
DRAFT ENVIRONMENTAL IMPACT ASSESSMENT
&
ENVIRONMENT MANAGEMENT PLAN
“B1” CATEGORY – MINOR MINERAL – PATTA LAND – NON-FOREST LAND
TMT. R. JEYACHITHRA ROUGH STONE & GRAVEL QUARRY
IN CLUSTER OVER AN EXTENT OF 9.81.10 Ha

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

Project Proponent	Proposed Project	Extent
Tmt. R. Jeyachithra, W/o. Rengaraj, No. 2/12, Melatheru, Shanmugapuram, Melapandiyapuram, Kailasapuram, Thoothukudi District – 628 301	S.F. Nos:36/2A(Part), 36/2B(Part), 36/3(Part), 37/1(Part), 50/1(Part) and 50/3(Part) Kollamparambu Village, Ottapidaram Taluk, Thoothukudi District, Tamil Nadu State.	4.82.10 ha
Production Details for Ten Years: 9,15,400 m ³ of Rough Stone 1,96,550 m ³ of Gravel Depth : 60m BGL (5m Gravel + 55m RoughStone)		
ToR obtained vide File No. 13605 ToR Identification No.TO26B0108TN5279712N Dated.11.05.2026		

Environmental Consultant GEO EXPLORATION AND MINING SOLUTIONS Old No. 260-B, New No. 17, Advaitha Ashram Road, Alagapuram, Salem – 636 004, Tamil Nadu, India Accredited for sector 1 Category ‘A’, 31 Category ‘B’ & 38 Category ‘B’ Certificate No : NABET/EIA/25-28/RA 0424 Dated: 25.08.2025 Valid Upto: 06.08.2028 Phone: 0427-2431989, Email: ifthiahmed@gmail.com, geothangam@gmail.com Web: www.gemssalem.com	Laboratory ENVIRONMENTAL LAB CHENNAI METTEX LAB PRIVATE LIMITED (Approved by AAI, AGMARK, APEDA, BIS, EIC FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD) Certificate No : ISO/IEC 17025:2017 Dated: 16.06.2024 Valid Upto: 15.06.2026 Jothi Complex, 83, M.K.N Road, Guindy, Chennai – 600 032
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Baseline Monitoring Season – March 2026 to May 2026

JULY 2026

DECLARATION BY THE PROJECT PROPONENT

I, R. Jeyachitra – Project Proponent of **Tmt. R. Jeyachitra Rough Stone and Gravel Quarry** hereby declare that this EIA & EMP report prepared by **M/s. Geo Exploration and Mining Solutions** for our Rough Stone & Gravel Quarry situated in S.F.Nos. 36/2A(Part), 36/2B(Part), 36/3(Part), 37/1(Part), 50/1(Part) and 50/3(Part) over an extent of 4.82.10 Ha in Kollamparambu Village, Ottapidaram Taluk, Thoothukudi District based on the ToR issued by the State Level Environmental Impact Assessment Authority (SEIAA), Tamil Nadu vide File No.13605 TOR Identification No. TO26B0108TN5279712N Dated: 11.05.2026.

I hereby assured that the Data's submitted and information given by me is true and correct to the best of my knowledge.

Signature of the Project Proponent

R. Jeyachitra

Place : Thoothukudi

Dated :

UNDERTAKING BY THE EIA COORDINATOR

I, Dr. M. Ifthikhar Ahmed, EIA Coordinator given undertaking that, this EIA & EMP report prepared for Tmt. R. Jeyachitra Rough Stone & Gravel Quarry situated in S.F.Nos. 36/2A(Part), 36/2B(Part), 36/3(Part), 37/1(Part), 50/1(Part) and 50/3(Part) over an extent of 4.82.10 Ha in Kollamparambu Village, Ottapidaram Taluk and Thoothukudi District based on the ToR issued by the State Level Environmental Impact Assessment Authority (SEIAA), Tamil Nadu vide File No. 13605 TOR Identification No. TO26B0108TN5279712N Dated: 11.05.2026

I hereby assured that the Data's submitted and information given by me is true and correct to the best of my knowledge

Signature of the EIA Co Ordinator



Dr. M. Ifthikhar Ahmed

Managing Partner

M/s. Geo Exploration and Mining Solutions

Place : Thoothukudi

Dated :

DECLARATION BY THE HEAD OF THE ACCREDITED CONSULTANT
ORGANIZATION

I, Dr. M. Ifthikhar Ahmed, Managing Partner, Geo Exploration and Mining Solutions, hereby, confirm that the below-mentioned Functional Area Experts and Team Members prepared the EIA/EMP for Tmt. R. Jeyachitra Rough Stone and Gravel Quarry over an Extent of 4.82.10 ha in Kollamparambu Village, Ottapidaram Taluk and Thoothukudi District of Tamil Nadu. It is also certified that information furnished in the EIA study are true and correct to the best of our knowledge.

Signature & Date:



Name:

Dr. M. Ifthikhar Ahmed

Designation:

Managing Partner

Name of the EIA Consultant Organization:

M/s. Geo Exploration and Mining Solutions

NABET Certificate No & Issue Date:

NABET/EIA/25-28/RA0424 Dated: 25-08-2025

Validity:

Valid till 06.08.2028

DECLARATION BY EXPERTS CONTRIBUTING TO THE EIA/EMP

Declaration by experts contributing to the EIA/EMP for Tmt. R. Jeyachitra Rough Stone and Gravel Quarry over an Extent of 4.82.10 ha in Kollamparambu Village, Ottapidaram Taluk and Thoothukudi District of Tamil Nadu. It is also certified that information furnished in the EIA study are true and correct to the best of our knowledge. I, hereby, certify that I was a part of the EIA team in the following capacity that developed the EIA/EMP Report.

Name: **Dr. M. Ifthikhar Ahmed**

Designation: **EIA Coordinator**

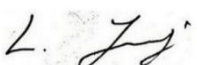
Date & Signature: 

Period of Involvement: **April 2026 to till date**

Associated Team Member with EIA Coordinator:

1. **Mr.A.Naveen**
2. **Mr. M. Shaik Nawas**

FUNCTIONAL AREA EXPERTS ENGAGED IN THE PROJECT

Sl. No.	Functional Area	Involvement	Name of the Expert/s	Signature
1	AP	▪ Identification of different sources of air pollution due to the proposed mine activity ▪ Prediction of air pollution and propose mitigation measures / control measures	Mr. A. Jagannathan	
2	WP	▪ Suggesting water treatment systems, drainage facilities ▪ Evaluating probable impacts of effluent/waste water discharges into the receiving environment/water bodies and suggesting control measures.	Dr. M. Ifthikhar Ahmed	
3	HG	▪ Interpretation of ground water table and predict impact and propose mitigation measures. ▪ Analysis and description of aquifer Characteristics	Mr. L. Jayaraj	
4	GEO	▪ Field Survey for assessing the regional and local geology of the area. ▪ Preparation of mineral and geological maps. ▪ Geology and Geo morphological analysis/description and Stratigraphy/Lithology.	Mr. B. Vengadagiri	
5	SE	▪ Revision in secondary data as per Census of India, 2011. ▪ Impact Assessment & Preventive Management Plan ▪ Corporate Environment Responsibility.	Mr. A. Allimuthu	

6	EB	- Collection of Baseline data of Flora and Fauna. - Identification of species labelled as Rare, Endangered and threatened as per IUCN list. - Impact of the project on flora and fauna. - Suggesting species for greenbelt development.	Mr. Panneer Selvam	
7	RH	- Identification of hazards and hazardous substances - Risks and consequences analysis - Vulnerability assessment - Preparation of Emergency Preparedness Plan - Management plan for safety.	Mr. N. Senthilkumar	
8	LU	- Construction of Land use Map - Impact of project on surrounding land use - Suggesting post closure sustainable land use and mitigative measures.	Mr. A. Allimuthu	
9	NV	- Identify impacts due to noise and vibrations - Suggesting appropriate mitigation measures for EMP.	Mr. A. Jagannathan	
10	AQ	- Identifying different source of emissions and propose predictions of incremental GLC using AERMOD. - Recommending mitigations measures for EMP	Mr. N. Senthilkumar	
11	SC	Assessing the impact on soil environment and proposed mitigation measures for soil conservation	Dr. M. Ifthikhar Ahmed	
12	SHW	- Identify source of generation of non-hazardous solid waste and hazardous waste. - Suggesting measures for minimization of generation of waste and how it can be reused or recycled.	Mr. A. Jagannathan	

LIST OF TEAM MEMBERS ENGAGED IN THIS PROJECT

Sl.No.	Name	Functional Area	Involvement	Signature
1	Mr. M. Shaik Nawas	AQ; NV; SC	- Site Visit with FAE - Provide inputs & Assisting FAE with sources of Air Pollution, its impact and suggest control measures - Analyse & provide inputs and assist FAE with meteorological data, emission estimation, AERMOD modelling and suggesting control measures - Assist FAE and provide inputs on impacts due to proposed mine activity and suggest mitigation measures - Assist FAE with prediction modelling - Provide inputs & Assisting FAE with soil conservation methods and identifying impacts	
2	Mr. A. Naveen	LU	- Site Visit with FAE - Assisting FAE in preparation of land use maps	

NABET CERTIFICATE



भारतीय गुणवत्ता परिषद्
**QUALITY COUNCIL
OF INDIA**
Creating an Ecosystem for Quality



NABET

National Accreditation Board for Education and Training

Certificate of Accreditation

Geo Exploration and Mining Solutions, Salem

No. 17, Advaita Ashram Road, Fairlands, Salem, Tamil Nadu – 636 004

Geo Exploration and Mining Solutions, Salem is Re-Accredited (RA3) as **Category-A organization** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations (Version 3), for the preparation of EIA/EMP reports in the sectors listed below, as per the specified categories

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1.	Mining of minerals including opencast / underground mining	1	1 (a) (i)	A
2.	Mineral beneficiation	7	2 (b)	A
3.	Industrial estates/ parks/ complexes/areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes	31	7 (c)	A
4.	Building and construction projects	38	8 (a)	B

Note: Names of approved experts and sectors are mentioned in RAAC minutes dated August 21, 2025, posted on QCI-NABET website.

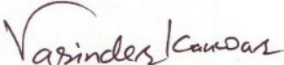
The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no QCI/NABET/ENV/ACO/25/3827 dated August 25, 2025. The accreditation needs to be renewed before the expiry date by Geo Exploration and Mining Solutions, Salem following due process of assessment.

Valid up to
August 06, 2028

Issue Date
August 25, 2025



Certificate No.
NABET/EIA/25-28/RA 0424


Prof (Dr) Varinder S Kanwar
(CEO – NABET)

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

For the easy representation the proposed quarry and existing quarry are designated as below –

Proposed Quarries				
Code	Name of the Proponent and Address	S.F. Nos & Village	Area (Ha)	Status
P1	Tmt. R. Jeyachitra	36/2A(Part), 36/2B(Part), 36/3(Part), 37/1(Part), 50/1(Part) and 50/3(Part) - Kollamparambu	4.82.10	File No. 13605 ToR Identification No. TO26B0108TN5279712N Dated: 11.05.2026
Total			4.82.10	
Existing Quarries				
CODE	Name of the Proponent and Address	S.F. Nos	Extent in Ha	Lease Period
E-1	Thiru. A. Arulrajan	22/1(P), 56/1, 56/2(P), 57/1, 57/2(P)	4.99.00	06.03.2026 – 05.03.2031
Total			4.99.00	
Expired/ Abandoned Quarries				
----- Nil -----				
Total			9.81.10	
Total Cluster Extent			9.81.10 Ha	

Note: -

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

As per above notification S.O.2269(E) dated : 01.07.2016 in para (b) in Appendix XI,- (ii) (5): The lease not operative for three years or more and leases which have got environmental clearance as on 15th January, 2016 shall not be counted for calculating the area of cluster, but shall be included in the Environment Management Plan and the Regional Environmental Management Plan”

TERMS OF REFERENCE (ToR) COMPLIANCE

Tmt. R. Jeyachitra Rough Stone & Gravel Quarry

File.No.13605 ToR Identification No. TO26B0108TN5279712N Dated: 11.05.2026

SPECIFIC CONDITIONS		
1	A Cluster Management Committee (CMC) shall be constituted including all the mines in the cluster as Committee Members for the effective management of the mining operation in the cluster through systematic & scientific approach with appointment of statutory personnel, appropriate environmental monitoring, good maintenance of haul roads and village/panchayat roads, authorized blasting operation etc. The PP shall submit the following details in the form of an Affidavit during the EIA appraisal: (i) Copy of the agreement forming CMC. (ii) The Organisation chart of the Committee with defining the role of the members (iii) The 'Standard Operating Procedures' (SoP) executing the planned activities.	Noted and Agreed Cluster Management committee has been detailed in the chapter - 7
2	The PP shall install the CCTV camera for the continuous surveillance of mining activity & furnish the photographic/videographic evidence along with the EIA report.	Noted and agreed After commencing the mining operation the CCTV cameras will be installed all the corners of the mine lease area. The photographic evidence will be submitted along with the Half yearly compliance report
3	The PP to enumerate structures within 300 metres.	Noted and agreed The structure study has been carried out within the radius of 300m. There is no habitation within the radius of 300m from the project site the details of the structures is given in the EIA report, Chapter No.III

SEIAA SPECIFIC CONDITIONS		
1	After detailed discussions, the Authority accepts the recommendation of SEAC and decided to grant Terms of Reference (ToR) along with Public Hearing for the quantity of 9,15,400 m ³ of Rough Stone & 1,96,550 m ³ of Gravel up to the depth of 60m and the annual peak production shall not exceed 1,03,000 m ³ of Rough stone and 72,000 m ³ of Gravel as per the approved mining plan, 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 conditions & SEIAA Specific & Standard conditions	Noted and agreed Draft EIA report is prepared as per the recommendation of SEAC & SEIAA.

SEIAA STANDARD CONDITIONS		
Cluster Management Committee		
1	Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry.	Noted and agreed The Cluster management committee has been formed covering the existing and proposed quarries in the cluster
2	The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling, tree plantation, blasting etc.,	Noted and agreed The information will be shared to the cluster management committee during the monthly meeting.
3	The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines.	Noted and agreed The list of members of the committee formed will be submitted to AD/Mines before resuming the mining operation.
4	Detailed Operational Plan must be submitted which must include the blasting frequency with respect to the nearby quarry situated in the cluster, the usage of haul roads by the individual quarry in the form of route map and network.	Noted and agreed It is a Fresh Quarry the blasting will be used for the removal of Rough Stone and Overburden only the blasting frequency and usage of haul roads are discussed.
5	The committee shall deliberate on risk & emergency management plan, fire safety & evacuation plan and sustainable development goals pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation of the cluster and evacuation plan.	Noted and agreed The risk management plan and disaster management plan has been prepared and enclosed in this EIA report, Chapter No. 7.
6	The Cluster Management Committee shall form Environmental Policy to practice sustainable mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the environmental policy devised shall be given in detail in the EIA Report.	Noted and agreed Environmental policy of the cluster management committee is detailed in the EIA Report Chapter No. 6
7	The committee shall furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner.	Noted and agreed The Restoration strategy is discussed in the progressive mine closure plan and will be enclosed in the Scheme of Mining plan.
8	The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public in the vicinity.	Noted and agreed The information on the health of the workers and the local people will be updated periodically along with medical examination.
Agriculture & Agro-Biodiversity		

9	Impact on surrounding agricultural fields around the proposed mining Area.	As the proposed lease area is dominantly surrounded by mining land, barren land, and fallow land, the impact on the surrounding agricultural fields if present is considerably low. The Mining operation will be carried out to reduce the impact further to the level of negligence.
10	Impact on soil flora & vegetation around the project site.	The vegetation details have been provided in chapter III. There is no schedule I species of animals observed within study area as per Wildlife Protection Act, 1972 and no species falls in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area.
11	Details of type of vegetation including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetation all along the boundary of the proposed mining area shall committed mentioned in EMP.	Noted and agreed There are no trees within the Fresh quarry site, and therefore, no proposal for tree felling or removal is anticipated during the quarrying operations.
12	The Environmental Impact Assessment should study the agro-biodiversity, agro-forestry, horticultural plantations, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.	Noted and agreed The details of the soil analysis and the impacts are given in the Chapter No 3 & 4.
13	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	Noted and agreed The Eco System of the area will be retained during the mining operation by the way of planting trees in the boundary barrier and un utilized areas. After completion of mining operation, the quarried-out pit will be facilitated to collect the rainwater to pit act as temporary reservoir
14	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock	Noted and agreed The project area is situated centre part of the quarry lands. The proposed Rough Stone quarrying operation will employ the wet drilling method, which is expected to have negligible impacts on nearby agricultural lands.
Forests		
15	The project proponent shall detail study on impact of mining on Reserve forests and free ranging wildlife	Noted and agreed. There is no Reserve Forest within 1km radius from the project area. The mining operation will not cause any significant impact to the Reserve Forest and Wild life Sanctuaries

16	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	Gulf of Mannar Marine National Park – 13.98km – South East and Vallanadu Black Buck Wildlife Sanctuary – 37.2km – South West, chapter 3 Details of Ecology and Biodiversity, and 4 endemic vulnerable and endangered indigenous flora and fauna.
17	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection	Details are discussed in the Chapter No.3
18	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site	Anticipated Environment Impact and Mitigation measures are detailed in Chapter No.4
Water Environment		
19	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 waterbodies 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	There are 05 open wells and 06 bore wells within the radius of 1km from the project area, Hydrogeological study has been conducted by the resistivity method.
20	Erosion Control measures	Details discussed in the chapter No.4
21	Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby Villages, Water-bodies/ Rivers, & any ecological fragile areas.	Details in Chapter 3
22	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir	Food webs describe who eats whom in an ecological community. Made of interconnected food chains, food webs help us understand how changes to ecosystems — say, removing a top predator or adding nutrients — affect many different species, both directly and indirectly. Whereas in this proposed project is for quarrying of Rough Stone and Gravel and is on a hard batholith formation where no diversion of any water bodies is proposed of there is no intersection of ground water table anticipated.
23	The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities.	Details are given in the Chapter No 4.
24	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies	Details in Chapter 4 impact of bio diversity.

	and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	
25	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components	Details of impact on soil environment is detailed in Chapter No.4
26	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites	Chalikulam RF – 10.5 km – South West There is, National Parks, Eco sensitive areas, Wild life sanctuaries 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. Ecological Environment is discussed under Chapter 3
27	The EIA shall include the impact of mining activity on the following: a) Hydrothermal/Geothermal effect due to destruction in the Environment. b) Bio-geochemical processes and its foot prints including environmental stress. c) Sediment geochemistry in the surface streams.	Noted and Agreed
Energy		
28	The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished.	Noted and agreed. Control measures of Noise, Air Water, Dust discussed in chapter 4
Climate Change		
29	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 agreed. Details discussed in chapter 4.
30	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock, soil health and physical, chemical & biological soil features	Noted and agreed. Details are discussed in chapter 3.
31	Impact of mining on pollution leading to GHGs emissions and the impact of the same on the local livelihood.	A greenhouse gas (GHG) is a gas that absorbs and emits radiant energy within the thermal infrared range, causing the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), and ozone (O ₃)

		Carbon dioxide (CO₂): Carbon dioxide enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, trees and other biological materials. Carbon dioxide is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle. Methane (CH₄): Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices, land use and by the decay of organic waste in municipal solid waste landfills. Nitrous oxide (N₂O): Nitrous oxide is emitted during agricultural, land use, and industrial activities; combustion of fossil fuels and solid waste; as well as during treatment of wastewater.
Mine Closure Plan		
32	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	Progressive Mine closure plan has been prepared considering the entire lease period in the mining plan and the same has been approved.
EMP		
33	Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued and the scope for achieving SDGs	Noted and agreed Detailed EMP discussed in chapter 10.
34	The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan.	Noted and agreed. Detailed EMP discussed in chapter 10.
Risk Assessment		
35	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	Noted and agreed. Risk Assessment and management Plan explicated in chapter 7.
Disaster Management Plan		
36	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	Noted and agreed. Disaster management Plan details given in Chapter-7

	lease period as per precise area communication order issued.	
Others		
37	The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc.	Letter obtained from the VAO regarding surface features within 300m radius
38	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 agreed. It will be updated in final EIA/EMP report.
39	The project proponent shall study and furnish the possible pollution due to plastic and micro plastic on the environment. The ecological risks and impacts of plastic & micro plastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported	Noted and agreed. Plastic waste management of the proposed project explicated in chapter 7.

STANDARD TERMS OF REFERENCE		
1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	Not applicable. The projects is Not a violation category. This proposal falls under B1 Category (Cluster situation)
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	Document is enclosed along with Approved Mining Plan as Annexure Volume 1 for the respective projects.
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).	Satellite imagery of the project area along with boundary co-ordinates is given in the Chapter No 1 Geomorphology of the area is given in Chapter No 2 Land use pattern of the project area is tabulated in the Chapter No.2. Land use pattern of the Study area is tabulated in the Chapter No.3
5	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the	Map showing – Geology map of the project area covering 10km radius - Geomorphology of the area is given in Chapter No 2.

	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 was inspected by the officers of Department of Geology along with revenue officials and found that the land is fit for quarrying under the policy of State Government.
7	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	The proponent has framed their Environmental Policy and the same is discussed in the Chapter No 10.1.
8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	It is an opencast quarrying operation proposed to operate in Mechanized method. The rough stone formation is a hard, compact and homogeneous body. The height and width of the bench will be maintained as 5m with 90° bench angles. Quarrying activities will be carried out under the supervision of Competent Persons like Mines Manager, Mines Foreman and Mining Mate. Necessary permissions will be obtained from DGMS after obtaining Environmental Clearance.
9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc., should be for the life of the mine / lease period.	Noted & Agreed. The study area considered for this study is 10 km radius and all data contained in the EIA report such as waste generation etc., is 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. Impact, if any, of change of land use should be given.	Land use and land cover of the study area is discussed in Chapter No. 3. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 2.
11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given	Not Applicable. There is no waste anticipated during this quarry operation. The entire quarried out Rough Stone will be transported to the needy customers. No Dumps is proposed outside the lease area.
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,	Not Applicable. There is no Forest Land involved in the proposed project area. The proposed project area is a Patta land.

	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.	Approved Mining Plan is enclosed as Annexure Volume 1.
13	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	Not Applicable. The proposed project area does not involve any Forest Land.
14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not Applicable. The project doesn't attract Recognition of Forest Rights Act, 2006.
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	No Reserve Forest within the Study Area.
16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	Not Applicable. There are No National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km Radius from the periphery of the project area.
17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 KM of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished	Not Applicable. There are No National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km Radius from the periphery of the project area.
18	A detailed biological study of the study area [core zone and buffer zone (10 KM radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	Detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] was carried out and discussed under Chapter No. 3. 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. Detailed in Chapter No. 3.
19	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravalli Range', (attracting court restrictions for mining operations), should also be indicated and where so	Not Applicable. Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range.

	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 w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	Not Applicable. The project doesn't attract The C. R. Z. Notification, 2018.
21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	Not Applicable. There are no approved habitations within a radius of 300 meters. Therefore, R&R Plan / Compensation details for the Project Affected People (PAP) is not anticipated and Not Applicable for this project.
22	One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season); December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	Baseline Data were collected for One Season Mar-May 2026 (Premonsoon Season) as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. 3.
23	Air quality modelling 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 modelling 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	Air Quality Modelling for prediction of incremental GLC's of pollutant was carried out using AERMOD view 9.6.1 Model. Details in Chapter No. 4.

	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.	Total Water Requirement for this project is given in the chapter No 2, Table No 2.13.
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Water for dust suppression, greenbelt development and domestic use will be obtained from accumulated rainwater/seepage water in mine pits. Drinking water will be sourced from the approved water vendors, No 2, Table No 2.13.
26	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	The rain water collected in the pits after spell of rain will be used for greenbelt development and dust suppression.
27	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	Impact Studies and Mitigation Measures of Water Quality discussed in Chapter No. 4.
28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	The ground water table is at 93-98m below ground level. In these projects, ultimate depth is 60m Maximum from the general ground profile. It is inferred the quarrying activities in the Cumulative EIA project (Quarry) will not intersect the Ground water table.
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.	Highest elevation of the project area is 100m AMSL Ultimate depth of the mine is 60m Bgl Water level in the area is 93-98m BGL
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.	Progressive greenbelt development plan has been prepared and discussed along with Recommended Species details are given in the Chapter 4,
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.	Traffic density survey was carried out to analyse the impact of Transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no much significant impact due to the proposed transportation from the project area. Details in Chapter 2.

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.	Infrastructure & other facilities will be provided to the Mine Workers after the grant of quarry lease and the same has been discussed in the Chapter No.2.
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Discussed in chapter No 2.
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.	Details in Chapter 10.
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.	Occupational health impact and details of the medical examination to the workers given in the Details in Chapter 10.
36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	Details in Chapter No. 4
37	Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Details of Socio Economic is given in the Chapter No 3.
38	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	Environment Management Plan Chapter 10.
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.	Public hearing points and commitment of the project proponent will be updated in the final EIA & EMP Report.
40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation is pending in any court against this project.
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Project Cost is given in the Chpater No 2,
42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Detailed under Chapter 7

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.	Total Water Requirement for this project is given in the chapter No 2,
44	Besides the above, the below mentioned general points are also to be followed: -	
A	Executive Summary of the EIA/EMP Report	Encloses as separate volume
B	All documents to be properly referenced with index and continuous page numbering.	All the documents are properly referenced with index and continuous page numbering.
C	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	List of Tables and source of the data collected are given properly.
D	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF & CC / NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project	Copy of Baseline monitoring reports are enclosed with this draft as annexure
E	Where the documents provided are in a language other than English, an English translation should be provided.	Not Applicable.
F	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Questionnaire of the project will be submitted in final EIA report after complying the public hearing points.
G	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF & CC vide O.M. No. J-11013/41/2006-IA.II(I) Dated: 4th August, 2009, which are available on the website of this Ministry, should be followed.	Instructions issued by MoEF & CC O.M. No. J-11013/41/2006-IA. II (I) Dated: 4th August, 2009 are followed.
H	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF & CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation	There is no changes in Form-I, Mining plan and Pre-feasibility report for all the projects.
I	As per the circular no. J-11011/618/2010-IA. II(I) Dated: 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	Not applicable.
J	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	Satellite imagery of the project area along with boundary co ordinates is given in the Chapter No 1 Geomorphology of the area is given in Chapter No 2

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1. INTRODUCTION

1.0 PREAMBLE

The project proponent Tmt. R. Jeyachitra has applied for rough stone and gravel quarry over an extent of 4.82.10 Ha in S.F.Nos. 36/2A(Part), 36/2B(Part), 36/3(Part), 37/1(Part), 50/1(Part) and 50/3(Part), Kollamparambu Village, Ottapidaram Taluk & Thoothukudi District.

- The proponent applied for Rough Stone and Gravel Quarry Lease Dated: 08.10.2025
- Precise Area Communication Letter was issued by the Assistant Director, Thoothukudi R.C. No: G.M.1/760/2025, Dated: 09.03.2026.
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Thoothukudi District, vide R.C. No: G.M.1/760/2025, Dated: 16.03.2026
- 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/574308/2026 Dated: 03.04.2026.
- The proposal was placed in 706th SEAC meeting held on 17.04.2026 and the committee recommended for issue of ToR.
- The proposal was considered in 1003rd SEIAA meeting held on 05.05.2026 and issued ToR vide File No.13605 TOR Identification No. TO26B0108TN5279712N Dated:11.05.2026.
- As per the EIA Notification, 2006 and subsequent amendments and OM The proposal falls in the B1 Category (Cluster quarries – 1 proposal, 1 Existing quarry forming Cluster Category {Total Extent of the Cluster is 9.81.10 Ha}- Cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016).

Based on the ToR Baseline Monitoring study has been carried out for one season (Pre Monsoon) i.e., **March – May 2026** 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) to minimize those adverse impacts.

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

1.1 PURPOSE OF THE REPORT

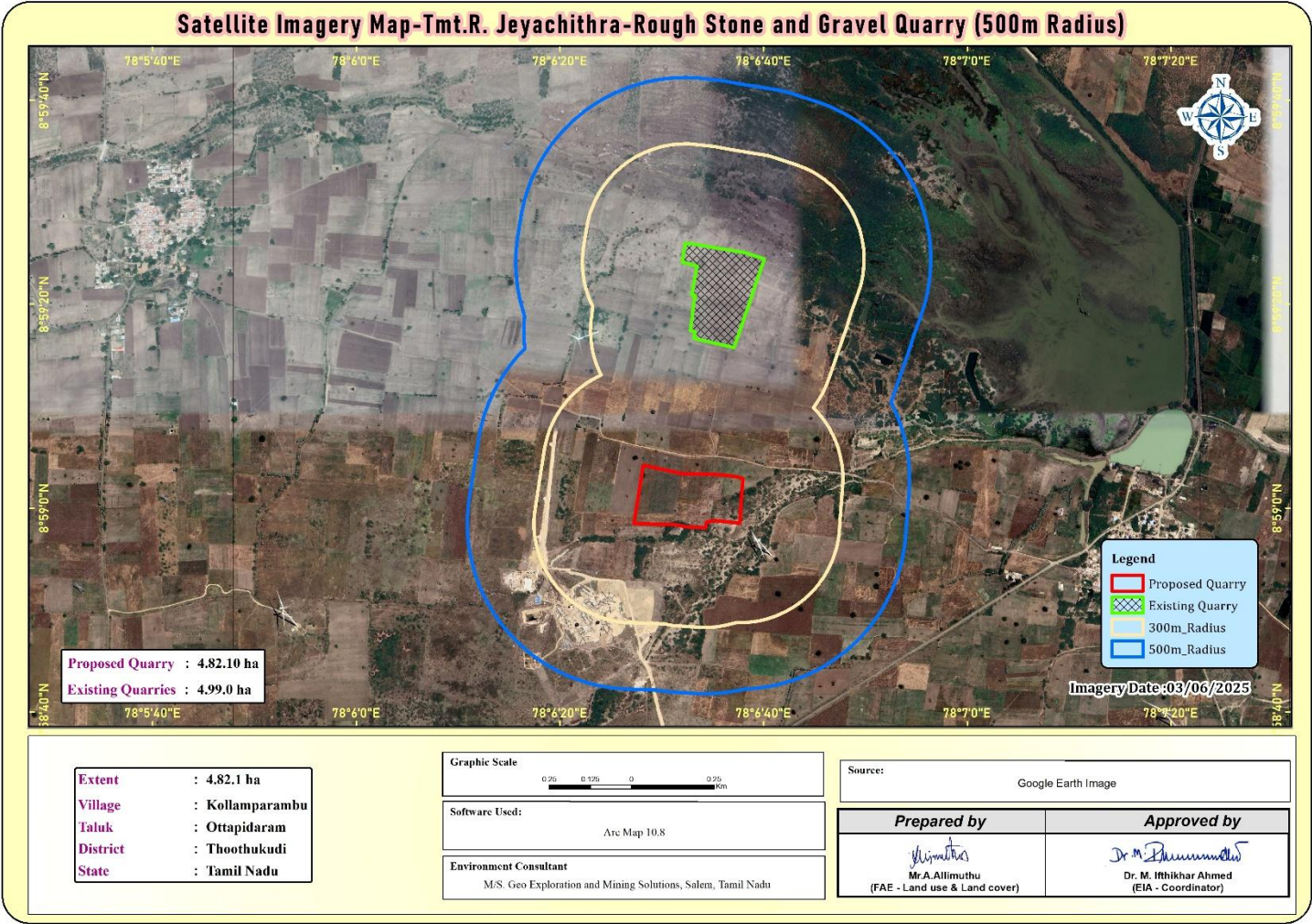
The Ministry of Environment and Forests, Govt. of India, through its EIA notification S.O. 1533(E) of 14th September 2006 and its subsequent amendments as per Gazette Notification S.O. 3977 (E) of 14th August 2018, Mining Projects are classified under two categories i.e. A (> 100 Ha) and B ($\leq$ 100 Ha), and Schematic Presentation of Requirements on Environmental Clearance of Minor Minerals including cluster situation in Appendix–XI.

Now, as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green Tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No. 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018 clarified the requirement for EIA, EMP and therefore, Public Consultation for all areas from 5 to 25 ha falling in Category B- 1 and appraised by SEAC/ SEIAA as well as for cluster situation.

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

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

FIGURE.1.1SATELLITE IMAGERY CLUSTER QUARRY



1.2 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

1.2.1 Identification of Project

TABLE 1.1: SALIENT FEATURES OF THE PROPOSED PROJECT

Name of the Project	Tmt. R. Jeyachitra Rough Stone & Gravel Quarry
S.F. No.	36/2A(Part), 36/2B(Part), 36/3(Part), 37/1(Part), 50/1(Part) and 50/3(Part)
Extent	4.82.10 ha
Land Type	Patta Land
Village Taluk and District	Kollamparambu Village, Ottapidaram Taluk, Thoothukudi District

Source: Approved Mining Plan.

1.2.2 Identification of Project Proponent

TABLE 1.2: DETAILS OF PROJECT PROPONENT

Name of the Proponent	Tmt. R. Jeyachitra
Address	W/o. Rengaraj, No. 2/12, Melatheru, Shanmugapuram, Melapandiyapuram, Kailasapuram, Thoothukudi District – 628 301
Mobile	98421 45464
Status	Individual

Source: Approved Mining Plan.

1.3 BRIEF DESCRIPTION OF THE PROJECT

1.3.1 Nature and Size of the Project

The quarrying operation is to be carried out by Opencast Mechanized Mining method with 5.0m bench height and 5.0m bench width by deploying Jack Hammer Drilling & Slurry Explosive during blasting. Hydraulic Excavator and tippers are used for Loading and transportation. Rock Breakers are deployed to avoid secondary blasting.

TABLE 1.3: BRIEF DESCRIPTION OF THE PROJECT

Name of the Quarry	Tmt. R. Jeyachitra Rough Stone & Gravel Quarry	
Toposheet No	58L/1	
Land Classification	It is a Patta Land, Registered in the name of the proponent (Tmt. R. Jeyachitra) vide patta nos.1167, 1168 and 1188.	
Latitude between	08°58'57.98"N to 08°59'04.13"N	
Longitude between	78°06'27.27"E to 78°06'37.98"E	
Highest Elevation	100m AMSL	
Proposed Depth of Mining as per Tor	60m (5m Gravel + 55m Rough Stone)	
Geological Resources	Rough Stone in m ³	Gravel m ³
	26,47,700	2,40,700
Mineable Reserves	Rough Stone in m ³	Gravel m ³
	9,15,400	1,96,550
Yearwise production for first five years	Rough Stone in m ³	Gravel m ³

	4,62,410	1,96,550
Yearwise production for Second five years	Rough Stone in m ³	Gravel m ³
	4,52,990	-
Ultimate Pit Dimension	Pit I: 192m (L) x 144m (W) x 60m (D) Bgl Pit II: 98m (L) x 119m (W) x 55m (D) Bgl	
Water Level in the surrounds area	93-98 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is plain terrain. The area has gentle sloping towards Northeastern side and altitude of the area is 100m (max) above from Mean Sea level. The area is covered by 5m thickness of Gravel and followed by Massive Charnockite which is clearly inferred from the nearby quarry pits. The Water level in the area is 93m -98m below general ground profile. Average annual rainfall is about 694 mm.	
Machinaries	Wagon Drill Machine	1 No
	Jack Hammer	2 Nos
	Compressor	1 Nos
	Excavator with bucket and rock breaker	2 Nos
	Truck	4 Nos
	Water Sprinkling Tanker	2 No
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	31 Nos	
Project Cost	Rs.4,07,14,000/-	
CER Cost	Rs. 5,00,000/-	
Nearby Water Bodies	Water bodies	Distance & Direction
	Odai	10m Safety-South Side
	Urani	170m NW
	Tank	470m NE
	Odai	1.9km NE
	Tank	2.4km SW
Greenbelt Development Plan	Proposed to plant 2,400 trees in the 7.5m Safety Zone, Village Road and panchayat roads.	
Proposed Water Requirement	7.0 KLD	
Nearest Habitation	1.0km East	

Source: Approved Mining Plan

1.3.2 Location of the Project

- The proposed quarry project falls in Kollamparambu Village, Ottapidaram Taluk and Thoothukudi District.
- Tmt. R. Jeyachitra Rough Stone and Gravel Quarry is located about 1.0km Western side of Kollamparambu Village.
- The Kollamparambu Village is located about 1.7km North Eastern side of Ottapidaram Taluk.
- The area is marked in the Survey of India, Toposheet No. 58L/1. The area lies between the Latitudes of 08°58'57.98"N to 08°59'04.13"N and Longitudes of 78°06'27.27"E to 78°06'37.98"E.

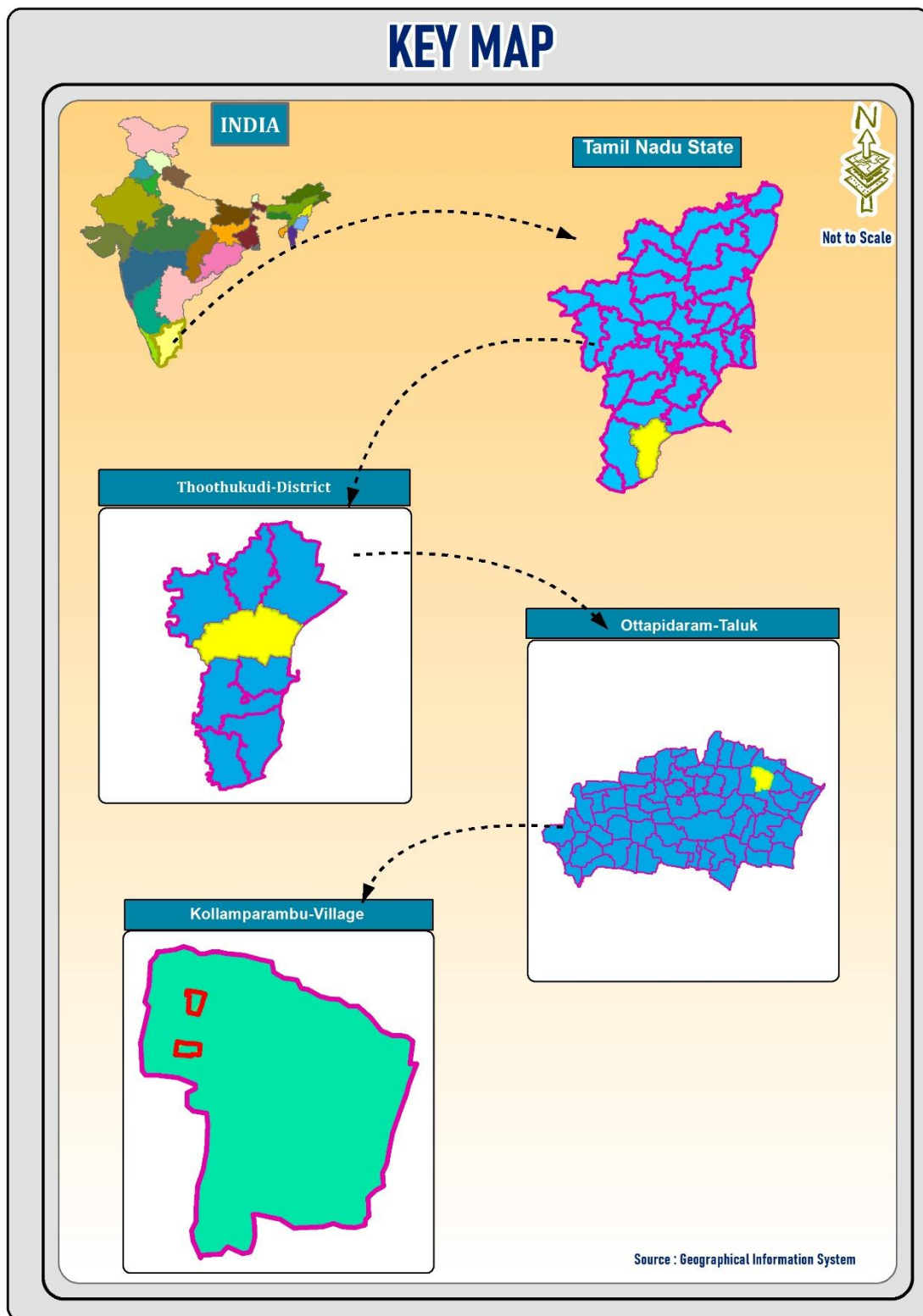
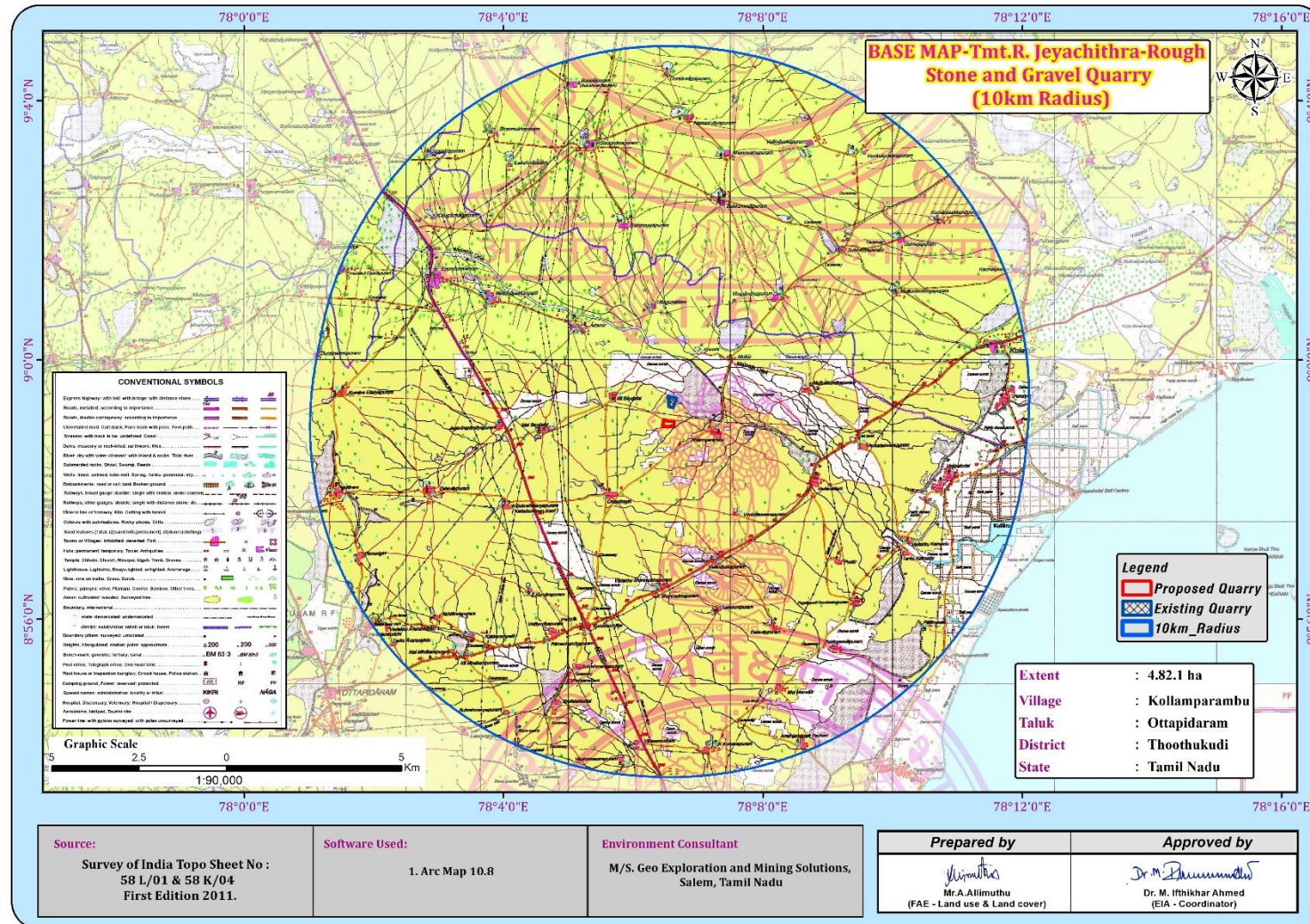
FIGURE 1.1A KEY MAP SHOWING THE LOCATION OF THE PROJECT SITE

FIGURE 1.2: TOPOSHEET SHOWING LOCATION OF THE PROJECT SITE AROUND 10 KM RADIUS

1.4 Environmental Clearance

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

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

SCREENING

- The proponent applied for Rough Stone and Gravel Quarry Lease Dated: 08.10.2025
- Precise Area Communication Letter was issued by the Assistant Director, Thoothukudi R.C. No: G.M.1/760/2025, Dated: 09.03.2026.
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Thoothukudi District, vide R.C. No: G.M.1/760/2025, Dated: 16.03.2026.
- Proponent applied for ToR for Environmental Clearance vide online Proposal No. SIA/TN/MIN/574308/2026 Dated: 03.04.2026.

SCOPING

- The proposal was placed in 706th SEAC meeting held on 17.04.2026 and the committee recommended for issue of ToR.
- The proposal was considered in 1003rd SEIAA meeting held on 05.05.2026 and issued ToR vide File No.13605 TOR Identification No. TO26B0108TN5279712N Dated:11.05.2026.

PUBLIC CONSULTATION –

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

APPRAISAL –

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

- Guidance Manual of Environmental Impact Assessment for Mining of Minerals, Ministry of Environment and Forests, 2010
- EIA Notification, 14th September, 2006
 - File No.13605 TOR Identification No. TO26B0108TN5279712N Dated:11.05.2026.
 - Approved Mining Plan.

1.5 TERMS OF REFERENCE (ToR)

ToR issued vide –

- File No.13605 TOR Identification No. TO26B0108TN5279712N Dated:11.05.2026 Area detailed in Page No. I – XXI.

1.6 POST ENVIRONMENT CLEARANCE MONITORING

The proposed project proponent shall submit a half-yearly compliance report in respect of stipulated Environmental Clearance terms and conditions to MoEF & CC Regional Office & SEIAA after grant of EC on 1st June and 1st December of each calendar year as per MoEF & CC Notification S.O. 5845 (E) Dated: 26.11.2018.

1.7 GENERIC STRUCTURE OF EIA DOCUMENT

The overall contents of the EIA report follow the list of contents prescribed in the EIA Notification 2006 and the “Environmental Impact Assessment Guidance Manual for Mining of Minerals” published by MoEF & CC.

1.8 THE SCOPE OF THE STUDY

The main scope of the EIA study is to quantify the cumulative impact in the study area due to cluster Quarry and formulate the effective mitigation measures for each individual leases. A detailed account of the emission sources, emissions control equipment, background Air quality levels, Meteorological measurements, Dispersion model and all other aspects of pollution like effluent discharge, Dust generation etc., have been discussed in this report. The baseline monitoring study has been carried out during the Pre Monsoon season (Mar 2026 to May 2026) for various environmental components so as to assess the anticipated impacts of the cluster quarry projects on the environment and suggest suitable mitigation measures for likely adverse impacts due to the proposed project.

TABLE 1.4: ENVIRONMENT ATTRIBUTES

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

Source: Field Monitoring Data

The data has been collected as per the requirement of the ToR issued by SEIAA – TN.

1.8.1 Regulatory Compliance & Applicable Laws/Regulations

- Application for Quarrying Lease as per Tamil Nadu Minor Mineral Concession Rules, 1959
- Obtained Precise Area Communication Letter as per Tamil Nadu Minor Mineral Concession Rules, 1959 for Preparation of Mining Plan and obtaining Environmental Clearance
- The Mining Plan has been approved under Rule 41 & 42 as amended of Tamil Nadu Minor Mineral Concession Rules, 1959
- File No.13605 TOR Identification No. TO26B0108TN5279712N Dated:11.05.2026.

CHAPTER – 2: PROJECT DESCRIPTION

2.0 GENERAL

The Proposed Rough Stone and Gravel Quarry requires Environmental Clearance. One proposed and One existing quarries forming a cluster; calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016 and the total extent of cluster is **9.81.10 ha**.

As the extent of cluster are 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.

2.1 DESCRIPTION OF THE PROJECT

The proposed project is site specific and there is no additional area required for this project. There is no effluent generation/discharge from the proposed Quarry.

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 LOCATION OF THE PROJECT

- The proposed quarry project falls in Kollamparambu Village, Ottapidaram Taluk and Thoothukudi District.
- Tmt. R. Jeyachitra Rough Stone and Gravel Quarry is located about 1.0km Western side of Kollamparambu Village.
- The Kollamparambu Village is located about 1.7km North Eastern side of Ottapidaram Taluk.
- The area is marked in the Survey of India, Toposheet No. 58L/1. The area lies between the Latitudes of 08°58'57.98"N to 08°59'04.13"N and Longitudes of 78°06'27.27"E to 78°06'37.98"E.

The project does not fall within 10 km radius of any Eco – sensitive zone, National Park, Tiger Reserve, Elephant Corridor and Biosphere Reserves.

TABLE 2.1: SITE CONNECTIVITY

Nearest Roadway	NH-38 Thoothukudi - Madurai – 4.2km -South West side SH-75 Vilanthikulam - Tirunelveli – 4.0km -South East Side
Nearest Village	Kollamparambu – 1.0km - East
Nearest Town	Ottapidram – 12 km – South West
Nearest Railway	Thoothukudi Railway station – 20.3Km – South East
Nearest Airport	Thoothukudi – 30 km – South West
Seaport	Thoothukudi - 20 km – South East

Source: Prefeasibility Report and Approved Mining Plan.

TABLE 2.2: BOUNDARY CO-ORDINATES OF PROPOSED PROJECT

Boundary Pillar No.	Latitude	Longitude
1	08°58'58.41" N	78°06'27.27" E
2	08°59'04.31" N	78°06'28.17" E
3	08°59'03.29" N	78°06'32.00" E
4	08°59'03.25" N	78°06'34.29" E
5	08°59'03.23" N	78°06'35.35" E
6	08°59'03.03" N	78°06'37.15" E
7	08°59'02.84" N	78°06'37.98" E
8	08°59'01.11" N	78°06'37.85" E
9	08°58'58.44" N	78°06'37.65" E
10	08°58'58.68" N	78°06'35.28" E
11	08°58'58.55" N	78°06'34.40" E
12	08°58'57.98" N	78°06'34.30" E
13	08°58'58.09" N	78°06'32.33" E
14	08°58'58.30" N	78°06'31.39" E

Source: Approved Mining Plan

FIGURE 2.1: TOPOGRAPHICAL VIEW OF THE PROJECT SITE

FIGURE 2.2A: GREEN BELT AND FENCING PHOTOS

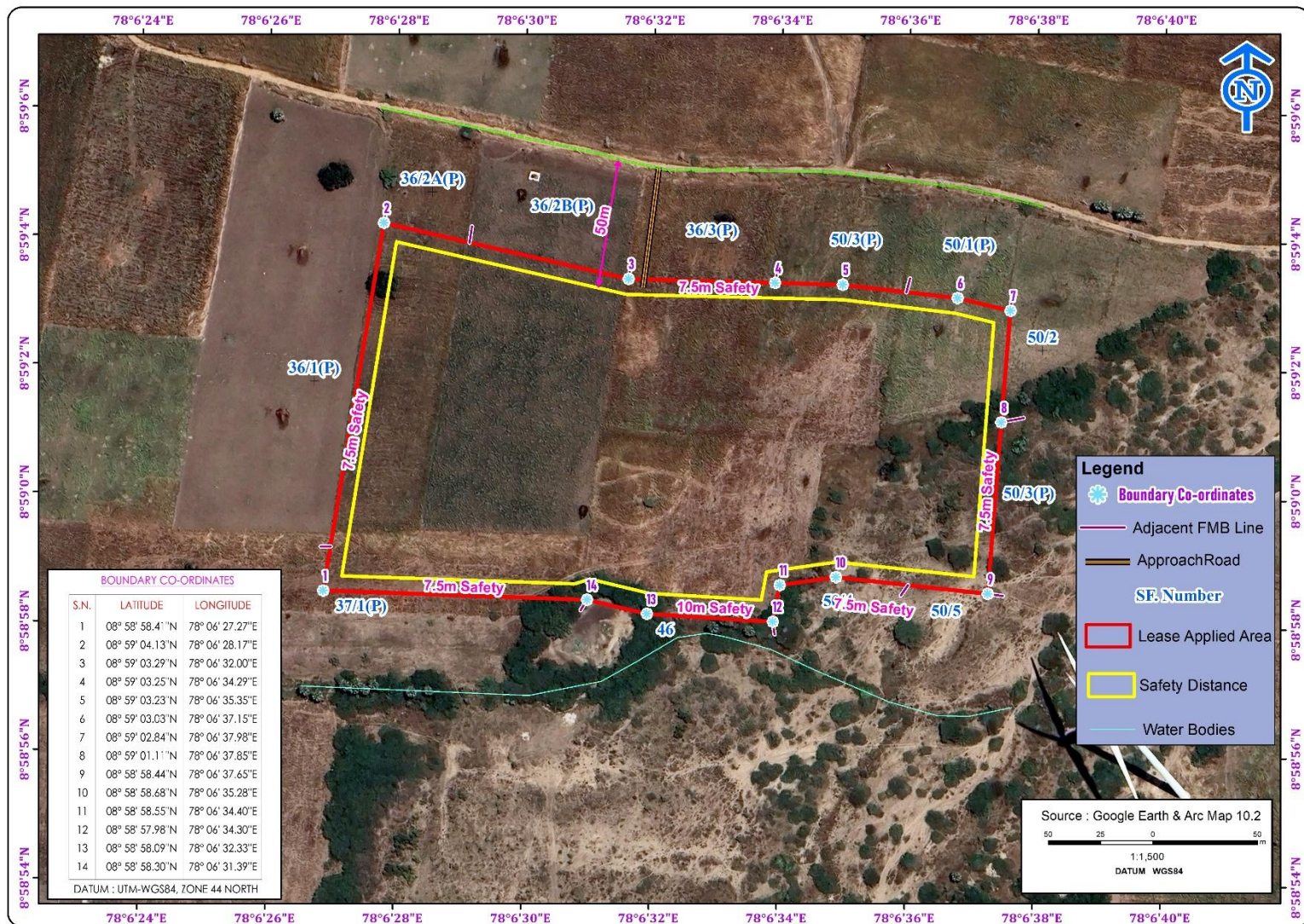
FIGURE 2.2: GOOGLE IMAGE ROUGH STONE AND GRAVEL QUARRY PROJECT AREAS

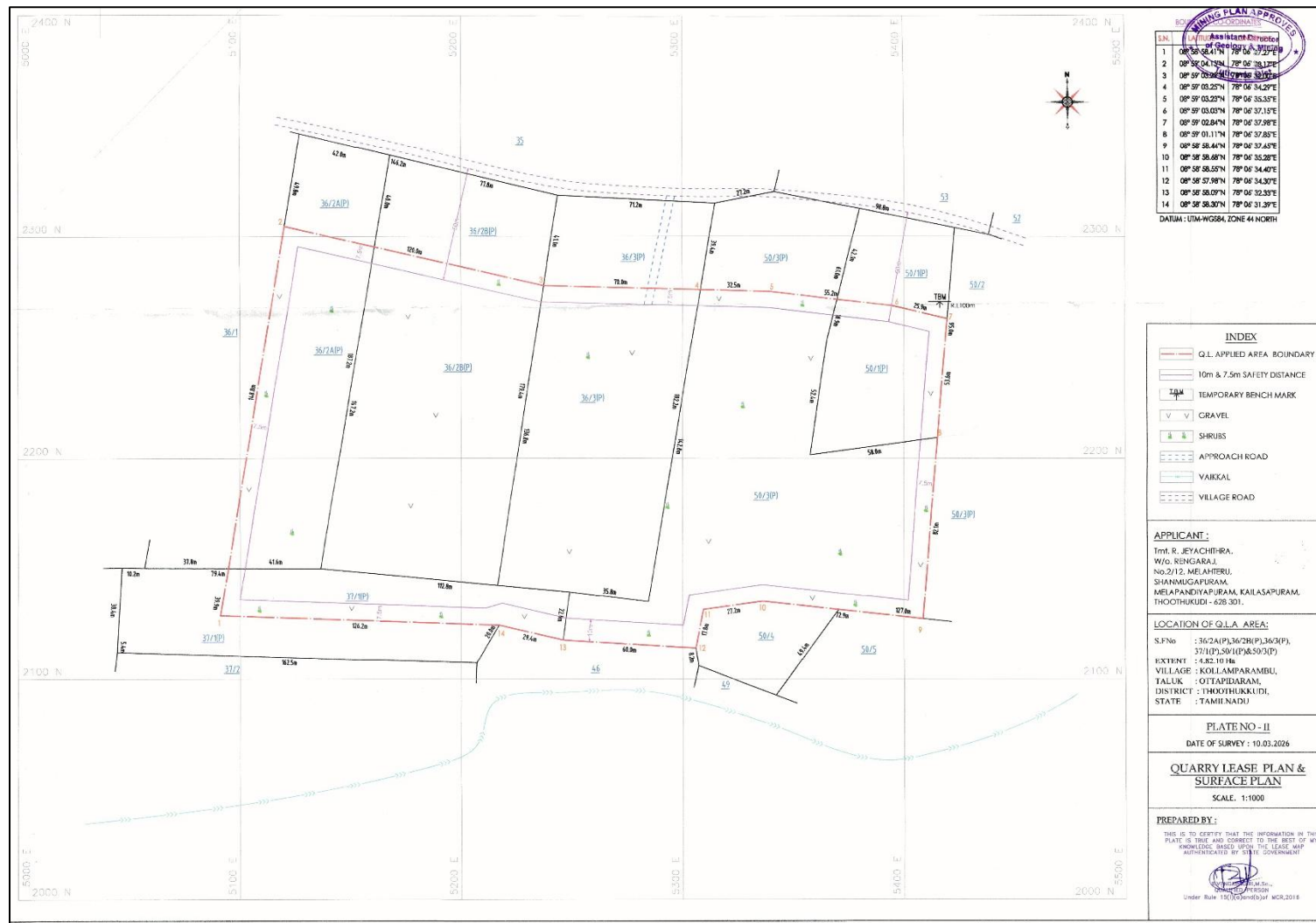
FIGURE 2.3: QUARRY LEASE PLAN / SURFACE PLAN

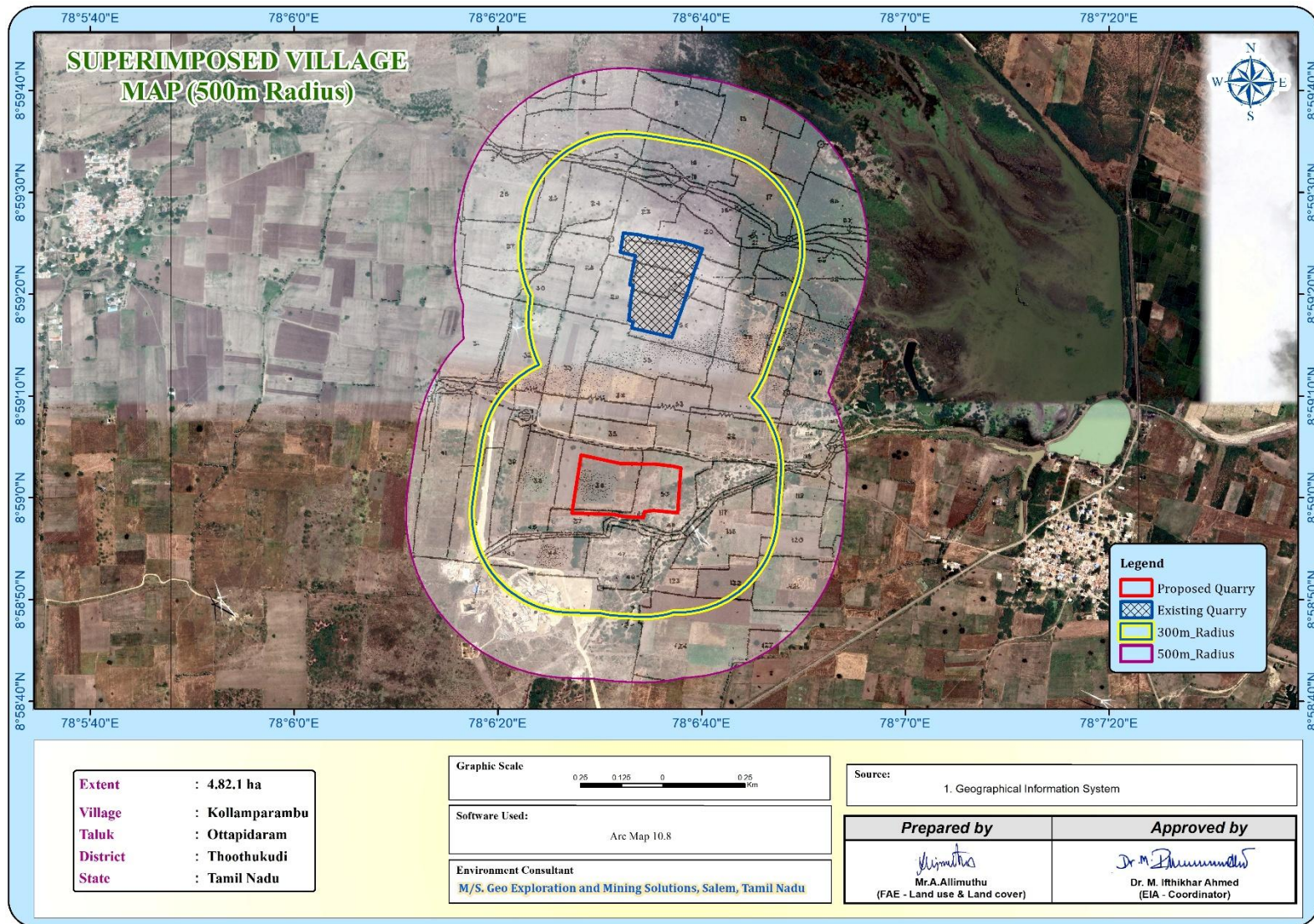
FIGURE 2.4: SATELLITE IMAGERY OF CLUSTER QUARRY

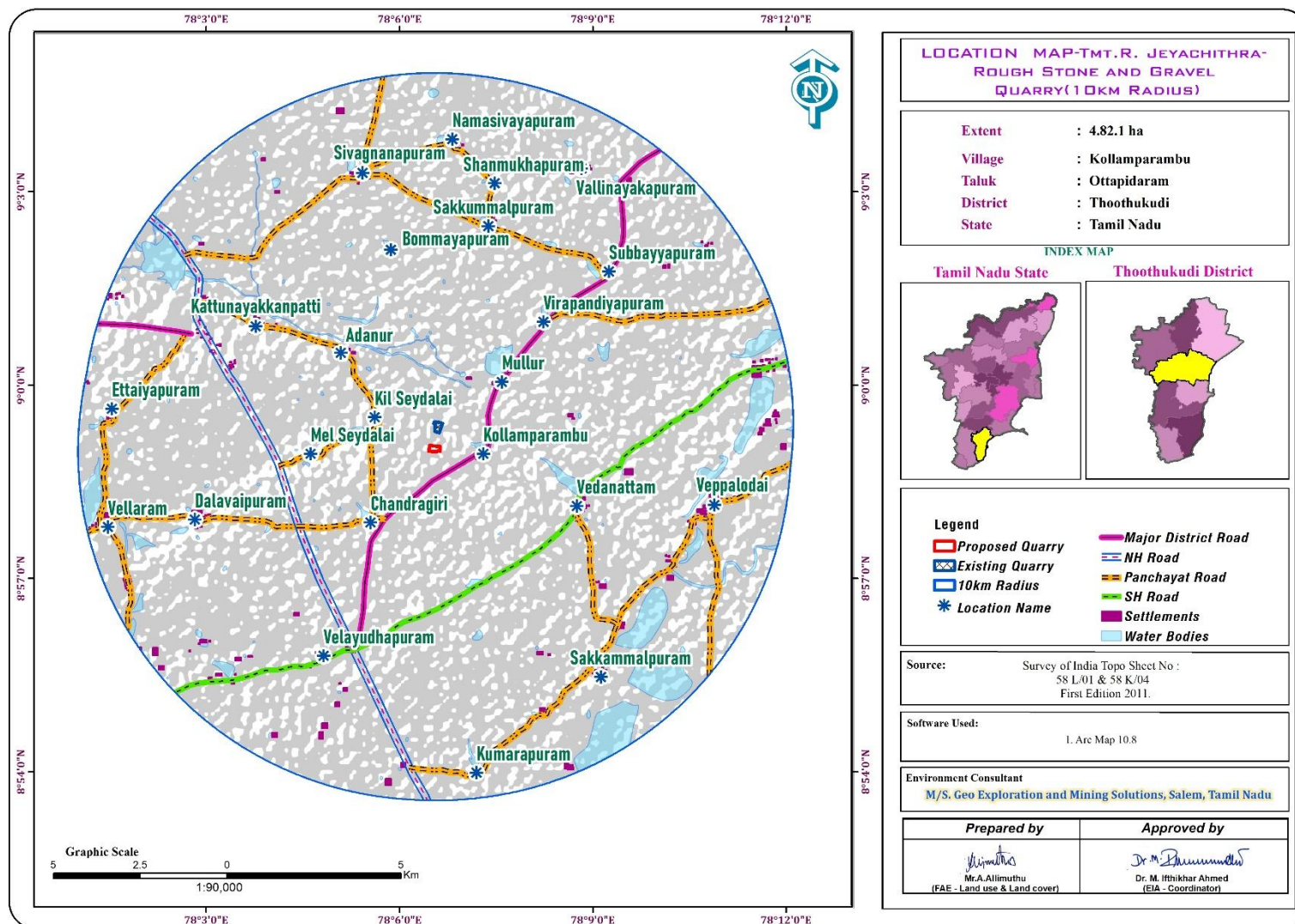
FIGURE 2.5: DIGITIZED MAP OF THE STUDY AREA (10 KM RADIUS FROM PROJECT SITE)

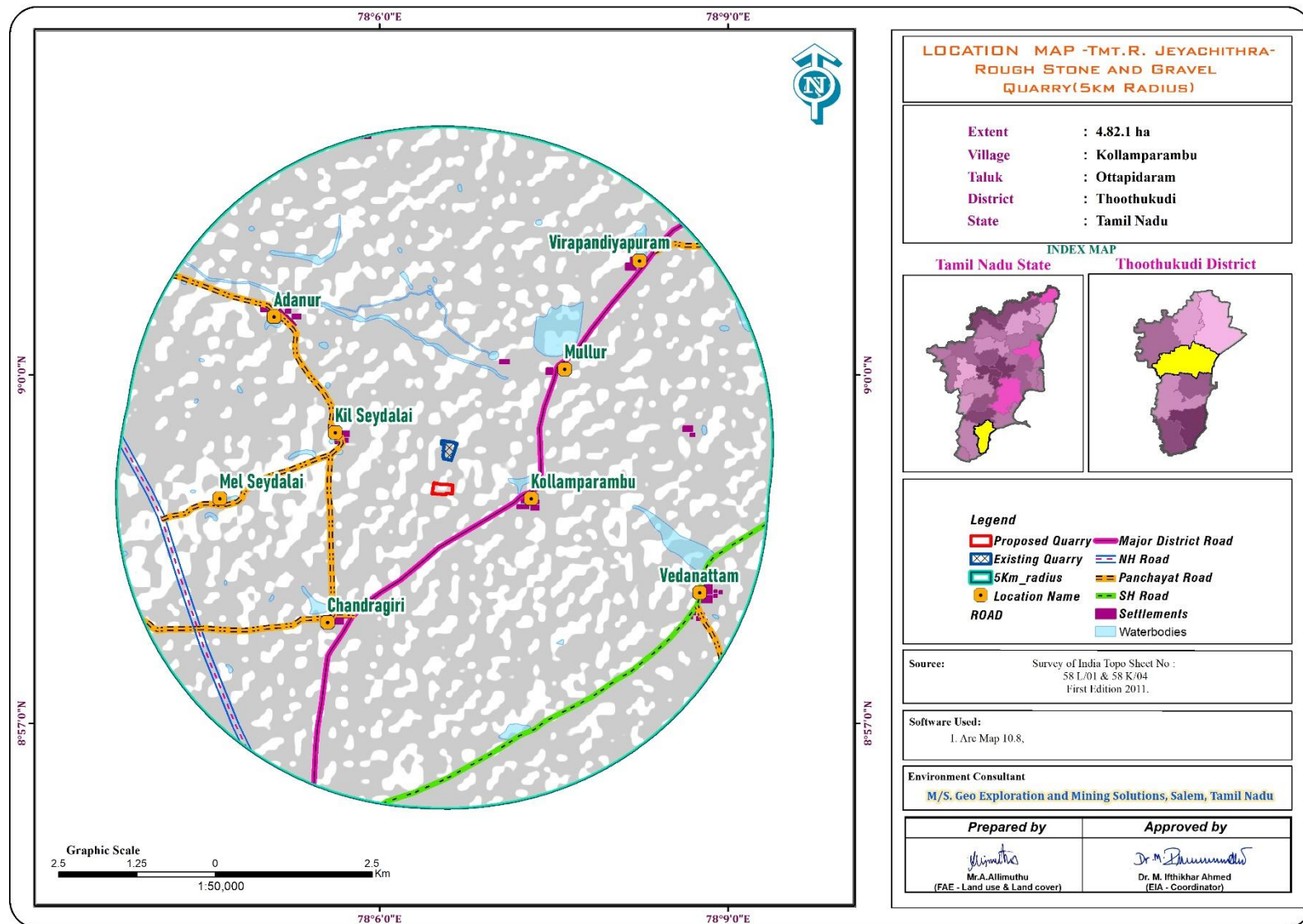
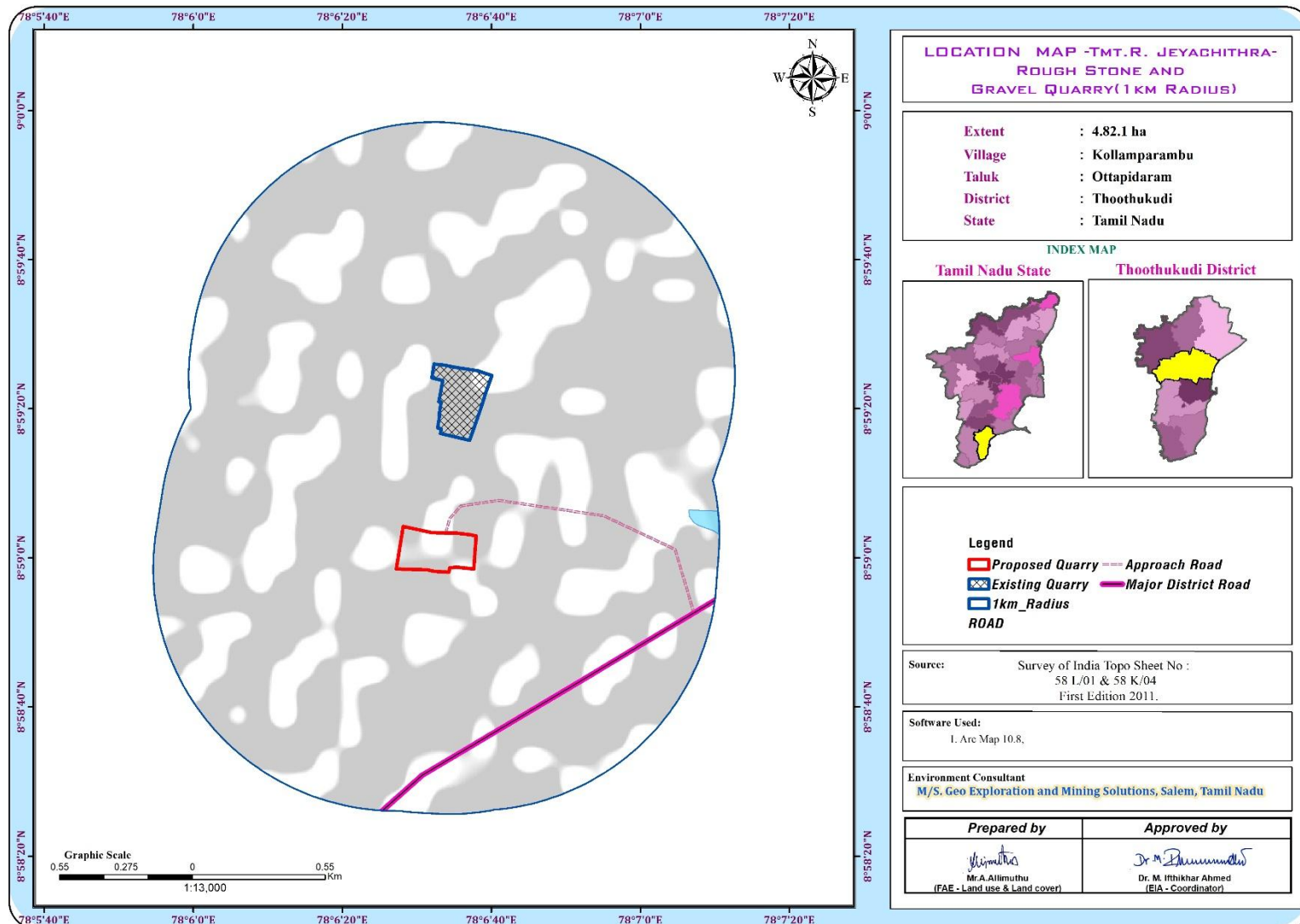
FIGURE 2.6: DIGITIZED MAP OF THE STUDY AREA (5 KM RADIUS FROM PROJECT SITE)

FIGURE 2.7: DIGITIZED MAP OF THE STUDY AREA (1 KM RADIUS FROM PROJECT SITE)

2.2.1 Project Area

- (i) The project under cluster are site specific, there is No beneficiation or processing proposed inside the project area.
- (ii) There is no forest land involved in the proposed project area and is devoid of major vegetation and trees.

TABLE 2.3 – LAND USE PATTERN

Description	Present area in (ha)	Area required during the first five years of plan period (ha)	Area at the end of lease period (ha)
Quarrying Pit	Nil	3.93.1	3.93.1
Infrastructure	Nil	0.01.00	0.01.00
Roads	Nil	0.02.00	0.02.00
Green Belt	Nil	0.46.00	0.46.00
Unutilized Area	4.82.10	0.40.00	0.40.00
Grand Total	4.82.10	4.82.10	4.82.10

Source: Approved Mining Plan

2.2.2 Size or Magnitude of Operation

TABLE 2.4: OPERATIONAL DETAILS FOR PROPOSED PROJECT

PARTICULARS	DETAILS	
	Rough Stone (10 Year Plan period)	Gravel (3 Year Plan period)
Geological Resources in m ³	26,47,700	2,40,700
Mineable Reserves in m ³	9,15,400	1,96,550
First Five Yearwise Production in m ³	4,62,410	1,96,550
Second Five Yearwise Production in m ³	4,52,990	-
Mining Plan Period	10 Years	3 Years
Number of Working Days	300 Days	
Production per day in m ³	305	18
No of Lorry loads (12m ³ per load)	28	73
Total Depth of Mining as per ToR	60m (5m Gravel + 55m Rough Stone)	

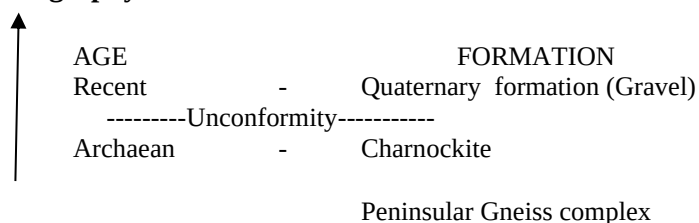
Source: Approved mining plan

2.3 Geology

2.3.1 Regional Geology

Peninsular gneiss forms the oldest rock formations, in which the massive formation of Charnockite lies over with rich accumulation of recent quaternary formation. On regional scale the Charnockite body N40°E to S40°W with dipping towards SE60°.

Stratigraphy of the area –



The geology of the district is mainly underlain by the rocks belonging to hard crystalline rock masses of Archaean age. The Archaean rocks in this area are represented by rocks of eastern ghat complex comprising

Charnockites, Migmatite complex of composite gneiss. The entire area is covered by metamorphic crystalline rocks of Charnockite, composite gneiss of Archaean age. The other rock type is encountered by composite granitic gneiss of epidote hornblende biotite gneiss and hornblende biotite gneiss are occupy in the middle portion of the basin. Charnockite group occupies the high ground as well as plain and it is poorly weathered and jointed. They are generally black grey to dark grey in colour medium to coarse grained texture, and generally massive and un-foliated. These rocks are highly metamorphosed and have been subjected to very severe folding, crushing and faulting. The crystalline rocks are subjected to tectonic activities under various orogenic cycles resulting in the development of secondary structures such as joints, fissures and cleavages.

2.3.2 Local Geology:-

The study area follows the regional trend and mainly comprises of Hard Rock Formation as a homogeneous formation / Batholith formation of Charnockite. The project area is plain terrain, all the project areas is covered with Gravel 5m of thickness; Massive Charnockite formation is found after 5m of gravel which is clearly inferred from the existing quarry pit.

2.3.3 Hydrogeology:

The origin, occurrence and movement of groundwater are controlled by geological setup of a terrain. During the study it is inferred that the entire cluster area is a Hard rock terrain and the low resistance encountered at the depth between 93 – 98m, hence it is assumed that the possibility of Ground water occurrence will be below this level and it also proved that this hard batholith above 60m will not encounter any subsurface water. There is possibility of seepage water from the surface levels i.e., below 10m and this seepage water will be collected in the mine pits and used for dust suppression and greenbelt development within the proposed project. In the geophysical study it has been clearly inferred that the depth of the quarrying operation will not intersect the ground water table.

Source: District Mineral survey Report, Thoothukudi district

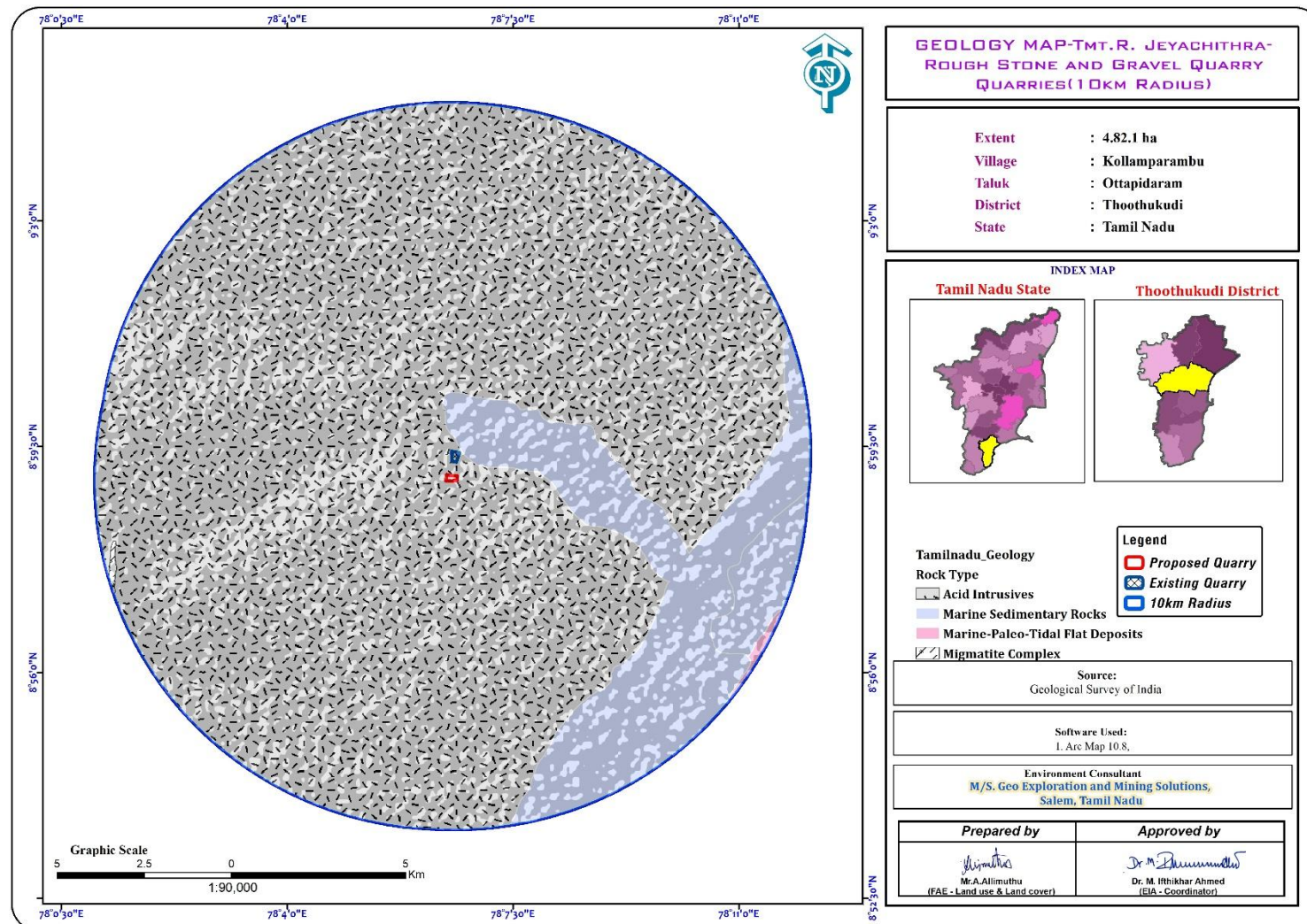
FIGURE 2.9: REGIONAL GEOLOGY MAP

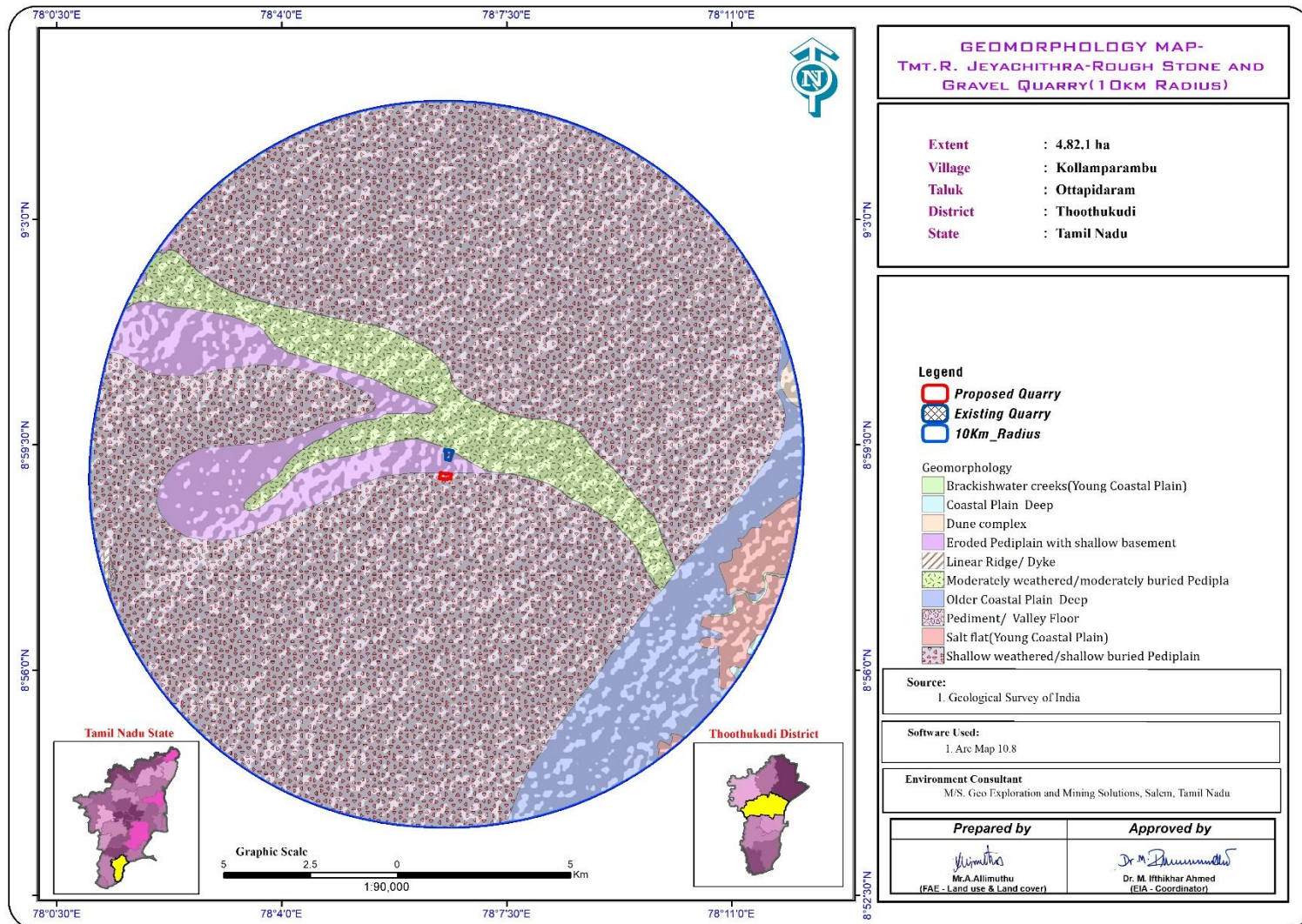
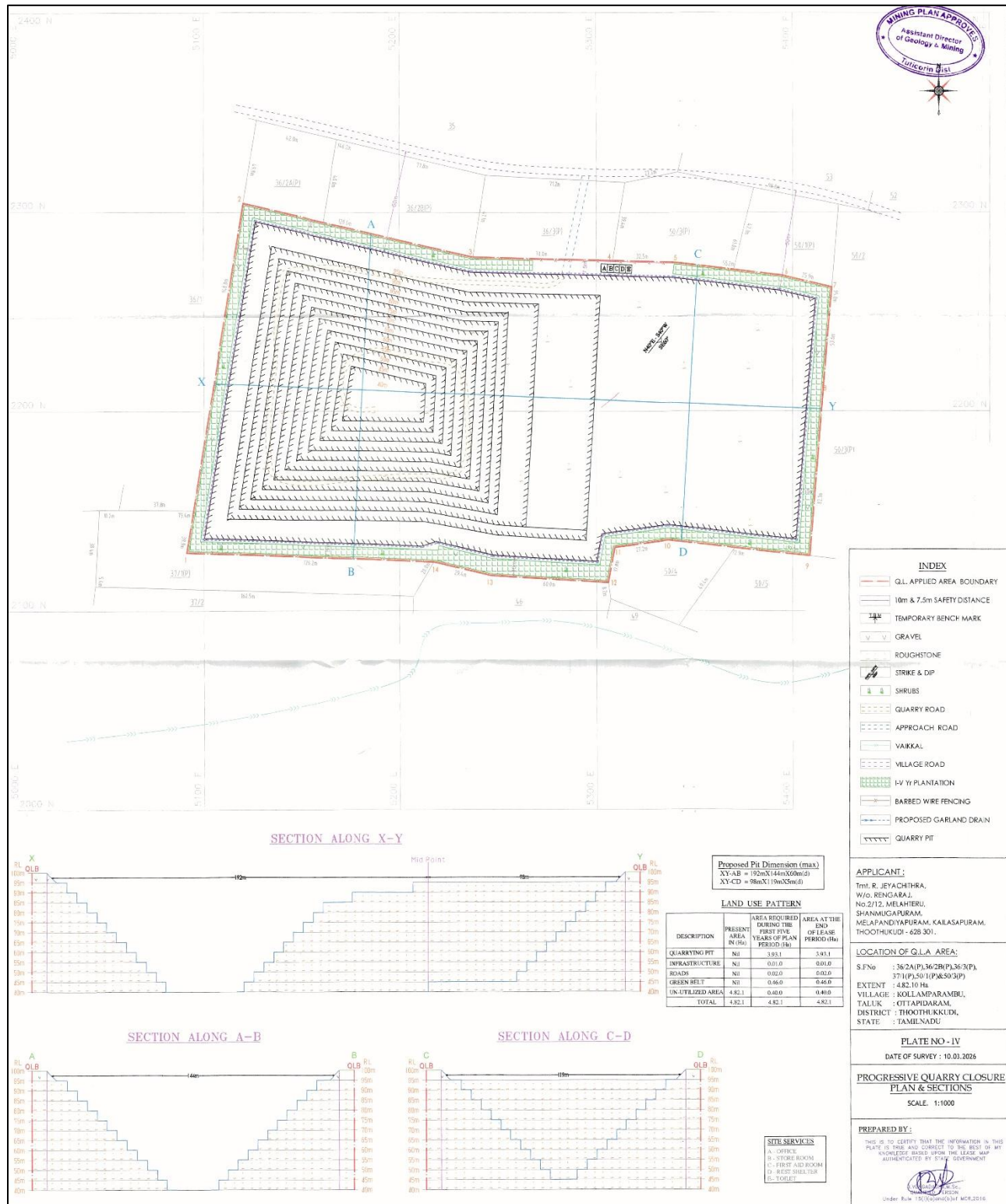
FIGURE 2.10: GEOMORPHOLOGY MAP

FIGURE 2.11: TOPOGRAPHY, GEOLOGICAL, YEARWISE DEVELOPMENT PRODUCTION PLAN AND SECTION FIRST FIVE YEARS



FIGURE 2.11A: TOPOGRAPHY, GEOLOGICAL, YEARWISE DEVELOPMENT PRODUCTION PLAN AND SECTION SECOND FIVE YEARS



2.4 Resources and Reserves of the proposed Quarry

The available mineable reserves are calculated after leaving necessary safety distances, reduced depth considering bench width.

TABLE 2.7: YEARWISE PRODUCTION FROM THE PROPOSAL FOR FIRST FIVE YEARS

YEARWISE Reserves	Rough Stone in m ³	Gravel in m ³
I	96,630	72,000
II	97,030	66,240
III	1,03,000	91,750
IV	91,750	-
V	74,000	-
Total	4,62,410	1,96,550

TABLE 2.8: YEARWISE PRODUCTION FROM THE PROPOSAL FOR SECOND FIVE YEARS

YEARWISE Reserves	Rough Stone in m ³
VI	91,145
VII	1,02,005
VIII	90,270
IX	81,390
X	88,180
Total	4,52,990

Source: Approved Mining Plan

Disposal of Waste

In the entire cluster Quarry no waste is anticipated, quarried out materials (Rough stone and Gravel) will be utilized (100%).

2.5 Method of Mining

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. However, as far as the quarrying of Rough Stone is concerned, observance of the provisions of Regulation 106 (2) (b) as above is seldom possible due to various inherent petro genetic factors coupled with mining difficulties. Hence it is proposed to obtain relaxation to the provisions of the above regulation from the Director of Mines Safety for which necessary provision is available with the Regulation 106 (2) (b) of MMR-1961, under Mine Act – 1952.

The top layer of overburden (Gravel) will be excavate directly by Hydraulic Excavators and loaded into tippers directly and sold to needy customers. The Rough Stone is a batholith formation and the splitting of rock mass of considerable volume from the parent rock mass will be carried out by deploying jackhammer drilling and Slurry Explosives will be used for blasting.

Hydraulic Excavators attached with Rock Breakers unit will be deployed for breaking large boulders to required fragmented sizes to avoid secondary blasting and hydraulic excavators attached with bucket unit will be deployed for loading the Rough Stone into the tippers and then the stone is transported from pithead to the nearby crushers.

2.5.1 Drilling

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

Spacing – 1.2m, Burden –1.0, Depth of hole - 1.5m

2.5.2 Blasting

Blasting will be done as per details below: -

- Controlled blasting parameter: -

Spacing – 1.2m

Burden – 1.0 m

Depth of hole – 1.5 m

Charge per hole – 0.5Kg

Powder factor – 6 tonnes/kg

Dia of hole – 32 mm

Details of blasting design and parameters are discussed in approved mining plan.

No of Holes to be drilled per day: -

Volume of Rough Stone will be excavated from

one Kg of explosive

= 6 Tonnes

Total Volume from one proposed quarry

= 9,15,400 m³

= 9,15,400/10

= 91,540/300

= 305* 2.75

= 839 Tonnes per day

Therefore, Number of Holes per day

= 839 /6

= 140 Holes per day

Type of Explosives to be used –

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

2.5.3 Extent of Mechanization

TABLE 2.9 PROPOSED MACHINERY DEPLOYMENT

S.NO.	TYPE	NOS	SIZE/CAPACITY	MOTIVE POWER
1	Wagon Drill Machine	1	3m to 10m	Diesel Drive
2	Jack hammers	2	1.2m to 2.0m	Compressed air
3	Compressor	1	400psi	Diesel Drive
4	Excavator with Bucket / Rock Breaker	2	300 HP	Diesel Drive
5	Tippers	4	20 Tonnes	Diesel Drive
6	Water Sprinkling Tanker	2	10,000 litres	Diesel Drive

Source: Approved Mining Plan of the project.

2.6 General Features

2.6.1 Existing Infrastructures

Infrastructures like Mine office, Temporary Rest shelters for workers, Latrine and Urinal Facilities are under construction in the nearby own lands and the same infrastructure as per the Mine Rule will be arranged after the grant of quarry lease in the proposed Quarry.

2.6.1 Drainage Pattern

The general drainage pattern of the area is dendritic. There are no streams, canals or water bodies crossing within the project area, hence there is no requirement of stream or canals diversion in the near future.

2.6.2 Traffic Density

Traffic density measurements were performed as per IRC 1960 Guidelines at three locations based on the transportation route. The monitoring was carried out on 26-12-2022. Traffic density measurement were made continuously for 24 hours by visual observation and counting of vehicles under three categories, viz., heavy motor vehicles, light motor vehicles and two/three wheelers. As traffic densities on the roads are high, two skilled persons were deployed simultaneously at each station during each shift- one person on either direction for counting the traffic. At the end of each hour, fresh counting and recording was undertaken.

TABLE 2.10 – TRAFFIC SURVEY LOCATION'S

Station code	Station location	Distance and Direction	Type of Road
TS1	Chandragiri -Kollamparambu- Panchayat Road-	2.3km SW	Panchayat Road
TS2	Kollamparambu- Veerapandiyapuram Panchayat Road	3km NE	Panchayat Road

Source: On-site monitoring by GEMS FAE & TM.

FIGURE 2.12: TRAFFIC SURVEY LOCATIONS & TRANSPORTATION ROUTE MAP



(Source: Survey of India Toposheet)

TABLE 2.10A – EXISTING TRAFFIC VOLUME

Station code	HMV (Hourly Average)		LMV hourly average		2/3 Hourly average		Total PCU per hour
	No	PCU	No	PCU	No	PCU	
TS1	42	126	58	58	30	15	199
TS2	45	135	76	76	42	21	232

Source: On-site monitoring by GEMS FAE & TM

- PCU conversion factor for HMV (Trucks and Bus) = 3, LMV (Car, Jeep and Auto) = 1 and 0.5 for Motor Vehicles (2/3 Wheelers)

TABLE 2.11 – ANTICIPATED TRAFFIC DUE TO THIS PROPOSED PROJECT

Transportation of Rough stone per day		
Capacity of trucks	Cumulative Trips	Volume in PCU
10/20 tonnes	46 per day	138

Source: Anticipated based on Approved Mining Plan Production

TABLE 2.12 – SUMMARY OF TRAFFIC VOLUME

Route	Existing traffic value in PCU	Incremental traffic from the quarry in PCU	Total traffic volume	Hourly Capacity in PCU as per IRC guidelines
Panchayat Road	199	138	337	1200
Panchayat Road	232	138	370	1200

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

Rough stone from the project site mainly will be supplied to the needy crushers located within the radius of 2 km from the project site.

- No villages in the proposed mineral transportation route
- Mineral loaded Vehicles will not allow during school hours (Morning 8AM to 10AM & Evening 4.30PM to 5.30PM)

As per the IRC 1960 this existing road can handle 1,200 PCU in hour and Major district road can handle 1500 PCU in hour hence there will not be any conjunction due to this transportation.

2.6.3 Mineral Beneficiation and Processing

There is no mineral beneficiation processing or ore beneficiation in this project within the lease area.

2.6.4 Existing Infrastructure

The project area is new and Existing Quarry for the existing Quarry infrastructures are already available within the project area. The infrastructural facilities to be made after the start of the quarrying operations will be prepared outside limit as per the rules and safe distance to be adopted.

2.6.2 Drainage Pattern

The drainage pattern of the area is dendritic – sub dendritic.

2.7 Project Requirement

2.7.1 Water Source & Requirement

Detail of Total water requirements in KLD as given below:

TABLE 2.13 – WATER REQUIREMENT FOR THE INDIVIDUAL PROJECT

*Purpose	Quantity	Source
Dust Suppression	3.0 KLD	From Nearby Existing bore well
Green Belt development	2.5 KLD	From Nearby Existing bore well
Domestic purpose	1.5 KLD	Water Tankers
Total	7.0 KLD	

Source: Prefeasibility Report

For the water conservation point of view about 50% water will be required for the suspension of the dust, Water shall be obtained from accumulated rainwater/seepage water in quarry pits. Packaged Drinking Water is available from the nearby approved water vendors.

2.7.2 Power and Other Infrastructure Requirement

The project's does not require power supply for the quarry operation. The quarrying activity is proposed during day time only (General Shift 8 AM – 5 PM, Lunch Break 1 PM – 2 PM). Electricity for use in office and other internal infrastructure will be obtained from TNEB. For the quarrying operation like compressor for drilling Diesel will be utilized.

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

2.7.3 Fuel Requirement

Gravel:

Per hour Excavator will consume	=	10 liters / hour
Per hour Excavator will excavate	=	60m ³ of Gravel
Gravel quantity	=	1,96,550/60 = 3,276 hours
Diesel consume	=	3,276 hours x 10 liters
Total diesel consumption	=	32,760 Liters of HSD will be utilized for Gravel

Rough stone:

Per hour Excavator will consume	=	16 liters / hour
Per hour Excavator will excavate	=	20m ³ of Rough Stone
Rough stone quantity	=	9,15,400/20 = 45,770 hours
Diesel consume	=	45,770 hours x 16 liters
Total diesel consumption	=	7,32,320 Liters of HSD will be utilized for Rough Stone
Total diesel consumption	=	7,65,080 Liters of HSD will be utilized for entire life of the mine

2.7.4 Employment Requirement:

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

TABLE 2.14: EMPLOYMENT P*OTENTIAL FOR PROPOSED QUARRY

Mines Manager/	1
Geologist	1
Mines Foreman	1
Mate/Blaster	1
Excavator operator	2
Truck Drivers	4
Wagon Drill Operator	1
Water Srprinkler Driver	2
Jack Hammer Drillers	4
Security	2
Labour Helper	3
Co-Operator and Cleaner	9
Total	31

A total of 31 people will get employment due to these proposal Quarry.

2.7.5 Project Cost

TABLE 2.15 – PROJECT COST OF PROPOSED PROJECT

Project Cost	Rs.4,07,14,000/-
--------------	------------------

Source: Approved Mining Plan & Prefeasibility Report of the project

2.8 Project Implementation Schedule

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

TABLE 2.16 – EXPECTED TIME SCHEDULE FOR THE PROPOSED QUARRY

S. No	Particulars lease execution	Time schedule (in month)					Remarks if any
		1 st	2 nd	3 rd	4 th	5 th	
1	Environmental Clearance						
2	Consent to operate						Production start period

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

CHAPTER – 3: DESCRIPTION OF ENVIRONMENT

3.0 GENERAL

This chapter presents a regional background to the baseline data at the very onset, which will help in better appreciation of micro-level field data, generated on several environmental and ecological attributes of the study area. The baseline status of the project environment is described section wise for better understanding of the broad-spectrum conditions. The baseline environment quality represents the background environmental scenario of various environmental components such as Land, Water, Air, Noise, Biological and Socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out covering March, April and May 2026 with CPCB guidelines. Environmental data has been collected with reference to cluster quarries by CHENNAI METTEX LAB PRIVATE LIMITED Approved by AAI, AGMARK, APEDA, BIS, EIC FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD Notified Laboratory, for the below attributes –

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

Study Area

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

Study Period

The baseline study was conducted during the Summer Season i.e., March 2026 – May 2026.

Study Methodology

- The project area was surveyed in detail with the help of Total Station and the boundary pillars were picked up with the help of GPS. The boundary coordinates were superimposed on the satellite imagery to understand the relief of the area, besides Land use pattern of the area was studied through the Bhuvan (ISRO)
- Soil samples were collected and analysed for relevant physio-chemical characteristics, exchangeable Cations, nutrients & micro nutrients etc., in order to assess the impact due to mining activities and to recommend saplings for Greenbelt development.
- Ground water samples were collected during the study period from the existing bore wells, while surface water was collected from ponds in the buffer zone. The samples were analysed for parameters necessary to determine water quality (based on IS: 10500:2012 criteria) and those which are relevant from the point of view of environmental impact of the proposed mines.
- An onsite meteorological station was setup in cluster area, to collect data about wind speed, wind direction, temperature, relative humidity, rainfall and general weather conditions were recorded throughout the study period.
- In order to assess the Ambient Air Quality (AAQ), samples of ambient air were collected by installation of Respiratory Dust Samplers (RDS) for Fugitive dust, PM₁₀ and SO₂, NO_x with gaseous attachments & Fine Dust Samplers (FDS) for PM_{2.5} and other parameters as per NAAQ norms and analysed for primary air pollutants to work out the existing status of air quality.
- The Noise level measurements were also made at various locations in different intervals of time with the help of sound level meter to establish the baseline noise levels in the impact zone.
- Baseline biological studies were carried out to assess the ecology of the study area to study the existing flora and fauna pattern of the area.

- Socio-Economic survey was conducted at village and household level in the study area to understand the present socio-economic conditions and assess the extent of impact due to the proposed mining project.

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

TABLE 3.1: MONITORING ATTRIBUTES AND FREQUENCY OF MONITORING

Attribute	Parameters	Frequency of Monitoring	No. of Locations	Protocol
Land-use Land cover	Land-use Pattern within 10 km radius of the study area	Data's from census handbook 2011 and from the satellite imagery	Study Area	Satellite Imagery Primary Survey
*Soil	Physio-Chemical Characteristics	Once during the study period	6 (1 core & 5 buffer zone)	IS 2720 Agriculture Handbook - Indian Council of Agriculture Research, New Delhi
*Water Quality	Physical, Chemical and Bacteriological Parameters	Once during the study period	6 (2 surface water & 4 ground water)	IS 10500& CPCB Standards
Meteorology	Wind Speed Wind Direction Temperature Cloud cover Dry bulb temperature Rainfall	1 Hourly Continuous Mechanical/Auto matic Weather Station	1	Site specific primary data& Secondary Data from IMD Station
*Ambient Air Quality	PM ₁₀ PM _{2.5} SO ₂ NO _x Fugitive Dust	24 hourly twice a week (March 2026 – May 2026)	7 (2 core & 5 buffer)	IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB
*Noise Levels	Ambient Noise	Hourly observation for 24 Hours per location	7 (2 core & 5 buffer zone)	IS 9989 As per CPCB Guidelines
Ecology	Existing Flora and Fauna	Through field visit during the study period	Study Area	Primary Survey by Quadrate & Transect Study Secondary Data – Forest Working Plan
Socio Economic Aspects	Socio–Economic Characteristics, Population Statistics and Existing Infrastructure in the study area	Site Visit & Census Handbook, 2011	Study Area	Primary Survey, census handbook & need based assessments.

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

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

3.1 LAND ENVIRONMENT

The main objective of this section is to provide a baseline status of the study area covering 10km radius around the proposed mine site so that temporal changes due to the mining activities on the surroundings can be assessed in future.

3.1.1 Land Use/ Land Cover

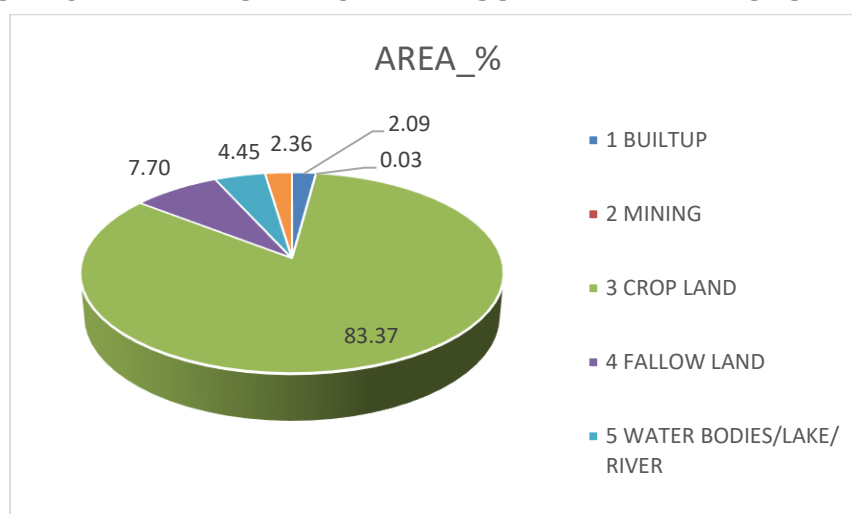
A visual interpretation technique has been adopted for land use classification based on the keys suggested in the chapter – V of the guidelines issued by NNRMS Bangalore & Level III classification with 1:50,000 scale for the preparation of land use mapping. Land use pattern of the area was studied through LISS III imagery of Bhuvan (ISRO). The 10 km radius map of study area was taken for analysis of Land use cover.

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

S.No	CLASSIFICATION	AREA_HA	AREA_%	AREA_HA	AREA_%
BUILTUP					
1	RURAL	922.40	2.88	117.57	8.50
2	URBAN	451.95	1.41	0.00	0.00
3	MINING	160.67	0.50	103.91	7.51
AGRICULTURAL LAND					
4	CROP LAND	17656.20	55.08	789.41	57.09
5	PLANTATION	829.34	2.59	64.35	4.65
6	FALLOW LAND	1219.23	3.80	18.09	1.31
FOREST					
7	FOREST LAND	9314.21	29.05	148.89	10.77
BARREN/WASTE LANDS					
8	SCRUB LAND	209.58	0.65	76.16	5.51
WETLANDS/ WATER BODIES					
9	WATER BODIES/LAKE/ RIVER	1294.66	4.04	64.31	4.65
TOTAL		32058.25	100.00	1382.68	100.00

Source: Survey of India Toposheet and Landsat Satellite Imagery

FIGURE 3.1: PIE DIAGRAM OF LAND USE AND LAND IN STUDY AREA



Source: Table 3.2

From the above table, pie diagram and land use map it is inferred that the majority of the land in the study area is Agriculture and fallow land (includes crop land) 91.07% followed by Built-up Lands – 2.09%, and Water bodies 4.45%.

The total mining area within the study area is 10.00.00 ha i.e., 0.03%. The cluster area of 9.81.10 ha contributes about 98.11% of the total mining area within the study area. This small percentage of Mining Activities shall not have any significant impact on the environment.

3.1.2 Topography

The proposed project area is flat terrain, covered with gravel formation of 5m thickness; Massive Charnockite formation is found after 5m graveled formation which is clearly inferred from the quarry pits.

3.1.3 Drainage Pattern of the Area

Drainage pattern are created by stream erosion over time that reveals characteristics of the kind of rocks and geological structures in a landscape region drained by streams.

Drainage pattern is the pattern formed by the streams, rivers, and lakes in a particular drainage basin. They are governed by the topography of the land, whether a particular region is dominated by hard or soft rocks, and the gradient of the land.

Dendritic patterns, which are by far the most common, develop in areas where the rock (or unconsolidated material) beneath the stream has no particular fabric or structure and can be eroded equally easily in all directions.

There are no streams, canals or water bodies crossing within the project area. The drainage pattern of the area is dendritic – sub dendritic.

3.1.4 Seismic Sensitivity

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

(Source: https://moes.gov.in/writereaddata/files/LS_EN_20032020_385.pdf)

3.1.5 Environmental Features in the Study Area

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

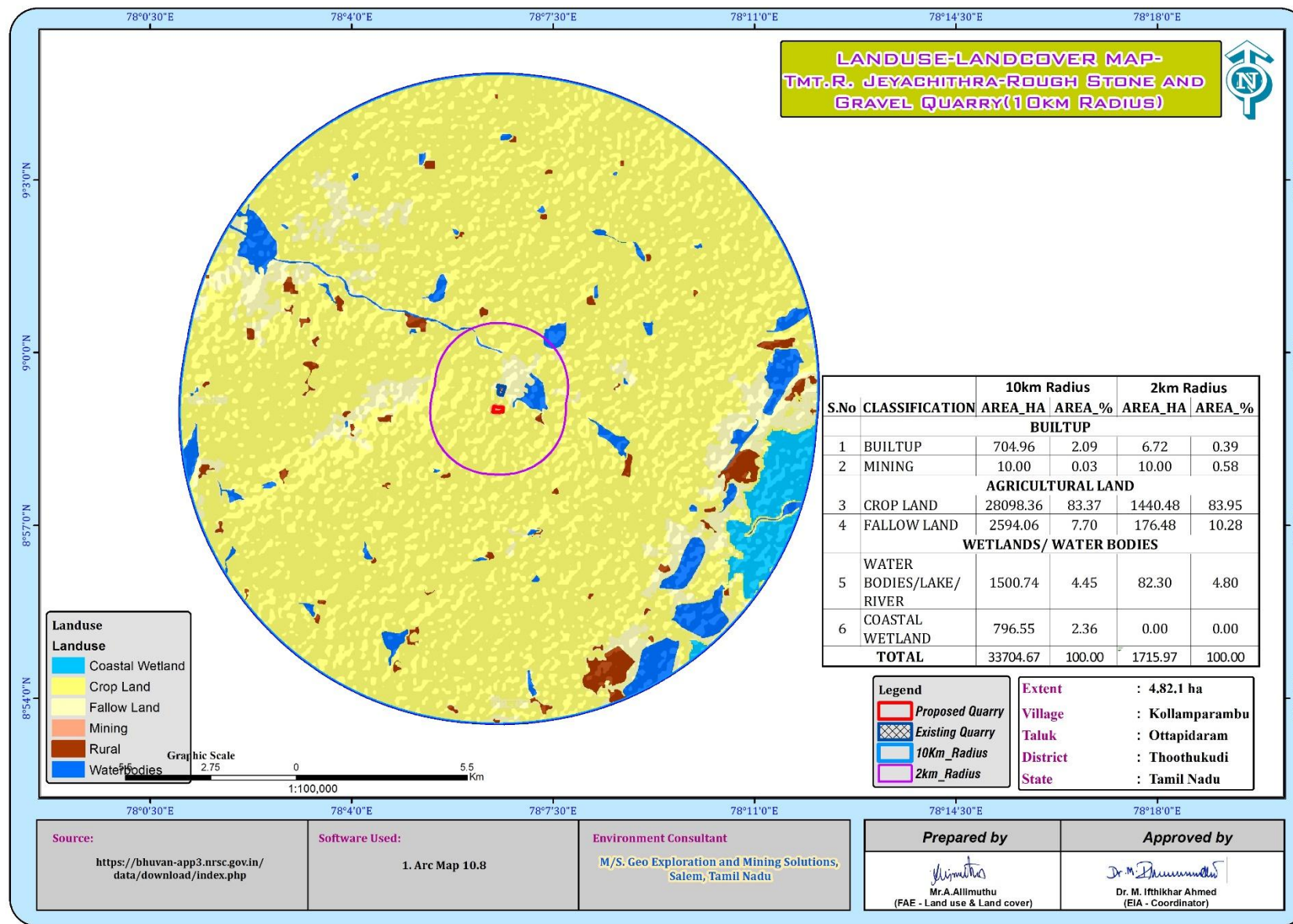
FIGURE 3.2: LAND USE LAND COVER MAP 10KM RADIUS

TABLE 3.3: DETAILS OF ENVIRONMENT SENSITIVITY AROUND THE CLUSTER

Sl.No	Sensitive Ecological Features	Name	Arial Distance in km from Cluster
1	National Park / Wild life Sanctuaries	Gulf of Mannar Marine National Park	13.98km – SE
		Vallandu Black Buck Sanctuary	37.2km - SW
2	Reserve Forest	Chalikulam R. F	10.5 Km – South West
3	Tiger Reserve/ Elephant Reserve/ Biosphere Reserve	None	Nil within 10Km Radius
4	Critically Polluted Areas	None	Nil within 10km Radius
5	Mangroves	None	Nil within 10km Radius
6	Mountains/Hills	None	Nil within 10km Radius
7	Notified Archaeological Sites	None	Nil within 10km Radius
8	Industries/ Thermal Power Plants	None	Nil within 10km Radius
9	Defence Installation	None	Nil within 10km Radius

Source: Survey of India Toposheet

TABLE 3.4: NEARBY WATER BODIES FROM THE PROPOSED PROJECT SITE

Sl.No	NAME	DISTANCE & DIRECTION
1	Odai	10m Safety-South Side
2	Urani	170m NW
3	Tank	470m NE
4	Odai	1.9km NE
5	Tank	2.4km SW

Source: Village Cadastral Map and Field Survey

3.1.6 Soil Environment

Soil quality of the study area is one of the important components of the land environment. The composite soil samples were collected from the study area and analysed for different parameters. The locations of the monitoring sites are detailed in Table 3.5 and Figure 3.3.

The objective of the soil sampling is -

To determine the baseline soil characteristics of the study area; study the impact of proposed activity on soil characteristics and study the impact on soil more importantly agriculture production point of view.

TABLE 3.5: SOIL SAMPLING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	S-1	Project Area	Core Zone	8°59'1.35"N 78° 6'31.76"E
2	S-2	Kollamparambu (Residential Land)	1.3km East	8°58'52.85"N 78° 7'24.00"E
3	S-3	K. Subramaniyapuram (Barren Land)	5km SW	8°57'47.30"N 78° 4'2.84"E
4	S-4	Vallinayagapuram (Agriculture Land)	4km SE	8°56'55.02"N 78° 7'20.36"E
5	S-5	Milaguntham (Residential Land)	3.2km North	9° 0'48.71"N 78° 6'22.95"E
6	S – 6	Melaseithalai (Barren Land)	3.5km West	8°58'58.91"N 78° 4'32.36"E

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

Methodology –

For studying soil quality, sampling locations were selected to assess the existing soil conditions in and around the project site representing various land use conditions. The samples were collected by auger boring into the soil up to 90-cm depth. Five (6) locations were selected for soil sampling on the basis of soil types, vegetative cover, industrial & residential activities including infrastructure facilities, which would accord an overall idea of the soil characteristics. The samples were analysed for physical and chemical characteristics. The samples were sent to laboratory for analysis. The samples were filled in Polythene bags, coded and sent to laboratory for analysis and the details of methodology in respect are given in below Table 3.6.

TABLE 3.6: METHODOLOGY OF SAMPLING COLLECTION

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

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

Soil Testing Result –

The samples were analysed as per the standard methods prescribed in “Soil Chemical Analysis (M.L. Jackson, 1967) & Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India”. The important properties analysed for soil are bulk density, porosity, infiltration rate, pH and Organic matter, kjeldahi Nitrogen, Phosphorous and Potassium. The standard classifications of soil is presented below in Figure 3.4 and the physico-chemical characteristics of the soil & Test Results in Table 3.7.

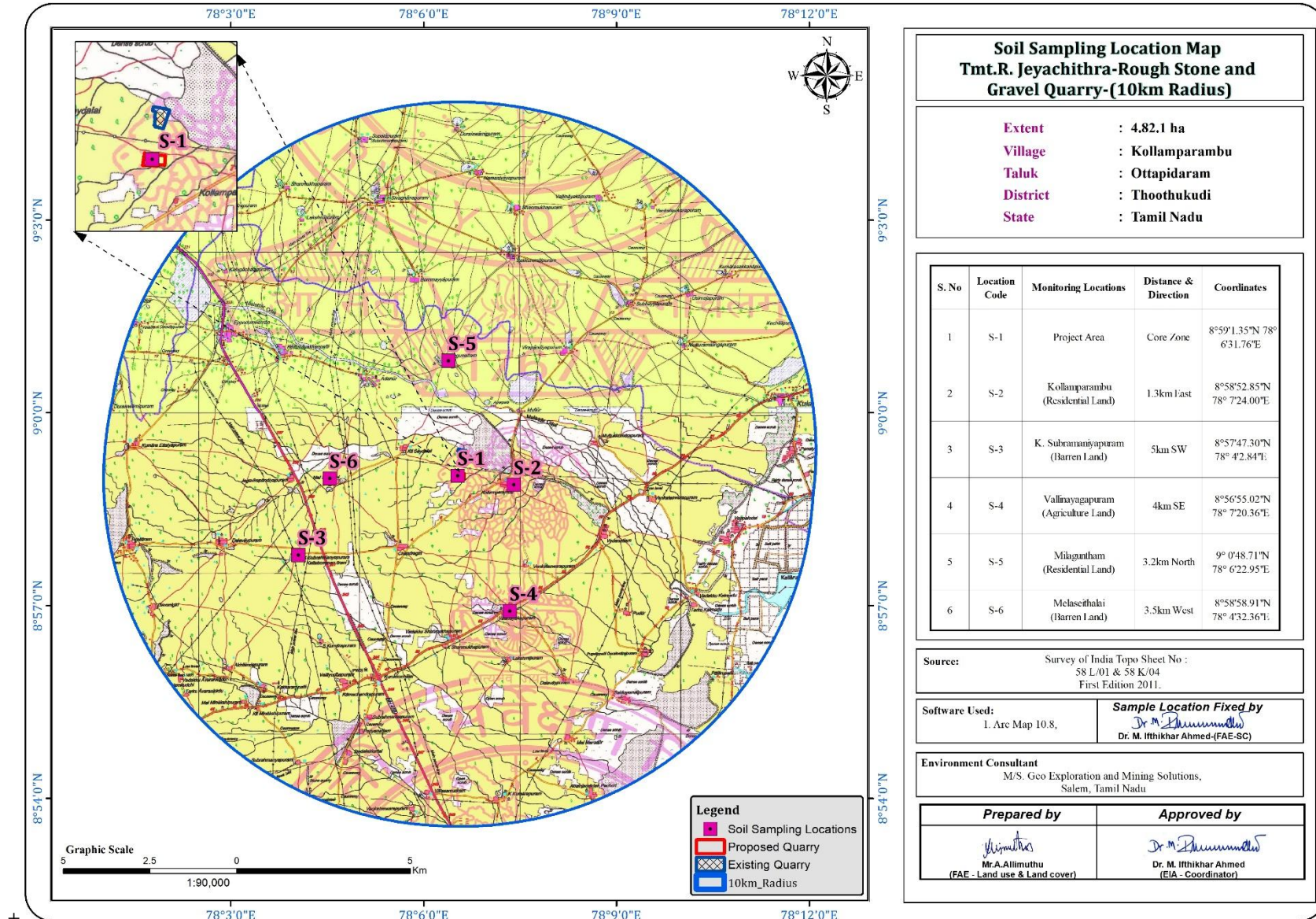
FIGURE 3.3: SOIL SAMPLING LOCATIONS AROUND 10 KM RADIUS

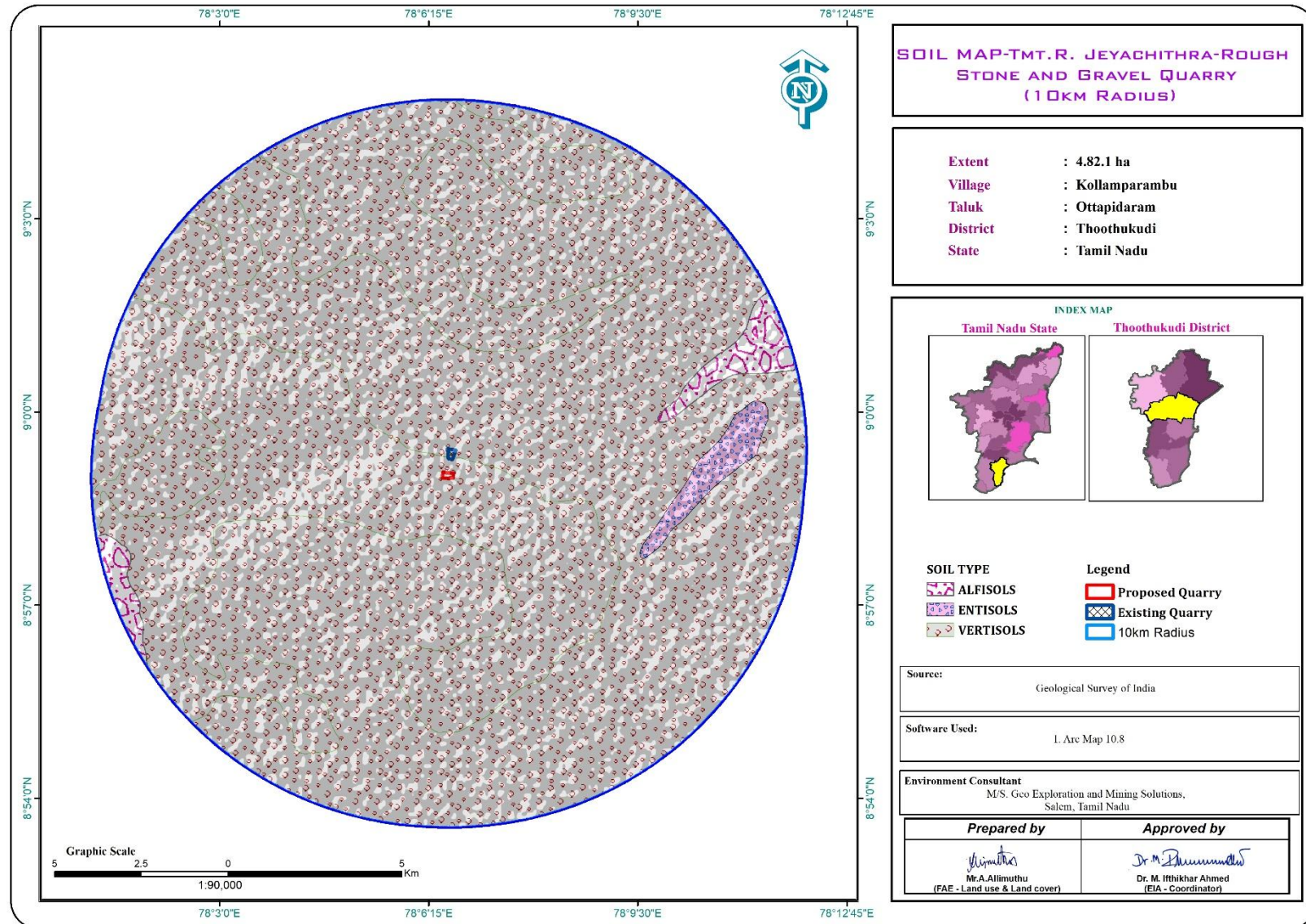
FIGURE 3.4: SOIL MAP

TABLE 3.7: SOIL QUALITY OF THE STUDY AREA

Parameter		Units	S-1 (Project Area)	S-2 (Kollamparambu)	S-3 (K. Subramaniyap uram)	S-4 (Vallinayagap uram)	S-5 (Milaguntha m)	S-6 (Melaseithal ai)
1	pH @ 25°C	-	6.28	5.98	6.05	4.89	5.29	6.51
2	Conductivity @ 25°C	µmhos/cm	298	326	312.5	356.9	298.3	378.5
3	Clay	%	25.3	24.2	24.7	24.1	22.1	20.1
4	Sand	%	28.8	28.9	30.1	29.0	26.1	27.1
5	Silt	%	45.9	46.9	45.2	46.9	51.8	52.8
6	Water Holding Capacity	%	39.3	39.3	33.3	23.8	32.6	36.9
7	Bulk Density	g/cm ³	1.04	1.02	1.06	1.15	1.02	1.19
8	Porosity	%	38.5	32.3	38.6	27.6	28.92	30.8
9	Calcium as Ca	mg/kg	49.9	60.2	62.5	55.8	52.4	57.6
10	Magnesium as Mg	mg/kg	26.4	28.9	36.4	23.4	24.5	29.8
11	Manganese as Mn	mg/kg	23.6	28.9	21.5	20.3	20.6	24.9
12	Zinc as Zn	mg/kg	2.07	2.12	2.81	2.18	1.06	3.25
13	Boron as B	mg/kg	1.12	1.21	1.13	2.32	4.62	4.74
14	Chloride as Cl	mg/kg	58.5	49.5	59.1	62.1	69.7	64.5
15	Total Soluble Sulphate as SO ₄	%	0.023	0.018	0.026	0.023	0.027	0.024
16	Potassium as K	mg/kg	25.1	26.6	29.3	24.3	29.7	24.6
17	Total Phosphorus as P	mg/kg	3.19	3.06	2.98	5.24	2.85	3.15
18	Total Nitrogen as N	mg/kg	283	399.8	320.1	412.8	285.6	324.5
19	Cadmium as Cd	mg/kg	BDL (DL:1.0)					
20	Total Chromium as Cr	mg/kg	BDL (DL:1.0)					
21	Copper as Cu	mg/kg	BDL (DL:1.0)					
22	Lead as Pb	mg/kg	1.09	2.29	1.56	1.15	1.03	1.23
23	Iron as Fe	mg/kg	2.64	3.01	4.10	5.6	3.03	6.12
24	Organic Matter	%	2.20	2.03	1.82	2.15	1.89	2.12
25	Organic Carbon	%	1.28	1.18	1.06	1.25	1.10	1.23
26	Cation Exchange Capacity	meq/100g of soil	26.3	23.8	26.7	30.9	29.1	31.1

Source: Sampling Results by Chennai Mettux Laboratories

Interpretation & Conclusion

Physical Characteristics –

The physical properties of the soil samples were examined for texture, bulk density, porosity and water holding capacity. The soil texture found in the study area is Clay, Sandy Clay to Sandy Loam Soil and Bulk Density of Soils in the study area varied between 1.02 – 1.19 g/cm³. The Water Holding Capacity and Porosity of the soil samples is found to be medium i.e. ranging from 23.8 – 39.3 %. and 27.6 – 38.6 %.

Chemical Characteristics –

- The nature of soil is slightly alkaline to strongly alkaline with pH range 4.89 to 6.15
- The available Nitrogen content range between 283 to 412.8 mg/kg
- The available Phosphorus content range between 2.85 to 5.24 mg/kg
- The available Potassium range between 24.3 to 29.7 mg/kg

3.2 WATER ENVIRONMENT

The water resources, both surface and groundwater play a significant role in the development of the area. The purpose of this study is to assess the water quality characteristics for critical parameters and evaluate the impacts on agricultural productivity, domestic community usage, recreational resources and aesthetics in the vicinity. The water samples were collected and transported as per the norms in pre-treated sampling cans to laboratory for analysis.

3.2.1 Surface Water Resources:

There is no major river within 10km radius. The area is studded with few tanks that serve as the source of drinking water and also their surplus feeds adjoining tanks. The rainfall over the area is moderate, the rainwater storage in open wells and trenches are in practice over the area and the stored water acts as source of freshwater for couple of months after rainy season.

3.2.2 Ground Water Resources:

The terrain is underlain by hard rock formation. Fissured and fractured crystalline rocks constitute the important aquifer systems in the Thoothukudi region.

The district is underlain by both porous and fissured formations. The important aquifer systems in the district are constituted by i) unconsolidated & semi consolidated formations and ii) weathered and fractured crystalline rocks. The porous formations in the district include sandstones and clays of Recent to subrecent and Tertiary age (Quaternary). The Recent formations comprising mainly sands, clays and gravels are confined to major drainage courses in the district.

The maximum thickness of alluvium is 45.0 m bgl, whereas the average thickness is about 25.0 m. Ground water occurs under water table and confined conditions in these formations and is being developed by means of dug wells and filter points. The productive zones are encountered in the depth range of 29.5 to 62 m bgl. Alluvium, which forms a good aquifer system along the Vaippar and Gundar river bed which is one of the major sources of water supply to the villages (source CGWB report 2009)

The study area falls in the Srivaikuntam block which is categorized as semi critical block (70%-90%) as per G.O (MS) No 113 dated 09.06.2016. Ground water extraction is not proposed for projects in cluster.

3.2.3 Methodology

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

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

Two (2) surface water and Four (4) ground water samples were collected from the study area and were analysed for physio-chemical, heavy metals and bacteriological parameters in order to assess the effect of mining and other activities on surface and ground water. The samples were analysed as per the procedures specified by CPCB, IS-10500:2012 and 'Standard methods for the Examination of Water and Wastewater' published by American Public Health Association (APHA). The water sampling locations are given in Table 3.8 and shown as Figure 3.5.

TABLE 3.8: WATER SAMPLING LOCATIONS

S.NO	CODE	LOCATIONS	DISTANCE & DIRECTION	COORDINATES
SURFACE WATER				
1	SW-1	Tank Near Kollamparambu	1.3km East	8°59'10.62"N 78° 7'21.02"E
2	SW-2	Tank Near Milaguntham	4.0km North	9° 1'2.93"N 78° 5'36.24"E
GROUND WATER				
3	OW-1	Kollamparambu	1.3km East	8°58'54.90"N 78° 7'22.32"E
4	OW-2	Melaseithalai	3.5km West	8°58'59.80"N 78° 4'34.82"E
5	BW-1	Near Crusher	350m SW	8°58'51.59"N 78° 6'17.37"E
6	BW-2	Vallinayagapuram	4km SE	8°56'52.26"N 78° 7'12.78"E

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

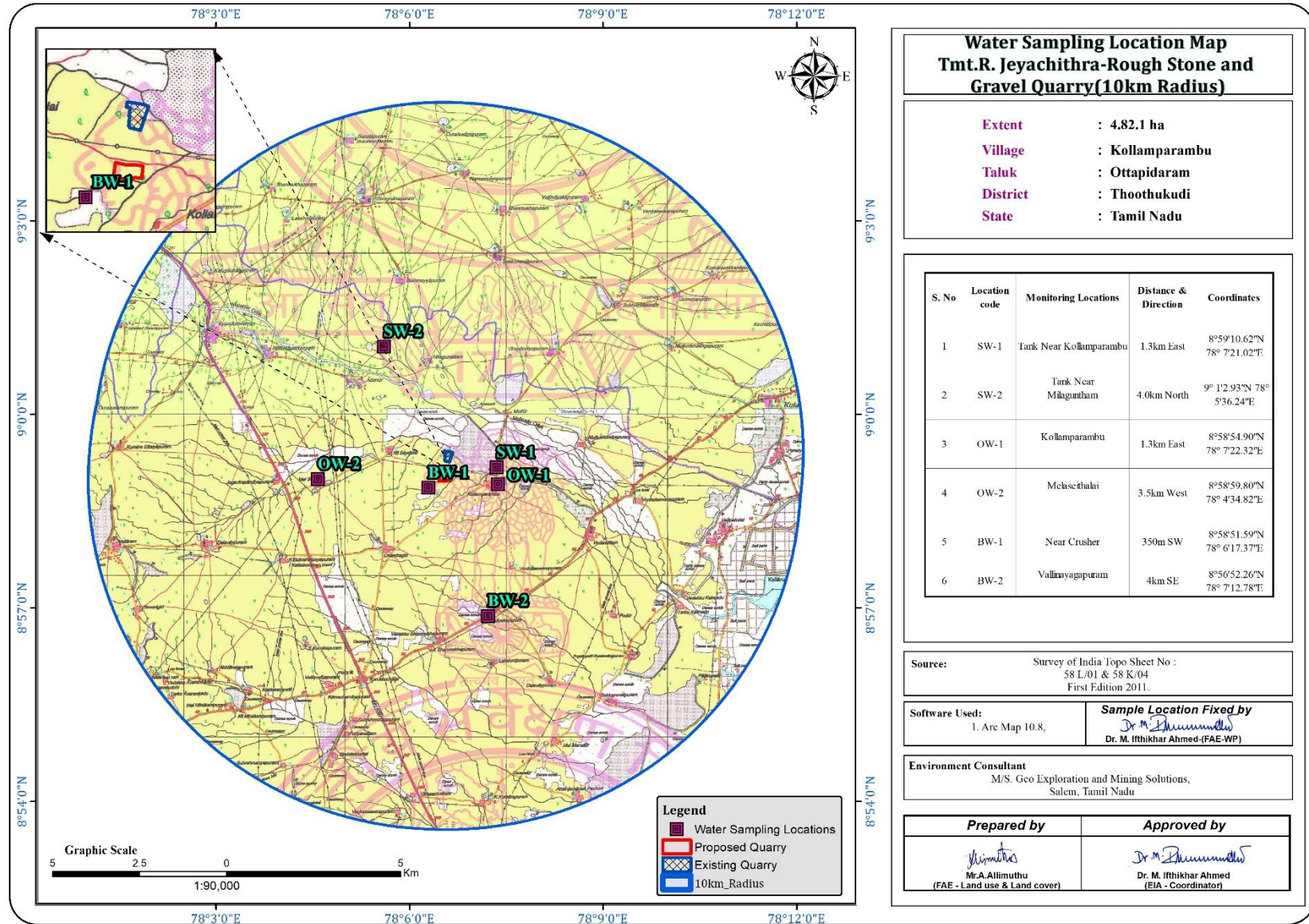
FIGURE 3.5: WATER SAMPLING LOCATIONS AROUND 10 KM RADIUS

TABLE 3.9: GROUND WATER SAMPLING RESULTS

S.NO	Parameter	OW-1 (Kollamparambu)	OW-2 (Melaseithalai)	BW-1 (Near Crusher)	BW-2 (Vallinayagapuram)
1	Color	< 5	< 5	< 5	< 5
2	Odour	Agreeable	Agreeable	Agreeable	Agreeable
3	pH@ 25°C	7.73	7.58	7.74	7.43
4	Electrical Conductivity @ 25°C	900.9	888.6	747.4	769.8
5	Turbidity	1	1	1	1
6	Total Dissolved Solids	522.6	515.6	433	446
7	Total Hardness as CaCO ₃	156.9	144	120	128
8	Calcium as Ca	35.2	32	25.6	30.4
9	Magnesium as Mg	16.5	15.5	13.6	12.6
10	Total Alkalinity	142.6	138.7	108.3	116.8
11	Chloride as Cl ⁻	142.5	156.9	131.6	135.6
12	Sulphate as SO ₄ ⁻	43.8	46.2	39.8	38.4
13	Iron as Fe	0.42	0.30	0.29	0.26
14	Free Residual Chlorine	BDL (DL: 0.1)	BDL(DL: 0.1)	BDL(DL: 0.1)	BDL(DL: 0.1)
15	Fluoride as F	0.37	0.28	0.24	0.21
16	Nitrates as NO ₃	4.1	3.3	3.1	4.1
17	Copper as Cu	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)
18	Manganese as Mn	BDL (DL:0.02)	BDL (DL:0.02)	BDL (DL:0.02)	BDL (DL:0.02)
19	Mercury as Hg	(BDL (DL: 0.0005)	(BDL (DL: 0.0005)	(BDL (DL: 0.0005)	(BDL (DL: 0.0005)
20	Cadmium as Cd	BDL (DL:0.001)	BDL (DL:0.001)	BDL (DL:0.001)	BDL (DL:0.001)
21	Selenium as Se	BDL (DL: 0.005)	BDL (DL: 0.005)	BDL (DL: 0.005)	BDL (DL: 0.005)
22	Aluminium as Al	BDL (DL: 0.005)	BDL (DL: 0.005)	BDL (DL: 0.005)	BDL (DL: 0.005)
23	Lead as Pb	BDL (DL:0.005)	BDL (DL:0.005)	BDL (DL:0.005)	BDL (DL:0.005)
24	Zinc as Zn	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)
25	Total Chromium	BDL (DL: 0.02)	BDL (DL: 0.02)	BDL (DL: 0.02)	BDL (DL: 0.02)
26	Boron as B	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)
27	Mineral Oil	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)
28	Phenolic Compunds as C ₆ H ₅ OH	BDL (DL:0.0005)	BDL (DL:0.0005)	BDL (DL:0.0005)	BDL (DL:0.0005)
29	Anionic Detergents as	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)
30	Cynaide as CN	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)
31	Total Coliform	163	156	123	118
32	E-Coli	< 1.8	< 1.8	< 1.8	< 1.8
33	Barium as Ba	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)
34	Ammonia (as Total	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)
35	Sulphide as H ₂ S	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)
36	Molybdenum as Mo	BDL (DL:0.02)	BDL (DL:0.02)	BDL (DL:0.02)	BDL (DL:0.02)
37	Total Arsenic as As	BDL (DL:0.005)	BDL (DL:0.005)	BDL (DL:0.005)	BDL (DL:0.005)
38	Total Suspended Solids	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)

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

TABLE 3.10: SURFACE WATER SAMPLING RESULTS

Sl. No.	Parameter	Unit	RESULT		CPCB Designated Best Use
			SW1	SW2	
1	Colour	Hazen	1	1	300
2	Odour	-	Agreeable	Agreeable	Not specified
3	pH@ 25°C	-	7.91	7.68	6.5 – 8.5
4	Electrical Conductivity @ 25°C	µs/cm	1158	1104	
5	Turbidity	NTU	2	1	Not specified
6	Total Dissolved Solids	mg /l	671	640	1500
7	Total Hardness as CaCO ₃	mg/l	196	188	Not specified
8	Calcium as Ca	mg/l	59.3	46.5	Not specified
9	Magnesium as Mg	mg/l	11.6	17.5	Not specified
10	Total Alkalinity as CaCO ₃	mg/l	184	178	Not specified
11	Chloride as Cl ⁻	mg/l	206	198.9	600
12	Sulphate as SO ₄ ⁻	mg/l	55.2	52.6	400
13	Iron as Fe	mg/l	0.42	0.39	50
14	Free Residual Chlorine	mg/l	BDL(DL: 0.1)	BDL(DL: 0.1)	400
15	Fluoride as F	mg/l	0.39	0.36	1.5
16	Nitrates as NO ₃	mg/l	19.3	9.4	50
17	Copper as Cu	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	1.5
18	Manganese as Mn	mg/l	BDL (DL:0.02)	BDL (DL:0.02)	Not specified
19	Mercury as Hg	mg/l	(BDL (DL: 0.0005)	(BDL (DL: 0.0005)	Not specified
20	Cadmium as Cd	mg/l	BDL (DL:0.001)	BDL (DL:0.001)	0.01
21	Selenium as Se	mg/l	BDL (DL: 0.005)	BDL (DL: 0.005)	Not specified
22	Aluminium as Al	mg/l	BDL (DL: 0.005)	BDL (DL: 0.005)	Not specified
23	Lead as Pb	mg/l	BDL (DL:0.005)	BDL (DL:0.005)	0.1
24	Zinc as Zn	mg/l	BDL (DL:0.05)	BDL (DL:0.05)	15
25	Total Chromium	mg/l	BDL (DL: 0.02)	BDL (DL: 0.02)	0.05
26	Boron as B	mg/l	BDL (DL:0.05)	BDL (DL:0.05)	Not specified
27	Mineral Oil	mg/l	BDL (DL:01)	BDL (DL:01)	Not specified
28	Phenolic Compounds as C ₆ H ₅ OH	mg/l	(BDL (DL: 0.0005)	(BDL (DL: 0.0005)	0.005
29	Anionic Detergents as MBAS	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	Not specified
30	Cyanide as CN	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	0.05
31	Biological Oxygen Demand, 3 days @ 27°C		13.2	13.5	3
32	Chemical Oxygen Demand		38.4	38.4	Not specified
33	Dissolved Oxygen		6.2	7.6	4
34	Total Coliform	MPN/ 100ml	1232	1119	5000
35	E-Coli		203	205	Not specified
36	Barium as Ba	mg/l	BDL (DL:0.05)	BDL (DL:0.05)	300
37	Ammonia (as Total Ammonia-N)	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	Not specified
38	Sulphide as H ₂ S	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	Not specified
39	Molybdenum as Mo	mg/l	BDL (DL:0.02)	BDL (DL:0.02)	Not specified
40	Total Arsenic as As	mg/l	BDL (DL:0.005)	BDL (DL:0.005)	0.2
41	Total Suspended Solids	mg/l	10.9	14.2	-

3.2.4 Interpretation & Conclusion

Surface Water

Ph:

The pH varied from 7.68 – 7.91 while turbidity found within the standards (Optimal pH range for sustainable aquatic life is 6.5 to 8.5 pH).

Total Dissolved Solids:

Total Dissolved Solids is 640 - 671 mg/l, the TDS mainly composed of carbonates, bicarbonates, Chlorides, phosphates and nitrates of calcium, magnesium, sodium and other organic matter.

Other parameters:

Chloride content is 198.9 - 206 mg/l. Nitrates is 9.4 – 19.3 mg/l, while sulphates is 52.6 – 55.2 mg/l.

Ground Water

The pH of the water samples collected ranged from 7.43 – 7.74 and within the acceptable limit of 6.5 to 8.5. pH, Sulphates and Chlorides of water samples from all the sources are within the limits as per the Standard. On Turbidity, the water samples meet the requirement. The Total Dissolved Solids were found in the range of 433 522.6 mg/l in all samples. The Total hardness varied between 120 156.9 mg/l for all samples.

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

3.2.5 Hydrology and Hydrogeological studies

The district is underlain by hard rock formation fissured and fractured crystalline rocks constitute the important aquifer systems in the district. Geophysical prospecting was carried out in that area by SSRMP-80 Instrument by qualified Geo physicist with the help of IGIS software and it was inferred that the low resistance encountered at the depth between 98m. The maximum depth proposed out of proposed projects is 60m BGL. Hence 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 the proposed project.

During the rainy season there is a possibility of collection of seepage water from the subsurface levels which will be collected and stored in the mine sump pits and will be used for dust suppression and greenbelt development and during the end of the life of the mine this collected water will act as a temporary reservoir.

TABLE 3.11: POST MONSOON WATER LEVEL OF OPEN WELLS 1 KM RADIUS

Station Code	Water Level in Meters bgl				Latitude	Longitude
	Mar-26	Apr-26	May-26	Average		
OW1	13.5	14.1	14.7	14.1	8° 59' 11.6551" N	78° 05' 59.5983" E
OW2	12.7	13.3	13.9	13.3	8° 59' 33.2706" N	78° 05' 58.0850" E
OW3	12.9	13.5	14.1	13.5	8° 58' 54.9986" N	78° 07' 22.0000" E
OW4	13.4	14	14.6	14	8° 58' 27.1746" N	78° 06' 21.6064" E
OW5	12.8	13.4	14	13.4	9° 00' 09.1312" N	78° 07' 06.9876" E

Source: Onsite monitoring data

TABLE 3.12: POST MONSOON WATER LEVEL OF BOREWELLS 1 KM RADIUS

Station Code	Water Level in Meters bgl				Latitude	Longitude
	Mar-26	Apr-26	May-26	Average		
BW1	93.5	94.1	94.7	94.1	8° 58' 51.5657" N	78° 06' 17.3567" E
BW2	93.2	93.8	94.4	93.8	8° 59' 22.0964" N	78° 05' 43.2902" E
BW3	94	94.6	95.2	94.6	9° 00' 06.0210" N	78° 07' 04.3625" E
BW4	93.8	94.4	95	94.4	8° 58' 54.8239" N	78° 07' 12.1225" E
BW5	93.6	94.2	94.8	94.2	8° 58' 53.6218" N	78° 07' 03.9541" E
BW6	94.2	94.8	95.4	94.8	8° 58' 24.5070" N	78° 06' 13.2210" E

Source: Onsite monitoring data

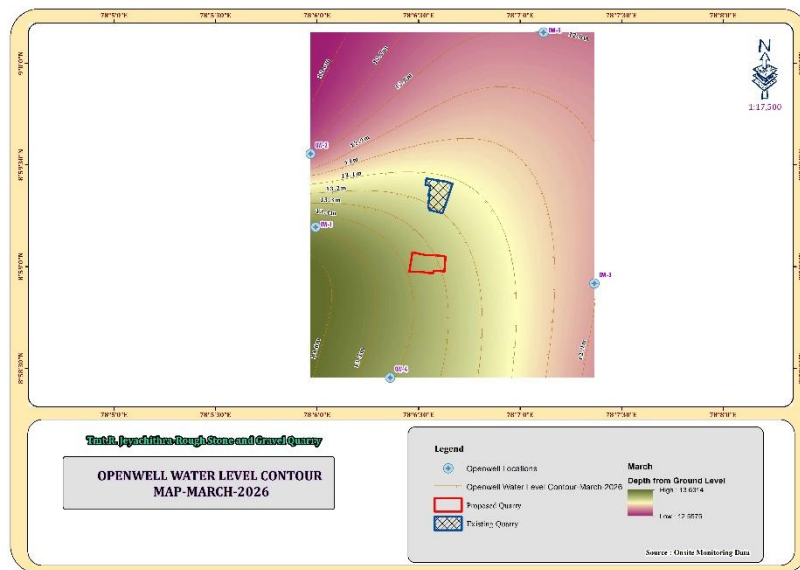
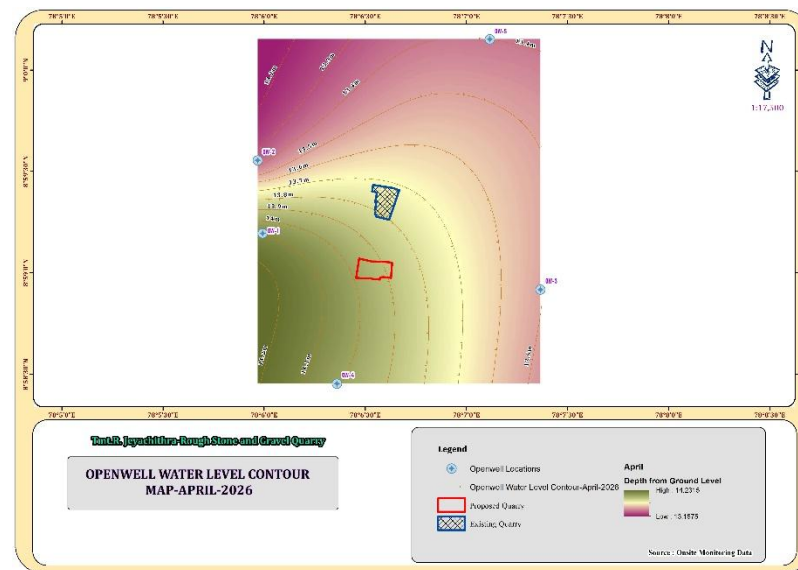
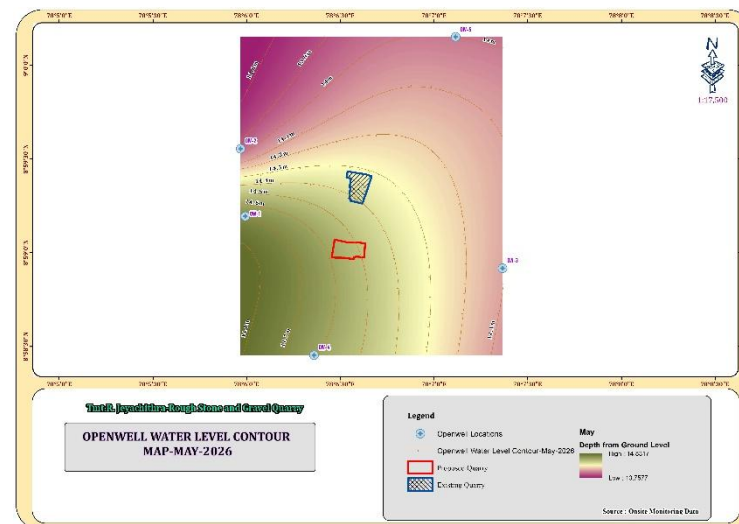
FIGURE 3.6: OPEN WELL CONTOUR MAP – March 2026**FIGURE 3.7: OPEN WELL CONTOUR MAP – April 2026****FIGURE 3.8: OPEN WELL CONTOUR MAP – May 2026**

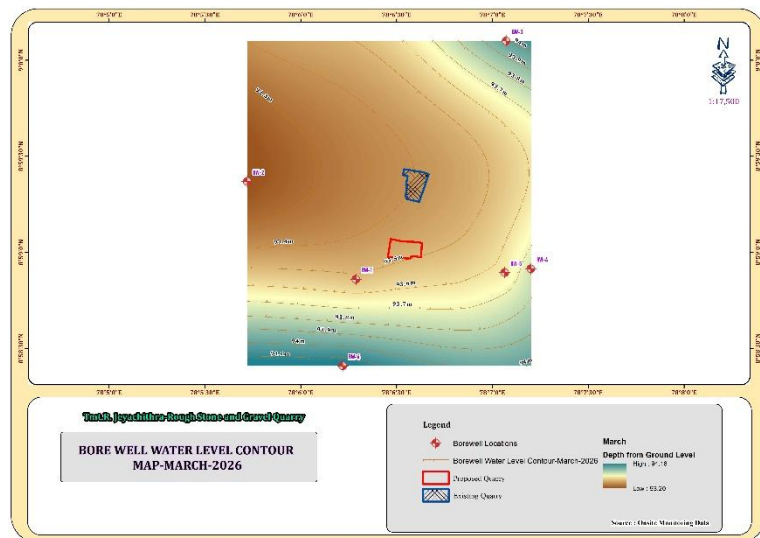
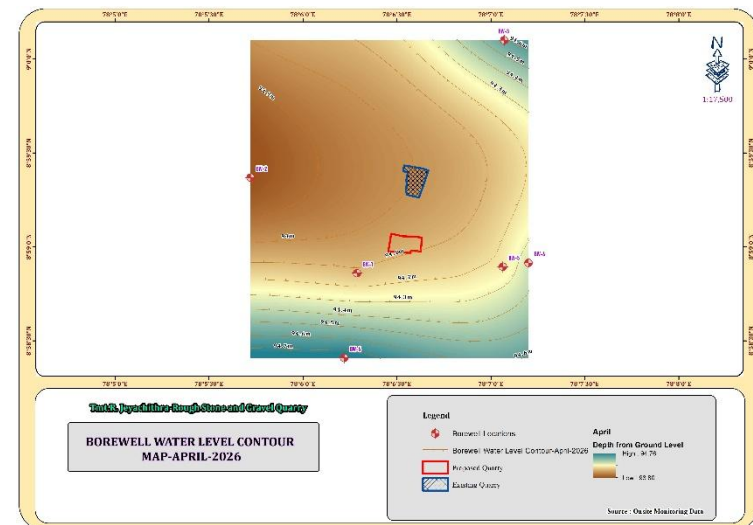
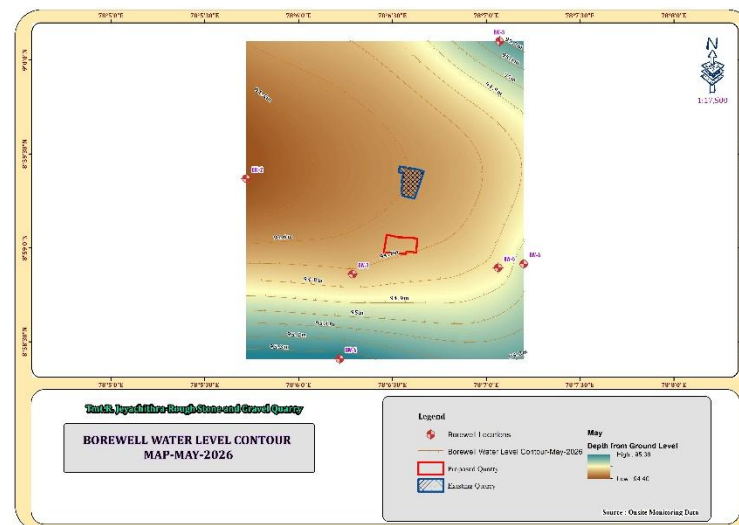
FIGURE 3.9: BOREWELL CONTOUR MAP – March 2026**FIGURE 3.10: BOREWELL CONTOUR MAP – April 2026****FIGURE 3.11: BOREWELL CONTOUR MAP – May 2026**

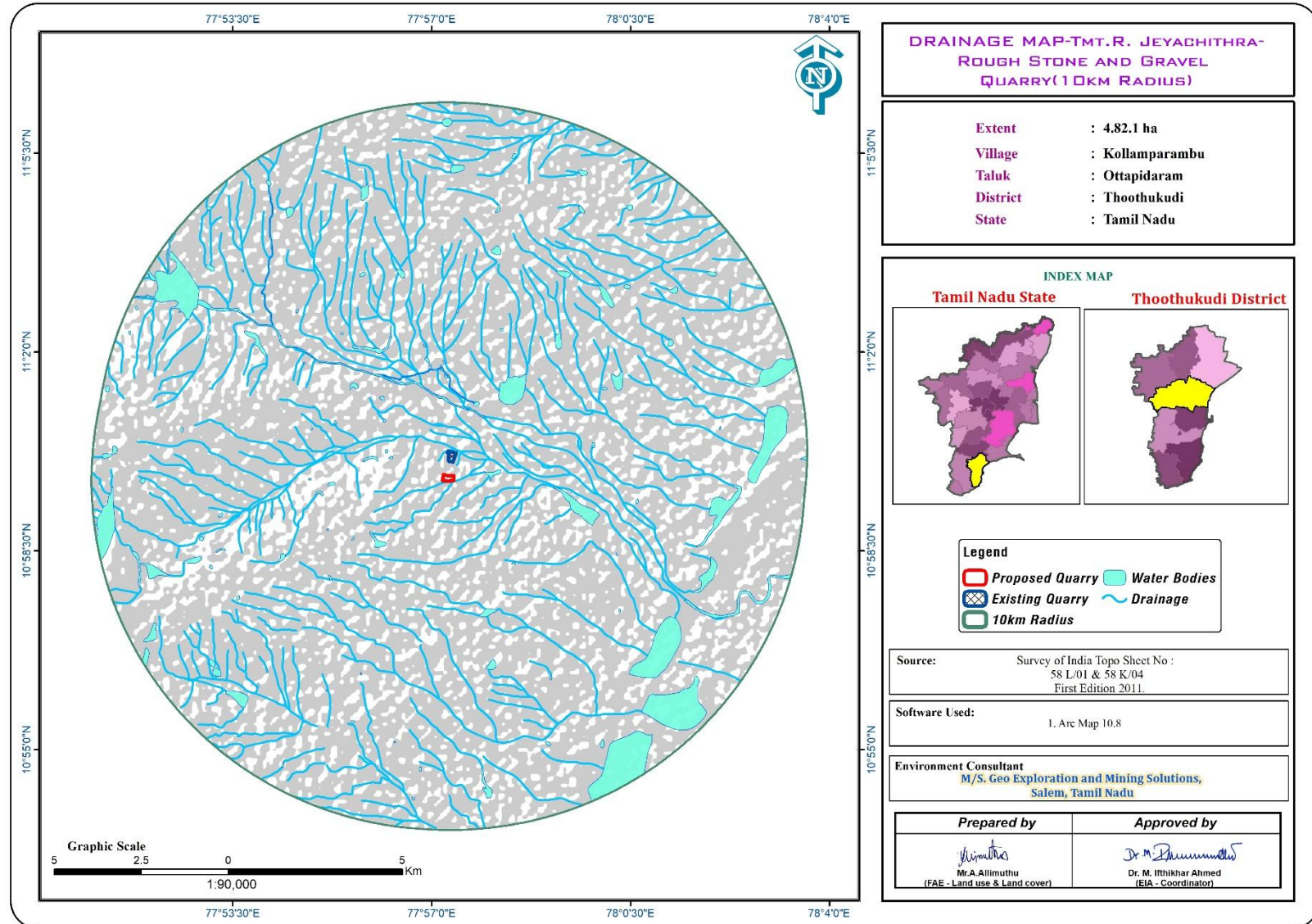
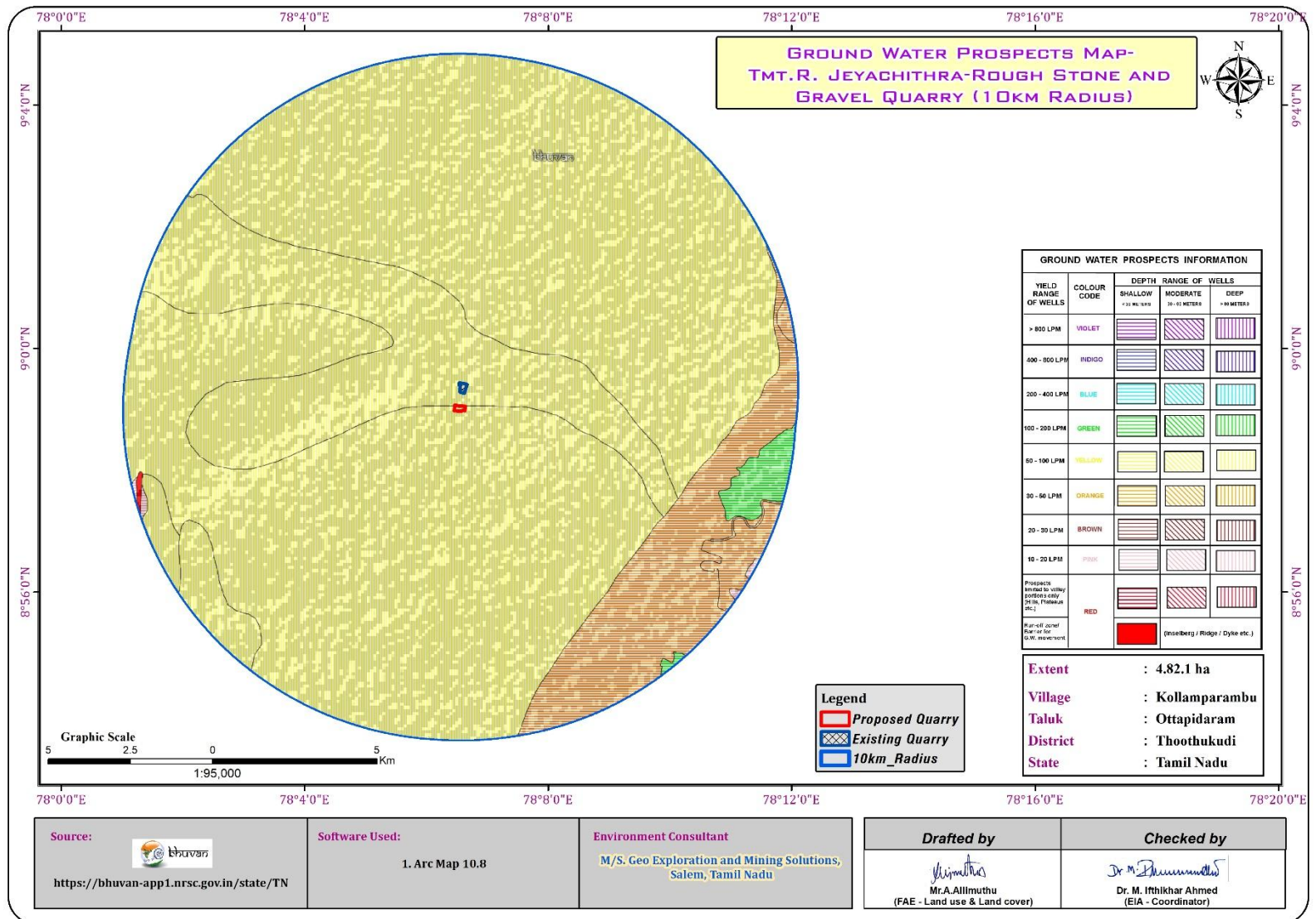
FIGURE 3.12: DRAINAGE MAP AROUND 10 KM RADIUS FROM PROJECT SITE

FIGURE 3.13: GROUND WATER PROSPECT MAP

3.2.5.1 Methodology and Data Acquisition

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

The present study utilizes maximum current electrode separation $AB/2$. The data from this survey are commonly arranged and contoured in the form 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 inhomogeneities 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,

$$\rho_r = F\rho_w = a \phi^m \rho_w$$

ρ_r = Resistivity of Rocks

ρ_w = Resistivity of water in pores of rock

F = Formation Factor

ϕ = Fractional pore volume

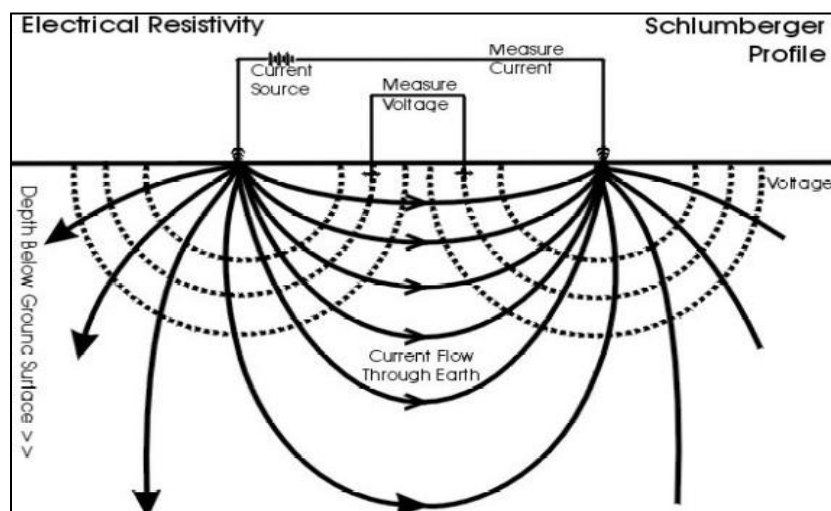
A = Constants with values ranging from 0.5 to 2.5

3.2.5.2 Survey Layout

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

The field equipment deployed for the study is in a deep resistivity meter with a model of SSR – MP – AT. This Signal stacking Resistivity meter is a high-quality data acquisition system incorporating several innovation features for Earth resistivity. In the presence of random earth Noises the signal to noise ration can be enhanced by $\sqrt{N}$ where N is the number of stacked readings. This SSR meter in which running averages of measurements $[1, (1+2)/2, (1+2+3)/3 \dots (1+2+\dots+16/16)]$ 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.

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.

3.2.5.3 Data Presentation

It was inferred that the low resistance encountered at the depth between 98m. The maximum depth proposed out of proposed project is 60m BGL. Hence 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.

3.2.5.4 Geophysical Data Interpretation

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

3.3 AIR ENVIRONMENT

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

The baseline studies on air environment include identification of specific air pollution parameters and their existing levels in ambient air. The ambient air quality with respect to the study zone of 10 km radius around the cluster forms the baseline information. The sources of air pollution in the region are mostly due to vehicular traffic, dust arising from unpaved village road and domestic & agricultural activities. The prime objective of the baseline air quality study was to establish the existing ambient air quality of the study area. These will also be useful for assessing the conformity to standards of the ambient air quality during the operation of proposed projects in cluster.

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

3.3.1 Meteorology & Climate

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

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

Climate –

- Tuticorin's climate is classified as tropical. During the winter season, precipitation levels are significantly lower compared to those experienced in summer. The climate here is classified as Aw by the Koppen-Geiger. In Tuticorin, the mean yearly temperature amounts to 27.9 °C | 82.3 °F. The annual precipitation in this location is approximately 818 mm | 32.2 inch.
- Because Tuticorin is located near the equator, the summers are not easy to define. It is highly recommended to plan your visit during the months of January, February, June, July, August, September, December for an optimal experience.
- Precipitation is the lowest in July, with an average of 5 mm | 0.2 inch. The majority of rainfall occurs during the month with the highest precipitation, which is November, and has an average amount of 270 mm | 10.6 inch.
- At an average temperature of 30.1 °C | 86.2 °F, May is the hottest month of the year. During the month of January, the mean temperature registers at a minimum value of 25.6 °C | 78.0 °F. This represents the coldest monthly average throughout the entire year.

<https://en.climate-data.org/asia/india/tamil-nadu/tuticorin-2785/>

Rainfall –

TABLE 3.13: RAINFALL DATA

Actual Rainfall in mm						Normal Rainfall in mm
2019	2020	2021	2022	2024	2024 (As on 30.09.2024)	
666.6	388.7	930.7	572.6	1009.80	180.1	694

Source: <https://www.twadboard.tn.gov.in/content/thoothukudi>

TABLE 3.14: METEOROLOGICAL DATA RECORDED AT SITE

S.No	Parameters		Mar-2026	Apr-2026	May-2026
1	Temperature (°C)	Max	31.22	32.22	31.01
		Min	28.20	30.00	28.39
		Avg	29.71	31.11	29.70
2	Relative Humidity (%)	Avg	65.16	63.02	72.60
3	Wind Speed (m/s)	Max	4.78	3.91	7.77
		Min	2.55	2.28	1.34
		Avg	3.66	3.09	4.55
4	Cloud Cover (OKTAS)		0-8	0-8	0-8
5	Wind Direction		E, ENE	SE, ESE	WSW, SW

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

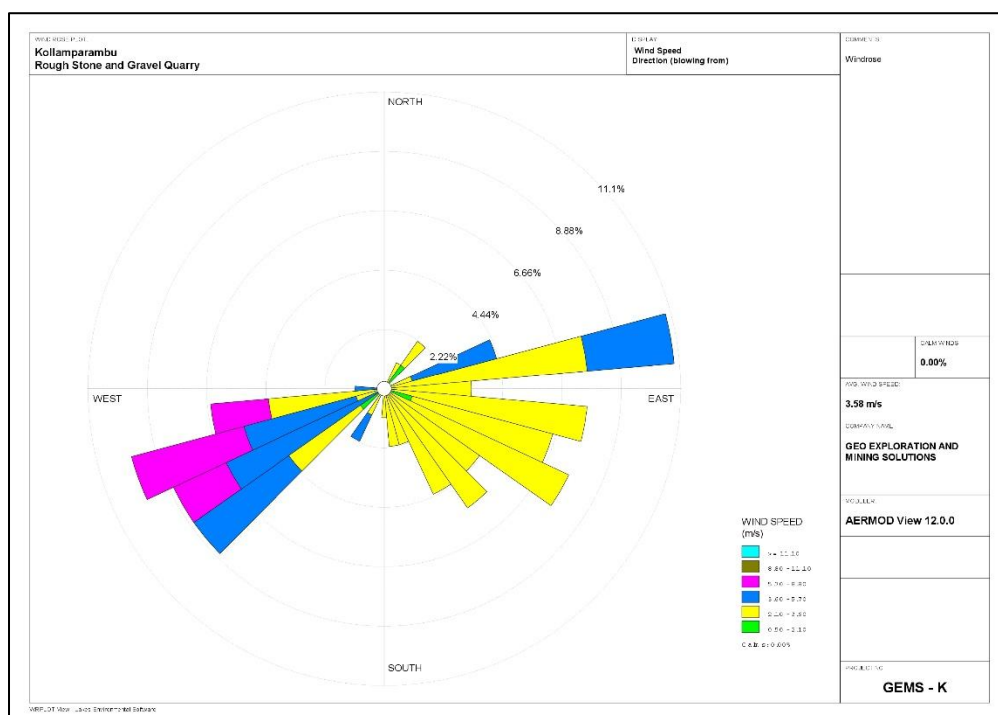
Correlation between Secondary and Primary Data

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

- The average maximum and minimum temperatures of IMD, Thoothukudi_Agro showed a higher in respect of on-site data i.e. in Kollamparambu village.
- The relative humidity levels were lesser at site as compared to IMD, Thoothukudi_Agro.
- The wind speed and direction at site shows similar trend that of IMD, Thoothukudi_Agro.

Wind rose diagram of the study site is depicted in Figure. 3.14. Predominant downwind direction of the area during study season is West to South East.

FIGURE 3.14: WINDROSE DIAGRAM



In the abstract of collected data wind rose were drawn on presented in figure No.3.14 during the monitoring period in the study area

1. Predominant winds were from SW- SE
2. Wind velocity readings were recorded between 1.34 to 7.77 m/s
3. Calm conditions prevail of about 0.8 % of the monitoring period
4. Temperature readings ranging from 28.20 to 32.22 °C
5. Relative humidity ranging from 63.02 to 72.60 %
6. The monitoring was carried out continuously for three months.

3.3.2 Methodology and Objective

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

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

3.3.3 Sampling and Analytical Techniques

TABLE 3.15: METHODOLOGY AND INSTRUMENT USED FOR AAQ ANALYSIS

Parameter	Method	Instrument
PM2.5	Gravimetric Method Beta attenuation Method	Fine Particulate Sampler Make – Thermo Environmental Instruments – TEI 121
PM10	Gravimetric Method Beta attenuation Method	Respirable Dust Sampler Make –Thermo Environmental Instruments – TEI 108
SO ₂	IS-5182 Part II (Improved West & Gaeke method)	Respirable Dust Sampler with gaseous attachment
NO _x	IS-5182 Part II (Jacob & Hochheiser modifiedmethod)	Respirable Dust Sampler with gaseous attachment
Free Silica	NIOSH – 7601	Visible Spectrophotometry

Source: Sampling Methodology followed by Chennai Mettux Laboratories & CPCB Notification

TABLE 3.16: NATIONAL AMBIENT AIR QUALITY STANDARDS

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

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

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

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

3.3.4 Frequency & Parameters for Sampling

Ambient air quality monitoring has been carried out with a frequency of two samples per week at Seven (7) locations, adopting a continuous 24 hourly (3 shift of 8-hour) schedule for the period March 2026 – May 2026. The baseline data of ambient air has been generated for PM₁₀, PM_{2.5}, Sulphur Dioxide (SO₂) & Nitrogen Dioxide (NO₂) Monitoring has been carried out as per the CPCB, MoEF guidelines and notifications.

It was ensured that the equipment was placed preferably at a height of at least 3 ± 0.5m above the ground level at each monitoring station, for negating the effects of wind-blown ground dust. The equipment was placed at open space free from trees and vegetation which otherwise act as a sink of pollutants resulting in lower levels in monitoring results.

3.3.5 Ambient Air Quality Monitoring Stations

Seven (7) monitoring stations were set up in the study area as depicted in Figure 3.15 for assessment of the existing ambient air quality. Details of the sampling locations are as per given below.

TABLE 3.17: AMBIENT AIR QUALITY (AAQ) MONITORING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	AAQ1	Project Area	Core Zone	8°58'59.32"N 78° 6'27.97"E
2	AAQ2	Near Crusher	450m SW	8°58'43.93"N 78° 6'28.68"E
3	AAQ3	Kollamparambu (Residential)	1.3km East	8°58'53.99"N 78° 7'20.51"E
4	AAQ4	K. Subramaniyapuram (School)	5km SW	8°57'45.56"N 78° 4'1.58"E
5	AAQ5	Vallinayagapuram (Residential)	4km SE	8°56'53.07"N 78° 7'17.32"E
6	AAQ6	Milaguntham (Residential)	3.2km North	9° 0'48.81"N 78° 6'24.90"E
7	AAQ7	Melaseithalai (Residential)	3.5km West	8°58'58.32"N 78° 4'32.34"E

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

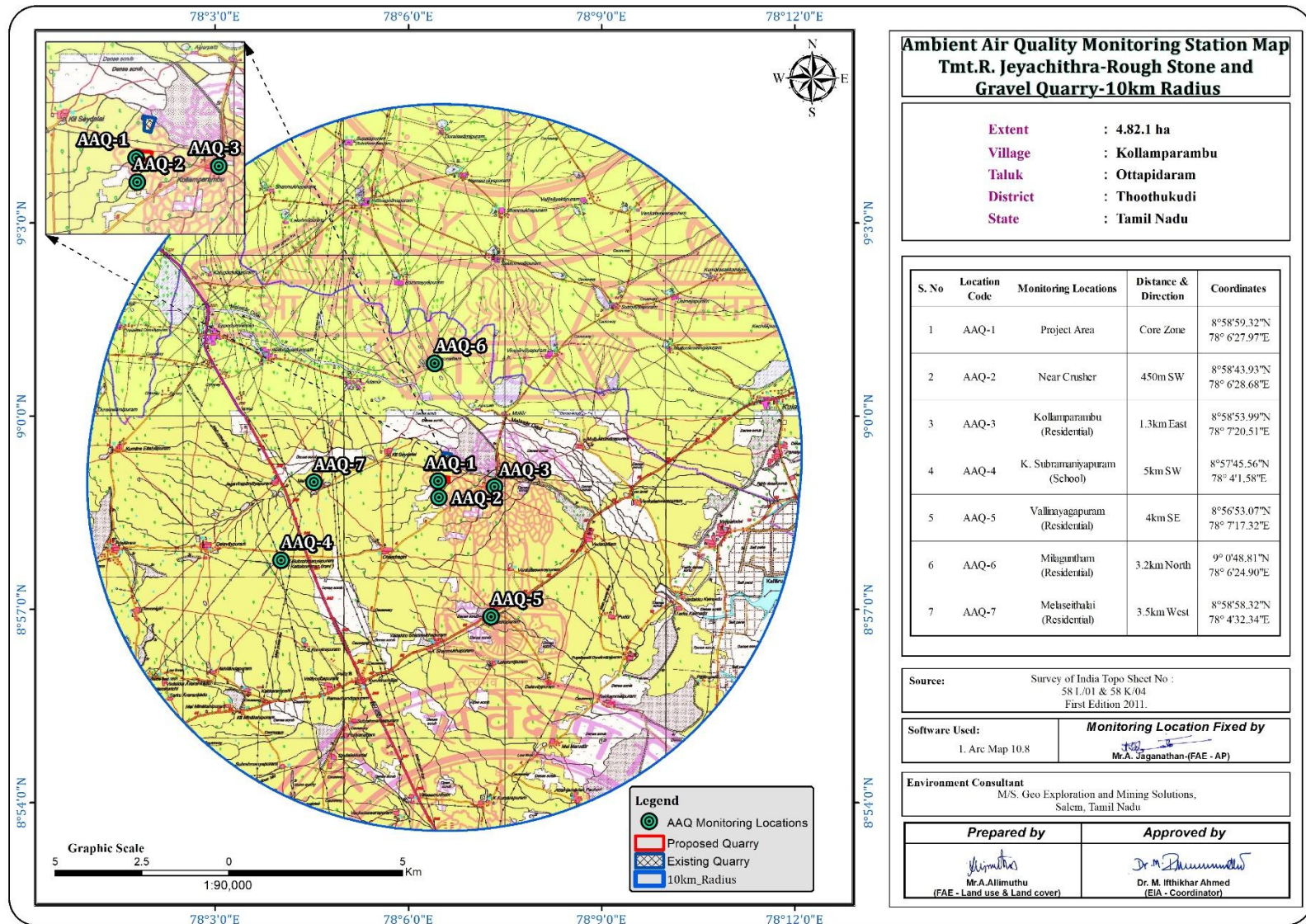
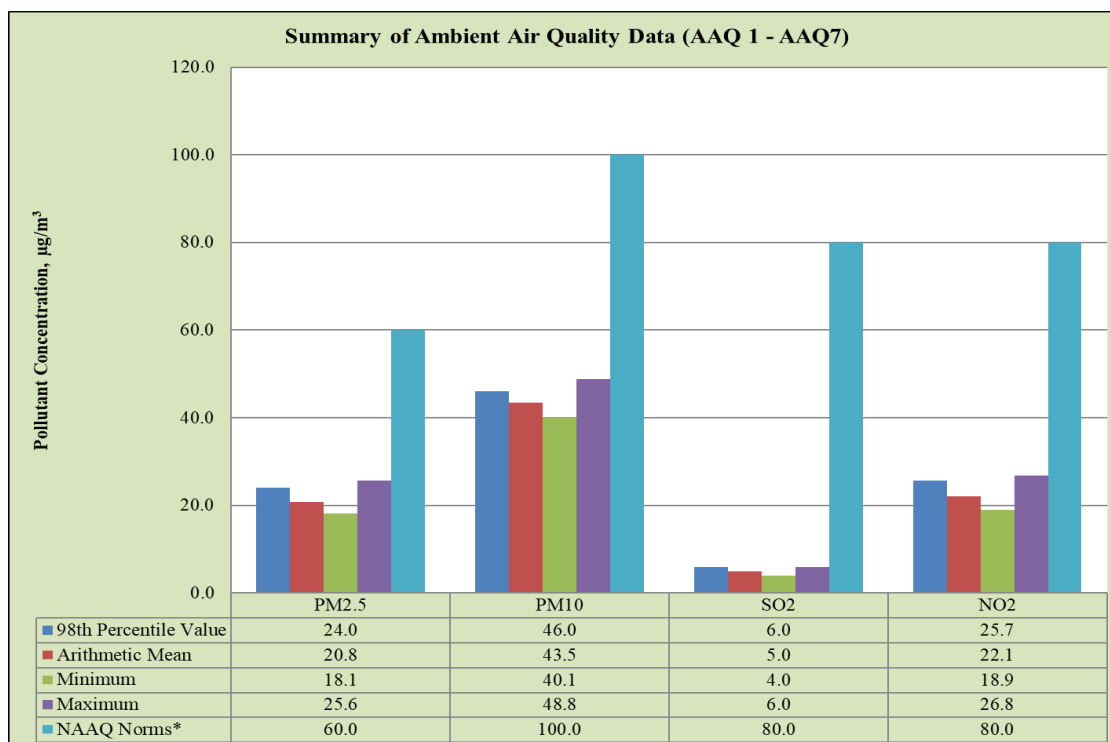
FIGURE 3.15: AMBIENT AIR QUALITY LOCATIONS AROUND 10 KM RADIUS

TABLE 3.27: SUMMARY OF AAQ – 1 to AAQ – 7

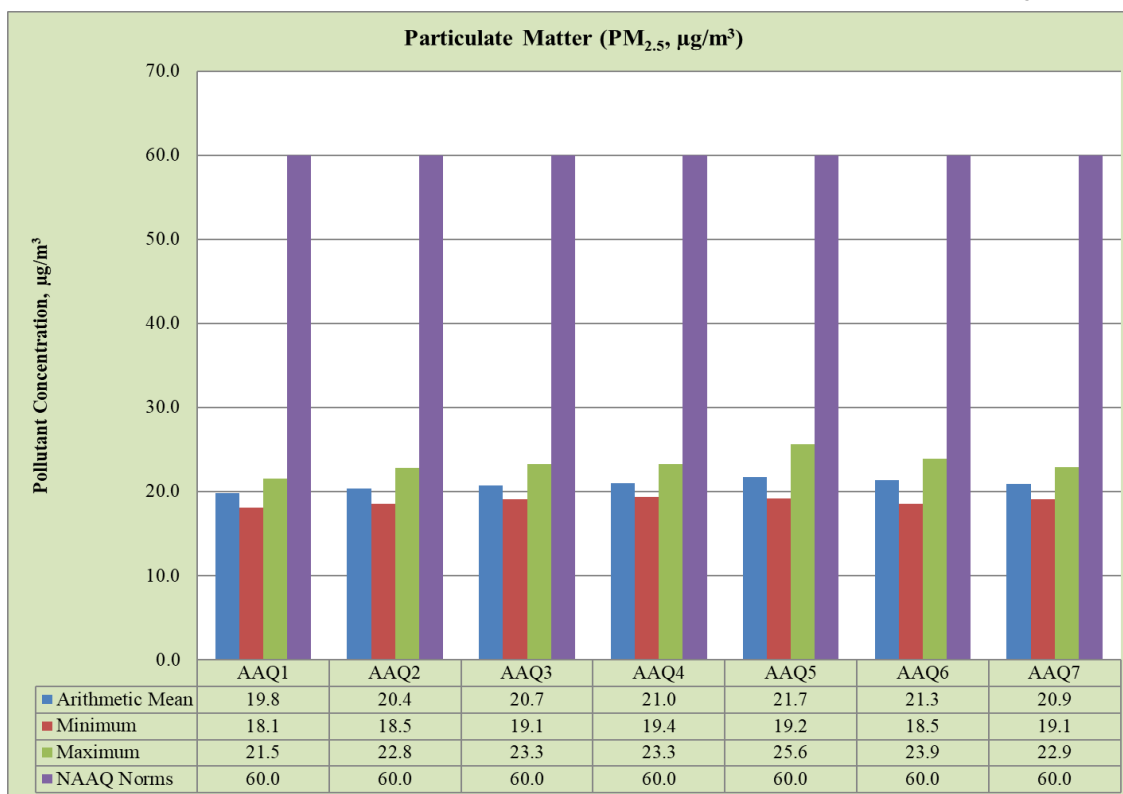
PM2.5	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	19.8	20.4	20.7	21.0	21.7	21.3	20.9
Minimum	18.1	18.5	19.1	19.4	19.2	18.5	19.1
Maximum	21.5	22.8	23.3	23.3	25.6	23.9	22.9
NAAQ Norms	60.0	60.0	60.0	60.0	60.0	60.0	60.0
PM10	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	43.0	43.1	44.3	43.2	43.7	43.3	44.0
Minimum	41.7	41.5	41.3	40.1	42.2	40.8	41.8
Maximum	44.4	45.1	46.2	45.1	45.3	45.0	48.8
NAAQ Norms	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SO₂	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	5.0	4.9	5.0	4.9	5.2	4.9	5.0
Minimum	4.0	4.0	4.1	4.1	4.1	4.0	4.1
Maximum	5.8	5.8	6.0	6.0	5.9	6.0	6.0
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0
NO₂	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	20.2	20.6	22.5	23.1	23.7	22.5	22.3
Minimum	19.1	19.0	19.5	21.6	22.1	18.9	19.5
Maximum	21.2	23.2	24.0	24.1	26.8	26.8	24.0
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0

TABLE 3.28: ABSTRACT OF AMBIENT AIR QUALITY DATA

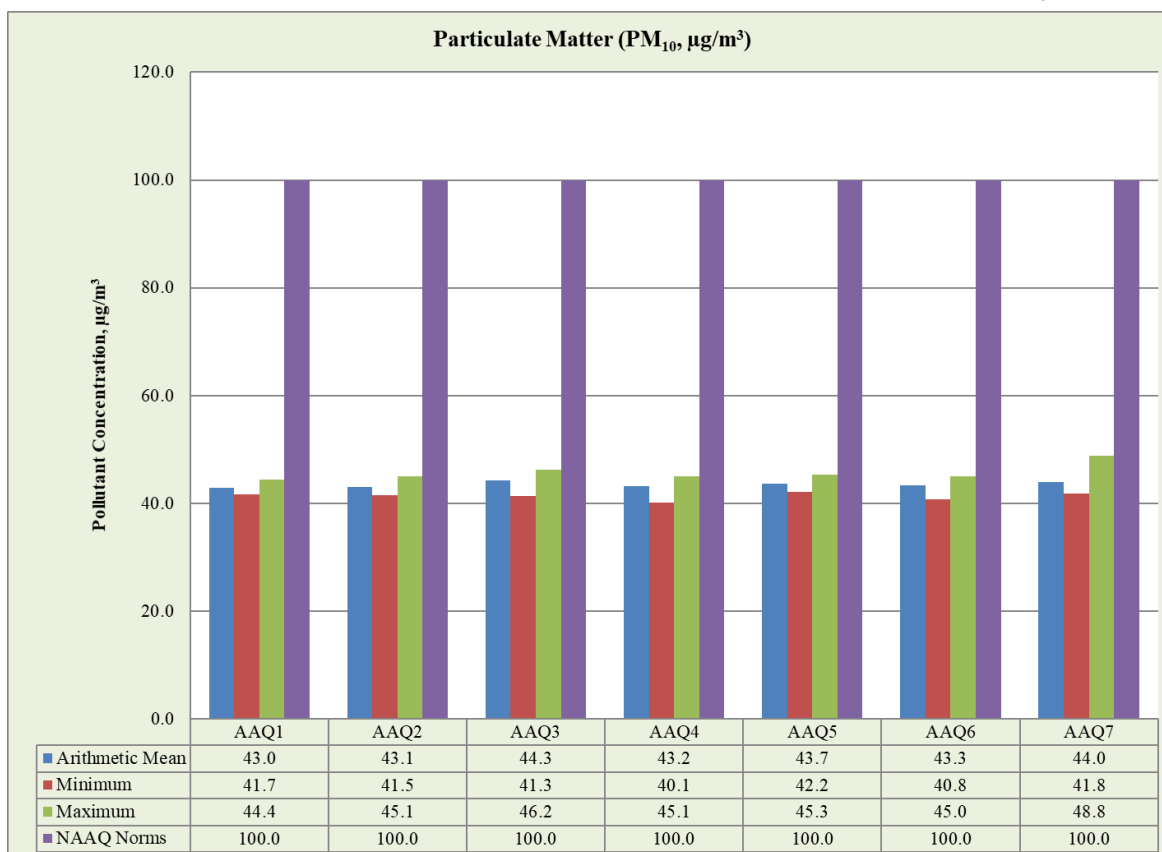
1	Parameter	PM2.5	PM10	SO₂	NO₂
2	No. of Observations	168	168	168	168
3	10 th Percentile Value	19.2	42.0	4.2	19.9
4	20 th Percentile Value	19.5	42.5	4.4	20.4
5	30 th Percentile Value	19.9	42.8	4.6	21.0
6	40 th Percentile Value	20.4	43.1	4.8	22.1
7	50 th Percentile Value	20.8	43.4	5.0	22.4
8	60 th Percentile Value	21.1	43.7	5.2	22.7
9	70 th Percentile Value	21.5	44.1	5.4	23.1
10	80 th Percentile Value	22.1	44.5	5.5	23.3
11	90 th Percentile Value	22.8	45.0	5.8	24.0
12	95 th Percentile Value	23.3	45.2	5.9	24.0
13	98 th Percentile Value	24.0	46.0	6.0	25.7
14	Arithmetic Mean	20.8	43.5	5.0	22.1
15	Geometric Mean	20.8	43.5	5.0	22.0
16	Standard Deviation	1.4	1.2	0.6	1.6
17	Minimum	18.1	40.1	4.0	18.9
18	Maximum	25.6	48.8	6.0	26.8
19	NAAQ Norms*	26.5	23.4	24.5	24.0
	% Values exceeding Norms*	23.7	20.4	22.7	21.6

FIGURE 3.16: BAR DIAGRAM OF SUMMARY OF AAQ 1 – AAQ 7

Source: Table 3.27

FIGURE 3.17: BAR DIAGRAM OF PARTICULATE MATTER PM_{2.5}

Source: Table 3.27

FIGURE 3.18: BAR DIAGRAM OF PARTICULATE MATTER PM₁₀

Source: Table 3.27

3.3.6 Interpretations & Conclusion

As per monitoring data, PM₁₀ ranges from 40.1 µg/m³ to 48.8 µg/m³, PM_{2.5} data ranges from 18.1 µg/m³ to 25.6 µg/m³, SO₂ ranges from 4.0 µg/m³ to 6.0 µg/m³ and NO₂ data ranges from 18.9 µg/m³ to 26.8 µg/m³. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB.

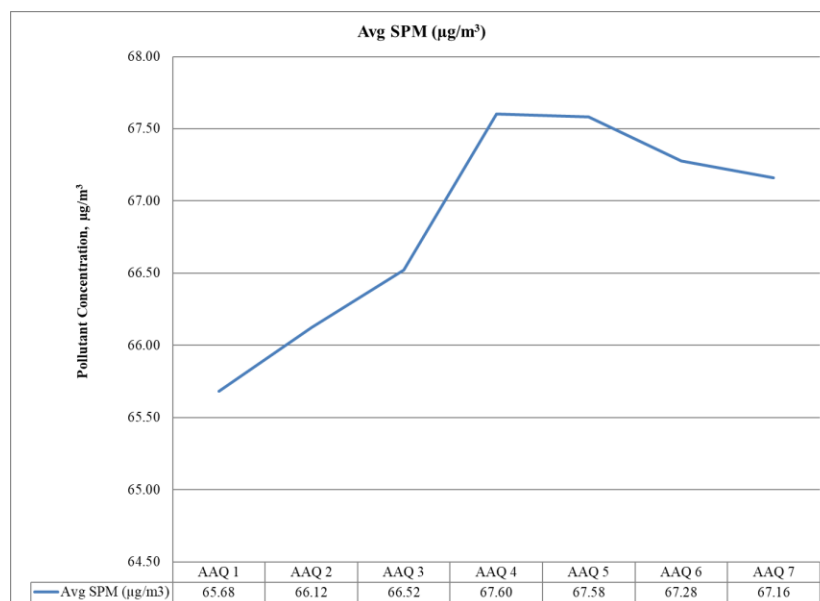
3.3.7 FUGITIVE DUST EMISSION –

Fugitive dust was recorded at 7AAQ monitoring stations for 30 days average during the study period.

TABLE 3.29: AVERAGE FUGITIVE DUST SAMPLE VALUES

AAQ Locations	Avg SPM (µg/m ³)
AAQ 1	65.68
AAQ 2	66.12
AAQ 3	66.52
AAQ 4	67.60
AAQ 5	67.58
AAQ 6	67.28
AAQ7	67.16

Source: Onsite monitoring/ sampling by Chennai Mettux Laboratories

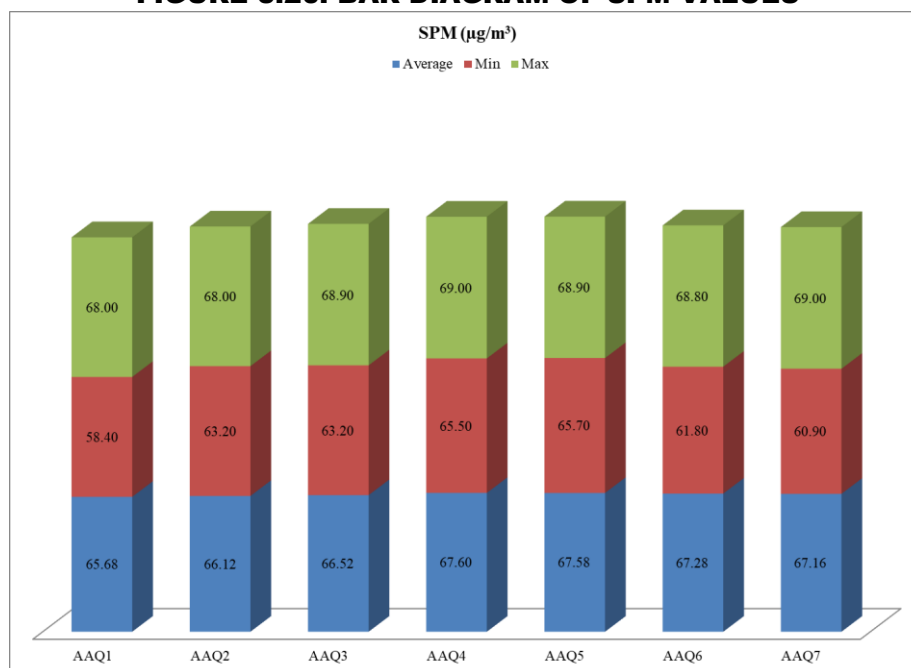
FIGURE 3.19: LINE DIAGRAM OF AVERAGE SPM VALUES

Source: Table 3.28

TABLE 3.30: FUGITIVE DUST SAMPLE VALUES IN µg/m³

SPM (µg/m³)	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Average	65.68	66.12	66.52	67.60	67.58	67.28	67.16
Min	58.40	63.20	63.20	65.50	65.70	61.80	60.90
Max	68.00	68.00	68.90	69.00	68.90	68.80	69.00

Source: Calculations from Lab Analysis Reports

FIGURE 3.20: BAR DIAGRAM OF SPM VALUES

Source: Table 3.30

3.4 NOISE ENVIRONMENT

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

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

3.4.1 Identification of Sampling Locations

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

TABLE 3.31: DETAILS OF SURFACE NOISE MONITORING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	N1	Project Area	Core Zone	8°59'1.80"N 78° 6'35.33"E
2	N2	Near Crusher	450m SW	8°58'44.93"N 78° 6'28.13"E
3	N3	Kollamparambu (Residential)	1.3km East	8°58'53.91"N 78° 7'20.91"E
4	N4	K. Subramaniyapuram (School)	5km SW	8°57'45.74"N 78° 4'1.41"E
5	N5	Vallinayagapuram (Residential)	4km SE	8°56'51.78"N 78° 7'17.99"E
6	N6	Milaguntham (Residential)	3.2km North	9° 0'48.72"N 78° 6'24.24"E
7	N7	Melaseithalai (Residential)	3.5km West	8°58'57.43"N 78° 4'31.52"E

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

3.4.2 Method of Monitoring

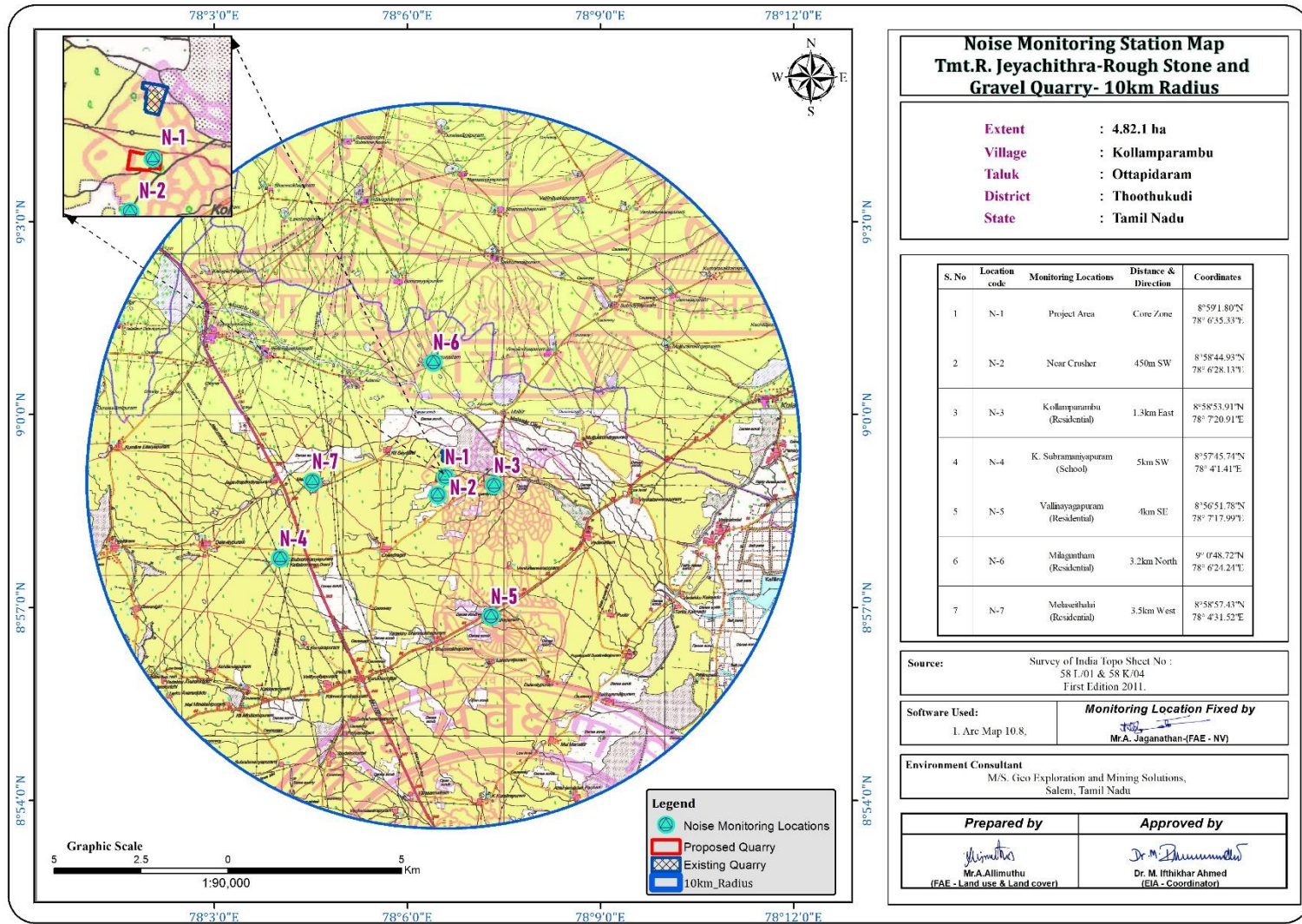
Digital Sound Level Meter was used for the study. All reading was taken on the 'A-Weighting' frequency network, at a height of 1.5 meters from ground level. The sound level meter does not give a steady and consistent reading and it is quite difficult to assess the actual sound level over the entire monitoring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

$$Leq = 10 \log L / T \sum (10L_n/10)$$

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

T = Time interval of observation

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

FIGURE 3.23: NOISE MONITORING STATIONS AROUND 10 KM RADIUS

3.4.3 Analysis of Ambient Noise Level in the Study Area

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

An analysis of the different Leq data obtained during the study period has been made. Variation was noted during the day-time as well as night-time. The results are presented in below Table 3.32.

Day time: 6:00 hours to 22.00 hours.

Night time: 22:00 hours to 6.00 hours.

TABLE 3.32: AMBIENT NOISE QUALITY RESULT

S. No	Locations	Noise level (dB (A) Leq)		Ambient Noise Standards
		Day Time	Night Time	
1	Project Area	47.4	43.1	Industrial Day Time- 75 dB (A) Night Time- 70 dB (A)
2	Near Crusher	47.8	43.6	
3	Kollamparambu (Residential)	42.5	38.4	Residential Day Time- 55 dB (A) Night Time- 45 dB (A)
4	K. Subramaniyapuram (School)	44.4	39.2	
5	Vallinayagapuram (Residential)	45.4	40.5	
6	Milaguntham (Residential)	44.9	40.3	
7	Melaseithalai (Residential)	45.6	42.9	

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

FIGURE 3.24: DAY TIME NOISE LEVELS IN CORE AND BUFFER ZONE

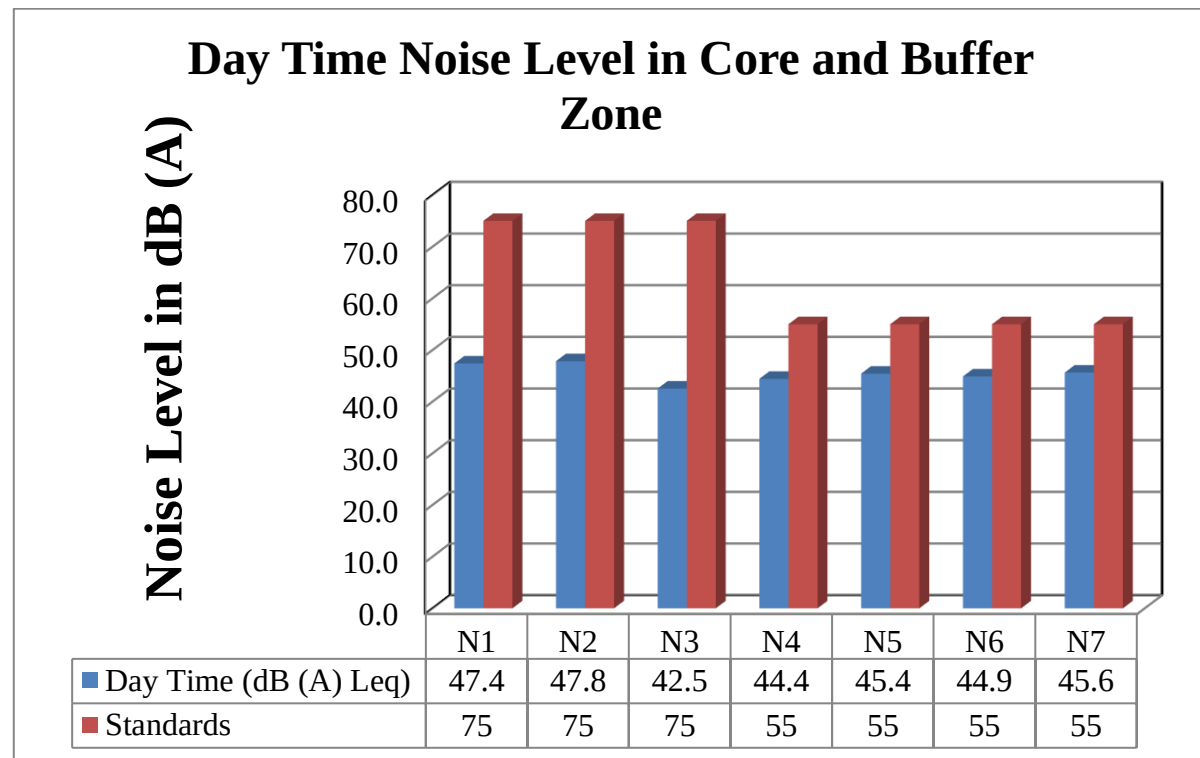
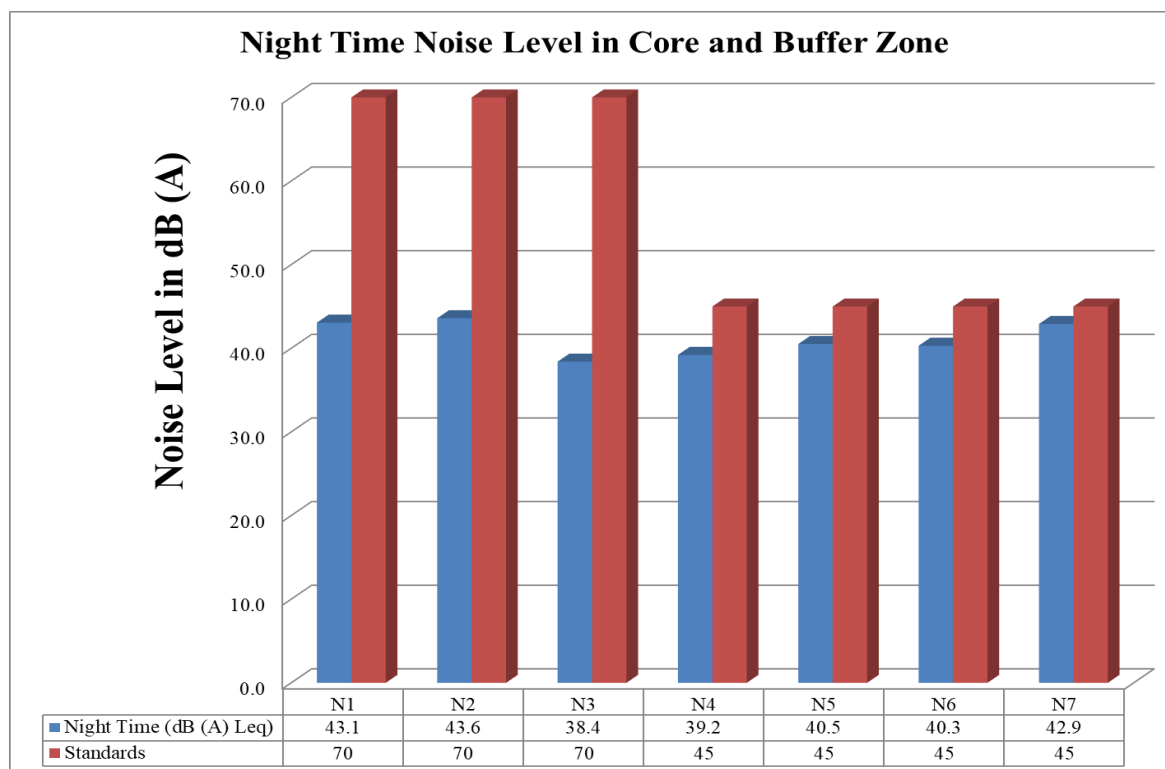


FIGURE 3.25: NIGHT TIME NOISE LEVELS IN CORE AND BUFFER ZONE

3.4.4 Interpretation & Conclusion:

Ambient noise levels were measured at 7 (Seven) locations around the proposed project area. Noise levels recorded in core zone during day time were from 47.4 – 47.8 dB (A) Leq and during night time were 43.1 – 43.6 dB (A) Leq. Noise levels recorded in buffer zone during day time were from 42.5 to 45.6 dB (A) Leq and during night time were from 38.4 to 42.9 dB (A) Leq.

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

3.5 ECOLOGICAL ENVIRONMENT

Ecology is a branch of science which dealing the relations and interactions between organisms and their environment. An ecological survey of the study area was conducted, particularly with reference to listing of species and assessment of the existing baseline ecological conditions in the study area. The main objective of biological study is to collect the baseline data regarding flora and fauna in the study area. Data has been collected through extensive survey of the area with reference to flora and fauna. Information is also collected from different sources i.e. government departments such as District Forest Office, Government of Tamil Nadu. The checklist of flora and fauna was prepared based on the onsite observations as well as forest department records.

3.0. Biological Environment

3.1.Study area Ecology

In the present project, the total cluster area within a 10 km radius from the periphery of the quarry is reported as 9.81.10Ha, comprising two quarries. In such a cluster situation, a common Ecology and Biodiversity study for the entire cluster is considered sufficient to capture the cumulative environmental impacts and externalities. The common EIA/EMP baseline data may be utilized for all quarries falling within this cluster. However, the present study has been carried out in detail to assess the specific impacts of the Kollamparambu Rough Stone and Gravel Quarry on the ecology and biodiversity of the core lease area, along with appropriate mitigation measures and a sustainable environmental management plan. The proposed mine lease area is

characterized by plain topography. The following methods were adopted during the baseline study for the assessment of flora, fauna, and biodiversity.

3.2. Objectives of Biological Studies

- a) To assess the likely impacts of the proposed mining project on local biodiversity and to recommend mitigation measures, if required, for vulnerable biological components.
- b) To conduct an intensive field survey for assessing the status of floral and faunal components across different habitats within the core and buffer zones of the project site.
- c) To identify and document flora and fauna species in accordance with the provisions of the Wildlife (Protection) Act, 1972.
- d) To suggest species-specific wildlife conservation and management measures for any threatened, critically endangered, or endangered (Schedule I) faunal species, if present within the study area.
- e) To evaluate the potential impacts of mining activities on surrounding agricultural lands and associated land-use patterns.
- f) To collect and analyze information regarding nearby wildlife sanctuaries, national parks, biosphere reserves, and other ecologically sensitive areas within the project influence zone.
- g) To develop appropriate biodiversity management and conservation measures to minimize ecological impacts and ensure sustainable environmental protection.

3.3. Methodology of Sampling

Identification of vegetation in relation to the natural flora and crops was conducted through reconnaissance field surveys and onsite observations in the core and buffer zone. The plant species identification was done based on the reference materials and also by examining the morphological characteristics and reproductive materials i.e. flowers, fruits and seeds. Land use pattern in relation to agriculture crop varieties were identified through physical verification of land and interaction with local villagers.

The faunal elements (animal species) of core and buffer zone were identified by direct sightings or indirect evidences viz. pug marks, skeletal remains, scats and droppings etc. (Jayson and Easa 2004). Standard binocular was used for the observations. The authenticity of faunal elements occurrence was confirmed by interaction with the local people. Avifauna identification was done with pictorial descriptions of published literature. Information pertaining to existence of any migratory corridors and paths were obtained from local inhabitants. The status of each faunal element was determined and wildlife schedule category was ascertained as per the IUCN-Red Data Book and Indian wildlife (Protection) Act, 1972.

Plot method is used in the floral documentation in the core and buffer zone. For trees (10x10-m), shrubs (5x5-m) and herbs (1x1-m) plots were taken. Birds and butterflies were mainly focused during faunal assessment, transect method was employed for birds and butterflies. Transect is a path along which one counts and records the occurrence of an individual for study. A straight-line walk covering desired distance, within a time span of one hour to 30 minutes was carried out in the proposed region. Bird species were recorded during the hours of peak activity. 0700 to 1100 Hrs and 1430 to 1730 Hrs (Bibby et al. 2000).

Direct observations and bird calls were used for bird documentation. Same transects were used for counting butterflies. Opportunistic observations were made for Amphibians, reptiles and ordinates. Presence of mammals was recorded by direct and indirect signs. All possible transects were taken for birds and butterflies. Birds and butterflies were classified into species level. Recorded bird species were identified to species level using standard books (Ali & Ripley 1987, Grimmett et al., 2016).

3.3.1. Sampling

A stratified simple random sampling procedure was employed to obtain a sample from study area. The study area was further stratified in different land use/ecosystems.

3.3.2. Sampling Size

Keeping in mind both random sampling technique and covering all land use patterns for the study following sampling locations were chosen depending up on the area of the proposed site.

3.3.3. Timing of Study

The study was carried out during morning and evening hours, to cover the different activity phases for important species such as time resting, feeding, hunting, and daily movements.

3.3.4. Observations from Sampling

The various observations relating to flora and fauna species are discussed in detail below, in separate sections.

3.3.5. Equipment/ References

- Canon Mark III Camera with 50-500mm lens– Snap shots taken
- Leica Binoculars (8x 20) to spot/identify species
- IUCN Red Data Book – <https://www.iucnredlist.org/species>

Ornithological/Entomological/Herpetological/Mammalian catalogues and pictorial descriptions from various authors and websites are followed for species identification.

3.4. Part I Field Sampling Techniques

3.4.1. Transect walk – Birds

Six no of transect lines with varying length (100m-300m) and fixed width (2m) were laid which cuts through the core and buffer areas of proposed site. The transect surveys were conducted from 0700 to 1100Hrs and 1430 to 1730Hrs (Bibby et al. 2000). All avifauna found along these transects were recorded for analysing the data. Counts were conducted while there is no heavy rain, mist or strong wind.

3.4.2. Modified Pollard Walk – for Butterflies

The Modified Pollard Walk (Pollard 1977, 1993, Walpole 1999) using fixed width transect walk method were employed to investigate butterfly spatial distribution, diversity and abundance at the different survey sites.

3.4.3. Visual Encounter Survey (VES) - reptiles and amphibians

VES is a time-constrained sampling technique (Campbell and Christman, 1982; Corn and Bury, 1990). It needs a systematic search through an area or habitat for a prescribed time period (Campbell and Christman, 1982). The result of VES is measured against the time spent for search. VES technique is one of the simplest methods, and an appropriate technique for both inventory and monitoring Herpetofauna (Heyer et al. 1994).

3.4.4. Observational methods- Mammals

For the purpose of recording mammals, we used two different observational techniques: (1) direct observations, and (2) recording of occurrences like holes, markings, scats, hairs, and spines (Menon 2003). For identification confirmations, photographs with a scale reference were used, and locations were recorded using a portable GPS device. Indigenous knowledge particularly that of the locals, was occasionally employed to compile a preliminary list of species and/or aid in the recognition of indicators.

3.4.5. Multiple Stage Quadrat – Vegetation

A variety of habitat or vegetation structure variables were measured using the Multiple Stage Quadrat sampling protocol (Sykes and Horrill 1977). All of those areas were sampled, and the major corners were temporarily delineated with coloured ribbons. Each site was identified in the field using a compass and clinometer, and the plot's latitude, longitude, and elevation were recorded using a handheld Global Positioning System (Garmin 12XL).

3.5. Floral analysis

The vegetation structure of the region was randomly checked at selected habitats and sampling was done study area. Most of the buffer zone area is under cultivation and hence sampling near pond side and road side are restricted to dense covered regions.

Quadrats of 10 × 10-m were laid down randomly within the core and 5-km buffer area; each quadrat was laid to assess the trees (>5 cm GBH) and one, 5 × 5-m sub-quadrat nested within the quadrat for shrubs. The quadrats were laid randomly to cover the area to maximize the sampling efforts and minimize the species homogeneity, such as small stream areas, trees in agricultural bunds, tank bunds, farm forestry plantations, wildlife areas, and natural forest area, avenue plantations, house backyards, etc. In each quadrat individuals belonging to tree (10 × 10-m) and shrub (5 × 5-m) were recorded separately and have been identified on the field. Only photographs were taken during the field survey and no damage is created to flora and fauna during the sampling. The plants were identified using floras by Gamble (1915-36), Saxena and Brahmam (1994-96), Nair and Henry (1983), Henry et al. (1987), Henry et al. (1989) and also by using updated check list from www.theplantlist.org.

3.5.1. Flora Composition in the Core Zone

Taxonomically a total of 17 species belonging to 15 families have been recorded from the core mining lease area. The proposed mine lease area is flat terrain and it is Patta land which is not fit for cultivation. Based on the habitat classification of the enumerated plants the majority of species were Herbs 8 followed by trees 8, Shrubs 5, Grasses 3, and Creepers 2. Details of flora with the scientific name were mentioned in Table No. 3.1. The result of the core zone of flora studies shows that Fabaceae, Poaceae, and Lamiaceae is the main dominating species in the study area mentioned in Table No.3.1. No species were found as threatened category.

TABLE NO: 3.33. FLORA IN THE CORE ZONE OF TMT. R. JEYACHITHRA, CLUSTER AREA, KOLLAMPARAMBU VILLAGE, ROUGH STONE AND GRAVEL QUARRY

SI. No	English Name	Vernacular Name	Scientific Name	Family Name
Trees				
1.	Neem	Vembu	<i>Azadirachta indica</i>	Meliaceae
2.	Mesquite	Mullu maram	<i>Prosopis juliflora</i>	Fabaceae
3.	Indian mulberry	Nuna maram	<i>Morinda tinctoria</i>	Rubiaceae
4.	Borassus	Pannai maram	<i>Borassus flabellifer</i>	Arecaceae
Shrubs				
1.	Tanner's cassia	Avaram	<i>Senna auriculata</i>	Fabaceae
2.	Lantana	Unni chedi	<i>Lantana camara</i>	Verbenaceae
3.	Milk Weed	Erukku	<i>Calotropis gigantea</i>	Apocynaceae
4.	Night shade plan	Sundaika	<i>Solanum torvum</i>	Solanaceae
Herbs				
1.	Common leucas	Thumbai	<i>Leucas aspera</i>	Lamiaceae
2.	Coat buttons	Thatha poo	<i>Tridax procumbens</i>	Asteraceae
3.	Bindii	Nerunji mullu	<i>Tribulus terrestris</i>	Zygophyllaceae
4.	Country Mallow	Nilatutti	<i>Sida cordifolia</i>	Malvaceae
5.	Prickly chaff flower	Nayuruv	<i>Achyranthes aspera</i>	Amaranthaceae
6.	Holy basil	Thulasi	<i>Ocimum tenuiflorum</i>	Lamiaceae
Creepers				
1.	Stinking passionflower	Poonai puduku chedi	<i>Passiflora foetida L</i>	Passifloraceae
Grasses				
1.	Eragrostis	Pullu	<i>Eragrostis ferruginea</i>	Poaceae
2.	Great brome	Thodappam	<i>Bromus diandrus</i>	Poaceae



a. *Prosopis juliflora*



b. *Morinda tinctoria*



c. *Borassus flabellifer*



d. *Azadirachta indica*



e. *Senna auriculata*



f. *Sida cordifolia*

FIG NO: 3.26. FLORA SPECIES OBSERVATION IN THE CORE ZONE AREA

3.6. Flora Composition in the Buffer Zone

A similar type of environment is also in the buffer area but with more flora diversity compare to core zone areas because of nearby agricultural land but presently there is no cultivation. It is fully dry conditions. The proposed mine lease area is flat terrain and it is Patta land which is not fit for cultivation. It contains a total of 102 species that have been recorded from the buffer zone. The floral (102) varieties among them Thirty-eight Trees 38, thirty-Two herbs 32, Eighteen shrubs 18, Six Climbers 6, Three Grasses 3, four Creepers 4, and two Cactus 2 were identified. The result of the buffer zone of flora studies shows that Fabaceae and Poaceae, Mimosaceae is the main dominating species in the study area mentioned in Table No.3.2. Agricultural land is located away from the proposed project site. There are no impacts on the agricultural land & Horticulture. There are no Rare, Endangered, and Threatened Flora species in the mining area and their surrounding study area. Details of flora with the scientific name were mentioned in Table No.3.2.

TABLE NO: 3.34. FLORA IN BUFFER ZONE OF TMT. R. JEYACHITHRA, KOLLAMPARAMBU VILLAGE, ROUGH STONE AND GRAVEL QUARRY

SI.No	English Name	Vernacular Name	Scientific Name	Family Name	Resource use type *(E,M,EM)
Trees					
1.	Gum arabic tree	Karuvelam	<i>Vachellia nilotica</i>	Fabaceae	E
2.	White-bark acacia	Vellaivelan	<i>Acacia leucophloea</i>	Mimosaceae	E
3.	Neem or Indian lilac	Vembu	<i>Azadirachta indica</i>	Meliaceae	M
4.	White Thorn	Seengai	<i>Acacia polyacantha</i>	Mimosaceae	M
5.	Horsetail She-oak	Chavuku	<i>Casuarina litorea</i>	Casuarinaceae	E
6.	Frywood	Vaagaimaram	<i>Albizia lebbeck</i>	Mimosaceae	E
7.	River tamarind	Subabul	<i>Leucaena leucocephala</i>	Mimosaceae	NE
8.	Velvet mesquite	Mullu maram	<i>Prosopis juliflora</i>	Fabaceae	M
9.	Portia tree	Poovarasan	<i>Thespesia Populnea</i>	Malvaceae	E
10.	Indian ash tree	Othiyamaram	<i>Lannea coromandelica</i>	Anacardaceae	M
11.	Bael	Vilvam	<i>Aegle marmelos</i>	Rutaceae	M
12.	Indian gooseberry	Nelli	<i>Phyllanthus emblica</i>	Euphorbiaceae	EM
13.	Lemon	Ezhumuchaipalam	<i>Citrus lemon</i>	Rutaceae	EM
14.	Chinese chaste tree	Nochi	<i>Vitex negundo</i>	Verbenaceae	E
15.	Java Plum	Naval	<i>Syzygium cumini</i>	Myrtaceae	EM
16.	Thorny bamboo	Moongil	<i>Bambusa arundinacea</i>	Poaceae	E
17.	Chinaberry	Malai Vembu	<i>Melia azadarach</i>	Meliaceae	M
18.	Asian Palmyra palm	Panai maram	<i>Borassus flabellifer</i>	Arecaceae	E
19.	Tree of heaven	Vathikuchimaram	<i>Ailanthus excelsa</i>	Simaroubaceae	E
20.	Tahitian gooseberry	Aranelli	<i>Phyllanthus acidus</i>	Euphorbiaceae	EM
21.	Indian mulberry	Nuna maram	<i>Morinda tinctoria</i>	Rubiaceae	E
22.	Pongamia pinnata	Pongam	<i>Millettia pinnata</i>	Fabaceae	M
23.	Tasmanian blue gum	Eucalyptus	<i>Eucalyptus globulus</i>	Myrtaceae	EM
24.	Guava	Koyya	<i>Psidium guajava</i>	Myrtaceae	EM
25.	Sacred Tree	Thenthangkottai	<i>Butea monosperma</i>	Fabaceae	E
26.	Monoon longifolium	Nettulingamaram	<i>Polyalthiya longifolia</i>	Annonaceae	NE
27.	Egyptian Pea	Sitthagathi	<i>Sesbania sesban</i>	Fabaceae	M
28.	Cluster fig	Atthi	<i>Ficus racemosa</i>	Moraceae	EM
29.	Tamarind	Puliyamaram	<i>Tamarindus indica</i>	Legumes	EM
30.	Drumstick tree	Murunga maram	<i>Moringa oleifera</i>	Moringaceae	EM
31.	Ficus religiosa	Arasamaram	<i>Ficus religiosa</i>	Moraceae	E
32.	Oil cake tree	Usil	<i>Albizia amara</i>	Mimosaceae	E
33.	Papaya	Pappali maram	<i>Carica papaya L</i>	Caricaceae	EM
34.	Banana tree	Vazhaimaram	<i>Musa acuminata</i>	Musaceae	EM
35.	Vegetable hummingbird	Agatthi	<i>Sesbania grandiflora</i>	Fabaceae	M
36.	Teak	Thekku	<i>Tectona grandis</i>	Verbenaceae	E
37.	Clammy Cherry	Naruvili	<i>Cordia obliqua</i>	Cordiaceae	M

38.	Indian jujub	Elanthai	<i>Ziziphus mauritiana</i>	Rhamnaceae	EM
Shrubs					
1.	Malabar catmint	Paeimirati	<i>Anisomeles malabarica</i>	Lamiaceae	M
2.	Coromandel Boxwood	Kaarai	<i>Canthium coromandelicum</i>	Rubiaceae	EM
3.	Apple of sodom	Vellai erukku	<i>Calotropis procera</i>	Asclepidaceae	E
4.	Broom creeper	Kattukodi	<i>Cocculus hirsutus</i>	Menispermaceae	M
5.	Hopbush	Virali chedi	<i>Dodonaea viscosa</i>	Sapindaceae	E
6.	Indian Atalantia	Kattu elumichai	<i>Atalantia monophylla</i>	Rutaceae	M
7.	Bellyache bush	Kattamanakku	<i>Jatropha gossypifolia</i>	Euphorbiaceae	NE
8.	Porcupine flower	Kaatukanagambaram	<i>Barleria prionitis</i>	Acanthaceae	EM
9.	Avaram	Avarai	<i>Senna auriculata</i>	Fabaceae	M
10.	Castor bean	Amanakku	<i>Ricinus communis</i>	Euphorbiaceae	M
11.	Shoe flower	Chemparuthi	<i>Hibiscu rosa-sinensis</i>	Malvaceae	EM
12.	Malabar nut	Adathoda	<i>Justicia adhatoda</i>	Acanthaceae	M
13.	Turkey berry	Sundai	<i>Solanum torvum</i>	Solanaceae	EM
14.	Castor oil plant	Aamannukku	<i>Ricinus communis</i>	Euphorbiaceae	EM
15.	Milk Weed	Erukku	<i>Calotropis gigantea</i>	Apocynaceae	M
16.	Touch-me-not	Thottalchinungi	<i>Mimosa pudica</i>	Mimosaceae	M
17.	Indian mallow	Thuthi	<i>Abutilon indicum</i>	Meliaceae	M
18.	West Indian Lantana	Unni chedi	<i>Lantana camara</i>	Verbenaceae	E
Herbs					
1.	Watergrass	Mukkutikorei	<i>Bulbostylis barbata</i>	Cyperaceae	NE
2.	Country Mallow	Nilatutti	<i>Sida cordifolia</i>	Malvaceae	M
3.	Sessile Joyweed	Ponnanganii	<i>Alternanthera sessilis</i>	Amaranthaceae	M
4.	Chamber bitter	Malai Kizhanelli	<i>Phyllanthus urinaria L.</i>	Euphorbiaceae	M
5.	Watergrass	Mukkorraikkorai	<i>Bulbostylis barbata</i>	Cyperaceae	M
6.	Madagascar Periwinkle	Nithyakalyani	<i>Catharanthus roseus</i>	Apocynaceae	NE
7.	Sand Herbage	Manal keerai	<i>Gisekia pharnaceoides</i>	Aizoaceae	M
8.	Common couch	Naaippul	<i>Agropyron repens</i>	Poaceae	M
9.	Taro	Sempu	<i>Colocasia esculenta</i>	Araceae	M
10.	Carrot grass	Parttiniyam	<i>Parthenium hysterophorus</i>	Asteraceae	NE
11.	Aloe barbadensis	Katrashai	<i>Aloe vera</i>	Asphodelaceae	EM
12.	Indian Mercury	Kuppamani	<i>Acalypha indica</i>	Euphorbiaceae	EM
13.	Bristly Needle Grass	Thudappampillu	<i>Aristida setacea</i>	Poaceae	E
14.	Indian nettle	Nayuruvi	<i>Achyranthes aspera</i>	Amaranthaceae	M
15.	Nut grass	Korai kilangu	<i>Cyperus rotundus</i>	Cyperaceae	M
16.	Indian doab	Arugampul	<i>Cynodon dactylon</i>	Poaceae	E
17.	Datura metel	Oomathai	<i>Datura metel</i>	Solanaceae	M
18.	Large Caltrops	Yanai nerunji	<i>Pedaliu murex L.</i>	Pedaliaceae	E
19.	Commelina benghalensis	Kanavalai	<i>Commelina benghalensi</i>	Commelinaceae	M
20.	Monarch redstem	Neermel nerupu	<i>Ammannia baccifera</i>	Lythraceae	M

21.	Common leucas	Thumbai	<i>Leucas aspera</i>	Lamiaceae	M
22.	Green amaranth	Kuppaikeerai	<i>Amaranthus viridis</i>	Amaranthaceae	M
23.	King of Bitters	Nilavaemboo	<i>Andrographis paniculata</i>	Acanthaceae	M
24.	Billygoat weed	Poompillu	<i>Ageratum conyzoides</i>	Asteraceae	EM
25.	Holy basil	Thulasi	<i>Ocimum tenuiflorum</i>	Lamiaceae	M
26.	Asthma-plant	Ammanpachaiarisi	<i>Euphorbia hirta</i>	Euphorbiaceae	M
27.	Tridax daisy	Thatha poo	<i>Tridax procumbens</i>	Asteraceae	M
28.	Spiny amaranth	Mullukeerai	<i>Amaranthus spinosus</i>	Amaranthaceae	M
29.	Floating Lace Plant	Kottikilangu	<i>Aponogeton natans</i>	Aponogetonaceae	EM
30.	Mexican prickly poppy	Biramathandu	<i>Argemone mexicana</i>	Papaveraceae	M
31.	American Basil	Naaithulasi	<i>Ocimum americanum</i>	Lamiaceae	M
Climber					
1.	Balloon vine	Mudakkathan	<i>Cardiospermum halicacabum</i>	Sapindaceae	M
2.	Ivy gourd	Kovai	<i>Coccinia grandis</i>	Cucurbitaceae	M
3.	Asian pigeonwings	Sanguppu	<i>Clitoria ternatea</i>	Fabaceae	M
4.	Bitter apple	Peikkumatti	<i>Citrullus colocynthis</i>	Cucurbitaceae	M
5.	Wild water lemon	Poonai puduku chedi	<i>Passiflora foetida</i>	Passifloraceae	M
6.	Stemmed vine	Perandai	<i>Cissus quadrangularis</i>	Vitaceae	M
Creeper					
1.	Spreading Hogweed	Saaranai Keerai	<i>Boerhavia diffusa</i>	Nyctaginaceae	M
2.	Nut grass	Korai	<i>Cyperus rotundus</i>	Poaceae	M
3.	Cucumis maderaspatanus	Musumusukkai	<i>Mukia maderaspatana</i>	Cucurbitaceae	M
4.	Grona triflora	Siru puladi	<i>Desmodium triflorum</i>	Fabaceae	EM
Grasses					
1.	Eragrostis	Pullu	<i>Eragrostis ferruginea</i>	Poaceae	E
2.	Windmill grass	Chevvarakupul	<i>Chloris barbata</i>	Amaranthaceae	NE
3.	Great brome	Thodappam	<i>Bromus diandrus</i>	Poaceae	E
Cactus					
1.	Indian fig opuntia	Sapathikalli	<i>Opuntia ficus-indica</i>	Cactaceae	M
2.	Fleshy Spurge	Chathurakkalli	<i>Euphorbia antiquorum</i>	Euphorbiaceae	M

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

3.7. The vegetation in the RF / PF areas, ecologically sensitive areas

There are no reserve forests located around 10 km radius. No protected (PF) forests either in the mine lease area or in the buffer zone. Thus, no forest land is involved in any manner. Hence, no certificate from the Forest department is required. There are no impacts due to this mining activity.

There are no protected or ecologically sensitive areas such as National parks or Important Bird Areas (IBAs), or Wetlands or migratory routes of fauna or water bodies or human settlements within the proposed mine lease area. There are no Biosphere reserves or wildlife sanctuaries or National parks or Important Bird Areas (IBAs), or migratory routes of fauna. Thus, the area under study (Mine lease area and the 10 Km buffer zone) is not ecologically sensitive. It is away from the proposed project site.

There are neither forests nor forest dwellers nor forest-dependent communities in the mine lease area. There shall be no forest-impacted families (PF) or people (PP). Thus, the rights of Traditional Forest Dwellers will not be compromised on account of the project.

3.8. Faunal analysis

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 Wildlife Protection Act, 1972. There are no rare, endangered, threatened (RET), and endemic species present in the core area.

3.8.1. Fauna Composition in the Core Zone

A total of 26 varieties of species were observed in the Core zone of Kollamparambu Village Cluster area, Rough stone and gravel quarry (Table No.3.3) among them numbers Insects 8, Reptiles 3, Mammals 2, and Avians 13. A total of 26 species belonging to 18 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 twelve species are under Schedule IV according to the Indian Wildlife Act 1972. A total of 13 species of bird were sighted in the mining lease area. There are no critically endangered, endangered, vulnerable, and endemic species were observed.

TABLE NO: 3.35. FAUNA IN THE CORE ZONE OF TMT. R. JEYACHITHRA, KOLLAMPARAMBU VILLAGE, ROUGH STONE AND GRAVEL QUARRY

Sl. No	Common Name	Scientific Name	Schedule list WLPA 1972	IUCN Red List data
Insects				
1.	Striped tiger	<i>Danaus plexippus</i>	Schedule IV	LC
2.	Colotis danae	<i>Colotis danae</i>	NL	LC
3.	Grasshopper	<i>Hieroglyphus sp</i>	NL	LC
4.	Chocolate pansy	<i>Junonia iphita</i>	NL	LC
5.	Common Tiger	<i>Danaus genutia</i>	NL	NL
6.	Termite	<i>Hamitermes silvestri</i>	NE	LC
7.	Red-veined darter	<i>Sympetrum fonscolombii</i>	NL	LC
8.	Tawny coster	<i>Danaus chrysippus</i>	Schedule IV	LC
Reptiles				
1.	Garden lizard	<i>Calotes versicolor</i>	NL	LC

2.	Common skink	<i>Mabuya carinatus</i>	NL	LC
3.	Green vine snake	<i>Ahaetulla nasuta</i>	Schedule IV	NL
Mammals				
1.	Indian Field Mouse	<i>Mus booduga</i>	Schedule IV	NL
2.	Asian Small Mongoose	<i>Herpestes javanicus</i>	Schedule (Part II)	LC
Aves				
1.	Common myna	<i>Acridotheres tristis</i>	NL	LC
2.	House crow	<i>Corvus splendens</i>	NL	LC
3.	Koel	<i>Eudynamis</i>	Schedule IV	LC
4.	Asian green bee-eater	<i>Merops orientalis</i>	NL	LC
5.	Rose-ringed parakeet	<i>Psittacula krameri</i>	NL	LC
6.	Common quail	<i>Coturnix coturnix</i>	Schedule IV	LC
7.	Black drongo	<i>Dicrurus macrocercus</i>	Schedule IV	LC
8.	Cattle egret	<i>Bubulcus ibis</i>	NE	LC
9.	Shikra	<i>Lanius excubitor</i>	Schedule IV	LC
10.	Paddy Bird	<i>Ardea grayii grayii</i>	Schedule IV	LC
11.	Rock pigeon	<i>Columbidae</i>	Schedule IV	LC
12.	Indian Robin	<i>Saxicoloides fulicata</i>	Schedule IV	LC
13.	Pond-Heron	<i>Ardeo labacchus</i>	Schedule IV	LC

***NL- Not listed, LC- Least Concern**

3.8.2. Fauna Composition in the Buffer Zone

As animals, especially vertebrates move from place to place in search of food, shelter, mate or other biological needs, separate lists for core and buffer areas are not feasible however, a separate list of fauna pertaining to core and buffer zone are listed separately. Though there are no reserved forests in the buffer zone. As such there are no chances of the occurrence of any rare or endangered or endemic or threatened (REET) species within the core or buffer area.

There are no Sanctuaries, National Parks, Tiger Reserve, or Biosphere Reserve, or Elephant Corridors, or other protected areas within 10 km radius from the core area. It is evident from the available records, reports, and circumstantial evidence that the entire study area including the core and buffer areas were free from any endangered animals. There were no resident birds other than common bird species such as, Small blue Kingfisher, Indian rollers, Rose-ringed parakeet, Common Mynas, Black drongos, Crows, Woodpecker bird, etc.,.

The list of bird species recorded during field survey and literature from the study area are given in Table 3.5. The list of reptilian species recorded during field survey and literature from the study area are given in Table 3.6. The list of insect's species recorded during the field survey and literature from the study area are given in Table 3.7. The list of Amphibian species recorded during the field survey and literature from the study area are given in Table 3.8. It is apparent from the list that none of the species either spotted or reported is included in Schedule I of the Wildlife Protection Act. Similarly, none of them comes under the REET category.

Taxonomically a total of 49 species belonging to 36 families have been recorded from the buffer zone area. Based on habitat classification the majority of species were Insect 18, followed by birds 14, Reptiles 10, Mammals 5, and amphibians 2. There are six Schedule II species, and twenty- six species are under Schedule IV according to the Indian Wildlife Act 1972. A total of 14 species of bird were sighted in the study area. There are no critically endangered, endangered, vulnerable, and endemic species were observed. There are no impacts on nearby fauna species.

Dominant species are mostly birds and insects, and three amphibian was observed during the extensive field visit *Euphyctis cyanophlyctis*, *Euphyctis hexadactylus*, and *Bufomelanostictus*. The result of the Buffer zone of fauna studies shows that Nymphalidae, Colubridae, and Scincidae are the main dominating species in the study area. There is no Schedule I Species in the study area. There are no critically endangered, endangered, vulnerable, and endemic species were observed.

**TABLE 3.36. LIST OF FAUNA & THEIR CONSERVATION STATUS,
Mammals: (*directly sighted animals & Secondary data)**

SI. No	Common Name	Scientific Name	Schedule WLPA 1972	IUCN Red List data
	Indian hare	<i>Lepus nigricollis</i>	Schedule (Part II)	LC
1	Indian palm squirrel	<i>Funambulus palmarum</i>	Schedule IV	LC
2	Indian Field Mouse	<i>Mus booduga</i>	Schedule IV	LC
3	Asian Small Mongoose	<i>Herpestes javanicus</i>	Schedule (Part II)	LC
5	Brown rat	<i>Rattus norvegicus</i>	Schedule IV	LC

Status assigned by the IUCN, where – CR – Critically Endangered; EN – Endangered; LC – Least Concern; NT – Near Threatened; VU – Vulnerable, DA – Data Deficient, NE – Not Evaluated

TABLE 3.37. LIST OF AVIAN SPECIES RECORDED IN THE STUDY AREA**Avian (*directly sighted species & Secondary data)**

SI. No	Common Name	Scientific Name	Schedule list WLPA 1972	IUCN Red List data
1.	Indian Robin	<i>Saxicoloides fulicatus</i>	Schedule IV	LC
2.	Pond Heron	<i>Ardeola grayii</i>	Schedule IV	LC
3.	Cattle egret	<i>Bubulcus ibis</i>	NL	LC
4.	Common myna	<i>Acridotheres tristis</i>	NL	LC
5.	Paddy Bird	<i>Ardea grayii grayii</i>	Schedule IV	LC
6.	House Sparrow	<i>Passer domesticus</i>	Schedule IV	LC
7.	Asian green bee-eater	<i>Meropsorientalis</i>	NL	LC
8.	Small blue Kingfisher	<i>Alcedo atthis</i>	Schedule IV	LC
9.	Rose-ringed parakeet	<i>Psittacula krameri</i>	NL	LC
10.	Small Sunbird	<i>Nectarinia asiatica</i>	Schedule IV	LC
11.	Black drongo	<i>Dicrurus macrocercus</i>	Schedule IV	LC
12.	Indian Robin	<i>Saxicoloides fulicata</i>	Schedule IV	LC
13.	Woodpecker bird	<i>Picidae</i>	Schedule IV	LC
14.	Two-tailed Sparrow	<i>Dicrurus macrocercus</i>	Schedule IV	LC
15.	Grey Francolin	<i>Francolinus pondicerianus</i>	Schedule IV	LC
16.	House crow	<i>Corvus splendens</i>	NL	LC
17.	Common Coot	<i>Fulica atra</i>	Schedule IV	LC
18.	House sparrow	<i>Passer domesticus</i>	Schedule IV	LC
19.	Koel	<i>Eudynamis</i>	Schedule IV	LC
20.	Indian Roller	<i>Coracias benghalensis</i>	Schedule IV	LC
21.	Cuckoo	<i>Cuculus canorus</i>	Schedule IV	LC
22.	Common quail	<i>Coturnix coturnix</i>	Schedule IV	LC

*Status assigned by the IUCN, where – CR – Critically Endangered; EN – Endangered; LC – Least Concern; NT – Near Threatened; VU – Vulnerable, DA – Data Deficient, NE – Not Evaluated

TABLE 3.38. LIST OF REPTILES EITHER SPOTTED OR REPORTED FROM THE STUDY AREA.**(*indicates direct observations & Secondary data)**

SI. No	Common Name	Scientific Name	Schedule list WLPA 1972	IUCN Red List data
	Rat snake	<i>Ptyas mucosa</i>	Sch II (Part II)	LC
1	Garden lizard	<i>Calotes versicolor</i>	NL	LC
2	Russell's viper	<i>Vipera russeli</i>	Sch II (Part II)	LC
3	Fan-Throated Lizard	<i>Sitanaponticeriana</i>	NL	LC

4	Indian wall lizard	<i>Hemidactylus flaviviridis</i>	Schedule IV	NL
5	Green vine snake	<i>Ahaetulla nasuta</i>	Schedule IV	NL
6	Chameleon	<i>Chameleon zeylanicus</i>	Sch II (Part II)	LC
7	Common krait	<i>Bungarus caeruleus</i>	Schedule IV	NL
8	Indian cobra	<i>Naja naja</i>	Sch II (Part II)	LC
10	Common skink	<i>Mabuya carinatus</i>	NL	LC

TABLE.3.39. LIST OF BUTTERFLIES AND INSECTS REPORTED FROM THE STUDY AREA

Sl. No	Common Name	Scientific Name	Schedule list WLPA 1972	IUCN Red List data
1.	Indian honey bee	<i>Apis cerana</i>	Schedule IV	LC
2.	Striped tiger	<i>Danaus plexippus</i>	Schedule IV	LC
3.	Termite	<i>Hamitermes silvestri</i>	NE	LC
4.	Crimson tip	<i>Colotis danae</i>	NL	LC
5.	Tawny coaster	<i>Danaus chrysippus</i>	Schedule IV	LC
6.	Grasshopper	<i>Hieroglyphus sp</i>	NL	LC
7.	Red-veined darter	<i>Sympetrum fonscolombii</i>	NL	LC
8.	Chocolate pansy	<i>Junonia iphita</i>	NL	LC
9.	Ant	<i>Camponotus Vicinus</i>	NL	NL
10.	Common Tiger	<i>Danaus genutia</i>	Schedule IV	LC
11.	Dragonfly	<i>Ceratogomphus pictus</i>	Schedule IV	LC
12.	Milkweed butterfly	<i>Danainae</i>	NL	LC
13.	Common Tiger	<i>Danaus genutia</i>	Schedule IV	LC
14.	Grass yellow	<i>Eurema hecabe</i>	NL	LC
15.	Common Indian crow	<i>Euploea core</i>	Schedule IV	LC
16.	Lesser grass blue	<i>Zizina Otis indica</i>	Schedule IV	LC
17.	Grass yellow	<i>Eurema hecabe</i>	Schedule IV	LC
18.	Chocolate pansy	<i>Junonia iphita</i>	NL	LC

3.9. Aquatic Ecosystem

The study area has many small and big water bodies away from the proposed project site. But no major drainage system can be found within the study area. In the study area, natural drainage is represented by few narrow and shallow canals, which remain dry for major time of the year. Apart from these, there are few water bodies within the study area, most. The seasonal fluctuation of water level (mostly during December) is very evident for these water bodies and most of the water bodies dry up during peak summer season.

3.9.1. Aquatic Faunal Diversity

Amphibian species like the common Pond frog, and Skipper frog were sighted near the water bodies located in the study area.

TABLE 3.40 AMPHIBIANS OBSERVED/RECORDED FROM THE STUDY AREA

Sl. No	Common Name	Zoological Name	WLPA, 1972	IUCN Red List data
1.	Indian Skipper Frog	<i>Euphlyctis cyanophlyctis</i>	Schedule IV	LC
2.	Indian Pond Frog	<i>Euphlyctis hexadactylus</i>	Schedule IV	LC
3.	Indian Toad	<i>Bufo melanostictus</i>	Schedule IV	LC

*Status assigned by the IUCN, where – CR – Critically Endangered; EN – Endangered; LC – Least Concern; NT – Near Threatened; VU – Vulnerable, DA – Data Deficient, NE – Not Evaluated

3.9.2. Effect on Migratory corridors, Nesting and Breeding sites.

There are no migratory corridors, nesting and breeding sites within the proposed site or in the core area and study area. No need to take any mitigation measures in this connection.

3.9.3. Effect on REET species

From the list, no Rare or Endangered or Endemic or Threatened (REET) species or any species listed in Schedule I of the Wildlife (Protection) Act. Hence, species specific and habitat specific mitigation measures are not needed in this connection. The project site does not overlap with any of the recognized Ramsar sites.

3.10. Aquatic Vegetation

No Aquatic diversity is noticed in the core zone area. Aquatic weeds are found to be growing everywhere in 10 km radius area, in every water bog, pond, etc. Typha angustata can be found growing all along the drains of villages, small water-logged depressions, and agricultural fields lacking water but containing enough moisture to support its growth. And where water is present, Eichhornia crassipes has taken its roots and covers the entire water surface by its sprawl and invasion. All the aquatic plant species listed in Table 3.9.

TABLE NO: 3.41. LIST OF AQUATIC PLANTS OBSERVED IN THE STUDY AREA

Sl. No	Scientific name	Common Name	Vernacular Name (Tamil)	IUCN Red List of Threatened Species
1	<i>Nymphaea nauchali</i>	Blue lotus	Alli	LC
2	<i>Cyperus exaltatus</i>	Tall Flat Sedge	Koraikizhangu	LC
3	<i>Aponogeton natans</i>	Floating laceplant	Kottikizhangu	NA
4	<i>Colocassia esculenta</i>	Taro	Seppakizhangu	LC
5	<i>Carex cruciata</i>	Cross Grass	Koraipullu	NA
6	<i>Cynodon dactylon</i>	Scutch grass	Arugampul	LC
7	<i>Eichhornia crassipes</i>	Water hyacinth	Agayatamarai	NA
8	<i>Nymphaea nouchali</i>	Blue waterlily	Nellambal	LC

*LC- Least Concern, NA-Not yet assessed

3.11. Findings/Results

The assessment was carried out during the summer season. The inspection day was quite alright with respectable weather. The details of the flora and fauna observed are given below.

Records of threatened species in the area

No threatened species were observed

Endangered Species as per Wildlife (Protection) Act

No Endangered fauna was recorded in the project area.

Endemic Species of the Project areas

No endemic species were observed in the project area.

Migratory species of the Project areas

No migratory fauna observed in project area.

Migratory corridors and Flight paths

No migratory corridors and Flight paths were observed in project area.

Breeding and spawning grounds

No breeding and spawning grounds were earmarked for the wildlife fauna in project area.

There are no critically endangered, endangered, vulnerable and endemic species were observed. As the rainfall in the area is scanty and as no toxic wastes are produced or discharged on account of mining, the proposed mining activity is not going to have any additional and adverse impacts on these RET species. There are no ecologically sensitive areas or protected areas within the 10 Km radius. Hence no specific conservation for conservation of any RET species or Wildlife is envisaged.

There are no National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar sites, Tiger/Elephant Reserves/(existing as well as proposed) within 10 km of the mine lease area. There are no protected forests within the project area. Hence submission of clearance from the National Board of Wildlife does not arise.

There are no endangered, endemic, and RET Species. There is no Schedule I species in the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] The proposed project is not going to have any direct or indirect adverse impact on the species mentioned above.

3.12. Conclusion

The observations and assessment of the overall ecological scenario involve details such as classification of Biogeographic zone, eco-region, habitat types, and land cover, distances from natural habitats, vegetation/forest types, and sensitive ecological habitats such as Wetlands sites, Important Bird areas, migration corridors of important wildlife etc. Such baseline information provides better understanding of the situation and overall ecological importance of the area. This baseline information viewed against proposed project activities help in predicting their impacts on the wildlife and their habitats in the region. Data collected and information gathered from secondary literature on flora, fauna, protected area, natural habitats, and wildlife species etc., and consulted and discussed with local people, from the villages, herders and farmers who inhabit close to the proposed project area.

3.6 SOCIO ECONOMIC ENVIRONMENT

Socio-economic study is an essential part of environmental study. It includes demographic structure of the area, provision of basic amenities viz., housing, education, health and medical services, occupation, water supply, sanitation, communication, transportation, prevailing diseases pattern as well as feature like temples, historical monuments etc., at the baseline level. This will help in visualizing and predicting the possible impact depending upon the nature and magnitude of the project.

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

3.6.1 Objectives of the Study

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

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

3.6.2 Scope of Work

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

3.6.3 District Profile

Traditionally known as “Pearl City” on account of the prevailing Pearl fish in the past in the area, Thoothukudi has a fascinating History. Forming part of the Pandian kingdom between 7th and 9th Century A.D., Thoothukudi remained in the hands of the Cholas during the period between 9th and 12th century. Emergence of Thoothukudi as a maritime port attracted travelers, adventures, and eventually colonizers. The Portuguese were the first to arrive in Thoothukudi in 1532 A.D., followed by the Dutch in 1658 A.D. The English Captured Thoothukudi from the Dutch in 1782 and the East India Company established their control over Thoothukudi in the same year.

On the 20th, October 1986 a new district, carved out of the erstwhile Tirunelveli district was born in Tamil Nadu and named after V.O. Chidambaranar, a great national leader hailing from Ottapidaram who led the Swadeshi Movement in the south. Since 1997 as in the case of other districts of Tamilnadu, this district has also been named after its headquarters town, Thoothukudi.

Source: <https://thoothukudi.nic.in/about-district/> .

3.6.4 Study area:

KOVUNDAMPALAYAM VILLAGE

Kolamparambu is a medium size village located in Ottapidaram Taluka of Thoothukkudi district, Tamil Nadu with total 237 families residing. The Kolamparambu village has population of 839 of which 414 are males while 425 are females as per Population Census 2011.

In Kolamparambu village population of children with age 0-6 is 57 which makes up 6.79 % of total population of village. Average Sex Ratio of Kolamparambu village is 1027 which is higher than Tamil Nadu state average of 996. Child Sex Ratio for the Kolamparambu as per census is 1036, higher than Tamil Nadu average of 943.

Kolamparambu village has higher literacy rate compared to Tamil Nadu. In 2011, literacy rate of Kolamparambu village was 82.35 % compared to 80.09 % of Tamil Nadu. In Kolamparambu Male literacy stands at 89.38 % while female literacy rate was 75.51 %.

As per constitution of India and Panchyati Raaj Act, Kolamparambu village is administrated by Sarpanch (Head of Village) who is elected representative of village. Our website, don't have information about schools and hospital in Kolamparambu village.

TABLE 3.38: KOLLAMPARAMBU VILLAGE POPULATION FACTS

Population	839
Male Population	414
Female Population	425
Children Population	57
Literacy	644
Male Literacy	345
Female Literacy	299
Scheduled Tribes (ST)	0
Scheduled Caste (SC)	133

Source: <https://villageinfo.in/tamil-nadu/thoothukkudi/ottapidaram/kolamparambu/>

As per Census 2011, Kolamparambu village has a total population of 839 people, consisting of 414 males and 425 females. The village has 237 households and a sex ratio of 1,026 females per 1,000 males. There are 57 children in the 0–6 years age group. The village has 644 literate and 195 illiterate residents. Additionally, 133 people belong to Scheduled Caste (SC) communities .

TABLE 3.39: DEMOGRAPHICS POPULATION OF VILLAGE KOLLAMPARAMBU

Total Population	Male Population	Female Population
839	414	425

Source : <https://villageinfo.in/tamil-nadu/thoothukkudi/ottapidaram/kolamparambu/>

Sex Ratio of Kollamparambu Village -Census 2011

Child Sex Ratio for the Kolamparambu as per census is 1036, higher than Tamil Nadu average of 943.

Literacy of Kollamparambu Village

Kolamparambu village has higher literacy rate compared to Tamil Nadu. In 2011, literacy rate of Kolamparambu village was 82.35 % compared to 80.09 % of Tamil Nadu. In Kolamparambu Male literacy stands at 89.38 % while female literacy rate was 75.51 %.

Worker's profile of Kollamparambu Village

In Kolamparambu village out of total population, 502 were engaged in work activities. 18.73 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 81.27 % were involved in Marginal activity providing livelihood for less than 6 months. Of 502 workers engaged in Main Work, 8 were cultivators (owner or co-owner) while 28 were Agricultural labourer.

TABLE 3.42: POPULATION DATA OF STUDY AREA

SI.No.	Village Name	No of House Holds	Total Population	Male	Female	Total Literate Population	Male Literate	Female Literate	Total Illiterate Population	Male Illiterate	Female Illiterate
1	Adanur	619	2152	1061	1091	1407	785	622	745	276	469
2	Chandragiri	526	1840	900	940	1322	687	635	518	213	305
3	D.Duraiswamipuram	331	1207	623	584	769	445	324	438	178	260
4	Jagaveerapandiapuram	396	1237	617	620	941	496	445	296	121	175
5	K.Shanmukapuram	266	958	469	489	656	376	280	302	93	209
6	Kattunayakkanpatti	472	1644	820	824	1142	644	498	502	176	326
7	Kolamparambu	237	839	414	425	644	345	299	195	69	126
8	Mullur Muthukumarapuram	258	939	503	436	529	327	202	410	176	234
9	S.Kumarapuram	466	1647	847	800	1178	680	498	469	167	302
10	Sakkammalpuram	485	1506	692	814	1076	541	535	430	151	279
11	Vadanatham	450	1548	801	747	1112	618	494	436	183	253
12	Veerapandiapuram	221	604	282	322	444	224	220	160	58	102

Source: www.censusindia.gov.in - Tamilnadu Census of India – 2011

TABLE 3.43: WORKERS PROFILE OF STUDY AREA

SI.No.	Village Name	Total Workers Population	Male Workers	Female Workers	Total Main Workers	Main Workers Male	Main Workers Female	Main Cultivation Workers	Main Agriculture Workers	Main Other Workers	Non-Worker Population
1	Adanur	1462	727	735	904	465	439	47	724	502	690
2	Chandragiri	972	550	422	654	483	171	133	215	242	868
3	D.Duraiswamipuram	611	370	241	603	367	236	87	331	7	596
4	Jagaveerapandiapuram	666	360	306	591	343	248	104	211	51	571
5	K.Shanmukapuram	382	259	123	299	186	113	39	117	4	576
6	Kattunayakkanpatti	856	487	369	718	429	289	5	280	95	788
7	Kolamparambu	502	276	226	94	66	28	8	28	44	337
8	Mullur Muthukumarapuram	518	299	219	511	294	217	1	450	5	421
9	S.Kumarapuram	947	498	449	585	331	254	4	377	305	700
10	Sakkammalpuram	937	448	489	898	440	458	214	443	23	569
11	Vadanatham	812	482	330	471	322	149	8	211	304	736
12	Veerapandiapuram	471	210	261	470	209	261	449	1	0	133

Source: www.censusindia.gov.in – Tamil Nadu Census of India – 2011

TABLE 3.44: COMMUNICATION & TRANSPORT FACILITIES IN THE STUDY AREA

SI.No	Village Name	PO	SPO	PTO	T	PCO	MP	IC / CSC	PCF	BS	PBS	RS	NH	SH	MDR	BTR	GR	NWR	FP
1	Adanur	2	1	2	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
2	Chandragiri	2	2	2	1	2	1	2	2	2	2	2	2	2	2	1	1	2	1
3	D.Duraiswamipuram	2	2	2	1	2	1	2	2	1	1	2	2	1	1	1	1	2	1
4	Jagaveerapandiapuram	2	1	2	1	1	1	2	2	1	1	2	1	1	1	1	1	2	1
5	K.Shanmukapuram	2	2	2	1	2	1	2	2	1	2	2	2	1	1	1	1	2	1
6	Kattunayakkanpatti	2	2	2	1	2	1	2	2	1	1	2	2	2	2	1	1	2	1
7	Kolamparambu	2	2	2	1	2	1	2	2	1	2	2	2	2	1	1	1	2	1
8	Mullur Muthukumarapuram	2	2	2	1	2	1	2	2	1	2	2	2	2	2	1	1	2	1
9	S.Kumarapuram	2	2	2	1	1	1	2	2	1	1	2	1	1	1	1	1	2	1
10	Sakkammalpuram	2	1	2	1	1	1	2	2	1	2	2	2	2	1	1	1	2	1
11	Vadanatham	2	1	2	1	1	1	2	2	1	1	2	2	1	1	1	1	2	1
12	Veerapandiapuram	2	2	2	1	1	1	2	2	1	1	2	2	2	1	1	1	2	1

Abbreviations: PO - Post Office; MP - Mobile Phone Coverage; RS - Railway Station; GR - Gravel Roads; SPO - Sub Post Office; IC / CSC - Internet Cafe/Common Service Centre; NH - National Highways; NWR - Navigate waterways River; PTO - Post & Telegraph office; PCF - Private Courier Facility; SH - State Highways; FP - Foot path; T- Telephone (Landline); BS - Public Bus Service; MDR - Major District Road; PCO - Public call office / Mobile; PBS - Private Bus Service; BTR - Black Topped (Pucca Roads). Note: 1 - Available within the village 2 - Not available

TABLE 3.45: WATER & DRAINAGE FACILITIES IN THE STUDY AREA

SI.No	Village Name	TP	CW	UCW	HP	TW/BH	S	R/C	T/P/L	CD	OD	CT
1	Adanur	1	1	1	1	1	2	1	2	1	1	2
2	Chandragiri	1	2	1	1	1	2	2	2	1	1	2
3	D.Duraiswamipuram	1	2	1	1	1	2	2	2	2	1	2
4	Jagaveerapandiapuram	1	2	2	2	1	2	2	2	1	1	2
5	K.Shanmukapuram	1	2	2	2	2	2	2	2	2	2	2
6	Kattunayakkanpatti	1	1	2	1	1	2	2	2	1	1	2
7	Kolamparambu	2	2	1	1	2	2	2	1	2	1	2
8	Mullur Muthukumarapuram	2	2	2	2	2	2	2	1	2	1	1
9	S.Kumarapuram	1	2	2	1	1	2	2	2	1	1	2
10	Sakkammalpuram	1	2	1	1	1	2	2	2	1	1	2
11	Vadanatham	1	2	2	1	1	2	2	2	1	1	2
12	Veerapandiapuram	1	2	1	2	2	2	2	2	1	1	2

Abbreviations: T - Tap Water; R / C - River / Canal; CW - Covered Well; T/P/L - Tank / Pond / Lake; UCW - Uncovered Well; CD - Covered Drainage; HP - Hand Pump; OD - Open Drainage; TW/BH - Tube / Bore Well; CT - Community Toilet Complex for General public; S - Spring

Note – 1 - Available within the village; 2 - Not available

TABLE 3.46: OTHER FACILITIES IN THE STUDY AREA

SI.No	Village Name	ATM	CB	COB	ACS	SHG	PDS	RM	AMS	NC	NC-AC	CC	SF	PL	NPS	APS	BDRO	PS
1	Adanur	2	2	2	2	1	1	2	2	1	1	1	1	1	1	1	1	1
2	Chandragiri	2	2	2	2	1	1	2	2	1	1	1	1	1	1	1	1	1
3	D.Duraiswamipuram	2	2	2	2	1	1	2	2	1	1	2	1	2	1	1	1	1
4	Jagaveerapandiapuram	2	2	2	1	1	1	2	2	1	1	1	1	1	1	1	1	1
5	K.Shanmukapuram	2	2	2	2	1	1	2	2	1	1	1	1	1	1	1	1	1
6	Kattunayakkanpatti	2	2	2	2	1	1	2	2	1	1	2	1	1	1	1	1	1
7	Kolamparambu	2	2	2	2	1	1	2	2	1	1	1	1	1	1	1	1	1
8	Mullur Muthukumarapuram	2	2	2	2	1	1	2	2	1	1	2	1	1	1	1	1	1
9	S.Kumarapuram	2	2	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1
10	Sakkammalpuram	2	2	2	1	1	1	2	2	1	1	1	1	1	1	1	1	1
11	Vadanatham	2	2	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1
12	Veerapandiapuram	2	2	2	2	1	1	2	2	1	1	1	1	2	1	1	1	1

Abbreviations: ATM - Automatic Teller Machine; PDS - Public Distribution System (Shop); CB - Commerical Bank; RM - Regular Market; COB - Co-operative Bank; AMS - Agricultural Market Society; ACS - Agricultural Credit Societies; NC - Nutritional Centres; SHG - Self Help Group; NC-AC - Nutritional Centres - Anganwadi Centre; DBRO - Birth & Death Registration Office; PS - Power Supply
 Note – 1 - Available within the village; 2 - Not available

TABLE 3.47: EDUCATIONAL FACILITIES IN THE STUDY AREA

SI.No	Village Name	PPS		PS		MS		SS		SSS		DC		EC		MC		MI		PT		VTS		SSD	
		G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P
1	Adanur	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2	Chandragiri	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	D.Duraiswamipuram	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
4	Jagaveerapandiapuram	1	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
5	K.Shanmukapuram	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
6	Kattunayakkanpatti	1	2	2	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
7	Kolamparambu	1	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
8	Mullur Muthukumarapuram	1	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
9	S.Kumarapuram	1	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
10	Sakkammalpuram	1	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
11	Vadanatham	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
12	Veerapandiapuram	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Abbreviations: PPS-Pre Primary School; SSS-Senior Secondary School; DC-Degree School; PT-Polytechnic; PS-Primary School; G-Government; EC-Engineering College; VTS-Vocational School/ITI; MS-Middle School; P-Private; MC-Medical College; SSD-Special School For Disabled; SS-Secondary School; MI-Management College/Institute;
 Note – 1 - Available within the village; 2 - Not available

TABLE 3.48: MEDICAL FACILITIES IN THE STUDY AREA

SL.No	Village Name	CHC	PHC	PHSC	MCW	TBC	HA	HAM	D	VH	MHC	FWC	NGM-I/O
1	Adanur	0	0	0	0	0	0	0	0	0	0	0	a
2	Chandragiri	0	0	0	0	0	0	0	0	0	0	0	b
3	D.Duraiswamipuram	0	0	0	0	0	0	0	0	0	0	0	b
4	Jagaveerapandiapuram	0	0	0	0	0	0	0	0	0	0	0	b
5	K.Shanmukapuram	0	0	0	0	0	0	0	0	0	0	0	a
6	Kattunayakkanpatti	0	0	1	0	0	0	0	0	0	0	0	a
7	Kolamparambu	0	0	0	0	0	0	0	0	1	0	0	c
8	Mullur Muthukumarapuram	0	0	0	0	0	0	0	0	0	0	0	c
9	S.Kumarapuram	0	0	0	0	0	0	0	0	0	0	0	a
10	Sakkammalpuram	0	0	1	1	0	0	0	0	0	0	0	b
11	Vadanatham	0	0	0	0	0	0	0	0	0	0	0	b
12	Veerapandiapuram	0	0	1	0	0	0	0	0	0	0	0	b

Abbreviations: CHC-Community Health Centre; TBC-TB Clinic; VH- Veternity Hospital; PHC-Primary Health Centre; HA-Aallopathic Hospital; FWC-Family Welfare Centre; PHSC-Primary Health Sub Centre ; HAM-Alternative Medicine Hospital; MH-Mobile Health Clinic; MCW-Maternity and Child Welfare Centre; D-Dispensary; NGM-I/O-Non Government Medical Facilities In & Out Patient

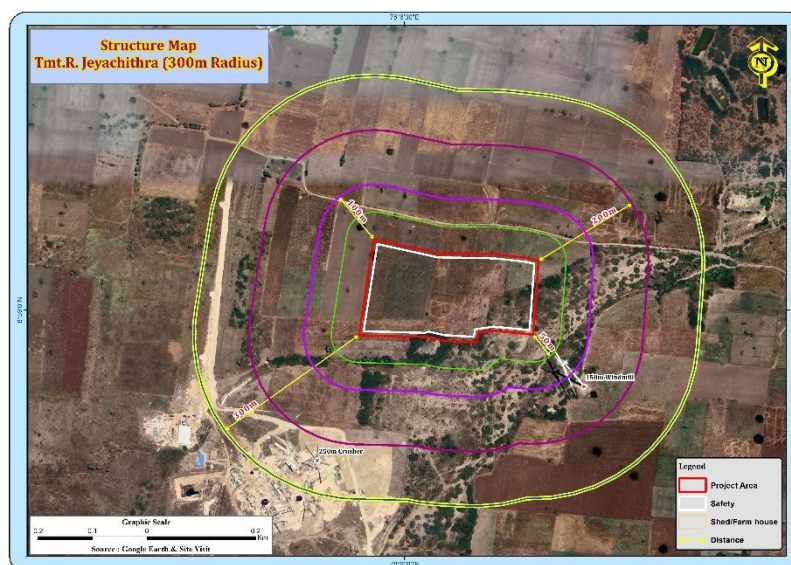
Note – 1 - Available within the village; 2 - Not available

a-facility available at <5kms

b-facility available at>10kms

Source: www.censusindia.gov.in – Tamil Nadu Census of India – 2011

STRUCTURE WITHIN 300M RADIUS



0 – 300m						
Structure Number	Distance & Direction from the Project site	Structure Details and Usage Purpose	Type of Structure Structures (Kutcha/ Brick/ Cement/ RCC/ Framed Structures)	No. of Occupants	Structure belongs to owner (Yes/No)	Remarks
1	150m – South East	Windmill	Framed Structure	Nil	No	Used to generate Electricity
2	250m – South West	Crusher	Framed Structure	4 Nos	No	Used to Produce M. Sand, P-Sand & Jelly

3.6.6 Recommendation and Suggestion

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

3.6.7 Summary & 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.

CHAPTER – 4: ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 General

The environmental impact can be categorized as either primary or secondary, primary impacts which are attributed directly by the project; secondary impacts are those which are indirectly induced. The open cast mining operations involve development of benches, Approach Road, Haul Road, Excavation and handling of material. If adequate control measures are not taken to prevent/mitigate the adverse environmental impacts/lead to damage of the eco-system.

In order to maintain the environmental commensuration with the mining operation, it is essential to undertake studies on the existing environmental scenario and assess the impact on different environmental components. This would help in formulating suitable management plans for sustainable resource extraction. Based on the baseline environmental status at the existing mine site, the environmental factors that are likely to be affected (Impacts) are identified, quantified and assessed. The various anticipated impacts will be on

- Land environment
- Water Environment
- Air Environment
- Noise Environment
- Socio economic environment
- Solid waste
- Soil environment

In general, the main findings regarding the potential impacts of climate change are Land Use Type, Energy Use, Water use & Dust emission and Biodiversity & rehabilitation.

Whereas, this mining activity is restricted to a small scale mining and the proposal falls in “B1” Category, the surrounding environment is already subjected to mining activities and based on the past weather data its inferred that there is no much of change in the climate data of the region and the district profile has no records or past history of climate change leading to Droughts and floods.

- The mine pit shall act as a rain water harvesting structure and formation of garland drains along the mine lease boundary to divert the surface runoff and collecting the runoff water for greenbelt development and dust suppression activities shall prove beneficial.
- The greenbelt development plan, all along the mine lease boundary, along with the budget allocation for the proposed mitigation measures shall prove beneficial to surrounding environment.
- Therefore, the implementation of proposed mitigation measures for winning of mineral may not have much of impact on the surrounding Climate Change.

4.1 Land Environment

4.1.2 Anticipated Impact from Proposed Project

- 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
- Impact due to heritage site, Archaeological sites

4.1.2.1 Mitigation Measures for Proposed Project

- The mining activity will be gradual confined in blocks and excavation will be undertaken progressively along with other mitigative measures like phase wise development of greenbelt etc.,
- Construction of garland drains all around the quarry pits and construction of check dam at strategic location in lower elevations to prevent erosion due to surface runoff during rainfall and also to collect the storm water for various uses within the proposed area
- Green belt development along the boundary within safety zone. The small quantity of water stored in the mined-out pit will be used for greenbelt
- Thick plantation will be carried out on unutilized area, top benches of mined out pits, on safety barrier, etc.,
- At conceptual stage, the land use pattern of the quarry will be changed into Greenbelt area and temporary reservoir
- In terms of aesthetics, natural vegetation surrounding the quarry will be retained (such as in a buffer area i.e., 7.5 m safety barrier and other safety provided) so as to help minimise dust emissions.
- Proper fencing will be carried out at the conceptual stage, Security will be posted round the clock, to prevent inherent entry of the public and cattle
- There are no Archaeological sites, heritage site in the vicinity of the project area, the topography will be changed due to excavation of rough stone and Gravel.

4.1.3 Soil Environment

4.1.4 Impact on Soil Environment

The top layer of the project site in the form of Gravel formation, the Gravel will be directly loaded into tippers for the filling and levelling of low-lying areas. There is no disposal of Gravel. The excavated rough stone will be directly loaded into dumpers to the needy customers.

There will be no disposal of waste water from the quarry operation, No discharge of toxic effluent from the proposed project. The dust emission at working face and haul roads will be controlled by water sprinkling and plantation.

Erosion and Sedimentation (Removal of protective vegetation cover; Exposure of underlying soil horizons that may be less pervious, or more erodible than the surface layers; Reduced capacity of soils to absorb rainfall; Increased energy in storm-water runoff due to concentration and velocity; and Exposure of subsurface materials which are unsuitable for vegetation establishment).

4.1.5 Mitigation Measures

- Run-off diversion – Garland drains will be constructed all around the project boundary to prevent surface flows from entering the quarry works areas. And will be discharged into vegetated natural drainage lines, or as distributed flow across an area stabilised against erosion.
- Sedimentation ponds - Run-off from working areas will be routed towards sedimentation ponds. These trap sediment and reduce suspended sediment loads before runoff is discharged from the quarry site. Sedimentation ponds should be designed based on runoff, retention times, and soil characteristics. There may be a need to provide a series of sedimentation ponds to achieve the desired outcome.
- Retain vegetation – Retain existing or re-plant the vegetation at the site wherever possible.
- Monitoring and maintenance – Weekly monitoring and daily maintenance of erosion control systems so that they perform as specified specially during rainy season

4.1.6 Waste Dump Management

There are no wastages anticipated in this rough stone and gravel quarrying operation. The entire quarried out materials will be utilized (100%). The overburden in the form of gravel formation the gravel will be also sold to needy customers for the filling and levelling of low-lying areas.

4.2 Water Environment

4.2.1 Anticipated Impact on Surface and ground water

The impact due to quarrying on the water quality is expected to be insignificant because of no use of chemicals or hazardous substances during quarrying process. The quarrying activity will not intersect ground water table as the maximum depth of the quarry is 60m and water table is found at 98m in summer season and 93m in rainy season.

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

TABLE 4.1: WATER REQUIREMENTS

<i>Purpose</i>	<i>Quantity calculation</i>	<i>Source</i>
Dust Suppression	3.0 KLD	From Nearby Existing bore well
Green Belt	2.5 KLD	From Nearby Existing bore well
Sanitation & Drinking	1.5 KLD	Approved water vendors
Total	7.0 KLD	

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

Source: Approved Mining Plan Pre-Feasibility Report

Total water requirement in the proposed project is about 7.0 KLD, the water for dust suppression and greenbelt development will be sourced from the mine pit water collected during rainy seasons, the water for domestic purpose and drinking will be sourced from the approved water vendors.

4.2.2 Mitigation Measures:

- Garland drains, settling tank will be constructed along the mining lease area. The Garland drain will be connected to settling tank and sediments will be trapped in the settling traps and only clear water will be discharged out to the natural drainage
- Rainwater will be collected in sump in the mining pits and will be allowed to store and pumped out to surface 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 and such sites where dust likely to be generated and for developing green belt. The proponent will collect and judiciously utilize the rainwater as part of rainwater harvesting system.
- Providing benches with inner slopes and through a system of drains and channels, allowing rain water to descent into surrounding drains, so as to minimize the effects of erosion & water logging arising out of uncontrolled descent of water.
- Reuse the water collected during storm for dust suppression and greenbelt development within the mines
- Installing interceptor traps/oil separators to remove oils and greases. Water from the tipper wash-down facility and machinery maintenance yard will pass through interceptor traps/oil separators prior to its reuse;
- Using flocculating or coagulating agents to assist in the settling of suspended solids during monsoon seasons;
- Periodic (every 6 month once) analysis of quarry pit water and ground water quality in nearby villages.
- Domestic sewage from site office & urinals/latrines provided in ML is discharged in septic tank followed by soak pits.
- Waste water discharge from mine will be treated in settling tanks before using for dust suppression and tree plantation purposes.
- De-silting will be carried out before and immediately after the monsoon season.
- Regular monitoring (every 6 month once) and analysing the quality of water in open well, bore wells and surface water.

Possibilities of water contamination and impact on an aquatic ecosystem health

- Anticipated impact from this proposed mining activity is surface runoff from cleared surfaces, or discharges from the quarry pit or floor, is likely to have elevated levels of sediment (both suspended and dissolved). The quality of the water discharged from the site can have impacts on downstream ecological communities and water users.
- Therefore, Run-off diversion is proposed – Garland drains will be constructed all around the project boundary to prevent surface flows from entering the quarry works areas. And will be discharged into vegetated natural drainage lines, or as distributed flow across an area stabilised against erosion with only clear water after the garland drains are enrooted through settlement traps.
- And, the depth of the mining is maximum 60m bgl and the ground water level in the surrounding areas is about 93-98 m bgl and there are no possibilities of encountering any ground water aquifers system and hence no ground water table intersection is anticipated.
- After the completion of quarry operation, the quarried out open pit mine may utilized for pici-culture or temporary reservoir pit for use of water for domestic purpose during dry seasons.
- Therefore, it's inferred that the implementation of proposed mitigation measures for winning of mineral may not have much of impact on the possibilities of water contamination and impact on an aquatic ecosystem health.

4.3 Air Environment

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

4.3.1. 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.

4.3.1.1. Modelling of Incremental Concentration from Proposed Project

Wind erosion of the exposed areas and the air borne particulate matter generated by quarrying operation and transportation are mainly PM₁₀ & PM_{2.5} and emissions of Sulphur dioxide (SO₂) & Oxides of Nitrogen (NO_x) due to excavation/loading equipment and vehicles plying on haul roads are the cause of air pollution in the project area.

Similarly, loading - unloading and transportation of Rough Stone, wind erosion of the exposed area and movement of light vehicles causes of pollution. This leads to an impact on the ambient air environment around the project area.

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

The impact on Air Environment is due to the mining and allied activities during Land Development phase, Mining process and Transportation. The emissions of Sulphur dioxide (SO₂), Oxides of Nitrogen (NO_x) due to excavation/loading equipment and vehicles plying on haul roads are marginal. Loading - unloading and transportation of Rough Stone, wind erosion of the exposed area and movement of light vehicles will be the main polluting source in the mining activities releasing Particulate Matter (PM₁₀) affecting Ambient Air of the area. Prediction of impacts

on air environment has been carried out taking into consideration cumulative production three proposed Quarry. Air environment and net increase in emissions by Open pit source modelling in AERMOD Software.

4.3.1.2 Emission Estimation

An emissions factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant.

The general equation for emissions estimation is:

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

Where:

E = emissions;

A = activity rate;

EF = emission factor, and

ER =overall emission reduction efficiency, %

The proposed mining activity includes various activities like ground preparation, excavation, handling and transport of ore. These activities have been analysed systematically basing on USEPA-Emission Estimation Technique Manual, for Mining AP-42, to arrive at possible emissions to the atmosphere and estimated emissions are given in Table 4-2.

TABLE 4.2: ESTIMATED EMISSION RATE FOR PROPOSED PROJECT

	Activity	Source type	Value	Unit
Estimated Emission Rate for PM ₁₀	Drilling	g/s	0.111729629	g/s
	Blasting	g/s	0.002978113	g/s
	Mineral Loading	g/s	0.053919541	g/s
	Haul Road	g/s/m	0.002689421	g/s/m
	Overall Mine	g/s	0.157049589	g/s
Estimated Emission Rate for SO ₂	SO ₂	g/s	0.002840695	g/s
Estimated Emission Rate for NO _x	Nox	g/s	0.000381179	g/s

4.3.2 Frame work of Computation & Model details

The prediction included the impact of Excavation, Drilling, Blasting, loading and movement of vehicles during transportation and meteorological parameters such as wind speed, wind direction, temperature, rainfall, humidity and Cloud cover.

Impact was predicted over the distance of 10 km around the source to assess the impact at each receptor separately at the various locations and maximum incremental GLC value at the project site. Maximum impact of PM₁₀ was observed close to the source due to low to moderate wind speeds. Incremental value of PM₁₀ was superimposed on the base line data monitored at the proposed site to predict total GLC of PM₁₀ due to combined impacts.

Air Pollution Dispersion Modelling.

Baseline Air Quality –

Baseline air quality has been measured at 2 locations in the cluster and 5 locations within the buffer zone of the study area. The 24 - hourly average samples of particulate matters (PM₁₀ and PM_{2.5}), SO₂ and NO_x were measured following the National Ambient Air Quality Standards (NAAQS), 2009. Monitoring data of 8 sampling stations are given below –

Meteorological Data –

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 and monitored continually for study period without break. The station was installed at a height of 4 m above the ground level in such a way that there are no obstructions facilitating flow of wind, wind speed, wind direction, humidity and temperature are recorded on hourly

basis. A weather data was collected from IMD, Thoothukudi agro for the month of Mar 2026 – May 2026 to correlate with site data and found not much of change in the parameters.

FIGURE 4.1: AERMOD TERRAIN MAP

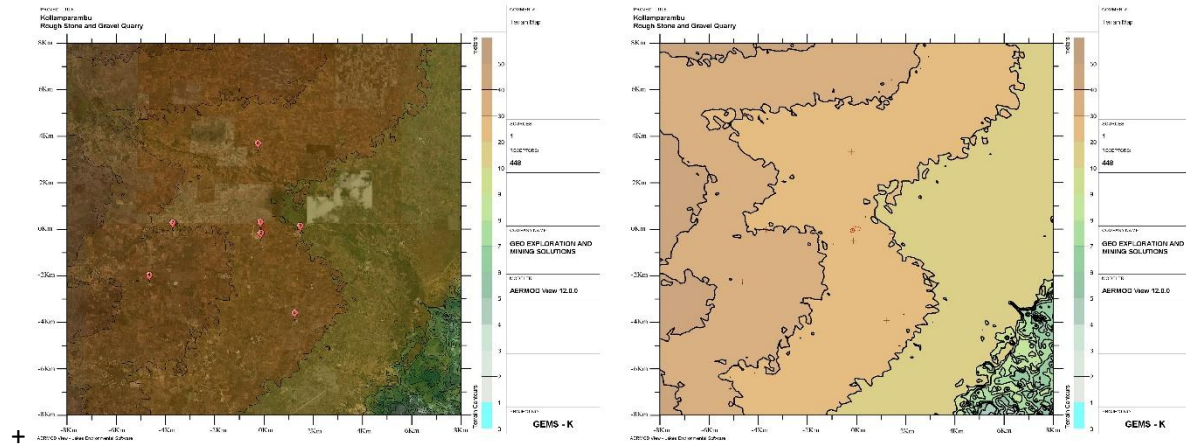


FIGURE 4.2: PREDICTED INCREMENTAL CONCENTRATION OF PM₁₀

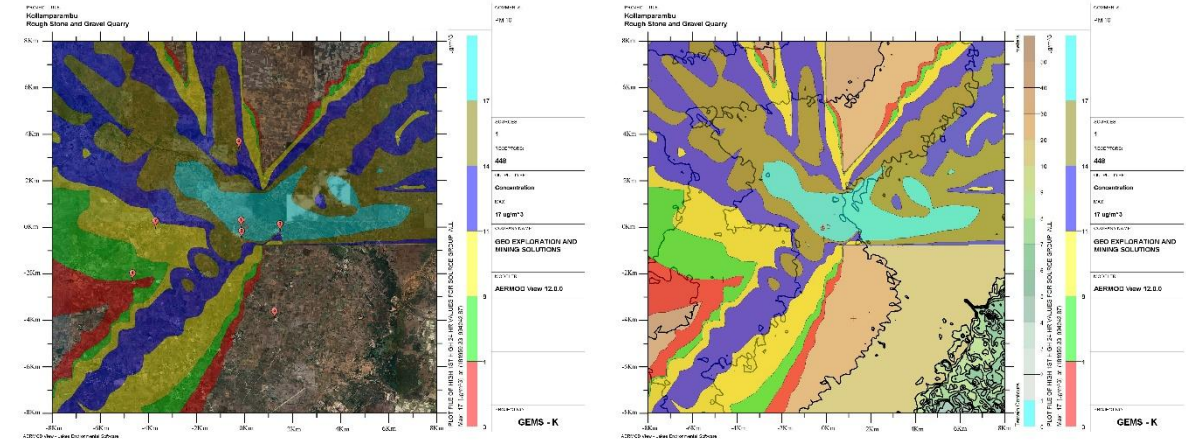


FIGURE 4.3: PREDICTED INCREMENTAL CONCENTRATION OF SO₂

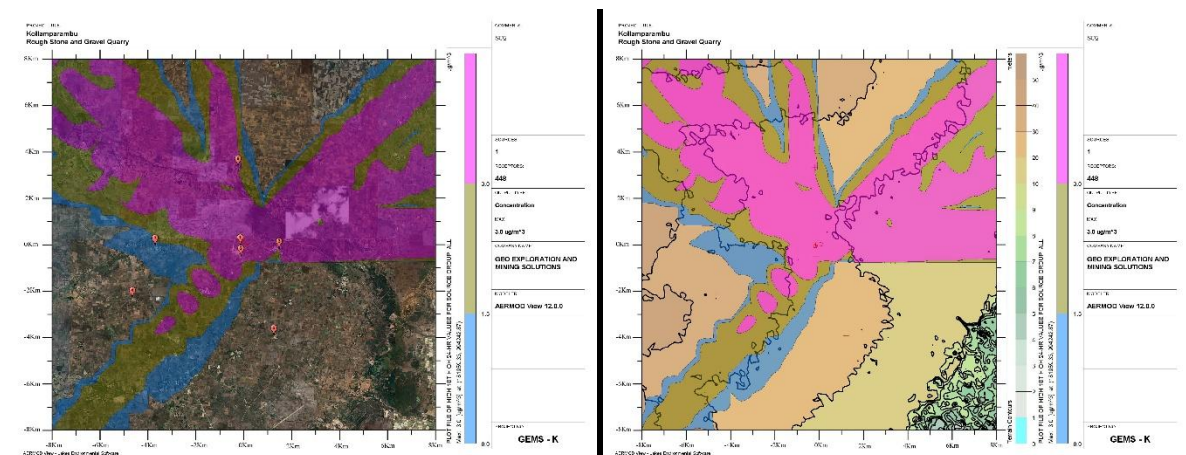
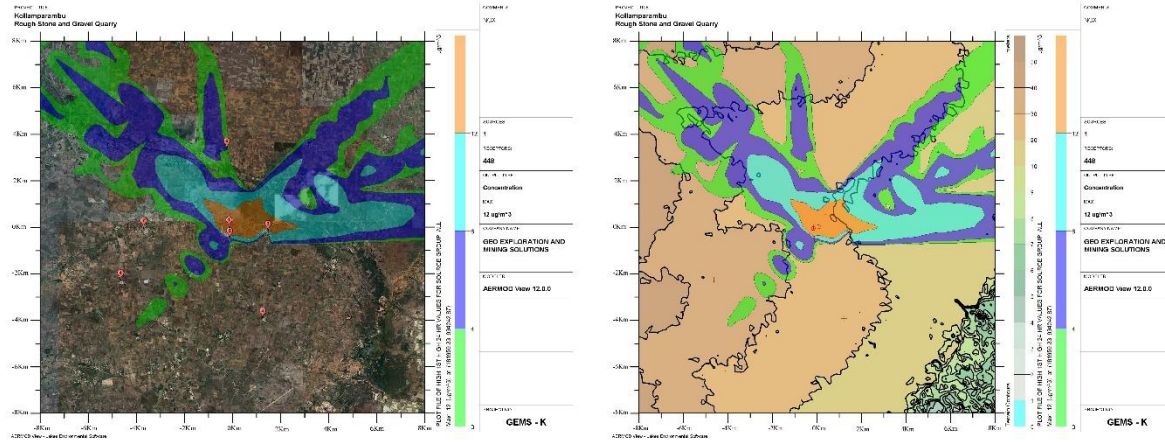
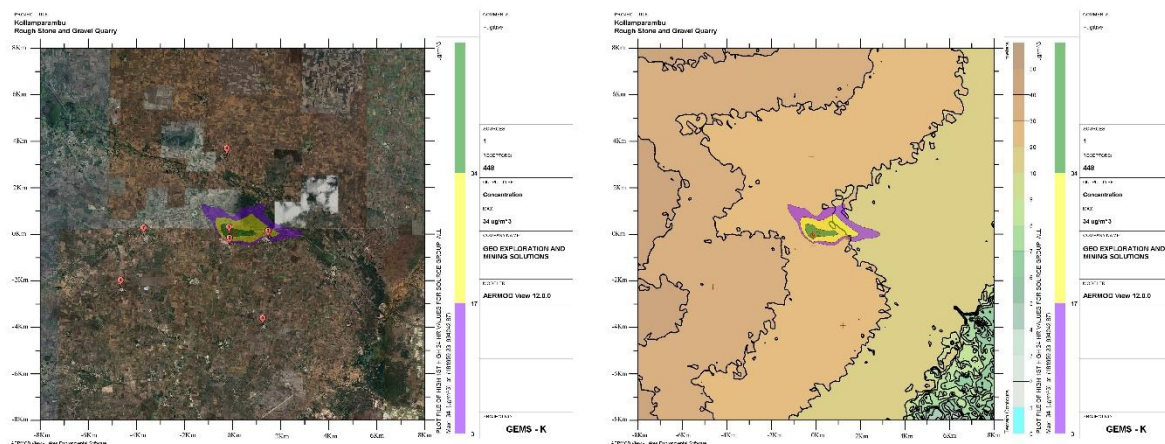


FIGURE 4.4: PREDICTED INCREMENTAL CONCENTRATION OF NO_x**FIGURE 4.5: PREDICTED INCREMENTAL CONCENTRATION OF FUGITIVE DUST**

4.3.2.1 Model Results

The post project Resultant Concentrations of PM₁₀, PM_{2.5}, SO₂ & NO_x (GLC) is given in Table below:

TABLE 4.3: INCREMENTAL & RESULTANT GLC OF PM₁₀

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline PM ₁₀ (µg/m ³)	Incremental value of PM ₁₀ due to mining (µg/m ³)	Total PM ₁₀ (µg/m ³) (5+6)
AAQ1	8°58'59.32"N 78° 6'27.97"E	-150	-25	43.0	17.00	60
AAQ2	8°58'43.93"N 78° 6'28.68"E	-122	-501	43.1	16.72	59.82
AAQ3	8°58'53.99"N 78° 7'20.51"E	1472	-198	44.3	13.65	57.95
AAQ4	8°57'45.56"N 78° 4'1.58"E	-4659	-2313	43.2	4.20	47.4
AAQ5	8°56'53.07"N 78° 7'17.32"E	1250	-3938	43.7	0	43.7
AAQ6	9° 0'48.81"N 78° 6'24.90"E	-244	3363	43.3	16.00	59.3
AAQ7	8°58'58.32"N 78° 4'32.34"E	-3707	-60	44.0	10.00	54

TABLE 4.4: INCREMENTAL & RESULTANT GLC OF PM_{2.5}

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline PM _{2.5} (µg/m ³)	Incremental value of PM _{2.5} due to mining (µg/m ³)	Total PM _{2.5} (µg/m ³) (5+6)
AAQ1	8°58'59.32"N 78° 6'27.97"E	-150	-25	19.8	9.48	29.28
AAQ2	8°58'43.93"N 78° 6'28.68"E	-122	-501	20.4	9.20	29.6
AAQ3	8°58'53.99"N 78° 7'20.51"E	1472	-198	20.7	7.15	27.85
AAQ4	8°57'45.56"N 78° 4'1.58"E	-4659	-2313	21.0	2.71	23.71
AAQ5	8°56'53.07"N 78° 7'17.32"E	1250	-3938	21.7	0.18	21.88
AAQ6	9° 0'48.81"N 78° 6'24.90"E	-244	3363	21.3	8.64	29.94
AAQ7	8°58'58.32"N 78° 4'32.34"E	-3707	-60	20.9	6.00	26.9

TABLE 4.5: INCREMENTAL & RESULTANT GLC OF SO₂

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline SO ₂ (µg/m ³)	Incremental value of SO ₂ due to mining (µg/m ³)	Total SO ₂ (µg/m ³) (5+6)
AAQ1	8°58'59.32"N 78° 6'27.97"E	-150	-25	5.0	3.09	8.09
AAQ2	8°58'43.93"N 78° 6'28.68"E	-122	-501	4.9	3.07	7.97
AAQ3	8°58'53.99"N 78° 7'20.51"E	1472	-198	5.0	2.79	7.79
AAQ4	8°57'45.56"N 78° 4'1.58"E	-4659	-2313	4.9	0	4.9
AAQ5	8°56'53.07"N 78° 7'17.32"E	1250	-3938	5.2	0	5.2
AAQ6	9° 0'48.81"N 78° 6'24.90"E	-244	3363	4.9	3.03	7.93
AAQ7	8°58'58.32"N 78° 4'32.34"E	-3707	-60	5.0	1.24	6.24

TABLE 4.6: INCREMENTAL & RESULTANT GLC OF NO_x

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline NO _x (µg/m ³)	Incremental value of NO _x due to mining (µg/m ³)	Total NO _x (µg/m ³) (5+6)
AAQ1	8°58'59.32"N 78° 6'27.97"E	-150	-25	20.2	12.00	32.2
AAQ2	8°58'43.93"N 78° 6'28.68"E	-122	-501	20.6	7.82	28.42
AAQ3	8°58'53.99"N 78° 7'20.51"E	1472	-198	22.5	1.00	23.5
AAQ4	8°57'45.56"N 78° 4'1.58"E	-4659	-2313	23.1	0	23.1
AAQ5	8°56'53.07"N 78° 7'17.32"E	1250	-3938	23.7	0	23.7
AAQ6	9° 0'48.81"N 78° 6'24.90"E	-244	3363	22.5	7.29	29.79
AAQ7	8°58'58.32"N 78° 4'32.34"E	-3707	-60	22.3	0	22.3

TABLE 4.7: INCREMENTAL & RESULTANT GLC OF FUGITIVE DUST

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline Fugitive (µg/m ³)	Incremental value of Fugitive due to mining (µg/m ³)	Total Fugitive (µg/m ³) (5+6)
AAQ1	8°58'59.32"N 78° 6'27.97"E	-150	-25	65.68	34.00	99.68
AAQ2	8°58'43.93"N 78° 6'28.68"E	-122	-501	66.12	0	66.12
AAQ3	8°58'53.99"N 78° 7'20.51"E	1472	-198	66.52	0	66.52
AAQ4	8°57'45.56"N 78° 4'1.58"E	-4659	-2313	67.60	0	67.6
AAQ5	8°56'53.07"N 78° 7'17.32"E	1250	-3938	67.58	0	67.58
AAQ6	9° 0'48.81"N 78° 6'24.90"E	-244	3363	67.28	0	67.28
AAQ7	8°58'58.32"N 78° 4'32.34"E	-3707	-60	67.16	0	67.16

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

4.3.4. Mitigation Measure

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 checkups, trainings and campaigns will be arranged to ensure awareness about importance of wearing dust masks among all mine workers & tipper drivers
- Ambient Air Quality Monitoring will be conducted six months once to assess effectiveness of mitigation measures proposed

Climatic Changes:

- In general, the main findings regarding the potential impacts of climate change are Land Use Type, Energy Use, Water use & Dust emission and Biodiversity & rehabilitation.

- Whereas, this proposed mining activity is restricted to a small scale mining the proposals falls in a cluster situation where the surrounding environment is already subjected to mining activities and based on the past weather data its inferred that there is no much of change in the climate data of the region and the district profile has no records or past history of climate change leading to Droughts and floods.
- The project area's proposed with land use type of patta land for mining with 5 m height bench with 5 m width bench and Pollution Under Control Certified Machineries is proposed for wining of mineral by opencast mechanized mining method and water consumption are proposed with water tankers from nearby areas and the mine pit itself shall act as a rain water harvesting structure and formation of garland drains along the mine lease boundary to divert the surface runoff and collecting the runoff water for greenbelt development and dust suppression activities shall prove beneficial.
- The greenbelt development plan, all along the mine lease boundary @ 2,400 Nos of trees, along with the budget allocation for the proposed mitigation measures shall prove beneficial to surrounding environment.
- Therefore, the implementation of proposed mitigation measures for winning of mineral may not have much of impact on the surrounding Climate Change leading Droughts and Floods etc.,

4.4 Noise Environment (Impact & Mitigation Measures)

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

Predictions have been carried out to compute the noise level at various distances around the working pit due to these major noise-generating sources. Noise modelling has been carried out to assess the impact on surrounding ambient noise levels. Basic phenomenon of the model is the geometric attenuation of sound. Noise at a point generates spherical waves, which are propagated outwards from the source through the air at a speed of 1,100 ft/sec, with the first wave making an ever-increasing sphere with time. As the wave spreads the intensity of noise diminishes as the fixed amount of energy is spread over an increasing surface area of the sphere. The assumption of the model is based on point source relationship i.e., for every doubling of the distance the noise levels are decreased by 6 dB (A).

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

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

Where:

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

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

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

4.4.1 Anticipated Impact

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

- Source data
- Receptor data
- Attenuation factor

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

TABLE 4.8: ACTIVITY AND NOISE LEVEL PRODUCED BY MACHINERY

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

*50 feet from source = 15.24 meters

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

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

TABLE 4.9: PREDICTED NOISE INCREMENTAL VALUES

Location ID	N1	N2	N3	N4	N5	N6	N7
Maximum Monitored Value (Day) dB(A)	56.7	54.7	49.8	49.8	50.1	49.9	52.4
Incremental Value dB(A)	60.1	47.0	37.8	26.1	28.1	30.0	29.2
Total Predicted Noise level dB(A)	61.7	55.4	50.1	49.8	50.1	49.9	52.4

4.4.2 Mitigation Measures

The following noise mitigation measures are proposed for control of Noise.

- Time intervals for each quarry during blasting.
- Use of personal protective devices i.e., earmuffs and earplugs by workers, who are working in high noise generating areas.
- Limiting time exposure of workers to excessive noise.
- Proper and regular maintenance of vehicles, machinery and other equipment's.
- The noise generated by the machinery will be reduced by proper lubrication of the machinery and other equipment's.
- Speed of trucks entering or leaving the quarry will be limited to moderate speed to prevent undue noise from empty vehicles.
- Noise levels will be controlled by using optimum explosive charge, proper delay detonators and proper stemming to prevent blow out of holes (occasionally).
- Providing proper noise proof enclosure for the workers separated from the noise source and noise prone equipment.
- Provision of Quiet areas, where employees can get relief from workplace noise.
- The development of green belts around the periphery of the quarry site to attenuate noise.
- Regular medical check-up and proper training to personnel to create awareness about adverse noise level effects.

4.4.3 Ground Vibrations

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

Another impact due to blasting activities is fly rocks. These may fall on the houses or agricultural fields nearby the mining lease area and may cause injury to persons or damage to the structures. Nearest habitation from the project area is located 1.0km East. The ground vibrations due to the blasting in proposed mine are calculated using the empirical equation.

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

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

Where –

V = peak particle velocity (mm/s)

K = site and rock factor constant

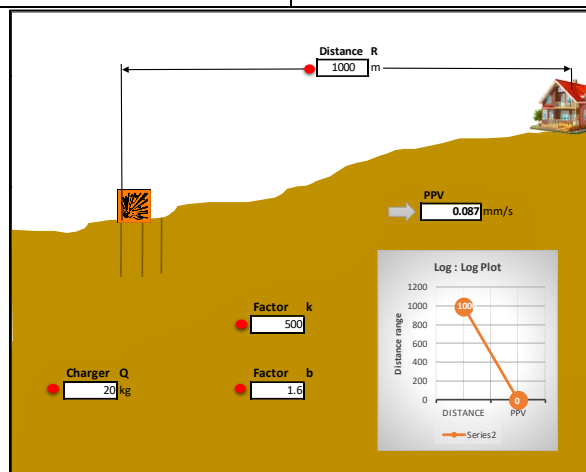
Q = maximum instantaneous charge (kg)

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

R = distance from charge (m)

TABLE 4.10: PREDICTED PPV VALUES DUE TO BLASTING

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
Tmt. R. Jeyachitra	20	1.0km - East	0.087



From the above graph, the Maximum charge per blast of 20Kg is well below the Peak Particle Velocity of 8 mm/s as per Directorate General of Mines Safety for safe level criteria through Circular No. 7 dated 29/8/1997. It is proposed to carry out blasting not exceeding 2kg of Explosives per one blasting round. However, as per statutory requirement control measures will be adopted to avoid the impacts due to ground vibrations and fly rocks due to blasting.

4.4.3.1 Mitigation Measures for Proposed Project

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

4.5 Ecology and Biodiversity

Mining activities generally result in deforestation, land degradation, and water, air, and noise pollution which directly or indirectly affect the faunal and floral status of the mine area. However, the occurrence and magnitude of these impacts are entirely dependent upon the project location, mode of operation, and technology involved. Existing roads will be used; new roads will not be constructed to reduce the impact on flora. Wildlife is not commonly found in the lease area and its immediate environments because of the lack of vegetal cover and surface water.

4.5.1. Impact Identification and Evaluation

In general, impact prediction methods argue that the foremost step in impact appraisal must consider and identify project actions that are likely to bring significant changes in the project environment. The present study determined to predict the likely impacts of the Proposed Rough stone and Gravel quarry, mining Project in the surrounding environment with a specific focus on biological attributes covering habitats/ecosystems and associated biodiversity. Likely impacts identified were categorized into different levels like direct or primary and indirect or secondary impacts based on the influence of sources of impacts.

4.5.2. Impact on Flora

The proposed mine lease area is characterized by flat terrain and comprises Patta land, which is not under active agricultural use. The site is predominantly barren with very limited and sparse vegetation cover. The core zone does not fall within any notified forest area.

Given the existing land condition and low vegetation density, the impact of mining activities on flora is expected to be negligible. No significant soil or ecological contamination is anticipated from the proposed operations. Furthermore, field investigations revealed the absence of any threatened or endemic plant species within both the core and buffer zones of the study area.

4.5.2.1. Anticipated Impact of mining activity on local flora and agricultural land

Anticipated Impact on Local Flora

- Removal of topsoil and existing vegetation during site preparation
- Dust deposition on plant leaves reducing photosynthesis
- Movement of heavy vehicles damaging nearby shrubs and grasses
- Reduction in soil moisture due to excavation activities
- Temporary disturbance to roadside vegetation

Anticipated Impact on Agricultural Land

- Dust settling on crops
- Temporary reduction in crop productivity near haul roads
- Soil compaction due to vehicle movement
- Possible alteration of drainage patterns if not managed properly

4.5.2. Mitigation Measures

4.5.2.1. General Guidelines for Green Belt Development

Green belt development is an important environmental management measure in mining projects to reduce dust pollution, attenuate noise, improve aesthetics, and create a buffer between the quarry and surrounding environment.

A green belt should be developed all along the periphery of the lease boundary to act as a physical and biological barrier between mining operations and surrounding areas. A minimum width of 7.5 m to 10 m is generally recommended wherever land is available, especially along haul roads, site boundaries, and sensitive locations such as nearby agricultural lands or settlements.

The selection of plant species should be based on native, fast-growing, and pollution-tolerant varieties. Indigenous species are preferred as they are better adapted to local climatic and soil conditions and support local

biodiversity. Species should have characteristics such as dense canopy, deep root systems, and high dust-capturing ability. A mix of trees, shrubs, and ground covers should be planted to ensure multi-layered vegetation.

Drone survey was covered the green belt and fencing as per the terms of references. The green belt and plantation purposes in and around the proposed mine lease area native species, fruit-bearing trees, medicinal plants, and dense canopy trees should be selected. These species should be tolerant to pollution levels as per Bio- Geography zones of India.

After the operation of mining production capacity, Green belt and Plantation species should be in accordance with the Terms and Conditions of the Environmental Clearance Green belt is created not only for the purpose of protecting sensitive areas or maintaining the ecological balance but because they also act as efficient biological filters or sinks for particulate and gaseous emissions, generated by vehicular movements and various industrial and mining activities. Optimally designed green belts can be effective in reducing the impact of fugitive emissions and pollutants accidentally or otherwise released at ground levels.

4.5.2.2. Proposed Green Belt

Extensive green belt development will be started during the construction phase, which will continue till the operation of the plant. About 500 trees will be planted per hectare all around the plant, approach roads, and township premises. Locally available types of trees that are resistant to pollutants will be planted. In addition to the above, all open spaces available within the premises will be developed as nurseries, parks, gardens, and other forms of greenery. 5m wide greenbelt will be developed along the plant premises, as per land available.

4.5.2.3. Development of Green Belt

The plantation matrix adopted for the green belt development includes pit of 0.3 m x 0.3 m in size with a spacing of 2 m x 2 m. In addition, earth filling and manure may also be required for the proper nutritional balance and nourishment of the sapling. It is also recommended that the plantation has to be taken up randomly and the landscaping aspects could be taken into consideration. Multi-layered plantations comprising of medium height trees (7 m to 10 m) and shrubs (5 m height) are proposed for the green belt.

4.5.2.4. Selection of Plant Species for Green Belt Development

It is also recommended that the plantation has to be taken up randomly and the landscaping aspects could be taken into consideration. Multi-layered plantations comprising of medium height trees (7 m to 10 m) and shrubs (5 m height) are proposed for the green belt. Green belt is plantation of trees for reducing the air pollution as they absorb both gaseous and particulate pollutant, thus removing them from atmosphere. Green plants form a surface capable of absorbing air pollutants and forming sinks for pollutants. It improves the aesthetic value of local environment. Under present project, green belts have been planned with emphasis on creating biodiversity; enhance natural surroundings and mitigating pollution. Regional tree saplings in eco-friendly bags like *Pterocarpus marsupium*, *Pongamia pinnata*, *Limonia acidissima*, and *Cassia roxburghii* will be planted along the Lease boundary and avenues as well as over non-active dumps with intervals 3m in between with the GPS Coordinates. The greenbelt development plan aims to overall improvement in the environmental conditions of the region Native plant species will be preferred.

- The species should be wind-firm and deep-rooted.
- The species should form a dense canopy.
- Fast-growing plants will be planted
- Species tolerance to air pollution like SO₂ and NO₂ should be preferred.
- Plants having large leaf area index will be considered
- Soil improving plants (Nitrogen fixing rapidly decomposable leaf litter).
- Attractive appearance with good flowering and fruit-bearing.
- Birds and insects attract tree species.
- Roadsides will be planted with local vegetation.

. Table 4.11: List of plant species proposed for Greenbelt development

S. No	Scientific name	Tamil Name
1	<i>Aegle marmelos</i>	Vilva maram
2	<i>Albizia lebbbeck</i>	Vaagai maram
3	<i>Cassia fistula</i>	Konrai tree
4	<i>Lannea coromandelica</i>	Othiyam
5	<i>Limonia acidissima</i>	Vila maram
6	<i>Syzygium cumini</i>	Naval maram
7	<i>Toona ciliata</i>	Santhana Vembu
8	<i>Ficus hispida</i>	Aththi maram
9	<i>Borassus flabellifer</i>	Panai-maram
10	<i>Madhuca longifolia</i>	Illupai maram

(*Source: Term of Reference-ToR)

Table 4.12: Species suitable for abatement of noise and dust pollution

S. No	Botanical name	Common name
1	<i>Azadirachta indica</i>	Vembhu maram
2	<i>Ficus religiosa</i>	Arasan maram
3	<i>Ficus hispida</i>	Aththi maram
4	<i>Bombax ceiba</i>	Mul Elavu
5	<i>Syzygium cumini</i>	Naval maram
6	<i>Tamarindus indica</i>	Puliyamaram
7	<i>Mangifera indica</i>	Manga maram
8	<i>Harwickia binata</i>	Anjan maram
9	<i>Delonix regia</i>	Neruppu Kondrai
10	<i>Cassia fistula</i>	Sara Kondrai

(*Source: Guidance for Developing Green belts Manual, CPCB 2000)

The above-suggested list covers species with thick canopy cover, perennial green nature, native origin, and a large leaf area index. The proposed species will help in forming an effective barrier between the mine site area and the surroundings.

These species need to be planted along the periphery of the lease area for absorb fugitive emissions and noise levels which is generated during mining activities. All the open spaces, where tree plantation may not be possible, should be covered with shrubs and grass to prevent erosion of topsoil.

Some of the important aspects to be considered are:

- ✓ Planting of trees in each row will be in staggered orientation.
- ✓ In the front row, shrubs will be grown.
- ✓ Since the trunks of the tall trees are generally devoid of foliage, it will be useful to have shrubs in front of the trees so as to give coverage to this portion.
- ✓ The spacing between the trees will be maintained slightly less than the normal spaces, so that the trees may grow vertically and slightly increase the effective height of the green belt.

4.5.3. Anticipated Impact on Fauna

- Noise and vibration may disturb birds and small mammals
- Increased vehicle movement may reduce animal movement near the site
- Dust generation may affect insects and grazing animals
- Temporary migration of small fauna from active quarry zones

4.5.3.1. Measures for protection and conservation of wildlife species**Restriction of Mining and Transportation Activities**

- No mining, drilling, blasting, or transportation activities shall be carried out during night hours.
- Vehicle movement should be restricted between sunset and sunrise to avoid disturbance to nocturnal wildlife, particularly elephants and carnivores.
- Speed limits shall be imposed on all project vehicles.

Control of Noise and Vibration

- Controlled blasting techniques shall be adopted.
- Blasting shall be conducted only during daytime with prior intimation to the Forest Department.
- Use of silencers and regular maintenance of machinery shall be ensured.
- Noise levels shall be monitored periodically.

Dust Suppression Measures

- Regular water sprinkling on haul roads and working areas.
- Transportation vehicles shall be covered with tarpaulin sheets.
- Development of green belt around the project boundary to act as a dust barrier.

Wildlife Movement Protection

- Natural drainage channels and existing wildlife movement paths shall not be obstructed.
- Adequate buffer areas shall be maintained along forest boundaries.
- Any observed wildlife corridor shall be kept free from project infrastructure.

Habitat Improvement and Green Belt Development

- Native tree species such as Neem, Pongamia, Tamarind, Amla, Banyan, Peepal, and other indigenous species shall be planted.
- Progressive plantation shall be carried out in non-operational areas.
- Degraded areas around the project site shall be restored through afforestation.

Prevention of Human–Wildlife Conflict

- Workers shall be prohibited from entering nearby forest areas.
- Hunting, trapping, feeding, or disturbing wildlife shall be strictly prohibited.
- Awareness programs shall be conducted for workers regarding wildlife conservation and safety practices.

Waste Management

- No solid waste, food waste, or hazardous waste shall be dumped near forest areas.
- Waste shall be collected and disposed of through approved methods.

Water Resource Protection

- No discharge of untreated wastewater.
- Rainwater harvesting and water conservation measures shall be implemented.
- Surface runoff shall be managed through garland drains.

Wildlife Monitoring Program

- Periodic monitoring of wildlife sightings and movement in consultation with the Forest Department.
- Immediate reporting of wildlife incidents to forest authorities.

Support for Conservation Activities

- Financial contribution towards wildlife conservation and habitat improvement measures as directed by statutory authorities.

4.5.4. Impact on Aquatic Biodiversity

- The major lake along the project sites doesn't have a rich biodiversity and almost all the species of both fauna and flora listed are either least concerned or not evaluated.
- There is no impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.

Table 4.13: Overall Ecological impact assessments of Kollamparambu Village, Rough stone and gravel Quarry, Ottapidaram Taluk, Thoothukudi District.

S.No	Attributes	Assessment
1	Activities of the project affect the breeding/nesting sites of birds and animals	No breeding and nesting site was identified in the mining lease site. The fauna sighted mostly migrated from the buffer area.
2	Located near an area populated by rare or endangered species	No Endangered, Critically Endangered, or vulnerable species were sighted in the core mining lease area.
3	Proximity to national park/wildlife sanctuary/reserve forest /mangroves/coastline/estuary/sea	Gulf of Mannar Marine National Park is located 13.98km from the South East side of the area.
4	The proposed project restricts access to waterholes for wildlife	‘No’
5	Proposed mining project impact surface water quality that also provides water to wildlife	‘No’ scheduled or threatened wildlife animals are sighted regularly core in the core area.
6	Proposed mining project increase siltation that would affect nearby biodiversity areas.	Surface runoff management such as drains is constructed properly so there will be no siltation effect in the nearby mining area.
7	Risk of fall/slip or cause death to wild animals due to project activities.	‘No’
8	The project release effluents into a water body that also supplies water to a wildlife.	Odai is passing south side which 10m safety distance has been provided.
9	Mining projects affect the forest-based livelihood/ any specific forest product on which local livelihood depended.	‘No’
10	The project likely to affect migration routes.	‘No’ Migration route was observed during the monitoring period.
11	The project is likely to affect the flora of an area, which have medicinal value	‘No’
12	Forestland is to be diverted, has carbon high sequestration.	‘No’ There was no forest land diverted.
13	The project is likely to affect wetlands, Fish breeding grounds, and marine ecology.	‘No’ Wetland was not present in the near core Mining lease area. No breeding and nesting ground is present in the core mining area.

(*Source: [EIA Guidance Manual-Mining and Minerals, 2010](#))

4.6 Socio Economic

4.6.1 Construction Phase

Anticipated Impacts:

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

♣ Impacts on the health of nearby villagers can be envisaged due to the transportation activities leading to short term exposure of fugitive dust, resulting in various acute diseases such as increased eye irritation, nausea, headache etc.

Mitigation measures:

♣ Deploying of mobile toilets or the construction of temporary toilets will be done near to the construction site with the adequate water supply.

♣ Awareness programme will be conducted before the monsoon season regarding the spread of water borne/ vector diseases.

♣ Mosquito repellents will be provided in the nearby villages and at construction site to avoid the spread of diseases.

♣ To overcome behavioral impact, proper site in charge with timely supervision will be done. In advance, facilities with equipped medical and safety services will be provided to take a control over the incident/violence if any caused.

♣ To overcome behavioral impact, supervision will be done by site in charge. In advance, emergency cell will be formed with fully equipped communication system, medical and safety services to take control over the incident/violence caused.

4.6.2 Operation Phase:

Anticipated Impacts:

♣ Long term exposure to the pollutants such as PM, SO₂ and NO₂ Cement dust have a potential to create health impacts such as risk of cardiovascular and respiratory disease, eye irritation, bronchitis, lung damage, increased heart ailments, etc.

♣ Other impacts, associated with the applied for rough stone and Gravel quarry Project will create a positive impact as it will result in the overall development of the area in respect to the infrastructure development, educational growth, health facilities etc., as a part of the CSR activity.

Mitigation Measures:

♣ In order to mitigate the long-term health impacts, efficient Air Pollution Control Equipment (APCE) like Bag House / Bag Filter / ESP will be installed at all major stacks to keep the emissions within the permissible limits. To reduce the gaseous emission, Pyro-process itself acts as a long SO₂ scrubber and De - NO_x system will be installed for fuel burning along with calciner for low NO_x formation. To reduce fugitive emission from vehicles and machineries will be regularly monitored and maintained.

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

4.6.3 Impact Evaluation:

Table 4.6.1 Impact Evaluation *Impact evaluation is given in table below.*

Impact Evaluation Element	Impact on socio economics due to the applied for rough stone and Gravel quarry over an extent of 4.81.10ha of Patta lands in S.F.Nos. 36/2A(Part), 36/2B(Part), 36/3(Part), 37/1(Part), 50/1(Part) and 50/3(Part), Kollamparambu Village, Ottapidaram Taluk, Thoothukudi District, Tamil Nadu State.
Potential Effect/ Concern	Proposed project will provide direct & indirect employment opportunities to the local residents, which will help to increase their earning and better living standard as well as further up-liftment of socio-economic status of the area.

Characteristics of Impacts				
Nature	Positive		Negative	Neutral
	✓			
Type	Direct	Indirect	Cumulative	
			✓	
Extent	Project area	Local	Zonal	Regional
	✓			
Duration	Short time		Long term	
			✓	
Intensity	Low		Medium	High
			✓	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C)
			✓	
Significance of Impact				
Significance	Insignificant	Minor	Moderate	Major
			✓	

4.6.4 Mitigation Measures for Proposed Project

- Good maintenance practices will be adopted for all machinery and equipment, which will help to avert potential noise problems.
- Green belt will be developed in and around the project site as per Central Pollution Control Board (CPCB) guidelines.
- Air pollution control measure will be taken to minimize the environmental impact within the core zone.
- For the safety of workers, personal protective appliances like hand gloves, helmets, safety shoes, goggles, aprons, nose masks and ear protecting devices will be provided as per mines act and rules.
- Benefit to the State and the Central governments through financial revenues by way of royalty, tax, duties, etc., from this project directly and indirectly.
- From above details, the quarry operations will have highly beneficial positive impact in the area.
- No villages in the proposed mineral transportation route.
- Mineral loaded Vehicles will not allow during school hours (Morning 8 AM to 10 AM & Evening 4.30PM to 5.30PM).

4.7 Occupational Health and Safety

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

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

4.7.1 Respiratory Hazards

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

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

4.7.2 Noise

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

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

4.7.3 Physical Hazards

The following measures are proposed for control of physical hazards

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

4.7.4 Occupational Health Survey

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

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

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

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

1.8 *Mine Waste Management*

No waste is anticipated from any of the proposed quarry.

4.9 *Mine Closure*

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

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

- To create a productive and sustainable after-use for the site, acceptable to mine owners and the public

- To protect public health and safety of the surrounding habitation
- To minimize environmental damage
- To conserve valuable attributes and aesthetics
- To overcome adverse socio-economic impacts.

4.9.1 Mine Closure Criteria

The criteria involved in mine closure are discussed below:

4.9.1.1 Physical Stability

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

4.9.1.2 Chemical Stability

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

4.9.1.3 Biological Stability

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

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

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

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

CHAPTER – 5: ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

5.0 Introduction:

Consideration of alternatives to a project proposal is a requirement of EIA process. This quarry is site specific. The site has been selected based on geological investigation and exploration and from the Existing quarry pits around the project site. Drilling, Blasting, Excavation, Loading & Transportation will be carried out in this quarrying operation.

- This area denotes the indicative of flow pattern of the rock mass in N40°E to S40°W with dipping SE60°.
- Transportation facility for materials & manpower.
- Overall impact on environment and mitigation feasibility.
- Socio – economic background.

Enough infrastructure exists and lesser resources are required to be deployed. Since, any major construction for infrastructure is not required and hence does not affect the environment considerably.

5.1 Factors Behind the Selection of Project Site

Rough Stone and Gravel Quarry Projects at Kollamparambu Villages is a site specific. The proposed mining lease area has following advantages: -

- The mineral deposit occurs in a non-forest area.
- There is no habitation within the project area; hence no R & R issues exist.
- There is no river, stream, nallah and water bodies within the project areas.
- Availability of skilled, semi-skilled and unskilled workers in this region.
- All the basic amenities such as medical, fire-fighting, education, transportation, communication and infrastructural facilities are well connected and accessible.
- The mining operations will not intersect the ground water level. Hence, no impact on ground water environment.
- Study area falls in seismic zone – III, there is no major history of landslides, earthquake, subsidence etc., recorded in the past history

5.2 Analysis of Alternative Site

The mineral deposits are site specific in nature; hence, question of seeking alternate site does not arise for this project.

5.3 Factors Behind Selection of Proposed Technology

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

- As the mineral deposition is homogeneous and batholith formation, therefore opencast method of working out deposit is preferred over underground method
- The material will be loaded after sprinkling with water with the help of excavators into dumpers / trippers and transported to the needy customers.
- Blasting and availability of drills along with controlled blasting technology gives desired fragmentation so that the mineral is handled safely and used without secondary blasting.

Semi skilled labours fit for quarrying operations are easily available around the nearby villages.

5.4 Analysis of Alternative Technology

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

CHAPTER – 6: ENVIRONMENTAL MONITORING PROGRAMME

6.0 *General*

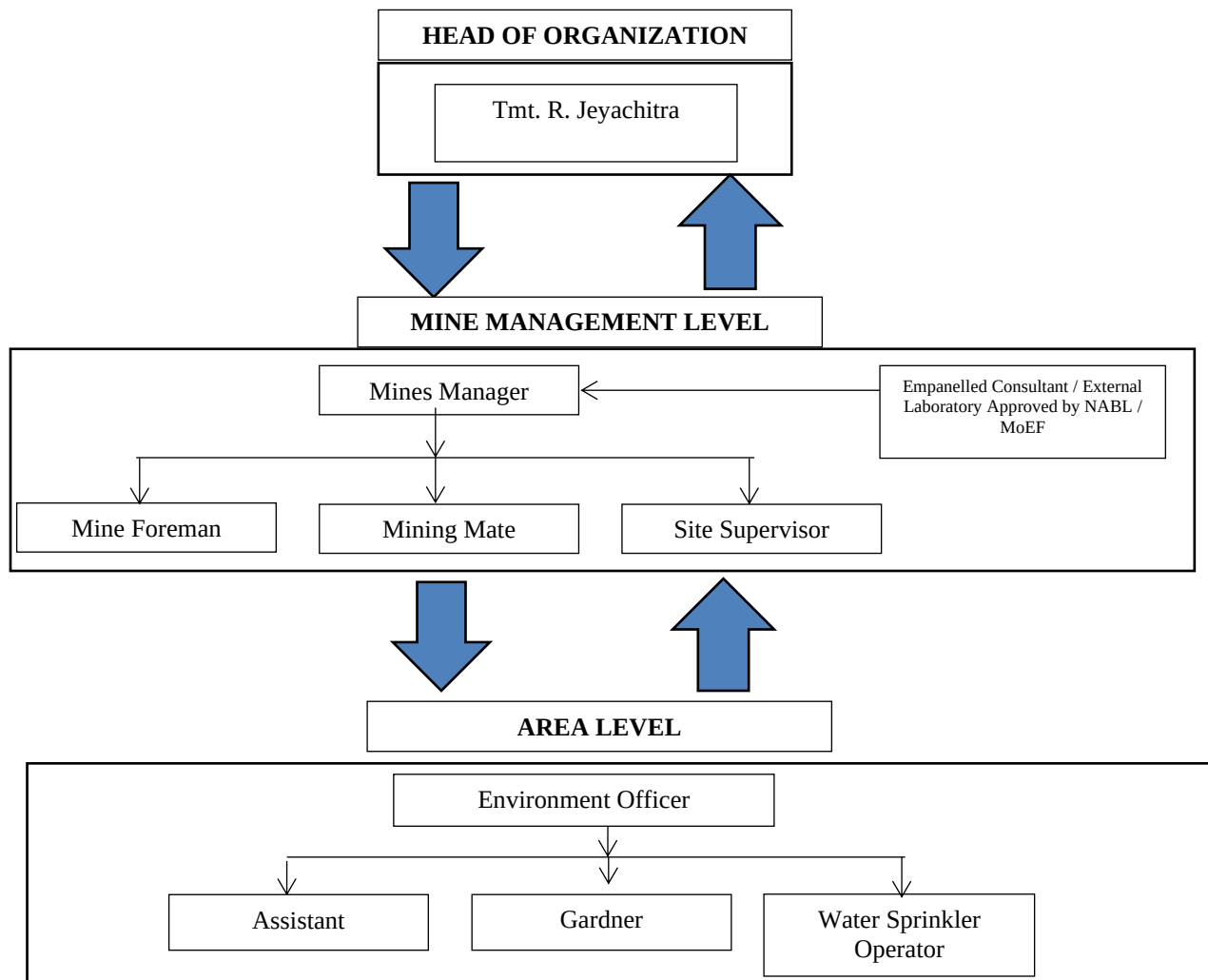
Environmental Monitoring will be taken up for various environmental components as per conditions stipulated in Environmental Clearance Letter issued by MoEF & Consent to Operate issued by the State Pollution Control Board. Monitoring reports will be submitted to regulator as per statutory requirements. The entire monitoring work will be carried out by MoEF & CC / NABL recognized laboratories.

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

6.1 *Methodology of Monitoring Mechanism*

Implementation of EMP and periodic monitoring will be carried out by the proponents and respective quarry owners in the cluster Quarry. A comprehensive monitoring mechanism has been devised for monitoring of impacts due to proposed project; Mine Management Level environmental protection measures like dust suppression, treatment and recycling of waste water, control of noise due to blasting and Ground vibration, maintenance of machinery and vehicles, housekeeping in the mine premises, plantation, implementation of other hand, implementation of area level protection measures like plantation and green Environmental Management Plan and environmental clearance conditions will be monitored by the proponent. On the belt development, environmental quality monitoring etc.,

An environment monitoring cell (EMC) will be constituted at the quarry consisting of following members to monitor the implementation of EMP and other environmental protection measures.

FIGURE 6.1 ENVIRONMENTAL MONITORING CELL

The responsibilities of this cell will be:

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

The environmental monitoring cell will co-ordinate all monitoring programs at site and data thus generated will be regularly furnished to the State regulatory agencies. The sampling and analysis report of the monitored environmental attributes will be submitted to the Tamil Nadu Pollution Control Board (TNPCB) at a frequency of monthly, half-yearly and yearly. The half-yearly reports will be submitted to Ministry of Environment and Forest, Regional Office and SEIAA as well.

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

6.2 Implementation Schedule of Mitigation Measures

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

TABLE 6.1 IMPLEMENTATION SCHEDULE

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

6.3 Monitoring Schedule and Frequency

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

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

The details of monitoring are detailed in Table 6.2

TABLE 6.2: PROPOSED MONITORING SCHEDULE POST EC

S. No.	Environment Attributes	Location	Monitoring		Parameters
			Duration	Frequency	
1	Air Quality	2 Locations (1 Core & 1 Buffer)	24 hours	Once in 6 months	Fugitive Dust, PM _{2.5} , PM ₁₀ , SO ₂ and NO _x .
2	Meteorology	At mine site before start of Air Quality Monitoring & IMD Secondary Data	Hourly / Daily	Continuous online monitoring	Wind speed, Wind direction, Temperature, Relative humidity and Rainfall
3	Water Quality Monitoring	2 Locations (1SW & 1 GW)	-	Once in 6 months	Parameters specified under IS:10500, 1993 & CPCB Norms

4	Hydrology	Water level in open wells in buffer zone around 1 km at specific wells	-	Once in 6 months	Depth in bgl
5	Noise	2 Locations (1 Core & 1 Buffer)	Hourly – 1 Day	Once in 6 months	Leq, Lmax, Lmin, Leq Day & Leq Night
6	Vibration	At the nearest habitation (in case of reporting)	–	During blasting Operation	Peak Particle Velocity
7	Soil	2 Locations (1 Core & 1 Buffer)	–	Once in six months	Physical and Chemical Characteristics
8	Greenbelt	Within the Project Area	Daily	Monthly	Maintenance

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

6.4 Environmental Policy of the Proponent

The project proponent in the Quarry is committed to ensure that:

- Protect the environment by control and prevention of pollution and promote green environment.
- To operate the quarry with an objective of no injuries and accidents at the work place and provide a safe work place for our employees, contractors and others who perform their duties.
- Adequate health care will be taken to all the employees and create process to reduce the adverse effect of the operations on Health of the employees.
- Provide safety appliance and continuous training in safety to employees to ensure safe production and achieve the target of zero accidents.
- Develop safe working methods and practices, remove unsafe work conditions and consider all the aspects at the early stages of process development to provide safe working atmosphere.
- Communicate Safety, Health and Environmental Policy to all employees for better understanding and practice.

6.5 Budgetary Provision for Environmental Monitoring Programme

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

The proposed total cost for Environmental Monitoring Programme for one proposed quarry for the mining plan period is Rs 3,80,000/-.

TABLE 6.3 ENVIRONMENT MONITORING BUDGET

Parameter	Sl.Nos	Capital Cost	Recurring Cost
Air Quality, Meteorology, Water Quality Hydrology, Soil Quality, Noise Quality Vibration Study, Greenbelt	Tmt. R. Jeychitra	Rs.3,80,000/-	Rs.76,000/-
TOTAL		Rs. 3,80,000/-	Rs.76,000/-

Source: Approved Mining Plans

6.6 Reporting Schedules of Monitored Data

The monitored data on Air quality, Water quality, Noise levels and other environmental attributes will be periodically examined by the proponent with Environmental Monitoring cell and necessary corrective measures will be carried out. The monitoring data will be submitted to Tamil Nadu State Pollution Control Board in the Compliance

to CTO Conditions & environmental audit statements every year to MoEF & CC and Half-Yearly Compliance Monitoring Reports to MoEF & CC Regional Office and SEIAA.

Periodical reports to be submitted to: -

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

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

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

CHAPTER – 7: ADDITIONAL STUDIES

7.0 General

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

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

7.1. Public Consultation:

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

7.2 Risk Assessment

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

The cluster quarry operation will be carried out under the direction of a Qualified Competent Mine manager holding certificate of competency to manage a metalliferous mine granted by the DGMS, Dhanbad. Risk Assessment is all about prevention of accidents and to take necessary steps to prevent it from happening. Factors of risks involved due to human induced activities in connection with mining & allied activities with detailed analysis of causes and control measures for the mine is given in below Table 7.1.

TABLE 7.1 RISK ASSESSMENT & CONTROL MEASURES

S. No	Risk factors	Causes of risk	Control measures
1	Accidents due to explosives and heavy mining machineries	Improper handling and unsafe working practice	▪ All safety precautions and provisions of Mine Act, 1952, Metalliferous Mines Regulation, 1961 and Mines Rules, 1955 will be strictly followed during all mining operations; ▪ Entry of unauthorized persons will be prohibited; ▪ Fire fighting and first-aid provisions in the mine office complex and mining area; ▪ Provisions of all the safety appliances such as safety boot, helmets, goggles etc. will be made available to the employees and regular check for their use.

			- Working of quarry, as per approved plans and regularly updating the mine plans; - Cleaning of mine faces shall be daily done in order to avoid any overhang or undercut; - Handling of explosives, charging and firing shall be carried out by competent persons only under the supervision of a Mine Manager; - Maintenance and testing of all mining equipment as per manufacturer 's guidelines.
2	Drilling& Blasting	Due to improper and unsafe practices Due to high pressure of compressed air, hoses may burst Drill Rod may break	- Safe operating procedure established for drilling (SOP) will be strictly followed. - Only trained operators will be deployed. - No drilling shall be commenced in an area where shots have been fired until the blaster/blasting foreman has made a thorough Examination of all places, - Drilling shall not be carried on simultaneously on the benches at places directly one above the other. - Periodical preventive maintenance and replacement of worn-out accessories in the compressor and drill equipment as per operator manual. - All drills unit shall be provided with wet drilling shall be maintained in efficient working in condition. - Operator shall regularly use all the personal protective equipment.
3	Blasting	Fly rock, ground vibration, Noise and dust. Improper charging, stemming & Blasting/fining of blast holes Vibration due to movement of vehicles	- The maximum charge per delay and by optimum blast hole pattern, vibrations will be controlled within the permissible limit and blast can be conducted safely. - SOP for Charging, Stemming & Blasting/Firing of Blast Holes will be followed by blasting crew during initial stage of operation - Shots are fired during daytime only. - All holes charged on any one day shall be fired on the same day. - The danger zone is and will be distinctly demarcated (by means of red flags)
4	Transportation	Potential hazards and unsafe workings contributing to accident and injuries Overloading of material	Before commencing work, drivers personally check the dumper/truck/tipper for oil(s), fuel and water levels, tyre inflation, general cleanliness and inspect the brakes, steering system, warning devices including automatically operated audio-visual reversing alarm, rear view

		While reversal & overtaking of vehicle Operator of truck leaving his cabin when it is loaded.	mirrors, side indicator lights etc., are in good condition. ▪ Not allow any unauthorized person to ride on the vehicle nor allow any unauthorized person to operate the vehicle. ▪ Concave mirrors should be kept at all corners ▪ All vehicles should be fitted with reverse horn with one spotter at every tipping point ▪ Loading according to the vehicle capacity ▪ Periodical maintenance of vehicles as per operator manual
5	Natural calamities	Unexpected happenings	▪ Escape Routes will be provided to prevent inundation of storm water ▪ Fire Extinguishers & Sand Buckets
6	Failure of Mine Benches and Pit Slope	Slope geometry, Geological structure	▪ Ultimate or over all pit slope shall be below 60° and each bench height shall be 5m height.

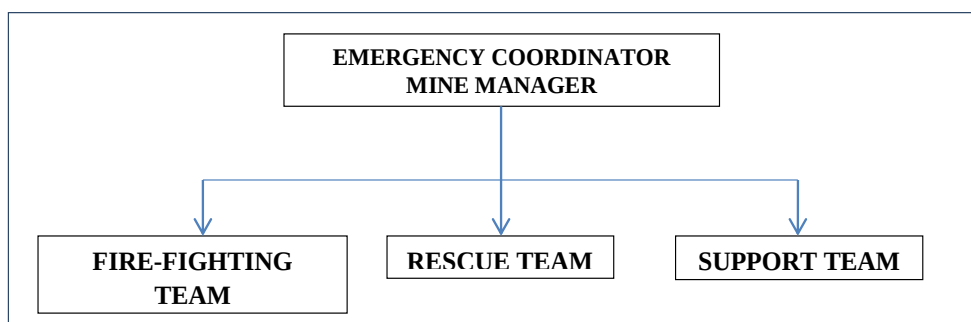
7.3 Disaster Management Plan

Natural disasters like Earthquake, Land slides has not been recorded in the past history as the terrain is categorized under seismic zone III. The area is far away from the sea hence the disaster due to heavy floods and tsunamis are not anticipated. The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities.

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

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

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

FIGURE 7.1: DISASTER MANAGEMENT TEAM LAYOUT

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

TABLE 7.2: PROPOSED TEAMS TO DEAL WITH EMERGENCY SITUATION

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

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

Roles and responsibilities of emergency team –

(a) Emergency coordinator (EC)

The emergency coordinator shall assume absolute control of site

(b) Incident controller (IC)

Incident controller shall be a person who shall go to the scene of emergency and supervise the action plan to overcome or contain the emergency. Shift supervisor or Environmental Officer shall assume the charge of IC.

(c) Communication and advisory team

The advisory and communication team shall consist of heads of Mining Departments i.e., Mines Manager

(d) Roll call coordinator

The Mine Foreman shall be Roll Call Coordinator. The roll call coordinator will conduct the roll call and will evacuate the mine personnel to assembly point. His prime function shall be to account for all personnel on duty.

(e) Search and rescue team

There shall be a group of people trained and equipped to carryout rescue operation of trapped personnel. The people trained in first aid and fire-fighting shall be included in search and rescue team

(f) Emergency security controller

Emergency Security Controller shall be senior most security person located at main gate office and directing the outside agencies e.g., fire brigade, police, doctor and media men etc.,

Emergency control procedure –

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

- On site fire crew led by a fireman will arrive at the site of incident with fire foam tenders and necessary equipment.
- Emergency security controller will commence his role from main gate office
- Incident controller shall rush to the site of emergency and with the help of rescue team and will start handling the emergency.
- Site main controller will arrive at MECR with members of his advisory and communication team and will assume absolute control of the site.
 - He will receive information continuously from incident controller and give decisions and directions to:
 - Incident controller
 - Mine control rooms
 - Emergency security controller

Proposed fire extinguishers at different locations –

The following type of fire extinguishers is proposed at strategic locations within the quarry.

Location	Type of Fire Extinguishers
Electrical Equipment's	CO ₂ type, foam type, dry chemical powder type
Fuel Storage Area	CO ₂ type, foam type, dry chemical powder type, Sand bucket
Office Area	Dry chemical type, foam type

Alarm system to be followed during disaster –

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

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

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

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

- All safety precautions and provisions of Metalliferous Mines Regulations (MMR), 1961 is strictly followed during all mining operations
- Fire fighting and first-aid provisions in the mines office complex and mining area will be provided.
- Provisions of all the safety appliances such as safety boot, helmets, goggles, dust masks, ear plugs and ear muffs etc. are made available to the employees and the use of same is strictly adhered to through regular monitoring
- Training and refresher courses for all the employees working in the quarry in phase manner
- Cleaning of mine faces will be carried out regularly
- Provision of high-capacity standby pumps with generator sets with enough quantity of diesel for emergency pumping especially during monsoon.
- A blasting SIREN will be used at the time of blasting for audio signal.
- Checking of blasting area for any un-blasted hole or material.
- Warning notice boards indicating the time of blasting and NOT TO TRESPASS will be displayed at prominent places

7.4 CUMULATIVE IMPACT STUDY

Totally 2 Quarry within the cluster, there are 1 No of Proposed quarry, 1 No existing Quarry falls in the cluster. The list of Quarry is as below –

TABLE 7.3: LIST OF QUARRY IN THE CLUSTER

Proposed Quarries				
Code	Name of the Proponent and Address	S.F. Nos & Village	Area (Ha)	Status
P1	Tmt. R. Jeyachitra	36/2A(Part), 36/2B(Part), 36/3(Part), 37/1(Part), 50/1(Part) and 50/3(Part) - Kollamparambu	4.82.10	File No. 13605 ToR Identification No. TO26B0108TN5279712N Dated: 11.05.2026
Total			4.82.10	
Existing Quarries				
CODE	Name of the Proponent and Address	S.F. Nos	Extent in Ha	Lease Period
E-1	Thiru. A. Arulrajan	22/1(P), 56/1, 56/2(P), 57/1, 57/2(P)	4.99.00	06.03.2026 – 05.03.2031
Total			4.99.00	
Expired/ Abandoned Quarries				
----- Nil -----				
Total			9.81.10	
Total Cluster Extent			9.81.10 Ha	

Note:-

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

TABLE 7.4: SALIENT FEATURES OF THE PROPOSAL PROJECT –P1

Name of the Quarry	Tmt. R. Jeyachitra Rough Stone & Gravel Quarry	
Toposheet No	58L/1	
Land Classification	It is a Patta Land, Registered in the name of the proponent (Tmt. R. Jeyachitra) vide patta nos.1167, 1168 and 1188.	
Latitude between	08°58'57.98"N to 08°59'04.13"N	
Longitude between	78°06'27.27"E to 78°06'37.98"E	
Highest Elevation	100m AMSL	
Proposed Depth of Mining as per Tor	60m (5m Gravel + 55m Rough Stone)	
Geological Resources	Rough Stone in m ³	Gravel m ³
	26,47,700	2,40,700
Mineable Reserves	Rough Stone in m ³	Gravel m ³
	9,15,400	1,96,550
Yearwise production for first five years	Rough Stone in m ³	Gravel m ³
	4,62,410	1,96,550
Yearwise production for Second five years	Rough Stone in m ³	Gravel m ³
	4,52,990	-
Ultimate Pit Dimension	Pit I: 192m (L) x 144m (W) x 60m (D) Bgl Pit II: 98m (L) x 119m (W) x 55m (D) Bgl	
Water Level in the surrounds area	93-98 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is plain terrain. The area has gentle sloping towards Northeastern side and altitude of the area is 100m (max) above from Mean Sea level. The area is covered by 5m thickness of Gravel and followed by Massive Charnockite which is clearly inferred from the nearby quarry pits. The Water level in the area is 93m -98m below general ground profile. Average annual rainfall is about 694 mm.	
Machinaries	Wagon Drill Machine	1 No
	Jack Hammer	2 Nos
	Compressor	1 Nos
	Excavator with bucket and rock breaker	2 Nos
	Truck	4 Nos
	Water Sprinkling Tanker	2 No
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	31 Nos	
Project Cost	Rs.4,07,14,000/-	
CER Cost	Rs. 5,00,000/-	
Nearby Water Bodies	Water bodies	Distance & Direction
	Odai	10m Safety-South Side
	Urani	170m NW
	Tank	470m NE

	Odai	1.9km NE
	Tank	2.4km SW
Greenbelt Development Plan	Proposed to plant 2,400 trees in the 7.5m Safety Zone, Village Road and panchayat roads.	
Proposed Water Requirement	7.0 KLD	
Nearest Habitation	1.0km East	

TABLE 7.5: SALIENT FEATURES OF THE PROPOSAL PROJECT –E1

Name of the Quarry	Thiru. A. Arul Rajan Rough stone and Gravel quarry	
S.F.No	22/1(P), 57/1, 57/2(P), 56/1 and 56/2(P)	
Extent	4.99.0 Ha	
Toposheet No	58-L/01	
Latitude between	08°59'15.68"N to 08°59'25.92"N	
Longitude between	78°06'32.02"E to 78°06'40.06"E	
Highest Elevation	53m AMSL	
Proposed Depth of Mining	75m (bgl)	
Geological Resources	Rough Stone	Gravel
	34,93,000m ³	99,800 m ³
Mineable Reserves	Rough Stone	Gravel
	11,31,505 m ³	84,766 m ³
Proposed Production for Five Years	Rough Stone	Gravel
	11,31,505 m ³	84,766 m ³
Ultimate Pit Dimension	Pit I: 31m (L) X 222m (W) X 30m (D) Pit II: 107m (L) X 163m (W) X 75m (D) Pit III: 129m (L) X 140m (W) X 65m (D)	
Water Level in the surrounds area	78 to 83m BGL	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Machinery proposed	Wagon drill machine	2 Nos
	Jack Hammer	4 Nos
	Compressor	1 No
	Excavator with bucket and rock breaker	2 Nos
	Tipper	4 Nos
	Water Sprinkling Tanker	1 No
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	35 Nos	
Project Cost	Rs. 3,07,78,000/-	
Proposed Water Requirement	3.5 KLD	
Nearest Habitation	1.2km- SE	

The Cumulative Impact is mainly anticipated due to drilling & blasting and excavation and transportation activities in all the Quarry (proposed and existing) within the cluster and major impact anticipated is on Air & Noise Environment and Ground Vibrations due to blasting.

Impact on Air Environment –

Calculating the Cumulative Load of Mining within the cluster is as shown in table 7.5 & 7.6.

TABLE 7.6 CUMULATIVE PRODUCTION LOAD OF ROUGH STONE IN CLUSTER

Proposed Quarry Project				
Quarry	Production for Ten/five-year plan period considering safety parameters	Per Year Production in m³	Per Day Production in m³	Number of Lorry Load Per Day @ 12m³ per load
P1	9,15,400	91,540	305	28Trips /Day
List of Existing Quarry				
Quarry	Production for five-year plan period	Per Year Production in m³	Per Day Production in m³	Number of Lorry Load Per Day @ 12m³ per load
E-1	11,31,505	2,26,301	754	63Trips /Day
G. Total	20,46,905	3,17,841	1,059	91 Trips/ Day

TABLE 7.7: CUMULATIVE PRODUCTION OF GRAVEL IN CLUSTER

Proposed Quarry Project				
Quarry	Production for three-year plan period considering safety parameters	Per Year Production in m³	Per Day Production in m³	Number of Lorry Load Per Day @ 12m³ per load
P1	1,96,550	65,517	218	18 Trips /Day
List of Existing Quarry				
Quarry	Production for three-year plan period	Per Year Production in m³	Per Day Production in m³	Number of Lorry Load Per Day @ 12m³ per load
E-1	84,766	28,255	94	8Trips /Day
G. Total	2,81,316	93,772	312	26 Trips/ Day

Based on the above production quantities the emissions due to various activities in all the 1 proposal quarry includes various activities like ground preparation, excavation, handling and transport of mineral. These activities have been analysed systematically basing on USEPA-Emission Estimation Technique Manual, for Mining AP-42, to arrive at possible emissions to the atmosphere and estimated emissions are given in Table 7.7.

TABLE 7.8: INCREMENTAL & RESULTANT GLC WITHIN CLUSTER

PM₁₀ in µg/m³	
Location	AAQ1 – CORE
Background (average)	43
Anticipated Incremental due to the proposals	17
Resultant	60
NAAQ Norms	100 µg/m ³
PM_{2.5} in µg/m³	
Location	AAQ1 – CORE
Background (average)	19.8
Highest Incremental	9.48
Resultant	29.28
NAAQ Norms	80 µg/m ³
SO₂ in µg/m³	
Location	AAQ1 – CORE

Background (average)	5
Anticipated Incremental due to the proposals	3.09
Resultant	8.09
NAAQ Norms	80 $\mu\text{g}/\text{m}^3$
NO_x in $\mu\text{g}/\text{m}^3$	
Location	AAQ1 – CORE
Background (average)	20.2
Anticipated Incremental due to the proposals	12
Resultant	32.2
NAAQ Norms	80 $\mu\text{g}/\text{m}^3$

Noise Environment –

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

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

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

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

TABLE 7.12: PREDICTED NOISE INCREMENTAL VALUES FROM CLUSTER

Location ID	Background Value (Day) dB(A)	Incremental Value dB(A)	Total Predicted dB(A)	Residential Area Standards dB(A)
Habitation Near South from the cluster 1.0km – P1	44.2	40.1	45.6	55
Habitation Near South East from the cluster 1.2km – E1	43.5	38.5	44.7	

Source: Lab Monitoring Data

The incremental noise level is found within the range of 44.7 – 45.6 dB (A) in Buffer zone. The noise level at different receptors in buffer zone is lower due to the distance involved and other topographical features adding to the noise attenuation. The resultant Noise level due to monitored values and calculated values at the receptors are based on the mathematical formula considering attenuation due to Green Belt as 4.9 dB (A) the barrier effect. From the above table, it can be seen that the ambient noise levels at all the locations near habitations are within permissible limits of Residential Area (buffer zone) as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 (The Principal Rules were published in the Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act, 1986.).

Ground Vibrations

Ground vibrations due to mining activities in the all the 2 Mines within cluster are anticipated due to operation of Mining Machines like Excavators, drilling and blasting, transportation vehicles, etc., However, the major source of ground vibration from all the 2 mines is blasting. The major impact of the ground vibrations is observed on the

domestic houses located in the villages nearby the mine lease areas. The kuchha houses are more prone to cracks and damage due to the vibrations induced by blasting whereas RCC framed structures can withstand more ground vibrations. Apart from this, the ground vibrations may develop a fear factor in the nearby settlements.

Another impact due to blasting activities is fly rocks. These may fall on the houses or agricultural fields nearby the mining areas and may cause injury to persons or damage to the structures. Nearest Habitations from Cluster is tabulated in Table 7.9

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

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

Where –

V = peak particle velocity (mm/s)

K = site and rock factor constant

Q = maximum instantaneous charge (kg)

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

R = distance from charge (m)

TABLE 7.13: GROUND VIBRATIONS AT MINES

PROPOSAL QUARRY			
Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	20	1.0km	0.087
EXISTING QUARRY			
Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
E1	20	1.2km	0.065

Source: PPV Calculation

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

Socio Economic Environment

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

TABLE 7.14: SOCIO ECONOMIC BENEFITS FROM CLUSTER MINES

PROPOSAL QUARRY			
Code	Employment	Project Cost	CER
P1	31	Rs.,4,07,14,000/-	Rs 5,00,000/-
EXISTING QUARRY			
Code	Employment	Project Cost	CER
E1	35	Rs. 3,07,78,000/-	Rs 5,00,000/-
Grand Total	66	Rs.7,14,92,000 /-	Rs. 10,00,000/-

A total of 66 people will get employment due to this cluster, in this already 35 people employed in the existing Quarry. For the Existing Quarry Corporate Environment Responsibility (CER) allocated as per Government of India, MoEF & CC Office Memorandum F.No.22-65/2017-IA.III, Dated: 01.05.2018.

For the proposed projects it is recommended to spent Rs 5,00,000/- towards CER Activities in the nearby Government School for Renovation or reconstruction of Existing Toilet, Providing Note books to the school library and Plantation in the school ground any other recommendations by the School Head masters.

- In this cluster from the 1 Proposal, it is proposed to spent Rs 5,00,000/- for CER activities

Considering 500 Nos of trees per hectare it is proposed to plant about 4200nos. of saplings in the proposed project for the Mining plan period in safety barrier, Un utilized area and village roads with survival rate 80% (Anticipated). The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

TABLE 7.15: GREENBELT DEVELOPMENT BENEFITS FROM PROPOSAL MINE

Proposed project				
CODE	No of Trees proposed to be planted	Survival %	Area to be covered	Name of the Species
Tmt. R. Jeyachitra	4200	80	7.5m Safety barrier, Panchayat road and Village roads	Neem, Pongamia, Pinnata, ashoka etc.,

It is anticipated that there shall growth of native species of Neem, Pongamia, Pinnata, etc., in the Proposal at a rate due to these proposals 4200 Trees Planted over a period of 10 Years with Survival Rate of 80%. Besides every individual lease holder will plant Saplings in the School ground as part of CER activities.

7.5 CLUSTER MANAGEMENT COMMITTEE

The cluster management committee is proposed to form including of 1 Proposed quarry and 1 existing quarries total extent of the cluster is 9.81.10 Ha

In the cluster management committee, the following Environmental Management plan will be followed the activities such as

- Transportation of Minerals and blasting activities with the coordination between the individual quarry owners.
- Sprinkling of water regularly thrice a day in the mutual understanding with the quarry owners
- Carrying out blasting operation as specified times by the Mines Managers and as per the EIA report
- Usage of Haul roads in a time specified by the Cluster Management Committee
- Following Safe operating procedure prescribed by the Mines Manager during natural calamities
- Planting Trees in the Government Land, School and within the project site
- Celebrating Safety month, Environmental Month along with the Mines Managers in every six months once
- Regularly follow the health of the workers and take medical examination as per the DGMS norms under the guidance of Mines Manager
- Meet at Association Hall monthly once to review the Environmental Management and Safety activities prescribed by the Cluster Management Committee
- We have read and understood all the above steps and we ensure to follow these specific steps Quarry owners in the Cluster management committee

Quarries in the Cluster Management Committee

Proposed Quarries				
Code	Name of the Proponent and Address	S.F. Nos & Village	Area (Ha)	Status
P1	Tmt. R. Jeyachitra	36/2A(Part), 36/2B(Part), 36/3(Part), 37/1(Part), 50/1(Part) and 50/3(Part) - Kollamparambu	4.82.10	File No. 13605 ToR Identification No. TO26B0108TN5279712N Dated: 11.05.2026
Total			4.82.10	
Existing Quarries				

CODE	Name of the Proponent and Address	S.F. Nos	Extent in Ha	Lease Period
E-1	Thiru. A. Arulrajan	22/1(P), 56/1, 56/2(P), 57/1, 57/2(P)	4.99.00	06.03.2026 – 05.03.2031
	Total		4.99.00	
Expired/ Abandoned Quarries				
----- Nil -----				
Total			9.81.10	
Total Cluster Extent			9.81.10 Ha	

STANDARD OPERATING PROCEDURE FOR KOLLAMPARAMBU CLUSTER MANAGEMENT COMMITTEE

1. Maintenance of Haul Roads and Village Roads:

- 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

2. Maintenance of Drilling Activities

- 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.
- Usage of sharp drill bits while drilling which will help in reducing noise;
- Secondary blasting will be totally avoided and hydraulic rock breaker will be used for breaking boulders;
- Controlled blasting with proper spacing, burden, stemming and optimum charge/delay will be maintained;

-
- The blasting will be carried out during favourable atmospheric condition and less human activity timings by using nonelectrical initiation system;
 - Proper maintenance, oiling and greasing of machines will be done every week to reduce generation of noise;
 - Provision of sound insulated chambers for the workers working on machines (HEMM) producing higher levels of noise;
 - Silencers / mufflers will be installed in all machineries;
 - Green Belt/Plantation will be developed around the project area and along the haul roads. The plantation minimizes propagation of noise;
 - Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators of HEMM and persons working near HEMM and their use will be ensured through training and awareness.
 - Regular medical check-up and proper training to personnel to create awareness about adverse noise level effects

3. Maintenance of Blasting Activities

- 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 (1.00 PM to 2.00 PM), 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
 - The blasting operations in the cluster quarries are carried out without deep hole drilling and blasting using delay detonators, which reduces the ground vibrations;
 - Proper quantity of explosive, suitable stemming materials and appropriate delay system will be adopted to avoid overcharging and for safe blasting;
 - Adequate safe distance from blasting will be maintained as per DGMS guidelines;
 - Blasting shelter will be provided as per DGMS guidelines;
 - Blasting operations will be carried out only during day time;
 - The charge per delay will be minimized and preferably a greater number of delays will be used per blasts;
 - During blasting, other activities in the immediate vicinity will be temporarily stopped;
 - Drilling parameters like depth, diameter and spacing will be properly designed to give proper blast;
 - A fully trained explosives blast man (Mining Mate, Mines Foreman, 2nd Class Mines Manager/ 1st Class Mines Manager) will be appointed.
 - A set of shot firing rules will be drawn up and blasting shall commence outlining the detailed operating procedures that will be followed to ensure that shot firing operations on site take place without endangering the workforce or public.
 - Sufficient angular stemming material will be used to confine the explosive force and minimise environmental disturbance caused by venting / misfire.
 - The detonators will be connected in a predetermined sequence to ensure that only one charge is detonated at any one time and a NONEL or similar type initiation system will be used.
 - The detonation delay sequence shall be designed so as to ensure that firing of the holes is in the direction of free faces so as to minimise vibration effects.
-

- Appropriate blasting techniques shall be adopted such that the predicted peak particle velocity shall not exceed 8 Hz.
- Vibration monitoring will be carried out every 6 months to check the efficacy of blasting practices

4. Maintenance of Greenbelt Activities

- 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
- Suitable plan for conservation of Schedule-I Species have prepared and necessary fund for implement for the same will be made.
- All the preventive measures will be taken for growth & development of fauna.
- Creating and development awareness for nature and wildlife in the adjoin villages.
- The workers shall be trained to not harm any wildlife, should it come near the project site. No work shall be carried out after 6.00 pm

5. Maintenance of Occupational Health

- Dust mask will be provided to the workers and their use will be strictly monitored
- Annual medical checkups, trainings and campaigns will be arranged to ensure awareness about importance of wearing dust masks among all mine workers & tipper drivers
- Ambient Air Quality Monitoring will be conducted six months once to assess effectiveness of mitigation measures proposed
- Specific personnel training on work-site safety management will be taken up;
- Work site assessment will be done by rock scaling of each surface exposed to workers to prevent accidental rock falling and / or landslide, especially after blasting activities;
- Natural barriers, temporary railing, or specific danger signals will be provided along rock benches or other pit areas where work is performed at heights more than 2m from ground level;
- Maintenance of yards, roads and footpaths, providing sufficient water drainage and preventing slippery surfaces with an all-weather surface, such as coarse gravel will be taken up

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

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

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

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

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

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

6. Cluster Management Committee Policy

- Meet the requirements of all laws, acts, regulations, and standards relevant to its operations and activities
- Implement a program to train employees in general environmental issues and individual workplace environmental responsibilities
- Allocate necessary resources to ensure the implementation of the environmental policy
- Ensure that an effective closure strategy is in place at all stages of project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts
- Implement monitoring programme to provide early warning of any deficiency or unanticipated performance in environmental safeguards
- Conduct periodic reviews to verify environmental performance and to continuously strive towards improvement
- Monitoring of the water/ waste water quality, air quality and solid waste generated
- Analysis of the water and air samples collected through external laboratory
- Implementation and monitoring of the pollution control and protective measures/ devices which shall include financial estimation, ordering, installation of air pollution control equipment, waste water treatment plant, etc.
- Co-ordination of the environment related activities within the project as well as with outside agencies
- Collection of health statistics of the workers and population of the surrounding villages
- Green belt development
- Monitoring the progress of implementation of the environmental monitoring programme

Compliance to statutory provisions, norms of State Pollution Control Board, Ministry of Environment and Forests and the conditions of the environmental clearance as well as the consents to establish and consents to operate.

CHAPTER – 8: PROJECT BENEFITS

8.1 General

Tmt. R. Jeyachitra Rough Stone and Gravel Quarry Project aims to produce 9,15,400m³ Rough Stone over a period of 10 Years, 1,96,550 m³ of Gravel over a period of 3 Years.

This will enhance the socio-economic activities in the adjoining areas and will result in the following benefits

- Increase in Employment Potential
- Improvement in Socio-Economic Welfare
- Improvement in Physical Infrastructure
- Improvement in Social infrastructure



8.2 Employment Potential

This proposed project falls in the cluster will provide employment opportunities to about employment to about 31 persons directly. In addition, there will be opportunity for indirect employment to many people in the form of contractual jobs, business opportunities, service facilities etc. the economic status of the local people will be enhanced due to mining project.

8.3 Socio-Economic Welfare Measures Proposed

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

8.4 Improvement in Physical Infrastructure

The proposed project site is located in Kollamparambu village, Ottapidaram taluk, Thoothukudi District of Tamil Nadu and the area have communications, roads and other facilities already well established. The following physical infrastructure facilities will further improve due to the cluster quarry projects.

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

8.5 Improvement in Social Infrastructure

The quarry project in the region will have positive impact on the social economic condition of the area by way of providing employment to the local peoples; thereby increasing the per capita income, housing, education, medical and transportation facilities, economic status, health and agriculture.

- Social welfare program like medical camps, educational facilities to the poverty level students, providing water supply from the Quarry during drought seasons will be taken from the project proponent's
- Supplementing Govt. efforts in health monitoring camps, social welfare and various Awareness programs among the rural population.

8.6 Other Tangible Benefits

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

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

CORPORATE SOCIAL RESPONSIBILITY

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

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

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

CORPORATE ENVIRONMENT RESPONSIBILITY

For the existing Quarry Allocation for Corporate Environment Responsibility (CER) shall be made as per Government of India, MoEF & CC Office Memorandum F.No.22-65/2017-IA.III, Dated: 01.05.2018.

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

For the proposed projects it is recommended to spend Rs 3, 00,000/- towards CER Activities in the nearby Government School for Renovation or reconstruction of Existing Toilet, Providing Note books to the school library and Plantation in the school ground any other recommendations by the School Head masters.

TABLE 8.1 CER – ACTION PLAN

Code	CER
Tmt. R. Jeyachitra	Rs 5,00,000/-
Total	Rs 5,00,000/-

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

CHAPTER – 9: ENVIRONMENTAL COST BENEFIT ANALYSIS

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

CHAPTER - 10: ENVIRONMENTAL MANAGEMENT PLAN

10.0 General

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

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

10.1 Environmental Policy

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

The Proponent **Tmt. R. Jeyachitra** will –

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

Description of the Administration and Technical Setup –

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

The said team will be responsible for:

- Monitoring of the water/ waste water quality, air quality and solid waste generated
- Analysis of the water and air samples collected through external laboratory
- Implementation and monitoring of the pollution control and protective measures/ devices which shall include financial estimation, ordering, installation of air pollution control equipment, waste water treatment plant, etc.
- Co-ordination of the environment related activities within the project as well as with outside agencies
- Collection of health statistics of the workers and population of the surrounding villages
- Green belt development
- Monitoring the progress of implementation of the environmental monitoring programme
- Compliance to statutory provisions, norms of State Pollution Control Board, Ministry of Environment and Forests and the conditions of the environmental clearance as well as the consents to establish and consents to operate.

10.2 Land Environment Management –

Land degradation is one of the major adverse impacts of opencast mining in the form of excavated voids and contamination of soil affects the viability of the soil resource.

Soil contamination then has a number of flow-on effects like, Inhabitation of plant growth, and death of existing plants in contaminated areas and contamination of soil also has potential to impact on a surface water quality and groundwater resources.

TABLE 10.1: PROPOSED CONTROLS FOR LAND ENVIRONMENT

CONTROL	RESPONSIBILITY
Designing vehicle wash-down system so that all washed water is captured and passed through grease and oil separators.	Mines Manager
Re fueling will be carried out in a safe location, away from vehicle movement pathways	Mine Foreman & Mining Mate
Greenbelt development and its maintenance	Environment Officer
Garland drains with catch pits to be provided all around the project area to prevent run off affecting the surrounding lands.	Environment Officer
The periphery of Project area will be planted with thick plantation to arrest the fugitive dust, which will also act as acoustic barrier.	Mines Manager
Thick plantation using native flora species will be carried out on the top benches.	Mines Manager
There will be formation of a small surface water body in the mined out area, which can be used for watering the greenbelt at the conceptual stages.	Environment Officer

Source: Proposed by FAE's & EIA Coordinator

10.3 Soil Management

Top Soil Management –

- There is no top soil within the project area thin layer of soil will be utilized for Greenbelt purpose.

Overburden / Waste and Side Burden Management –

- The overburden 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 fees to the Government.

TABLE 10.2: PROPOSED CONTROLS FOR SOIL MANAGEMENT

CONTROL	RESPONSIBILITY
Garland drains are to be paved around the quarry pit area to arrest possible wash off in the rainy seasons	Mines Manager
Surface run-off from the surface water via garland drains will be diverted to the mine pits	Mine Foreman & Mining Mate
Design haul roads and other access roads with drainage systems to minimize concentration of flow and erosion risk	Environment Officer
keeping records of mitigation of erosion events, to improve on management techniques	Environment Officer
A monitoring map with information including their GPS coordinates, erosion type, intensity, and the extent of the affected area, as well as existing control measures and assessment of their performance	Environment Officer

Empty sediment from sediment traps Maintain, repair or upgrade garland drain system	Environment Officer
Test soils for pH, EC, chloride, exchangeable cations, particle size and water holding capacity	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.4 Water Management

In the proposed quarrying project, no process is involved for the effluent generation, only oil & grease from the machinery wash is anticipated and domestic sewage from mine office.

The quarrying operation is proposed upto a depth of 60m BGL, the water table in the area is 93-98m below ground level, hence the proposed projects will not intersect the Ground water table during entire quarry period.

TABLE 10.3: PROPOSED CONTROLS FOR WATER ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.5 Air Quality Management

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

Carbon dioxide (CO₂): Carbon dioxide enters the atmosphere through burning fossil fuels (Coal, natural gas, and oil), solid waste, trees and other biological materials. Carbon dioxide is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.

Therefore, the proposal for 4200 Nos. of trees to be planted.

TABLE 10.4: PROPOSED CONTROLS FOR AIR ENVIRONMENT

CONTROL	RESPONSIBILITY
Generation of dust during excavation is minimized by daily (twice) water sprinkling on working face and daily (twice) water sprinkling on haul road	Mines Manager
Wet drilling procedure /drills with dust extractor system to control dust generation during drilling at source itself is implemented	Mines Manager
Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution	Mines Manager

Ambient Air Quality Monitoring carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted air pollution control measures	Mines Manager
Provision of Dust Mask to all workers	Mines Manager
Greenbelt development all along the periphery of the project area	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.6 Noise Management

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

TABLE 10.5: PROPOSED CONTROLS FOR NOISE ENVIRONMENT

CONTROL	RESPONSIBILITY
Development of thick greenbelt all along the Buffer Zone (7.5 Meters and 50m safety barrier) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Preventive maintenance of mining machinery and replacement of worn-out accessories to control noise generation	Mines Foreman
Deployment of mining equipment with an in-built mechanism to reduce noise	Mines Manager
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Mining Mate
Provision of effective silencers for mining machinery and transport vehicles	Mines Manager
Provision of sound proof AC operator cabins to HEMM	Mines Manager
Sharp drill bits are used to minimize noise from drilling	Mines Foreman
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring shall be carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted noise control measures. Additional noise control measures will be adopted if required as per the observations during monitoring	Mines Manager
Reduce maximum instantaneous charge using delays while blasting	Mining Mate
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination	Mines Manager
Undertake noise or vibration monitoring	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.7 Ground Vibration and Fly Rock Control

TABLE 10.6: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK

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

Source: Proposed by FAE's & EIA Coordinator

10.8 Biological Environment Management

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

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

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

10.8.1 Green Belt Development Plan

About 4200 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier and nearby village roads with survival rate 80%. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

TABLE 10.7 PROPOSED GREENBELT ACTIVITIES FOR 10 YEAR PLAN PERIOD

Year	No. of trees proposed to be planted	Survial %	Area to be planted	Name of the species
I	It is proposed to plant 4200 Nos of trees in the 1 st year	80 %	7.5m Safety barrier, Panchayat Road and nearby village roads	Neem, Pongamia, Pinnata, ashoka etc.,

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

The objectives of the greenbelt development plan are –

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

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

10.8.2 Species Recommended for Plantation

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

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

TABLE 10.8: RECOMMENDED SPECIES TO PLANT IN THE GREENBELT

S.No	Botanical Name	Local Name
1.	Azadirachta indica	Neem, Vembu
2.	Borassus Flabellifer	Palmyra Palm
3.	Pongamia pinnata	Pungam

Source: Proposed by FAE's & EIA Coordinator

10.9 OCCUPATIONAL SAFETY & HEALTH MANAGEMENT

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

10.9.1 Medical Surveillance and Examinations –

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

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

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

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

TABLE 10.9: MEDICAL EXAMINATION SCHEDULE

Sl.No	Activities	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year
1	Initial Medical Examination (Mine Workers)					
A	Physical Check-up					
B	Psychological Test					
C	Audiometric Test					
D	Respiratory Test					
2	Periodical Medical Examination (Mine Workers)					
A	Physical Check – up					
B	Audiometric Test					
C	Eye Check – up					
D	Respiratory Test					
3	Medical Camp (Mine Workers & Nearby Villagers)					
4	Training (Mine Workers)					
Medical Follow ups:- Work force will be divided into three targeted groups age wise as follows:-						
Age Group		PME as per Mines Rules 1955		Special Examination		
Less than 25 years		Once in a Three Years		In case of emergencies		
Between 25 to 40 Years		Once in a Three Years		In case of emergencies		
Above 40 Years		Once in a Three Years		In case of emergencies		
Medical help on top priority immediately after diagnosis/ accident is the essence of preventive aspects.						

10.9.2 Proposed Occupational Health and Safety Measures –

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

FIGURE 10.1: PERSONAL PROTECTIVE EQUIPMENT TO THE MINE WORKERS

10.9.3 Health and Safety Training Programme

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

TABLE 10.10: LIST OF PERIODICAL TRAININGS PROPOSED FOR EMPLOYEES

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

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

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

10.9.4 Budgetary Provision for Environmental Management –

Adequate budgetary provision has been made by the Company for execution of Environmental Management Plan. The Table 10.11 gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE 10.11: EMP BUDGET FOR PROPOSED PROJECT

Activities	Mitigation Measure	Provision for Implementation	Capital	Recurring
Air Environment	Haul road maintenance & Water sprinkling	Lump sum fund allocation for daily maintenance of haul roads and thrice a day water sprinkling by fixed sprinklers or water tankers	0	50000
	Muffle blasting – To control fly rocks during blasting	Lump sum fund allocation Blasting face will be covered with sand bags / steel mesh / old tyres / used conveyor belts	0	5000
	Wet drilling procedure	Lump sum fund allocation for ensuring wet drilling by covering drill holes with wet gunny bags and spraying water while drilling	0	10000
	No overloading of trucks/tippers/tractors	Lump sum fund allocation Manual Monitoring through Security guard	0	5000
	Stone carrying trucks will be covered by tarpaulin	Lump sum fund allocation Manual Monitoring through Security guard	0	5000
	Enforcing speed limits of 20 km/hr within ML area	Lump sum fund allocation Manual Monitoring through Security guard	0	5000
	Regular monitoring of exhaust fumes as per RTO norms	Lump sum fund allocation Manual Monitoring through Security guard	0	5000
	Installing wheel wash system near gate of quarry	Installation + Maintenance + Supervision	50000	5000
	Haul road maintenance & Water sprinkling	Lump sum fund allocation for daily maintenance of haul roads and thrice a day water sprinkling by fixed sprinklers or water tankers	0	50000
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 / Competent Person	0	0
	Provision for Portable blaster shed	Installation of Portable blasting shelter	50000	2000
	NONEL Blasting will be practiced to control Ground vibration and fly rocks	Rs. 30/- per 6 Tonnes of Blasted Material	0	0
Waste Management	Waste management (Spent Oil, Grease etc.,)	Provision for domestic waste collection and disposal through authorized agency	5000	20000
		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
Mine Closure	1. Progressive Closure Activity - Surface Runoff management	Provision for garland drain @ Rs. 10,000/- per Hectare	5000	1000
	2. Progressive Closure Activity Barbed Wire Fencing to quarry area will be provisioned.	Provision made in Operating Cost	0	0
	3. Greenbelt development under safety zone during the mining plan period	Provision made in Operating Cost	0	0
Implementation of EC, Mining Plan &	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	10000	1000

DGMS Condition	Air, Water, Noise and Soil Quality Sampling every 6 Months for Compliance Report of EC Conditions	Submission of 2 Half Yearly Compliance - Lab Monitoring Report as per CPCB norms	0	100000
	Workers will be provided with Personal Protective Equipment's	Lumpsum fund allocation	50000	15000
	Health checkup for workers will be provisioned	IME & PME Health checkup for all the employees will be covered batch wise.	0	50000
	First aid facility will be provided	Lumpsum fund allocation	0	5000
	Mine will have safety precaution signages, boards.	Provision for signages and boards made	10000	2000
	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	Lumpsum fund allocation	50000	10000
	Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	30000	5000
	Appointment of Competent person for ensuring the safety operation	Provision made in operational cost	0	0
CER	As per MoEF &CC OM 22-65/2017-IA.III Dated 25.02.2021	Lumpsum fund allocation	500000	0
TOTAL			7,60,000	3,02,000

In order to implement the environmental protection measures, an amount of Rs.7.60 lakhs as capital cost and recurring cost as Rs. 3.02 lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project.

<u>Year Wise Break Up</u>			
1 st Year	₹ 10,62,000/-	6 th Year	₹ 3,85,437/-
2 nd Year	₹ 3,17,100/-	7 th Year	₹ 4,04,709/-
3 rd Year	₹ 3,32,955/-	8 th Year	₹ 4,24,944/-
4 th Year	₹ 3,49,603/-	9 th Year	₹ 4,46,192/-
5 th Year	₹ 3,67,083/-	10 th Year	₹ 4,68,501/-
Total		Rs. 46 lakhs	

10.10 CONCLUSION –

Various aspects of mining activities were considered and related impacts were evaluated. Considering all the possible ways to mitigate the environmental concerns Environmental Management Plan was prepared and fund has been allocated for the same. The EMP is dynamic, flexible and subjected to periodic review. For project where the major environmental impacts are associated, EMP will be under regular review. Senior Management responsible for the project will conduct a review of EMP and its implementation to ensure that the EMP remains effective and appropriate. Thus, the proper steps will be taken to accomplish all the goals mentioned in the EMP and the project will bring the positive impact in the study area.

CHAPTER – 11: SUMMARY AND CONCLUSIONS

Tmt. R. Jeyachitra Rough Stone & Gravel Quarry (Cluster Extent – 9.81.10 ha); falls under “B” category as per MoEF & CC Notification (S.O. 3977 (E)).

Now, as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green Tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No. 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018 clarified the requirement for EIA, EMP and therefore, Public Consultation for all areas from 5 to 25 ha falling in Category B-1 and appraised by SEAC/ SEIAA as well as for cluster situation.

A detailed Draft EIA /EMP Report is prepared for public and other stakeholders' suggestions and the Final EIA /EMP Report will be prepared based on the outcome of Public Consultation and the outcome will be incorporated in the EMP Report.

Environmental monitoring and audit mechanism have been recommended before and after commencement of the project, where necessary, to verify the accuracy of the EIA predictions and the effectiveness of recommended mitigation measures.

The main scope of the EIA study is to quantify the cumulative impact in the study area due to cluster Quarry and formulate the effective mitigation measures for each individual leases. A detailed account of the emission sources, emissions control equipment, background Air quality levels, Meteorological measurements, Dispersion model and all other aspects of pollution like effluent discharge, Dust generation etc., have been discussed in this report. The baseline monitoring study has been carried out during the months Mar 2026 to May 2026 for various environmental components so as to assess the anticipated impacts of the cluster quarry projects on the environment and suitable mitigation measures for likely adverse impacts due to the proposed project is suggested individually for the respective proposed project under Chapter 10.

The project proponent ensures to obtain necessary clearances and quarrying will be carried out as per rules and regulations. The Mining Activity will be carried out in a phased manner as per the approved mining plan after obtaining EC, CTO from TNPCB, execution of lease deed and obtaining DGMS Permission and working will be carried out under the supervision of Competent Persons employed.

Overall, the Draft EIA report has predicted that the project will comply with all environment standards and legislation after commencement of the project and operational stage mitigation measures are implemented.

Mining operations has positive impact on environment and socio economy such as landscape improvement, water as by-product, economy development and better public services, providing and supply of Rough Stone as per market demand.

Sustainable and modern mining leads us to see positive impact of mining operation and providing consistent employment for nearly 31 people directly in the one proposed project people.

As discussed, it is safe to say that the one proposed quarry in cluster is not likely to cause any significant impact to the ecology of the area, as adequate preventive measures will be adopted to keep the various pollutants within the permissible limits. Green belt development around the area will also be taken up as an effective pollution mitigate technique, as well as to serve as biological indicators for the pollutants released from Tmt. R. Jeyachithra Rough Stone & Gravel Quarry (Extent – 4.82.10 ha).

CHAPTER 12.0: DISCLOSURE OF CONSULTANTS

The Project Proponent Tmt. R. Jeyachitra have engaged M/s Geo Exploration and Mining Solutions, an Accredited Organization under Quality Council of India – National Accreditation Board for Education & Training, New Delhi, for carrying out the EIA Study as per the ToR Issued.

Name and address of the consultancy:

GEO EXPLORATION AND MINING SOLUTIONS

No 17, Advaita Ashram Road,

Alagapuram, Salem – 636 004

Tamil Nadu, India

Email: infogeoexploration@gmail.com

Web: **www.gemssalem.com**

Phone: 0427 2431989.

The Accredited Experts and associated members who were engaged for this EIA study as given below –

Sl.No.	Name of the expert	In house/ Empanelled	EIA Coordinator		FAE	
			Sector	Category	Sector	Category
1	Dr. M. Ifthikhar Ahmed	In-house	1 38	A B	WP GEO SC	B A A
2	Mr. A. Jagannathan	In-house	-	-	AP NV SHW	B A B
3	Mr. A. Allimuthu	In-house	-	-	LU SE	A B
4	Mr. N. Senthilkumar	Empanelled	31 38	A B	AQ RH	A A
5	Mr. P. Panneer Selvam	In-house	-	-	EB	B
6	Mr. L. Jayaraj	In-house	-	-	HG	B
7	Mr. Vengadagiri Balasubramanian	In-house	-	-	GEO	A
Abbreviations						
EC	EIA Coordinator	EB	Ecology and bio-diversity			
AEC	Associate EIA Coordinator	NV	Noise and vibration			
FAE	Functional Area Expert	SE	Socio economics			
FAA	Functional Area Associates	HG	Hydrology, ground water and water conservation			
TM	Team Member	SC	Soil conservation			
GEO	Geology	RH	Risk assessment and hazard management			
WP	Water pollution monitoring, prevention and control	SHW	Solid and hazardous wastes			
AP	Air pollution monitoring, prevention and control	MSW	Municipal Solid Wastes			
LU	Land Use	ISW	Industrial Solid Wastes			
AQ	Meteorology, air quality modeling, and prediction	HW	Hazardous Wastes			