	BS 1377 -3
27	Cation Exchange Capacity (CEC)	meq/100g	34.2	37.6	34	30.5	37.6	35.7	IS 2720 (Part-24)

3.7.1 Observations:

- pH of the soil samples varied from 7.28 to 8.02 indicating slightly alkaline soil
- Bulk density of the soil samples varied from 0.59 to 1.28 g/cm^3
- Organic matter in the soil samples varied from 1.30 to 2.02 %
- Total Nitrogen in the soil samples varied from 140.2 to 263 mg/kg
- Water Holding Capacity (WHC) in the soil samples varied from 28.0 to 42.5%.

From the analysis results of the soil samples, it was observed that the soil was low to medium fertile and having low productivity. The soil in the study area needs additional fertilizers for improving the fertility status and increase in crop productivity. This also indicates the poor level of micro-nutrient. The organic matter was found in the range of 1.30 to 2.02 % indicating moderate organic content in the soil. Overall, the soil quality in the area was found to medium to fair fertile with moderate productivity.

3.8 AIR ENVIRONMENT

3.8.1 Meteorology

The district enjoys a tropical climate. The weather is pleasant during the period from November to January. The normal rain fall occurs during North East monsoon and moderate rainfall is received during South West monsoon.

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 3m 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 period from April to June is generally hot and dry. The temperature recorded varies from 11.7°C to 42.6°C. *(Source:* http://cgwb.gov.in/District_Profile/TamilNadu/Coimbatore.pdf)

TABLE 3.5: RAINFALL DATA

Actual Rainfall (mm)						Normal Rainfall (mm)
2013	**2014**	**2015**	**2016**	**2017**	**2018**	
901.0	1221.7	992.9	505.5	873.4	1302.0	689.3

(Source: https://www.twadboard.tn.gov.in/content/coimbatore*)*

The annual rainfall normal (1970-2000) of Coimbatore district is 694 mm. 4 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. Rainfall data from six stations over the period 1901-2000 were utilized and a perusal of the analysis shows that the normal annual rainfall over the district varies from about 550mm to 900mm. It is the minimum around Sulur (550 mm) in the eastern part of the district. It gradually increases towards south and attains a maximum around Anamalai hills.
*(Source:*http://www.tnenvis.nic.in/WriteReadData/UserFiles/file/17_COIMBATORE_RAINFALL.pdf)

TABLE 3.6: METEOROLOGICAL DATA RECORDED AT SITE

S. No	Parameters		October-2021	November - 2021	December-2021
1	Temperature (^{0}C)	Max	34.9	32.7	32.1
		Min	20	17.5	15.8
		Avg	27.4	25.1	24.0
2	Relative Humidity (%)	Avg	75	73.5	67.5
3	Wind Speed (mph)	Avg	6.7	5.9	5.3
4	Cloud Cover (OKTAS)		0-7	0-7	0-7
5	Wind Direction		SW	NE	NE

Source: On-site monitoring/sampling

3.8.2 Analysis of Meteorological Data, Coimbatore

The Indian Meteorological Department records the data at two times a day viz. 08:30 hr and 17:30 hr.

The meteorological data recorded during the monitoring period is very useful for proper interpretation of the baseline information as well as input for air quality prediction. Historical data on meteorological parameters also plays an important role in identifying the general meteorological regime of the region. The year may broadly be divided into four seasons based on meteorological variations:

Winter	:	December to February
Pre-Monsoon/Summer	:	March to May
Monsoon	:	June to September
Post-Monsoon	:	October to November

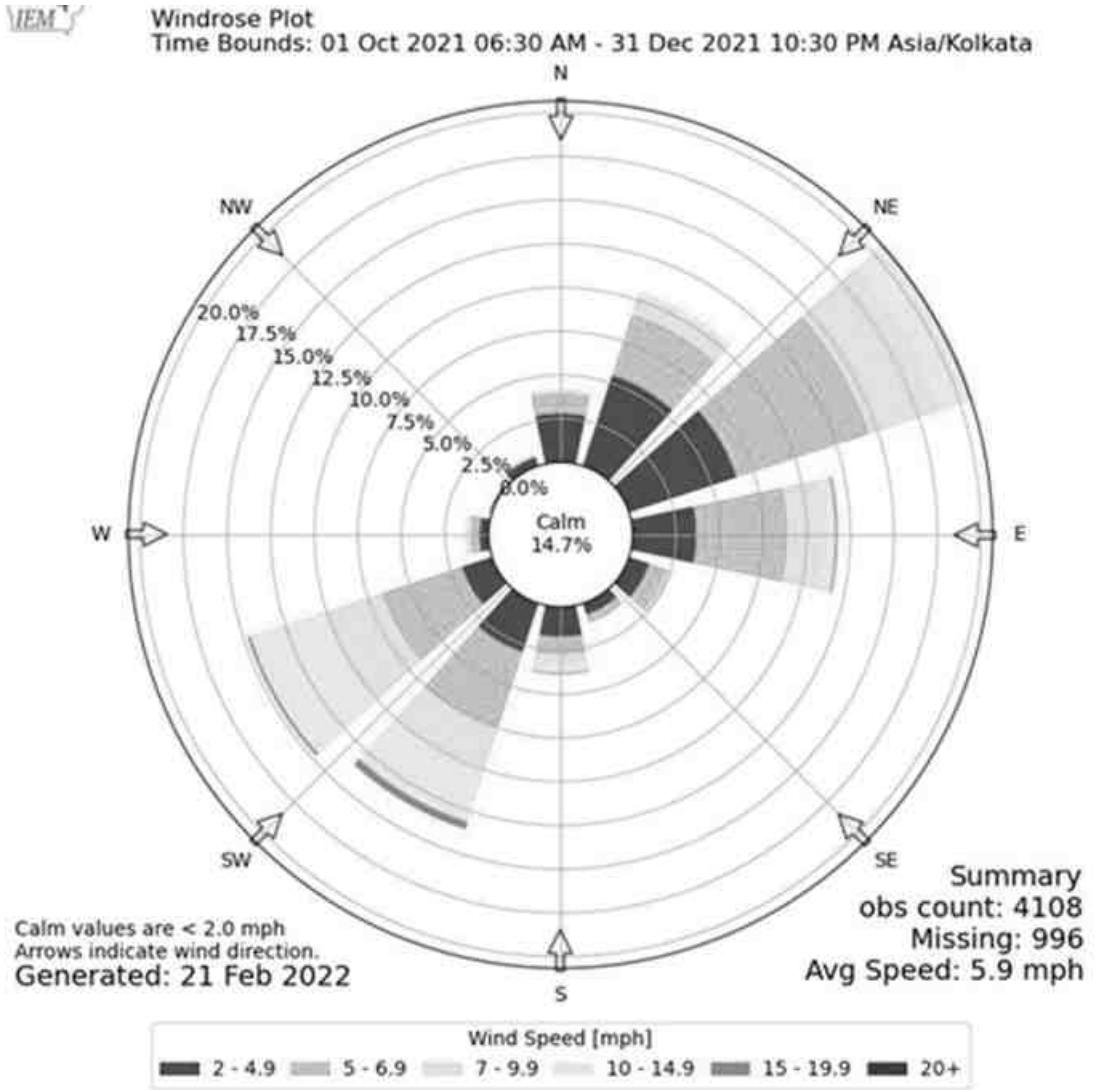


FIGURE 3.8: SITE SPECIFIC WINDROSE OCTOBER 2021 TO DECEMBER 2021

TABLE 3.7: WIND DIRECTION AND WIND SPEED

Wind Direction	**Frequency %**
Upwind Direction	NE (30 %)
Downwind Direction	SW (15%)
Calm conditions (%)	<2mph

Average Speed	5.9 mph

3.8.3 Baseline Ambient Air Quality

The status of ambient air quality within the study area was monitored during October 2021 to December 2021 at 7 locations including the Rough stone mine lease area and in nearby villages. The monitoring locations are given in **Table 3.8** and are shown in **Figure 3.11**.

The various sources of air pollution in the region are stone mining, crushing activities and vehicular traffic. The prime objective of the baseline air quality study (10-km radius) was to assess the existing air quality of the area to form baseline information. The study area represents mostly rural environment with stone mining quarries & crushers.

The regional climatologically data, was used as a guideline to know the predominant wind direction during study period. The locations were identified keeping in view predominant wind directions prevailing during study period, sensitive receptors, human settlements, and mining activities around.

The levels of Respirable Particulate Matter (PM_{10}), Fine Particulates ($PM_{2.5}$), Sulphur Dioxide (SO_2) and Oxides of Nitrogen (NO_x) were monitored for establishing the baseline status. PM10 were sampled with the help of Respirable Dust Samplers on filter papers and SO_2& NOx were absorbed in the respective absorption media in the impingers attached to RD samplers and analyzed Spectro-photometrically. $PM_{2.5}$ was monitored with the help of Fine Particulate Samplers. The minimum, maximum, average and 98th percentile values have been computed from the observed raw data for all the AAQ monitoring stations and the results are summarized in **Table 3.9.**

TABLE 3.8: DETAILS OF AMBIENT AIR QUALITY MONITORING LOCATIONS

S. No.	Station Code	Locations	Distance (Km)	Direction of wind	Criteria
			w.r.t Project Site		
1	AAQ1	Project Site	0.0	-	Core zone
2	AAQ 2	Nachipalayam	0.37km	SE	Core Zone Crosswind
3	AAQ 3	Arisipalayam	1.2km	SE	Crosswind
4	AAQ 4	Palathurai	1.25km	N	Crosswind
5	AAQ 5	Kumarapalyam	1.4km	W	Crosswind
6	AAQ 6	Muthukkarai Pachapalayam	1.9km	SW	Down wind
7	AAQ 7	Seerapalayam	2.84km	NE	Upwind

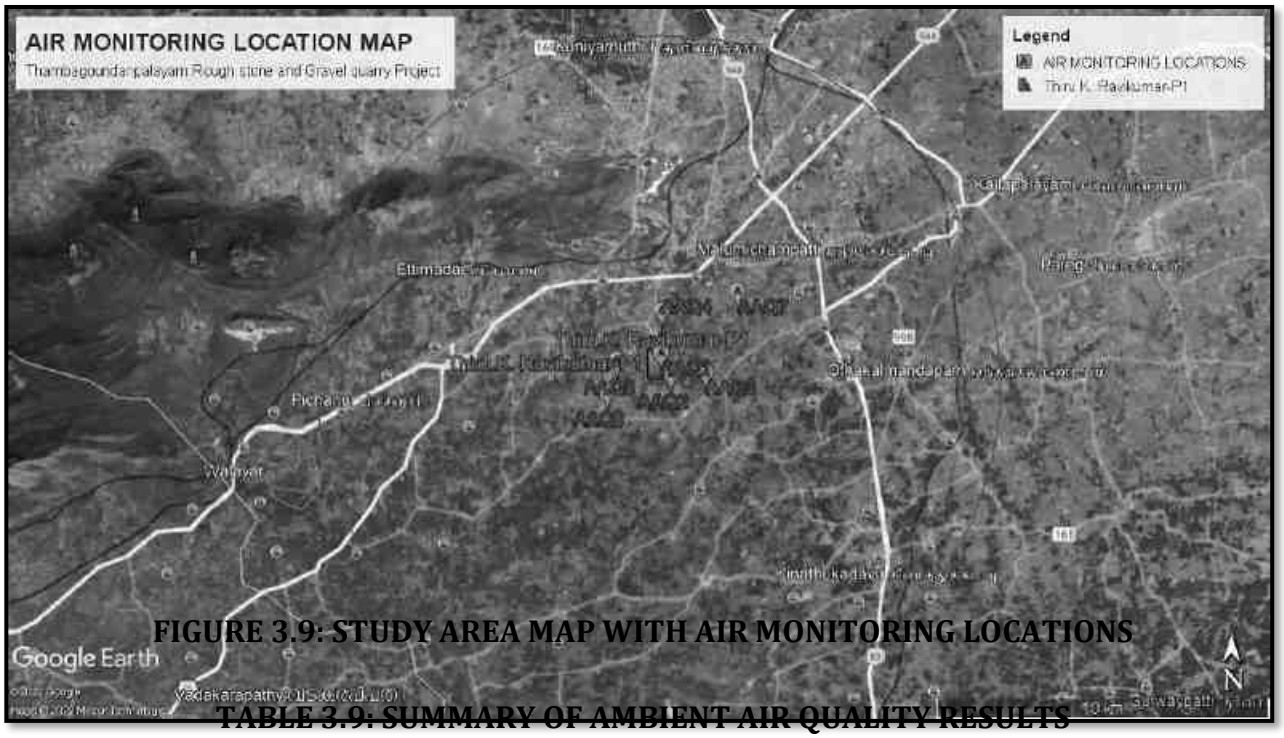


FIGURE 3.9: STUDY AREA MAP WITH AIR MONITORING LOCATIONS

TABLE 3.9: SUMMARY OF AMBIENT AIR QUALITY RESULTS

Date of Sampling	-	**Sampling Method**	ETS/STP/AIR-01
Analysis Start Date	05.12.2021	**Sample Quantity**	-
Analysis End Date	31.12.2021	**Packing Condition**	**-**
Sampling Done By	ETS STAFF	**Weather Condition**	**Clear**

Station ID	Max	Min	Mean	98 Percentile	STDEV
Particulate matter PM-$_{2.5}$					
AAQ-1	34.1	22.0	25.8	31.65	2.29
AAQ-2	37.2	21.7	25.1	35.18	3.67
AAQ-3	34.7	25.2	28.5	33.37	1.97
AAQ-4	32.9	22.5	25.1	31.59	2.23
AAQ-5	32.5	23.6	26.7	31.25	1.85
AAQ-6	39.6	28.5	36.1	39.57	2.59
AAQ-7	28.6	22.0	25.4	27.99	1.43
Particulate matter PM-$_{10}$					
AAQ-1	55.1	43.5	47.9	53.75	2.42
AAQ-2	51.9	40.6	44.6	51.06	2.48
AAQ-3	57.7	42.0	46.7	56.49	3.56
AAQ-4	67.7	52.3	56.9	66.65	1.08
AAQ-5	62.0	45.1	50.1	60.67	3.76
AAQ-6	66.1	45.5	51.3	65.29	2.69
AAQ-7	50.3	37.5	43.4	50.12	2.40
Sulphur Di-oxide as SO_2					
AAQ-1	10.4	8.0	9.6	10.39	2.26

Station ID	Max	Min	Mean	98 Percentile	STDEV
AAQ-2	9.5	6.4	7.9	9.42	2.51
AAQ-3	10.3	7.3	8.8	10.23	3.83
AAQ-4	10.9	7.1	7.9	10.73	3.64
AAQ-5	10.1	7.2	8.6	10.07	4.10
AAQ-6	9.2	6.1	7.6	9.13	5.99
AAQ-7	9.4	7.2	8.7	9.40	2.85
Oxide of Nitrogen as NO_2					
AAQ-1	28.2	23.0	25.3	28.15	0.67
AAQ-2	21.6	18.6	20.1	21.48	0.81
AAQ-3	20.6	15.5	19.1	20.56	0.89
AAQ-4	19.8	15.8	17.7	19.62	0.95
AAQ-5	22.0	18.6	20.7	22.02	0.89
AAQ-6	17.6	13.0	16.2	17.52	0.81
AAQ-7	15.4	12.6	13.8	15.39	0.61

3.8.4 Observations of Primary Data:

- $PM_{2.5}$ concentration in the study area varied from 21.7 to 39.9 µg/m^3 during the study period.
- PM_{10} concentration in the study area varied from 37.5 to 67.7 µg/m^3 during the study period.
- SO_2 concentration in the study area varied from 6.1 to 10.9 µg/m^3 during the study period.
- NO_2 concentration in the study area varied from 12.6 to 28.2 µg/m^3during the study period.

From the above results, it is observed that the ambient air quality with respect to PM_{10}, $PM_{2.5}$, SO_2, and NO_2 at all the monitoring locations was within the permissible limits specified by CPCB.

3.9 NOISE ENVIRONMENT

3.9.1 Baseline Status

Ambient noise level monitoring was carried out at the 8 monitoring locations; those were selected for ambient air quality monitoring. The details of noise monitoring locations are given in **Table 3.10** and are shown in **Figure-3.10**. Monitoring stations and the results are summarized in **Table 3.11**.

TABLE 3.10: NOISE SAMPLING LOCATIONS IN THE STUDY AREA

S. No.	Station Code	Locations	Distance (Km)	Direction of wind	Zone
			w.r.t Project Site		
1	N 1	Project Site	-	Core zone	Industrial

2	N 2	Nachipalayam	2.77	SE	Residential
3	N 3	Arisipalayam	4.37	SE	Residential
4	N 4	Palathurai	0.57	NW	Residential
5	N 5	Kumarapalyam	3.77	NW	Residential
6	N 6	Muthukkarai Pachapalayam	4.70	NE	Residential
7	N 7	Seerapalayam	3.66	SW	Commercial

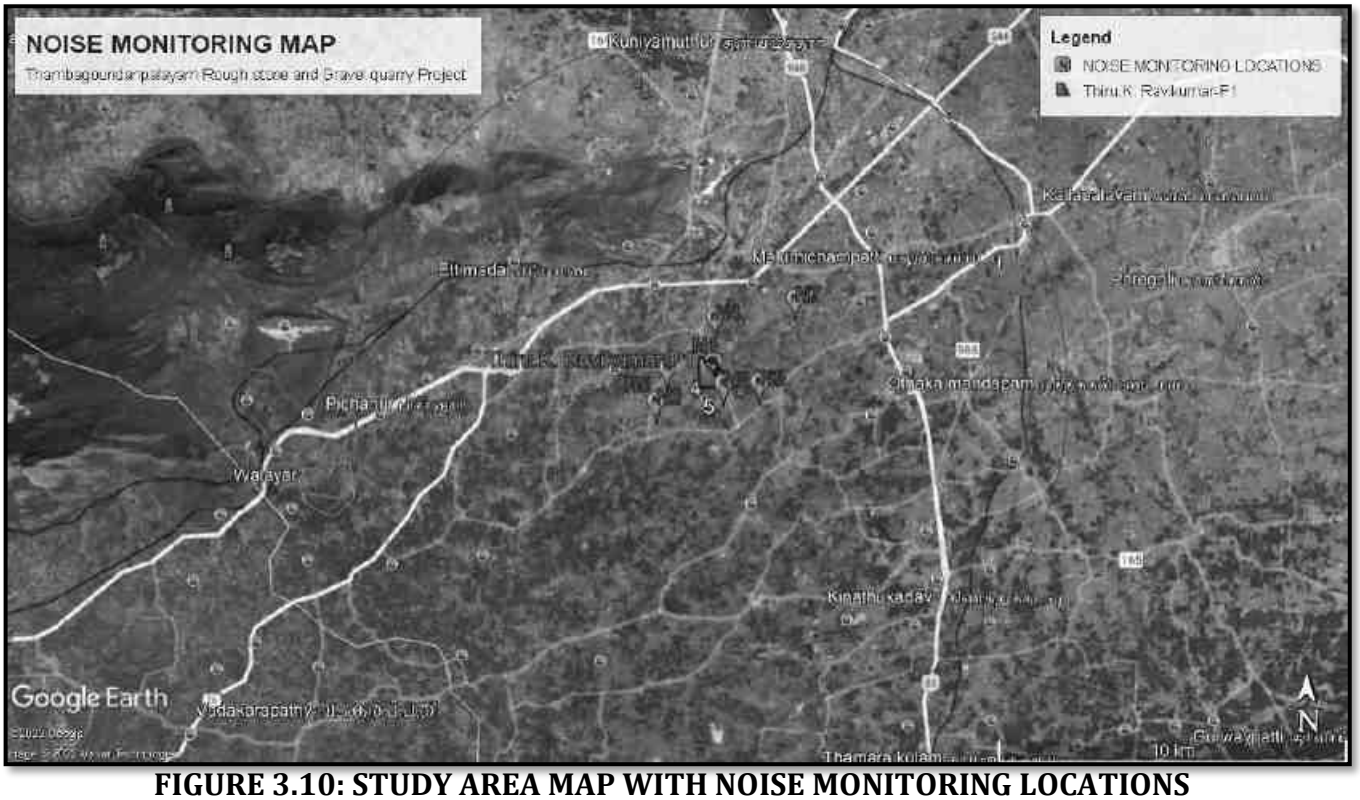


FIGURE 3.10: STUDY AREA MAP WITH NOISE MONITORING LOCATIONS

TABLE 3.11: AMBIENT NOISE LEVEL MONITORING RESULTS, [dB(A)]

Date of Sampling	-	**Sampling Method**	ETS/STP/NOISE-01
Analysis Start Date	20.12.2021	**Sample Quantity**	-
Analysis End Date	21.12.2021	**Packing Condition**	**-**
Sampling Done By	ETS STAFF	**Category of Area**	**Industrial Area**

Location		**N1**			**N2**			**N3**			**N4**		
S.No	**S.No**	**Min dB(A)**	**Max dB(A)**	**dB(A)**	**Min dB(A)**	**Max dB(A)**	**dB(A)**	**Min dB(A)**	**Max dB(A)**	**dB(A)**	**Min dB(A)**	**Max dB(A)**	**dB(A)**
1	0600	41.1	48.5	46.0	43.6	46.6	45.4	47.3	50.1	46.9	32.4	36.2	36.0
2	0700	41.5	51.2	47.6	41.6	44.1	45.0	46.3	51.2	47.5	34.5	40.4	37.2
3	0800	43.6	53.6	49.0	42.2	45.5	46.3	46.1	48.6	47.5	35.2	39.5	37.9
4	0900	42.6	53.1	51.5	44.9	49.8	48.0	47.4	46.2	48.3	36.8	38.5	37.7
5	1000	43.1	45.8	46.7	41.9	50.6	49.1	46.2	49.1	49.9	36.5	37.6	38.3
6	1100	44.5	46.6	45.7	42.5	52.6	50.0	45.1	47.3	50.4	38.1	45.3	40.2
7	1200	45.6	47.8	46.8	44.2	54.2	51.6	46.9	49.5	50.2	34.7	40.5	42.5
8	1300	46.9	49.6	42.5	41.6	51.6	52.0	46.2	48.8	50.7	37.2	41.3	46.7
9	1400	47.1	50.2	48.9	42.2	53.5	50.8	45.7	46.7	51.5	36.2	43.5	48.3
10	1500	45.4	51.8	46.7	42.6	54.5	52.8	46.3	48.7	51.4	35.9	44.8	50.3
11	1600	43.6	52.8	51.3	43.2	46.5	52.2	48.1	50.2	52.3	36.6	38.7	51.6
12	1700	44.8	52.6	51.3	43.5	48.3	50.5	46.3	51.5	51.8	32.5	40.9	50.5
13	1800	46.2	55.3	52.8	42.5	47.6	51.8	47.3	53.5	50.4	34.4	43.4	49.9
14	1900	43.5	52.1	49.7	40.9	49.6	48.1	48.9	50.5	49.7	31.5	39.6	48.3
15	2000	40.9	50.2	47.7	43.5	47.6	47.0	42.6	55.5	49.5	36.9	46.5	47.9

Location		N1			N2			N3			N4		
S.No	**S.No**	**Min dB(A)**	**Max dB(A)**	**dB(A)**	**Min dB(A)**	**Max dB(A)**	**dB(A)**	**Min dB(A)**	**Max dB(A)**	**dB(A)**	**Min dB(A)**	**Max dB(A)**	**dB(A)**
16	2100	40.5	49.8	46.3	41.5	47.1	45.1	40.9	51.9	48.2	32.5	40.8	38.4
17	2200	38.6	46.9	44.5	38.2	45.6	43.3	41.2	53.2	47.6	36.1	44.3	46.9
18	2300	37.5	38.1	37.8	39.8	43.5	42.0	35.1	43.6	44.2	34.1	39.9	44.9
19	0000	36.1	40.5	38.8	37.6	43.7	41.6	36.4	47.2	44.7	32.9	37.8	42.0
20	0100	35.3	39.7	38.0	36.8	42.5	40.5	32.9	37.5	40.8	33.5	36.9	40.5
21	0200	36.1	38.6	37.5	37.3	44.1	40.9	31.8	39.8	37.4	33.7	35.8	38.9
22	0300	33.5	35.8	34.8	37.1	39.1	38.2	32.7	37.5	36.7	32.5	34.5	36.6
23	0400	34.1	37.8	36.3	35.9	39.8	37.3	32.5	36.2	35.2	33.4	36.6	35.3
24	0500	34.6	36.9	34.9	36.5	38.2	37.4	31.4	35.5	33.9	33.4	36.5	35.6
Day Mean dB(A)				48.4	**Day Mean dB(A)**		47.1	**Day Mean dB(A)**		48.7	**Day Mean dB(A)**		39.4
Night Mean dB(A)				37.0	**Night Mean dB(A)**		40.0	**Night Mean dB(A)**		37.7	**Night Mean dB(A)**		35.4

Location		N5			N6			N7		
S.No	**Time (Hrs)**	**Min**	**Max**	**dB(A)**	**Min**	**Max**	**dB(A)**	**Min**	**Max**	**dB(A)**
1	0600	40.5	45.3	43.4	46.7	48.5	47.4	41.2	43.5	21.3
2	0700	41.6	46.6	44.4	49.5	50.4	49.8	41.5	42.3	42.1
3	0800	41.6	45.5	44.7	47.5	52.1	50.7	41.4	44.9	43.2
4	0900	42.4	50.4	47.3	45.5	47.2	47.5	42.8	45.5	44.6
5	1000	45.5	48.8	47.5	48.3	52.3	50.7	43.8	47.6	46.4
6	1100	46.7	51.3	49.6	45.9	48.3	47.1	44.7	45.5	45.1

Location		**N5**			**N6**			**N7**		
S.No	**Time (Hrs)**	**Min**	**Max**	**dB(A)**	**Min**	**Max**	**dB(A)**	**Min**	**Max**	**dB(A)**
7	1200	47.7	50.3	49.5	47.2	49.5	48.5	44.6	49.9	48.3
8	1300	48.1	50.3	49.3	45.8	51.2	49.3	46.5	49.2	48.6
9	1400	47.2	51.2	50.7	46.1	55.6	54.7	46.4	52.5	50.4
10	1500	48.5	51.3	50.1	47.3	54.5	52.2	45.8	54.2	51.8
11	1600	47.6	51.7	50.6	45.8	52.2	51.6	44.2	54.7	52.1
12	1700	46.1	50.4	48.8	47.1	53.5	51.4	42.8	53.9	51.7
13	1800	45.5	50	48.2	47.2	54.3	51.9	42.7	53.2	51.5
14	1900	45.2	48.5	47.7	48.5	51.3	50.5	42.8	51.8	49.3
15	2000	46.1	49.5	48.1	35.1	46.3	43.6	41.9	50.5	48.5
16	2100	44.4	45.5	44.6	36.4	45.7	43.2	41.5	49.7	47.2
17	2200	43.2	45.6	44.0	34.7	44.4	41.9	41.5	46.9	45.0
18	2300	31.5	38.9	36.6	36.1	40.2	38.7	38.8	40.2	40.8
19	0000	36.7	38.2	37.5	34.2	38.4	37.0	38.9	42.8	40.9
20	0100	35.8	37.9	36.4	34.9	39.9	37.8	38.4	40.5	39.4
21	0200	31.2	34.6	33.2	32.8	34.2	34.0	36.5	38.9	37.9
22	0300	34.2	36.8	35.7	33.1	36.6	35.2	35.5	37.7	36.6
23	0400	33.6	35.9	34.5	36.2	38.8	36.7	34.8	36.6	35.6
24	0500	32.2	35.5	34.6	34.4	38.2	35.4	34.4	35.6	35.5
Day Mean dB(A)				47.5	**Day Mean dB(A)**		48.9	**Day Mean dB(A)**		47.5
Night Mean dB(A)				35.5	**Night Mean dB(A)**		36.7	**Night Mean dB(A)**		38.0

3.9.2 Observations

From the above table, it is observed that the ambient noise levels at all the monitoring locations and villages as the permissible limits of 55 dB(A) for day time and 45 dB(A) for night time observed within permissible limit.

3.10 WATER ENVIRONMENT

3.10.1 Topography & Drainage Pattern

Topography

The lease applied area is exhibits elevated terrain. The area has gentle sloping towards western side and altitude of the area is 302m above from Mean sea level.

Drainage Pattern of the area

There are no developed surface drainage channels in the study area. The area is studded with few tanks that serve as the source of drinking water and their surplus feeds adjoining tanks. The area is mostly dry in all seasons except rainy seasons. The Bhavani river which has its origin in the silent valley ranges in Kerala state and enters in to Coimbatore district about 25 km west of Mettupalayam and flows in a northeast direction. The river drains an area of 1056 Sq.km with in this district. The Noyil River has its origin in the Boluvampatty valley of the Vellingiri hills and comes to be called the Swami Mudiyar. Further south it is joined by the Periyar and Chinnar. The Amaravathi River rises in the Anjanad valley in the Kerala state between the Anamalai hills and the plains and flows in the northeastern direction. Amaravathi dam is located on this river. The Palar, Aliyar and Upar which are the main steams of the river Ponnani are originating from the Anaimalai hills and flows in a north-northwest direction on the southern part of the district, the Aliyar and Thirumoorthy dams are located on Aliyar and Palar respectively.

The Parambikulam and Sholaiyar streams, which are tributaries to the Periyar River has a southwesterly direction on the southwestern part of the district. Five surface reservoirs are located on this river, which form part of the Parambikulam Aliyar project.

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 E to W direction. The quarrying activity will not hinder the natural flow of rainwater.

3.10.2 Rainfall

The area receives rainfall by South-West monsoon. Rainy season sets in the middle of June and lasts till September. The normal average rainfall in the Coimbatore district is 989 mm.

3.10.3 HYDROLOGY

- The Northwestern part and the Southern part of the Coimbatore is occupied by hill ranges of the Western Ghats, namely Nilgiris hills in the North-West and Annamalai hills in the South.
- The most part of the district forms parts of Cauvery river basin whereas the Southwestern part of the district comes under Ponnani River basin.
- The major river courses which come under Cauvery basin are Bhavani, Noyyal and Amaravathi.

The study area is part of Thirumanimuthar river basin. Dendritic to sub dendritic type of drainage is observed in study area. The 10km study area comprises of small stream the major is Thirumanimuthar River 8.85 Km in north direction.

TABLE 3.12: DISTANCE & DIRECTION OF RIVER/STREAM/NALA WITHIN THE 10KM RADIUS

Name of the River/Stream/Nala	Distance from Project Site (Km)	Direction from Project Site
Varattur River	50 m	N
Kumittipathi River	3.99 km	W

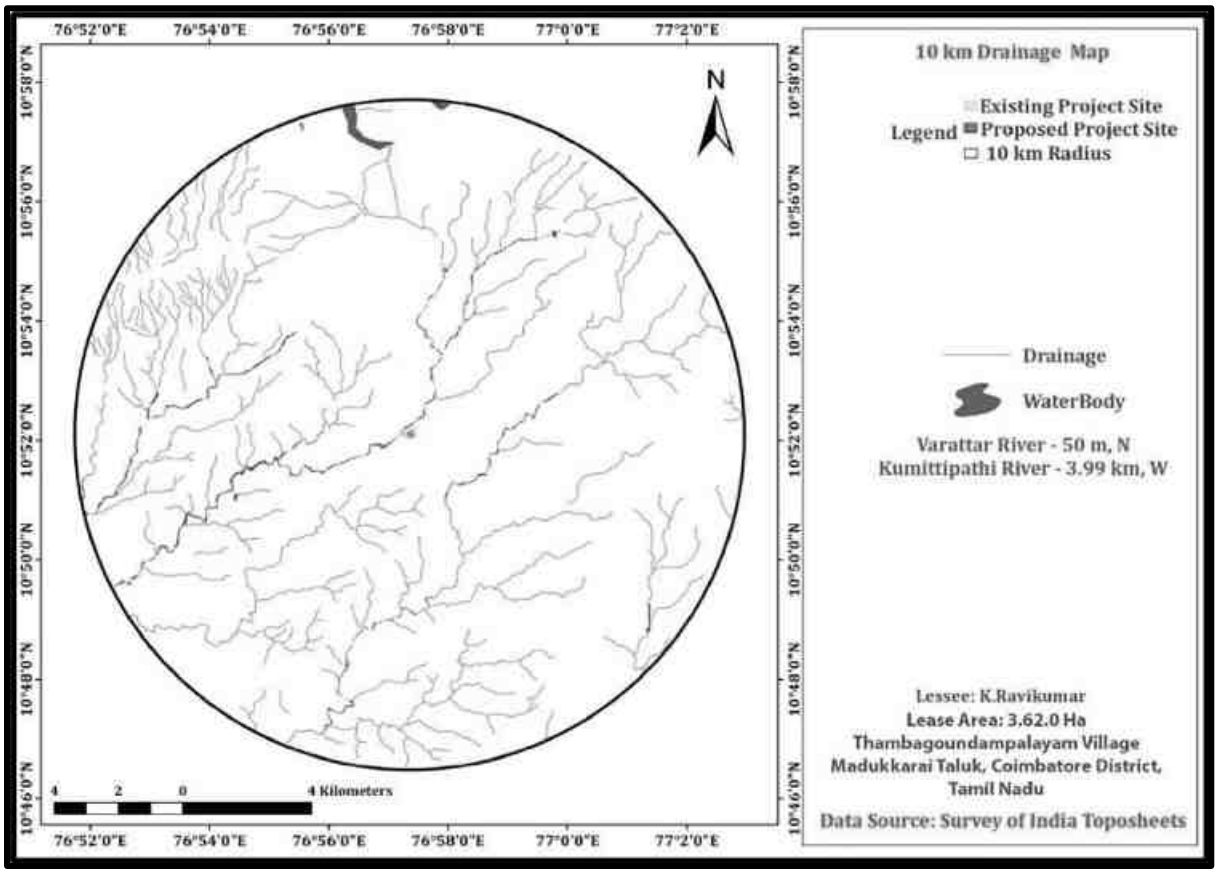


FIGURE 3.11: DRAINAGE PATTERN 10 KM RADIUS

3.10.4 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 Coimbatore district especially in Chinnathadagam and Chitrachavadi sub-basins of Noyil river basin. Studies carried out in this area indicate that the sand and gravel beds constitute more than 60 to 70 percent of the colluvium in the western part of Chinnathadagam basin. The Colluvial material in Chitrachavadi basin is mostly composed of silt and kantar with admixtures of sands and gravels. Ground water is occurring under phreatic conditions in the colluviums and is developed by means of dug wells and bore wells. The depth range of these shallow aquifers ranges from 34 to 56 m. The saturated thickness of these aquifers ranges from a few meters in Chitrachavadi basin to as much as 56 m at the center of Chinnathadagam sub-basin. The river alluvium is occurring along the major river courses.

The hard consolidated crystalline rocks are represented by weathered and fractured Granite Gneisses, Granites, Charnockites and other associated rocks. Ground water occurs under phreatic conditions in the weathered mantle and under semi-confined conditions in the fractured zones. The shallow aquifers in the major part of the district occur within the depth of 30 m while in the western most part of Coimbatore; they are more than 30 m. The depth of the wells ranged from 7 to 45 m bgl.

The yield of large diameter wells in the district, tapping the weathered mantle of crystalline rocks ranges from 50 to 300 lpm and are able to sustain pumping for 2 to 4 hours per day. The Specific capacity of large diameter wells tested in crystalline rocks from 6.28 to 200.00 lpm / m. of drawdown.

The yield of bore wells drilled down to a depth of 50 to 100 m, by various state agencies mainly for domestic purposes ranged from 1 to 5 lps. The yield of successful bore wells drilled down to a depth of 304 m bgl during the ground water exploration programme of Central Ground Water Board ranged from <1 to 10 lps. The aquifer and well parameters of the wells show wide variation.

(Source: http://cgwb.gov.in/District_Profile/TamilNadu/Coimbatore.pdf*)*

Type of Aquifer	Water Table Conditions In Hard Rock Areas
Well Yield in Lpm	50 - 300
Transmissivity (T)m^2/day	1.49; 164.18 m2/day
Permeability (K)(m/day)	0.25; 26.75 m/day
Depth of Water level	7m to 25m

(Source: Coimbatore | TWAD (tn.gov.in)*).*

3.10.5 Site Specific Ground Water Table scenario

The depth to water level in the district varied between 1.54 and 39.03 m bgl during pre-monsoon (May 2006) and varied between 0.62 and 36.42 m bgl during post monsoon (Jan 2007). The seasonal fluctuation shows a rise in water level, which ranges from 0.34 to 10.88 m bgl. The piezometric head varied between 1.47 to 50.66 m bgl (May 2006) during pre-monsoon and 0.34 to 51.02 m bgl during post monsoon (Jan 2007).

As per data obtained from nearby village borewells are tabulated in **Table 3.13 and 3.14.**

TABLE 3.13: WATER LEVEL

Particulars	Project
Water Table Level	
During summer Pre Monsoon	55-59m
Post Monsoon	54-58m

Particulars	Distance & Direction	Depth (m)	Water Level (m)
Open Well	200m, E	16	10
Bore Well	120m, N	157	55-59m (Pre-Monsoon) 54-58m (Post-Monsoon)

TABLE 3.14: WATER LEVEL OBSERVED IN BOREWELLS WITH 1KM RADIUS

Station Code	Latitude	Longitude	Oct	Nov	Dec	Average
			Water Level bgl in m			
A.	10°51'58.84"N	76°57'28.67"E	54	56	57	56
B.	10°52'14.07"N	76°57'19.62"E	55	56	54	55
C.	10°51'59.30"N	76°56'54.74"E	54	57	58	56
D.	10°52'5.04"N	76°56'38.63"E	56	56	57	56
E.	10°51'31.90"N	76°57'28.71"E	55	55	56	55
F.	10°51'40.54"N	76°57'45.41"E	56	57	56	56
G.	10°52'20.09"N	76°57'55.13"E	57	58	57	57
H.	10°52'44.35"N	76°57'35.38"E	56	57	56	56
I.	10°52'48.91"N	76°57'18.09"E	57	57	58	57
J.	10°51'57.31"N	76°57'51.81"E	56	57	56	56
K.	10°52'31.23"N	76°57'45.81"E	57	58	58	58

Source: Field Monitoring Data

3.10.6 GEOPHYSICAL SURVEY

Geophysical survey was carried out in that area by SSRMP-ATS Instrument with the help of IGIS software. Low resistance encountered at the depth between 50m bgl. The

quarrying operations is restricted upto 42 m. There is no possibilities of water table intersection during the entire mine life period besides it is also inferred topographically that there are no major water bodies intersecting the project area. There is no necessity of stream, channel diversion due to this proposed project. During rainy season there is a possibility of collection of seepage water from the subsurface levels this is due to the fracture and fissures at a depth of 54 m. Since the total mining depth is 42 m bgl, the water seepage from the fractured zone is not anticipated.

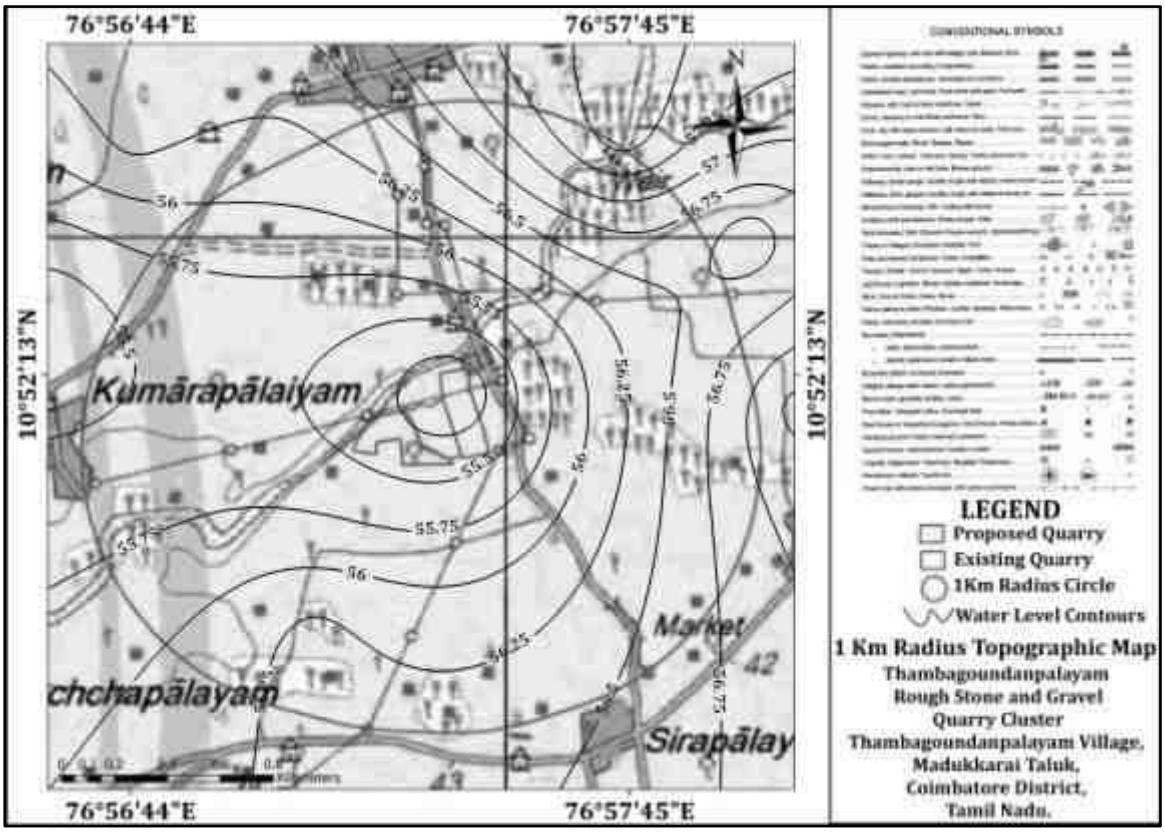


FIGURE 3.12: WATER LEVEL CONTOURS OBSERVED WITHIN 1KM RADIUS

3.10.6.1 Methodology and Data Acquisition

VES Resistivity Method for delineating lateral as well vertical discontinuities in the resistive structure of the Earth's subsurface is well established. Schlumberger electrode set up was employed for making sounding measurements. Since it is least influenced by lateral in homogeneities and can provide higher depth of investigation. The 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

3.10.6.2 Survey Layout

Here the present study is considered with Schlumberger array. The layout for a resistivity survey depends on the choice of the current and potential electrode arrangement, which is called electrode 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 – ATS. 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 $\sqrt{N}$ 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.

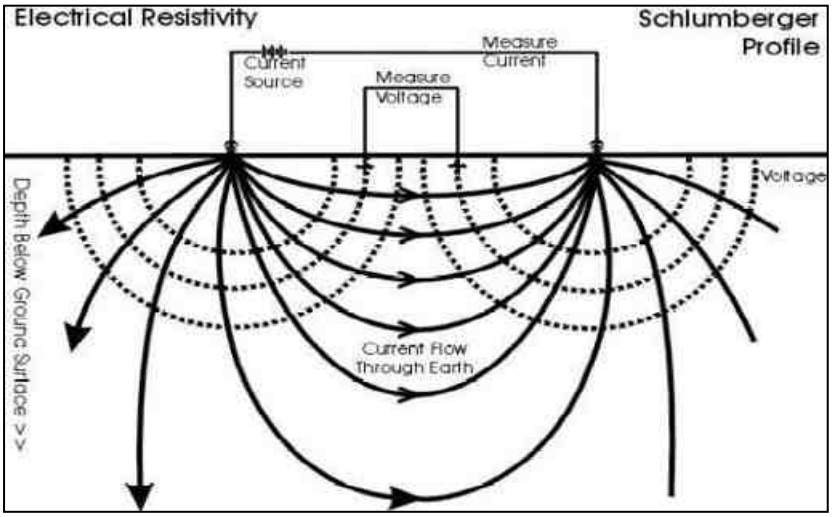


FIGURE 3.13: RESISTIVITY SURVEY PROFILE

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.

TABLE 3.15: GPS CO-ORDINATES OF VES LOCATION

No of station	Co-ordinates	Vertical Electrical Sounding depth in (m)
Station 1	10°52'7.14"N 76°57'23.98"E	100m

Source: Field Data

3.12.6.3 Data Presentation

TABLE 3.16 VES RESULTS OF STATION 1

S.No	Ab/2	Mn/2	K	R	Rho
1	2	1	6.29	21.81	137.185
2	4	1	25.13	8.14	204.558
3	6	1	56.53	4.45	251.559
4	8	1	100.49	3.03	304.485
5	10	1	157.03	2.29	359.599
6	10	5	158.29	15.51	2455.08
7	15	5	160.5	6.51	1044.86
8	20	5	119.33	3.81	454.647
9	30	5	276.33	2.7	746.091
10	40	5	496.13	2.04	1012.11
11	50	5	305.29	1.7	518.993

S.No	Ab/2	Mn/2	K	R	Rho
12	60	5	1124.13	1.56	1753.64
13	70	5	1532.33	1.44	2206.56
14	80	5	2003.33	1.34	2684.46
15	90	5	2537.13	1.3	3298.27
16	100	5	3133.73	1.28	4011.17

Source: Field Data

3.10.6.4 Geophysical Data Interpretation

From the interpreted data, it has inferred that the area has moderate groundwater potential in the investigated area. This small quarrying operation is above ground level and topography is hilly and will not have any significant impact on the Ground Water. 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.

3.10.7 Water requirement

Total water requirement in the rough stone mine for the project is estimated to be 3.0 KLD. Water will be supplied from mostly rainwater accumulated in mine pit (when available) for dust suppression and plantation and by tanker from nearby villages. Drinking water will be supplied from nearby villages.

3.10.8 Baseline Status

The existing status of groundwater and surface water quality was assessed by identifying 5 ground water (Bore wells/dug wells) samples in different villages and 2 surface water samples.

The physico-chemical characteristics of ground are given in the **Table 3.18** respectively**.**

TABLE-3.17: DETAILS OF WATER SAMPLING LOCATIONS

Sr. No.	Station Code	Locations	Distance (Km)	Direction	Source
1	GW 1	Nachipalayam	0.4km	SE	Borewell
2	GW 2	Arisipalayam	1.28km	SE	Borewell
3	GW 3	Palathurai	1.25km	NW	Borewell
4	GW 4	Kumarapalyam	1.3km	NW	Borewell
5	GW 5	Muthukkarai Pachapalayam	2.8km	NE	Borewell
Surface Water					
1	SW1	Nallah	0.16km	N	-
2	SW2	Nallah	1.75km	SE	-

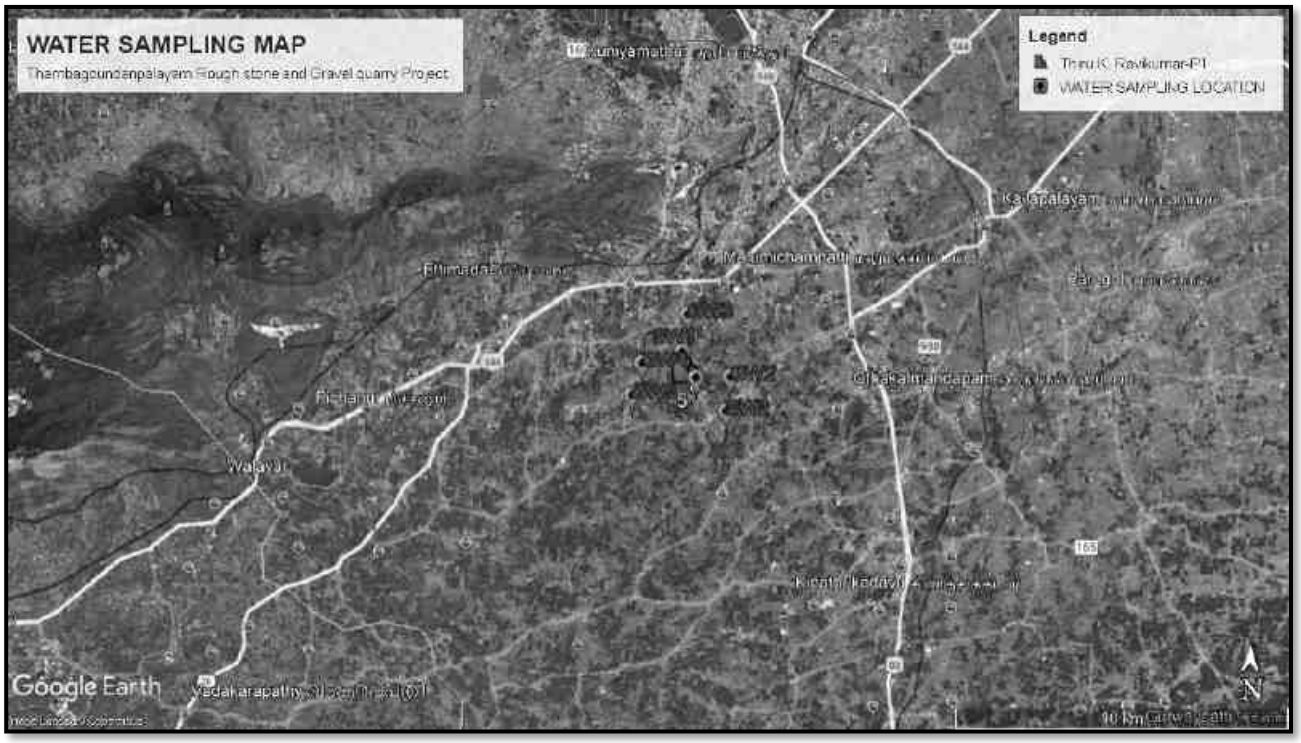


FIGURE 3.14: WATER MONITORING LOCATIONS

TABLE 3.18: PHYSICO-CHEMICAL CHARACTERISTICS OF GROUND WATER

Date of Sampling	20.12.2021	**Sampling Method**	ETS/STP/WATER-01
Analysis Start Date	25.12.2021	**Sample Quantity**	2.0+ 0.5 Litre
Analysis End Date	30.12.2021	**Packing Condition**	Sealed
Sampling Done By	ETS STAFF	**Packed IN**	PVC and Glass Bottle

S. No.	Test Parameter	Unit	GW 1 Result	GW 2 Result	GW 3 Result	GW 4 Result	GW 5 Result	Specification/Limit (As per IS:10500: 2012)		Test Method
								Desirable	Permissible	
1	Colour	Hazen	< 5	< 5	< 5	< 5	< 5	5	15	APHA 2120-B
2	Odour	…	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	APHA 2150-B
3	pH	…	7.64	7.26	7.83	8.10	7.03	6.5 - 8.5	No Relaxation	APHA 4500-H+
4	Conductivity	µs/cm	637	642	654	590	677	Not Specified	Not Specified	APHA 2510-B
5	Turbidity	NTU	< 1	< 1	< 1	< 1	< 1	1	5	APHA 2130-B
6	Total Dissolved Solids,(TDS)	mg/L	386	438	412	352	457	500	2000	APHA 2540-C
7	Total Hardness, ($CaCO_3$)	mg/L	190.5	210.2	187	225.6	167.4	200	600	APHA 2340-C
8	Calcium,(Ca)	mg/L	26.5	53.8	37.6	30.3	28	75	200	APHA 3500:(Ca)-B
9	Magnesium(Mg)	mg/L	23	27.2	23.5	20.7	18.9	30	100	APHA 3500:(Mg)-B

S. No.	Test Parameter	Unit	GW 1 Result	GW 2 Result	GW 3 Result	GW 4 Result	GW 5 Result	Specification/Limit (As per IS:10500: 2012)		Test Method
								Desirable	Permissible	
10	Total Alkalinity (CaCO3)	mg/L	138.7	210	123	158	183	200	600	APHA 2320-B
11	Chloride,(Cl)	mg/L	81	168.4	95.1	87	90.4	250	1000	APHA 4500:(Cl-)-B
12	Sulphate,(SO_4)	mg/L	18.2	37	25.6	23	25.1	200	400	APHA 4500:(SO_4)-E
13	Iron,(Fe)	mg/L	0.11	0.18	0.21	0.26	0.11	0.3	No Relaxation	APHA-3120B
14	Chlorine (Residual)	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	1	APHA 4500:(Cl)-B
15	Fluoride,(F)	mg/L	0.21	0.14	0.31	0.26	0.27	1	1.5	APHA 4500:(F-)-D
16	Nitrate,(NO_3)	mg/L	18	18	18.4	16.7	12.6	45	No Relaxation	APHA 4500:(NO_3-)-B
17	Copper,(Cu)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.05	1.5	APHA 3120B
18	Manganese,(Mn)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.1	0.3	APHA-3120B
19	Mercury,(Hg)	ug/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	No Relaxation	APHA-3114C
20	Cadmium,(Cd)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	No Relaxation	APHA 3120B
21	Selenium,(Se)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	No Relaxation	APHA-3120B
22	Aluminium,(Al)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.2	APHA-3120B
23	Lead,(Pb)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	No Relaxation	APHA-3120B
24	Zinc,(Zn)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	5	15	APHA-3120B
25	Total Chromium,	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	Not	Not Specified	APHA-3120B

S. No.	Test Parameter	Unit	GW 1 Result	GW 2 Result	GW 3 Result	GW 4 Result	GW 5 Result	Specification/Limit (As per IS:10500: 2012)		Test Method
								Desirable	Permissible	
	(Cr)							Specified		
26	Boron,(B)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.5	1	APHA 4500: (B)-C
27	Mineral Oil	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.5	No Relaxation	IS 3025 (Part-39)
28	Phenolic Compound, (C_6H_5OH)	mg/L	Absent	Absent	Absent	Absent	Absent	0.001	0.002	APHA 5530-C
29	Anionic Detergent(MBAS)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	1	APHA 5540-C
30	Cyanide, (CN)*	mg/L	Absent	Absent	Absent	Absent	Absent	0.05	No Relaxation	APHA 4500: (CN-)-D
31	Total Coliform Count	MPN/ 100mL	< 2	< 2	< 2	< 2	< 2	Shall Not Be Detectable		IS 1622
32	Escherichia coli	MPN/ 100mL	< 2	< 2	< 2	< 2	< 2	Shall Not Be Detectable		IS 1622
33	Barium,(Ba)	mg/L	<0.005	<0.005	<0.005	< 2	< 2	0.7	No Relaxation	APHA 3120B
34	Ammonia(as Total NH_3-N)*	mg/L	<0.05	<0.05	<0.05	<0.005	<0.005	0.5	No Relaxation	APHA 4500:(NH3)-C
35	Sulphide,(H_2S)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	No Relaxation	APHA 4500: (S_2-)-D
36	Molybdenum,(Mo)	mg/L	<0.005	<0.005	<0.005	<0.05	<0.05	0.07	No Relaxation	APHA-3120B
37	Arsenic,(As)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	0.05	APHA 3120B

S. No.	Test Parameter	Unit	GW 1 Result	GW 2 Result	GW 3 Result	GW 4 Result	GW 5 Result	Specification/Limit (As per IS:10500: 2012)		Test Method
								Desirable	Permissible	
38	(TSS)	mg/L	<2.0	<2.0	<2.0	<0.005	<0.005	Not Specified	Not Specified	APHA 2540-D

TABLE 3.18a: PHYSICO-CHEMICAL CHARACTERISTICS OF SURFACE WATER

Date of Sampling	**20.05.2021**	**Sampling Method**	**ETS/STP/WATER-01**
Analysis Start Date	**25.05.2021**	**Sample Quantity**	**2.0+ 0.5 Litre**
Analysis End Date	**30.05.2021**	**Packing Condition**	**Sealed**
Sampling Done By	**ETS STAFF**	**Packed IN**	**PVC and Glass Bottle**

S. No.	Test Parameter	Unit	SW 1 Result	SW 2 Result	Test Method
1	Colour	Hazen	5	10	IS:3025 (Pt-4)
2	Odour	Agreeable	Agreeable	Agreeable	IS:3025 (Pt-5)
3	pH	---	7.85	8.20	IS:3025 (Pt-11)
4	Conductivity (25 °C)	us/Cm	727	780	APHA-2510
5	Turbidity	NTU	10.2	12.0	IS:3025 (Pt-10)
6	Total Dissolve Solid (TDS)	mg/L	534	568.4	IS:3025 (Pt-16)
7	Total Hardness(CaCO3)	mg/L	256.5	289.2	IS:3025 (Pt-21)
8	Calcium (Ca)	mg/L	42.6	29.3	IS:3025 (Pt-40)
9	Magnesium (Mg)	mg/L	38.6	27.1	IS:3025 (Pt-45)
10	Total Alkalinity (CaCO3)	mg/L	173	226	IS:3025 (Pt-23)
11	Chloride (Cl)	mg/L	73.4	105	IS:3025 (Pt-32)

S. No.	Test Parameter	Unit	SW 1 Result	SW 2 Result	Test Method
12	Sulphate (SO_4)	mg/L	28	21	IS:3025 (Pt-24)
13	Iron (Fe)	mg/L	0.20	0.25	IS:3025 (Pt-53)
14	Chlorine (Residual)	mg/L	< 0.02	< 0.02	APHA 4500:(Cl)-B
15	Fluoride (F)	mg/L	0.28	0.22	IS:3025 (Pt-60)
16	Nitrate,(NO_3)	mg/L	16.4	19.4	APHA 4500:(NO_3-)-B
17	Copper(Cu)	mg/L	<0.1	<0.1	APHA-3111(B)
18	Manganese,(Mn)	mg/L	< 0.01	< 0.01	APHA-3120B
19	Mercury,(Hg)	ug/L	<0.001	<0.001	APHA-3114C
20	Cadmium(Cd)	mg/L	<0.001	<0.001	APHA-3111 (B)
21	Selenium,(Se)	mg/L	< 0.01	< 0.01	APHA-3120B
22	Aluminium,(Al)	mg/L	<0.01	<0.01	APHA-3120B
23	Lead(Pb)	mg/L	<0.001	<0.001	APHA-3111 (B)
24	Zinc(Zn)	mg/L	<0.01	<0.01	APHA-3111 (B)
25	Chromium,(Cr)	mg/L	< 0.01	< 0.01	APHA-3120B
26	Boron,(B)	mg/L	< 0.01	< 0.01	APHA 4500:(B)-C
27	Mineral Oil	mg/L	<0.001	<0.001	IS 3025 (Part-39)
28	Phenolic Compound (C6H5OH)	mg/L	<0.001	<0.001	APHA-5530
29	Anionic Detergent,(MBAS)	mg/L	<0.01	<0.01	APHA 5540-C
30	Cyanide,(CN)	mg/L	<0.05.	<0.05.	APHA 4500:(CN-)-D
31	Biological Oxygen Demand (BOD at 27^0C for 3 day)	mg/L	9.2	8.3	APHA-5220 (B)
32	Chemical Oxygen Demand (COD)	mg/L	16.5	17.3	APHA-5220 (B)
33	Dissolved Oxygen(DO)	mg/L	5.6	4.8	APHA 4500:(O)-C

S. No.	Test Parameter	Unit	SW 1 Result	SW 2 Result	Test Method
34	Total Coliform	MPN/100ml	180	210	IS:1622-1981
35	E. Coli	Coli/100ml	80	110	IS:1622-1981
36	Barium,(Ba)	mg/L	< 0.01	< 0.01	APHA 3120B
37	Ammonia, (as Total NH_3-N)	mg/L	0.80	2.2	APHA 4500:(NH3)-C
38	Sulphide,(H_2S)	mg/L	< 0.5	< 0.5	APHA 4500:(S_2-)-D
39	Molybdenum,(Mo)	mg/L	< 0.01	< 0.01	APHA-3120B
40	Arsenic,(As)	mg/L	< 0.01	< 0.01	APHA 3120B
41	Total Suspended Solids,(TSS)	mg/L	17.4	14.1	APHA 2540-D

3.10.9 Result Discussion

3.10.9.1 Ground Water Quality

The physico-chemical characteristics of groundwater are presented in Table below and are compared with the standards. The pH of the water samples collected ranged from 7.03 to 8.10 and within the acceptable limit of 6.5 to 8.5. The total dissolved solids were found in the range of 352 to 457 mg/l in all samples. The total hardness varied between 167.4 to 225.6 mg/l for all samples collected at 5 locations.

In all samples, iron content is 0.11 to 0.26 mg/l, Nitrate in between 12.6 to 18.4 mg/l, fluoride varied between 0.14 to 0.31 mg/l, chloride 81 to 168.4 mg/l, Sulphate 18.2 to 37 mg/l, alkalinity 123 to 210 mg/l, calcium 26.5 to 53.8 mg/l and magnesium in between 18.9 to 27.2 mg/l. The overall ground water quality was found to be good in most of the villages. The levels of heavy metals content were found to be within permissible limits.

3.10.9.2 Surface Water Quality

The results of the surface water samples analyzed are presented in **Table 3.17** and are compared with the standards.

The pH of the water samples collected ranged from 7.85-8.20 and is within the acceptable limit of 6.5 to 8.5. The total dissolved solids were found in range of 534-568.4 mg/l in all samples. The total hardness varied between 256.5 to 289.2 mg/l for all samples collected at 2 location only.

In all samples, iron content is 0.20-0.25 mg/l, Nitrate in between 16.4 to 19.4 mg/l, fluoride varied between 0.22 to 0.28 mg/l, chloride 73.4 to 105 mg/l, Sulphate 21 to 28 mg/l, alkalinity 173 to 226 mg/l, calcium 29.3 to 42.6 mg/l and magnesium in between 27.1.9 to 38.6 mg/l. The overall surface water quality was found to be good in the village. The levels of heavy metals content were found to be within permissible limits.

3.11 BIOLOGICAL ENVIRONMENT

3.11.1 Introduction

Biological environment of any area constitutes all living beings of that area. It is an integral part of the environment. Biodiversity is often considered synonymous with species richness of the area. Identifying, measuring, and monitoring biodiversity is a complex exercise. The biodiversity assessment generally concerns with, conducting biodiversity inventories, inventories for assessing existing biodiversity. This provides the information on the biodiversity richness of the area under consideration. The selection of indicators differs for each biodiversity monitoring and is entirely based on the output required from such biodiversity inventory. Any change in the surrounding environment

could cause loss of species or decrease in biodiversity of the area. Therefore, the present study is proposed to assess the impact of the rough stone mining project on biological environment of the project site and surrounding area within 10 km radius. Accordingly, mitigation measures are planned to sustain the biological diversity.

3.11.2 Ecological Impact Assessment

Ecological Impact Assessment is used to predict and evaluate the impacts of development activities on ecosystems and their components, thereby providing the information needed to ensure that ecological issues are given full and proper consideration in development planning. Environmental Impact Assessment (EIA) has emerged as a key to sustainable development by integrating social, economic and environmental issues. EIA has a major part to play as a component of EIA but also has other potential applications in environmental planning and management. Ecological Impact Assessment provides a comprehensive review of the EIA process and summarizes the ecological theories and tools that can be used to understand, explain and evaluate the ecological consequences of development proposals.

Environmental Impact Assessments have become an integral part of development projects in India ever since 1994, to formulate policies and guidelines for environmentally sound economic development. Proper assessment of biological environment and compilation of its taxonomical data is essential for the impact predictions.

Consistent and regularly updated data on regional and local taxonomy and floristic and faunal diversity of the areas are almost non-existent in country as diverse as India. Instant information on biodiversity profiles of the area, where the proposed project is setting up, is an essential part of the baseline studies of EIA. In such a situation, good primary baseline biodiversity survey is a pre-requisite for the collection of reliable data. These contributions towards biodiversity surveys may sometimes recognized as the actual value additions in terms of new records or a new data base but are more often recognized in the validation and updating of the existing information base.

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.

3.11.3 Objectives of the study

The ecological study of the area was conducted in order to understand the existing status of the flora and fauna to generate baseline information and evaluate the possible impacts on biological environment. The present study highlights the various issues pertaining to floristic diversity and faunal wealth in the surrounding area up to 10 km radius of the proposed project site.

3.11.4 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;
- 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 and there are no forest blocks in study area. The detailed ecological assessment of the study a rea 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 andfaunal categories); and
- Evaluation of impact of proposed expansion on flora and fauna of the area.

The present study was carried out in given steps

- Field survey was conducted by visual encounter survey for flora present within the 10 km radius study areaof all the proposed mine site.
- After surveying the core and buffer areas, a detailed floral inventory has been compiled. List of all plants of the study area was prepared and their habitats were recorded.
- Verification of Rare, Endangered and Threatened Flora species from IUCN Red Data Book.
- Plants and Animals communities were noted.

3.11.5 Site selection criteria

The core study area is located at Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu. The buffer study area comprises of 10 km radius from all the proposed rough stone quarry area. Selection of sampling locations was made with reference to topography, land use, vegetation pattern, etc. The observations were taken on natural vegetation, roadside plantation and non-forest area (agricultural field, in plain

areas, village wasteland, etc.) for quantitative representation of different species. A methodology of Sampling Flora and fauna studies were carried out to assess the list of terrestrial plant and animal species that occur in the core area and the buffer area up to 10 km radius from the project site. No damage was created to flora and fauna during the sampling.

3.11.6 Flora Methodology

To provide representative ecological status for the study area, the 10-km buffer zone has been divided into four quartiles for biodiversity sampling, i.e., NE (Quartile-1), NW (Quartile-2) SW (Quartile-3) and SE (Quartile-4). Each of the quartiles have been examined for representative flora on randomly sampled quadrats for trees (25x25-m), shrubs (10x10-m) and herbs (2x2-m) depending upon prevailing geographical conditions and bio-diversity aspects of study area.

3.11.7 Fauna Methodology

The assessment of fauna was done collecting the primary data from the project sites. The presence was also confirmed from the local inhabitants depending on the animal sightings and the frequency of their visits in the project area. In addition, officials, local people were another source of information for studying the fauna of the area. Field activities were physical search, hollow inspection, covering rocks, location of nesting sites and habitat assessment etc. Taxonomical identification was done by the field guide book and wildlife envis data base (wiienvis.nic.in/Database/Schedule Species Database) and Zoological Survey of India (ZSI).

3.11.7.1 Survey and Monitoring of Mammals

Intensive survey was done by line transect method (Walking and in vehicle) for all major habitats for surveying of mammals by direct and indirect evidence. Indirect methods such as scat (i.e. faecal matter,) and pug mark by establishing 10 × 100-m linear transects depending on the habitat (i.e., existing wildlife game routes/foresttrails used).
Direct observation technique was used for surveying large and medium sized mammals but this technique was perfectly suitable for surveying of diurnal mammals.

3.11.7.2 Survey and Monitoring of Birds

Birds are sampled by using point count methods, and opportunistic bird sightings. By this bird vocal sounds, the species were identified in consultation with village local people.
Point count: In this method, the observer will stand in a randomly chosen point and birds seen or heard in 50m radius will be recorded for 5-min, this observation will be repeated in another point at least 30m from the first point. We have enumerated 20 point – counts

in each quartile, which constitute a total of 80 points-count (20 x 4) within 10 km radius area.

Opportunistic bird sightings: While traveling in study area, many bird species will be detected in survey time. Such species will be recorded by their appearance or by their call.

3.11.7.3 Survey and Monitoring of reptiles

Several survey techniques such as standard walk transect visual encounter survey methods were used to sampling reptiles in each and every habitat of the study area. Species identification was done by using standard field guides in consultation with village people expert. The butterfly was enumerated by 2 linear transects of 10 × 100 m, laid within each quartile at minimum interval of 1 km. Further, amphibians and fishes documented in existing literature and secondary information in consultation with local people and wildlife experts.

3.11.8 Flora in Core Zone

Taxonomically a total of 15 species belonging to 16 families have been recorded from the core mining lease area. It is very dry and exhibit plain topography. Based on habitat classification of the enumerated plants the majority of species were Tree (6), Shrubs (4), Herbs (3) and Climber (2). The result of core zone of flora studies shows that Fabaceae and Arecaceae are the main dominating species.

3.11.9 Flora in Buffer Zone

Similar type of environment also in buffer area but with more flora diversity compare than core zone area because nearby some agriculture land. The agriculture land was found to dominate mostly in North, and East directions. Majority of the flat landscape around project unit is occupied by agriculture fields. It contains a total of 59 species belonging to 39 families have been recorded from the buffer zone. Floral (62) varieties among them trees (25), shrubs (11) and herbs (14) and climbers (9) were identified. The result of buffer zone of flora studies shows that Fabaceae and Lamiaceae, Moraceae are the main dominating species in the study area.

There is no Rare, Endangered and Threatened Flora species in mining area and their surrounding area.

TABLE 3.19: FLORA IN CORE ZONE

S. No	*Scientific Name*	*Family*	**Local Name**

S. No	*Scientific Name*	*Family*	**Local Name**
TREES			
1	*Mangifera indica*	Anacardiaceae	Manga maram
2	*Azadirachta indica*	Meliaceae	Vembu
3	*Vachellia nilotica*	Fabaceae	Karuvelam maram
4	*Cocos nucifera*	Arecaceae	Thennai maram
5	*Borassus flabellifer*	Arecaceae	Panai maram
6	*Morinda citrifolia*	Rubiaceae	Nuna maram
HERB			
7	*Leucas aspera*	Lamiaceae	Thumbai
8	*Tribulus terrestris*	Zygophyllales	Nerunji
9	*Cynodon dactylon*	Poaceae	Arugampul
SHRUB			
10	*Calotropis gigantea*	Apocynaceae	Erukku
11	*Abutilon indicum*	Malvaceae	Thuththi
12	*Mimosa pudica*	Mimosaceae	Thottalchinungi
13	*Senna auriculata*	Fabaceae	Avarai
CLIMBER			
14	*Passiflora foetida*	Passifloraceae	Sirupunaikkali
15	*Cissus quadrangularis*	Vitaceae	Perandai

TABLE 3.20: FLORA IN BUFFER ZONE

S. No	**Scientific Name**	**Family**	**Local Name**	**Resource use type**
TREE				
1.	*Ficus recemosa*	Moraceae.	Athi	EM
2.	*Lawsonia inermis*	Lythraceae	Marudaani	EM
3.	*Azadirachta indica*	Meliaceae	Vembu	M
4.	*Musa*	Musaceae	Vazhaimaram	EM
5.	*Mangifera indica*	Anacardiaceae	Manga	E
6.	*Ficus benghalensis*	Moraceae	Alamaram	E
7.	*Tamarindus indica*	Legumes	Puliyamaram	EM
8.	*Ficus religiosa*	Moraceae	Arasanmaram	M
9.	*Bambusa bambo*	Poaceae	Moonghil	E
10.	*Morinda citrifolia*	Rubiaceae	Nuna maram	M
11.	*Sygygium cumini*	Myrtaceae	Navalmaram	EM
12.	*Tectona grandis*	Verbenaceae	Thekku	E
13.	*Psidium guajava*	Myrtaceae	Koyya	EM
14.	*Emblica officinalis*	Phyllanthaceae	Nelli	EM
15.	*Carica papaya L*	Caricaceae	Pappali maram	EM

S. No	Scientific Name	Family	Local Name	Resource use type
16.	*Vachellia nilotica*	Fabaceae	Karuvelam maram	M
17.	*Manilkara zapota*	Sapotaceae	Sapota	E
18.	*Calophyllu inophyllum*	Calophyllaceae	Punnai	M
19.	*Cocos nucifera*	Arecaceae	Thennai maram	EM
20.	*Borassus flabellifer*	Arecaceae	Panai maram	E
21.	*Vitex negundo*	Verbenaceae	Nochi	E
22.	*Annona reticulata*	Annonaceae	Seethapazham	E
23.	*Murraya koenigii*	Asclepiadaceae	Velipparuthi	EM
24.	*Citrus lemon*	Rutaceae	Ezhumuchaipalam	EM
25.	*Eucalyptus globules*	Myrtaceae	Eucalyptus	EM
		HERB		
26.	*Solanumnigrum*	Solanaceae	Manathakkali	EM
27.	*Cyperus compressus*	Cyperaceae	Kunnakora	NE
28.	*Eclipta prostata*	Asteraceae	Karisilanganni	EM
29.	*Centella asiatica*	Apiaceae	Vallarai	EM
30.	*Phyllanthus amarus*	Phyllanthaceae	Kilanelli	M
31.	*Leucas aspera*	Lamiaceae	Thumbai	M
32.	*Achyranthes aspera*	Amaranthaceae	Nayuruv	M
33.	*Ocimum tenuiflorum*	Lamiaceae	Thulasi	M
34.	*Cyperus rotundus*	Cyperaceae	Korai	NE
35.	*Boerhavia diffusa*	Nyctaginaceae	Mukurattai	M
36.	*Tridax procumbens*	Asteraceae	Veetukaayapoondu	M
37.	*Cynodon dactylon*	Poaceae	Arugampul	E
38.	*Acalypha indica*	Euphorbiaceae	Kuppaimeni	M
39.	*Commelina benghalensis*	Commelinaceae	Kanamvazha	M
		SHRUB		
40.	*Solanum torvum*	Solanaceae	Sundaika	EM
41.	*Phoenix pusilla*	Arecaceae	Icham	EM
42.	*Abutilon indicum*	Meliaceae	Thuthi	M
43.	*Senna auriculata*	Fabaceae	Avarai	M
44.	*Nerium indicum*	Apocynaceae	Arali	M
45.	*Hibiscu rosa-sinensis*	Malvaceae	Chemparuthi	EM
46.	*Jatropha curcas*	Euphorbiaceae	Kattamanakku	EM
47.	*Calotropis gigantea*	Apocynaceae	Erukku	M
48.	*Abrus precatorius*	Fabaceae	Kundumani	M
49.	*xoracoc cinea*	Rubiaceae	Idlipoo	M
50.	*Mimosa pudica*	Mimosaceae	Thottalchinungi	M
		CLIMBER		
51.	*Jasminum augustifolium*	Oleaceae	Malli	EM
52.	*Cissus quadrangularis*	Vitaceae	Perandai	M
53.	*Lagenaria siceraria*	Cucurbitaceae	Sorakkai	EM
54.	*Coccinia grandis*	Cucurbitaceae	Kovai	M

S. No	Scientific Name	Family	Local Name	Resource use type
55.	*Clitoriaternatia*	Fabaceae	Sangupoo	M
56.	*Solanum trilobatum*	Solanaceae	Thuthuvelai	EM
57.	*Trichosanthes dioica*	Cucurbitaceae	Kovakkai	EM
58.	*Passiflora foetida*	Passifloraceae	Sirupunaikkali	
59.	*Clitoria ternatea*	Fabaceae	Karkakartum	M

*E- Economical, M- Medicinal, EM- Both Economical and Medicinal, NE- Not evaluated

3.11.10 FAUNA

The faunal survey has been carried out as per the methodology cited and listed out Mammals, birds, Reptiles, Amphibians and Butterflies. All the listed species were compared with Red Data Book and Indian WildlifeProtection Act, 1972. There are no rare, endangered, threatened (RET) and endemic species present in core area.

3.11.11 FAUNA IN CORE ZONE

A total of 22 varieties of species observed in the Core zone of Thambagoundanpalayam village, rough stone quarry. Among them numbers of Insects 9 (37.5%), Reptiles 4 (20.83%), Mammals 3 (12.5%)and Avian 6 (29.16%). A total of 22 species belonging to 19 families have been recorded from the core mining lease area. None of these species are threatened or endemic in the study area and surroundings. There is no Schedule I species and six species are under schedule IV according to Indian wild life Act 1972. A total seven species of bird were sighted in the mining lease area.

Dominant species are mostly birds and insects and three amphibians were observed during the extensive field visit (Hoplobatrachus tigerinus), (Rana hexadactyla), (Bufo melonosticatus). There are no critically endangered, endangered, vulnerable and endemic species were observed. Details of fauna in core zone with the scientific name were mentioned in **Table 3.21**.

TABLE 3.21: LIST OF FAUNA IN CORE ZONE

S. No	*Scientific Name*	*Family Name*	*WPA Schedule*	*IUCN List*
INSECTS				
1	*Danaus plexippus*	Nymphalidae	Schedule IV	LC
2	*Catopsilia pyranthe*	Peridae	NL	LC
3	*Hieroglyphus sp*	Acrididae	NL	LC
4	*Hamitermes silvestri*	Blattodea	NL	LC
5	*Mantis religiosa*	Mantidae	NL	NL
6	*Crausius morosus*	Lonchodidae	NL	LC
7	*Sympetrum fonscolombii*	Libellulidae	NL	LC

8	*Acraea violae*	Nymphalidae	NL	LC
9	*Danaus genutia*	Nymphalidae	NL	NL
REPTILES				
10	*Hemidactylus frenatus*	Gekkonidae	NL	LC
11	*Sitanaponticeriana*	Agamidae	NL	LC
12	*Calotes versicolor*	Agamidae	NL	LC
13	*Eutropis carinata*	Scincidae	NL	LC
MAMMALS				
14	*Rattus rattus*	Muridae	Schedule IV	LC
15	*Mus booduga*	Muridae	Schedule IV	NL
16	*Herpestes javanicus*	Herpestidae	Schedule II	LC
AVES				
17	*Meropsorientalis*	Meropidae	NL	LC
18	*Bubulcus ibis*	Ardeidae	NL	LC
19	*Acridotheres tristis*	Sturnidae	NL	LC
20	*Coturnix coturnix*	Phasianidae	Schedule IV	LC
21	*Corvussplendens*	Corvidae	NL	LC
22	*Dicrurus macrocercus*	Dicruridae	Schedule IV	LC

*NE- Not evaluated; LC- Least Concern, NT –Near Threatened, T-Threatened

3.11.10.1 FAUNA IN BUFFER ZONE

Taxonomically a total of 40 species belonging to 29 families have been recorded from the buffer zone area.Based on habitat classification the majority of species were Insects 14 (35%), followed by Birds 15 (37.5%), Reptiles 5 (12.5%), Mammals 3 (7.5%) and amphibians 3 (7.5%). There are one Schedule II species and twenty-two species are under schedule IV according to Indian wild life Act 1972. A total 15 species of bird were sighted in the study area. There are no critically endangered, endangered, vulnerable and endemic species were observed.

The result of core & Buffer zone of fauna studies shows that Nymphalidae and *Scincidae, Agamidae* are the main dominating species in the study area; it is mentioned in Table No.3.5. There is no schedule I Species in study area. There are no critically endangered,endangered, vulnerable and endemic species were observed. Details of faunal diversity in buffer zone are given in **Table 3.22**.

TABLE 3.22: FAUNA IN BUFFER ZONE

S.No	Scientific Name	Family Name	WPA Schedule	IUCN List
INSECTS				
1	*Apis cerana*	Apidae	Schedule IV	LC
2	*Danaus plexippus*	Nymphalidae	Schedule IV	LC
3	*Danaus chrysippus*	Nymphalidae	Schedule IV	LC
4	*Danaus genutia*	Nymphalidae	Schedule IV	LC
5	*Eurythyrea austriaca*	Buprestidae	Schedule IV	NA

S.No	Scientific Name	Family Name	WPA Schedule	IUCN List
6	*Sympetrum fonscolombii*	Libellulidae	NL	LC
7	*Camponotus Vicinus*	Formicidae	NL	NL
8	*Ceratogomphus pictus*	Gomphidae	Schedule IV	
9	*Danainae*	Nymphalidae	NL	LC
10	*Euploea core*	Nymphalidae	Schedule IV	LC
11	*Mantis religiosa*	Mantidae	NL	NL
12	*Hieroglyphus sp*	Acrididae	NL	LC
13	*Zizina Otis indica*	Lycaenidae	Schedule IV	LC
14	*Tirumala limniace*	Nymphalidae	Schedule IV	LC
REPTILES				
15	*Calotes versicolor*	Agamidae	NL	LC
16	*Eutropis carinata*	Scincidae	NL	LC
17	*Hemidactylus frenatus*	Gekkonidae	NL	LC
18	*Sitanaponticeriana*	Agamidae	NL	LC
19	*Mabuya carinatus*	Scincidae	NL	LC
MAMMALS				
20	*Funambulus palmarum*	Sciuridae	Schedule IV	LC
21	*Mus booduga*	Muridae	Schedule IV	LC
22	*Herpestes javanicus*	Herpestidae	Schedule II	LC
AVES				
23	*Eudynamys*	Cucalidae	Schedule IV	LC
24	*Bubulcus ibis*	Ardeidae	NL	LC
25	*Acridotheres tristis*	Sturnidae	NL	LC
26	*Corvussplendens*	Corvidae	NL	LC
27	*Meropsorientalis*	Meropidae	NL	LC
28	*Pycnonotuscafer*	Pycnonotidae	Schedule IV	LC
29	*Psittacula krameri*	Psittaculidae	NL	LC
30	*Accipiter badius*	Accipitridae	NL	LC
31	*Coturnix coturnix*	Phasianidae	Schedule IV	LC
32	*Dicrurus macrocercus*	Dicruridae	Schedule IV	LC
33	*Dicrurus macrocercus*	Dicruridae	Schedule IV	LC
34	*Francolinus pondicerianus*	Phasianidae	Schedule IV	LC
35	*Coturnix coturnix*	Phasianidae	Schedule IV	LC
36	*Amaurornis phoenicurus*	Rallidae	NL	LC
37	*Fulica atra*	Rallidae	Schedule IV	LC
38	*Sphaerotheca breviceps*	Dicroglossidae	Schedule IV	LC
39	*Rana hexadactyla*	Ranidae	Schedule IV	LC
40	*Hoplobatrachus tigerinus*	Chordata	Schedule IV	LC

*NL- Not listed, LC- Least concern, NT- Near threatened

3.11.11 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.

3.12 SOCIO ECONOMIC ENVIRONMENT

A prosperous nation needs well-developed industries to provide the amenities of life to its citizens. Industrial development has had an important role in the socio -economic growth of countries. Rapid economic growth is often essential for achieving a reduction in absolute poverty. Industrialization is often essential for economic and social growth.
Poverty reduction the pattern of industrialization, however, impacts remarkably on how the poor benefit from growth. Pro-poor economic and industrial policies focus on increasing the economic returns to the productive factors that the poor possess, e.g. raising returns to unskilled labour, whereas policies promoting higher returns to capital and land tend to increase inequality, unless they also include changes in existing patterns of concentration of physical and human capital and of land ownership. Use of capital-intensive methods instead of labor-intensive ones tends to increase employment, labour regulation, social protection, health, education, etc.

Where the level of education is low and human capital concentrated. Income disparities, as does the employment of skill-based technologies, especially Also, the location of industrial facilities has an impact on overall poverty reduction and inequality. As enterprises are often concentrated in urban areas. The industrial revolutions led to the development of factories for large-scale production, with consequent changes in society like Growth and structure of employment, impact of Socio-economic reforms and globalization trade and employment, labour regulation, social protection, health, education, etc. In this manner all developmental projects have direct as well as indirect relationship with socio-economic aspect, which also include public acceptability for new developmental projects. Thus the study of socio-economic component incorporating various facets related to prevailing social & cultural conditions and economic status of the project region is an important part of EIA study.

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 theproject.

It is expected that the Socio- Economic Status of the area will substantially improve because of this proposedproject. 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.

3.12.1 Objectives of the Study

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

- To examine, current status of developmental parameter in identified study area.
- To identify the direct and indirect impact on the social environment as a result of development project.
- To evaluate the nature and magnitude of these impacts.
- To provide probable mitigating measures on identified negative impacts due to proposed development activity on socio economic environment.

3.12.2 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

3.13 ADMINISTRATIVE SETUP OF COIMBATORE DISTRICT

An official Census 2011 detail of Coimbatore, a district of Tamil Nadu has been released by Directorate of Census Operations in Tamil Nadu. Enumeration of key persons was also done by census officials in Coimbatore District of Tamil Nadu.

In 2011, Coimbatore had population of 34,58,045 of which male and female were 17,29,297 and 17,28,748 respectively. In 2001 census, Coimbatore had a population of 5,41,425 of which males were 2,47,069 and remaining 2,94,356 were females. Coimbatore District population constituted 2.25. percent of total Tamil Nadu population.

The district decadal population growth during 2001 - 2011 was 18.6%, higher than the State average of 15.6%.

3.13.1 Coimbatore District Density

The district population density was 731 persons/sq km, higher than the State population density of 555 persons/sq km

3.13.2 Coimbatore Literacy Rate

In 2011 census, Coimbatore district has returned 84% as literate population; males with 89.1% and females with 78.9%. The total literacy in 2001 was 78.5%; males at 85.7% and females at 71.1%.

3.13.3 Coimbatore Sex Ratio

The sex ratio (i.e., females per 1000 males) of the district was recorded as 1000, higher than the State level of 996 during 2011 census. Child sex ratio of the district was 956 in 2011.

3.13.4 Coimbatore Child population

The initial provisional data released by census India 2011, shows that the child Population of district is 3,19,332 out of which 1,63,230 are Males and 1,56,102 are females.

3.13.5 Coimbatore Houseless Census

The initial provisional data released by census India 2011, the density was 731 persons/sq km, higher than the State population density of 555 persons/sq km.

3.13.6 Coimbatore District Urban/ Rural

In 2011 census, the total population of Coimbatore district was 3458045. Of this, rural population was 839105 and urban population was 2618940. In 2001, these were 2916620, 854489 and 2062131 respectively. The following table shows taluk level distribution of population for Total, Rural and Urban areas of Coimbatore district. Coimbatore South taluk has returned with the highest population of 1592646 and the lowest population was recorded in Valparai taluk with the population of 70859. Among the taluks in rural population, Pollachi taluk tops with the population of 321477. Coimbatore South taluk has recorded the lowest rural population of 82321. Comparing the population of urban areas, Coimbatore South taluk has the highest population of 1510325. Valparai taluk has recorded the lowest urban population of 70859.

3.14 STUDY AREA

The 10km radius village map is shown in **Figure 3.15.**

3.14.1 Reconnaissance

EIA study for Rough Stone Mine by Thiru. K. Ravikumar for Total Proposed Production of 2,73,335 m^3 of Rough Stone, S.F. No. 54/2, 55/1, 57/2 over an extent of 3.62.0 Ha. of Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamilnadu, India. The details of information on demographic structure of the villages in the study area are presented in in **Table 3.23**.

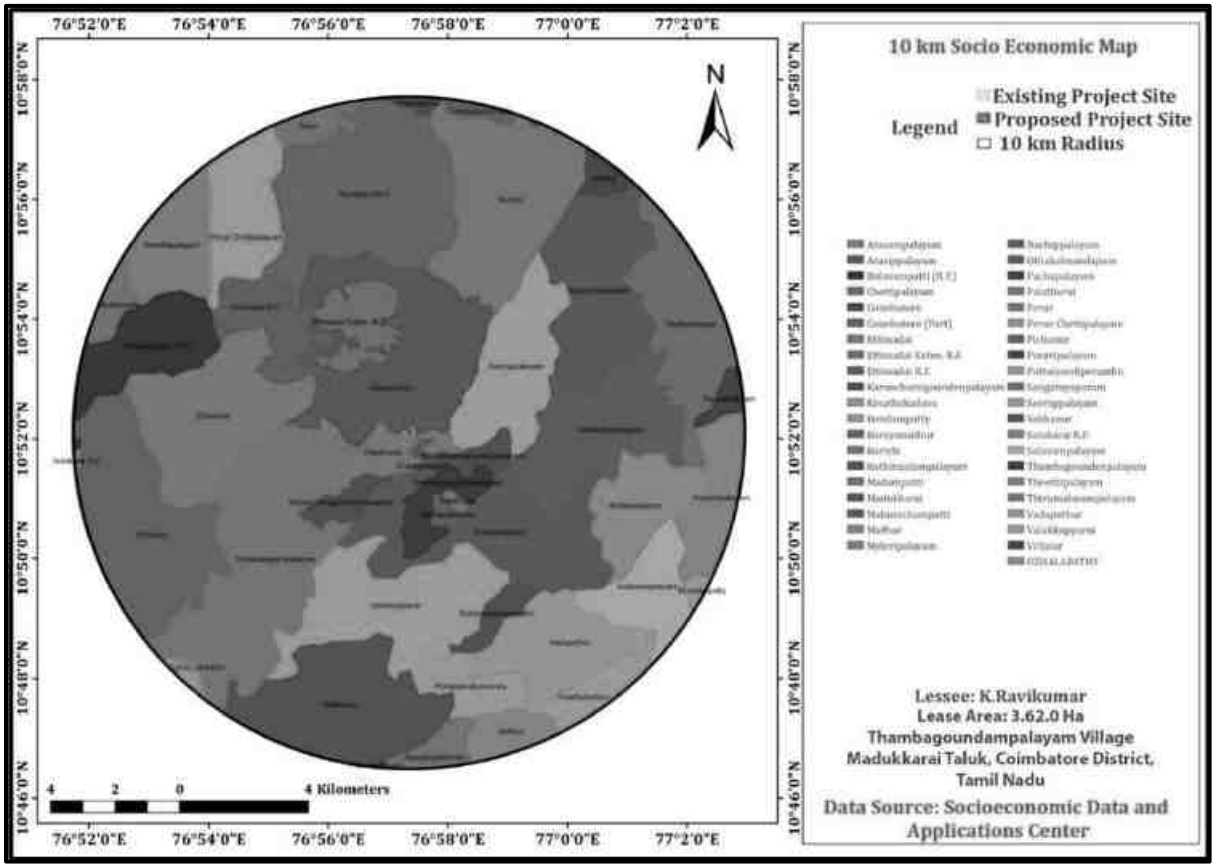


FIGURE 3.15: VILLAGE MAP OF THE STUDY AREA

TABLE 3.23: LIST OF VILLAGES IN THE STUDY AREA

SN	District	Villages
1.	Coimbatore	Arasampalayam
2.		Arisippalayam
3.		Boluvampatti (Block I)
4.		Perur Chettipalayam (CT)
5.		Chettipalayam
6.		Ettimadai (R.F)
7.		Ettimadai (R.F)
8.		Karunchamigoundenpalayam
9.		Kinathukadavu
10.		Kondampatty
11.		Kurichi
12.		Kuthiraialampalayam
13.		Madampatti
14.		Madukkarai

SN	District	Villages
15.		Malumichampatti (CT)
16.		Muthur
17.		Myleripalayam
18.		Nachippalayam
19.		Othakalmandapam
20.		Pachapalayam
21.		Palathurai
22.		Perur
23.		Pichanur
24.		Poravipalayam
25.		Pottaiyandiporambu
26.		Sangarayapuram
27.		Seerappalayam
28		Sokkanur
29.		Solakarai R.F.
30.		Solavampalayam
31.		Thambagoundenpalayam
32.		Theethipalayam
33.		Thirumalayampalayam
34.		Vadaputhur
35.		Valukkupparai
36.		Vellalur
37.		Coimbatore

Source*: Primary Census Abstract 2011, Coimbatore District, State Tamil Nadu*

3.14.2 Baseline Status

Baseline information is collected after delineation of the baseline study area in order to study the socio-economic profile of the project affected area. The process related to baseline database analysis includes:

- Demographic Structure
- Infrastructure Base
- Economic Structure
- Health Status
- Cultural Attributes
- Salient Observation

3.14.3 Demographic Structure

The demographic structure of the study area was derived primarily from data of Census record of one district covering two tehsil and 37 villages. Summary of demographic structure is presented in **Table 3.24.** The demographic structures of each village in the study area as per Census 2011 are presented in **Table 3.25**.

TABLE 3.24: SUMMARY OF DEMOGRAPHIC STRUCTURE IN STUDY AREA

Demographic Parameters	Details
No. of States	1
No. of District	1
No. of Tehsil	2
No. of Villages	36
Total Area of surveyed village (ha)	40773
Total No. of Households	125297
Total Population	448719
Density of Population (per km2)	498
Sex Ratio (No. of female\ 1000 males)	995
Child Population	40752
Scheduled Castes	81502
Scheduled Tribes	3474
Literacy Male Female	95866 55602 40264

Source: *Primary Census Abstract 2011, Coimbatore District, State Tamil Nadu*

TABLE 3.25: DEMOGRAPHIC STRUCTURE OF VILLAGE IN THE STUDY AREA

SN	Villages	No. of Household	Total Population			0-6 Child Population			Scheduled Cast			Scheduled Tribes		
			Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
														District: Coimbatore
1.	Arasampalayam	1090	3818	1894	1924	298	160	138	947	471	476	0	0	0
2.	Arisippalayam	700	2400	1212	1188	225	127	98	823	414	409	0	0	0
3.	Boluvampatti (Block I)	0	0	0	0	0	0	0	0	0	0	0	0	0
4.	Perur Chettipalayam (CT)	5004	17809	8891	8918	1770	892	878	2968	1472	1496	4	1	3
5.	Chettipalayam	2841	10366	5268	5098	880	480	400	2920	1460	1460	0	0	0
6.	Ettimadai (R.F)	0	0	0	0	0	0	0	0	0	0	0	0	0
7.	Ettimadai (R.F)	0	0	0	0	0	0	0	0	0	0	0	0	0
8.	Karunchamigoundenpalayam	95	343	171	172	33	17	16	0	0	0	0	0	0
9.	Kinathukadavu	28005	95575	47658	47917	7424	3802	3622	19788	9768	10020	1567	773	794
10.	Kondampatty	738	2467	1218	1249	165	77	88	455	221	234	2	1	1
11.	Kurichi	32,830	1,23,667	61,815	61,852	12,987	6,596	6,391	13,001	6,502	6,499	62	24	28
12.	Kuthiraialampalayam	444	1448	685	763	107	52	55	442	216	226	9	5	4
13.	Madampatti	1999	6771	3359	3412	595	312	283	1384	700	684	9	4	5

SN	Villages	No. of Household	Total Population			0-6 Child Population			Scheduled Cast			Scheduled Tribes		
			Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
14.	Madukkarai	13123	46762	23464	23298	4135	2148	1987	11071	5500	5571	752	391	361
15.	Malumichampatti (CT)	3594	12936	6568	6368	1294	687	607	2561	1294	1267	4	2	2
16.	Muthur	378	1385	683	702	101	45	56	370	174	196	0	0	0
17.	Myleripalayam	1393	4990	2451	2539	447	227	220	1381	679	702	0	0	0
18.	Nachippalayam	878	3008	1517	1491	228	120	108	1033	509	524	0	0	0
19.	Othakalmandapam	3,394	12,207	6,028	6,179	1,087	551	536	1,479	707	772	69	40	29
20.	Pachapalayam	683	2359	1191	1168	208	104	104	703	360	343	0	0	0
21.	Palathurai	767	2727	1346	1381	213	103	110	1214	602	612	0	0	0
22.	Perur	2,211	8,004	4,010	3,994	690	345	345	1,211	609	602	0	0	0
23.	Pichanur	1687	6261	3094	3167	526	259	267	1523	765	758	69	36	33
24.	Poravipalayam	1874	6568	3280	3288	547	269	278	1304	643	661	184	98	86
25.	Pottaiyandiporambu	445	1530	764	766	127	59	68	357	180	177	71	30	41
26.	Sangarayapuram	255	816	416	400	58	27	31	147	67	80	55	27	28
27.	Seerappalayam	1646	5881	3053	2828	505	282	223	1041	513	528	0	0	0
28	Sokkanur	1776	6020	2978	3042	464	218	246	1166	584	582	339	165	174
29.	Solakarai R.F.	0	0	0	0	0	0	0	0	0	0	0	0	0
30.	Solavampalayam	1837	6387	3195	3192	619	316	303	1364	691	673	3	2	1

SN	Villages	No. of Household	Total Population			0-6 Child Population			Scheduled Cast			Scheduled Tribes		
			Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
31.	Thambagoundenpalayam	133	482	234	248	30	17	13	87	42	45	0	0	0
32.	Theethipalayam	2386	8629	4296	4333	847	425	422	1395	686	709	25	16	9
33.	Thirumalayampalayam	3,375	12,164	6,034	6,130	1,024	523	501	2,904	1,426	1,478	164	83	80
34.	Vadaputhur	1467	5176	2561	2615	503	259	244	706	348	358	15	5	10
35.	Valukkupparai	1412	4891	2376	2515	383	182	201	1368	667	701	55	33	22
36.	Vellalur	6,837	24,872	12,794	12,078	2,232	1,129	1,103	4,389	2,206	2,183	16	8	8
Total		**125297**	**448719**	**224504**	**224215**	**40752**	**20810**	**19942**	**81502**	**40476**	**41026**	**3474**	**1744**	**1719**

Source: *Primary Census Abstract 2011, Coimbatore District, State Tamil Nadu*

3.14.4 Salient Features of Demographic Structure

In the study area, Coimbatore city town is likely to have high Population density. The reason for this could be equipped facilities like education, health, sanitization, banking, and transportation. In the study area, Kurichi village is likely to have very low population density. The reason for this could be lack of facilities like education, health, sanitization, communication, transportation, and banking.

3.14.5 Infrastructure Resources

The infrastructure resources base of the eleven study areas with reference to education, medical facility, water supply, post and telegraph, transportation, communication facility, power supply, sanitation, road, bank etc. according to the Village Directory Census CD 2011 supply is given in **Table 3.26**.

TABLE 3.26: INFRASTRUCTURE RESOURCE BASE OF THE STUDY AREA

SN	Villages	Education	Medical	Water	Sanitation	Communicatio	Transportation	Road	Bank	Power	SHG
1.	Arasampalayam	GPPS(3),PPPS,GPS(2)	PHSC	TWT,TWU,CW,UW,TW/B,S	CD,OD,OPDU,OKD	SPO,TP,MPC	A/MA,T	BTPR,GKR,WBM,AWR,F	ACS	PSDU,PSAU	SHG
2.	Arisippalayam	GPS	NA	UW,TW/B	CD,OD,OPDU	SPO,TP,PCO,MPC	PBS,A/MA	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU	SHG
3.	Boluvampatti (Block I)	GPPS,GPS,GMS	PHSC	TWT,TWU,CW,UW,TW/B,S	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	GBS,PBS	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
4.	Perur Chettipalayam (CT)	GPS(2),GMS	PHSC	TWT,TWU,CW,UW,TW/B,S	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	GBS,PBS,SH	BTPR,GKR,WBM,AWR,F	ACS	PSDU,PSAU,PSCU,PSAU	SHG
5.	Chettipalayam	GPPS(4),GPS,PPS,GMS,PMS,GSS,PSS	PHSC, M&CWC	TWT,TWU,CW,UW,TW/BR/C,T/P/L	CD,OD,OPDU	PO,SPO,TP,PCO,MPC	GBS,PBS,A/MA,V,SH	BTPR,GKR,WBM,AWR,F	COB, ACS	PSDU,PSAU,PSCU,PSAU	SHG
6.	Ettimadai (R.F)	NA	NA	NA	NA	NA	NH,SH	BTPR,GKR,WBM,AWR,F	NA	NA	NA
7.	Ettimadai (R.F)	NA	NA	NA	NA	NA	NA	BTPR,GKR,WBM,A	NA	NA	NA

SN	Villages	Education	Medical	Water	Sanitation	Communicatio	Transportation	Road	Bank	Power	SHG
								WR,F			
8.	Karunchamigoundenpalayam	GPPS,GPS,GMS	NA	,TWU,CW,UW,TW/B	ND	SPO,TP,PCO,MPC	GBS,PBS	BTPR,GKR,WBM,AWR,F	NA	NA	NA
9.	Kinathukadavu	GPPS(2),GPS(2),GSS	PHC,PHSC,M&CWC,TBC,D,VH,FWC	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	GBS,PBS,V	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSAU	SHG
10.	Kondampatty	GPPS,GPS,GMS	VH	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	NA	BTPR,GKR,WBM,AWR,F	COB,ACS	PSDU,PSAU,PSCU,PSAU	SHG
11.	Kurichi	GPS,GMS	NA	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU	SPO,TP,PCO,MPC	GBS	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
12.	Kuthiraialampalayam	GPPS(3),GPS(3),PPS,GMS(2),PMS,GSS(2),PSS	PHC,PHSC,M&CWC,TBC,D,FWC	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	GBS,PBS,A/MA,SH	BTPR,GKR,WBM,AWR,F	CB,COB,ACS	PSDU,PSAU,PSCU,PSAU	SHG
13.	Madampatti	GPPS(2),PPPS(3),GPS,PPS(3)GMS	PHSC	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	GBS,PBS,SH	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG

SN	Villages	Education	Medical	Water	Sanitation	Communicatio	Transportation	Road	Bank	Power	SHG
14.	Madukkarai	GPS	NA	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	NA	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
15.	Malumichampatti (CT)	NA	NA	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	GBS,PBS	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
16.	Muthur	GPPS,GPS(2)	PHSC,VH	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	GBS,PBS,SH	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
17.	Myleripalayam	GPPS(2),GPS(3),GMS(4)	PHSC	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	GBS,PBS,A/MA	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
18.	Nachippalayam	GPPS,GPS	NA	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	GBS,PBS,SH	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
19.	Othakalmandapam	GPPS(2),PPPS, GPS(2),GSS	PHSC	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	GBS,PBS,A/NA,SH	BTPR,GKR,WBM,AWR,F	CB,ACS	PSDU,PSAU,PSCU,PSAU	SHG
20.	Pachapalayam	GPPS(6),PPPS(2),GPS(5),PPS(2),GMS(5)	PHC(2),PHSC,M&CWC(2),TBC(2),D(	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	GBS,PBS,A/MA,T,V	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG

SN	Villages	Education	Medical	Water	Sanitation	Communicatio	Transportation	Road	Bank	Power	SHG
		,PMS(2),GSS (6)	2),VH,FWC(2)								
21.	Palathurai	GPPS,PPPS,GPS	NA	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	GBS	BTPR,GKR,WBM,AWR,F	ACS	PSDU,PSAU,PSCU,PSAU	SHG
22.	Perur	GPPS(6),GPS(2),PPS,GMS,PMS,GSSS	PHSC	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	PO,SPO,TP,PCO,MPC	GBS,PBS,A/MA,V,NH,SH	BTPR,GKR,WBM,AWR,F	CB,ACS	PSDU,PSAU,PSCU,PSAU	SHG
23.	Pichanur	GPPS,GPS,GMS	NA	TWT,TWU,CW,UW,TW/B	ND	SPO,TP,PCO,MPC	NA	F	NA	PSDU,PSAU,PSCU,PSAU	NA
24.	Poravipalayam	GPPPS,GPS(2)	NA	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU	SPO,TP,PCO,MPC	GBS,SH	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
25.	Pottaiyandiporambu	GPS	VH	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	GBS,PBS,T,SH	BTPR,GKR,WBM,AWR,F	ACS	PSDU,PSAU,PSCU,PSAU	SHG
26.	Sangarayapuram	GPS,GMS	PHSC	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	GBS,PBS,SH	BTPR,GKR,WBM,AWR,F	ACS	PSDU,PSAU,PSCU,PSAU	SHG
27.	Seerappalayam	GPS	NA	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	NA	BTPR,GKR,WBM,A	NA	PSDU,PSAU,PSCU,PS	SHG

SN	Villages	Education	Medical	Water	Sanitation	Communicatio	Transportation	Road	Bank	Power	SHG
								WR,F		AU	
28.	Sokkanur	GPPS,GPS, GMS	VH	TWT,TWU,C W,UW,TW/B	CD,OD,OPDU ,OKD	SPO,TP,PCO, MPC	GBS	BTPR,GK R,WBM,A WR,F	NA	PSDU,PSA U,PSCU,PS AU	SHG
29.	Solakarai R.F.	NA	NA	NA	NA	NA	NH,SH	BTPR,GK R,WBM,A WR,F	NA	NA	NA
30.	Solavampalayam	GPPS,GPS, GMS	PHC,PHS C,M&CW C,TBC,D	TWT,TWU,C W,UW,TW/B	CD,OD,OPDU ,OKD	SPO,TP,PCO, MPC	GBS,PBS,SH	BTPR,GK R,WBM,A WR,F	NA	PSDU,PSA U,PSCU,PS AU	SHG
31.	Thambagoundenpa layam	GPPS(2),G PS,GMS	PHSC,VH	TWT,TWU,C W,UW,TW/B	CD,OD,OPDU ,OKD	SPO,TP,PCO, MPC	GBS,PBS,T,V	BTPR,GK R,WBM,A WR,F	ACS	PSDU,PSA U,PSCU,PS AU	SHG
32.	Theethipalayam	GPPS,GPS	NA	TWU,CW,UW ,TW/B	CD,OD,OPDU	SPO,TP,PCO, MPC	GBS	BTPR,GK R,WBM,A WR,F	NA	PSDU,PSA U,PSCU,PS AU	SHG
33.	Thirumalayampala yam	GPPS,GPS, GMS	NA	TWT,TWU,C W,UW,TW/B	CD,OD,OPDU ,OKD	SPO,TP,PCO, MPC	GBS,V	BTPR,GK R,WBM,A WR,F	NA	PSDU,PSA U,PSCU,PS AU	SHG
34.	Vadaputhur	GPPS,GPS, GMS	PHSC	TWT,TWU,C W,UW,TW/B	CD,OD,OPDU ,OKD	SPO,TP,PCO, MPC	GBS,V	BTPR,GK R,WBM,A WR,F	NA	PSDU,PSA U,PSCU,PS AU	SHG
35.	Valukkupparai	GPPS(3),G	PHSC,VH	TWT,TWU,C	CD,OD,OPDU	PO,SPO,TP,PC	GBS,PBS,SH	BTPR,GK	CB	PSDU,PSA	SHG

SN	Villages	Education	Medical	Water	Sanitation	Communicatio	Transportation	Road	Bank	Power	SHG
		PS,GMS,GSS		W,UW,TW/B	,OKD	O,MPC		R,WBM,AWR,F		U,PSCU,PSAU	
36.	Vellalur	GPPS	NA	TWT,TWU,CW,UW,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO,MPC	SH	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG

Abbreviations:

EDUCATION	MEDICAL FACILITY	WATER	TRANSPORTATION	SANITATION	COMMUNICATION
AC: Anganwadi Center	AH: Allopathic Hospital	TWT: Tap Water Treated	GBS: Govt. Bus Service PBS: Private Bus Service	OD: Open Drainage	PO: Post Office
GPS: Govt. Primary School	PHC: Primary Health Centre	TWU; Tap Water Untreated	A/MA: Auto/Modified Autos	OPDC: Open Pucca Drainage Covered	SPO: Sub Post Office
PPS: Private Primary School	PHSC: Primary Health Sub Centre	CW; Covered Well	V:Van CPR: Cycle-pulled Rickshaws	OPDU: Open Pucca Drainage Uncovered	P&TO: Post &Telegraph office
GMS: Govt. Middle School	M&CWC: Maternity And Child Welfare Centre	UW: Uncovered Well	T:Taxi Trc: Tractor	ND: No Drainage	TP: Telephone

PMS: Private Middle School	FWC: Family Welfare Centre	HP; Hand Pump	SH: State Highway	OKD: Open Kuccha Drainage	PCO: Public Call Office
		SR: Service Reservoir	NH: National Highway	PL: Public Latrine	DNA: Data Not Available
GSS: Govt. Secondary School	D: Dispensary	R/C: River/Canal	**ROAD**	**BANK**	**POWER**
GSS: Govt. Secondary School	VH: Veterinary Hospital	T/P/L: Tank/Pond/Lake	BTPR: Black Topped pakka Road	CB: Commercial Bank	PSDU: Power Supply for Domestic use
	MHC: Mobile Health clinic			NB: Nationalize Bank	
PEC: Private Engineering College			PR: Pakka Road		
GSSS: Govt. Senior Secondary School	NA: Not Applicable	TWB: Tube Wells/Borehole	GKR: Gravel (kuchha) Road	COB: Co Operative Bank	PSAU: Power Supply Agriculture use
PSSS: Private Senior Secondary School	**SHG: SELF HELP GROUP**	OHT: Over Head Tank	AWR: All Weather Road	ACS: Agriculture Credit Society	PSCU: Power Supply For Commercial Use
DC: Degree College			F:Foothpath	PCB: Private Commercial Bank	PSIU: Power Supply For Industrial Users

3.14.6 Socio-Economic Survey - Sampling Methodology

To assess and evaluate the likely impacts arising out of any developmental projects on socio-economic environment, it is necessary to gauge the apprehensions of the people in the project area. Socio-economic survey serves as an effective tool for fulfilling this requirement. Sarpanch, ward members, school teachers, medical practitioners, self-help group members and village youth and other respondents (adult's male-female) are involved for awareness and opinion, by using judgmental or purposive sampling methods representing different socioeconomic sections of the community. The respondents were asked for their awareness/opinion about the project, job opportunities, drinking water, road and drainage construction, education, health care, housing, transportation facility and economic status.

Data Collection Method

To assess and evaluate the likely impacts arising out of any developmental projects on socio-economic environment, it is necessary to gauge the apprehensions of the people in project area. For the process of data collection through primary and secondary sources certain methods are used as given below:

Field Survey and Observation

Field survey and observations is made at each sampling villages and the quality of life of that region is studied. Visits are made to hospitals, primary health centres to know the health status of the region. Various governmental organizations such as statistical department, department of census operations are visited to collect the population details of that region.

Interview Method

Structured interview method is used to collect data regarding the awareness and opinion of sample selected from various socio-economic sections of the community. Structured interviews involve the use of predetermined set of questions that includes fixed and alternative questions. The questionnaire mainly highlights the parameters such as income, employment and working conditions, housing, food, clothing, water supply, sanitation, health, energy, transportation, communication, education, environment and pollution to assess the quality of life of that particular region, general awareness and opinion of the respondents about the project. Interview method helps to collect error free and accurate information to the interviewer during the field survey. The respondents were asked for their awareness / opinion about the project and also the impacts of the project which is an important aspect of socio-economic environment, viz. job opportunities, education, health care, transportation facility and economic status.

Focus Group Discussion

A focus group discussion is a small, but demographically diverse group of people It is a form of qualitative research consisting of interviews in which a group of people are asked about their perceptions, opinions, beliefs, and attitudes towards an employment, income, transport, education, Medical facilities, Sanitation, housing, health, agriculture, pollution etc. Questions are asked in an interactive group setting where participants are free to talk with other group members. During this process, the researcher either takes notes. Through the focus group discussion of all these factors, the proposed project helps in evaluating socio-economic conditions in the study area. The study was carried out with a participatory approach by involving the stakeholders, particularly the project beneficiaries and probable affected persons through a series of consultative process. The population groups consulted include beneficiary group of people shopkeepers, farmers, school teachers, gram panchayat sarpanch/members, village leaders, etc.

Observations on Infrastructure Resources:

The significant features of these important parameters for each study area are discussed as follows:

(a) **Education Facilities**: In the study area, education is available from Primary School to Degree collage. Higher education facilities including colleges and other diploma courses are available at Coimbatore at a distance of 13 km respectively from the project site.

(b) **Medical Facilities**: There are Nine (9) government healthcare facilities available within the study area. However; Twelve (12) villages in the study areas were lacking in medical facilities. In the study area list of villages with Twenty Five (25) government health services available and Sixteen (16) villages lacking medical facilities Table 3.23 is given in. Hospitals and other better medical facilities were available at Coimbatore.

(c) **Drinking Water**: The main water supply in the surveyed villages is through tap water, hand pump, well and tube well is the main sources of drinking water in the region.

(d) **Power Supply**: All villages are accessed with electricity supply.

(e) **Transportation**: For transportation purpose Government bus Auto and Taxi Service are available in the study area. Transportation facilities were not frequently available in the region. Private vehicles like Bicycles and Motor Cycles were mostly used by villagers for transportation purpose.

(f) **Communication Facilities**: For communication purpose mainly Sub Post Office, Telephone, Mobile phones and newspaper are available in most of the villages.

(g) **Agriculture**: Most of the respondents are engaged in labor work, agriculture, and livestock activities. Farming is the main occupation; a few respondents service in

government sectors. Most of the respondents are labors and others are trying to migrate towards other city places.

(h) **Houses**: Most of the houses are pakka and Semi pakka with good construction in the study area.

(i) **Employment**: **:** main occupations of the people in the study area are agriculture and labor work. The labors were getting daily wage in the range of Rs. 500-600, depending on the type of work involved

(j) **Fuel**: The primary source of cooking fuel is LPG and wood. Kerosene is also been as per the requirement.

(k) **Main Crops**: The principal crops grown in agricultural farm are Coconut, sugarcane, paddy banana, turmeric maize, and onion.

(l) **Language**: The official language of Tamil Nadu is Tamil. The most widely spoken language within the study area is Tamil English and hindi.

(m) **Migration**: During survey it was found that local population were migrating maximum towards the Coimbatore city as a purpose of employment and some to other states.

(n) **Sanitation**: Systems of individual and combined septic tanks are in use at some places of this Study area. Toilet facility is one of the most basic facilities required in a house. Most of the households were having toilet facilities in their houses. There was no proper drainage line in the villages

(o) **Road Connectivity**: Most of the roads are tar and connects to the villages. Both tar and gravel roads were commonly seen in the villages.

(p) **Market Facility**: Study area was predominantly semi urban type. In villages, small shops were available for daily needs. Weekly market facility was available in some villages. Wholesale markets were available at town place. Coimbatore is major hub for all type of facilities in the area.

(q) **Recreation**: Temples, Samajbhawan, Television and Radio are the main recreation facilities in the study area. Newspaper/Magazine is also used by the villagers.

3.14.7 Employment Pattern

Economic resource base of any region mainly depends upon its economically active group i.e. the working population involved in productive work. Work may be defined as participation in any economically productive activity. Such participation may be physical or mental in nature. Work not only involves actual work but also effective supervision and direction of work. It also includes unpaid work on farm or in family enterprise.

There are different types of workers that may be classified as - those persons who had worked for at least six months or 180 days are treated to be Main Workers, on the other hand if person categorized as worker has participated in any economic or productive activity for less than six months or 180 days during the last one year is treated as

Marginal Worker. Non–workers are those who have not worked any time at all in the year preceding the enumeration.

The workers coming under the main and marginal workers category are those involved in activities such as cultivation, agriculture, livestock, forestry, fishing, hunting, plantations, orchards and allied activities, mining and quarrying, manufacturing, processing, servicing and repairs in household industry, construction, trade and commerce, transport, storage and communication and other services. **Table 3.27.**

Table 3.27: Summary of Economic Attributes in Study Area

Demographic Parameters	Details
Total Worker	65440 (14.58%)
Marginal Worker	63406 (14.13)
Non Worker	67289 (13.63)
Main Worker	63406 (15%)
Cultivators	9908 (2.2%)
Agriculture	39675 (8.88%)
Household	1145 (0.23%)
Others	34167 (6.92%)

Source: *Primary Census Abstract 2011, Coimbatore District, State Tamil Nadu*

3.14.8 Health Status

Diarrhea / Cholera, Malaria, Could, Cough; viral fever, eye disease, skin disease and Unhygienic are the general health problems which are attributed due to improper sanitation, mosquito nuisance and water logging. Malaria is one of the most frequently occurring diseases and respiratory infection in the region.

3.14.9 Cultural and Aesthetic Environment

There is no, culturally, and aesthetically important of tourist places in the study area. Hence, there shall be no impact on places of interest.

3.14.10 Quality of Life

The average Quality of life for the study area is leading to satisfactory level due to satisfactory status like, educational facilities, also availability of basic needs viz., food, clothing & housing. Medical, Sanitation, and Bank facilities were not adequate in the study area; Improvement in these fields will help to increase quality of life of the study area.

3.14.11 Rehabilitation and Resettlement Plan (R & R Plan)

As there is no existing settlement on the proposed project area, there are no issues of resettlement or rehabilitation.

3.14.12 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 based on field survey. In this study the villages which fall within 10 km radius around the site has been covered. Infrastructure facilities availablein the area are presented below.

All basic amenities Education (higher education, colleges, universities, medical college, Transport facilities, Railway station, Bus station area are all available in the district headquarters Coimbatore).

3.14.13 Recommendation and Suggestion

- Awareness program should be conducted to make the population aware to get education and a betterlivelihood.
- Health care centre and ambulance facility can be provided to the population to get easy and accessiblemedical facilities.
- Vocational training programme can be organized to make the people self - employed, particularly forwomen and unemployed youth.
- Based on 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.

3.14.14 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 have PHC, Anganwadi school, post office, telegram, Government and Private school, bus connectivity besides. To achieve the above objective, a detailed study of the area was undertaken in 10 km radius from the proposed project area.

CHAPTER 4: ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 INTRODUCTION

This chapter provides a brief overview of the potential impacts on various environmental components due to the Rough stone mining project which will be operated by mechanized method with controlled blasting. The opencast mining operations involve development of benches, approach roads, haul roads, excavation and loading and unloading, manual sorting and transportation of materials. If adequate control measures are not taken to prevent/mitigate the adverse environmental impacts, these operations may cause environmental degradation and ultimately lead to irreversible damage to the ecosystem. Various environmental impacts, which are identified due to mining project, are discussed in the following sections:

4.2 ENVIRONMENTAL IMPACT ASSESSMENT & MITIGATION MEASURES

Mining activities causes environmental problems such as degradation of land, deteriorating air, water, and soil quality, affecting the biological and socio-economic environment of the area. The impacts of mining on various environmental parameters were assessed and are given below.

4.3 IMPACT ON AIR QUALITY

To assess the impact of the Rough stone mining, crushing and transportation operations from the Rough stone Mine, air quality modeling was carried out for the mining operations and the mineral transportation activities. The modeling was carried out using MoEF/CPCB approved Lakes AERMOD model. The incremental ground level concentration of PM_{10} due to mining and allied activities was predicted using the above-mentioned models and the resultant concentration of PM_{10} were compared with the National Air Quality Standards.

4.3.1 Ground Level Concentration Increment

4.3.1.1 Air Environment

Base line ambient air monitoring report reveals air pollutant concentrations of SPM, SO2 and NOx are well within the permissible limits as prescribed by National Ambient Air Quality Standards (NAAQS). The major air pollutant from the mining activity will be suspended particulate matter. SPM will be emitted during various stages of the mining activity like excavation, drilling, blasting, loading, Haulage, etc. The pollutants released into the atmosphere will disperse in the down wind direction and finally reach the ground at farther distance from the source. The concentration of ground level

concentrations mainly depends upon the strength of the emission source and micrometeorology of the study area.

4.3.1.2 Meteorological data

The meteorological data for the monitoring date, i.e., 01/10/2021 to 31/12/2021 was considered for the study. Data included for the AERMET processing were daily wind speed, wind direction, temperature, relative humidity, station pressure, precipitation, solar radiation, and cloud cover recorded during the period. AERMET reformats raw meteorological data as to be availed as input for AERMOD model.

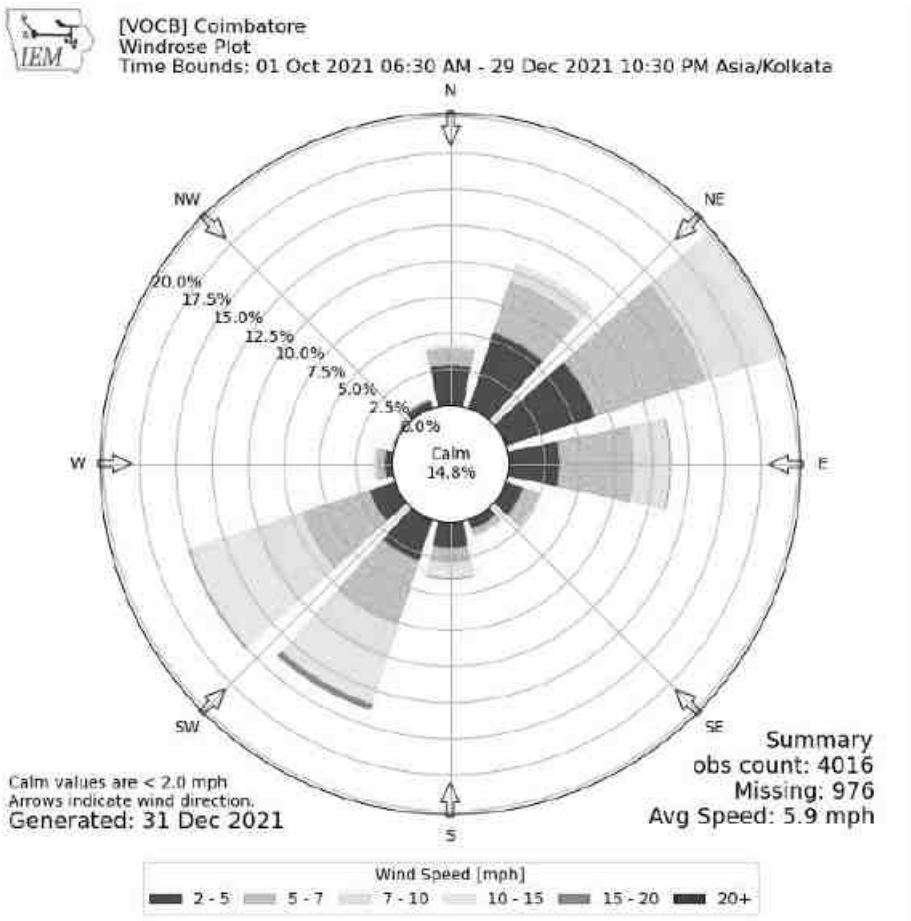


FIGURE 4.1: WINDROSE DIAGRAM OF THE PROJECT SITE OCTOBER 2021 TO DECEMBER 2021

Site weather summary for Oct 2021 -Dec 2021	
Average Temperature (°C)	23.8
Predominant Wind direction from	NE
Relative Humidity (%)	73.2
Average Wind speed (m/h)	5.9

4.3.1 EMISSION CALCULATIONS FROM MINING AREA

Excavation by various activities in project area is construed as an area source which includes excavation pit(s) and activities happening in the excavation area like digging, dozing, hauling and loading/unloading. The dust emission from these areas will be fugitive in nature. The excavator operations, loading/unloading operations will also cause dust emission though it will be confined to the area of operation of the machinery. The gaseous emission from their operation shall be minimal and limited within the project. Transportation of excavated material from the project site to dumping sites are categorized as line source. Since the dumper movement on haul road will be within the project area, no adverse impact shall be felt in the settlement area.

Dust Dispersion Modeling for Excavation Operation

In the present study, United States Environmental Protection Agency (USEPA–42 series) approved mathematical equations have been used to predict concentrations for different operations in project including the material transportation. To predict the particulate emissions, Envitrans AERMOD Cloud. (Air Dispersion Modeling Software) an interface based on ISCST3 – was used to predict changes in air quality i.e., maximum ground level concentration (GLC's) of Particulate Matter. Short term model options were opted for uniform emissions rates. The air modeling was restricted to determination of PM10, PM2.5, SO2 and NO2 in the present case. The emission factors adopted for various project operations are mentioned below:

Emission Factor for Excavation and Material Loading/unloading

For excavation and material handling the emission factor has been adopted as per USEPA – 42 series.

For Dozing Operation:

EFPM10 (kg/hr) = 0.34 X s1.5(%) / M1.4(%)

Where,

EFPM10 (kg/hr) = emission factor in kg/hr

S = silt contents in percentage by weight

M = moisture content in percentage by weight

For Material Loading/unloading:

EFPM10 (kg/hr) = 0.34 [0.119 / M0.9]

Where,

EFPM10 (kg/hr) = emission factor in kg/ton

M = moisture content in percentage by weight.

Emission Factor for Material Haulage within Project:

The emission rate is dependent on several factors which include soil properties, climatic conditions, vehicular traffic, wind forces and machinery operation. The Empirical equation for calculation of emission rate is as under.

E= k*(1.7) *(s/12) *(S/48) *(W/2.7)0.7*(W/2.7)0.7 (w/4)0.5 * (365-p/365) g/VKT

Where,
E=Emission Rate
K = Particle size multiplier
s=Silt Content of the Road surface material
S= Mean Vehicle Speed (km/hr)
W=Mean Vehicle Weight (tons)
w=Mean number of wheels
p= Number of days with at least 0.254mm of precipitation per year

The Isopleths developed are shown in **Figure 4.2 to 4.4** for PM10, PM2.5, SO2 and NO2 respectively. The maximum GLC due to excavation, loading & unloading activities for PM10, PM2.5, SO2 and NO2 was found to be 11.7 µg/m^3 , 7.4 µg/m3 , 6.0 µg/m3 and 6.4 µg/m3 respectively and has been shown in Table 4.1

TABLE 4.1: MAXIMUM GROUND LEVEL CONCENTRATION

S.No.	Pollutants	Max. GLC observed, (µg/m3)	Distance and Direction
1	PM_{10}	11.7	1000, SW
2	$PM_{2.5}$	7.4	1000, SW
3	SO_2	6.0	1000, SW
4	NO_2	6.4	1000, SW

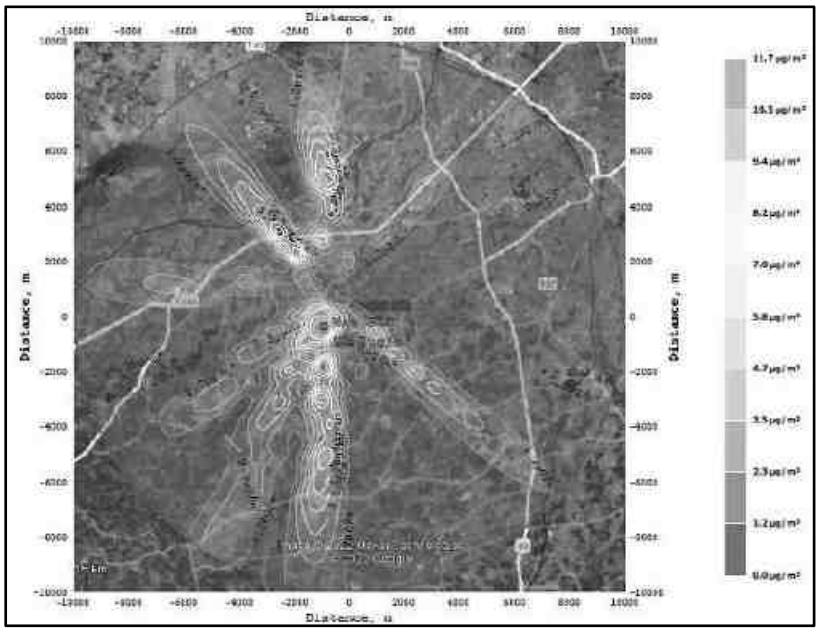


FIGURE 4.2: ISOPLETH OF MAXIMUM PREDICTED 24 HOURLY GROUND – LEVEL CONCENTRATIONS FOR PM10

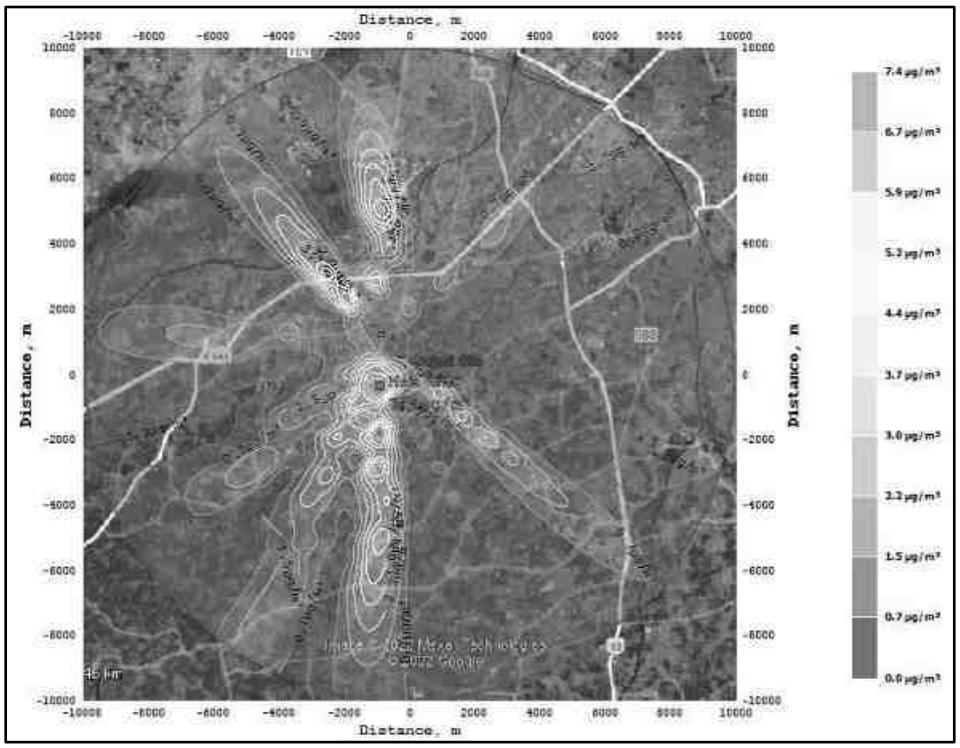


FIGURE 4.3: ISOPLETH OF MAXIMUM PREDICTED 24 HOURLY GROUND – LEVEL CONCENTRATIONS FOR PM 2.5

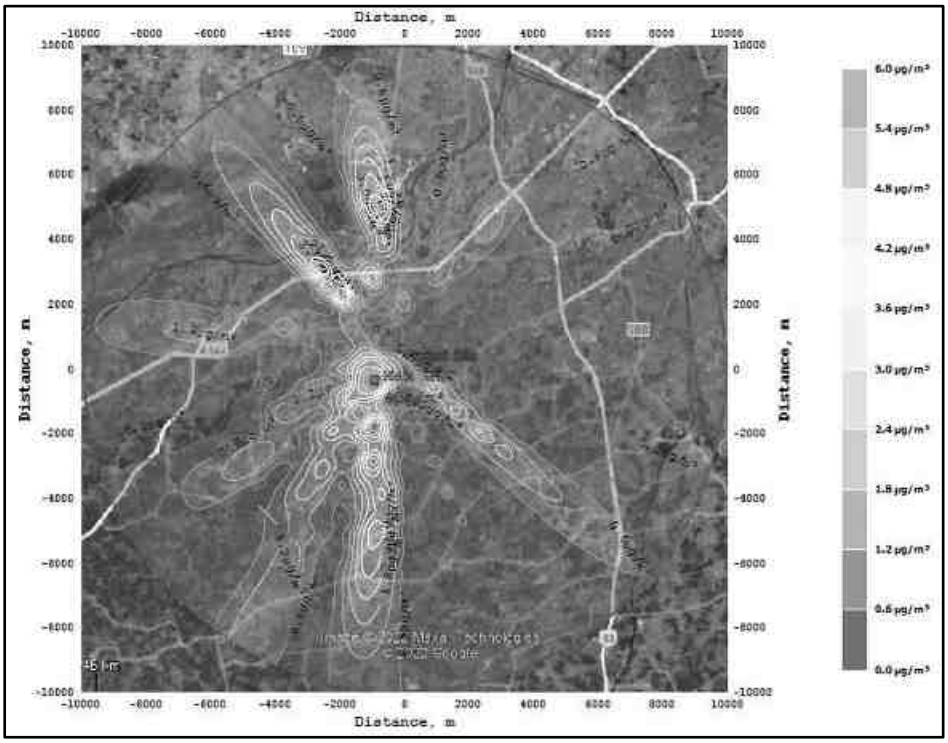


FIGURE 4.4: ISOPLETH OF MAXIMUM PREDICTED 24 HOURLY GROUND – LEVEL CONCENTRATIONS FOR SO2

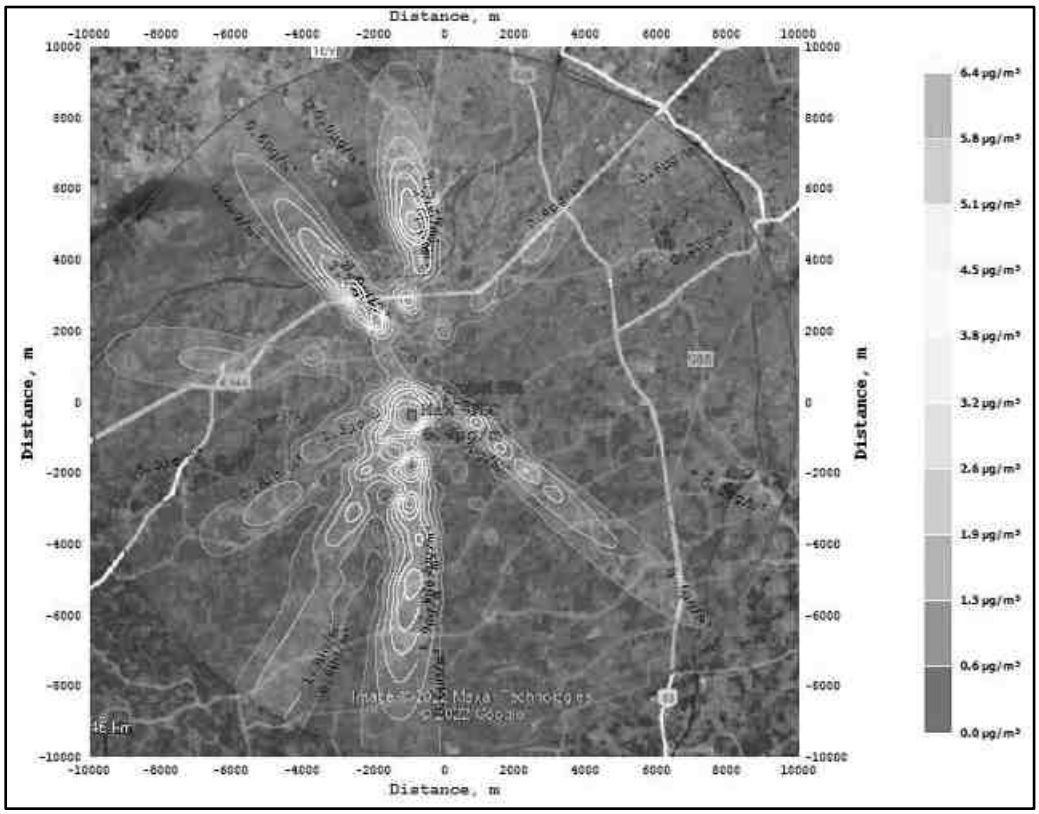


FIGURE 4.5: ISOPLETH OF MAXIMUM PREDICTED 24 HOURLY GROUND – LEVEL CONCENTRATIONS FOR NO2

4.3.2 RESULTANT IMPACT

The resultant impact due to construction activities (excavation and crushing) on the ambient air quality for PM_{10}, $PM_{2.5}$, SO_2 and NO_2 at monitoring station project site respectively is presented in **Table 4.2** which shows that, the resultant concentration level is within the NAAQS.

TABLE 4.2: RESULTANT LEVELS DUE TO EXCAVATION

S.No.	Locations	PM_{10} (µg/m³)			$PM_{2.5}$ (µg/m³)			SO_2 (µg/m³)			NO_2 (µg/m³)		
		Inc	Max	Total	Inc	Max	Total	Inc	Max	Total	Inc	Max	Total
1	AAQ-1	2.3	55.1	57.4	1.5	34.1	35.6	1.2	10.4	11.6	1.3	28.2	29.5
2	AAQ-2	1.3	51.9	53.2	0.7	37.2	37.9	0.5	9.5	10	0.6	21.6	22.2
3	AAQ-3	1	57.7	58.7	0.5	34.7	35.2	0.3	10.3	10.6	0.3	20.6	20.9
4	AAQ-4	1.3	67.7	69	0.7	32.9	33.6	0.5	10.9	11.4	0.6	19.8	20.4
5	AAQ-5	1	62	63	0.5	32.5	33	0.3	10.1	10.4	0.3	22	22.3
6	AAQ-6	2.7	66.1	68.8	1.8	39.6	41.4	1.5	9.2	10.7	1.9	17.6	19.5
7	AAQ-7	1.3	50.3	51.6	0.7	28.6	29.3	0.5	9.4	9.9	0.7	15.4	16.1
NAAQS (µg/m³)		100			60			80			80		

4.3.3 OCCUPATIONAL HEALTH IMPACT

Progressive deposition of inhaled particles or dust results in major health problems. Smaller the particle size (less than PM2.5) higher is the chemical and biological reactivity. These smaller particles reach the deepest portion of the lungs. These micron sized particles, once air-borne, are extremely difficult to be collected or trapped. Lung functions are impaired due to both respirable and non-respirable dust particles. Chronic exposure leads to respiratory illnesses like asthma, emphysema, severe dyspnoea (shortness of breath), and bronchitis and in extreme cases pneumoconiosis or the black- lung disease of miners. The effect of dust may be harmful to the human health.

4.3.4 MITIGATION MEASURES IMPACT ON AIR QUALITY

Mitigate measures suggested for air pollution controls are based on the baseline ambient air quality of the area. From the point of view of maintenance of an acceptable ambient air quality in the region, it is desirable that air quality is monitored on a regular basis to check compliance of standards as prescribed by regulatory authorities. In case of non-compliance, appropriate mitigative measures need to be checked.

4.3.5 MEASURES TO PREVENT GENERATION AND DISPERSAL OF DUST

Dust particles, which are normally generated during mining operations, become air borne, thus leading to increase in particulate matter level in the ambient air. In the proposed mining activity adequate control measures will be adopted during both, mining operations as well as transportation of rough stone within the area.

Water sprinkling system already provided throughout the mine area especially on the mine roads carrying overburden dumpers. Presently tankers used for the dust suppression. The control measures already adopted are given below:

- Regular cleaning and removal of spillage from the roads are done regularly.
- Water spraying on haul roads, service roads and overburden dumps will help in reducing considerable dust pollution.
- Proper and regular maintenance of mining equipment.
- The treated mine water can be utilized for dust suppression in and around mine areas.
- Comprehensive green belt around overburden dumps has to be carried out to reduce to fugitive dust emissions in order to create clean and healthy environment.
- Land reclamation may be carried out for dumps where mining activities have been completed.
- The following additional measures will also be adopted such as,
- Dust generation will be reduced by using sharp teeth of shovels.
- Wet drilling will be carried out to control the dust.
- Controlled blasting techniques will be adopted.

- Charge per hole and charge per round will be optimized.
- Cabins for shovel and dumpers and dust masks to workmen will be provided.
- Information on wind direction and meteorology will be considered while planning, so that pollutants, which cannot be fully suppressed by engineering technique, will be prevented from reaching the residential areas.
- A good housekeeping and proper maintenance will be practiced which will help in controlling pollution.

The objective of the system is to eliminate the air borne dust or suppress the dust at its source. The system involves confinement of the dust within the dust producing area by a curtain of moisture and wetting the dust by direct contact between the particles and droplets of water. Adequate number of precision anti-clog nozzles will be installed at suitable locations for suppressing dust by spraying water mixed with suppressant. Suitable control for dust suppression will be provided and the system will be so inter-locked that it functions only when the conveyor system is operating, or the loading operation is on.

4.3.6 GREENBELT

Even with the various dust suppression measures in place, dust generated from mine faces, fine dust produced during blasting operations are difficult to control. Therefore, in addition to the above mitigative measures, it is proposed to have dense green belt in and around the mine site.

4.3.7 OCCUPATIONAL HEALTH & SAFETY MEASURES TO CONTROL DUST INHALATION

All the above precautions will be adopted to minimize dust generation at site and prevent dispersion in the outside environment. However, for the safety of workers at site, engaged at the strategic locations/dust generation points like drills, loading & unloading points, crushing etc., dust masks will be provided. Dust masks will prevent inhalation of RPM thereby reducing the risk of respiratory disorders. Regular health check-up of workers and nearby villagers in the impacted area (1 km from the core zone) should be carried out by the contractor and regular occupational health assessment of employees should be carried out as per the Factories Act.

4.4 IMPACT OF NOISE / VIBRATIONS & MITIGATION MEASURES

4.4.1 Noise Impact Due to Working Environment

High noise levels pose a major health risk to the mine workers. When noise in the form of waves impinges the eardrum, it begins to vibrate, stimulating other delicate tissues and organs in the ear. If the magnitude of noise exceeds the tolerance limits, it is manifested in the form of discomfort leading to annoyance and in extreme cases to loss of hearing. Detrimental effects of noise pollution are not only related to sound pressure level and

frequency, but also on the total duration of exposure and the age of the person. The adverse effects of high noise levels on exposed workers may result in:

- Annoyance;
- Fatigue;
- Temporary shift of threshold limit of hearing;
- Permanent loss of hearing; and
- Hypertension and high blood cholesterol, etc.
- The following are the sources of noise in the Rough stone mine:
- Drilling & Blasting;
- Loading & unloading;
- Vehicular Movement.

The likely generation of noise levels, due to various mining activities will be as given in following **Table-4.3.**

TABLE 4.3 EXPECTED NOISE LEVELS FROM MINING OPERATIONS AT SOURCE

Equipment's	**Expected Noise Levels dB(A)**
Drilling	80-90
Shovel	75-85
Tippers (2)	65-75
Compressor	75-85

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.

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

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.

PREDICTED NOISE INCREMENTAL VALUE

Equipment with Highest Noise Level	Location ID	Background Value (Day) dB(A)	Incremental Value dB(A)	Total Predicted dB(A)	Residential Area Standards dB(A)
Drilling 90 dB(A)	N4 Palathurai, 0.57 Km	39.4	30.0	39.9	55
Shovel 85 dB(A)		39.4	25.0	39.6	
Tipper 75 dB(A)		39.4	15.0	39.4	
Compressor 85 dB(A)		39.4	25.0	39.6	
Excavator 102 dB(A)		39.4	42.0	43.9	

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, the ambient noise levels at all the locations near habitations are within permissible limits of Residential Area (buffer zone)

4.4.2 IMPACTS DUE TO GROUND VIBRATION AND FLY ROCKS

As per the approved Mining Plan Controlled blasting will be carried out with the help of delayed detonators.

Ground vibration due to mining activities in the area are anticipated due to operation of mining machines like excavators, drilling and blasting, transportation vehicles, etc. However, the major source of ground vibration from this mine is blasting. The major impact of the ground vibrations can be observed on the domestic houses located in the villages surrounding the mine lease area. The kachha houses are more prone to cracks and damage due to the 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 agriculture fields nearby the mining lease area and may cause injury to persons or damage to the structures. Nearest major habitation from the mine lease area is in

Thambagoundanpalayam –1.0Km - Southeast. The ground vibrations at Thambagoundanpalayam Village due to the blasting in Rough stone Mines are calculated using the empirical equation: It is proposed to use about 79Kg /day explosives for blasting for obtaining the desired stone production.

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

$V= 417.8 \{D/(Q^{0.5})\}^{-1.265}$

Where

V= Peak particle velocity in mm/s

D= Distance between location of blast and gauge point in m

Q=Quantity of explosive per blasting in kg

TABLE 4.4: ESTIMATED PEAK PARTICLE VELOCITY FOR EXPLOSIVE CHARGE

Distance from blasting site, m	Quantity of Explosive/Blast, Kg	PPV, mm/s
100	79	47.0
150	79	19.6
200	79	8.1
250	79	4.9
300	79	3.4
350	79	2.6
400	79	2.0
450	79	1.7
500	79	1.4
550	79	1.2
600	79	1.1
650	79	2.0
700	79	1.8
750	79	1.7

Note: The empirical formula does not consider the delay factor in blasting due to use of Delay Detonators.

The standards for safe limit of PPV are established by Directorate General of Mines Safety for safe level criteria through Circular No. 7 dated 29/8/1997. Permissible standards of Ground vibration due to blasting as per guidelines of Director General of Mines Safety (DGMS), Dhanbad are given in **Table-4.5**

TABLE 4.5: PERMISSIBLE PEAK PARTICLE VELOCITY (mm/s)

Type of Structure	Dominant Excitation Frequency, Hz		
	<8 Hz	8 – 25 Hz	>25 Hz
A] Buildings/structures not belonging to the owner			

Type of Structure	**Dominant Excitation Frequency, Hz**		
	<8 Hz	**8 – 25 Hz**	**>25 Hz**
Domestic houses/structures (Kuchha brick and cement)	5	10	15
Industrial Buildings (RCC and framed structures	10	20	25
Objects of historical importance and sensitive structures	2	5	10
B] Buildings belonging to owner with limited span of life			
Domestic houses/structures (Kuchha brick and cement)	10	15	25
Industrial buildings (RCC& framed structures)	15	25	50

Source: DGMS Circular No. 7 dated 29/08/1997

From the above table, the blasting will not cause any significant ground vibrations in the area. The ground vibrations at nearest habitation will be well within the permissible limits recommended by DGMS. However, additional control measures needs to be adopted to avoid the impacts due to ground vibrations and fly rocks due to blasting.

4.4.3 MEASURES FOR MINIMIZING IMPACTS NOISE CONTROL MEASURES

The following control measures will be adopted to keep the ambient noise levels well below the limits. The same will be continued and strengthen in proposed expansion project:

- Drilling will be carried out with sharp drill bits which help in reducing noise.
- Secondary blasting will be totally avoided, and Hydraulic rock breaker/jack hammer drills 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 between 12.00 Noon to 2.00 PM when there is less human activity.
- Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise.
- Provision of sound insulated chambers for the workers deployed on machines producing higher levels of noise.
- Green Belt/Plantation will be developed around the mining activity area and a long haul roads.
- Personal Protective Equipment (PPE) like earmuffs/ear plugs will be provided to the operators and
- Periodical monitoring of noise will be done.

4.4.4 MEASURES TO CONTROL GROUND VIBRATION & FLY ROCKS

The blasting operations in the mine are carried out by deep hole drilling and blasting using delay detonators, which reduce the ground vibrations. The measures that are generally followed and currently proposed for abatement of ground vibration and fly rocks are detailed below:

- Proper quantity of explosive, suitable stemming materials and appropriate delay system will be adopted to avoid overcharging and for safe blasting.
- Proper blast design will be made to control ground vibration and fly rocks.
- Adequate safe distance from blasting will be maintained.
- 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 burden, depth, diameter and spacing will be properly designed to give proper blast.
- Muffle blasting using wire mesh and sand bags will be conducted at mine working near ML boundary towards habitation.

4.5 IMPACT ON WATER ENVIRONMENT & MITIGATION MEASURES

4.5.1 IMPACT ON IMPACT ON SURFACE WATER

There is a seasonal stream or nallah flowing 1.6km in N from mining area

The changed topography will alter the drainage within the mining lease area. However, there will not be any changes in the topography or drainage pattern outside the mining lease area. At the end of mining activities after reserves are exhausted, the area will be restored to an acceptable level of self-sustaining eco-system, green belt will be developed in safety zone and upper benches of mine area. No surface water will be utilized for mining operation. Moreover, there would not be any discharge from mine into the surface water body as no process waste water generation in the mine and allied activities. Hence there would not be any impact on surface water.

Only domestic effluent will be generated from the mine office and rest shelter. The domestic effluent is discharged in septic tank followed by soak pit. Besides, there will be no toxic element in the mined out material, which may contaminate ground/ surface water. It is, therefore, apparent that there will be negligible impact of mining on the surface water regime.

4.5.2 IMPACT ON GROUND WATER

The Rough stone and associated soil in the area does not contain any toxic material. Rough stone constitute of inert and chemically non-reactive ingredients. Also, there is no use of chemicals or hazardous substances in the mining process. Thus, ground water pollution is not envisaged due to the mining operations.

The Water in the area is 55-59m in summer pre monsoon season and 54-58m in post monsoon season which is observed from the nearby bore wells and data obtained from existing private boreholes. The lease area is fully covered by Massive Charnokite formation. Hence the Ground water problem will not arise. The ultimate depth of mine will be 42 m.

Thus, the mining activities will not intersect ground water. The ground water may seep into the working mine pits. This water will be collected in mine sump created in the lower most part and will be allowed to accumulate. This water will be used for dust suppression and plantation. Considering small scale of mining operations, only small quantity of seepage water is expected. Thus, there will not be any significant impact in terms of lowering of ground water table in the nearby villages

Based on the experience in the nearby quarries, pumping of seepage water from the mine pit is not required due to small seepage potential. After completion of mining, the mined out pit will be developed into a reservoir by accumulating rainwater into it. Thus, this will help in improving ground water table in the area.

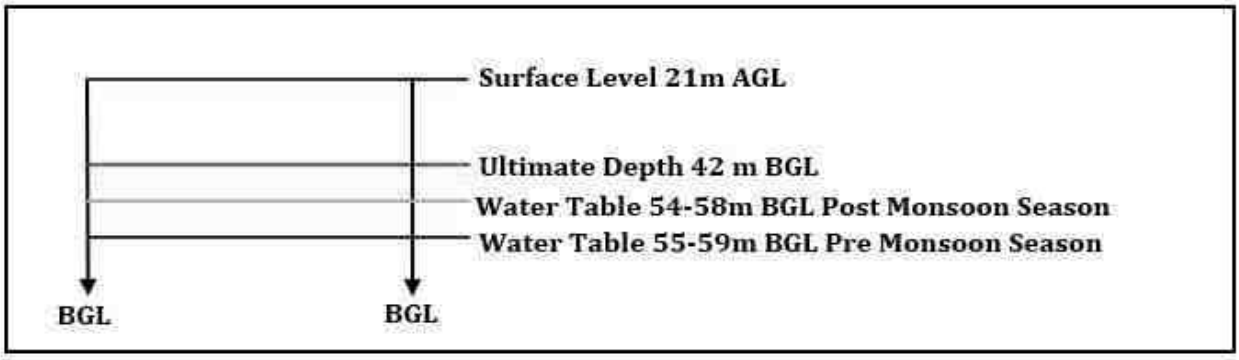


FIGURE 4.6: SCHEMATIC DIAGRAM OF MINE WORKINGS W.R.T. GROUND WATER TABLE

4.5.3 MITIGATION MEASURES FOR WATER ENVIRONMENT

- No wastewater will be generated during mining operation.
- Septic tanks and soak pits will be provided for the disposal of domestic wastewater generated from mine office.
- Garland drains will be provided to prevent the entry of rainwater into the mining pit.
- Construction of settling tanks at points to arrest silt.

- Rainwater falling in the mining pit will be collected in lower benches & will be used for dust suppression & plantation.
- Regular monitoring of ground water quality will be carried out.

4.5.4 MITIGATION MEASURES FOR WATER ENVIRONMENT

- No waste water will be generated during mining operation.
- Septic tanks and soak pits will be provided for the disposal of domestic wastewater generated from mines office.
- Garland drains will be provided to prevent the entry of rainwater into the mining pit.
- Construction of settling tanks at points to arrest silt.
- Rainwater falling in the mining pit will be collected in lower benches & will be used for dust suppression & plantation.
- Regular monitoring of ground water quality will be carried out.

4.5.4 ARTIFICIAL RECHARGE AND RAIN WATER HARVESTING

The mine management will Roof top harvesting structures in the public buildings in nearby villages with prior consent from local gram panchayats to collect rainwater and charge to ground through available dug well/ tube well**.** Also, the reservoir/dam in the nearby area will act as an additional source of water to the nearby villagers and will also help in recharging ground water table of the area.

The cluster area has potential to harvest rainwater water will be harvested in mining area in nonworking mining pits and will be utilized for dust suppression and plantation.

4.6 IMPACT ON LAND ENVIRONMENT& MITIGATION MEASURES

The land environment comprises of Geology, land use and soil the impact and mitigation of land all land environment component is given below.

4.6.1 IMPACT ON GEOLOGY

Mining is the extraction of valuable minerals or other geological materials from the earth. Mining activity is hence exploitation of Geology. Mining will lead to change in geological setting of the area. Mining will also change the geomorphology of the area i.e. the flat land topography of the area will change to undulating topography with pits. If mining is not done systematically, it may also generate hazards such as landslides i.e. dump failure in terms of mining. The impact of mining activity on geology will be limited to only cluster area of 9.36.5 Ha. The area is structurally with no occurrence of fault and no karst topography observed in area.

4.6.2 IMPACT ON LANDUSE

The Rough stone mining activity will slightly change the present landscape of the ML area. The land use of the area at the time of lease grant was Govt Land for which LOI issued by Assistant Director, Department of Geology and Mining, Coimbatore District. Any change in land use will lead to land degradation as the ecosystem of the area gets disturbed. The present topography of the ML area will be affected mainly due to Rough stone Mine and allied activities i.e. mineral transport and manual crushing. The potential adverse impact of opencast Rough stone mining will be in the form of change in land use pattern. So reclamation of mined out land will be given due importance as a step for sound land resource management in the form of reclaimed land and water body. The land use of mine lease area at present, at the end of mining plan period and at the end of mine life as per closure plan will be as follows:

TABLE 4.6: LAND USE OF LEASE AREA

Sr. No.	Activity	Area in Ha	
		Present	End of Plan Period (5Yrs)
1	Area under quarrying	2.18.0	2.55.0
2	Dump	0.25.8	Nil
3	Infrastructure	Nil	0.01.0
4	Roads	0.02.0	0.02.0
5	Green Belt	Nil	0.16.0
6	Unutilized Area	1.16.2	0.87.5
Total		**3.62.0**	**3.62.0**

No adverse impact is anticipated on land use of buffer zone associated due to the Rough stone mining, as all the activities will be confined within the project site only. Mined out Rough stone will be and will be further transported to the consuming industries to nearby consumers

4.6.3 IMPACT ON SOIL

No OB is expected to be generated during plan period. 100% ROM is saleable. The soil will be properly preserved in safety zone and will be utilized for plantation purpose. The silt may get carried to the nearby seasonal streams with the surface runoff during rains and may cause siltation of the seasonal water bodies located outside the mining area.

Sub-grade material there is no overburden available in the lease which can be readily available for backfilling. There is no O/B or waste material available in the lease or nearby areas.

4.6.4 MITIGATION MEASURES FOR LAND ENVIRONMENT

- Mining activity will be carried out in planned manner as per approved mine plan.
- Mining bench dimension will be maintained for stability of area.
- Land reclamation will be carried out as per approved progressive mine closure plan.
- Thick Plantation will be carried out in safety zone in order to maintain the eco system of area which will be disturbed due to land degradation.
- Construction of Garland drains around mine lease area connected to settling tank will control soil erosion.
- Development of green belt around mine lease area and grasses plantation to control soil erosion.

4.7 SOCIO - ECONOMIC ENVIRONMENT

It is obvious to assume that the activities of the mining operations will improve the socio-economic levels in the study area. The anticipated impact of this project on various aspects is described in the following sections

4.7.1 IMPACT ON HUMAN SETTLEMENT

There is no human settlement in or adjacent to the cluster area of Rough stone Mine. Nearest human settlement from cluster area as Thambagoundanpalayam Village~ 1.0 Km SE, there will not be any impact on the human settlement in the area. The operation of the Rough stone & Gravel mine and associated activities will improve the economic development, civic amenities, and educational facilities in the project vicinity. Overall, due to employment generation and economic progress, there will be positive changes in the socio-economic condition of the people residing in the vicinity of the project site.

4.7.2 EMPLOYMENT

This is a Rough stone mining project. The mine will provide manpower for 31 nos of persons (each Mine Block) for mine management and another for activities such as excavation, transportation etc. Mostly local persons will be employed in the mine. Additional manpower requirement in the mine will be employed from the nearby villages. Thus, there will not be any population growth in the area due to the Rough stone mining project.

4.7.3 IMPACT ON CIVIC AMENITIES

The existing infrastructure facilities are sufficient to cater the needs of the Rough stone mine. However, the mine management will take efforts as a part of CER for improvement in civic amenities like sanitation, drinking water facilities, transport road, etc in the nearby villages.

4.7.4 IMPACT ON HEALTH CARE FACILITIES

There are primary health care facilities in the nearby villages and hospital is available in Coimbatore town. Mine management will also conduct periodic medical camps in the nearby villages as a part of CER.

4.7.5 IMPACT ON ECONOMIC ASPECTS

The mine will have fulltime (31 nos.) for mine management such as excavation, transportation etc. Mostly local persons will be employed in the mine. The local population will be given preference in employment. The employment potential will improve economic conditions of these families directly and provide employment to many other families indirectly who are involved in business and service-oriented activities. This will, in-turn improve the quality of life in the region.

4.8 OCCUPATIONAL HEALTH & SAFETY

4.8.1 IDENTIFICATION OF WORK RELATED HEALTH HAZARDS

Details of the principle environmental and occupational risks that are likely to be created are given in **Table-4.7.**

TABLE 4.7: WORK RELATED HEALTH HAZARDS

Sr. No.	Hazardous Activities	Type of Hazards	Severity of Injury
1	Drilling	Exposed to high level of Noise	Hearing impairment
		Exposed to dusty environment	Respiratory diseases
2	Blasting	Struck by fly rock	Serious Physical injury
		Exposed to dusty environment	Respiratory diseases
		Exposed to high level noise	Hearing impairment
		Exposed to excessive vibration	Cracks to permanent structures
3	Loading	Struck by rolling big boulders	Serious injury and equipment damage
		Struck by fall of objects	Serious Physical injury
4	Transportation	Accidental runaway of vehicle	Serious injury, and equipment damage
		Fall of vehicle from height while reversing	
		Exposed to high level noise	Hearing impairment

Sr. No.	Hazardous Activities	Type of Hazards	Severity of Injury
		Fire in engine due to over heating	Serious Physical injury
5	Storage of oil, lubricant	Leaks and spills	Fire & vigorous chemical reaction
6	Battery maintenance handling	Acid spillage	Acid burns
7	Use/repair of hydraulic jacks & pumps	High pressure operation	Physical injury
		Oil spillage	
		Rupture of hydraulic hoses	

The mine management takes full responsibility for the protection of the workers against sickness, disease and injury arising out of their employment and have adopted certain principles about occupational health services, like establishing and maintaining a safe and healthy working environment which will facilitate optimal physical and mental health in relation to work.

The following occupational health measures shall also be adopted**:**

a) Identification and assessment of the risks from health hazards in the workplace;
b) Surveillance of the factors in the working environment and working practices which may affect workers health, including sanitary installations and canteens; and
c) Planning and organization of work, including the design of workplaces, choice, maintenance and condition of machinery and other equipment and substances used in work.

4.8.2 MEDICAL SURVEILLANCE AND EXAMINATIONS

To evaluate the impacts from Rough stone mining project activities on health of workers, baseline health studies will be conducted on every worker before joining their duties.

- Identifying workers with conditions that may be aggravated by exposure to dust & noise and establishing baseline status for determining changes in health
- Evaluating the effect of dust and noise on workers
- Enabling corrective action to be taken when necessary
- providing health education and awareness
- The medical surveillance program will consist of the following:
- Pre-employment medical examinations
- Periodic medical examinations
- Health & Safety awareness and training

- Record keeping

4.8.2.1 HISTORY:

The initial medical and occupational history cover previous exposure to dust, personal habits (e.g., smoking, etc.) and history of present or past respiratory disorders (particularly tuberculosis).

4.8.2.2 OCCUPATIONAL HEALTH MONITORING

All the employees in the mine will be subjected to pre-employment & periodic medical examination to assess the occupational health impacts. The tests will be conducted as per Form O as given in the Mines Rules, 1955 for the following parameters:

1. Height & Weight
2. Eyes
3. Ears
4. Respiratory Systems
5. Circulatory Systems
6. Abdomen
7. Nervous systems
8. Locomotory systems
9. Skin
10. Hydrocele
11. Hernia
12. Any other abnormality
13. Urine tests
14. Skiagram of chest
15. Complete Blood picture
16. Any other test considered by the Doctor

Based on the medical findings, the worker will be placed for appropriate jobs and necessary safety training will be provided.

4.8.2.3 AWARENESS AND TRAINING PROGRAM

All workers will be subjected to pre-employment and periodic awareness program on health and safety issues of mining and related activities. They would also be imparted with proper training and would be made to understand the health impacts of inhaling high concentration of dust laden air. All the workers will also be provided training in first aid.

- Holders of first aid certificate will be given refresher training once in two years
- Rescue trained person will acquire highest standards of proficiency in first aid
- Ambulance van will be provided fully equipped with lifesaving drugs, medicines and appliances needed in emergency

RECORD KEEPING

A Registered Medical Practitioner (Doctor) will be appointed for examining the workers. All the health records of the workers will be maintained in separate file in site office and the records will be regularly updated.

IMPLEMENTATION OF OH&S

For implementation of Occupational Health & Safety in the mining project, a safety committee will be formed. The hierarchy of the committee and responsibilities of individual members will be as shown in **Table 4.8.**

TABLE 4.8: OH&S COMMITTEE & ITS RESPONSIBILITIES

Sr. No.	Designation	Responsibility
1.	Mines Manager	Overall responsibility of Occupational Health & Safety in the Mines
2.	Mining Engineer / Foreman	Adherence to OH&S guidelines and provision of training and conducting awareness programs
3.	EH&S Manager	Assisting mines manager in ensuring Occupational Health, Safety and environmental compliance
4.	Doctor	Pre-employment and periodic examination / health checkup and updating the records, provision of first aid training.

4.8.3 PUBLIC HEALTH IMPLICATIONS OF THE PROJECT

There is no human settlement in or adjacent to the cluster area of Rough stone Mine. Nearest human settlement from cluster area as Thambagoundanpalayam Village~ 1.0 Km, SE direction

As observed from the modeling results, the dust emissions and noise from the mining project will not cause any significant impact on the ambient air quality and ambient noise levels in the surrounding villages. The mine will be operated during day time only. Thus, there will not be any disturbance to the nearby habitations during night. The mineral transportation will be carried out through existing mines road from mines. Thus, there will not be any disturbance to the normal traffic of the area. Also, the mine management will conduct periodic medical camps in the nearby villages to provide medical facilities to the villagers. Thus, no significant impact is envisaged on the public health due to the project.

4.9 IMPACT ON LOCAL TRANSPORT INFRASTRUCTURE I.E. TRAFFIC STUDY

Nachipalayam Road – 0.25 km E direction

The total production from cluster is 2,73,335 m^3 of Rough stone & 21,528 m^3 will be handled per day for proposed mining project. The excavated Rough stone will be dispatched to the consuming industries through 20tonne capacity trucks/Dumpers to consumers from mine site. Considering 300 days of mine working in a year. About approx. 30 trips of 20 tonne capacity trucks will be required for transportation of Rough

stone to user consuming industry. The Rough stone will be transported through the existing roads network.

Traffic study measurements were performed at one locations at confluence of Coimbatore to Nachipalayam Road – 0.25 km E direction to assess impact on local transport infrastructure due to this mining project.
The mineral from the proposed mining project will be loaded and transported through at Coimbatore to Nachipalayam Road – 0.25 km E direction. Excavated Rough stone will be dispatched as accordingly mentioned in **Table 4.9.**

TABLE 4.9: TRANSPORT ROAD DETAILS

Name of Road	Direction		Distance from project site
	Up	Down	
Nachipalayam Road	Coimbatore/Palathurai	Nachipalayam	0.25 km E direction

Traffic data was collected 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 each of the two directions for counting the traffic. Counted data sheet is provided in **Table 4.10** and PCU is calculated in **Table 4.10.** At the end of each hour, fresh counting and recording was undertaken.

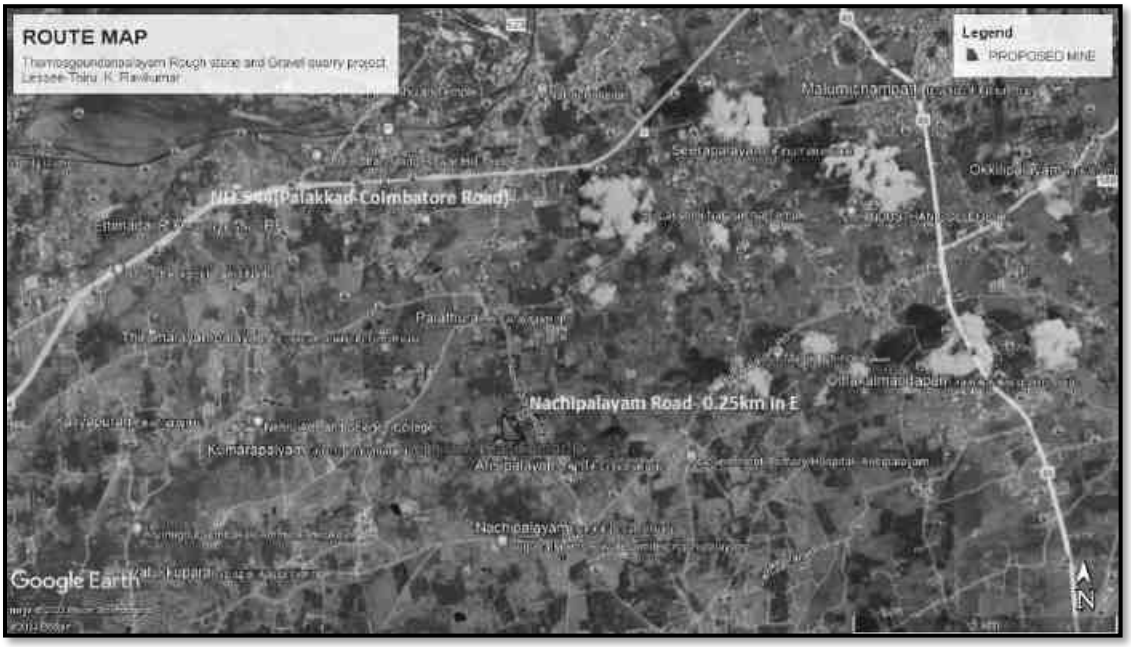


FIGURE 4.7: ROAD CONNECTIVITY MAP WITH FOR TRAFFIC MONITORING

TABLE 4.10: TRAFFIC VOLUME COUNT SURVEY (HOURLY)

Vehicle Distribution	No. of Vehicles/Day		Total Number of Vehicle in PCU/Day		
	Towards Coimbatore/Palathurai	Towards Nachipalayam	Equivalent Factor	Towards Coimbatore/Palathurai	Towards Nachipalayam
Two Wheelers	78	57	0.5	39	29
Three Wheelers	24	19	1	24	19
Cars	56	43	1	56	43
Bus	17	16	3	51	48
Tractor	14	13	4	56	53
Trucks	37	35	3	111	105
TOTAL	**226**	**183**		**337**	**297**

TABLE 4.11: EXISTING TRAFFIC SCENARIO AND LOS

Road	Total V (Volume in PCU/day)	C (Capacity in PCU/day.)	Existing V/C Ratio	LOS
Nachipalayam Road	634	1200	0.52	C

V = Volume in PCU's /hr, C= Capacity PCU's /hr, LOS = Level of Service

V/C	LOS	Performance
0.0 – 0.2	A	Excellent
0.2 – 0.4	B	Very Good
0.4 – 0.6	C	Good
0.6 – 0.8	D	Fair/ Average
0.8 – 1.0	E	Poor
1.0 & Above	F	Very Poor

Note: IRC is accepting the fact that, in Indian roads the real congestion starts when V/C ratio is >1, i.e. for forced flow. Till this limit the road is free for traffic movement without any impediments. Hence it is acceptable as normal up to V/C = 1 and the performance will be taken as good only.

During Mine Operation

Maximum Production of Mine from Cluster Per Year P1-63148 P2-66780 E1-31010	224,086 m^3
No. of working days	300
Extraction and Transportation of mineral	747/day
Working hours per day	8
Dumpers Capacity	16m^3
Frequency of trucks/Dumpers deployed/day	47 trips per day approx..
PCU for per Dumper is 3 Hence Increased PCU will	140

TABLE 4.12: MODIFIED TRAFFIC SCENARIO AND LOS

Road	Increased Volume in PCU/day	Volume (V)	Capacity (C)	Modified V/C Ratio	LOS
Highway (SH79)	140	634+140=774	1200	0.64	D

Not much impact on local transport. The LOS value from the proposed mining project will not change; the performance will be Fair/ Average (D). The existing roads network will be sufficient to cater the transport needs of the mine. However, mine management will periodically maintain the transport road in proper condition to avoid any impacts on traffic infrastructure. Rough stone will be transported in trucks covered with tarpaulin. Major part of transportation will comprise of local or state highway which will be periodically maintained.

4.10 IMPACT ON BIOLOGICAL ENVIRONMENT

IMPACT ON TERRESTRIAL FLORA

- Dust deposition on leaf lamina observed on nearby local plant species which may results in decline the rate of photosynthesis and retards the plant growth.

MEASURES FOR MINIMIZING IMPACT ON FLORA

- Dust issues are mainly raised in the area due to unpaved road, cumulative fugitive dust emissions by various mining activities.
- To mitigate the impact regular water sprinkling will be carried out within the mine lease area as well as approach road.
- Stabilization of soil/waste dumps by grass cover shall be done.

IMPACT ON WILDLIFE

- There is no Wildlife Sanctuary and Biosphere Reserve within 10 km radius of the project site.
- No rare, endemic & endangered species are reported in the buffer zone. However, during mining, the management will practice scientific method of mining with proper Environmental Management Plan including pollution control measures especially for air and noise, to avoid any adverse impact on the surrounding wildlife.
- Fencing around the mine lease area to restrict the entry of stray animals
- Green belt development will be carried out which will help in minimizing adverse impact on the flora found in the area.

STUDY OF IMPACT ON AGRICULTURE

- Mining pits, poor rehabilitation and mining have caused a loss of agricultural land resulting in reduced crop yields and poor living standards.
- Dust & smoke from equipment can affect on agriculture productivity.
- Dust from mining activities & blasting can also affect on crops of nearby area.
- Development of thick green belt around mine lease boundary and plantation on undisturbed area, top benches of mined out area, waste dump area etc. using native flora species.
- Transport through covered trucks. Sprinkler will be installed at loading & unloading point; regular water sprinkling within the mining area and also on haulage road will be carried out.

MEASURES FOR MINIMIZING IMPACT ON FAUNA

Following measures will be adopted to minimize the impact of mining on faunal environment of the area.

- Measures will be taken to curb pollution due to mining activities on air, water, land & noise environment. Plantation around mine area will help in creating habitats for small faunal species and to create better environment for various fauna. Creating and developing awareness for nature and wildlife in the adjoining villages.

STUDY OF IMPACT ON AQUATIC ECOLOGY

- Mining activities will not disturb the existing aquatic ecology as there is no effluent discharge proposed from the Rough stone mine.
- Mining activity may increase sediment load and total dissolved solids in streams due to, surface run off, erosion activity of loosened soil especially during rainy season and may affect water quality of natural water body and stream within mine lease area.

4.10.1 MITIGATION MEASURES

- Periodic maintenance of mineral transport road.
- Covered Transport of stone mine to consuming industry.
- Development of thick plantation around mine lease area
- Monitoring of dust fall at agriculture land located nearby the mining area

4.11 GREENBELT DEVELOPMENT & PLANTATION PROGRAMME

Proposed Greenbelt Development & Plantation Programme

It is proposed to develop plantation at 2 M x 2 M spacing, the rate of survival is aimed at 70 to 80% by regular watering & fencing to keep plants safe from animal grazing. Local species will be planted in consultation with local horticulturist. Diseased plants will be replaced by planting new saplings.

The basic approach towards the development of Green belt /plantation in the lease area is with a view to provide an aesthetic look, eliminating fugitive emissions and for controlling the impact of noise, etc. A Green Belt will be developed based on the following principles:

- Plants that grow fast will be preferred.
- Preference for high canopy covers plants with local varieties
- Perennial and evergreen plants will be preferred.
- Plants having a high Air Pollution Tolerance Index (APTI) will be preferred.
- The development of green belt is an important aspect for any project because:
- It improves the ambient air quality by controlling Suspended Particulate Matter in air.
- It helps in noise attenuation for the surrounding area.
- It helps in attracting new birds and insects as their habitation.
- It maintains the ecological balance.
- It increases the aesthetic value of site.

Plantation along the Safety Zone

Thick plantation will be carried out on the safety barrier and undisturbed area within the mine lease. Also plantation will be developed around temporary waste dumps. Soil generated during mining will be separately stacked and will be used for plantation.

TABLE 4.13: PROPOSED AFFORESTATION PROGRAM

Year	No. of tress proposed to be planted	Survival %	Area to be covered sq.m.	Name of the species	No. of trees expected to be grown

I	2200	80%	Near safety distance, panchayat road, Village road	Neem, Pongamia Pinnata, Casuarina, etc.,	1800

Selection of plant species with special reference

TABLE 4.14: SELECTION OF PLANT SPECIES WITH SPECIAL REFERENCE

Sr. No.	**Plant species**	**Common Hindi Name**	**Purpose of plantation of species**
1.	*Aegle marmelos*	Bael	Pollution Tolerant Plants Automobile
2.	*Albizzia lebbeck*	Shirish ke phool	
3.	*Butea frondosa*	Palash	
4.	*Alstonia scholaris*	Saptaparna	Best dust filtering capacity Plants
5.	*Ailanthus excelsa*	Adu Ghoda Neem	
6.	*Ficus benghalensis*	Banyan	
7.	*Ficus religiosa*	Peepal	
8.	*Cassia fistula*	Amalatas	Exhaust pollution Control Plants
9.	*Delonix regia*	Gulmohar	
10.	*Phyllanthus emblica*	Amla	Medicinal value Plants
11.	*Terminalia cattapa*	Jungali Badam	
12.	*Azadiracta indica*	Neem	
13.	*Tectona grandis*	Sagwan	Economic value Plants
14.	*Pongamia pinnata*	Karanj	
15.	*Shorea robusta*	Sal	
16.	*Cymbopagon martini*	Gandhabel	Soil Conservation Plants
17.	*Ziziphus jujube*	Bada Bare	Fruit bearing Plants
18.	*Psidigium guava*	Amrud	
19.	*Syzygium cumini*	Jamun	
20.	*Mangifera indica*	Mango	
21.	*Dalbergiasisso*	Seesam	Nitrogen Assimilation Plants
22.	*Cassia siamea*	Kassod	
23.	*Polyalthia longifolia*	Devdaru	Aesthetic beautification Plants

CHAPTER 5: ANALYSIS OF ALTERNATIVES

5.1 SITE ALTERNATIVES

A comparison of alternatives helps to determine the best method of achieving the project objectives with minimum environmental impacts or indicates the most environment friendly and cost-effective options. Every mine needs to be planned in away that the mineral is extracted to the maximum extent without causing severe irreversible environmental damages. The mine plan and mine closure plan has been approved by the competent Authority prior to submission of the Form-1 and PFR.

5.2 ANALYSIS OF ALTERNATIVE TECHNOLOGY

5.2.1 CHOICE OF METHOD OF MINING

The mechanized method will be adopted because of the following reasons:

- Mining operations is proposed to be carried out by opencast mechanized method by deploying drilling and blasting method, loader and tipper/dumper combination.
- There is no overburden present.
- The mineral i.e. Rough stone is available at surface.
- The mining by opencast method is highly productive & economical as compared to underground method; and
- Underground mining is not economical and practically not feasible in the present case.

Hence, conventional open cast mechanized method of mining involving excavation through drilling and blasting will be done with excavated material will be loaded with into tipper and transported to consumer.

CHAPTER 6: ENVIRONMENTAL MONITORING PROGRAMME

6.1 INTRODUCTION

Post Environmental Clearance Monitoring is an essential part to check the impact of project related activity. Hence monitoring of various environmental parameters will be carried out on a regular basis to ascertain the following as:

- Status of Pollution within the mine site and in its vicinity.
- Generate data for predictive or corrective purpose in respect of pollution.
- Examine the efficiency of pollution control system adopted at the site.
- To assess environmental impacts.

Monitoring will be carried out at the site as per the norms of CPCB. Environmental Monitoring Programme has been/will be conducted for various environmental components as per conditions stipulated in Environmental Clearance Letter issued by SEIAA & Consent to Operate issued by TNPCB.

Six monthly compliance reports will be submitted to TNPCB/MOEF for the periods of January to June and July to December will be submitted on regular basis on 1st June and 1st December of each calendar year. Quarterly compliance Report for conditions stipulated in Consent to Operate will be submitted to TNPCB on regular basis.

6.2 FORMATION OF ENVIRONMENTAL MANAGEMENT CELL (EMC)

Monitoring is as important as that of control of pollution since the efficacy of pollution control measures adopted can only be determined by monitoring. An Environmental Management Cell will be established for implementing the Environmental Management Plan and conducting periodic environmental monitoring of important and crucial environmental parameters to assess the status of environment regularly during mine operations. With the knowledge of baseline conditions, the monitoring program will serve as an indicator for any deterioration in environmental conditions due to operation of the mine and so that suitable additional mitigation steps could be taken in time to safeguard the environment. The organizational chart of Environment Management Cell is as given in **Figure 6.1**.

6.3 IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES

The mitigation measures suggested in **Chapter-4** will be implemented to reduce the impact on environment due to the operations of the Rough stone mining projects. To facilitate easy implementation of mitigation measures, these are phased as per the priority implementation as given in **Table-6.1**.

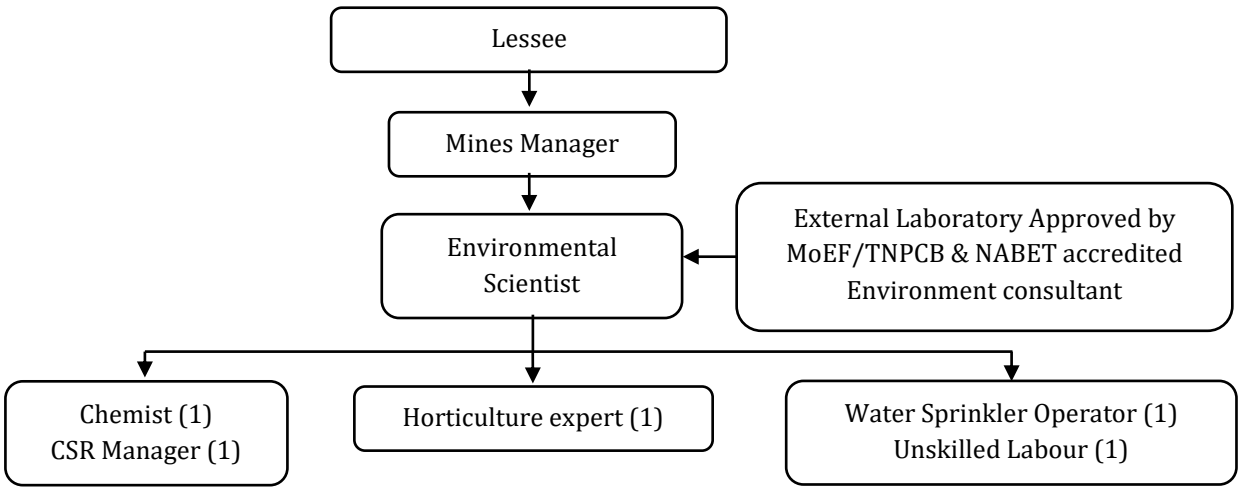


FIGURE 6.1: ORGANIZATION CHART OF ENVIRONMENTAL MANAGEMENT CELL (EMC)

6.3.1 RESPONSIBILITIES OF EMC

The responsibilities of the EMC include the following:

A. Environmental monitoring of the core and buffer zone.
B. Commissioning of pollution control equipment.
C. Specification and regulation of maintenance schedules for pollution control equipment.
D. Ensuring that standards are maintained.
E. Developing the green belt.
F. Ensuring optimum water usage.
G. Carrying out the Environmental Management Plan.
H. Organizing meetings of the Environmental Management Committee and reporting to the committee.

TABLE 6.1: IMPLEMENTATION SCHEDULE

Sr. No.	Recommendations	Time Requirement	Schedule
1	Air pollution control measures	Will be further improved at the time of start of mine after grant of EC and lease renewal.	Immediate
2	Water pollution control measures	Will be further improved at the time of start of mine after grant of EC.	Immediate
3	Noise control measures	Will be further improved at the time of start of mine after grant of EC.	Immediate

Sr. No.	Recommendations	Time Requirement	Schedule
4	Ecological preservation and upgrade	May be started before grant of EC and will be continued in phase-wise manner till life of the mine.	Immediate & Progressive

6.4 MEASUREMENT METHODOLOGIES

6.4.1 INSTRUMENTS TO BE USED

The following instruments are being used for data collection work in the monitoring schedule:

1. Respirable Dust Sampler (RDS)
2. Fine Particulate Sampler (FPS)
3. Dry and Wet Bulb Thermometer.
4. Sound Level Meter
5. Micro Meteorological Station
6. Water Level Indicator
7. Global Positioning System (GPS)

In addition to the above instruments, the data on land use, vegetation and agricultural crops will be collected by the field team by meeting with many local inhabitants in the study area and different government departments /agencies.

6.4.2 MONITORING PROGRAMME

The environmental monitoring for the Rough stone mine operations will be conducted for following aspects:

- Ambient Air quality
- Water table depth
- Surface and ground water quality
- Ambient Noise Levels
- Soil Quality
- Green belt & Plantation
- CSR Activities

The following routine monitoring program will be implemented under the post-project monitoring. Environmental monitoring of ambient air quality, surface and ground water quality, ambient noise levels, etc. will be carried out through MOEF accredited agencies regularly and reports will be submitted to TNPCB/MoEF.

Air Pollution

The ambient air quality will be monitored as per EC Conditions/Central Pollution Control Board guidelines at one location in mine lease area and four locations in nearby villages.

Water Table Depth

The depth of ground water table in the area will be monitored regularly in the wells/ borewell located in four nearby villages. The water table depth at Pre-monsoon (May month) and Pre-Monsoon (November Month) will be measured and records will be maintained.

Water quality

Ground water samples from four villages surrounding the project area will be analyzed. The water quality monitoring will be carried out once during every season. Surface water sample will be collected from mine pit, when available.

Ambient Noise Levels

Noise levels in the core zone and in surrounding villages will be monitored regularly. Ambient noise level monitoring will be carried out at 1 location in mine lease area and in 7 locations in nearby villages. Noise level monitoring will be conducted once in each season.

Soil quality

Soil quality monitoring will be carried out in the plantation area within the mine lease area and in the agricultural fields located nearby the mine lease area. 1 sample from core zone in mine lease and 3 samples from nearby villages will be collected and analyzed, once in a year, preferably during dry season.

CSR Activities

Social welfare activities conducted in nearby villages will be regularly monitored for their effectiveness and accordingly new activities will be planned.

6.4.2.1 MONITORING SCHEDULE

The proposed environmental monitoring schedule is given in **Table 6.2**.

TABLE 6.2: PROPOSED ENVIRONMENTAL MONITORING SCHEDULE

S. No.	Environment Attributes	Location	Monitoring		Parameters
			Duration	Frequency	
1	Air Quality	2 Locations (1 Core & 1 Buffer)	24 hours	Once in 6 months	Fugitive Dust, $PM_{2.5}$, PM_{10}, SO_2 and NO_x.

S. No.	Environment Attributes	Location	Monitoring		Parameters
			Duration	Frequency	
2	Meteorology	At mine site before start of Air Quality Monitoring & IMD Secondary Data	Hourly / Daily	Continuous online monitoring	Wind speed, Wind direction, Temperature, Relative humidity and Rainfall
3	Water Quality Monitoring	2 Locations (1SW & 1 GW)	-	Once in 6 months	Parameters specified under IS:10500, 1993 & CPCB Norms
4	Hydrology	Water level in open wells in buffer zone around 1 km at specific wells	-	Once in 6 months	Depth in bgl
5	Noise	2 Locations (1 Core & 1 Buffer)	Hourly – 1 Day	Once in 6 months	Leq, Lmax, Lmin, Leq Day & Leq Night
6	Vibration	At the nearest habitation (in case of reporting)	–	During blasting Operation	Peak Particle Velocity
7	Soil	2 Locations (1 Core & 1 Buffer)	–	Once in six months	Physical and Chemical Characteristics
8	Greenbelt	Within the Project Area	Daily	Monthly	Maintenance

6.5 ENVIRONMENTAL POLICY

6.5.1 Environmental Policy of the Company

Environmental policy by lessee is attached as **Annexure XI**.

6.5.2 Organization Set-up

The company has clearly defined duties and responsibilities for the employees. Organizational setup for environment management is shown in **Figure 6.1.**

6.5.3 Environmental Management Cell

An Environmental Management Cell (EMC) will be established in the mine under the control of Mines Manager. The EMC will be headed by an Environmental scientist having

adequate qualification and experience in the field of environmental management. The responsibilities of EMC will be as follows:

1. Implementation of pollution control measures as suggested in Environmental Management Plan and recommended in EC
2. Conducting environmental monitoring as per EMP and EC stipulation through external laboratories approved by MoEF/TNPCB and NABL
3. Ensuring compliance with other conditions stipulated in Environmental Clearance for the project.
4. Ensuring compliance with the conditions stipulated in 'Consent to Operate' for the project.
5. Timely submission of compliance status to MoEF/ TNPCB
6. Seeking experts' guidance, as and when required.
7. Conducting CSR activities in nearby villages.

6.5.4 Audit & Review

Review and audit are essentially a management tool. However, its application is crucial at the operational level for verification and feedback on the effectiveness of organization system and environmental performance. Basically, auditing involves in the following items:

- Line management system
- Awareness and training
- Procedures: standards, targets
- Plans: Waste, contingency, pollution control compliance
- Verify environmental impact assessment
- Verify mitigation
- Reporting and communication
- Documentation
- Feedback

Internal Audit:

A system of auditing will be undertaken for mining operations and includes the use of trained internal and external auditors. In addition, auditing should be undertaken to ensure compliance with all the applicable legislations.

Audit Type Frequency:

- Internal: - From other site in-charge every 6 months
- External - independent expert Every 12 months

The company shall depute internal / external auditors who are trained and certified as competent EMS auditors by an independent and external standard organization. The

results of monitoring and auditing shall be regularly reported through the senior management team to ensure that action items are addressed.

6.5.5 Non-conformity, Corrective Action and Preventive Action

As per the Environmental Policy of the company, non-conformities, corrective actions, and preventive actions shall be managed in accordance with *Nonconformance, Preventive and Corrective Action Procedure.* This procedure, which relates to all projects of the company, details the processes to be utilized with respect to the identification of non-conformances, the application of appropriate corrective actions(s) to address non-conformances and the establishment of preventive actions to avoid non-conformances. The key elements of the process include:

- identification of Non-conformance and /or Non-compliances
- Recording of Non-conformance and/or Non-compliance
- Evaluation of the Non-conformance and/or Non-compliance to determine specific corrective and preventive actions
- Corrective and preventive actions to be assigned to responsible persons and
- Management Review of corrective actions to ensure the status and effectiveness of the actions

6.5.6 Management Review

A comprehensive review of the objectives and targets associated with the individual project of the company shall be undertaken on an annual basis via the business planning (1 year outlook) and business strategy (5-year outlook) processes. These reviews, which include involvement from the senior site management and other key personnel, assess the performance of the mine over the previous year and develop goals and targets for the following period.

6.6 OCCUPATIONAL HEALTH AND SAFETY

Occupational health and safety are very closely related to productivity and good employer-employee relationship. The main factors of occupational health in mine are fugitive dust and noise. Safety of employees during operation and maintenance of mining equipment and handling of explosive materials is to be taken care of as per the Mine Regulations, 1965 and circulars of DGMS. To avoid any adverse effects on the health of workers due to dust, heat, noise and vibration, sufficient measures are proposed in the EMP. These include:

- Provision of rest shelters for mine workers with amenities like drinking water, toilets etc.;
- Provision of personnel protection devices for the workers;
- Rotation of job for workers exposed to high noise areas;

- First-aid facilities.
- Occupational Health Survey of the employees will be carried out at regular intervals.

6.7 BUDGETARY ALLOCATION FOR ENVIRONMENTAL MONITORING

The details of monitoring of pollution along with annual recurring cost are given in **Table-6.3**.

TABLE 6.3 COST OF ENVIRONMENTAL MONITORING PROGRAMME

S. No.	Description of item	Capital Cost (Rs.)
1	Air Pollution Control - Water sprinkling on haul road & plantation	52,000
2	Water Pollution Control (Settling tank, Garland Drains, etc.)	18,000
3	Noise Level Monitoring	2,000
4	Ground Vibration Test	4,000
	Total	**76,000**
	Total Environmental Monitoring Cost Cost for five years	**3,80,000**

CHAPTER 7: ADDITIONAL STUDIES

7.1 PUBLIC CONSULTATION

Draft EIA/EMP for Proposed Rough stone Mine in an area of 3.62.0 Ha, located in Survey Nos. S.F.No. 54/2, 55/1, 57/2 Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu is prepared as per the TOR issued by SEIAA, Tamil Nadu and the report is submitted for public consultation process as per the provisions of EIA Notification 2006 and amendments thereof.

After completing the public consultation process, the issues raised and commitment of Project Proponent during the public hearing will be incorporated in the final EIA/EMP report. The following Additional Studies were/will be carried out in as per Terms of Reference: Risk Assessment & Disaster Management Plan.

7.2 RISK ASSESSMENT

Hazard analysis involves the identification and quantification of various hazards (unsafe conditions) that exist in the mines. On the other hand, risk analysis deals with the identification and quantification of risks, mining equipment and personnel are exposed to, due to accidents resulting from the hazards present in the mine. Risk analysis follows an extensive hazard analysis. It involves the identification and assessment of risks the neighboring populations are exposed to because of hazards present.

In the sections below, the identification of various hazards, probable risks, maximum credible accident analysis, and consequence analysis are addressed which gives a broad identification of risks involved. Based on the risk estimation disaster management plan has to be prepared.

The mining will be carried out under the management control and direction of a qualified Mine Manager holding a second-class manager's certificate of competency. The DGMS have been regularly issuing standing orders, model standing orders and circulars to be followed by the mine management in case of disaster, if any. Moreover, mining staff will be sent to refresher courses from time to time to keep them alert. However, following natural/industrial hazards may occur during normal operation:

- Accident due to explosives;
- Accident due to heavy mining equipment;

To take care of above hazard/disasters, the following control measures will be adopted:

- All safety precautions and provisions of the Mine Act, 1952 and the Mines Rules, 1955 will be strictly followed during all mining operations;
- Entry of unauthorized persons will be prohibited;

- Firefighting and first-aid provisions in the mine office 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;
- Training and refresher courses for all the employees working in hazardous premises; Under mines rules all employees of mines shall have to undergo the training at a regular interval;
- Working of mine, as per approved plans and regularly updating the mine plans;
- Regular maintenance and testing of all mining equipment as per manufacturer's guidelines;
- Suppression of dust on the haulage roads;
- Increasing the awareness of safety and disaster through competitions, posters and other similar drives.

7.2.1 Measures to Prevent Accidents due to Trucks and Dumpers

- All transportation within the main cluster area would be carried out under the direct supervision and control of the management;
- The vehicles will be maintained in good repairs and checked thoroughly at least once a week by a competent person authorized for this purpose by the management;
- Broad signs would be provided at each and every turning point specially for the guidance of the drivers;
- To avoid dangers while reversing the vehicles, all areas as far as possible, will be made man free and
- A statutory provision of the fence, constant education, training etc. will go a long way in reducing the incidence of such accidents.

7.2.2 POST COVID HEALTH MANAGEMENT PLAN

COVID – 19 ailments as a result of SARS-CoV-2 Coronavirus is exceptionally a brand new disorder, with sparkling data being known on a dynamic basis approximately the natural history of the ailment, specifically in terms of post-healing occasions.

After acute COVID-19 illness, recovered sufferers might also preserve to record wide sort of signs and signs and symptoms including fatigue, body pain, cough, sore throat, trouble in respiration, and so forth. As of now there is limited evidence of submit-COVID sequalae and similarly studies is needed and is being actively pursued. A holistic method is needed for follow up care and nicely-being of all post COVID getting better patients.

Post-COVID Follow Up Protocol –

- Keeping COVID appropriate behavior (use of mask, hand & respiratory hygiene, bodily distancing).
- Drink adequate amount of heat water (if not contra-indicated).

- Make sure your places of work are smooth and hygienic
- Surfaces (e.g. desks and tables) and gadgets (e.g. phones, helmet) want to be wiped with disinfectant often
- Positioned sanitizing hand rub dispensers in prominent locations around the place of work. make certain these dispensers are regularly refilled
- Displaying posters regarding hand-washing
- Make certain arrangement that workforce, contractors, and clients have get right of entry to places wherein they could wash their fingers with soap and water
- Display posters promoting breathing hygiene.
- Brief your personnel, contractors, and clients that if COVID-19 starts off evolved spreading for your community everyone with even a mild cough or low-grade fever (37.3°C or extra) want to live at home. They must additionally stay home (or earn a living from home) if they have had to take easy medications, consisting of paracetamol/acetaminophen, ibuprofen or aspirin, which may also mask symptoms of infection
- Keep communicating and selling the message that people need to stay at home even though they have just moderate signs of COVID-19.
- Recall whether a face-to-face assembly or occasion is wanted. ought to it be replaced by way of a teleconference or online event?
- Should the assembly or event be scaled down in order that fewer humans attend?
- Pre-order sufficient supplies and materials, such as tissues and hand sanitizer for all employees. Have surgical mask available to provide every person who develops respiration signs.
- it's also suggested with the aid of the Ministry of AYUSH that the use of within the morning (1 teaspoonful) with luke heat water/milk is tremendously advocated (underneath the path of Registered Ayurveda physician) as in the clinical exercise is believed to be powerful in put up-restoration duration.
- If there's continual dry cough / sore throat, do saline gargles and take steam inhalation. The addition of herbs/spices for gargling/steam inhalation. Cough medicinal drugs must be taken on recommendation of clinical medical doctor or qualified practitioner of Ayush.
- Search for early warning symptoms like high grade fever, breathlessness, Sp02 < 95%, unexplained chest ache, new onset of misunderstanding, focal weakness.
- Avoid smoking and intake of alcohol.
- Talk in your personnel and contractors approximately the plan and ensure they are aware of what they need to do – or no longer do – below the plan. Emphasize key points which include the importance of staying faraway from work even though they have got only moderate symptoms or have had to take easy medicines (e.g. paracetamol, ibuprofen) which can also masks the signs

- The plan must deal with a way to preserve your commercial enterprise running although a extensive variety of personnel, contractors and suppliers cannot come for your administrative center - both because of local restrictions on journey or because they're unwell.

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 order of priorities. The disaster/ emergency situations will be countered with an organizational chart entrusting responsibility to various mine personnel with their specific roles during emergency and will be updated from time to time.

- Aid and medical care for victims;
- Protect other people;
- Minimize damage to property and the environment;
- Initially contain and finally control the accident;
- Ensure the safe rehabilitation of the affected area; and
- Retain relevant documents and equipment for later investigation of the cause and circumstances of the emergency

The composition of the disaster management team will be:-

1. Mines Manager
2. Site Supervisors/ Foremen
3. Personnel/Administrative Manager/Environmental Manager
4. First Aid Expert/ Medical Coordinator
5. Transport in-charge

For effective implementation of the disaster management plan, the following facilities would be widely circulated and personnel training through rehearsals/drills.

Infrastructure at site

1. Emergency Control Room

Site office will be used as Emergency Control Room. Following facilities will be kept ready at the site office for use in emergency conditions:

a. Master plan of the mines.
b. First aid boxes.
c. Gas masks.
d. Mobile phone with charging facility.
e. Loud speakers
f. Emergency lighting system.

g. Stretchers.
h. Transport facility.

- ***Assembly Points***

Assembly points will be set up in the Mine lease at farthest from the location of likely hazardous events, where pre-designated persons from the works, contractors and visitors would assemble in case of emergency. Up-to-date list of pre-designated employees of various departments will be available at these points so that roll call could be taken. Pre-designated persons would take charge of these points and mark presence as the people come into it.

- ***Communication System***

Different types of alarms to differentiate types of emergencies will be assigned and communicated. Alarms will be followed by an announcement over Public Address System. In case of failure of alarm system, communication will be made through Public Address System (loud speakers). If everything fails, a messenger will be used for sending the information.

- ***Warning System and Control***

The Control Centres will be located at an area of minimum risk or vulnerability in the premises concerned, considering the wind direction, areas which might be affected by fire/explosion, toxic releases, etc. For promptness and efficiency, the premises/storage sites will be divided into number of zones, which will be clearly marked on the site plan.

- ***Emergency Services***

This includes the fire-fighting system, first aid centre, ambulance etc. Alternate sources of power supply, communication with local bodies, fire brigade etc., will be identified and clearly demarcated at control room. Adequate number of external and internal telephone connections will be provided.

- ***Fire Protection System***

The fire protection system in the proposed Rough stone mine consist of portable fire extinguishers of suitable types and capacities to be placed in transport vehicles and additional fire extinguishers at site office. Water pumps will be used for supporting the firefighting arrangements.

Emergency control procedure –

The onset of the emergency will likely begin with a major fire or explosion or wall collapse along the excavation and will need to be detected by various safety devices as well as by operating personnel in service. If located by a member of the staff on duty, the

latter (according to the emergency procedure of the site of which he is sufficiently informed) will go to the nearest alarm point, break the windows, and trigger the alarms. He will also do his best to inform the location and nature of the incident to the emergency control room. In accordance with the emergency procedure at work, the following key activities will take place immediately to interpret and take control of the emergency.

- An on-scene fire crew, led by a firefighter, will arrive with fire foam tenders and other essential equipment at the scene of the event.
- The emergency security controller's duties will begin at the main gate office.
- The incident controller will rush to the scene of the emergency and, with the assistance of the rescue team, begin dealing with the situation.
- The site's chief controller will arrive at MECR with members of his advisory and communication teams and take complete leadership of the facility.
- He will get constant information from the incident controller and make choices and provide orders to:
    - Incident commander
    - Mine command centres
    - Control panel for emergency security

Alarm system during disaster –

On getting the message of disaster from Site Controller, putting out fires group, the mine control room orderly will sound alarm howling for 5 minutes. Occurrence regulator will orchestrate to communicate debacle message through open location framework. On getting the message of "Crisis Over" from Incident Controller the crisis control room chaperon will give "All Clear Signal", by sounding caution straight for 2 minutes. The elements of alert framework will be disclosed to the whole gang to try not to freeze or misjudge during calamity. To forestall or deal with peril/calamities assuming any the accompanying control measures have been taken on.

Generally security precautionary measures and arrangements of Metalliferous Mines Regulations (MMR), 1961 is completely followed during all mining tasks.

- Recognition of generally wellbeing safeguards for impacting and capacity of explosives according to MMR 1961.
- Section of unapproved people into mine and partnered regions is totally restricted.
- Putting out fires and first-help arrangements in quite a while office complex and mining region are given.
- Arrangements of all the wellbeing apparatuses, for example, security boot, head protectors, goggles, dust veils, ear attachments and ear muffs and so forth are made accessible to the representatives and the utilization of same is totally stuck to through normal checking.
- Preparing and supplemental classes for every one of the representatives working in risky premises.

- Working of mine, according to supported plans and routinely refreshing the mine arrangements.
- Cleaning of mine appearances is routinely finished.
- Treatment of explosives, charging and impacting are done simply by qualified people following SOP.
- Checking and customary support of wreath channels and earthen bunds to stay away from any inflow of surface water in the mine pit.
- Arrangement of high limit reserve siphons with generator sets with enough diesel for crisis siphoning particularly during rainstorm.
- An impacting SIREN is utilized at the hour of impacting for sound sign.
- Prior to impacting and after impacting, red and green banners are shown as visual signs.
- Cautioning notice loads up showing the hour of impacting and NOT TO TRESPASS are shown at conspicuous spots.
- Standard support and testing of all mining gear were completed according to maker's rules.

7.4 CUMULATIVE IMPACT STUDY

Cluster Details:

Code	Name of the lessee	S.F.Nos	Extent Area (Ha)	Status
Proposed				
P1.	Thiru. K. Ravikumar	54/2, 55/1, 57/2 Thambagoundanpalayam Village	3.62.0	ToR Letter Number SEIAA-TN/F.No.9047/SEAC/ToR-1164/2022 Dated : 06.06.2022
P2	Thiru. K. Ravikumar	57/1 Thambagoundanpalayam Village	2.59.0	EC Granted
Existing				
Cod	**Name of the lessee**	**S.F.Nos**	**Extent Area (Ha)**	**Period of lease**
E1.	N.S.Manonmani	577/1A1A, 577/1A2, Arisipalayam	3.15.5	24.11.2018 to 23.11.2023
		Total Extent	**9.36.5**	

TABLE 7.1: SALIENT FEATURES OF PROPOSAL "P1"

Name of the Mine	Thiru. K. Ravikumar	
Survey Nos	S.F.No. 54/2, 55/1 and 57/2	
Land Type	Patta land	
Extent	3.62.0 Ha	
Mining Plan Period / Lease Period	5Years/10Years	
Ultimate Pit Dimension	269 m (L) x 101m (W) x 42m (D) BGL	
Latitude between	10°52'03.05''N to 10°52'13.95''N	
Longitude between	76°57'21.81''E to 76°57'27.87''E	
Highest Elevation	308 m	
Machinery Proposed	Jack Hammer	7
	Compressor	2
	Excavator bucket & Rock breaker attached	2
	Tippers (20 tonnes Capacity)	4
Proposed Blasting Method	Controlled Blasting Method	
Manpower Proposed	31 Nos	
Total Project Cost	Rs. 86,14,000/-	

Source: Approved Mining Plan

TABLE 7.2: SALIENT FEATURES OF PROPOSAL "P2"

Name of the Mine	Thiru. K. Ravikumar	
Survey Nos	S.F.No. 57/1	
Land Type	Patta land	
Extent	2.59.0 ha	
Mining Plan Period / Lease Period	5Years/10Years	
Ultimate Pit Dimension	217 m (L) x 124m (W) x 42m (D)	
Latitude between	10°52'02.67''N to 10°52'10.08''N	
Longitude between	76°57'17.47''E to 76°57'24.54''E	
Highest Elevation	305 m	
Machinery Proposed	Jack Hammer	8
	Compressor	2
	Excavator bucket & Rock breaker attached	2
	Tippers (20 tonnes Capacity)	3
Proposed Blasting Method	Controlled Blasting Method	
Manpower Proposed	32 Nos	
Total Project Cost	Rs. 69,38,000/-	

TABLE 7.3: SALIENT FEATURES OF PROPOSAL "E1"

Name of the Mine	N.S.Manonmani	
Survey Nos	577/1A1A, 577/1A2, Arisipalayam	
Land Type	It is a Patta land, Registered in the name of N.S.Manonmani vide Patta No.40. The applicant has obtained consent from the pattadhar.	
Extent	3.15.5 ha	
Mining Plan/Lease Period	03.10.2017 to 25.05.2022	
Ultimate Pit Dimension	Length 136m, Width 100m Depth in Max 12m	
Latitude between	10°52'7.58"N to 10°52'2.20"N	
Longitude between	76°57'13.12"E to 76°57'23.37"E	
Highest Elevation	304 m	
Machinery Proposed	Jack Hammer	2
	Compressor	1
	Excavator bucket & Rock breaker attached	1
	Tippers (20 tonnes Capacity)	1
Proposed Blasting Method	Controlled Blasting Method	
Manpower Proposed	18 Nos	
Total Project Cost	Rs. 76,81,000/-	

The Cumulative Impact is anticipated due to drilling & blasting and excavation and transportation activities from proposed 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. The current monitoring was done as existing quarry are working which gives the ambient or present condition of air quality as well as noise.

TABLE 7.4: PREDICTED AIR INCREMENTAL VALUE

Locations	**PM_{10} (µg/m³)**			**$PM_{2.5}$ (µg/m³)**			**SO_2 (µg/m³)**			**NO_2 (µg/m³)**		
	Inc	**Max**	**Total**	**Inc**	**Max**	**Total**	**Inc**	**Max**	**Total**	**Inc**	**Max**	**Total**
AAQ-1	2.3	55.1	57.4	1.5	34.1	35.6	1.2	10.4	11.6	1.3	28.2	29.5
AAQ-2	1.3	51.9	53.2	0.7	37.2	37.9	0.5	9.5	10	0.6	21.6	22.2
AAQ-3	1	57.7	58.7	0.5	34.7	35.2	0.3	10.3	10.6	0.3	20.6	20.9
AAQ-4	1.3	67.7	69	0.7	32.9	33.6	0.5	10.9	11.4	0.6	19.8	20.4
AAQ-5	1	62	63	0.5	32.5	33	0.3	10.1	10.4	0.3	22	22.3
AAQ-6	2.7	66.1	68.8	1.8	39.6	41.4	1.5	9.2	10.7	1.9	17.6	19.5
AAQ-7	1.3	50.3	51.6	0.7	28.6	29.3	0.5	9.4	9.9	0.7	15.4	16.1
NAAQS (µg/m³)	100			60			80			80		

TABLE 7.5: MAXIMUM GROUND LEVEL CONCENTRATION

Pollutants	Max. GLC observed, (µg/m3)	Distance and Direction
PM_{10}	11.7	1000, SW
$PM_{2.5}$	7.4	1000, SW
SO_2	6.0	1000, SW
NO_2	6.4	1000, SW

TABLE 7.6: PREDICTED NOISE INCREMENTAL VALUE

Equipment with Highest Noise Level	Location ID	Background Value (Day) dB(A)	Incremental Value dB(A)	Total Predicted dB(A)	Residential Area Standards dB(A)
Drilling 90 dB(A)	N4 Palathurai, 0.57 Km	39.4	30.0	39.9	55
Shovel 85 dB(A)		39.4	25.0	39.6	
Tipper 75 dB(A)		39.4	15.0	39.4	
Compressor 85 dB(A)		39.4	25.0	39.6	
Excavator 102 dB(A)		39.4	42.0	43.9	

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, the ambient noise levels at all the locations near habitations are within permissible limits of Residential Area (buffer zone)

TABLE 7.7: ESTIMATED PEAK PARTICLE VELOCITY FOR EXPLOSIVE CHARGE FOR EXISTING AND PROPOSED MINES

Distance from blasting site, m	Quantity of Explosive/Blast, Kg			PPV, mm/s		
	P1	P2	E1	P1	P2	E1
100	79	97	50	47.0	22.3	14.6
150	79	97	50	19.6	13.3	8.8
200	79	97	50	8.1	9.3	6.1
250	79	97	50	4.9	7.0	4.6
300	79	97	50	3.4	5.5	3.6
350	79	97	50	2.6	4.6	3.0

Distance from blasting site, m	Quantity of Explosive/Blast, Kg			PPV, mm/s		
	P1	P2	E1	P1	P2	E1
400	79	97	50	2.0	3.9	2.5
450	79	97	50	1.7	3.3	2.2
500	79	97	50	1.4	2.9	1.9
550	79	97	50	1.2	2.6	1.7
600	79	97	50	1.1	2.3	1.5
650	79	97	50	2.0	2.1	1.4
700	79	97	50	1.8	1.9	1.2
750	79	97	50	1.7	1.7	1.1

Note: The empirical formula does not consider the delay factor in blasting due to use of Delay Detonators.

The nearest habitation from cluster is Thambagoundanpalayam –1.0Km - Southeast. From the above table, the blasting will not cause any significant ground vibrations in the area. The ground vibrations at nearest habitation will be well within the permissible limits recommended by DGMS.

TABLE 7.8: SOCIO ECONOMIC BENEFITS FROM 3 MINES

	Project Cost in Rs.	CER in Rs.
P1	86,14,000	5,00,000
P2	69,38,000	5,00,000
E1	76,81,000	1,53,620
Total	**2,32,33,000**	**11,53,620**

CER allocation has been made as per MoEF & CC OM F.No.22-65/2017-IA.III, Dated: 01.05.2018. 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 and the total CER amount from the 3 mines is Rs. 11,53,620/-.

TABLE 7.9: EMPLOYMENT BENEFITS FROM 3 MINES

	Direct Employment	Indirect Employment
P1	31	40
P2	32	40
E1	18	34
Total	**81**	**114**

A total of 81 people will get employment due to these 3 mines in cluster.

Greenbelt Development –

TABLE 7.10: GREENBELT DEVELOPMENT BENEFITS FROM 3MINES

CODE	No of Trees proposed to be planted	Survival %	Area Covered Sq.m	Name of the Species	No. of Trees expected to be grown
P1	2200	80%	Near by safety distance, panchayat road , village road.	Neem, Pungan, Casuarinas and other regional trees	1800
P2	1550	80%			1300
E1	220	80%			176
Total	**3970**	**80%**	**-**	**-**	**3276**

Based on the Proposed Mining Plans its anticipated that there shall growth of native species of Neem, Casuarina, Pungan etc in the Cluster at a rate of 3970 Trees Planted over a period of 5 Years with Survival Rate of 80% and expected growth is around 3276 Trees .

CHAPTER 8: PROJECT BENEFITS

8.1 NEED BASED ASSESSMENT

Socio-economic survey conducted in the villages located within 10 km radius of the Rough stone Mine area 3.62.0 Ha, located in S.F.No. 54/2, 55/1, 57/2 Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu, brings out that villages are lacking in basic amenities like healthcare, transportation, treated drinking water, higher education and sanitation facilities etc. The survey also reveals that the literacy rate in the area is low and the people are mostly engaged in mining and agriculture related activities.

8.2 PROPOSED WELFARE MEASURES

To address some of the expectations of local people and as a commitment towards the Corporate Social Responsibility, the project proponent through the mine management will adopt following socio-economic welfare measures in the nearby villages within 2.5 km distance. Further need will be assessed as per issues raised during public hearing.

8.2.1 WELFARE ACTIVITIES

Apart from direct and indirect employment opportunities, the mine management will carry out welfare activities in the surrounding two villages for improving the conditions of the villages.

8.3 EMPLOYMENT POTENTIAL

The mine will provide fulltime employment for mine management to 31 nos. for activities such as excavation, transportation etc. Mostly local persons will be employed in the mine. The impact of mining on the economic aspects can be clearly anticipated. The employment potential will ameliorate economic conditions of these families directly and provide employment to many other families indirectly who are involved in business and service-oriented activities.

The employment of local people in project will upgrade the prosperity of the region. These will in-turn marginally improve the socio-economic conditions of the area.

8.4 BUDGET FOR SOCIO-ECONOMIC WELFARE ACTIVITIES

Considering this case greenfield project. As per Memorandum No:F NO 22-65/2017-IA-III dated 01/05/2018 the applicable CER is 2% in greenfield of project cost. The proposed utilization of the budget of CSR activities affidavit furnished to SEIAA-TN. Further CSR activities will be identified as per public comments during public hearing.

TABLE 8.1: CER COST

Project Cost in Rs.	CER in Rs.
86,14,000	5,00,000/-

8.5 SUMMARY

The project activity and the management will support the local Panchayat and provide other forms of assistance for the development of public facilities in this region. The mine management will recruit semi-skilled & unskilled workers from the nearby villages. The overall effect will improve the buying power of employees and thus a higher standard of living. Transport, medical, educational, and other civic amenities will get a boost in future. This is envisaged as a major positive benefit.

CHAPTER 9: ENVIRONMENTAL COST BENEFIT ANALYSIS

9.0 ENVIRONMENTAL COST BENEFIT ANALYSIS

As per EIA Notification dated 14th September, 2006; as amended from time to time, this Chapter on 'Environmental Cost Benefit Analysis' is applicable only if it is recommended at the Scoping stage.

Post, mining activities, the area under mining will be utilized as water reservoir after discontinuation of the mining activity.

In post-mining, the left out voids of opencast mines behave as huge groundwater reservoirs and contain groundwater runoff. Thus, development of water reservoir will help in maintaining and conserving the groundwater levels of the area.

CHAPTER 10: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

10.1 INTRODUCTION

The environmental management plan consists of following set of mitigation, management, monitoring, and institutional measures to be taken during implementation and operation of the project, to eliminate adverse environmental impacts or reduce them to acceptable levels.

- Overall conservation of environment.
- Minimization of natural resources and water.
- Safety, welfare and good health of the work force and populace.
- Ensure effective operation of all control measures.
- Vigilance against probable disasters and accidents.
- Monitoring of cumulative and longtime impacts.
- Ensure effective operation of all control measures.
- Waste generation and pollution.
- Judicious use of the present environmental management plan addresses, the components of environment, which are likely to be affected by the different operations in expansion project.

Environmental Management Plan, which will be implemented in the proposed project, is detailed under the following heads:

- Air Quality Management
- Noise Management
- Water Management
- Solid Waste Management
- Land Reclamation
- Greenbelt Development & Plantation

10.2 AIR QUALITY MANAGEMENT

To minimize impacts of mining on different environmental parameters and to keep air and water quality within prescribed limits of CPCB, an Environmental Management Plan (EMP) has been prepared. This will help in resolving all environmental and ecological issues due to mining in the area

The environmental management plan includes all preventive as well as mitigation measures to minimize impact on environment along-with reclamation and rehabilitation measures for mined out land.

The individual operations which will generate particulate matter are excavation, loading, unloading and transportation etc. The general air pollution in case of mining operation includes dust, smoke, Sulphur dioxide, Nitrogen dioxide etc. These can have adverse effects on the human health conditions, depending upon the concentration, particle size and duration of exposure with the above pollutants. However, proper precautions will help in minimizing the adverse impact due to air pollution.

10.2.1 PREVENTION AND CONTROL OF AIR POLLUTION

A. Dust Pollution

The main pollutant in air is Particulate Matter (PM10), which is generated due to various mining activities. However, to reduce the impact of dust pollution the following steps will be taken during various mining activities.

a) During drilling and blasting operations

- Use of dust aprons on drilling equipment and adopting wet drilling methods.
- Avoiding blasting during adverse weather conditions.
- Use of controlled blasting practice

Thus, pollution generated will be minimized due to drilling & blasting.

b) During loading and transportation operation

- The ripped and fragmented Rough stone would be raised using Hydraulic Excavator & Front End Loader and will be loaded to the tippers.
- Regular sprinkling of water on haul and access roads.
- Periodic maintenance of haul roads
- All tippers would be covered by tarpaulin sheets at top and avoid spillage.
- Regular maintenance of all equipment to minimize particulate matter and gaseous emissions from diesel engines.

c) Monitoring of air pollution

- Periodic ambient air quality monitoring will be carried out to assess the quality and for timely corrective actions.

B. Prevention and Control of Gaseous Pollution

In mining activities, the only source of gaseous emissions is from diesel engines, other vehicles and equipment's.

The emissions from diesel engines of the machinery could be visible as smoke or invisible gases such as Sulphur Dioxide, Oxides of Nitrogen and un-burnt Hydrocarbons due to

incomplete combustion of fuel. The reasons may be quality of fuel, improper operation of the engine, etc.

Proper maintenance of machines improves combustion process and brings the reduction in pollution. The effect of these gases will be limited to the surrounding of the equipment in operation only and will not affect the nearby community.

10.3 NOISE & GROUND VIBRATION MANAGEMENT

10.3.1 NOISE ABATEMENT AND CONTROL

- Small scale blasting will be carried out.
- Charge per delay will be kept optimum.
- Blasting will be conducted during lunch (noon) time when no employees are present in mine working area.
- Periodic maintenance of all mining machinery and transport vehicles
- Provision of effective silencers to all mine machinery
- Provision of ear plugs/ear muffs to workers exposed to high noise generating operations
- Development of thick plantation around mine lease boundary to act as a noise screen.
- Regular noise monitoring will be carried-out.

10.3.2 VIBRATION ABATEMENT

- Even though there is no habitation in the vicinity of the lease, the blasting pattern would be designed to keep the ground vibrations & noise to a minimum.
- The frequency of blasting too would be optimized by adopting multi-row blasting using delay detonators.
- Fly rock control would be given high priority and the blasting pattern, stemming column, charge per hole, etc., as discussed earlier, are likely to control fly rock. In addition, the detonating cord trunk line would be covered with drill chips and cutting to keep the air blast to a minimum.

10.4 WATER MANAGEMENT

10.4.1 SURFACE WATER MANAGEMENT

The changed topography will alter the drainage within the mining lease area. However, there will not be any changes in the topography or drainage pattern outside the mining lease area. At the end of mining activities after reserves are exhausted, the area will be restored to an acceptable level of self-sustaining eco-system, which will comprise of will be developed in upper benches and safety zone and at the end of lease period mining pits will be converted into water reservoir with suitable slope and fenced boundaries

No surface water will be utilized for mining operation. Moreover, there would not be any discharge from mine into the surface water body as no process waste water generation in the mine and allied activities. Hence there would not be any impact on surface water. Only domestic effluent will be generated from the mine office and rest shelter. The domestic effluent is discharged in septic tank followed by soak pit. Besides, there will be no toxic element in the mined out material, which may contaminate ground/ surface water.

10.4.2 GROUND WATER MANAGEMENT

The Water in the area is 70m in summer season and 65m in rainy season which is observed from the nearby bore wells and data obtained from existing private boreholes The lease area is fully covered by Massive Charnokite Formation. Hence the Ground water problem will not arise. Thus, the mining activities will not intersect ground water.

10.4.3 WASTE WATER MANAGEMENT

- Septic tanks and soak pits will be provided for the disposal of domestic waste water generated from mine office.
- Garland drains will be provided to prevent the entry of rainwater into the mining pit.
- Construction of settling tanks at points to arrest silt.
- Rainwater falling in the mining pit will be collected in lower benches & will be used for dust suppression & plantation.
- Regular monitoring of ground water quality will be carried out.

10.4.4 WATER CONSERVATION MEASURES

Optimum Utilization of Water

Initially, water will be sourced which will be met from mine pit water (when available) and by tankers from nearby bore wells**.** Water for drinking purposes will be supplied from nearby borewell.

Water Recycling

No waste water generation envisaged. Septic tanks and soak pits will be provided for the disposal of domestic waste water generated from mine office while rainwater falling during rainy season i.e. Monsoon in the mining pit will be collected in lower benches & will be used for dust suppression & plantation

Rain Water Harvesting

The mine management will Roof top harvesting structures in the public buildings in nearby villages with prior consent from local gram panchayats to collect rain water and

charge to ground through available dug well/ tube well**.** Also, the reservoir developed in mined out pit will act as an additional source of water to the nearby villagers and will also help in recharging ground water table of the area. The cluster has potential to harvest rain water to the tune of about 2575 m^3/annum in non-mining pits and will be utilized for dust suppression and plantation.

10.5 SOLID WASTE MANAGEMENT

No top soil or subgrade present within lease area. The Total excavated ROM is saleable; therefore, recovery is 100%.

10.6 LAND RECLAMATION

Land reclamation will be carried out as per approved progressive mine closure plan. Mined out area will be developed as water body, which will act as rain water harvesting structure help in increasing water level in nearby area. Plantation will be carried out all along the safety zone and upper benches.

10.7 GREEN BELT DEVELOPMENT

Green belt & plantation has been/shall be carried out in the lease area with a view to provide green belt and to give an aesthetic look, for eliminating fugitive emissions and controlling impact of noise etc. At the conceptual stage, Greenbelt /plantation will be developed on safety zone and upper benches of pit having area of 0.16 Ha.

10.8 CORPORATE SOCIAL RESPONSIBILITY

The mine management will support the local Panchayat and provide other forms of assistance for the development of public facilities in this region. The mine management will recruit semi-skilled & unskilled workers from the nearby villages. The overall effect will improve the buying power of employees and thus a higher standard of living viz. better education, improved health and sanitation facilities, housing and acquisition of consumer durables. Transport, medical, educational and other civic amenities will get a boost in future. This is envisaged as a major positive benefit.

10.9 INDUSTRIAL HYGIENE, OCCUPATIONAL HAZARDS AND SAFETY

The working conditions in the mines are governed by the enactments of the Director General of Mines Safety (DGMS). As per the guidelines of the Mines Act, the management will take all necessary precautions. Normal sanitary facilities will be provided within the lease area. The management will carry out periodic health checkup of workers.

Occupational hazards involved in mines are related to dust pollution, noise pollution, and injuries from moving belt conveyors, equipment and fall from high places. DGMS has given necessary guidelines for safety against these occupational hazards. The

management will strictly follow these guidelines. All necessary first aid and medical facilities will be provided to the workers. The mine will be well equipped with proper fire protection and firefighting equipment. All operators and mechanics will be trained to handle fire-fighting equipment's. Further all the necessary protective equipment's such as helmets, reflective jackets, safety goggles, earplugs, earmuffs, etc. will be provided to persons working in risky areas.

10.10 BUDGETARY ALLOCATION FOR ENVIRONMENTAL MANAGEMENT PROGRAMME

The details of Environmental Management Programme for different environmental protection and control activities along with capital and annual recurring cost are given in **Table 10.1**

TABLE 10.1: BUDGET FOR IMPLEMENTATION OF EMP

	Mitigation Measure	Provision for Implementation	Capital	Recurring
Air Environment	Compaction, gradation and drainage on both sides for Haulage Road	Rental Dozer & drainage construction on haul road @ Rs. 10,000/- per hectare; and yearly maintenance @ Rs. 10,000/- per hectare	36200	36200
	Fixed Water Sprinkling Arrangements + Water sprinkling by own water tankers	Fixed Sprinkler Installation and New Water Tanker Cost for Capital; and Water Sprinkling (thrice a day) Cost for recurring	400000	25000
	Air Quality will be regularly monitored as per norms within ML area & nearby Reserve forest with necessary permission	Yearly Compliance as per CPCB norms	0	40000
	Muffle blasting – To control fly rocks during blasting	Blasting face will be covered with sand bags / steel mesh / old tyres / used conveyor belts	0	0
	Wet drilling procedure / latest eco-friendly drill machine with separate dust extractor unit	Dust extractor @ Rs. 25,000/- per unit deployed as capital & @ Rs. 2500 per unit recurring cost for maintenance	25000	2500
	No overloading of trucks/tippers/tractors	Manual Monitoring through Security guard	0	5000
	Stone carrying trucks will be covered by tarpaulin	Monitoring if trucks will be covered by tarpaulin	0	10000
	Enforcing speed limits of 20 km/hr within ML area	Installation of Speed Governers @ Rs. 5000/- per Tipper/Dumper deployed	5000	0
	Regular monitoring of exhaust fumes as per RTO norms	Monitoring of Exhaust Fumes by Manual Labour	0	5000

	Mitigation Measure	Provision for Implementation	Capital	Recurring
	Regular sweeping and maintenance of approach roads for at least about 200 m from ML Area	Provision for 2 labours @ Rs.10,000/labour (Contractual) per Hectare	0	72400
	Installing wheel wash system near gate of quarry	Installation + Maintenance + Supervision	40000	10000
Noise Environment	Source of noise will be during operation of transportation vehicles, HEMM for this proper maintenance will be done at regular intervals.	Provision made in Operating Cost	0	0
	Oiling & greasing of Transport vehicles and HEMM at regular interval will be done	Provision made in Operating Cost	0	0
	Adequate silencers will be provided in all the diesel engines of vehicles.	Provision made in Operating Cost	0	0
	It will be ensured that all transportation vehicles carry a fitness certificate.	Provision made in Operating Cost	0	0
	Safety tools and implements that are required will be kept adequately near blasting site at the time of charging.	Provision made in OHS part	0	0
	Line Drilling all along the boundary to reduce the PPV from blasting activity and implementing controlled blasting.	Provision made in Operating Cost	0	0
	Proper warning system before blasting will be adopted and clearance of the area before blasting will be ensured.	Blowing Whistle by Mining Mate / Blaster / Compentent Person	0	0
	Provision for Portable blaster shed	Installation of Portable blasting shelter	50000	2000

	Mitigation Measure	Provision for Implementation	Capital	Recurring
	NONEL Blasting will be practiced to control Ground vibration and fly rocks	Rs. 30/- per 6 Tonnes of Blasted Material	0	1366675
Water Environment	Water management	Provision for garland drain @ Rs. 10,000/- per Hectare with maintenance of Rs. 5,000/- per annum	36200	5000
Waste Management	Waste management (Spent Oil, Grease etc.,)	Provision for domestic waste collection and disposal through authorized agency	1000	5000
		Installation of dust bins	5000	2000
	Bio toilets will be made available outside mine lease on the land of owner itself	Provision made in Operating Cost	0	0
Implementation of EC, Mining Plan & DGMS Condition	Size 6' X 5' with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	Fixed Display Board at the Quarry Entrance as permanent structure mentioning Environmental Conditions	7000	1000
	Workers will be provided with Personal Protective Equipment's	Provision of PPE @ Rs. 4000/- per employee with recurring based on wear and tear (say, @ Rs. 1000/- per employee)	124000	31000
	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	0	31000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	7240
	Mine will have safety precaution signages, boards.	Provision for signages and boards made	10000	2000
	Barbed Wire Fencing to quarry area will be provisioned.	Per Hectare fencing Cost @ Rs. 2,00,000/- with Maintenance of Rs 10,000/- per annum	724000	10000

	Mitigation Measure	Provision for Implementation	Capital	Recurring
	No parking will be provided on the transport routes. Separate provision on the south side of the hill will be made for vehicles /HEMMs. Flaggers will be deployed for traffic management	Parking area with shelter and flags @ Rs. 50,000/- per hectare project and Rs. 10,000/- as maintenance cost	181000	10000
	Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	2000	5000
	Implementation as per Mining Plan and ensure safe quarry working	Mines Manager (1^{st} Class / 2^{nd} Class / Mine Foreman) under regulation 34 / 34 (6) of MMR, 1961 and Mining Mate under regulation 116 of MMR,1961 @ 40,000/- for Manager & @ 25,000/- for Foreman / Mate	0	780000
Green Belt Development	Green belt development - 500 trees per one hectare (200 Inside Lease Area & 300 Outside Lease Area)	Site clearance, preparation of land, digging of pits /trenches, soil amendments, transplantation of saplings @ 200 per plant (capital) for plantation inside the lease area and @ 30 per plant maintenance (recurring)	144800	21720
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	325800	32580
			2117000	**2518315**

EMP for 5 Years					
Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
Rs. 4635315	Rs. 2644231	Rs. 2776442	Rs. 2915264	Rs. 3061028	Rs. 160,00,000

10.11 CONCLUSION

As discussed, it is safe to say that the project is not likely to cause any significant impact on the ecology of the area, as adequate preventive measures will be adopted to contain the various pollutants within permissible limits. Green belt development around the area would also be taken up as an effective pollution control technique, as well as to control the pollutants released due to mining.

CHAPTER 11: SUMMARY & CONCLUSION

11.1 INTRODUCTION

Rough Stone is the major requirements for construction industry. This EIA report is prepared by considering Cumulative load of all proposed & existing quarries of Thambagoundanpalayam Rough Stone Quarries Cluster consisting of 2 Proposed and 1 Existing Quarry with total extent of Cluster of 9.36.5 Ha in Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu State, cluster area calculated as per MoEF & CC Notification S.O. 2269(E), Dated 1st July 2016.

This EIA Report is prepared in compliance with ToR obtained vide –

- Letter No. SEIAA-TN/F.No.9047/SEAC/ToR-1164/2022, dated 06.06.2022

The Baseline Monitoring study has been carried out during the period of October 2021 to December 2021 and this EIA and EMP report is prepared for considering cumulative impacts arising out of these projects, the Cumulative Environmental Impact Assessment study is undertaken, which is followed by preparation of a detailed Environmental Management Plan (EMP) individually to minimize those adverse impacts.

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

TABLE 11.1: DETAILS OF PROJECT PROPONENT

Name of the Project	Thiru. K. Ravikumar Rough stone and Gravel quarry
S.F. No.	S.F.No. 54/2, 55/1, 57/2
Extent	3.62.0 Ha
Land Type	Patta Land
Village Taluk and District	Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu.

TABLE 11.2: QUARRY DETAILS WITHIN 500 M RADIUS

Code	Name of the lessee	S.F.Nos	Extent Area (Ha)	Status
Proposed				
P1.	Thiru. K. Ravikumar	54/2, 55/1, 57/2 Thambagoundanpalayam Village	3.62.0	ToR Letter Number SEIAA-TN/F.No.9047/SEAC/ToR-1164/2022 Dated : 06.06.2022

Code	Name of the lessee	S.F.Nos	Extent Area (Ha)	Status
P2	Thiru. K. Ravikumar	57/1 Thambagoundanpalayam Village	2.59.0	EC Granted
Existing				
Cod	**Name of the lessee**	**S.F.Nos**	**Extent Area (Ha)**	**Period of lease**
E1.	N.S.Manonmani	577/1A1A, 577/1A2, Arisipalayam	3.15.5	24.11.2018 to 23.11.2023
		Total Extent	**9.36.5**	

TABLE 11.3: SALIENT FEATURES OF THE PROPOSAL

S. No.	Particulars	Details		
1.	Type of Project	Thambagoundanpalayam Rough stone and Gravel quarry project		
2.	Mine area applied	3.62.0 Ha		
3.	Project Location	S.F.No. 54/2, 55/1 & 57/2 Thambagoundanpalayam Village, Madukkarai Taluk, Coimbatore District, Tamil Nadu.		
4.	Mine Location on WGS 1984 datum	**Latitude**	**Longitude**	
		10°52'03.05''N to 10°52'13.95''N	76°57'21.81''E to 76°57'27.87''E	
5.	Topo sheet Number	58 - B/13		
6.	Land use at the proposed project site	Non-Forest Land / Patta Land Land Cover: Barren Land which is not fit for vegetation/cultivation		
7.	Site Topography	Undulated topography, the area has gentle sloping toward northern side		
8.	Site elevation above Mean Sea Level	309 m (Max)		
9.	Reserves	**Description**	**Rough stone**	**Gravel in m^3**
		Geological Reserves	8,26,240 m^3	40,170 m^3
		Mineable	2,73,335 m^3	21,528 m^3
		Five years plan period As	2,73,335 m^3	21,528 m^3

S. No.	Particulars	Details		
		in the approved mining plan		
10.	Lease period	5 years		
11.	Proposed depth of Mining	42 m		
12.	Existing Pit Dimension	224m (L) x 97m (W) x 32m (D) AGL		
13.	Ultimate Pit Dimension	269 m (L) x 101m (W) x 42m (D) BGL		
14.	Land Use Pattern	**Description**	**Percentage**	
		Quarry pits/Crusher	06%	
		Trees	27%	
		Seasonal Agri Land	32%	
		Roads	05%	
		Habitation	06%	
		Barren land	24%	
15.	Climatic Conditions	IMD Data, Coimbatore (1971-2000) • Rainfall - 689mm/annum • Temperature - 42ºC - 21ºC		
16.	Ground water level	The Ground water is about **54 to 58m** depth from ground level.		
17.	Seismic zone	Seismically, this area is categorized under Zone-III as per IS-1893 (Part-1)-2002. Hence, seismically the site is High Damage Risk Zone. With MSK scale of VII.		
18.	Nearest State/National Highway	The Nearest National Highway (NH -544) Coimbatore – Palakkad road is situated about 3.0km on the Northern side of the lease applied area. The State Highway (SH-26) K.G.Chavadi – Velanthavalam Road is about 6.0km on the North-western side of the lease applied area.		
19.	Nearest Railway Station	Madukkarai -4.0km – Northwest		
20.	Nearest Air Port	Coimbatore Airport – 21km – Northeast		
21.	Nearest village/major town	Thambagoundanpalayam :1.0Km - Southeast		
22.	Nearest Town, city, District	Coimbatore : 16.18 Km, North Direction Madukkarai : 4.0 Km, N Direction		

<table>
<tr><th>S. No.</th><th>Particulars</th><th>Details</th></tr>
<tr><td></td><td>Headquarters along with distance in kms.</td><td></td></tr>
<tr><td>23.</td><td>Ecologically sensitive zone</td><td>No wildlife sanctuary, national park or biosphere reserve within 10m radius of mine lease area.</td></tr>
<tr><td>24.</td><td>Reserved/Protected forests</td><td>No wildlife sanctuary, national park or biosphere reserve within 10m radius of mine lease area.</td></tr>
<tr><td>25.</td><td>Historical/tourist places</td><td>None within 300m radius of mine lease area</td></tr>
<tr><td>26.</td><td>Water bodies within 10 Km Radius</td><td><table><tr><th>Water bodies</th><th>Distance (Km)</th><th>Direction</th></tr><tr><td>Kumittipathi River</td><td>0.130</td><td>N</td></tr><tr><td>Canal</td><td>1.80</td><td>SE</td></tr><tr><td>Odai</td><td>4.6</td><td>NW</td></tr></table></td></tr>
<tr><td>27.</td><td>Reserve Forest within 10Km Radius</td><td><table><tr><th>Reserve Forest</th><th>Distance (Km)</th><th>Direction</th></tr><tr><td>Ettimadai R.F</td><td>4.5</td><td>NW</td></tr></table></td></tr>
<tr><td>28.</td><td>Nearest Hospital</td><td>Madukkarai -5.0km – Northwest</td></tr>
<tr><td>29.</td><td>Details of other quarries for a radius of 500m around the quarry site</td><td>There are following quarries located within the radius of 500m from the proposed project site.
Details:
Abandoned quarry – Nil
Expired quarry – Nil
Existing Quarry – 1Nos (3.15.5Ha)
Proposed quarry – 2Nos (6.21.0Ha)
The total extent of the Existing and proposed quarry within the radius of 500m is 9.36.5Ha. The project falls under the cluster situation.</td></tr>
<tr><td>30.</td><td>Man power</td><td>Total Employees proposed for the quarry operation is 31 Nos.</td></tr>
<tr><td>31.</td><td>Water requirement & source</td><td>Total water requirement for 3.0 KLD from water vendors & nearby Bore well.</td></tr>
<tr><td>32.</td><td>Overburden /Waste</td><td>The overburden in the form of Gravel formation</td></tr>
<tr><td>33.</td><td>Cost of the project</td><td>Project cost = Rs. 86,14,000/-
EMP Cost = Rs. 1,60,00,000/-</td></tr>
</table>

11.1.1 STATUTORY DETAILS

PROPOSAL -P1

- The lessee has applied for Rough Stone Quarry Lease Dated: 26.04.2021
- Precise Area Communication Letter was issued by the Assistant Director, Geology and Mining, Coimbatore District, Rc.No. 525/Mines/2021, Dated: 16.09.2021.
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Coimbatore District, Rc.No. 525/Mines/2021, Dated: 09.02.2022.
- 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/72703/2022 and ToR was granted by SEAC with letter no. SEIAA-TN/F.No.9047/SEAC/ToR-1164/2022, dated 06.06.2022.

11.2 PROJECT DESCRIPTION

The proposed projects are site specific and there is no additional area required for this project. There is no effluent generation/discharge from the proposed quarries. Method is mining is common for all the proposed quarries in the cluster. Rough Stone is proposed to be excavated by opencast mechanized method involving splitting of rock mass of considerable volume from the parent rock mass by jackhammer drilling and blasting, hydraulic excavators are used for loading the Rough Stone from pithead to the needy crushers and rock breakers to avoid secondary blasting.

TABLE 11.4: SITE CONNECTIVITY TO THE PROJECT AREA

Nearest Roadway	The Nearest National Highway (NH -544) Coimbatore – Palakkad road is situated about 3.0km on the Northern side of the lease applied area. The State Highway (SH-26) K.G.Chavadi – Velanthavalam Road is about 6.0km on the North-western side of the lease applied area.
Nearest Village	Thambagoundanpalayam :1.0Km - Southeast
Nearest Town	Coimbatore : 16.18 Km, North Direction Madukkarai : 4.0 Km, N Direction
Nearest Railway	Madukkarai -4.0km – Northwest
Nearest Airport	Coimbatore Airport – 21km – Northeast

TABLE 11.5: LAND USE PATTERN OF THE LEASE APPLIED AREA

S. No.	Description	Present area (Ha)	Area at the end of this quarrying period (Ha)
1.	Area under quarrying	2.18.0	2.55.0
2.	Dump	0.25.8	Nil
3.	Infrastructure	Nil	0.01.0
4.	Roads	0.02.0	0.02.0
5.	Green Belt	Nil	0.16.0
6.	Unutilized Area	1.16.2	0.87.5
Total		**3.62.0**	**3.62.0**

TABLE 11.6: OPERATIONAL DETAILS OF LEASE APPLIED AREA

PARTICULARS	DETAILS	
	Rough stone in m3	**Gravel in m3**
Geological Resources	8,26,240 m^3	40,170 m^3
Available Mineable reserves	2,73,335 m^3	21,528 m^3
Five years plan period As in the approved mining plan	2,73,335 m^3	21,528 m^3
Mining Plan Period	5 Years	
Number of Working Days	300 Days	
Production per day in m^3	182 m^3 Rough Stone	
No of Lorry loads (6m^3 per load)	30	
Total Depth of Mining	42m (2m Gravel+ 40m Rough stone)	

TABLE 11.7: YEAR-WISE PRODUCTION PLAN

Year	Rough Stone (m^3)	Gravel (m^3)
I	52010	7000
II	54175	5880
III	54500	8648
IV	52100	-
V	60550	-
TOTAL	**273335**	**21528**

11.2.1 METHOD OF MINING

Proposed Method of Mining is common for all the Proposed Projects – The method of mining is Opencast Mechanized Mining Method is being proposed by formation of 5.0

meter height bench with a bench width not less than the bench height. The Rough Stone is a batholith formation and the splitting of rock mass of considerable volume from the parent rock mass will be carried out by deploying jackhammer drilling and Slurry Explosives will be used for blasting. Hydraulic Excavators attached with Rock Breakers unit will be deployed for breaking large boulders to required fragmented sizes to avoid secondary blasting and hydraulic excavators attached with bucket unit will be deployed for loading the Rough Stone into the tippers and then the stone is transported from pithead to the nearby crushers.

FIGURE 11.1: GOOGLE IMAGE SHOWING APPLIED QUARRY LEASE AREA

TABLE 11.8: PROPOSED MACHINERY DEPLOYMENT

S.No	Particulars	Size capacity	Motive Power	Nos
1.	Jack hammer (30-35mm dia hole)	1.2m to 2.0m	Compressed air	7
2.	Compressor	400 psi	Diesel drive	2
3.	Excavator with Bucket and Rock Breaker	300	Diesel drive	2
4.	Tippers	20 tonnes	Diesel drive	4

11.2.2 CONCEPTUAL MINING PLAN/ FINAL MINE CLOSURE PLAN

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

TABLE 11.9: ULTIMATE PIT DIMENSION

PROPOSAL – P1			
Pit	**Length (Max) (m)**	**Width (Max) (m)**	**Depth (Max)**
I	269	101	42

11.3 DESCRIPTION OF THE ENVIRONMENT

Field monitoring studies to evaluate the base line status of the project site were carried out during October to December 2021 as per CPCB guidelines. Environmental Monitoring data has been collected with reference to proposed quarry by Enviro Tech Services, Ghaziabad an NABL Certified & MoEF Notified Laboratory

11.10: ENVIRONMENT MONITORING ATTRIBUTES

S. No.	**Attributes**	**Parameters**	**Frequency**
1	Ambient Air Quality	PM_{10}, SO_2, NO_X, & mineralogical composition of PM_{10}, particularly for free silica	24 hourly samples, twice a week for three months at 7 locations.
2	Meteorology	Wind speed, Wind direction, Temperature, Relative humidity and Rainfall	Continuous hourly recording (one season) at project site. Secondary data from the nearest IMD station.
3	Water quality	Physical and Chemical parameters.	Grab samples collected once during study period from 5 ground water and 2 surface water locations.
4	Soil Quality	Physical and Chemical parameters.	Grab samples collected once during study period from 6 locations.
5	Ecology	Existing terrestrial flora	Through field studies once during

S. No.	Attributes	Parameters	Frequency
		and fauna covering Core Zone (3.62.0 Ha) & Buffer Zone (10-Km radius). Existing aquatic ecological status in Buffer Zone (10-Km radius).	study period. Secondary data also collected.
6	Noise levels	Noise levels in dB (A) Day and Night.	Hourly Noise levels in and around the project area for 24 hours at each location once during study period at 7 locations.
7	Land use	Current land use scenario	Once during study period based on recent satellite imagery and ground-truthing at site.
8	Geology	Geological details	Once during study period. Data collected from secondary sources
9	Hydrogeology	Drainage area and pattern, nature of streams, aquifer characteristics, recharge and discharge areas, etc.	Based on primary and secondary sources, once during study period.
10	Socio-Economic aspects	Socio-economic aspects like demography, population dynamics, infrastructure resources, health status, economic resources, etc.	From primary and secondary sources (like census abstracts of census of India 2011) once during the study period.

TABLE 11.11: LAND ENVIRONMENT

S. No	Level I	Level -II	Area (Km^2)	Percentage (%)
1	Built-up Land	Built-up Land	43.1	12.96
2	Forest	Dense Forest	19.96	6.00
3	Agricultural Land	Plantation - Coconut Trees	51.28	15.42
		Crops – Cultivated	20.45	6.15
		Crops - Uncultivated	183.72	55.26
4	Waste Land	Bare land	9.49	2.85
5	Water Body	Water Body	1.13	0.34
6	Others	Mining land	3.35	1.00
		Total	**332.48**	**100**

The cluster area of 9.36.5 Ha contributes about 3.2% of the total mining area within the study area. This small percentage of Mining Activities shall not have any significant impact on the environment.

11.3.1 SOIL ENVIRONMENT

Physical Characteristics –

- pH of the soil samples varied from 7.28 to 8.02 indicating slightly alkaline soil
- Bulk density of the soil samples varied from 0.59 to 1.28 g/cm^3
- Organic matter in the soil samples varied from 1.30 to 2.02 %
- Total Nitrogen in the soil samples varied from 140.2 to 263 mg/kg
- Water Holding Capacity (WHC) in the soil samples varied from 28.0 to 42.5%.

From the analysis results of the soil samples, it was observed that the soil was low to medium fertile and having low productivity. The soil in the study area needs additional fertilizers for improving the fertility status and increase in crop productivity. This also indicates the poor level of micro-nutrient. The organic matter was found in the range of 1.30 to 2.02 % indicating moderate organic content in the soil. Overall, the soil quality in the area was found to medium to fair fertile with moderate productivity.

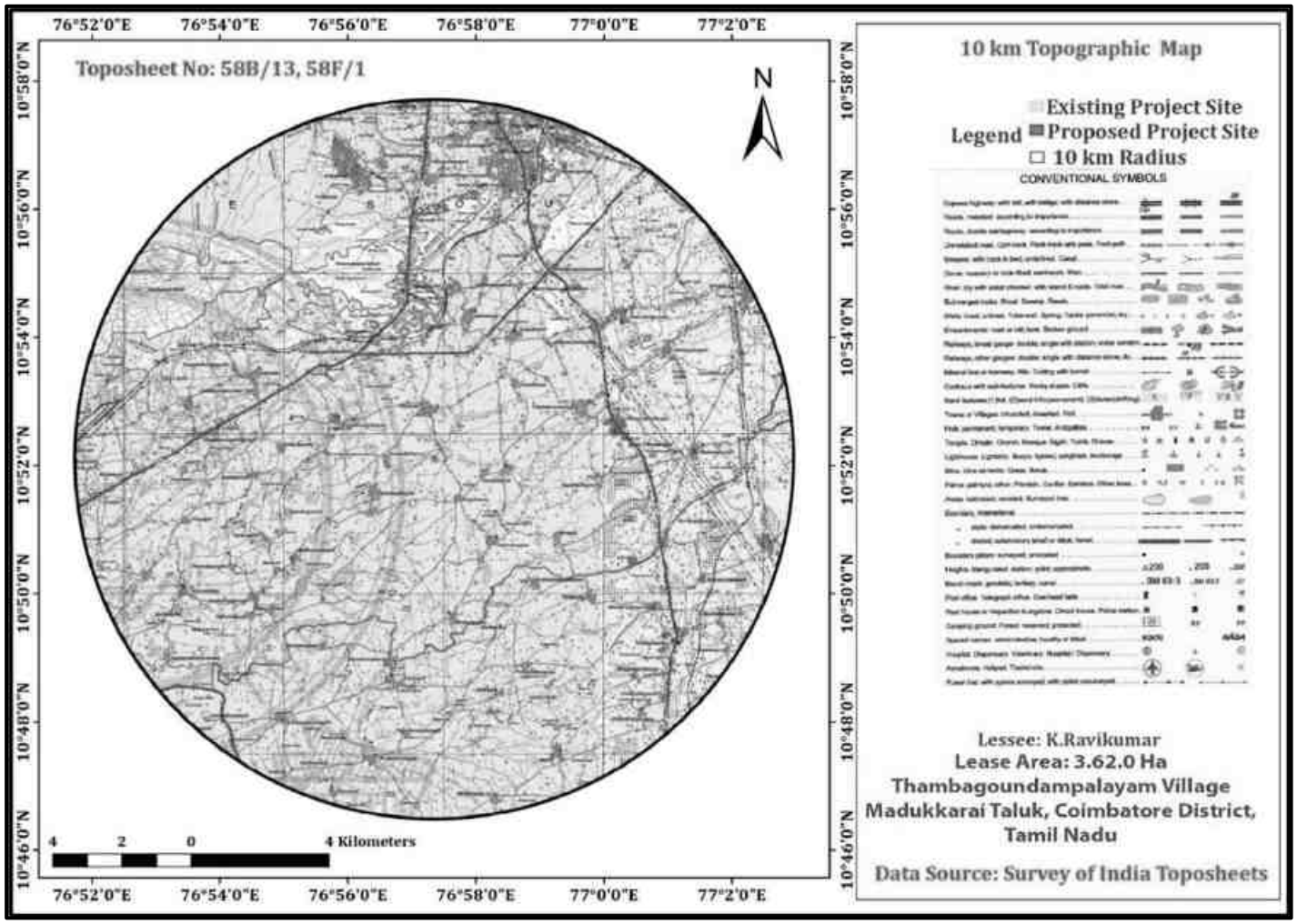


FIGURE 11.2: TOPOSHEET MAP COVERING 10 KM RADIUS

11.3.2 WATER ENVIRONMENT

Surface Water

The results of the surface water samples analyzed are presented in Table 3.17 and are compared with the standards.

The pH of the water samples collected ranged from 7.85-8.20 and is within the acceptable limit of 6.5 to 8.5. The total dissolved solids were found in range of 534-568.4 mg/l in all samples. The total hardness varied between 256.5 to 289.2 mg/l for all samples collected at 2 location only.

In all samples, iron content is 0.20-0.25 mg/l, Nitrate in between 16.4 to 19.4 mg/l, fluoride varied between 0.22 to 0.28 mg/l, chloride 73.4 to 105 mg/l, Sulphate 21 to 28 mg/l, alkalinity 173 to 226 mg/l, calcium 29.3 to 42.6 mg/l and magnesium in between 27.1.9 to 38.6 mg/l. The overall surface water quality was found to be good in the village. The levels of heavy metals content were found to be within permissible limits.

Ground Water

The physico-chemical characteristics of groundwater are presented in Table below and are compared with the standards. The pH of the water samples collected ranged from 7.03 to 8.10 and within the acceptable limit of 6.5 to 8.5. The total dissolved solids were found in the range of 352 to 457 mg/l in all samples. The total hardness varied between 167.4 to 225.6 mg/l for all samples collected at 5 locations.

In all samples, iron content is 0.11 to 0.26 mg/l, Nitrate in between 12.6 to 18.4 mg/l, fluoride varied between 0.14 to 0.31 mg/l, chloride 81 to 168.4 mg/l, Sulphate 18.2 to 37 mg/l, alkalinity 123 to 210 mg/l, calcium 26.5 to 53.8 mg/l and magnesium in between 18.9 to 27.2 mg/l. The overall ground water quality was found to be good in most of the villages. The levels of heavy metals content were found to be within permissible limits.

11.3.3 AIR ENVIRONMENT

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

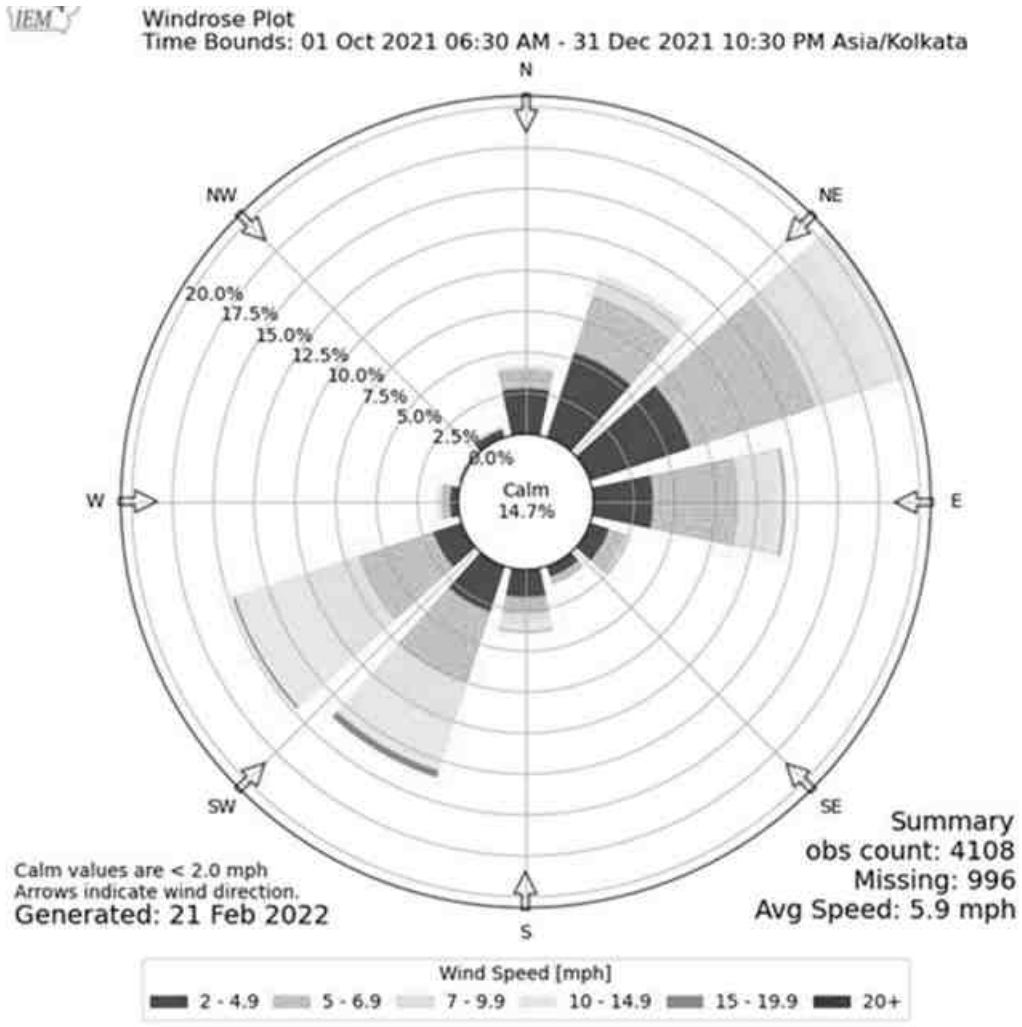


FIGURE 11.3: WIND ROSE DIAGRAM

The results of ambient air quality monitoring for the period (October to December 2021) are presented in the report. Data has been complied for three months. As per monitoring data, PM_{10} ranges from 37.5 to 67.7 µg/m^3, $PM_{2.5}$ data ranges from 21.7 to 39.9 µg/m^3, SO_2 ranges from 6.1 to 10.9 µg/m^3 and NO_2 data ranges from 12.6 to 28.2 µg/m^3. 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 6 (Six) locations around the proposed project area. Noise levels recorded in core zone during day time were from 39.4 to 48.9 dB (A) Leq and during night time were from 35.4 to 40.0 dB (A) Leq.

11.3.5 ECOLOGICAL ENVIRONMENT

The study involved in the collection of primary data by conducting a survey in the field, examination of floral and faunal records in previously published reports and records. Analysis of the information is the view of the possible alteration in the environment of the project site. For the survey of fauna, both direct and indirect observation methods were used.

There is no schedule I species of animals observed within study area as per Wildlife Protection Act 1972 as well as no species is in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area. Hence this small operation over short period of time will not have any significant impact on the surrounding flora and fauna.

11.3.6 SOCIO ECONOMIC ENVIRONMENT

It includes demographic structure of the area, provision of basic amenities viz., housing, education, health and medical services, occupation, water supply, sanitation, communication, transportation, prevailing diseases pattern as well as feature like temples, historical monuments etc., at the baseline level. This will help in visualizing and predicting the possible impact depending upon the nature and magnitude of the project. The socio-economic study of surveyed villages gives a clear picture of its population, average household size, literacy rate and sex ratio etc. It is also found that a part of population is suffering from lack of permanent job to run their day-to-day life. Their expectation is to earn some income for their sustainability on a long-term basis. The proposed projects will aim to provide preferential employment to the local people there by improving the employment opportunity in the area and in turn the social standards will improve.

11.4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES – IN COMMON FOR ALL PROPOSED QUARRIES

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.

11.4.1 LAND ENVIRONMENT:

ANTICIPATED IMPACT

- Permanent or temporary change on land use and land cover.
- Change in Topography: Topography of the ML area will change at the end of the life of the mine.
- Movement of heavy vehicles sometimes cause problems to agricultural land, human habitations due to dust, noise and it also causes traffic hazards.

- Due to degradation of land by pitting the aesthetic environment of the core zone may be affected.
- Earthworks during the rainy season increase the potential for soil erosion and sediment laden water entering the water ways.

If no due care is taken wash off from the exposed working area may choke the water course & can also causes the siltation of water course

MITIGATION MEASURES

- The mining activity will be gradual confined in blocks and excavation will be undertaken progressively along with other mitigative measures like phase wise development of greenbelt etc.
- Construction of garland drains all around the quarry pits and construction of check dam at strategic location in lower elevations to prevent soil erosion due to surface runoff during rainfall and also to collect the storm water for various uses within the proposed area
- Green belt development along the boundary within safety zone. The small quantity of water stored in the mined-out pit will be used for greenbelt
- Thick plantation will be carried out on unutilized area, top benches of mined out pits, on safety barrier, etc.,
- At conceptual stage, the land use pattern of the quarry will be changed into Greenbelt area and temporary reservoir
- In terms of aesthetics, natural vegetation surrounding the quarry will be retained (such as in a buffer area i.e., 10 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.

11.4.2 WATER ENVIRONMENT

ANTICIPATED IMPACT

- The major sources of water pollution normally associated due to mining and allied operations are:
    - Generation of waste water from vehicle washing.
    - Washouts from surface exposure or working areas
    - Domestic sewage
    - Disturbance to drainage course in the project area
    - Mine Pit water discharge
- Increase in sediment load during monsoon in downstream of lease area
- This being a mining project, there will be no process effluent. Waste from washing of machinery may result in discharge of Oil & grease, suspended solids.

- The sewage from soak pit may percolate to the ground water table and contaminate it.
- Surface drainage may be affected due to Mining
- Abstraction of water may lead to depletion of water table

MITIGATION MEASURES

- Garland drains, settling tank will be constructed along the individual mining leases. The Garland drains of the individual leases will be connected to settling tank and after settling the water will be discharged out to the natural drainage
- Rainwater will be collected in sump in the mining pits and will be allowed to store and pumped out to surface setting tank of 15 m x 10m x 3m to remove suspended solids if any. This collected water will be judiciously used for dust suppression onwards and such sites where dust likely to be generated and for developing green belt. The proponent will collect and judicially utilize the rainwater as part of rainwater harvesting
- Providing benches with inner slopes and through a system of drains and channels, allowing rain water to descent into surrounding drains, so as to minimize the effects of erosion & water logging arising out of uncontrolled descent of water.
- Reuse the water collected during storm for dust suppression and greenbelt development within the mines
- Installing interceptor traps/oil separators to remove oils and greases. Water from the tipper wash-down facility and machinery maintenance yard will pass through interceptor traps/oil separators prior to its reuse;
- Using flocculating or coagulating agents to assist in the settling of suspended solids during monsoon seasons;
- Periodic analysis of quarry pit water and ground water quality in nearby villages.
- Domestic sewage from site office & urinals/latrines provided in ML is discharged in septic tank followed by soak pits.
- Waste water discharge from mine will be treated in settling tanks before using for dust suppression and tree plantation purposes.
- De-silting will be carried out before and immediately after the monsoon season.
- Regular monitoring and analysing the quality of water in open well, bore wells and surface water

11.4.3 AIR ENVIRONMENT

ANTICIPATED IMPACT

- During mining, at various stages activities such as excavation, drilling, blasting, and transportation of materials, particular matter (PM), gases such as Sulphur dioxide, oxides of Nitrogen from vehicular exhaust are the main air pollutants.

- Emissions of noxious gases due to incomplete detonation of explosive may sometimes pollute the air.
- The fugitive dust released from the mining operations may cause effect on the mine workers who are directly exposed to the fugitive dust.
- Simultaneously, the air-borne dust may travel to longer distances and settle in the villages located near the mine lease area.

MITIGATION MEASURES

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

Advantages of Wet Drilling:-

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

Blasting –

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

Haul Road & Transportation –

- Water will be sprinkled on haul roads twice a day to avoid dust generation during transportation
- Transportation of material will be carried out during day time and material will be covered with tarpaulin

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

Green Belt –

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

Occupational Health –

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

11.4.4 NOISE ENVIRONMENT

ANTICIPATED IMPACT

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

MITIGATION MEASURES

- Usage of sharp drill bits while drilling which will help in reducing noise;
- Secondary blasting will be totally avoided and hydraulic rock breaker will be used for breaking boulders;
- Controlled blasting with proper spacing, burden, stemming and optimum charge/delay will be maintained;
- The blasting will be carried out during favourable atmospheric condition and less human activity timings by using nonelectrical initiation system;

- Proper maintenance, oiling and greasing of machines will be done every week to reduce generation of noise;
- Provision of sound insulated chambers for the workers working on machines (HEMM) producing higher levels of noise;
- Silencers / mufflers will be installed in all machineries;
- Green Belt/Plantation will be developed around the project area and along the haul roads. The plantation minimizes propagation of noise;
- Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators of HEMM and persons working near HEMM and their use will be ensured though training and awareness.
- Regular medical check–up and proper training to personnel to create awareness about adverse noise level effects.

11.4.5 BIOLOGICAL ENVIRONMENT

ANTICIPATED IMPACT

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

MITIGATION MEASURES

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

Table 11.12: GREENBELT DEVELOPMENT PLAN

Year	No. of tress proposed to be planted	Survival %	Area to be covered sq.m.	Name of the species	No. of trees expected to be grown
I	2200	80%	Near safety distance, panchayat road, Village road	Neem, Pongamia Pinnata, Casuarina, etc.,	1800

11.4.6 SOCIO ECONOMIC ENVIRONMENT

ANTICIPATED IMPACT

- Employment generation due to the project will provide direct employment for about 31 persons.

MITIGATION MEASURES

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

11.5 ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

- The site has been selected based on geological investigation and exploration as below:
- Occurrence of minerals at the specific site.
- Transportation facility for materials & manpower.
- Overall impact on environment and mitigation feasibility
- Socio – economic background.
- The mineral deposits are site specific in nature; hence question of seeking alternate site does not arise for this project.

11.6 ENVIRONMENT MONITORING PROGRAM

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

The Objective of Monitoring -

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

11.6.1 ENVIRONMENTAL MONITORING CELL

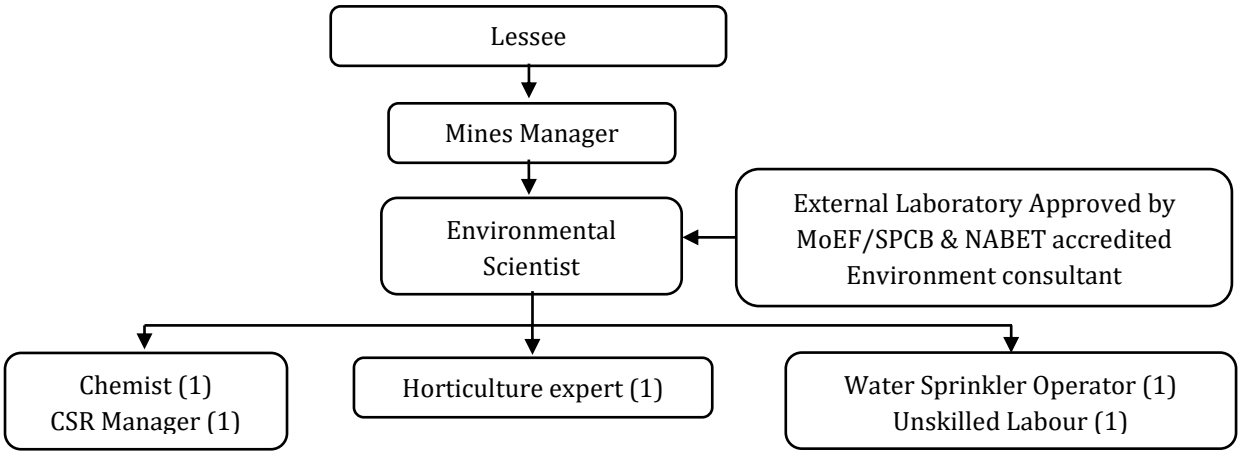


TABLE 11.13: POST ENVIRONMENTAL CLEARANCE MONITORING SCHEDULE

S. No.	Environment Attributes	Location	Monitoring		Parameters
			Duration	Frequency	
1	Air Quality	2 Locations (1 Core & 1 Buffer)	24 hours	Once in 6 months	Fugitive Dust, $PM_{2.5}$, PM_{10}, SO_2 and NO_x.
2	Meteorology	At mine site before start of Air Quality Monitoring & IMD Secondary Data	Hourly / Daily	Continuous online monitoring	Wind speed, Wind direction, Temperature, Relative humidity and Rainfall
3	Water Quality Monitoring	2 Locations (1SW & 1 GW)	-	Once in 6 months	Parameters specified under IS:10500, 1993 & CPCB Norms
4	Hydrology	Water level in open wells in buffer zone around 1 km at specific wells	-	Once in 6 months	Depth in bgl
5	Noise	2 Locations (1 Core & 1 Buffer)	Hourly – 1 Day	Once in 6 months	Leq, Lmax, Lmin, Leq Day & Leq Night
6	Vibration	At the nearest habitation (in case of reporting)	–	During blasting Operation	Peak Particle Velocity
7	Soil	2 Locations (1 Core & 1 Buffer)	–	Once in six months	Physical and Chemical

S. No.	Environment Attributes	Location	Monitoring		Parameters
			Duration	Frequency	
					Characteristics
8	Greenbelt	Within the Project Area	Daily	Monthly	Maintenance

11.7 ADDITIONAL STUDIES

11.7.1 RISK ASSESSMENT

The methodology for the risk assessment has been based on the specific risk assessment guidance issued by the Directorate General of Mine Safety (DGMS), Dhanbad, vide Circular No.13 of 2002, dated 31st December, 2002. The DGMS risk assessment process is intended to identify existing and probable hazards in the work environment and all operations and assess the risk levels of those hazards 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.

11.7.2 DISASTER MANAGEMENT PLAN

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

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

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

11.7.3 CUMULATIVE IMPACT STUDY

TABLE 11.14: SALIENT FEATURES OF PROPOSAL "P1"

Name of the Mine	Thiru. K. Ravikumar
Survey Nos	S.F.No. 54/2, 55/1 and 57/2
Land Type	Patta land

Extent	3.62.0 Ha	
Mining Plan Period / Lease Period	5 Years	
Ultimate Pit Dimension	269 m (L) x 101m (W) x 42m (D) BGL	
Latitude between	10°52'03.05''N to 10°52'13.95''N	
Longitude between	76°57'21.81''E to 76°57'27.87''E	
Highest Elevation	308 m	
Machinery Proposed	Jack Hammer	7
	Compressor	2
	Excavator bucket & Rock breaker attached	2
	Tippers (20 tonnes Capacity)	4
Proposed Blasting Method	Controlled Blasting Method	
Manpower Proposed	31 Nos	
Total Project Cost	Rs. 86,14,000/-	

Source: Approved Mining Plan

TABLE 11.15: SALIENT FEATURES OF PROPOSAL "P2"

Name of the Mine	Thiru. K. Ravikumar	
Survey Nos	S.F.No. 57/1	
Land Type	Patta land	
Extent	2.59.0 ha	
Mining Plan Period / Lease Period	5Years	
Ultimate Pit Dimension	217 m (L) x 124m (W) x 42m (D)	
Latitude between	10°52'02.67''N to 10°52'10.08''N	
Longitude between	76°57'17.47''E to 76°57'24.54''E	
Highest Elevation	305 m	
Machinery Proposed	Jack Hammer	8
	Compressor	2
	Excavator bucket & Rock breaker attached	2
	Tippers (20 tonnes Capacity)	3
Proposed Blasting Method	Controlled Blasting Method	
Manpower Proposed	32 Nos	
Total Project Cost	Rs. 69,38,000/-	

TABLE 11.16: SALIENT FEATURES OF PROPOSAL "E1"

Name of the Mine	N.S.Manonmani
Survey Nos	577/1A1A, 577/1A2, Arisipalayam

Land Type	It is a Patta land, Registered in the name of N.S.Manonmani vide Patta No.40. The applicant has obtained consent from the pattadhar.	
Extent	3.15.5 ha	
Mining Plan/Lease Period	03.10.2017 to 25.05.2022	
Ultimate Pit Dimension	Length 136m, Width 100m Depth in Max 12m	
Latitude between	10°52'7.58"N to 10°52'2.20"N	
Longitude between	76°57'13.12"E to 76°57'23.37"E	
Highest Elevation	304 m	
Machinery Proposed	Jack Hammer	2
	Compressor	1
	Excavator bucket & Rock breaker attached	1
	Tippers (20 tonnes Capacity)	1
Proposed Blasting Method	Controlled Blasting Method	
Manpower Proposed	18 Nos	
Total Project Cost	Rs. 76,81,000/-	

The Cumulative Impact is anticipated due to drilling & blasting and excavation and transportation activities from proposed 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. The current monitoring was done as existing quarry are working which gives the ambient or present condition of air quality as well as noise.

TABLE 11.17: PREDICTED AIR INCREMENTAL VALUE

Locations	PM_{10} (µg/m³)			$PM_{2.5}$ (µg/m³)			SO_2 (µg/m³)			NO_2 (µg/m³)		
	Inc	Max	Total	Inc	Max	Total	Inc	Max	Total	Inc	Max	Total
AAQ-1	2.3	55.1	57.4	1.5	34.1	35.6	1.2	10.4	11.6	1.3	28.2	29.5
AAQ-2	1.3	51.9	53.2	0.7	37.2	37.9	0.5	9.5	10	0.6	21.6	22.2
AAQ-3	1	57.7	58.7	0.5	34.7	35.2	0.3	10.3	10.6	0.3	20.6	20.9
AAQ-4	1.3	67.7	69	0.7	32.9	33.6	0.5	10.9	11.4	0.6	19.8	20.4
AAQ-5	1	62	63	0.5	32.5	33	0.3	10.1	10.4	0.3	22	22.3
AAQ-6	2.7	66.1	68.8	1.8	39.6	41.4	1.5	9.2	10.7	1.9	17.6	19.5
AAQ-7	1.3	50.3	51.6	0.7	28.6	29.3	0.5	9.4	9.9	0.7	15.4	16.1
NAAQS (µg/m³)	100			60			80			80		

TABLE 11.18: MAXIMUM GROUND LEVEL CONCENTRATION

Pollutants	Max. GLC observed, (µg/m3)	Distance and Direction
PM_{10}	11.7	1000, SW

Pollutants	Max. GLC observed, (µg/m3)	Distance and Direction
$PM_{2.5}$	7.4	1000, SW
SO_2	6.0	1000, SW
NO_2	6.4	1000, SW

TABLE 11.19: PREDICTED NOISE INCREMENTAL VALUE

Equipment with Highest Noise Level	Location ID	Background Value (Day) dB(A)	Incremental Value dB(A)	Total Predicted dB(A)	Residential Area Standards dB(A)
Drilling 90 dB(A)	N4 Palathurai, 0.57 Km	39.4	30.0	39.9	55
Shovel 85 dB(A)		39.4	25.0	39.6	
Tipper 75 dB(A)		39.4	15.0	39.4	
Compressor 85 dB(A)		39.4	25.0	39.6	
Excavator 102 dB(A)		39.4	42.0	43.9	

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, the ambient noise levels at all the locations near habitations are within permissible limits of Residential Area (buffer zone)

TABLE 11.20: ESTIMATED PEAK PARTICLE VELOCITY FOR EXPLOSIVE CHARGE FOR EXISTING AND PROPOSED MINES

Distance from blasting site, m	Quantity of Explosive/Blast, Kg			PPV, mm/s		
	P1	P2	E1	P1	P2	E1
100	79	97	50	47.0	22.3	14.6
150	79	97	50	19.6	13.3	8.8
200	79	97	50	8.1	9.3	6.1
250	79	97	50	4.9	7.0	4.6
300	79	97	50	3.4	5.5	3.6
350	79	97	50	2.6	4.6	3.0
400	79	97	50	2.0	3.9	2.5
450	79	97	50	1.7	3.3	2.2
500	79	97	50	1.4	2.9	1.9

Distance from blasting site, m	Quantity of Explosive/Blast, Kg			PPV, mm/s		
	P1	P2	E1	P1	P2	E1
550	79	97	50	1.2	2.6	1.7
600	79	97	50	1.1	2.3	1.5
650	79	97	50	2.0	2.1	1.4
700	79	97	50	1.8	1.9	1.2
750	79	97	50	1.7	1.7	1.1

Note: The empirical formula does not consider the delay factor in blasting due to use of Delay Detonators.

The nearest habitation from cluster is Thambagoundanpalayam –1.0Km – Southeast direction. From the above table, the blasting will not cause any significant ground vibrations in the area. The ground vibrations at nearest habitation will be well within the permissible limits recommended by DGMS.

TABLE 11.21: SOCIO ECONOMIC BENEFITS FROM 3 MINES

	Project Cost in Rs.	CER @ 2% in Rs.
P1	86,14,000	5,00,000
P2	69,38,000	5,00,000
E1	76,81,000	1,53,620
Total	**23,705,900**	**11,53,620**

CER allocation has been made as per MoEF & CC OM F.No.22-65/2017-IA.III, Dated: 01.05.2018. 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 and the total CER amount from the 3 mines is Rs. 11,53,620/-.

TABLE 11.22: EMPLOYMENT BENEFITS FROM 3 MINES

	Direct Employment	Indirect Employment
P1	31	40
P2	32	40
E1	18	34
Total	**81**	**114**

A total of 81 people will get employment due to these 3 mines in cluster.

Greenbelt Development –

TABLE 11.23: GREENBELT DEVELOPMENT BENEFITS FROM 3 MINES

CODE	No of Trees proposed to be planted	Survival %	Area Covered Sq.m	Name of the Species	No. of Trees expected to be grown
P1	2200	80%	Near by 7.5m safety distance, panchayat road , village road.	Neem, Pungan, Casuarinas and other regional trees	1800
P2	1550	80%			1300
E1	220	80%			176
Total	**3970**	**80%**	**-**	**-**	**3276**

Based on the Proposed Mining Plans its anticipated that there shall growth of native species of Neem, Casuarina, Pungan etc in the Cluster at a rate of 3940 Trees Planted over a period of 5 Years with Survival Rate of 80% and expected growth is around 3286Trees.

11.8 PROJECT BENEFITS

Proposed Project for Quarrying Rough Stone at Thambagoundanpalayam Village aims to produce 2,73,335 m^3 Rough Stone & 21,528 m^3 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

11.9 ENVIRONMENT MANAGEMENT PLAN

The Environment Monitoring Cell discussed formed by the mine management will ensure effective implementation of environment management plan and to ensure compliance of environmental statutory guidelines through Mine Management Level.

The said team will be responsible for:

1. Implementation of pollution control measures as suggested in Environmental Management Plan and recommended in EC
2. Conducting environmental monitoring as per EMP and EC stipulation through external laboratories approved by MoEF/SPCB and NABL
3. Ensuring compliance with other conditions stipulated in Environmental Clearance for the project.

4. Ensuring compliance with the conditions stipulated in 'Consent to Operate' for the project.
5. Timely submission of compliance status to MoEF/ SPCB
6. Seeking experts' guidance, as and when required.
7. Conducting CSR activities in nearby villages.
8. Co-ordination of the environment related activities within the project as well as with outside agencies
9. Collection of health statistics of the workers and population of the surrounding villages
10. Green belt development
11. Monitoring the progress of implementation of the environmental monitoring programme
12. Monitoring of the water/ waste water quality, air quality and solid waste generated
13. Analysis of the water and air samples collected through external laboratory
14. 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
15. 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.

11.10 CONCLUSION

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

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

CHAPTER 12: DISCLOSURE OF CONSULTANTS

12.1 Disclosure of Consultant

M/s Enviro Resources is a NABET Accredited EIA consultant as per NABET Certificate: NABET/EIA/1922/SA0133. The registered office of Enviro Resources is at E-604, Crystal Plaza, New Link Road, Andheri (W), Mumbai 400 053, Maharashtra. NABET Certificate is provided in **Figure 12.1.**

M/s Enviro Resources is engaged in providing following environmental consultancy services to their valuable clients:

1) Obtaining **Environmental Clearance** from Department of Environment of State Govt. and MoEF & CC, GOI
2) Environmental Impact Assessment **(EIA)** studies and Environmental Management Plan **(EMP)**
3) Environmental Due Diligence Services
4) Consent to Establish, Operate, Renewal& its amendments from State Pollution Control Board
5) **CRZ Clearance** from Central & State CZMA (Coastal Zone Management Authority)
6) **Forest Clearance** from MoEF & CC, GOI
7) Environmental **Compliance Report** preparation for Environmental Clearances, Consent to Establish and Consent to Operate
8) Designing and Commissioning of **ETP, STP, WTP**& Zero Liquid Discharge **(ZLD)** Plant
9) Preparation of Quantitative Risk Analysis **(QRA), HAZOP, HAZID**, Disaster Management Plan **(DMP)** Reports.
10) Preparation of On-site & Off-site Emergency Preparedness Plan
11) Reply for legal directions & Revocation of closure.

Quality Council of India

National Accreditation Board for Education & Training

Certificate of Accreditation

Enviro Resources

1604 Roopnagar CHS, S.V.Road, Kandivali West, Mumbai- 400067, Maharashtra

*The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –*

Sl.No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals- Opencast only	1	1 (a) (i)	B
2	River Valley	3	1(c)	A
3	Thermal power plants	4	1 (d)	A
4	Coal washeries	6	2 (a)	B
5	Metallurgical industries (ferrous & nonferrous)	8	3 (a)	A
6	Pesticide industry and pesticide specific intermediates	17	5 (b)	A
7	Petro-chemical complexes	18	5 (c)	A
8	Synthetic organic chemicals industry	21	5 (f)	A
9	Distilleries	22	5 (g)	A
10	Sugar Industry	25	5(j)	B
11	Isolated storage & handling of hazardous chemicals	28	-	B
12	Airports	29	7 (a)	A
13	Ports, harbours, break waters and dredging	33	7 (e)	A
14	Highways	34	7(f)	A
15	Building and construction projects	38	8 (a)	B
16	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SA AC minutes dated Dec.18, 2020 and supplementary minutes dated Mar. 24 and May 07, 2021 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/21/1774 dated June 12, 2021.The accreditation needs to be renewed before the expiry date by Enviro Resources, Mumbai following due process of assessment.

Sr. Director, NABET
Dated: June 12, 2021

Certificate No.
NABET/EIA/1922/SA 0133

Valid up to
30-03-2022

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

FIGURE 12.1 NABET CERTIFICATE ENVIRO RESOURCES, MUMBAI

National Accreditation Board
for Education and Training
(Member - International Accreditation Forum & Pacific Accreditation Cooperation)

QO/NABET/ENV/ACO/22/2628 Dec 28, 2022

To

Enviro Resources
1604 Roopnagar CHS, S.V.Road, Kandivali West,
Mumbai -400067, Maharashtra

Sub.: Extension of Validity of Accreditation till March 27, 2023 – regarding
Ref.. Certificate no. NABET/EIA/1922/SA0133

Dear Sir/Madam

This has reference to the accreditation of your organization under the QO-NABET EIA Scheme, the validity of **Enviro Resources** is hereby extended till March 27, 2023, or completion of the assessment process, whichever is earlier.

The above extension is subject to the submitted documents/required information with respect to your application and timely submission and closure of NC/Obs during the process of assessment.

You are requested not to use this letter after the expiry of the above-stated date.

With best regards.

(A K Jha)
Sr. Director, NABET

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FIGURE 12.2 NABET EXTENSION LETTER