
DRAFT ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENT MANAGEMENT PLAN

FOR OBTAINING

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

“B1” CATEGORY – MINOR MINERAL – B1 CLUSTER CATEGORY– NON-FOREST
LAND-PATTA LAND-EXISTING QUARRY- LEASE PERIOD- 5 YEARS

CLUSTER EXTENT-8.06.5 ha

(2 Proposed quarry + 2 Existing quarries)

TMT. M. SARASWATHI ROUGH STONE & GRAVEL QUARRY

PROJECT PROPONENT	PROPOSED PROJECT	PROPOSED PRODUCTION
Tmt. M. Saraswathi, W/o. Hariharasudhan, No.9, New Ramakrishnapuram Main Road, Tiruppur District, Tamil Nadu – 641 607.	Extent: 2.13.0 ha S.F. Nos: 1284/2(P) & 1284/4 Sivanmalai Village, Kangeyam Taluk, Tiruppur District.	Rough Stone = 1,39,732 m³ Annual Peak Production = 34,190m³ of Rough Stone Proposed Depth = 42m (2m Gravel + 40m Rough Stone)
File No.11251 TOR Identification No. TO24B0108TN5962901N Dated:29.11.2024		
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 Cat ‘A’, sector 31 & 38 Cat ‘B’ Certificate No : NABET/EIA/2225/RA 0276 Phone: 0427-2431989, Email: ifthiahmed@gmail.com, geothangam@gmail.com Web: www.gemssalem.com	  Laboratory  EHS 360 LABS PRIVATE LIMITED, NABL Accredited laboratory 10/2 Ground floor, 50 th street, 7 th Avenue, Ashok Nagar, Chennai – 600 083.	
Baseline Monitoring Period MARCH TO MAY 2025		
MAY 2025		

UNDERTAKING

I, M. Saraswathi given undertaking that this EIA & EMP report prepared for our Rough Stone and Gravel Quarry situated in S.F. Nos 1284/2 (P) & 1284/4 over an extent of 2.13.0 Ha in Sivanmalai Village, Kangeyam Taluk, Tiruppur District, Tamil Nadu State based on the ToR issued by the State Level Environmental Impact Assessment Authority (SEIAA), Tamil Nadu vide File No.11251 TOR Identification No. TO24B0108TN5962901N Dated:29.11.2024

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



M. Saraswathi
(Proponent)

Place: Tiruppur

Date:

DECLARATION

I Dr. M. Ifthikhar Ahmed – EIA Co Ordinator declare that the Draft EIA & EMP report for the Rough Stone and Gravel Quarry in S.F. Nos 1284/2(P) & 1284/4 over an extent of 2.13.0 Ha in Sivanmalai Village, Kangeyam Taluk, Tiruppur District has been prepared by Geo Exploration and Mining Solutions, Salem, Tamil Nadu.

The Data's provided in the EIA report are true and correct to the best of my knowledge.

Signature of the EIA Co Ordinator



Dr. M. Ifthikhar Ahmed

EIA Coordinator

M/s. Geo Exploration and Mining Solutions

The following quarries are falls in the cluster for the easy representation the proposed, existing, abandoned and expired quarries are designated as below

–PROPOSED QUARRIES				
CODE	Name of the Proponent and Address	S.F. Nos & Village	Extent in Ha	Status
P1	Thiru. M. Saraswathi W/o. Hariharasudhan, No.9, New Ramakrishnapuram main Road, Tiruppur District, Tamil Nadu – 641 607.	1284/2 (Part) & 1284/4 Sivanmalai Village,	2.13.0	Obtained ToR vide, File No.11251 TOR Identification No. TO24B0108TN5962901N Dated: 29.11.2024
P2	Thiru. C. Ramji	1286/1 (Part)	1.95.0	Applied for Quarry Lease
	Total		4.08.0	
EXISTING QUARRIES				
CODE	Name of the Proponent and Address	S.F.Nos	Extent in Ha	Lease Period
E-1	Thiru.K.Murugasamy	1258(Part)	1.96.0	19.04.2023 – 18.04.2028
E-2	Thiru.V.Maruthachalam	1259/3	2.02.5	19.04.2023 – 18.04.2028
Total			3.98.5 Ha	
ABANDONED/EXPIRED QURRIES				
CODE	Name of the Proponent and Address	S.F. Nos	Extent in Ha	Lease Period
EX-1	Thiru.S.M.Palanisamy	1259/1	1.95.5	08.02.2008 – 07.02.2013
	Total		1.95.5	
*TOTAL CLUSTER EXTENT			8.06.5 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.M.Saraswathi

“File No.11251 TOR Identification No. TO24B0108TN5962901N Dated: 29.11.2024”

SEAC SPECIFIC CONDITIONS		
1	The project proponent shall submit a Certified Compliance Report as per the MoEF&CC O.M dated.08.06.2022 for the earlier EC dated.08.03.2018.	The Proponent will obtain the Certified Compliance Report and submit in the Final EIA Appraisal.
2	The structures within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m & up to 1km shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories, sheds, etc. and spell out the mitigation measures to be proposed for the protection of the above structures, if any during the quarrying operations.	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. 3.
3	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 & agreed. Cluster management committee has been formed as per the ToR condition. SOP for the cluster along with roles of the members are described and affidavit given.
4	Since waterbodies are situated nearby, the PP shall carry out the scientific studies to assess the hydrogeological condition of the quarry to determine impacts of the mining operation on the ground water conditions in the waterbodies	Noted and agreed. The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details are discussed under Chapter No. 4.
5	The proponent shall furnish photographs of adequate fencing, garland drainage built with siltation tank & green belt along the periphery including replantation of existing trees; maintaining the safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	Noted and agreed PP erected adequate fencing for proposed quarry and planted 1310 trees in safety barrier and village roads. Photographs of green belt and fencing given in chapter 2. PP agreed to construct garland drainage with siltation tank.
5	The Proponent shall carry out Bio diversity study as a part of EIA study and the same shall be included in the Report	Noted and agreed The Bio diversity study has been conducted by the Functional Area Expert approved by the NABET. The same has been detailed in the Chapter No. 3.
6	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.	Noted and agreed The EMP has been prepared for the entire life of the mine i.e., upto the lease period (5 Years) and the affidavit will be submitted.
7	The PP shall carry out the comprehensive studies on the cumulative environmental impacts of the existing & proposed quarries which included	Noted and agreed The Cumulative impact study has been carried out covering the cluster quarries with reference to the

	drilling & blasting, loading & hauling on the surrounding village and structures.	drilling & blasting, loading & hauling on the surrounding village and structures. The details are given in the Chapter No.7
8	The PP shall furnish the controlled blasting design methodology for ensuring the blast induced ground vibration level restricted to below 2 mm/s at the structures existing in 500 m from the lease boundary	Noted and agreed The details of design for carrying out controlled blasting operation involving line drilling and muffle blasting to minimize blast-induced ground vibrations and controlled fly rock travel from the blast site is detailed in Chapter 4.
Annexure-1		
1	In the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following: (i) Original pit dimension (ii) Quantity achieved Vs EC Approved Quantity (iii) Balance Quantity as per Mineable Reserve calculated. (iv) Mined out Depth as on date Vs EC Permitted depth (v) Details of illicit mining (vi) Violation in the quarry during the past working. (vii) Quantity of material mined out outside the mine lease area (viii) Condition of Safety zone/benches (ix) Revised/Modified Mining Plan showing the benches of not exceeding 6 m height and ultimate depth of not exceeding 50m.	• Previous Lessee: Tmt.M.Saraswathi • Previous Lease Period: 09.04.2018 to 08.04.2023, S.F. Nos 1284/2 (Part) and 1284/4. 09.04.2018 • EC obtained vide Letter No DEIAA—TRP/F.No.601/3(X)2017, Dated: 08.03.2018 • EC Granted Depth – 17m bgl • Existing Pit Dimension – 174m (L) X 97m (W) X 17m (D) • Non-Violation during the past working this quarry.
2	Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery of the site.	Noted and Agreed Proponent obtained VAO certificate regarding 300m radius periphery of the project site and the same is enclosed as Annexure
3	The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m (v) 500m shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories, sheds, etc with indicating the owner of the building, nature of construction, age of the building, number of residents, their profession and income, etc.	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. 3.
4	The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the waterbodies like lake, water tanks, etc are located within 1 km of the proposed quarry.	Noted and agreed The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details are discussed under Chapter No. 3
5	The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report.	Noted and agreed The Bio diversity study has been conducted by the Functional Area Expert approved by the NABET. The same has been detailed in the Chapter No. 3
6	The DFO letter stating that the proximity distance of Reserve Forests, Protected Areas, Sanctuaries, Tiger reserve etc., up to a radius of 25 km from the proposed site.	Noted and agreed Request to consider the secondary source data detailing the nearest reserve forest from Tamil Nadu Geographical Information System (TNGIS) The Nearest Reserve Forest is Voipadi R.F 9.32 Km – North East.
7	In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or)	Noted and Agreed.

	partially formed as per the approved Mining Plan, the Project Proponent (PP) shall the PP shall carry out the scientific studies to assess the slope stability of the working benches to be constructed and existing quarry wall, by involving any one of the reputed Research and Academic Institutions - CSIR-Central Institute of Mining & Fuel Research / Dhanbad, NIRM/Bangalore. Division of Geotechnical Engineering-IIT-Madras, NIT-Dept of Mining Engg, Surathkal. and Anna University Chennai-CEG Campus. The PP shall submit a copy of the aforesaid report indicating the stability status of the quarry wall and possible mitigation measures during the time of appraisal for obtaining the EC.	The slope stability study will be conducted for this existing depth of the quarry. The report will be submitted along with half yearly compliance report and mannerly.
8	However, in case of the fresh virgin quarries, the Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC. when the depth of the working is extended beyond 30 m below ground level.	Noted and agreed. It is a Existing quarry. Slope stability study will be carried out while reaching 30m depth of mining and the report will submitted along with HYCR.
9	The PP shall furnish the affidavit stating that the blasting operation in the proposed quarry is carried out by the statutory competent person as per the MMR 1961 such as blaster, mining mate, mine foreman, II/I Class mines manager appointed by the proponent.	Noted and Agreed Proponent given affidavit stating that the blasting operation will be carried out under the supervision of Competent person.
10	The PP shall present a conceptual design for carrying out only controlled blasting operation involving line drilling and muffle blasting in the proposed quarry such that the blast-induced ground vibrations are controlled as well as no fly rock travel beyond 30 m from the blast site.	Noted and agreed The details of design for carrying out controlled blasting operation involving line drilling and muffle blasting to minimize blast-induced ground vibrations and controlled fly rock travel beyond 30 m from the blast site is detailed in Chapter 4.
11	The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences.	Noted and Agreed The project proponent does not own any other quarries apart from the one proposed in this project.
12	If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines,	EC: Lr.No. DEIAA-TPR/F.No..601/3 (X)/2017 Dated: 08.03.2018
13	What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?	Existing Lease Period: 09.04.2018 – 08.04.2023
14	Quantify of minerals mined out. • Highest production achieved in any one year • Detail of approved depth of mining. • Actual depth of the mining achieved earlier. • Name of the person already mined in that leases area. • If EC and CTO already obtained, the copy of the same shall be submitted. • Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	Approved Depth-17m Actual Depth – 17m Name of the proponent; Tmt.M.Saraswathi Existing: 174m (L) X 97m (W) X 17m (D) Letter No EC: Lr.No. DEIAA-TPR/F.No..601/3 (X)/2017 Dated: 08.03.2018
15	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Topo sheet. Topographic sheet, geomorphology. lithology and geology of the mining lease area should be provided. Such an Imagery of the	Noted and agreed Satellite imagery of the project area along with boundary coordinates is given in the Chapter No 2, Figure No.2.2.

	proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Geomorphology of the area is given in Chapter No 2, Figure No.2.9. Land use pattern of the project area is tabulated in the Chapter No.2. Table no 2.3.
16	The PP shall carry out Drone video survey covering the cluster green belt, fencing, etc.,	Noted and agreed. The Drone Video of the project site is taken covering the Greenbelt and Fencing around the Project site
17	The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	Noted and agreed As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 1065 Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads. As well the pp has provided wire fencing as recommended all along the boundary of the lease applied area.
18	The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment, and the remedial measures for the same.	Noted and agreed Details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology justifications are provided in Chapter 2. The anticipated impacts of the mining operations on the surrounding environment and the remedial measures for the same are provided in Chapter 4.
19	The Project Proponent shall provide the Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of the Mines Act 1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	Noted and agreed The Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of Mines Act, 1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.
20	The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of groundwater pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds, etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD / TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided.	Noted and agreed The hydro-geological study was conducted to evaluate the possible impact on the ground water table. A comprehensive analysis of water levels within a 10km radius was conducted to determine water flow patterns. The resulting data was utilized to create a detailed contour map, which is presented in Figure No. 3.11. This map provides a visual representation of the water levels and facilitates a better understanding of the hydrological characteristics of the area.
21	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & flora/fauna including traffic vehicular movement study.	Noted and agreed Baseline Data were collected for Post monsoon season March 2025 to May 2025. The Details of the Baseline Monitoring is given in the Chapter No. 3.
22	The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of Soil health, Biodiversity, Air pollution, Water pollution, Climate change and flood control & health impacts- Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.	Noted and agreed Cumulative impact study has been carried out covering proposed and existing quarries in the cluster and results related to air pollution, water pollution, & health impacts have been given in chapter No. 7, Based on the results, environmental management plan has been prepared and given in Chapter No. 10.

23	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	Noted and agreed The lower part of the mine pit will be utilized as rain water harvesting structure (Temporary) and the water will be used for the water sprinkling on haul roads and Greenbelt development purpose. Rainwater harvesting structure will be constructed near the mine office.
24	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.	Noted and agreed 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. Table 2.3
25	Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use. R&R issues, if any, should be provided.	Not applicable, There are no wastages anticipated, the entire quarried out rough stone material will be utilized.
26	Proximity to Areas declared as 'Critically Polluted' (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required. clearance certifications from the prescribed Authorities, such as the TNPCB (or) Dept of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable. Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range.
27	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	Noted and agreed The lower part of the mine pit will be utilized as rain water harvesting structure (Temporary) and the water will be used for the water sprinkling on haul roads and Greenbelt development purpose. Rainwater harvesting structure will be constructed near the mine office.
28	Impact on local transport infrastructure due to the Project should be indicated.	Noted and agreed Traffic density survey was carried out to analyze the impact of transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no significant impact due to the proposed transportation from the project area. Details have been provided in Chapter No. 2.
29	A tree survey study shall be carried out (nos., name of the species, age, diameter etc..) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	Noted and agreed The area is a Exiting Quarry and no trees inside the lease area.
30	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	Noted & agreed. The Mine closure plan has been prepared and got approval along with the Mining plan. After the completion of mining operation, the part of the quarried-out land will be utilized as temporary storage reservoir. The details are given in the Chapter No.4..
31	As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible.	Noted and agreed The Flora and Fauna Study has been carried out along with educating local School students by the Functional Area Experts in Ecology and Biodiversity.

32	The purpose of green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the Appendix-I in consultation with the DFO, State Agriculture University and local school/college authorities. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.	Noted and agreed As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 1065 Nos of trees were planted as a part of greenbelt development program all along the periphery of the lease applied area and approach roads and village roads.
33	Taller/one year old Saplings raised in appropriate size of bags, preferably eco-friendly bags should be planted as per the advice of local forest authorities/botanist/Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner	Noted & agreed. It is proposed to plant 1065 Nos of trees in the 7.5m safety barrier and approach & Village roads. Proponent planted trees and carrying out fencing along with green mesh.
34	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Disaster management Plan is detailed in the Chapter No.7
35	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report.	A Risk Assessment and management Plan detailed in the Chapter No.7
36	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.	Noted and agreed Occupational Health impacts are discussed in chapter- 10
37	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.	Noted and agreed No Public Health Implications anticipated due to this project. The anticipated impact and effective mitigation measures are discussed in the Chapter No. 4
38	The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Noted and agreed The Socio-Economic study has been carried out and the details are given in the Chapter No. 3.
39	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 against this project
40	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.,	Noted and agreed. The project will reduce the demand and supply gap in this area. Due to this project 27 Nos of people will get direct employment and ancillary job facilities will be developed in the region
41	If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall	The Proponent will obtain the Certified Compliance Report and submit in the Final EIA Appraisal.

	duly be certified by MoEF & CC. Regional Office, Chennai (or) the concerned DEE/TNPCB.	
42	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.	Noted & agreed. The EMP has been prepared for the entire life of the mine and proponent given affidavit regarding the EMP.
43	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Conditions besides attracting penal provisions in the Environment (Protection) Act, 1986.	Noted & Agreed.

ADDITIONAL CONDITIONS-Annexure-B

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.	Cluster management committee has been formed with mutual agreement with the proponents including Existing and Proposed quarry at present are framed.
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..	As per the committee agreement proponents will coordinates for the Greenbelt development, Water sprinkling and tree plantation activities combinedly.
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.	The formation of committee with list of members has been submitted to the AD mines office, Tiruppur and the same will be update in every year
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.	As per the committee agreement the blasting frequency will be discussed and carryout by the Mines Manager appointed by the proponents and the same will be updated in the committee minutes. Transport details in chapter-2
5	The committee shall deliberate on risk management plan 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	Details discussed in chapter 7 of Draft EIA report
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.	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 enclosed in the Scheme of Mining plan.
8	The committee shall furnish the Emergency Management within the cluster.	Details discussed in chapter 7.
9	The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public.	Noted and agreed The information on the health of the workers and the local people will be updated periodically along with medical examination.

10	The committee shall furnish an action plan to achieve sustainable development goals with reference to water, sanitation & safety.	Noted & agreed
11	The committee shall furnish the fire safety and evacuation plan in the case of fire accidents.	Detailed discussed in chapter 7.
Impact study of mining		
12	Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise area communication order issued from reputed research institutions on the following a) Soil health & bio-diversity b) Climate change leading to Droughts, Floods etc. c) Pollution leading to release of Greenhouse gases (GHG), rise in Temperature' & Livelihood of the local people. d) Possibilities of water contamination and impact on aquatic ecosystem health' e) Agriculture, Forestry & Traditional practices. 1) Hydrothermal/Geothermal effect due to destruction in the Environment' g) Bio-geochemical processes and its foot prints including environmental stress' h) Sediment geochemistry in the surface streams.	Details of Soil health is given in Chapter No 3 and biodiversity is given in Chapter No 3. The project will not cause any significant changes in the climate Climatic changes and GHG are described in Chapter No 4. Details of water contamination and impact on aquatic ecosystem is given in Chapter No 4. Hydrothermal/ Geothermal effects due to destruction in the environment, Bio geochemical process and sediment geo chemistry given in the Chapter No 7.
Agriculture & Agro-Biodiversity		
13	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.
14	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.
15	Details of type of vegetations including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetations all along the boundary of the proposed mining area shall committed mentioned in EMP.	Noted and agreed There are no trees within the existing quarry site, and therefore, no proposal for tree felling or removal is anticipated during the quarrying operations.
16	The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora. fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.	Noted and agreed The details of the soil analysis and the impacts are given in the Chapter No 3 & 4.
17	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

18	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.
Forest		
19	The project proponent shall detail study on impact of mining on Reserve forests free ranging wildlife.	Noted and agreed. Voipadi R.F. 13.55 Km-South 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
20	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	The EIA study has been carried out in the core and buffer zone by covering the impact assessment on forest, vegetation, endemic flora and fauna. It is inferred that the mining operation will not create significant impact on the Environment.
21	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	The project area is bounded by quarries on all sides. Proponent erected Barbed wire fencing on all the sides of the project site Budgetary allocation given in the Chapter No. 10.
22	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		
23	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 08 open wells and 09 bore wells within the radius of 1km from the project area, Hydrogeological study has been conducted by the resistivity method
24	Erosion Control measures.	Garland drainage structures will be constructed around the lease area to control the erosion, as discussed in Section 4.3 under Chapter 4.
25	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.	The impact of mining on the nearby villages and water bodies are discussed in the Chapter No.4
26	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.
27	The project proponent shall study and furnish the details on potential fragmentation impact on natural Environment by the activities.	The EIA study has been carried out as per the ToR Condition the impact analysis and mitigation measures are given in the Chapter No.4.

28	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site and archaeological sites possible land form changes visual and aesthetic impacts.	The EIA study has been carried out as per the ToR Condition the impact analysis and mitigation measures are given in the Chapter No.4.
29	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
30	The Environmental impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	The Environmental Impact Assessment study carried out considering the wet lands, water bodies, rivers streams and agriculture lands. The details are given in the Chapter No.3.
Energy		
31	The measures taken to control Noise. Air, Water. Dust Control and steps adopted too efficiently utilize the Energy shall be furnished.	The anticipated impact and mitigation measures are given in the Chapter No. 4
Climate Change		
32	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.	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 (CO ₂): 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 (CH ₄): 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 (N ₂ O): 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
33	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	Discussed in the Final EIA/EMP Report in Chapter No.3.
Mine Closure Plan		
34	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		
35	Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.	Detailed discussed in chapter 10.
36	The Environmental Impact Assessment should hold detailed study on EMP with budget for green belt development and mine closure plan including disaster management plan.	The EMP has been prepared with budget for greenbelt development and mine closure plan including disaster management plan. Details are given in the Chapter No.10.
Risk Assessment		

37	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	A Risk Assessment and management Plan Chapter- 7
Disaster Management Plan		
38	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/unfavorable accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	Disaster management Plan details in Chapter-7
Others		
39	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.,	VAO certificate has been obtained mentioning the details of approved habitations within the radius of 300m
40	As per the MoEF& CC office memorandum tr.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.	The issues raised during public hearing is addressed in chapter No.7
41	The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	Plastic waste management in the project area detailed in Chapter No.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. This is Not a violation category project. This proposal falls under B1 Category
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	Noted and agreed The applied land for quarrying is a Patta Land, registered in the name of applicant (Tmt.M.Saraswathi) vide patta no.725 Document is enclosed along with Approved Mining Plan as Annexure
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. The documents including Mining plan, EIA report and public hearing is compatible with one another and all the documents in the name of project proponent.
4	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/toposheet, topographic sheet, geomorphology and	Noted and agreed

	geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Map showing – Project area is with adjacent quarries details is enclosed in Figure No1.1, Page No 1. Project area boundary coordinates superimposed on Toposheet – Figure No. 1.1A Toposheet of the project area covering 10km radius – Figure No. 1.2, Geology map of the project area covering 10km radius - Figure No. 2.10
5	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	Noted and agreed Geology map of the project area covering 10km radius - Figure No. 2.11 Geomorphological features are incorporated in the Toposheet map covering 10km radius around the project area Figure No. 1.21.
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.	Noted and agreed 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.	Noted and agreed 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.	Noted and agreed 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.	Noted and agreed Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 2, Table No 2.3 Land use and land cover of the study area is discussed in Chapter No. 3.

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, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	Not Applicable. There is no Forest Land involved in the proposed project area. It is a patta land.
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. The details of the vegetation in the study area is detailed in the Chapter No 3.
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	Noted and agreed 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.

	allocation of funds for implementing the same should be made as part of the project cost.	
19	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravalli Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable. Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range'.
20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	Not Applicable. The project doesn't attract The C. R. Z. Notification, 2018.
21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a 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 Winter Season (March 2025- May 2025) 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 habitation. The	Air Quality Modelling for prediction of incremental GLC's of pollutant was carried out using AERMOD v9.6.1 Model. Details in Chapter No. 4.

	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.	Noted and agreed Total Water Requirement for this project is given in the chapter No 2, Table No 2.15.												
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Noted and agreed 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 2.15,.												
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 58-62m below ground level. The ultimate depth of this projects is ultimate depth of mining is 42m BG (2m Gravel + 40m Rough Stone)												
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.	Noted and agreed There is no streams/season odai within the project site. This proposed project will not have significant impact on the surface water bodies.												
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.	<table> <tr> <th>Description</th><th>BGL</th><th>AMSL</th></tr> <tr> <td>Site elevation</td><td>-</td><td>339m</td></tr> <tr> <td>Working depth</td><td>42m</td><td>-</td></tr> <tr> <td>Water table</td><td>58-62m</td><td>-</td></tr> </table>	Description	BGL	AMSL	Site elevation	-	339m	Working depth	42m	-	Water table	58-62m	-
Description	BGL	AMSL												
Site elevation	-	339m												
Working depth	42m	-												
Water table	58-62m	-												
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.	Noted and agreed 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	Noted and agreed The proponent will transport the rough stone boulders to the nearby crushers only which is situated within the radius of 500m.												

	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.	The project will not have significant impact to the local transport.
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Noted and agreed 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.	Noted and agreed 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.	Noted and agreed 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.	Noted and agreed The details of public health implication of the project are given 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.	Noted and agreed The local community socio economic is depending upon the quarry and crusher related works.
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.	The outcome of public hearing will be updated in the final EIA/AMP report
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.	Noted and agreed
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 pending against the project
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The Capital Cost and recurring cost are detailed in the Environmental Management plan in Chapter No. 10.
42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Noted and agreed The Disaster management plan is discussed in the Chapter No.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.	Noted and agreed The benefits of the project are given in the Chapter No .8
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 booklet

B	All documents to be properly referenced with index and continuous page numbering.	Noted and agreed 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.	Noted and agreed 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	Noted and agreed The Baseline data are enclosed as Annexure
E	Where the documents provided are in a language other than English, an English translation should be provided.	Noted and Agreed
F	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Noted and agreed. The questionnaire of the project will be enclosed along with the Final EIA/EMP
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.	Noted and agreed 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	Noted & agreed.
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. The previous quarry operation was conducted by the different proponent.
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.	Noted and agreed Surface Plan – Figure No. 2.4, Page No 13 Working Plan – Figure No 2.12, Page No 28

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CHAPTER – 1: INTRODUCTION

1.0 Preamble

The project proponent Thiru. M. Saraswathi applied for Rough Stone & Gravel Quarry over an extent of 2.13.0 Ha in S.F. Nos 1284/2(Part) & 1284/4, Sivanmalai Village, Kangeyam Taluk, Tiruppur District. As per the EIA Notification, 2006 and subsequent amendments the proposal falls in the B1 Cluster Category - Cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016).

- Proponent applied for Rough Stone and Gravel quarry lease on 07.12.2022.
- Precise area communication letter was issued by the District Collector vide Rc.No.760/Kanimam/2022 Dated 12.03.2024.
- The Mining plan has been prepared by the Qualified person and got approval vide Letter vide Rc.No.817/Kanimam/2023 Dated 05.07.2024
- The Mining plan has been approved for the quantity of 1,39,732m³ of Rough Stone up to the depth of 42m (2m Gravel + 40m Rough stone)
- It is a broken-up land the proponent applied for the quarry lease for the period of Five years and the Mining plan has been prepared for the period of five years.
- Proponent applied for ToR for Environmental Clearance vide online Proposal No. SIA/TN/MIN/496285/2024, Dated: 12.09.2024.
- The proposal was placed in 510th SEAC meeting held on 14.11.2024 and the committee recommended for issue of ToR.
- The proposal was considered in 774th SEIAA meeting held on 27.11.2024 and issued ToR vide File.No.11251 TOR Identification No. TO24B0108TN5962901N Dated: 29.11.2024.

As per the EIA Notification, 2006 and subsequent amendments and OM The proposal falls in the B1 Category (Cluster quarries - 2 proposal and 2 Existing quarries forming Cluster Category {Total Extent of the Cluster is 8.06.5 Ha}- Cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016).

- Proponent applied for Terms of Reference vide Proposal No. SIA/TN/MIN/496285/2024, Dated: 12.09.2024.and the ToR was Granted vide File.No.11251 TOR Identification No. TO24B0108TN5962901N Dated: 29.11.2024.
- The Baseline Monitoring study has been carried out during the period of **March to May 2025**

This EIA and EMP report is prepared for considering cumulative impacts arising out of this projects, the Cumulative Environmental Impact Assessment study is undertaken, which is followed by preparation of a detailed Environmental Management Plan (EMP) individually to minimize those adverse impacts.

This EIA/EMP report is prepared for considering cumulative impacts arising out of this project, the Cumulative Environmental Impact Assessment study is undertaken, which is followed by preparation of a detailed Environmental Management Plan (EMP) individually to minimize those adverse impacts.

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.

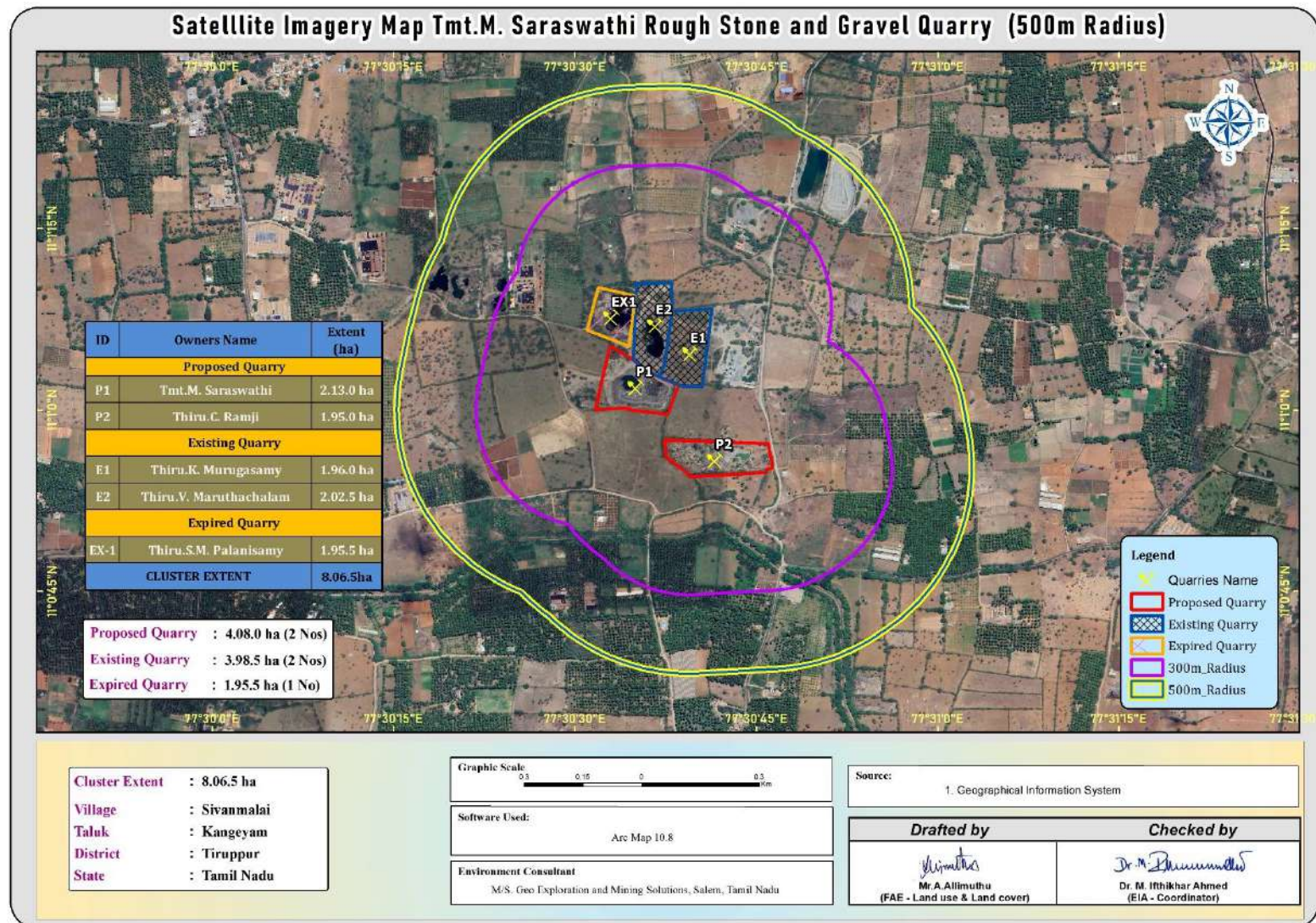
1.1 Purpose of the report

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. 1886 of 20th April 2022, Mining Projects are classified under two categories i.e. A (> 250 Ha) and B ($\leq$ 250 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 for carrying out public hearing for the grant of Environmental Clearance from SEIAA, Tamil Nadu”

FIGURE 1.1. SATELLITE IMAGERY OF CLUSTER QUARRIES

1.2 Identification of Project and Project Proponent

1.2.1 Identification of Project

The project area is an existing quarry situated in the quarry and crushers region.

TABLE 1.1: DETAILS OF PROPOSED PROJECT

Name of the Project	Tmt. M. Saraswathi Rough Stone & Gravel Quarry
S.F. No.	1284/2 (Part) & 1284/4
Extent	2.13.0 Ha
Village, Taluk	Sivanmalai Village, Kangeyam Taluk
District	Tiruppur District

Source: Approved Mining Plan

1.2.2 Identification of Project Proponent

TABLE 1.2: DETAILS OF PROJECT PROPONENT

Name of the Proponent	Tmt.M.Saraswathi
Address	W/o. Hariharasudhan, No.9, New Ramakrishnapuram main Road, Tiruppur District, Tamil Nadu – 641 607.
Mobile	98434 14149 & 96265 22905
Email	kirelakya@gmail.com
Status	Proprietor (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 proposed to be carried out by Opencast Mechanized Mining method with 5.0m bench height and 5.0m bench width by deploying Jack Hammer Drilling & Slurry Explosive during blasting. Hydraulic Excavator and tippers are used for Loading and transportation. Rock Breakers are deployed to avoid secondary blasting.

TABLE 1.3: SALIENT FEATURES OF THE PROPOSED PROJECT

Name of the Quarry	Tmt. M. Saraswathi Rough stone and Gravel quarry	
Land Ownership	It is a Patta land, registered in the name of applicant Tmt. M. Saraswathi	
Land classification	It is a Patta Land (Barren Land)	
SF No & Area (Ha)	1284/2 (Part) & 1284/4	
Village, Taluk & District	Sivanmalai Village, Kangeyam Taluk & Tiruppur District.	
Toposheet No	58E/12	
Latitude between	11°00'59.6649"N to 11°05.12058 "N	
Longitude between	77°30'31.74788"E to 77°38.36491 "E	
Highest Elevation	339m AMSL	
Proposed Depth of Mining	42m (2m Gravel + 40m Rough Stone) below the ground level	
Geological Resources	Rough Stone in m ³	Gravel m ³
	6,38,479	5,122m³
Mineable Reserves	Rough Stone in m ³	Gravel m ³
	1,39,732	-
Year wise Production for five Years	Rough Stone in m ³	Gravel m ³
	1,39,732	-
Ultimate Pit Dimension	174m (L) X 128m (W) X 42m BGL (D)	
Water Level in the surrounds area	58-62 m bgl	

Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits Flat terrain. The area has gentle sloping towards Southeastern side. The altitude of the area is 339m (max) above Mean Sea level. The area is covered by 2m thickness of Gravel formation. Massive Charnockite which is clearly inferred from the existing quarry pits.	
Machinery proposed	Jack Hammer	4 Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	1 No
	Tipper	3 Nos
	Water Sprinkler	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	27 Nos	
Project Cost	Rs. 66,12,000/-	
EMP cost	Rs. 3,80,000/-	
CER Cost	Rs. 5,00,000/-	
Nearby Water Bodies	Canal	280m East
	PAP Vaikkal	310m South
	Canal	470m NW
	Noyyal River	9.8km North
Greenbelt Development Plan	It is proposed to plant 1,065 Nos of trees in the safety barrier and village road.	
Proposed Water Requirement	2.0 KLD	
Nearest Habitation	710m – West	

Source: Approved Mining Plan of the proposal

1.3.2 Location of the project

- The area is located in **S.F.Nos. 1284/2 (Part) & 1284/4 of Sivanmalai Village, Kangeyam Taluk, Tiruppur District, Tamil Nadu State.**
- The entire quarry lease area falls in the Patta land, the lease applied area is exhibits flat terrain.
- The Altitude of the area is 339m (Maximum) above MSL.
- The area is mentioned in GSI Topo Sheet No. **58 - E/08**
- The Latitude between of **11°00'59.6649"N to 11°05.12058 "N**
- The Longitude between of **77°30'31.74788"E to 77°38.36491 "E** on WGS 1984 datum

FIGURE 1.2 KEY MAP SHOWING THE LOCATION OF THE PROJECT SITE

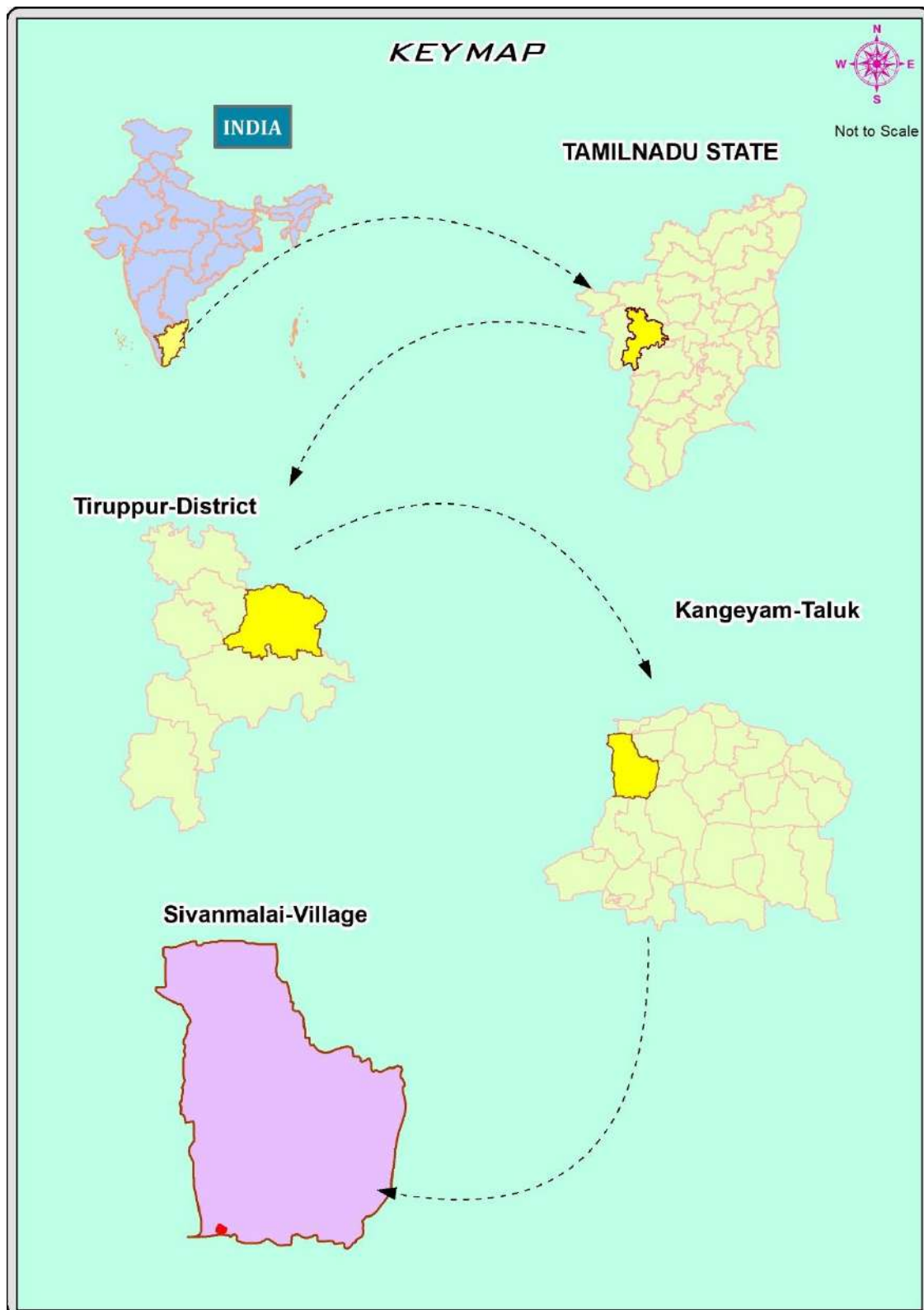


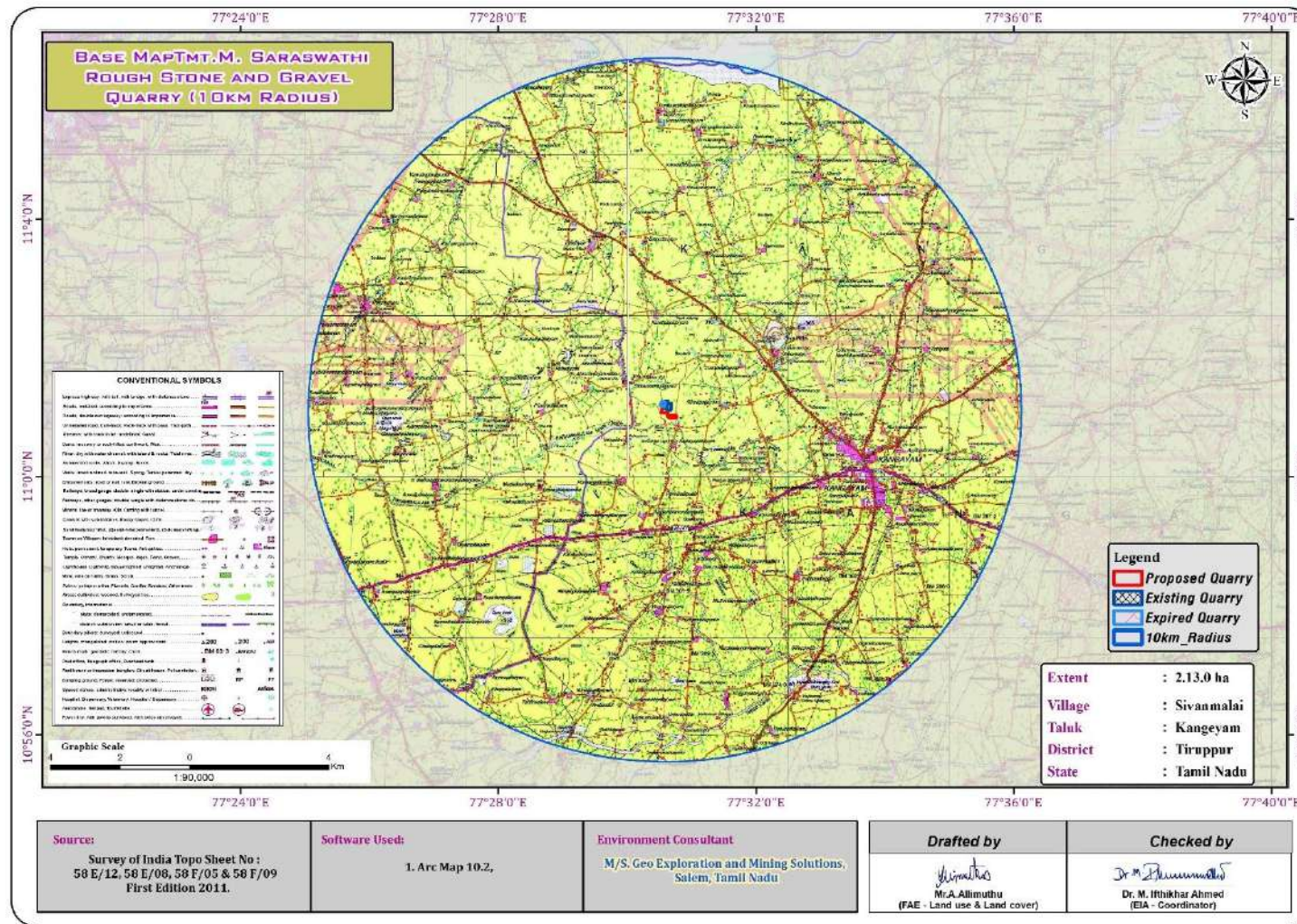
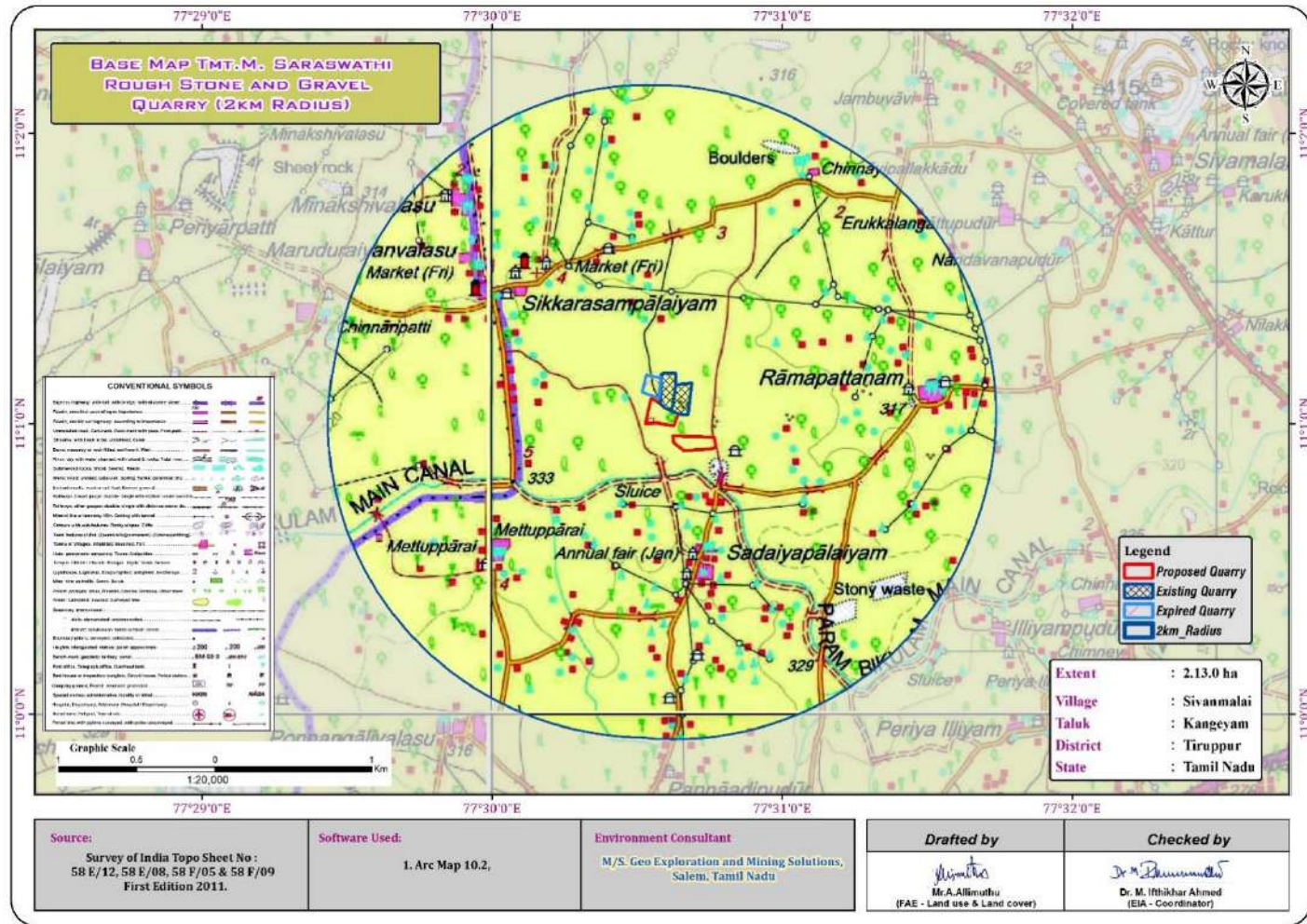
FIGURE 1.3: TOPOSHEET SHOWING LOCATION OF THE PROJECT SITE AROUND 10 KM RADIUS

FIGURE 1.4: TOPOSHEET SHOWING LOCATION OF THE PROJECT SITE AROUND 2 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: 07.12.2022
- The precise area communication letter was received from the Assistant Director, Department of Geology and Mining, Tiruppur District vide Rc.No.760/Mines/2022, Dated: 12.03.2024
- The Mining plan was approved by the Assistant Director, Department of Geology and Mining, Tiruppur District vide Rc.No.817/Mines/2023 Dated: 05.07.2024.
- Proponent applied for ToR for Environmental Clearance vide online Proposal No. SIA/TN/MIN/496285/2024, Dated: 12.09.2024.

SCOPING –

- The proposal was placed in 510th SEAC meeting held on 14.11.2024 and the committee recommended for issue of ToR.
- The proposal was considered in 774th SEIAA meeting held on 27.11.2024 and issued ToR vide File.No.11251 TOR Identification No. TO24B0108TN5962901N Dated: 29.11.2024.

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 was submitted.

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.11251 TOR Identification No. TO24B0108TN5962901N Dated: 29.11.2024.
- Approved Mining of the Rough stone and Gravel quarry project

1.5 Post Environment Clearance Monitoring

The Project Proponent will 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 every year.

1.6 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.

TABLE 1.4 – STRUCTURE OF THE EIA REPORT

S. No	Chapters	Title	Particulars
1	Chapter 1	Introduction	Presents, an Introduction along with Scope and Objective of this EIA/EMP Studies
2	Chapter 2	Project Description	Presents the Technical Details of the Project
3	Chapter 3	Description of Environment	Presents the Baseline Status for various Environmental Parameters in the Study Area for One Season (3 Months)
4	Chapter 4	Anticipated Environmental Impacts and Mitigation Measures	Presents the Identification, Prediction and Evaluation of overall Environmental Impacts due to the Proposed Projects Activities. Also presents Proposed Mitigation Measures.
5	Chapter 5	Analysis of Alternatives (Technology & Site)	Presents Analysis of alternatives with respect to site
6	Chapter 6	Environment Monitoring Programme	Present details of post project environment monitoring
7	Chapter 7	Additional Studies	Presents Public Consultation, Risk Assessment and Disaster Management Plan
8	Chapter 8	Project Benefits	Presents project benefits as: Improvements in the Physical Infrastructure, Social Infrastructure Employment Potential –Skilled; Semi-Skilled and Unskilled etc.,
9	Chapter 9	Cost Benefit Analysis	Environmental Cost Benefit Analysis has not been recommended at Scoping Stage – thus no analysis carried out separately in this EIA/EMP Report
10	Chapter 10	Environmental Management Plan	Description of the administrative aspects to ensure the Mitigation Measures are implemented and their effectiveness monitored, after approval of the project.
11	Chapter 11	Summary & Conclusion	Summary of the EIA Report
12	Chapter 12	Disclosure of Consultants Engaged	Disclosure of the Consultants

1.7 Scope of the Study

The main scope of the EIA study is to quantify the cumulative impact in the study area due to cluster quarries 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 Winter season March to May 2025 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 1.5 – ENVIRONMENT ATTRIBUTES

Sl.No.	Attributes	Parameters	Source and Frequency
1	Ambient Air Quality	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂	24 hourly samples twice a week for three months at 7 locations
2	Meteorology	Wind speed and direction, temperature, relative humidity and rainfall	Near project site continuous for three months with hourly recording and from secondary sources of IMD station, Tiruppur
3	Water quality	Physical, Chemical and Bacteriological parameters	Grab samples were collected at 5 ground water and 1 surface water locations once during study period.
4	Ecology	Existing terrestrial and aquatic flora and fauna within 10 km radius circle.	Limited primary survey and secondary data was collected from the Forest department.
5	Noise levels	Noise levels in dB(A)	At 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 assessment done for the mining associated activities

Source: Field Monitoring Data

The data has been collected as per the requirement of the ToR issued by SEIAA – TN and Standard ToR Published by MoEF & CC.

1.7.1 Regulatory Compliance & Applicable Laws/Regulations

- Application for Quarrying Lease as per Tamil Nadu Minor Mineral Concession Rules, 1959
- Obtained Precise Area Communication Letter as per Tamil Nadu Minor Mineral Concession Rules, 1959 for Preparation of Mining Plan and obtaining Environmental Clearance
- The Mining Plan of Rough Stone and Gravel quarry has been approved under Rule 41 & 42 as amended of Tamil Nadu Minor Mineral Concession Rules, 1959
- ToR from SEIAA – **File.No.11251 TOR Identification No. TO24B0108TN5962901N Dated: 29.11.2024.**
- Approved Mining of the Rough stone and Gravel quarry project

CHAPTER – 2: PROJECT DESCRIPTION

2.0 General

The Rough Stone and Gravel Quarry requires Environmental Clearance. There are Two proposed, two existing quarries forming a cluster; the cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016 and the total extent of cluster is 8.06.5Ha.

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 project is site specific, existing quarry and there is no additional area required for this project. There is no effluent generation/discharge from this quarry.

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 pit head to the needy crushers and rock breakers to avoid secondary blasting.

2.2 Location of the Project

- The area is located in **S.F.Nos. 1284/2 (Part) & 1284/4 of Sivanmalai Village, Kangeyam Taluk, Tiruppur District, Tamil Nadu State.**
- The entire quarry lease area falls in the Patta land, the lease applied area is exhibits flat terrain.
- The Altitude of the area is 339m (Maximum) above MSL.
- The area is mentioned in GSI Topo Sheet No. **58 - E/08**
- The Latitude between of **11°00'59.6649"N to 11°05.12058 "N**
- The Longitude between of **77°30'31.74788"E to 77°38.36491 "E** on WGS 1984 datum
- The project site does not fall within 10 km radius of any Eco – sensitive zone, Wild life Sanctuary, National Park, Tiger Reserve, Elephant Corridor and Biosphere Reserves.

TABLE 2.1: SITE CONNECTIVITY TO THE CLUSTER QUARRIES

Nearest Roadway	NH81-Coimbatore-Trichy Highway-3.4km-South SH172 – Tiruppur –Kangayam Road – 3km-NE
Nearest Village	710m West
Nearest Town	Kangeyam – 5.5Km – SE
Nearest Railway	Uthukuli Railway Station – 16.6Km – NW
Nearest Airport	Coimbatore Airport – 51.2Km –West
Seaport	Kochi – 180 Km-SW

Source: Survey of India Toposheet.

TABLE 2.2 – BOUNDARY CO-ORDINATES

S. No	Latitude	Longitude
1	11°00'59.90029"N	77°30'31.74788"E
2	11°01'02.69999"N	77°30'32.21992"E
3	11°01'05.12058"N	77°30'32.66280"E
4	11°01'04.27728"N	77°30'34.41987"E
5	11°01'03.28908"N	77°30'35.57993"E
6	11°01'02.54594"N	77°30'37.24212"E
7	11°01'02.07869"N	77°30'38.36491"E
8	11°00'59.66649"N	77°30'37.57202"E
9	11°00'59.95429"N	77°30'34.33535"E
10	11°01'00.12054"N	77°30'34.35642"E
Datum: UTM-WGS84 Zone 43 N		

Source: Mine Lease Plan of the proposal

FIGURE 2.1: TOPOGRAPHICAL VIEW OF THE PROJECT SITE



FIGURE 2.2: FENCING AND GREENBELT OF THE PROJECT SITE



FIGURE 2.3: GOOGLE IMAGE – LEASE AREA

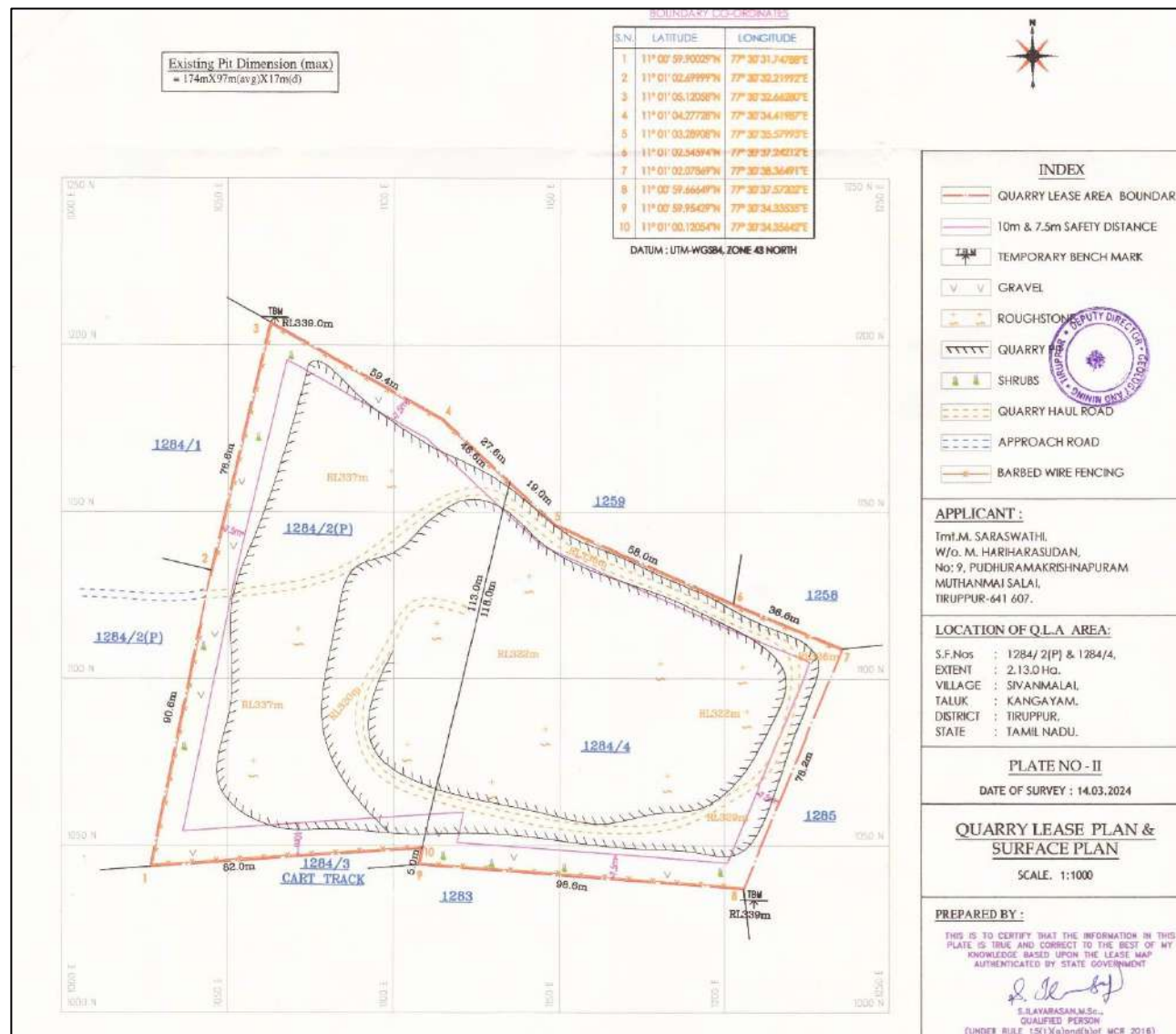
FIGURE 2.4: QUARRY LEASE PLAN WITH CO ORDINATES

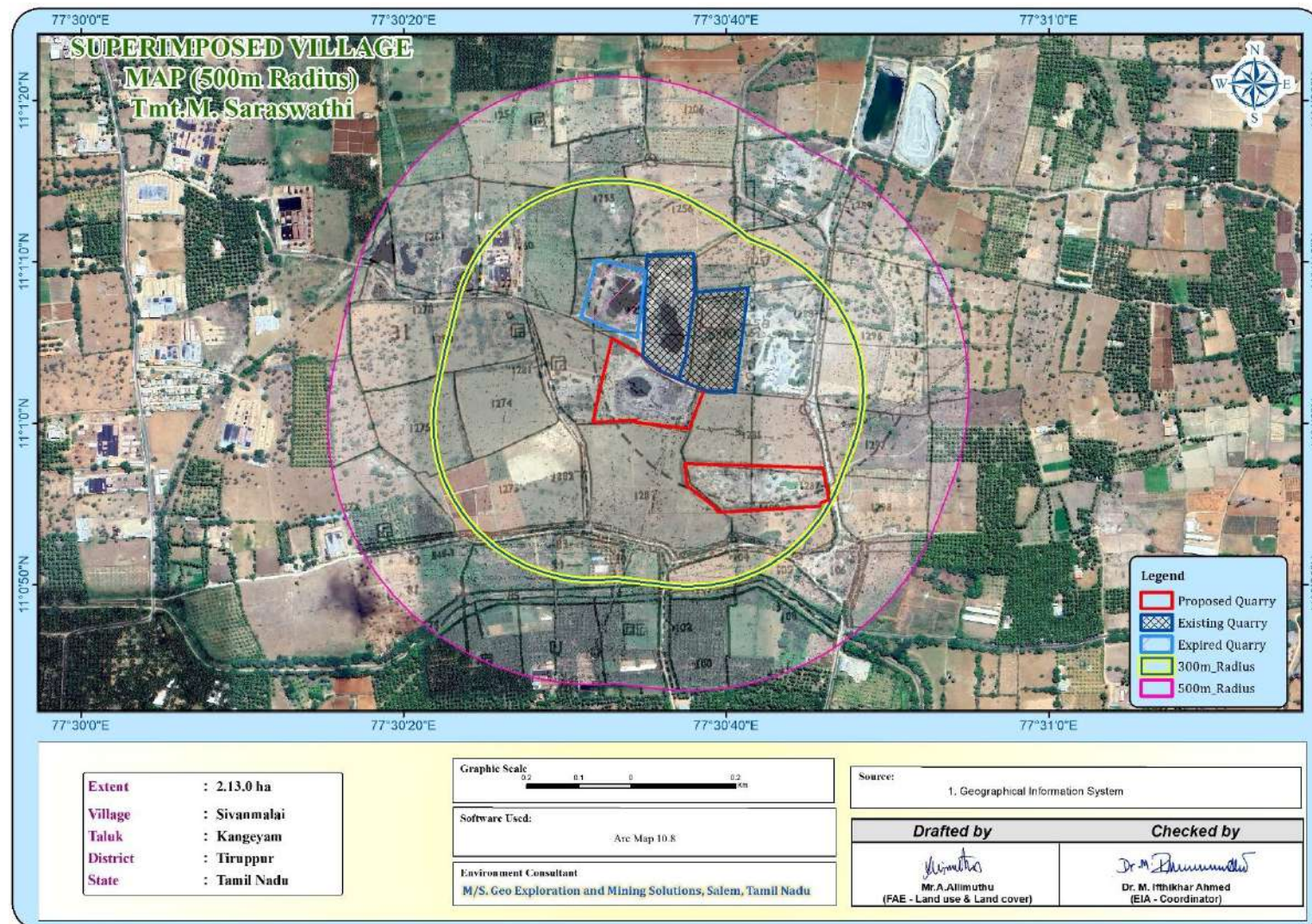
FIGURE 2.5: VILLAGE MAP

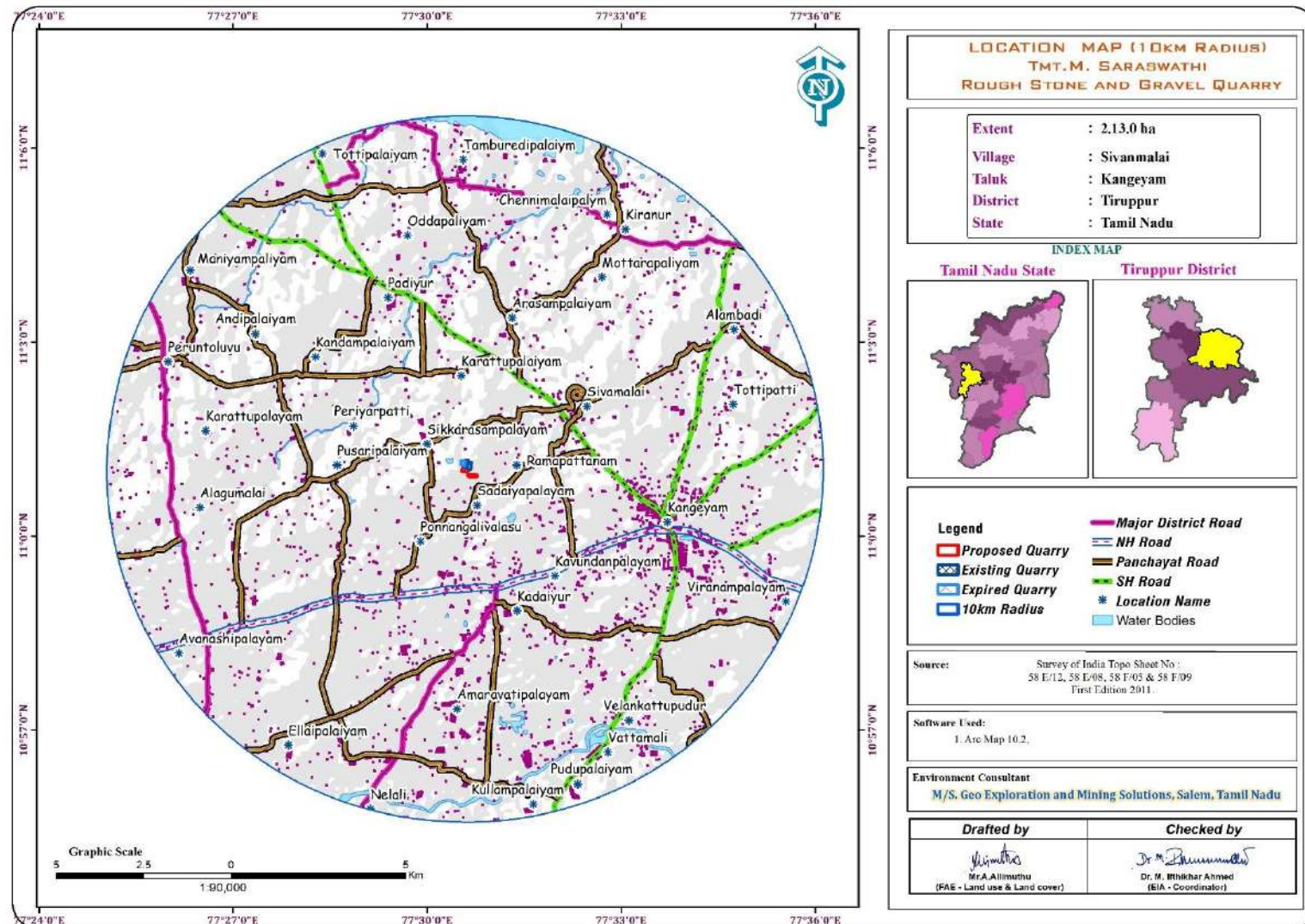
FIGURE 2.6: DIGITIZED MAP OF THE STUDY AREA (10 KM RADIUS)

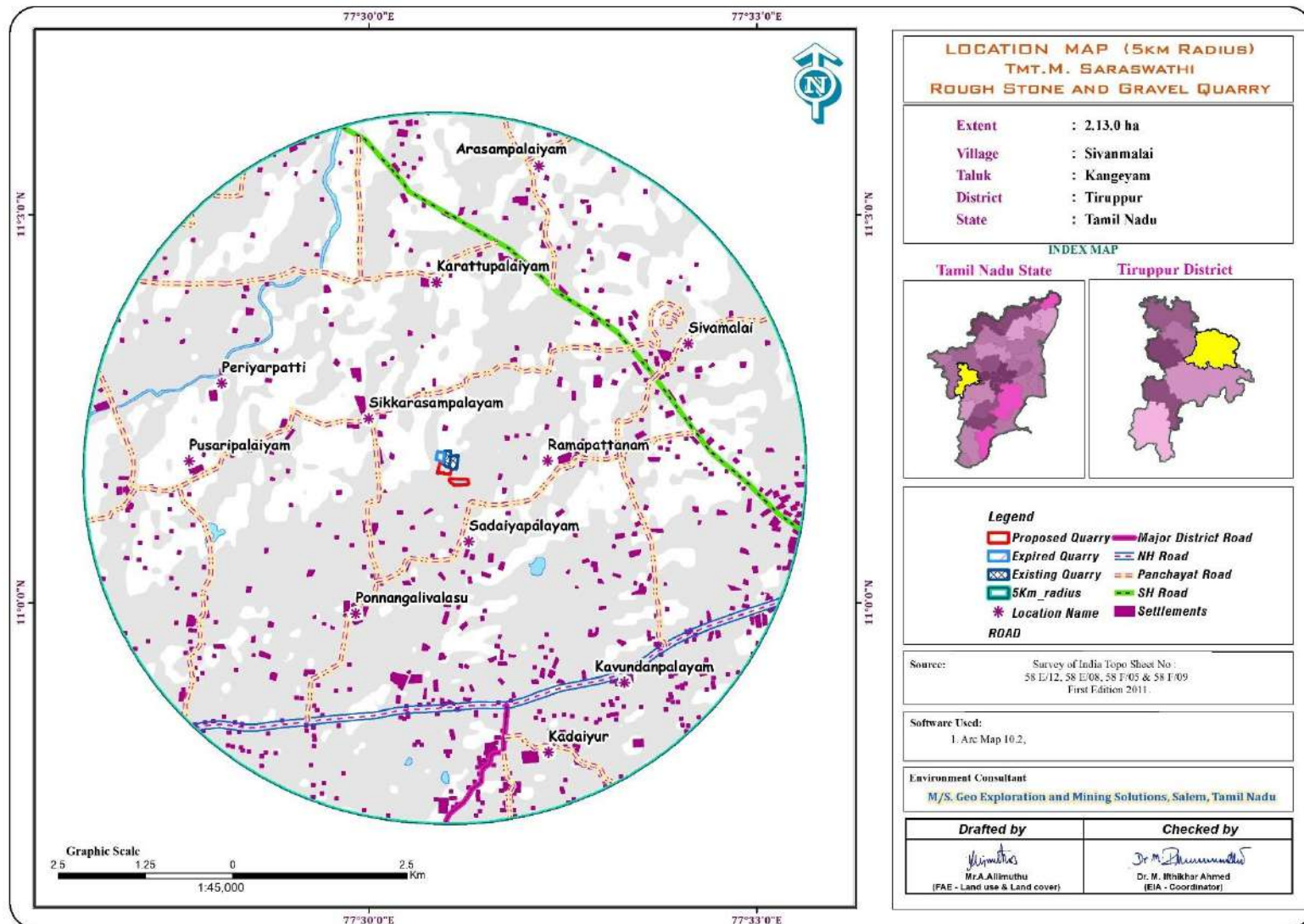
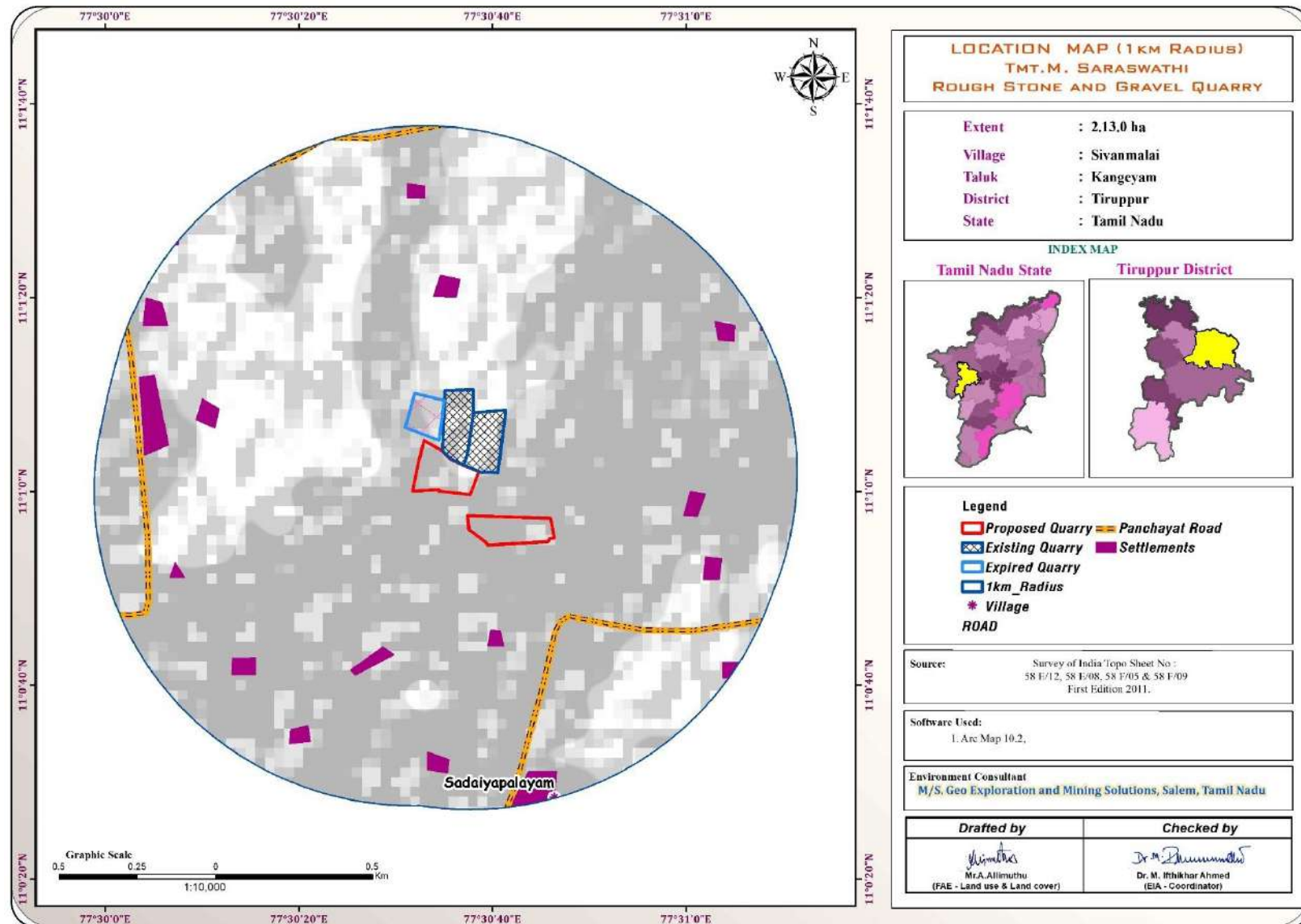
FIGURE 2.7: DIGITIZED MAP OF THE STUDY AREA (5 KM RADIUS FROM PROJECT SITE)

FIGURE 2.8: DIGITIZED MAP OF THE STUDY AREA (1 KM RADIUS FROM PROJECT SITE)

2.2.1 Project Area

- (i) The proposed project is 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 OF THE PROPOSED PROJECT

Description	Present area (Ha)	Area at the end of lease period (Ha)
Area Under Quarry	1.68.0	1.68.0
Site Services	Nil	0.01.00
Roads	0.02.0	0.02.00
Green Belt	Nil	0.18.0
Unutilized Area	0.43.0	0.24.0
Grand Total	2.13.0	2.13.0

Source: Approved Mining Plan

2.2.2 Size or Magnitude of Operation

TABLE 2.4: OPERATIONAL DETAILS

PARTICULARS	DETAILS	
	Rough Stone (m ³) (5Year Plan period)	Gravel (m ³) (3 Years Plan period)
Geological Resources	6,38,479	5,122
Mineable Reserves as per Mining Plan	1,39,732	-
Production for five-year plan period	1,39,732	-
Mining Plan Period / Lease Applied Period	5Years	
Number of Working Days	300 Days	
Production per day	94	-
No of Lorry loads (12m ³ per load)	8	-
Total Depth of Mining	42m bgl (2m Gravel + 40m Rough stone).	

Source: Approved mining plan

2.3 Geology

2.3.1 Regional Geology

Tiruppur district of Tamil Nadu forms a part of southern Granulitic terrain and is predominantly occupied by crystalline rocks of Archaean to late Proterozoic age. Regionally, the rocks can be grouped under five categories namely

- I. Charnockite Group represented by Charnockite, Pyroxene Granulite and Magnetite Quartzite,
- II. Peninsular Gneissic Complex (II) comprising hornblende-biotite gneiss,
- III. Basic intrusive include Pyroxinite/Dunite
- IV. Younger intrusive comprising, Nepheline-Syenite, Pink Granite, Pegmatite and Quartz veins and
- V. Quaternary sediments of Kankar and soil.

Stratigraphy of the area

Age	Group	Lithology
Holocene		Block cotton soil/clay±gypsum
Cenozoic		Kankar/calc-tufa
Neoproterozoic	Acid intrusive	Quartz veins Pegmatite Pink Granite
	Sivamalai syenite Complex	Nepheline-syenite

	Chalk Hills (Basic Intrusives)	Pyroxenite/Dunite
Archaean - Palaeoproterozoic	Peninsular Gneissic Complex (II) PGC (II)	Pink Granite Gneiss Hornblende Biotite gneiss
Archaean	Charnockite Group	Charnockite (Unclassified) Pyroxene Granulite Banded Magnetite Quartzite

Tiruppur District is predominantly occupied by hornblende Biotite gneisses of PGC (II) with enclaves of Magnetite Quartzite, Pyroxene Granulite and Charnockite. The area exposes several bands of Pyroxene Granulite which is medium grained, medium to dark grey in color and stand out prominently in the gneissic country generally parallel to regional foliation. Charnockite is coarse grained, massive, many places it is foliated, grey colored and greasy and exposed as boulder outcrops and small knolls. It is well exposed in Central, Western and Southern parts of the Tiruppur District. The general strike of foliation varies from ENE-WSW, E-W with dipping towards NW and N respectively.

Source: District Survey Report for Minor Minerals Tiruppur District – May 2019

<https://cdn.s3waas.gov.in/s3d1f255a373a3cef72e03aa9d980c7eca/uploads/2019/05/2019052585.pdf>

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, covered with gravel formation of 2m thickness; Massive Charnockite formation is found after 2m gravel formation which is inferred from the existing pit within the lease area.

Peninsular gneiss forms the oldest rock formation, in which the massive formation of Charnockite lies over with rich accumulation of recent quaternary formation. On regional scale the Charnockite body N30°E – S30°W with dipping towards SE60° (Source Approved Mining plan).

2.3.3 Hydrogeology

Tiruppur District is underlain by crystalline metamorphic complex in the western parts of district and sedimentary tract in eastern side. An area of 4551 Sq.km is covered by crystalline rocks (63%) and 2671 Sq.km is covered by sediments (37%). The general geological sequence of formation is given below:

Quaternary - Laterites, Sands and Clays

Tertiary - Sandstone, Gravels and Clays

Cretaceous - Limestone, Calcareous Sandstone and Clay unconformity.

Archaean - Charnockites, Gneisses, Granites, Dolerites and Pegmatite

- The major part of the area is covered by metamorphic crystalline rocks of charnockite, granitic gneiss of Archaean age intruded by dolerite dykes and pegmatite veins. These rocks are highly metamorphosed and have been subjected to very severe folding, crushing and faulting.
- Ground Water occurs under the phreatic condition and wherever there are deep seated fractures, it occurs under semi-confined to confined conditions.
- Occurrence of Ground Water in hard rock depends upon the intensity and depth of weathering, fractures and fissures present in the rocks.
- Depth of well in hard rock generally ranges between 8 and 15m below ground level.
- Generally, yield in open wells ranges from 30 to 250m³/day and in bore well between 260 and 430 m³/day. The weathered thickness varies from 2.5 m to 42m in general there are 3 to 5 fracture zones within 100 m and 1 to 4 fracture zones between 100 and 200 m.

Aquifer Systems:

Occurrence and storage of groundwater depend upon three factors viz., Geology, Topography and rainfall in the form of precipitation. Apart from Geology, wide variation in topographic profile and intensity of rainfall constitutes the prime factors of groundwater recharge. Aquifers are part of the more complex hydro geological system and the behaviour of the entire system cannot be interpreted easily. In hard rock terrain the occurrence of Ground Water is limited to top

weathered, fissured and fractured zone which extends to maximum 30 m on an average it is about 10-15 m in Tiruppur District.

In Sedimentary formations, the presence of primary inter granular porosity enhances the transmitting capacity of groundwater where the yield will be appreciable. The sedimentary area which occupies the eastern part of the district along the coastal tract is more favourable for groundwater recharge. Ground Water occurs both in semi confined and confined conditions. A brief description of occurrence of groundwater in each formation is furnished below.

Aquifer Parameters

The thickness of aquifer in this district is highly erratic and varies between 15 m to 40 m below ground level. The inter granular Porosity is essentially dependent on the intensity and degree of weathering and fracture development in the bed rock. As discussed earlier deep weathering has developed in Gneissic formations and moderate weathering in Charnockite formations. The range of aquifer parameters in hard rock and sedimentary formations are given below:

TABLE 2.5: RANGE OF AQUIFER PARAMETERS

Name	Sp. Capacity (lpm/d)	Specific Yield (%)	T (m ² /d)	K (m/day)	Yield of wells (lps)
Alluvium	2.08	7.2	98	19.7	2.5
Tertiary	78-173	1.4-3.5	46-134	16-33	2-3.3
Cretaceous	33-782	0.3-2.56	33-782	10-66	1.1-3.5
Crystalline	27-224	0.8-2.5	16-60	5-20	1-2

Source: <http://nwm.gov.in/sites/default/files/Notes%20on%20Tiruppur%20District.pdf>

The Ground Water levels from the 38 number of observation wells of TWAD have been analyzed for Post-Monsoon and Pre-Monsoon.

FIGURE 2.9: GROUND WATER LEVEL VARIATIONS OF TIRUPPUR DISTRICT

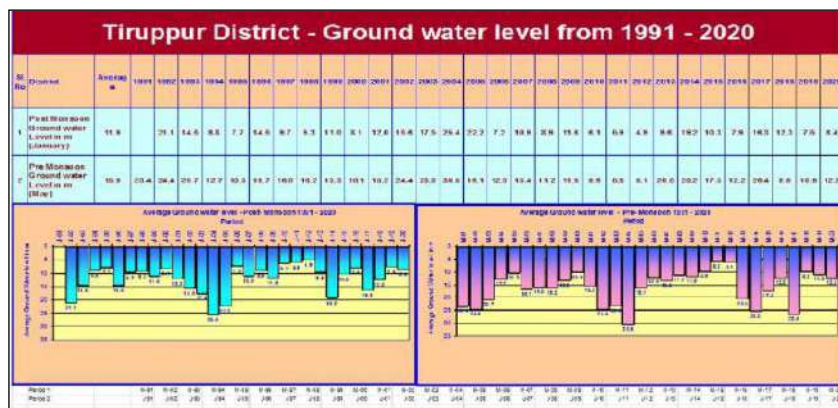


TABLE 2.6: GROUND WATER LEVEL VARIATIONS OF TIRUPPUR DISTRICT

Jan 2017	May 2017	Jan 2018	May 2018	Jan 2019	May 2019	Jan 2020	May 2020	Jan 2021	May 2021	5 Years Pre-Monsoon Average	5Years Post Monsoon Average
16.3	26.4	12.4	9.8	7.6	10.9	8.4	12.3	7.1	10.6	11.9	8.8

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

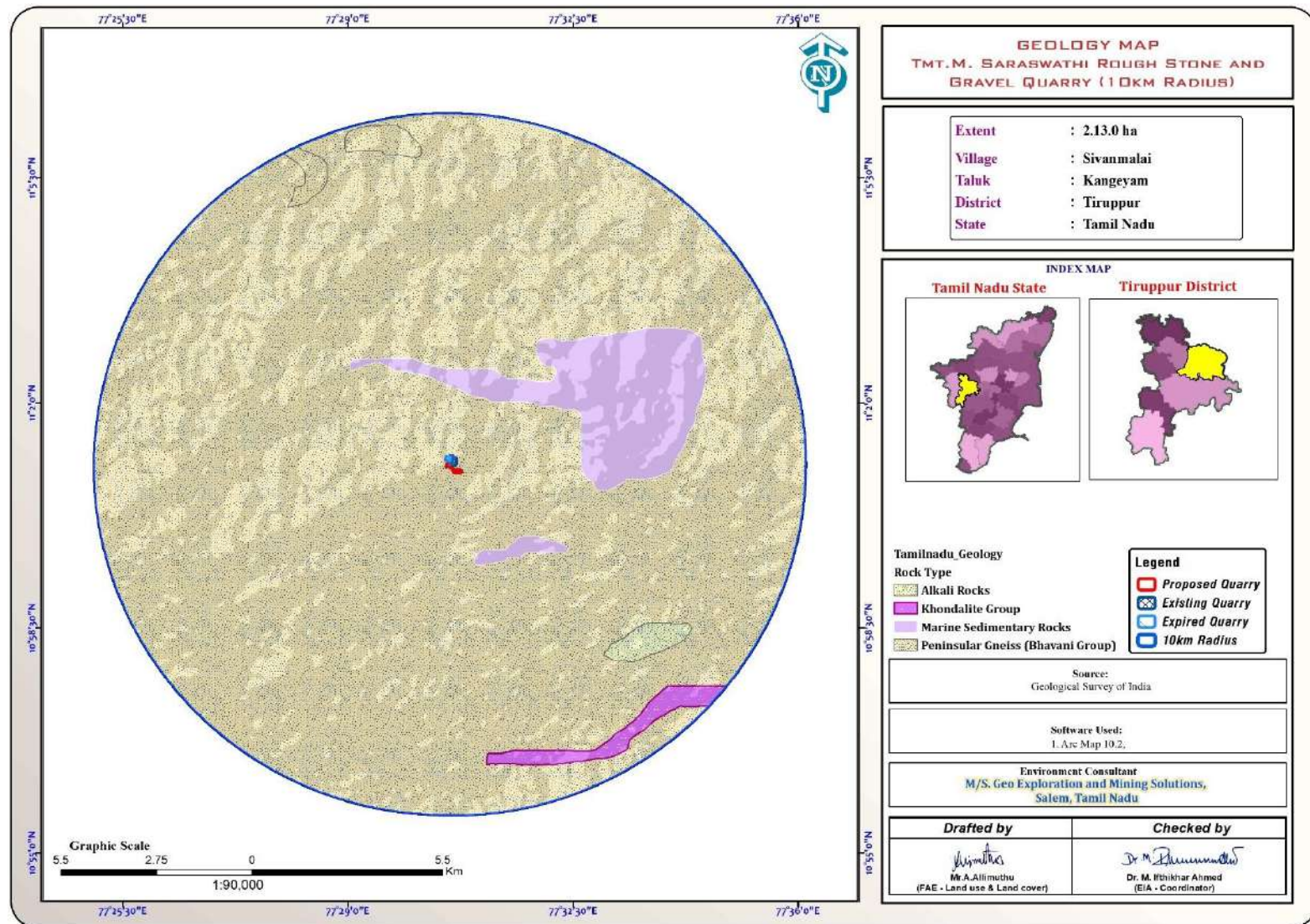
FIGURE 2.10: REGIONAL GEOLOGY MAP

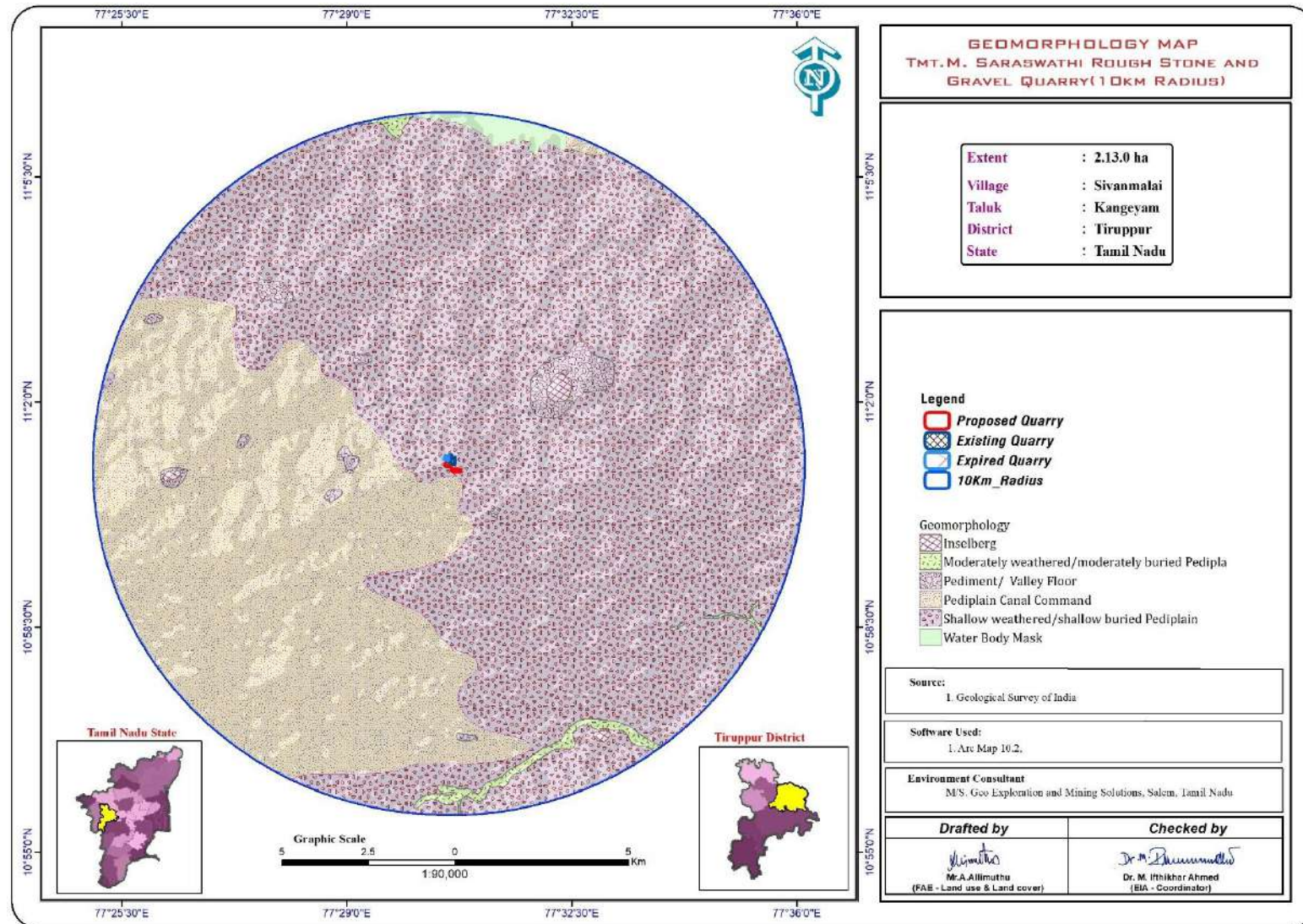
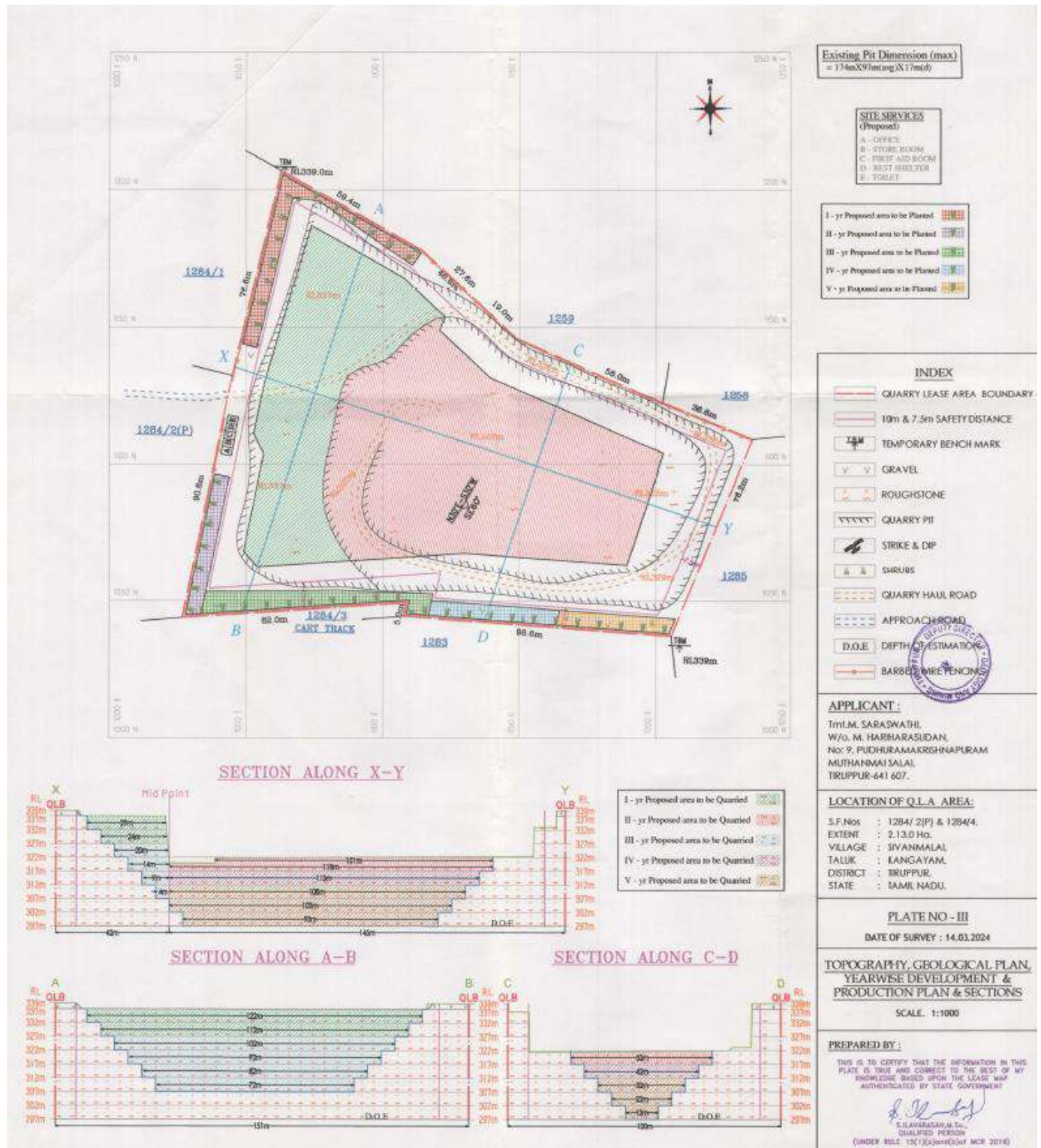
FIGURE 2.11: GEOMORPHOLOGY MAP

FIGURE 2.12: TOPOGRAPHY, YEARWISE PRODUCTION PLAN AND SECTION-

2.4 Resources and Reserves Estimation

The mineable reserves are calculated after leaving necessary safety distances and bench loss prescribed in the Precise area communication letter.

TABLE 2.7: AVAILABLE GEOLOGICAL RESOURCES OF PROPOSED PROJECT

Description	Rough Stone(m ³)	Gravel(m ³)
Geological Resource	6,38,479	5,122
Mineable Reserves	1,39,732	-
Proposed production for five years	1,39,732	-

Source: Approved Mining Plan

TABLE 2.8: YEAR-WISE PRODUCTION PLAN

YEAR	ROUGH STONE QUARRY (m ³)
I	31,130
II	28,912
III	21,770
IV	23,730
V	34,190
TOTAL	1,39,732

Source: Approved Mining Plan

Disposal of Waste

There is no waste is anticipated, quarried out materials (Rough stone and Gravel) will be utilized (100%).

Conceptual Mining Plan/ Final Mine Closure Plan

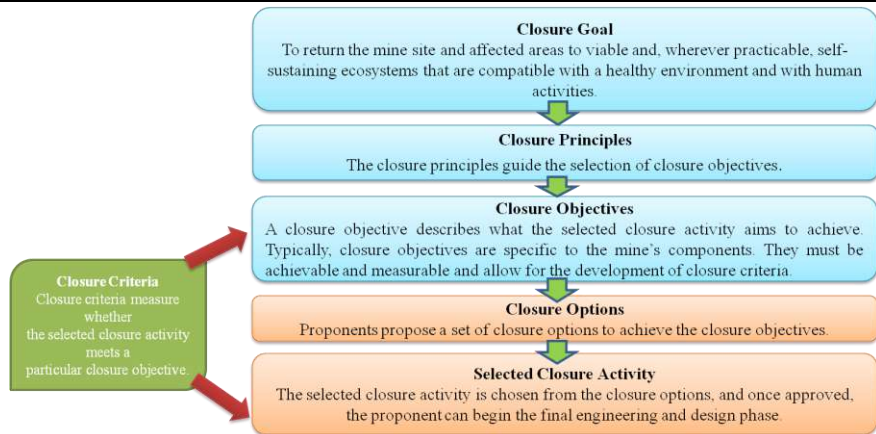
The ultimate pit size is designed based on certain practical parameters such as economical depth of mining, safety zones, permissible area, etc.

TABLE 2.9: ULTIMATE PIT DIMENSIONS

Length (Max) (m)	Width (Max) (m)	Depth (Max) (m)
174	128	42m BGL

Source: Approved Mining Plan

- At the end of the life of the mine the quarried out land will be 1.68.0 Ha which will act as artificial reservoir for collecting rain water and helps to meet out the demand or crises during drought season.
- After mine closure the greenbelt developed along the safety barrier and top benches and temporary water reservoir will enhance the ecosystem
- Mine Closure is a process of returning a disturbed site to its natural state or which prepares it for other productive uses that prevents or minimizes any adverse effects on the environment or threats to human health and safety.
- The principal closure objectives are for rehabilitated mines to be physically safe to humans and animals, geo-technically stable, geo-chemically non-polluting/ non-contaminating, and capable of sustaining an agreed post-mining land use.

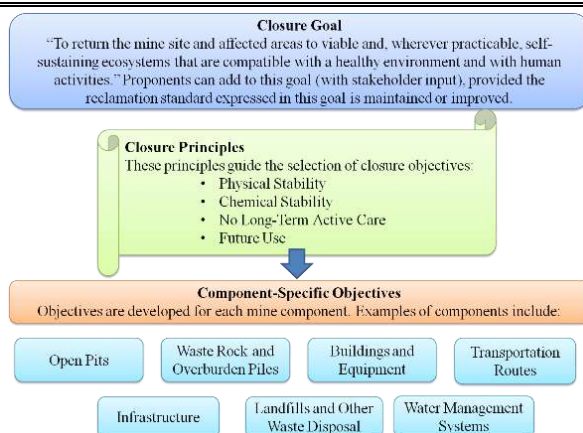


Closure Objectives

- Access to be limited, for the safety of humans and wildlife.
- The open pit mine workings and pit boundary are physically and geo-technically stable.
- Water quality in the mined out pits will be ensuring safe for humans, aquatic life, and wildlife.
- Discharge of contaminated drainage has been minimized and controlled.
- Emergency access and escape routes from flooded pits for humans and wildlife are in place.
- Dust levels are safe for people, vegetation, aquatic life, and wildlife.

Closure Planning & Options Considerations in Mine Design –

- The closure of mine is well planned at the initial stage of planning & design consideration by the internal and external stake holders
- Construction of 2m height bund all along the mine pit boundary and ensure its stability all time & construction of garland drain along the natural slope to avoid sliding and collection of soil to the pit & surface runoff during rainfall
- After complete exploitation of mineral, the lowest bench foot wall side will be maintained as plain surface without any sump pits to avoid any accidents
- All the sharp edges will be dressed to smoother face before the closure of mine and ensure no loose debris on hanging wall side
- The project proponent as a part of social responsibilities assures to supply the stored mine pit water to the nearby villages after effective treatment process as per the standards of TNPCB & TWAD
- Native species will be planted in 3 row patterns on the boundary barriers and 1st bench, a full-time sentry will be appointed at the gate to prevent inherent entry of public & cattle.
- The access road to the quarry will be cut-off immediately after the closure
- The layout design shall be prepared and get approved from Department of Geology and Mining.
- There will be a positive change in the environmental and ecology due to the mine closure



Post-Closure Monitoring –

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

- Monitor physical and geotechnical stability of remnant pit walls.
- Monitor the ground regime in pit walls to confirm achievement of design objectives.
- Monitor water level in pit to confirm closure objectives regarding fish, fish habitat, and wildlife safety are being achieved.
- Sample water quality and quantity at controlled pit discharge points.
- Monitor wildlife interactions with barriers to determine effectiveness.
- Inspect aquatic habitat in flooded pits where applicable.
- Monitor dust levels.

2.5 Method of Mining

The method of mining is Opencast Mechanized Mining. It is an existing quarry attained a depth of 20m maximum in the centre part of the pit it is proposed to start from the North side and progress towards south. The same method of mining 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). 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 will be quarried 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	– 1.6 m
Charge per hole	– 0.5Kg

Powder factor – 6.0 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: -

Total Volume	=	1,39,732 m ³
	=	1,39,732/5
	=	27946/300
	=	94* 2.6
	=	242 Tonnes per day
Powder factor	=	6 Tonnes/kg
Hence it is required t	=	40 kg per day
Quantity of Explosives required per hole	=	0.5kg
Total No of holes/ Day	=	80 Holes per day
Total quantity of Explosives will not exceed 5 kg per round i.e., 10 holes per round		

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 2.10 PROPOSED MACHINERY DEPLOYMENT

S.NO.	TYPE	NOS	SIZE/CAPACITY	MOTIVE POWER
1	Jack hammers	4	1.2m to 2.0m	Compressed air
2	Compressor	1	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker	1	300 HP	Diesel Drive
4	Tippers	3	20 Tonnes	Diesel Drive
5	Water Sprinkler	1	4000 ltrs	Diesel Drive

Source: Approved Mining Plan.

2.6 General Features

2.6.1 Existing Infrastructures

Infrastructures like Mine office, Temporary Rest shelters for workers, Latrine and Urinal Facilities are available in the Existing quarries and the same infrastructure as per the Mine Rule will be maintained.

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. 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.

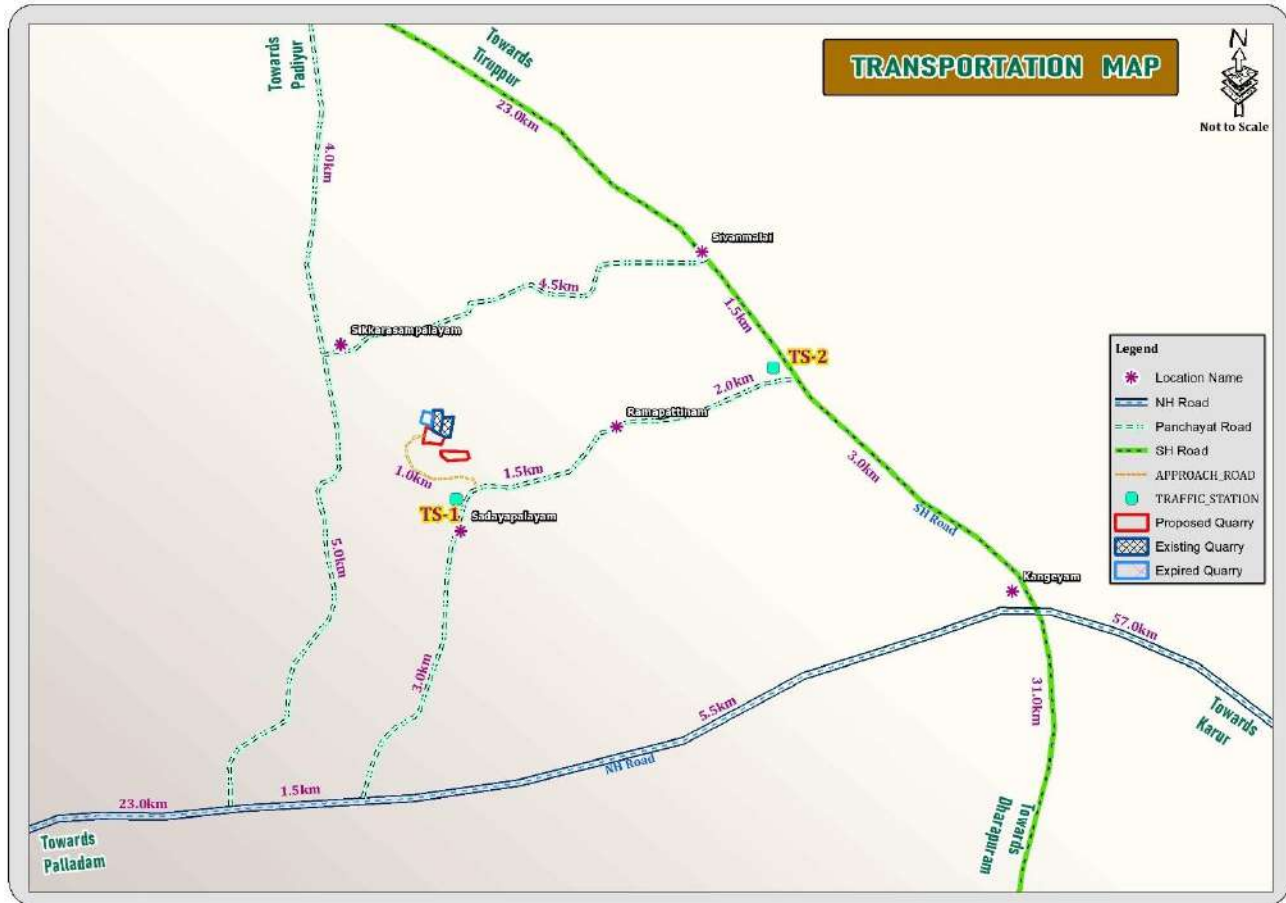
TABLE 2.11 – TRAFFIC SURVEY LOCATION'S

Station code	Station location	Distance and Direction	Type of Road
TS1	Sadayapalayam Panchayat Road	700m- SE	Panchayat Road

TS2	Tiruppur-Dharapuram SH Road	3.2km-NE	State Highway road
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Source: On-site monitoring by GEMS FAE & TM

FIGURE 2.13: TRAFFIC SURVEY LOCATIONS & TRANSPORTATION ROUTE MAP



(Source: Survey of India Toposheet)

TABLE 2.12 – EXISTING TRAFFIC VOLUME

Station code	HMT (Hourly Average)		LMV hourly average		2/3 Hourly average		Total PCU per hour
	No	PCU	No	PCU	No	PCU	
TS1	55	165	50	50	75	37	252
TS2	150	450	100	100	150	75	625

Source: On-site monitoring by GEMS FAE & TM

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

TABLE 2.13 – ANTICIPATED TRAFFIC DUE TO THIS PROPOSED PROJECT

Transportation of Rough stone per day		
Capacity of trucks	Cumulative Trips	Volume in PCU
10/20 tonnes	30	90

Source: Anticipated based on Approved Mining Plan Production

TABLE 2.14 – 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
TS1	625	90	715	1500
TS2	252	90	342	1200

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

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 proposal for the mineral processing or ore beneficiation in this project. the entire quarried out material will be transported to the crushing units situated within 500m south side.

2.6.4 Existing Infrastructure

It is an Existing quarry, no infrastructural facility 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. There is no drainage pattern, water course adjacent to the project site.

2.7 Project Requirement

2.7.1 Water Source & Requirement

Detail of Total water requirements in KLD as given below:

TABLE 2.15 – WATER REQUIREMENT FOR THE PROJECT

*Purpose	Quantity	Source
Domestic & Drinking purpose	0.4KLD	From existing, bore wells and drinking water will be sourced from Approved water vendors.
Dust Suppression	0.6KLD	From Existing bore wells from nearby area
Green Belt	1.0KLD	From Existing bore wells from nearby area
Total	2.0 KLD	

Source: Prefeasibility Report

About 50% water will be required for the suppression of the dust, Water will be sourced 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 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., are already available within the project site. 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

High speed Diesel (HSD) will be used for mining machineries. Diesel will be brought from nearby Fuel Stations. The quarry works restricted to one general shift during day time only. **No electricity is needed for quarry operation etc** as mainly diesel operated mining machinery is used for quarrying. However, the electricity will be required for crusher

plant, pumping of water and for administrative building & rest shelters. Besides, standby generator will be available to meet the emergency power requirement of the quarry.

For Rough stone and gravel:

Per hour Excavator will consume	=	16 liters / hour
Per hour Excavator will excavate	=	20m ³ of Rough stone
Rough stone	=	1,39,732/20 = 6986 hours
Diesel consume	=	6986 hours' x 16 liters
Total diesel consumption	=	1,11,785 Liters of HSD will be utilized for rough stone

Total diesel consumption is around **1,11,785 Liters** of HSD for the entire period of life.

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 2.16: EMPLOYMENT POTENTIAL

Mine officials & Competent person	Nos
Geologist	1
Mines Foreman	1
Mate/ Blaster	1
Water Sprinkler Drivers	1
Jack hammer Operator	8
Excavator Operator	1
Tipper Driver	3
Labour & Helper	4
Cleaner & Co operator	5
Security	2
Total	27 Nos

To operate the quarry in safe and systematic manner the above Statutory/ Competent persons are required. A total of 27 people will get employment this project.

2.7.5 Project Cost

TABLE 2.17 – PROJECT COST

Project Cost
Rs. 66,12,000/-

Source: Approved Mining Plan & Prefeasibility Report

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 2.18 – EXPECTED TIME SCHEDULE

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

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 to May 2025 with CPCB guidelines. Environmental data has been collected with reference to cluster quarries by EHS 360 Labs Private Limited, accredited by ISO/IEC-17025:2005 (NABL) 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 quarries 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 to May 2025.

Study Methodology

1. The project area (Core zone) was surveyed in detail with the help of DGPS survey instrument and the boundary pillars were picked up with DGGPS. 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).
2. Soil samples were collected and analysed for relevant physico-chemical characteristics, exchangeable cations, nutrients & micro nutrients etc., in order to assess the impact of mining activities and proposed greenbelt development.
3. Ground water samples were collected during the study period from the open wells and bore wells, while surface water was collected from river and lake 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 project.
4. A meteorological station was setup in Sivanmalai village. Wind speed, Wind direction, Dry and wet bulb temperature, Relative humidity, Rainfall with cloud cover and general weather conditions were recorded throughout the study period.
5. 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
6. 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
7. 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

8. 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 – ENVIRONMENTAL 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 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 (1 surface water & 5 ground water)	IS 10500& CPCB Standards
Meteorology	Wind Speed Wind Direction Temperature Cloud cover Dry bulb temperature Rainfall	1 Hourly Continuous Mechanical/Automatic Weather Station	1	Site specific primary data& Secondary Data from IMD Station
*Ambient Air Quality	PM ₁₀ PM _{2.5} SO ₂ NO _x Fugitive Dust	24 hourly twice a week (Mar to May 2025)	7 (2 core & 5buffer)	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 Quadrat & 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 EHS 360 Lab Private Limited in association with GEMS

* All monitoring and testing are 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 10 Km radius around the proposed mine site so that temporal changes due to the mining activities on the surroundings can be assessed in future.

Considering the core zone of the project site the area has been already broken up and the quarrying activities carried out past 10 years and the surrounding lands are used specifically for the mining activities. Around this project site mining activities and crushers are operating more than 15 years.

3.1.1 LAND USE/ LAND COVER

To study the land use pattern of the core as well as a buffer zone, land use/land cover details have been identified/ maps have been prepared in accordance with the **Standard ToR point no. 4 & 10 Stating:**

Point No. 4 All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/ topo sheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).

Point No. 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.

Current vintage data of Indian Remote Sensing Satellite Resourcesat1 LIII (False Color Composite) has been used for Land Use / Land Cover study. Satellite image has been procured from National Remote Sensing Centre, Hyderabad.

3.1.2 OBJECTIVE

The objectives of the LULC study are as follow:

- ☞ To develop the Land use & Land cover map using land coordinates of the quarry area (Core Zone) and 10 km radius from the quarry site (Buffer area).
- ☞ To Identify and mark the important Land use and Land cover features using the primary and secondary data collected.
- ☞ To evaluate the impacts on existing land use/cover features of the buffer area by the Proposed Project activities.
- ☞ To identify the mitigative measures for the sustainable use of land and to protect the buffer zone from the adverse impacts.

Technical specification of Satellite imagery Data Used:

Current vintage data of Indian Remote Sensing Satellite RESOURCESAT1 (LISS-III) digital FCC (False Color Composite) has been used for preparation of Land use/ Land cover thematic map of study area. Satellite image has been procured from National Remote Sensing Centre, Hyderabad. Survey of India Toposheet as a reference map on 1:50,000 scale has been used for preparation of base layer data like road, rail network; village for geo-referencing of satellite image.

- | | | |
|-------------------------|---|--|
| ☞ Satellite Image | - | Resourcesat1-LISSIII, 23.5m Resolution |
| ☞ Satellite Data Source | - | NRSC, Hyderabad |
| ☞ Satellite Vintage | - | 14st July 2020, Swath 141km wide. |
| ☞ SOI Toposheet No | - | 58 -E/08 |
| ☞ Software Used | - | ArcGIS 10.8 |

The satellite image (FCC color 3,2,1) of the buffer zone is given in 3.1

The spatial resolution and the spectral bands in which the sensor collects the remotely sensed data are two important parameters for any land use survey. Resourcesat1-LISSIII, 23m Resolution of 23.5m and a 141 km wide swath of the earth in 23.5m resolution covering wide areas the data is collected in 4 visible bands namely band number and Resolution.

TABLE 3.2: RESOURCESAT1-LISSIII SENSOR CHARACTERISTICS

Band Number	Description	Wavelength	Resolution
Band 1	Green	0.52-0.59 μm	23.5 meters
Band 2	Red	0.62-0.68 μm	23.5meters
Band 3	NIR	0.77-0.86 μm	23.5meters
Band 4	SWIR	1.55-1.70 μm	70meters

Source: NRSC, Hyderabad

3.1.3 METHODOLOGY

The land use / land cover map is prepared by adopting the interpretation techniques of the Satellite image in combination with collateral data such as Survey of India topographical maps. Image classification is done by using visual interpretation techniques and digital classification using any of the image processing software. The various activities for preparation of LULC include pre-processing, rectification, image enhancements and classifying the satellite data for assessing the change in land use land cover due to proposed developmental activities.

- ☞ Preliminary/primary data collection of the study area
- ☞ Satellite data procurement from NRSC
- ☞ Secondary data collection from authorized bodies
- ☞ Survey of India Toposheet (SOI)
- ☞ Mine Layout
- ☞ Cadastral / Khasra map
- ☞ GPS Coordinates of Lease Boundary
- ☞ Processing of satellite data using ArcGIS 10.8 and preparing the Land Use & Land cover maps (e.g. Plant/Mine area, Existing Quarry, Settlements, Agriculture land, Non agriculture land, water bodies, etc.) by Digital Image Processing (DIP) technique.
- ☞ Geo-Referencing of the Survey of India Toposheet
- ☞ Geo-Referencing of satellite Imagery with the help of Geo-Referenced Toposheets
- ☞ Enhancement of the Satellite Imagery
- ☞ Base Map layer creation (Roads, Railway, Village Names, and other Secondary data, etc.)
- ☞ Data analysis and Classification using Digital interpretation techniques.
- ☞ Ground truth studies or field Verification.
- ☞ Error fixing / Reclassification
- ☞ Final Map Generation.

The land use/Land cover Map of the buffer zone is given in 3.3. Land Use Pattern of the Buffer Zone (Study area) Details of the same are given in Table - 3.3 and the map is shown in Figure - 3.3.

TABLE: 3.3 LAND USE / LAND COVER DETAILS OF STUDY AREA

S.No	CLASSIFICATION	AREA_HA	AREA_%
BUILTUP			
1	Builtup Urban	453.52	1.41
2	Builtup Rural	990.38	3.09
3	Builtup Mining	185.13	0.58
AGRICULTURAL LAND			
4	Crop Land	21618.31	67.40
5	Follow Land	5750.24	17.93
6	Agricultural Plantation	1928.74	6.01
BARREN/WASTE LANDS			
7	Scrub Land	797.47	2.49
WETLANDS/ WATER BODIES			
8	Waterbodies	350.47	1.09
TOTAL		32074.26	100.00

Source: Bhuvan, NRSC.

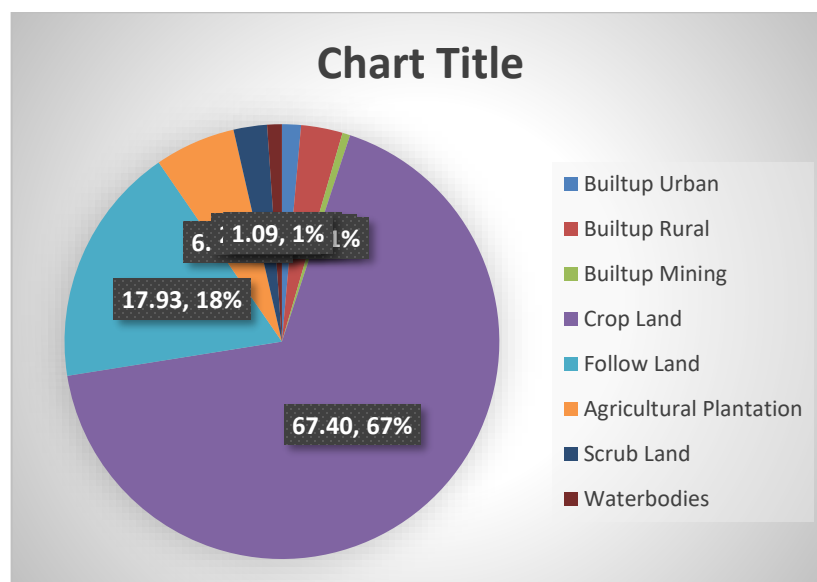
**FIGURE 3.1: CHART SHOWING LANDUSE/LANDCOVER ANALYSIS USING LISS III Data**

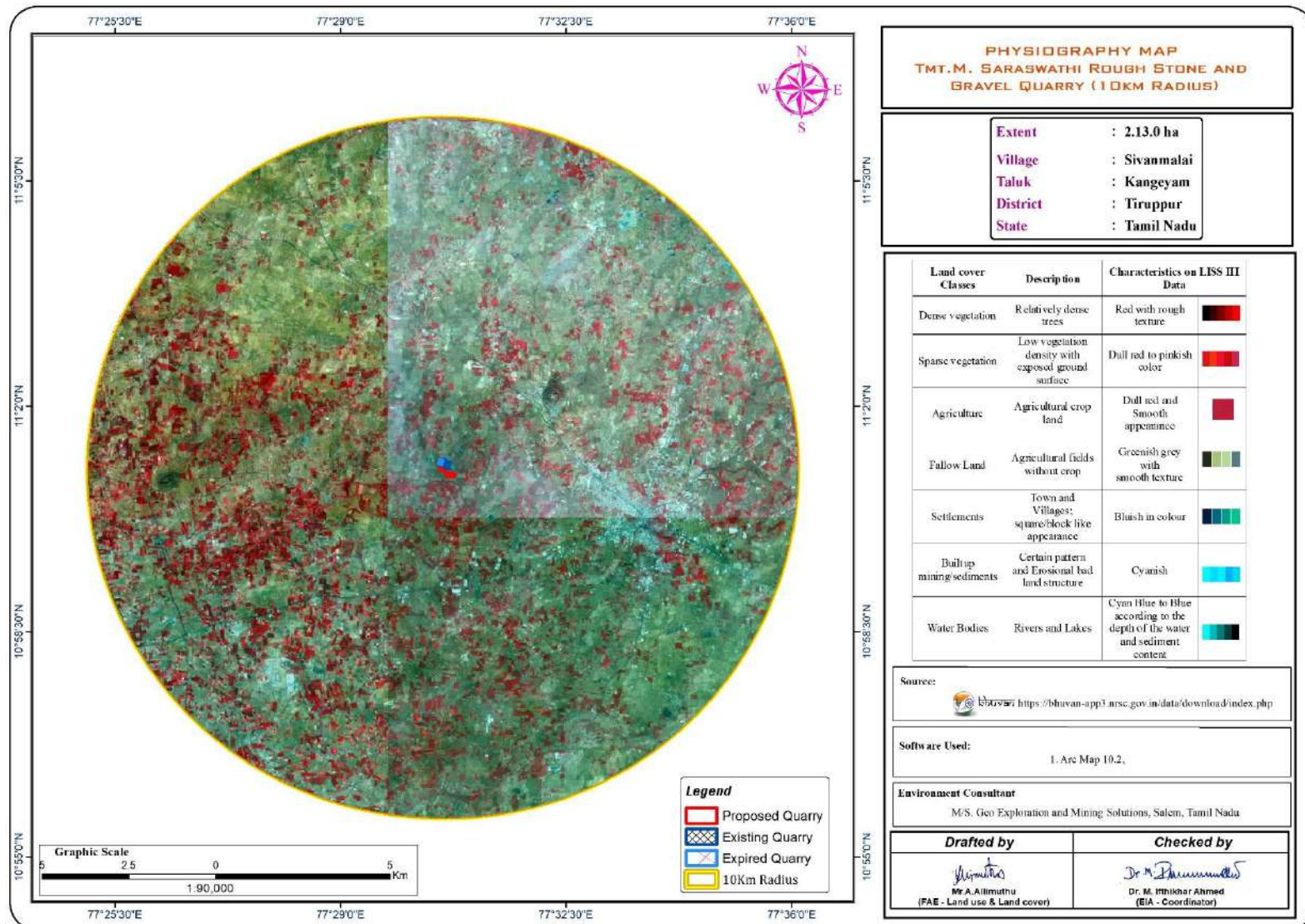
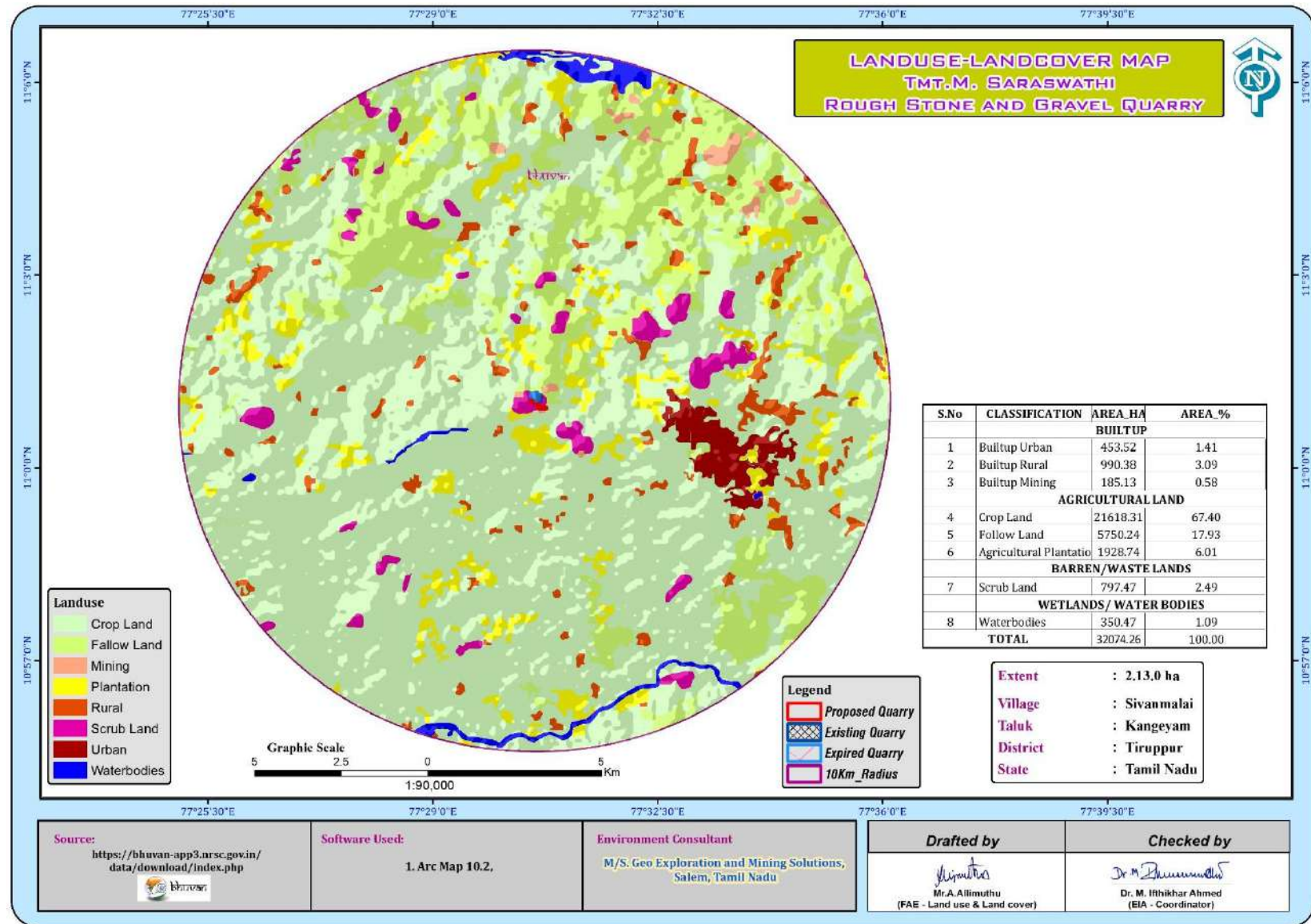
FIGURE 3.2: MAP SHOWING FALSE COLOR COMPOSITE (3,2,1) SATELLITE IMAGERY OF THE STUDY AREA

FIGURE 3.3: LAND USE LAND COVER MAP 10KM RADIUS

3.1.4 Interpretation

- ∞ The 10 km radius study area mainly comprises of Crop land & Agriculture Plantation land accounting of 67.40% & 6.01% of the total study area. The study area also consists of follow land of 17.93%.
- ∞ The buffer zone studied has no ecological sensitive area (National Park, Wildlife Sanctuary, Biosphere Reserve/ etc.).
- ∞ Water Bodies such as Odai, ponds/ lakes comprise of 1.09% of the total buffer area.
- ∞ The Scrub land accounts of 2.49%. As per the primary survey, it was observed the scrub land is mainly occupied by the stony waste and left-over domestic waste generated by the nearby areas.
- ∞ 0.58% of the total study area is occupied by the mine industries. The area occupied by Mainly Rough stone and gravel of the total buffer area. As also observed within the primary survey, the 10 km buffer area is also occupied by the medium scaled Rough stone and crusher industries also located in the study area.
- ∞ 4.50% of the area is covered under the Built-up Land including rural area. The project site falls under the quarry region. Therefore, the area is appropriate for developing Road development and building etc., it shows that the region has good prospects in the future. Due to proposed Rough stone and gravel quarry in this region, economic condition of locals is expected to be improved directly & indirectly. Hence project will prove to be the best economic proposal for the coming times.

3.1.5 Topography

The project area is almost flat terrain with gentle gradient towards South-eastern, maximum elevation of the area is 339 m above Mean Sea Level There are no hilly regions in and around the area.

3.1.6 Drainage Pattern of the Area

There are no developed surface drainage channels adjacent to the site the main drainage pattern in the study area is Noyyal, a non-perennial pass 9.8km-North from the project site. The area is studded with few tanks that serve as the source of drinking water and also their surplus feeds adjoining tanks. The area is mostly dry in all seasons except rainy seasons.

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

3.1.7 Environmental Features in the Study Area

Nanjarayan Birds Sanctuary – 17.8km- NW & Vellode Bird Sanctuary – 29.0km – NE side of the project site. No Protected and Reserved Forest area is involved in the project area. The details related to the environment sensitivity around the mine lease area i.e. 10 km radius of the mine lease area, are given in the below Table 3.3.

3.1.8 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.

TABLE 3.4 – DETAILS OF ENVIRONMENT SENSITIVITY AROUND THE PROJECT AREA

Sl. No	Sensitive Ecological Features	Name	Arial Distance in km from Mine Lease Boundary
1	National Park / Wild life Sanctuaries	None	Nanjarayan Birds Sanctuary – 17.8km- NW Vellode Bird Sanctuary – 29.0km – NE
2	Reserve Forest	None	Uthiyur R.F– 13.5Km – South
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	Kodumanal Archeological site – 10.20Km – North East
8	Defence Installation	None	Nil within 10Km Radius

Source: Survey of India Toposheet, Village Cadastral Map& Google Earth/Maps

TABLE 3.5 – WATER BODIES IN THE STUDY AREA

S.No	NAME	DISTANCE & DIRECTION
1	Canal	280m East
2	PAP Vaikkal	310m South
3	Canal	470m NW
4	Noyyal River	9.8km North

Source: Village Cadastral Map and Field Survey and Toposheet

3.1.9 Soil Environment

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

TABLE 3.6 – SOIL SAMPLING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	S-1	Project Area	Core Zone	11° 1'3.67"N 77°30'33.44"E
2	S-2	Near Project Area	300m SE	11° 0'54.53"N 77°30'46.43"E
3	S-3	Andipalayam	7.2km NW	11° 3'14.88"N 77°27'16.27"E
4	S-4	Sivanmalai	3.5km NE	11° 2'17.52"N 77°31'57.85"E
5	S-5	Sambanthampalayam	2.5km SW	10°59'50.82"N 77°29'49.95"E
6	S-6	Kangeyam	4.5km SE	11° 0'21.76"N 77°33'3.05"E

Source: On-site monitoring/sampling by EHS 360 Lab Private Limited in association with GEMS

The objective of the soil sampling is -

1. To determine the baseline soil characteristics of the study area;
2. To determine the impact of proposed activity on soil characteristics and;

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

Methodology –

For studying soil quality, sampling locations were selected to assess the existing soil conditions in and around the proposed quarry site representing various land use conditions. The samples were collected by auger boring into the soil up to 90-cm depth. Six (6) locations were selected for soil sampling on the basis of soil types, vegetative cover, industrial & residential activities including infrastructure facilities, which would accord an overall idea of the soil characteristics. The samples were analysed for physical and chemical characteristics. The sealed 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 3.7 – 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 KGS Enviro Laboratory Private Limited

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 classification of soil and physico-chemical characteristics of the soils are presented below in Table 3.6 & Test Results in Table 3.7.

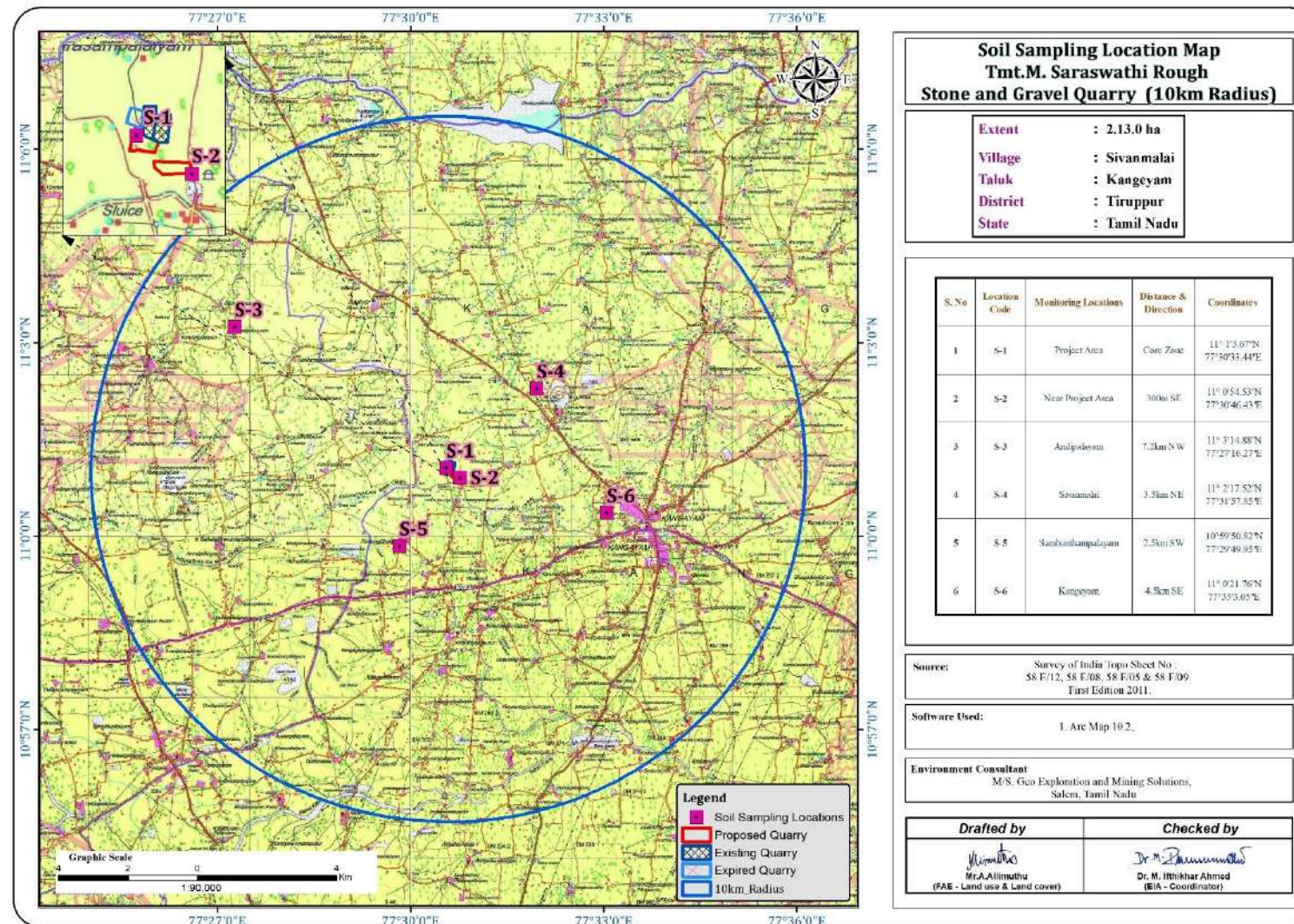
FIGURE 3.4: SOIL SAMPLING LOCATIONS AROUND 10 KM RADIUS

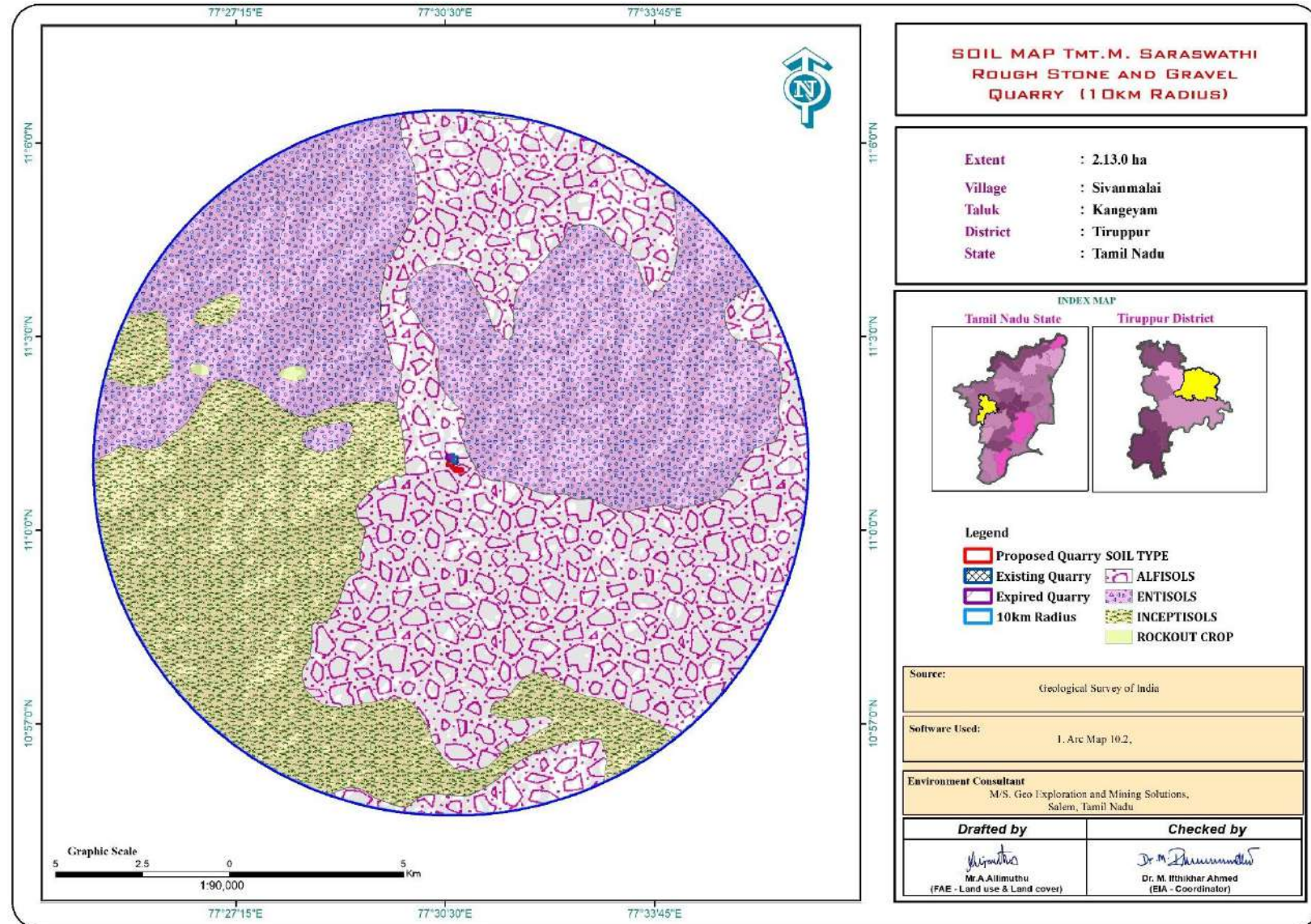
FIGURE 3.5: SOIL MAP

TABLE 3.8 – SOIL QUALITY MONITORING DATA

Parameter		Unit	S-1 Core Zone	S-2 Near Project Area	S-3 Andipalayam	S-4 Sivanmalai	S-5 Sambanthampala yam	S-6 Kangeyam
1	pH @ 25°C	-	8.53	8.02	8.33	8.72	8.66	8.50
2	Conductivity @ 25°C	µmhos/cm	502 µmhos/cm	369	388	489	380	410
3	Water Holding Capacity	%	47.5	47.6	47.1	45.1	47	46.8
4	Bulk Density	g/cm ³	1.04	1.06	1.04	1.02	1.02	1.11
5	Porosity	%	46.9	46.7	47.9	46.5	46.8	47.4
6	Calcium as Ca	mg/kg	22.1	16.1	26.8	42	35.2	36
7	Magnesium as Mg	mg/kg	18.8	12.4	18.5	31.5	28.5	20.5
8	Chloride as Cl	mg/kg	15.4	22.87	20	20.1	26	19.1
9	Soluble Sulphate as SO ₄	%	0.0019	0.0028	0.0014	0.0019	0.0019	0.0016
10	Total Phosphorus as P	mg/Kg	4.16	4.06	3.15	7.05	5.08	2.04
11	Total Nitrogen as N	mg/Kg	410.3	47.3	402.8	410.5	397.2	428.2
12	Organic Matter	%	1.48	1.86	1.74	1.05	1.91	1.57
13	Organic Carbon	%	0.86	1.08	1.01	0.61	1.11	0.91
14	Texture :							
	Clay	%	32.8	33.8	32.5	30.9	28.8	32.9
	Sand	%	29.5	31.5	28.9	32.7	31.4	33.1
	Silt	%	37.7	34.7	38.6	36.4	39.8	34.0
15	Manganese as Mn	mg/Kg	6.1	8.1	7.16	3.70	20.7	4.15
16	Zinc as Zn	mg/Kg	4.43	3.15	1.48	3.2	2.13	3.34
17	Boron as B	mg/Kg	2.67	1.67	1.13	1.25	6.24	0.91
18	Potassium as K	mg/Kg	32.1	42.7	41.1	36.4	40.4	57.6
19	Cadmium as Cd	mg/Kg	BDL (DL : 1.0)					
20	Total Chromium as Cr	-	1.19	2.02	1.04	4.88	3.02	1.20
21	Copper as Cu	mg/Kg	BDL (DL : 1.0)					
22	Lead as Pb	mg/Kg	1.64	0.87	0.79	0.68	1.01	0.77
23	Iron as Fe	mg/Kg	8.9	21.3	5.19	7.79	7.67	6.08
24	Cation Exchange Capacity	meq/100g	35.11	40.1	41.2	48.5	35.19	37.5

Source: Sampling Results by EHS 360 Lab Private Limited

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 to Sandy Soil and Bulk Density of Soils in the study area varied between 1.02– 1.11 g/cm³. The Water Holding Capacity 45.1 to 47.6% and Porosity of the soil samples is found to be medium i.e., ranging from 46.5 to 47.9%.

Chemical Characteristics –

- The nature of soil is slightly alkaline to strongly alkaline in nature with pH range 8.02 to 8.72
- The available Nitrogen content range between 397 to 428.2mg/kg
- The available Phosphorus content range between 2.04 to 7.05mg/kg
- The available Potassium range between 32.1 to 57.6 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:

Noyyal river lies at 9.8km North from the project. The area is studded with few tanks that serve as the source for agriculture and also their surplus feeds adjoining tanks. The rainfall over the area is moderate, the rainwater storage in open wells, trenches is in practice over the area and the stored water acts as source of freshwater for couple of months after rainy season.

3.2.2 Ground Water Resources:

The terrain is underlain by hard rock formations, Fissured and fractured crystalline rocks constitute the important aquifer systems in the Tiruppur region. Ground water occurs under phreatic to semi-confined conditions in these formations and is being developed by means of dug wells and filter points. Proterozoic formation is the basement rocks which consist of quartzite, crystalline limestone, calc-granulite, hornblende – biotite gneiss, charnockite or pyroxene granulite, granite and pegmatite. Weathered, a fissured crack, shear zones and joints in the basement rock act as a good groundwater potential zone in the study area. The study area is falls in the hard rock region and the proposed depth of the mine is 42m bgl will not intersect the ground water table. The study area falls in the Kangeyam which is categorized as over-exploited zone as per G.O (MS) No 113 dated 09.06.2016.

3.2.3 Methodology

Reconnaissance survey was undertaken to collect the sampling and locations were finalized based on;

1. Drainage pattern;
2. Location of residential areas representing different activities/likely impact areas; and
3. Likely areas, which can represent baseline conditions

One (1) surface water and five (5) ground water samples were collected in the study area and physico-chemical, heavy metals and bacteriological parameters were analysed. The samples were analysed as per the procedures specified by CPCB, IS-10500:2012 and 'Standard methods for the Examination of Water and Waste water' published by American Public Health Association (APHA). The water sampling locations are given in Table 3.9 and shown as Figure 3.6.

TABLE 3.9 – WATER SAMPLING LOCATIONS

S. No	Location code	Monitoring Locations	Distance & Direction	Coordinates
1	SW-1	Noyyal River	9.5km North	11° 6'27.03"N 77°30'25.92"E
2	WW-1	Near Project Area	440m SW	11° 0'52.97"N 77°30'18.84"E
3	WW-2	Andipalayam	7km NW	11° 3'22.67"N 77°27'13.29"E
4	WW-3	Sivanmalai	3.0km NE	11° 2'5.58"N 77°31'47.02"E
5	BW-1	Near Project Area	200m East	11° 1'2.36"N 77°30'44.75"E
6	BW-2	Kangeyam	4.3km SE	11° 0'25.37"N 77°32'56.64"E

Source: On-site monitoring/sampling by EHS 360 Lab Private Limited

Note: SW- Surface water, WW – Well Water, BW – Bore well

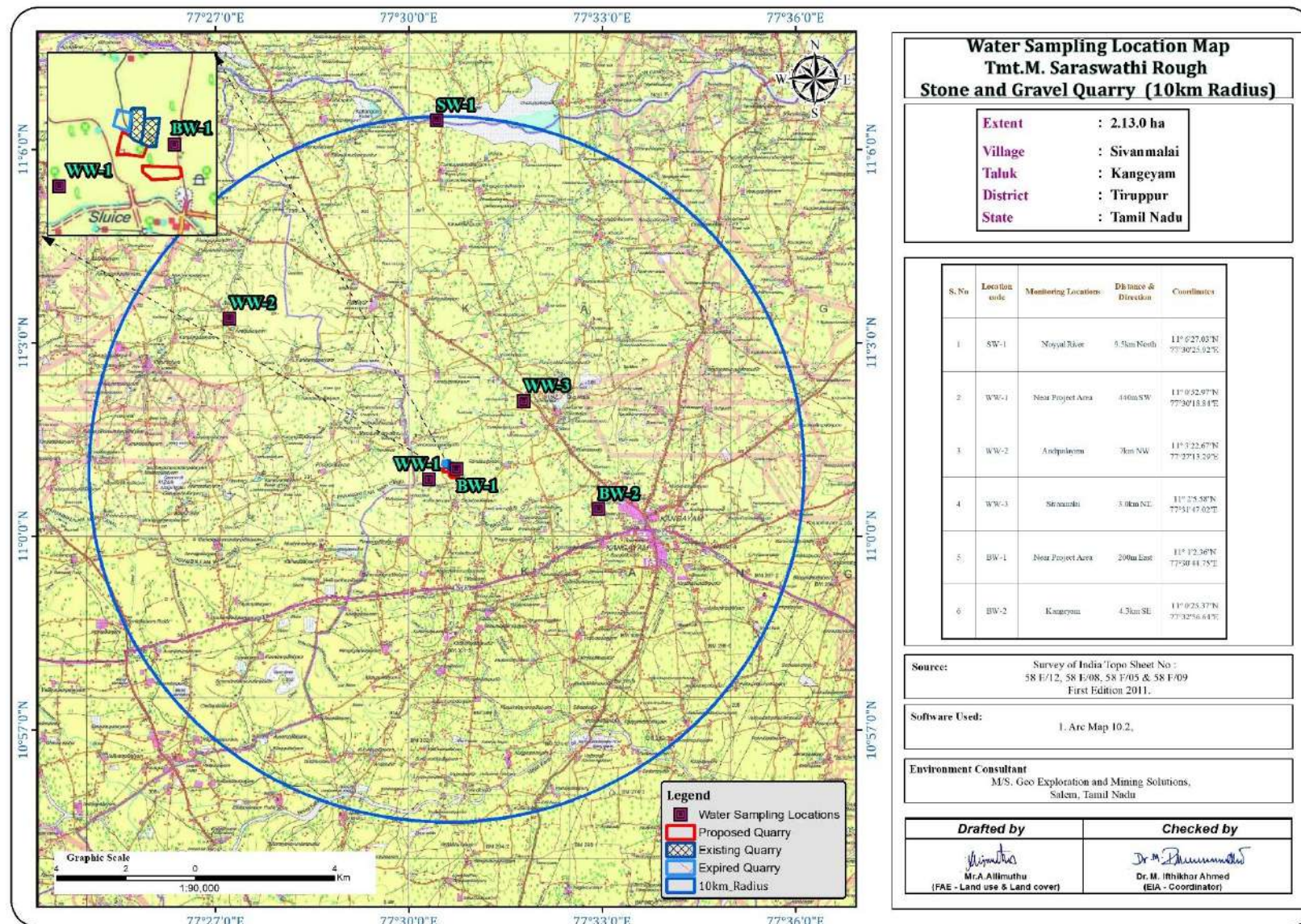
FIGURE 3.6: WATER SAMPLING LOCATIONS AROUND 10 KM RADIUS

TABLE 3.10 – SURFACE WATER ANALYSIS RESULTS

S.N O	Parameter	UNIT	SW1 Noyyal River
1	Color	Hazen	5
2	Odour	-	Agreeable
3	pH@ 25°C	-	7.89
4	Electrical Conductivity @ 25°C	µmhos/ cm	871
5	Turbidity	NTU	5.9
6	Total Dissolved Solids	mg /l	514
7	Total Hardness as CaCO ₃	mg/l	170.54
8	Calcium as Ca	mg/l	28.8
9	Magnesium as Mg	mg/l	24
10	Total Alkalinity as CaCO ₃	mg/l	158
11	Chloride as Cl ⁻	mg/l	120
12	Sulphate as SO ₄ ⁻	mg/l	67.1
13	Iron as Fe	mg/l	0.35
14	Free Residual Chlorine	mg/l	BDL (DL:0.1 mg/l)
15	Fluoride as F	mg/l	0.24
16	Nitrates as NO ₃	mg/l	7.04
17	Copper as Cu	mg/l	BDL (DL:0.01 mg/l)
18	Manganese as Mn	mg/l	BDL (DL:0.02 mg/l)
19	Mercury as Hg	mg/l	BDL (DL:0.0005 mg/l)
20	Cadmium as Cd	mg/l	BDL (DL:0.001 mg/l)
21	Selenium as Se	mg/l	BDL (DL:0.005 mg/l)
22	Aluminium as Al	mg/l	BDL (DL:0.005 mg/l)
23	Lead as Pb	mg/l	BDL (DL:0.005 mg/l)
24	Zinc as Zn	mg/l	BDL(DL : 0.05 mg/l)
25	Total Chromium	mg/l	BDL(DL : 0.02 mg/l)
26	Boron as B	mg/l	BDL(DL : 0.05 mg/l)
27	Mineral Oil	mg/l	BDL(DL : 0.01 mg/l)
28	Phenolic Compounds as	mg/l	BDL (DL:0.0005 mg/l)
29	Anionic Detergents as	mg/l	BDL (DL:0.01 mg/l)
30	Cynaide as CN	mg/l	BDL (DL:0.01 mg/l)
31	Bio chemical Oxygen demand	mg/l	12.2
32	Chemical Oxygen demand	mg/l	40
33	Dissolved Oxygen	mg/l	5.1
34	Barium as Ba	mg/l	BDL(DL:0.05 mg/l)
35	Ammonia-n (as Total	mg/l	1.6
36	Sulphide as H ₂ S	mg/l	BDL (DL:0.01 mg/l)
37	Molybdenum as Mo	mg/l	BDL (DL:0.02 mg/l)
38	Total Arsenic as As	mg/l	BDL (DL:0.005 mg/l)
39	Total Suspended Solids	mg/l	15.2
40	Total Coliform	Per 100ml	490
41	E-Coli	Per 100ml	150

TABLE 3.11 – GROUND WATER ANALYSIS RESULTS

S.NO	Parameter	Unit	WW1 Near project area	WW2 Andipalayam	WW3 Sivanmalai	BW1 Near project area	BW2 Thirunagar
1	Color	Hazen	5	5	5	5	5
2	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	pH@ 25°C	-	7.02	7.02	7.11	7.67	7.85
4	Electrical Conductivity	µmhos/cm	771	895	834	715	817
5	Turbidity	NTU	1.0	1.0	1.0	1.0	1
6	Total Dissolved Solids	mg /l	455	528	492	422	482
7	Total Hardness as CaCO ₃	mg/l	163.49	194.72	176.47	141.87	175.57
8	Calcium as Ca	mg/l	30.1	35.2	32.0	26.7	29.5
9	Magnesium as Mg	mg/l	21.5	26.0	23.5	18.3	24.8
10	Total Alkalinity	mg/l	150	184	151	135.8	143
11	Chloride as Cl ⁻	mg/l	112	112	103	84.2	115.1
12	Sulphate as SO ₄ ⁻	mg/l	38.6	55.5	68.4	51.0	61.5
13	Iron as Fe	mg/l	0.20	0.26	0.25	0.16	0.23
14	Free Residual Chlorine	mg/l	BDL (DL:0.1 mg/l)				
15	Fluoride as F	mg/l	0.12	0.15	0.29	0.23	0.26
16	Nitrates as NO ₃	mg/l	5.05	6.24	5.02	7.01	5.76
17	Copper as Cu	mg/l	BDL (DL:0.01 mg/l)				
18	Manganese as Mn	mg/l	BDL (DL:0.02 mg/l)				
19	Mercury as Hg	mg/l	BDL (DL:0.0005 mg/l)				
20	Cadmium as Cd	mg/l	BDL (DL:0.001 mg/l)				
21	Selenium as Se	mg/l	BDL (DL:0.005 mg/l)				
22	Aluminium as Al	mg/l	BDL (DL:0.005 mg/l)				
23	Lead as Pb	mg/l	BDL (DL:0.005 mg/l)				
24	Zinc as Zn	mg/l	BDL(DL : 0.05 mg/l)				
25	Total Chromium	mg/l	BDL(DL : 0.02 mg/l)				
26	Boron as B	mg/l	BDL(DL : 0.05 mg/l)				
27	Mineral Oil	mg/l	BDL(DL : 0.01 mg/l)				
28	Phenolic Compounds	mg/l	BDL (DL:0.0005 mg/l)				
29	Anionic Detergents	mg/l	BDL (DL:0.01 mg/l)				
30	Cynaide as CN	mg/l	BDL (DL:0.01 mg/l)				
31	Barium as Ba	mg/l	BDL(DL:0.05 mg/l)				
32	Ammonia (as Total	mg/l	BDL (DL:0.01 mg/l)				
33	Sulphide as H ₂ S	mg/l	BDL (DL:0.01 mg/l)				
34	Molybdenum as Mo	mg/l	BDL (DL:0.02 mg/l)				
35	Total Arsenic as	mg/l	BDL (DL:0.005 mg/l)				
36	Total Suspended Solids	mg/l	BDL (DL:1.0 mg/l)				
37	Total Coliform	Per 100ml	100 MPN/100ml	160 MPN/100ml	140 MPN/100ml	130 MPN/100ml	180 MPN/100ml
38	E-Coli	Per 100ml	< 1.8 MPN/100ml				

Source: Sampling Results by EHS 360 Lab Private Limited

3.2.4 Interpretation & Conclusion

Surface Water

The pH of surface 7.89 while turbidity found within the standards. Total Dissolved Solids 514 mg/l and Chloride 120mg/l. Nitrates 7.04 mg/l, while sulphates 67.1 mg/l.

Ground Water

The pH of the water samples collected ranged from 7.02 to 7.85 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. Total Dissolved Solids were found in the range of 422 to 528 mg/l in all samples. The Total hardness varied between 141.87 to 194.72mg/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

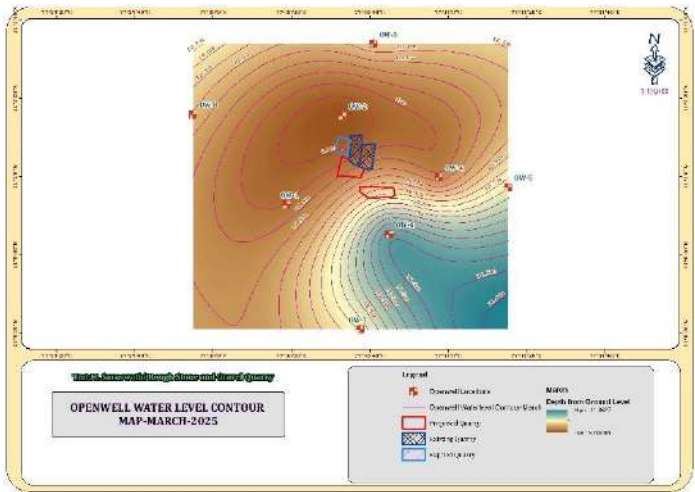
The district is underlain by hard rock formation Fissured and Fractured crystalline rocks constitute the important aquifer systems in the district. Geophysical prospecting was carried out in that area by SSRMP-ATS Instrument by qualified Geo physicist with the help of IGIS software and it was inferred that the low resistance encountered at the depth between 58-62m. the quarrying operations is up to 47m 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.

During the rainy season there is a possibility of collection of seepage water from the subsurface levels this is due to the high intensity of fracture and weathered portion upto a depth of 10m thus the collected seepage water will be 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 be as a temporary reservoir in that area.

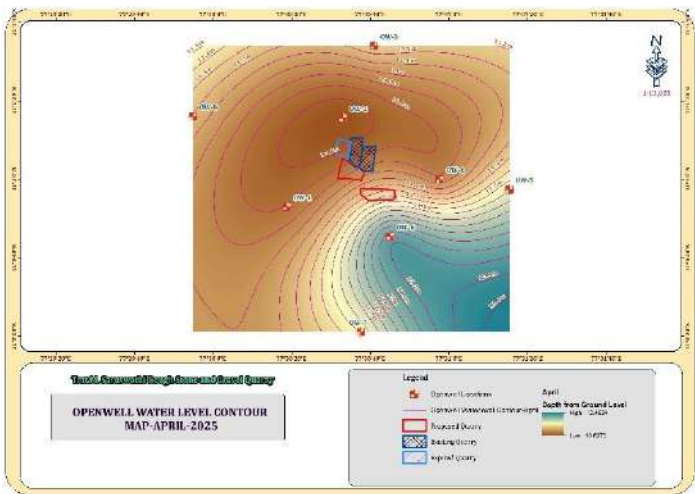
TABLE 3.12: WINTER WATER LEVEL OF OPEN WELLS 1 KM RADIUS

S.No	LABEL	LONGITUDE	LATITUDE	Mar-25	Apr-25	May-25
1	OW-1	77° 30' 18.8345" E	11° 00' 52.8934" N	10	10.8	11.4
2	OW-2	77° 30' 33.0859" E	11° 01' 15.5461" N	9.8	10.6	11.2
3	OW-3	77° 30' 40.9468" E	11° 01' 33.9250" N	10.5	11.3	11.9
4	OW-4	77° 30' 57.6807" E	11° 00' 59.8909" N	10.1	10.9	11.5
5	OW-5	77° 31' 15.3731" E	11° 00' 57.3369" N	10.8	11.6	12.2
6	OW-6	77° 30' 45.0781" E	11° 00' 45.3247" N	11.4	12.2	12.8
7	OW-7	77° 30' 37.5959" E	11° 00' 21.0548" N	10.7	11.5	12.1
8	OW-8	77° 29' 54.9270" E	11° 01' 15.9263" N	10.4	11.2	11.8

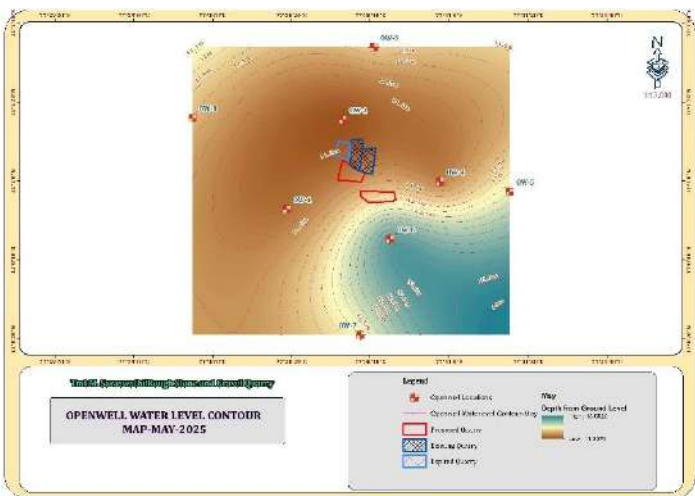
FIGURE 3.7: CONTOUR MAP OF OPEN WELL WATER LEVEL



MARCH 2025



APRIL 2025



MAY 2025

TABLE 3.13: WINTER WATER LEVEL OF BOREWELLS 1 KM RADIUS

S.No	LABEL	LONGITUDE	LATITUDE	Mar-25	Apr-25	May-25
1	BW1	77° 30' 44.7948" E	11° 01' 02.3724" N	61.6	62.4	62.8
2	BW2	77° 31' 00.5539" E	11° 01' 08.6499" N	60.8	61.6	62
3	BW3	77° 31' 13.6194" E	11° 01' 07.9234" N	60.3	61.1	61.5
4	BW4	77° 30' 37.8080" E	11° 00' 42.1971" N	61	61.8	62.2
5	BW5	77° 30' 37.2655" E	11° 00' 20.9274" N	60.6	61.4	61.8
6	BW6	77° 30' 12.5655" E	11° 00' 51.3512" N	60.9	61.7	62.1
7	BW7	77° 29' 57.0176" E	11° 01' 06.1502" N	61.4	62.2	62.6
8	BW8	77° 30' 28.2053" E	11° 01' 18.5466" N	61.1	61.9	62.3
9	BW9	77° 30' 25.4418" E	11° 01' 38.2497" N	60.7	61.5	61.9

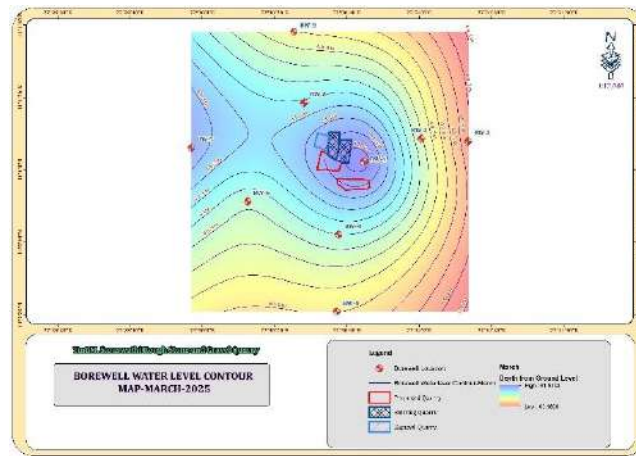
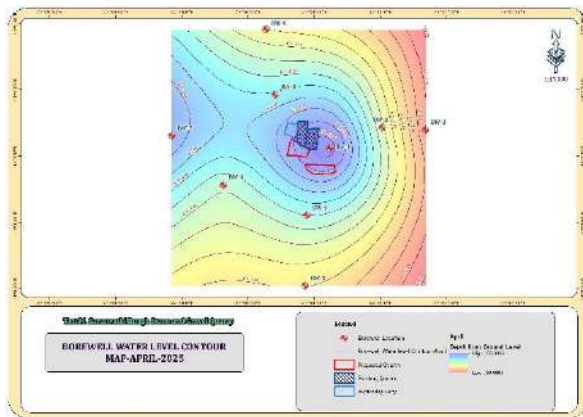
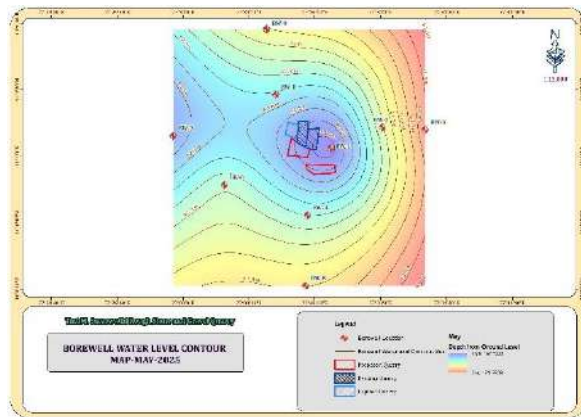
FIGURE 3.8: CONTOUR MAP OF BORE WELL WATER LEVEL**MARCH 2025****APRIL 2025****MAY 2025**

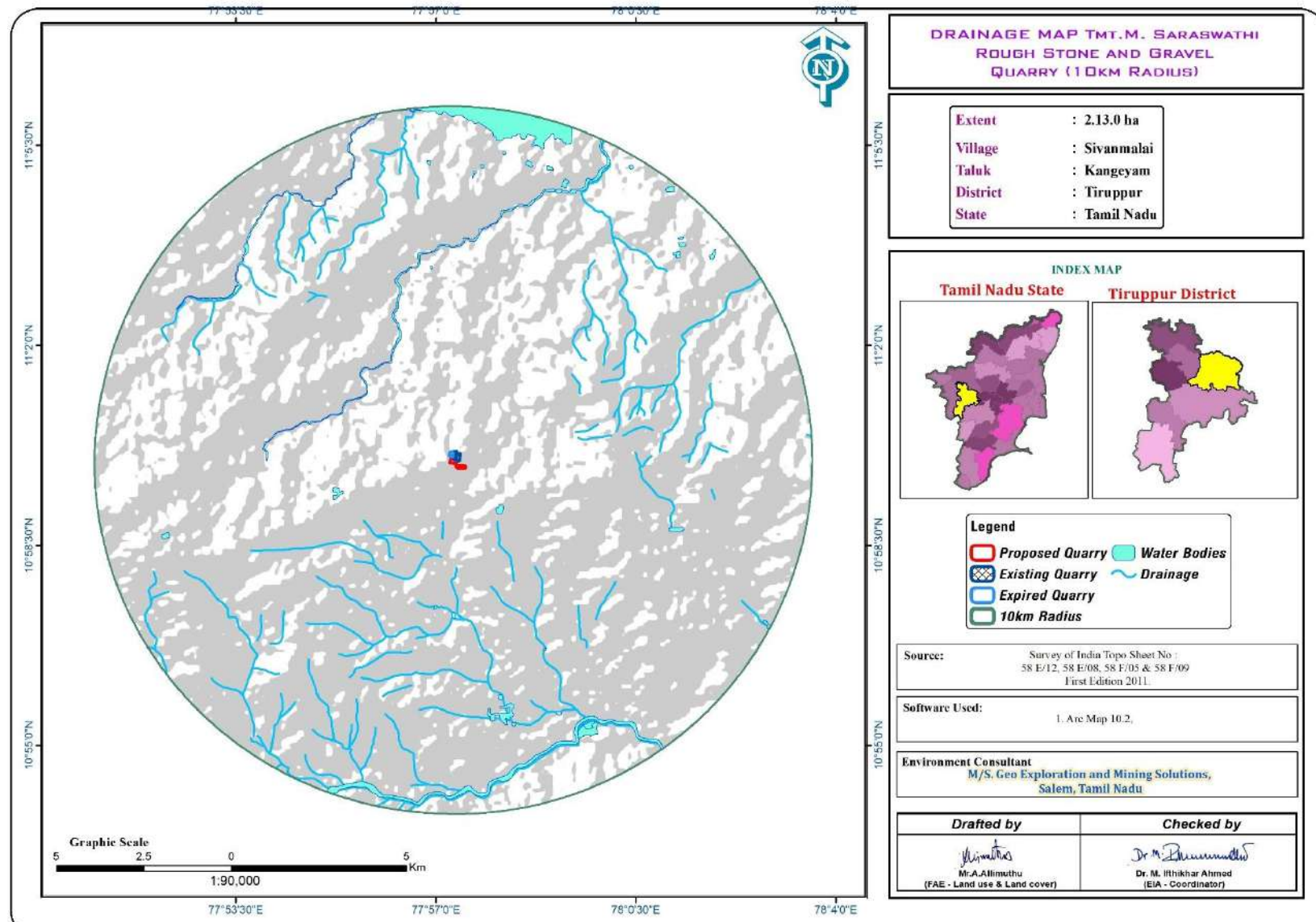
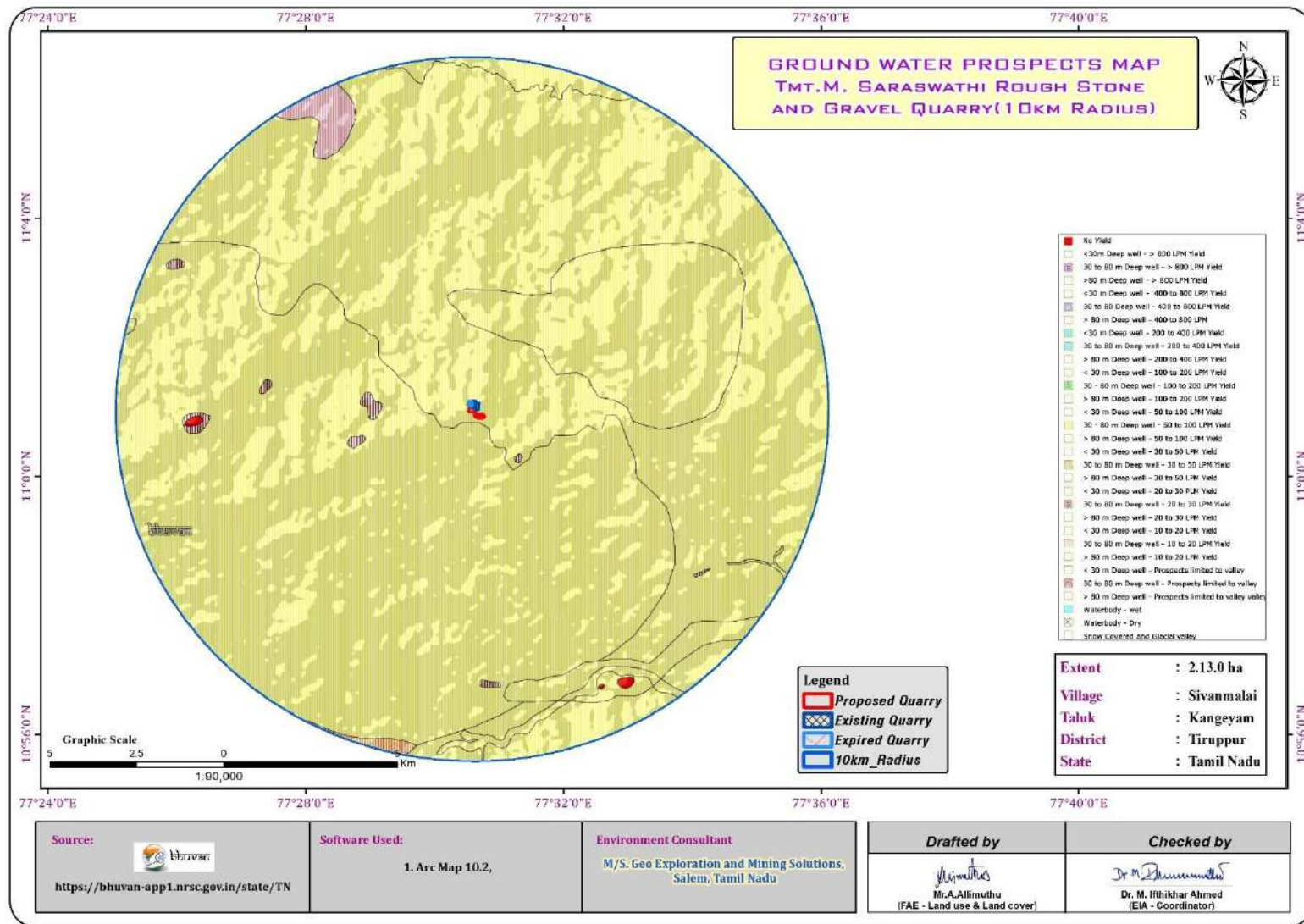
FIGURE 3.9: DRAINAGE MAP AROUND 10 KM RADIUS FROM CLUSTER

FIGURE 3.10: GROUND WATER PROSPECTS MAP

Source: Bhuvan

3.2.5.1 Methodology and Data Acquisition

Electric Resistivity Method is well established for delineating lateral as well vertical discontinuities in the resistive structure of the Earth's subsurface. The present study makes use of vertical electric sounding (VES) to delineate the Vertical Resistivity structure at depth. Schlumberger electrode set up was employed for making sounding measurements. Since it is least influenced by lateral 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

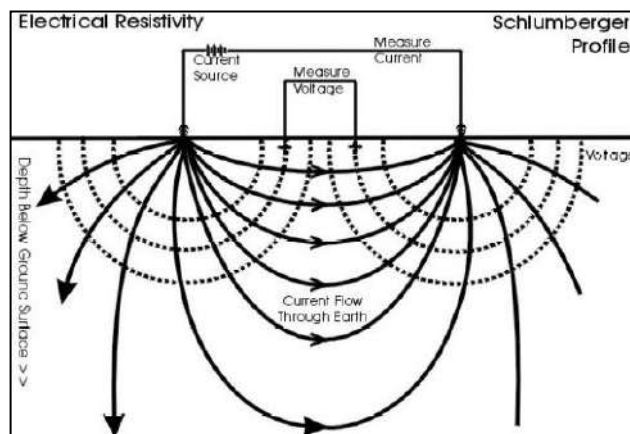
A = Constants with values ranging from 0.5 to 2.5

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 ratio 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 58-62m. The maximum depth proposed out of proposed projects is 42m 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 ambient air quality with respect to the study area of 10 km radius including the cluster quarries forms the baseline information. The prime objective of baseline air quality monitoring is to assess existing air quality of the area. This will also be useful in assessing the conformity to standards of the ambient air quality during the operations

The existing ambient air quality of the area is important for evaluating the impact of mining activities on the ambient air quality. These will also be useful for assessing the conformity to standards of the ambient air quality during the operation of Existing and proposed quarries within the radius of 500m.

The sources of air pollution in the region are mostly due to vehicular traffic, Crushers dust arising from unpaved village road and domestic & agricultural activities. This section describes the identification of sampling locations, methodology adopted during the monitoring period and sampling frequency.

The baseline status of the ambient air quality has been assessed through scientifically designed ambient air quality network. The design of monitoring network in the air quality surveillance program has been based on the following considerations:

- Meteorological conditions.
- Topography of the study area.
- Likely impact area.

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. 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.

Climate –

- The atmospheric conditions prevailing in this region are of a tropical nature. In Tiruppur, the precipitation during summers is significantly higher in comparison to winters. This location is classified as Aw by Köppen and Geiger. In Tiruppur, the average annual temperature is 26.4 °C | 79.6 °F. Approximately 943 mm | 37.1 inch of rainfall occurs on a yearly basis.
- Due to its proximity to the equator, it is quite challenging to precisely delineate summers in Tiruppur. The period of January, February, March, June, July, August, September, October, November, December is widely regarded as the peak season for visitation.
- The month with the least amount of precipitation is January exhibiting a mere 13 mm | 0.5 inch rainfall. The maximum quantity of rainfall is observed during the month of October, exhibiting an average value of 209 mm | 8.2 inch.
- The month of April boasts the highest average temperature, with a recorded maximum of 30.0 °C | 86.0 °F. During the month of December, there is a notable drop in temperature, with an average low of approximately 23.7 °C | 74.7 °F.

<https://en.climate-data.org/asia/india/tamil-nadu/tiruppur-2789/>

Rainfall –

The average annual rainfall and the 5 years' rainfall is as follows:

TABLE 3.14 – RAINFALL DATA

Actual Rainfall in mm					Normal Rainfall in mm
2017	2018	2019	2020	2021	606.8
679.8	716.2	488.1	748.8	845.1	

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

TABLE 3.15 – METEOROLOGICAL DATA RECORDED AT SITE

S.No	Parameters		Mar - 2025	Apr-2025	May-2025
1	Temperature (°C)	Max	31.2	31.52	31.59
		Min	26.08	28.47	25.26
		Avg	28.64	29.99	28.42
2	Relative Humidity (%)	Avg	57.39	58.17	67.44
3	Wind Speed (m/s)	Max	4.29	4.31	6.69
		Min	1.19	1.34	1.45
		Avg	2.74	2.82	4.07
4	Cloud Cover (OKTAS)		0-8	0-8	0-8
5	Wind Direction		ESE,E	WSW,ESE	WSW,W

Source: On-site monitoring/sampling by **EHS 360 Lab Private Limited** in association with GEMS

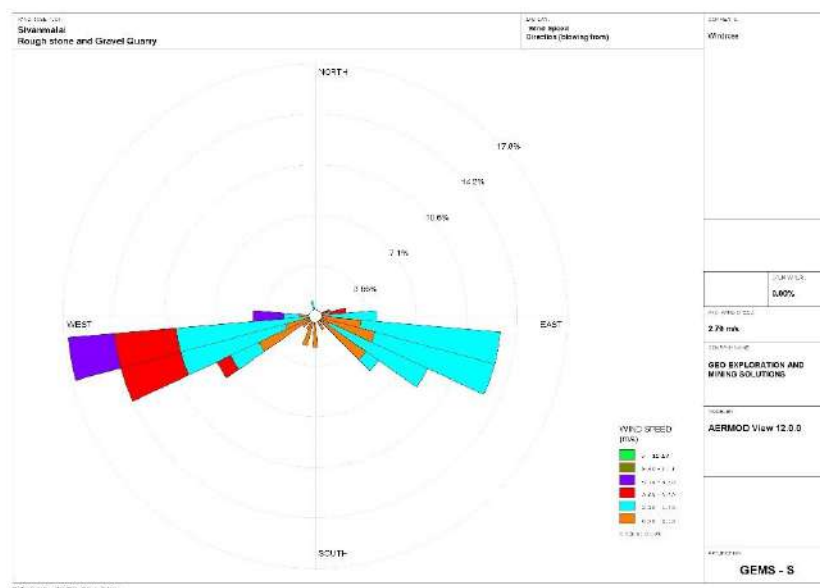
Correlation between Secondary and Primary Data

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

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

Windrose diagram of the study site is depicted in Figure. 3.8. Predominant downwind direction of the area during study season is North East to South West.

FIGURE 3.11: WINDROSE DIAGRAM



3.3.3 Sampling and Analytical Techniques

TABLE 3.16 – METHODOLOGY AND INSTRUMENT USED FOR AIR QUALITY ANALYSIS

Parameter	Method	Instrument
PM _{2.5}	Gravimetric Method Beta attenuation Method	Fine Particulate Sampler Make – Thermo Environmental Instruments – TEI 121
PM ₁₀	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 modified method)	Respirable Dust Sampler with gaseous attachment
Free Silica	NIOSH – 7601	Visible Spectrophotometry

Source: Sampling Methodology followed by EHS 360 Lab Private Limited & CPCB Notification.

TABLE 3.17 – 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) PM ₁₀ (µg/m ³)	Annual Avg. 24 hours	60.0 100.0	60.0 100.0
4	Particulate matter (size less than 2.5 µm) PM _{2.5} (µg/m ³)	Annual Avg. 24 hours	40.0 60.0	40.0 60.0

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

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

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

3.3.4 Frequency & Parameters for Sampling

Ambient air quality monitoring has been carried out with a frequency of two samples per week at seven (7) locations, adopting a continuous 24 hourly (3 shift of 8-hour) schedule for the period Mar-May2025. The baseline data of ambient air has been generated for PM₁₀, PM_{2.5}, Sulphur Dioxide (SO₂) & Nitrogen Dioxide (NO₂).

3.3.5 Ambient Air Quality Monitoring Stations

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

TABLE 3.18 – AMBIENT AIR QUALITY (AAQ) MONITORING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	AAQ-1	Project Area	Core Zone	11° 1'0.25"N 77°30'32.20"E
2	AAQ-2	Project Area	Core Zone	11° 1'2.09"N 77°30'38.05"E
3	AAQ-3	Near Project Area	300m SE	11° 0'55.29"N 77°30'46.24"E
4	AAQ-4	Andipalayam	7km NW	11° 3'9.66"N 77°27'14.36"E
5	AAQ-5	Sivanmalai	3km NE	11° 2'10.14"N 77°31'56.83"E
6	AAQ-6	Sambanthampalayam	2.3km SW	10°59'53.45"N 77°29'51.32"E
7	AAQ-7	Kangeyam	4.5km SE	11° 0'23.38"N 77°33'3.01"E

Source: On-site monitoring/sampling by EHS 360 Lab Private Limited in association with GEMS

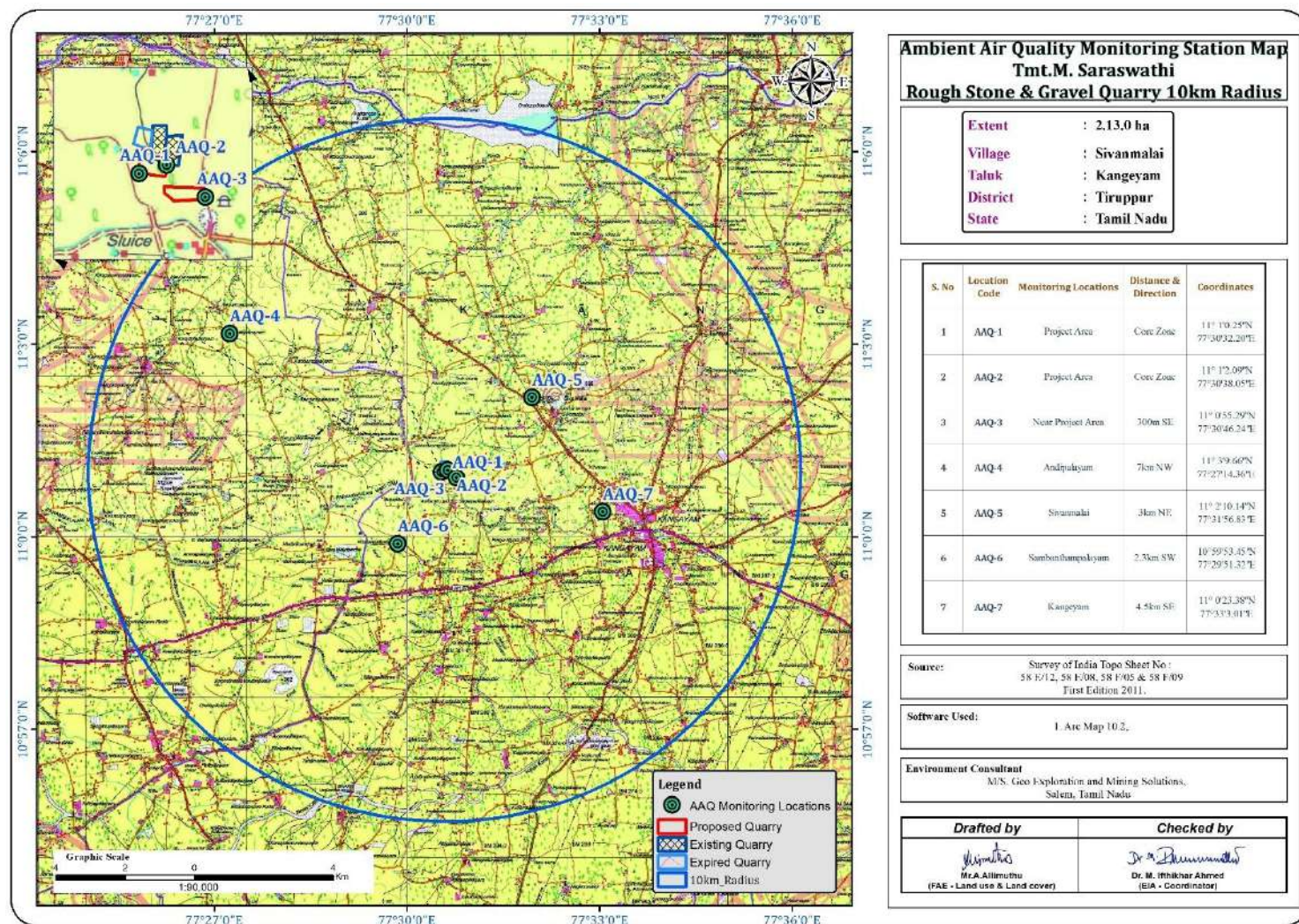
FIGURE 3.12 AMBIENT AIR QUALITY LOCATIONS AROUND 10 KM RADIUS

TABLE 3.19 – ABSTRACT OF AMBIENT AIR QUALITY DATA

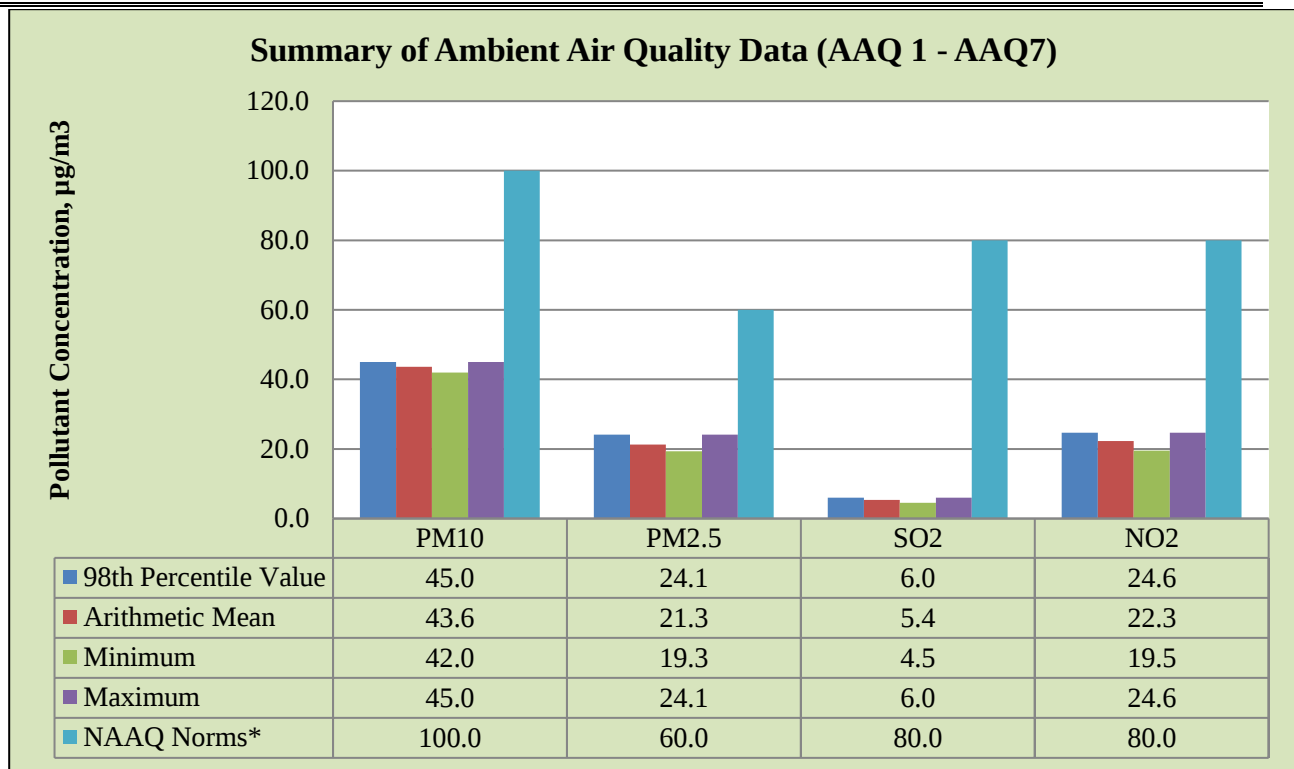
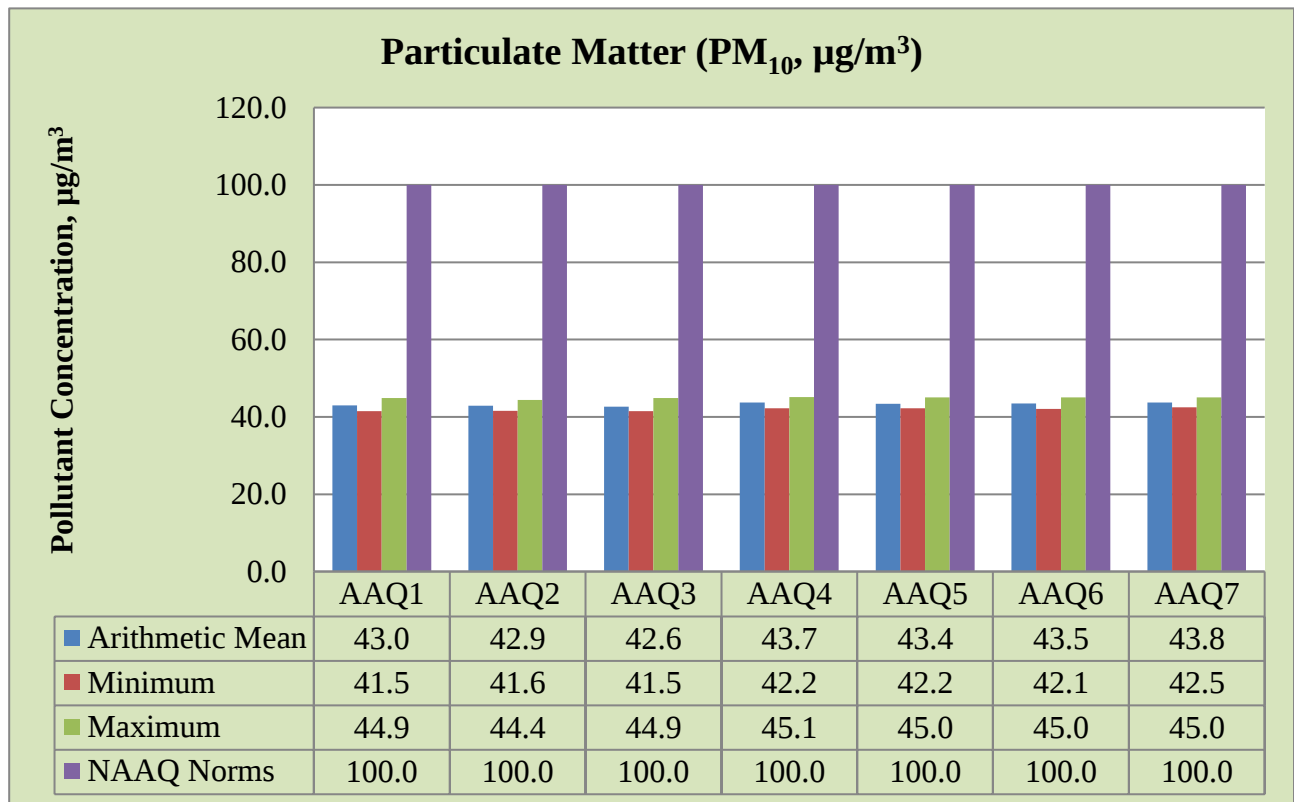
1	Parameter	PM ₁₀	PM _{2.5}	SO ₂	NO ₂
2	No. of Observations	260	260	260	260
3	10 th Percentile Value	42.0	19.3	4.5	19.5
4	20 th Percentile Value	42.5	19.7	4.8	19.9
5	30 th Percentile Value	42.7	19.9	4.9	20.4
6	40 th Percentile Value	42.9	20.1	4.9	21.0
7	50 th Percentile Value	43.3	20.5	5.1	22.4
8	60 th Percentile Value	43.5	20.9	5.4	22.7
9	70 th Percentile Value	43.9	21.2	5.5	23.1
10	80 th Percentile Value	44.2	22.2	5.8	23.5
11	90 th Percentile Value	44.9	23.0	6.0	24.0
12	95 th Percentile Value	45.0	23.5	6.0	24.1
13	98 th Percentile Value	45.0	24.1	6.0	24.6
14	Arithmetic Mean	43.6	21.3	5.4	22.3
15	Geometric Mean	43.6	21.2	5.3	22.2
16	Standard Deviation	1.1	1.6	0.5	1.8
17	Minimum	42.0	19.3	4.5	19.5
18	Maximum	45.0	24.1	6.0	24.6
19	NAAQ Norms*	100.0	60.0	80.0	80.0
	% Values exceeding Norms*	0.0	0.0	0.0	0.0

Legend:PM_{2.5}-Particulate Matter size less than 2.5 µm; PM₁₀-Respirable Particulate Matter size less than 10 µm; SO₂-Sulphur dioxide; NO₂-Nitrogen Dioxide; CO-Carbon monoxide; O₃-Ozone; NH₃-Ammonia; Pb-Particulate Lead; As-Particulate Arsenic; Ni-Particulate Nickel; C₆H₆-Benzene & BaP- Benzo (a) pyrene in particulate phase levels were monitored below their respective detectable limits.

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

TABLE 3.20 –SUMMARY OF AMBIENT AIR QUALITY DATA

PM ₁₀	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	43.0	42.9	42.6	43.7	43.4	43.5	43.8
Minimum	41.5	41.6	41.5	42.2	42.2	42.1	42.5
Maximum	44.9	44.4	44.9	45.1	45.0	45.0	45.0
NAAQ Norms	100.0	100.0	100.0	100.0	100.0	100.0	100.0
PM _{2.5}	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	20.0	20.0	20.1	21.5	20.9	21.4	21.0
Minimum	18.5	18.8	18.8	19.5	19.1	19.0	19.6
Maximum	21.1	21.4	21.5	24.1	23.0	24.0	23.5
NAAQ Norms	60.0	60.0	60.0	60.0	60.0	60.0	60.0
SO ₂	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	5.2	5.1	5.3	5.1	5.2	5.0	5.3
Minimum	4.5	4.5	4.6	4.0	4.0	4.1	4.1
Maximum	6.0	6.0	6.0	6.0	6.0	6.0	6.0
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0
NO ₂	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	20.2	19.6	20.2	23.1	23.0	23.1	23.3
Minimum	19.4	18.4	19.1	22.1	20.4	20.7	22.0
Maximum	21.1	21.5	21.1	24.0	24.1	24.9	24.8
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0

**FIGURE 3.13: BAR DIAGRAM OF SUMMARY OF AAQ****FIGURE 3.14: BAR DIAGRAM OF PARTICULATE MATTER (PM_{10})**

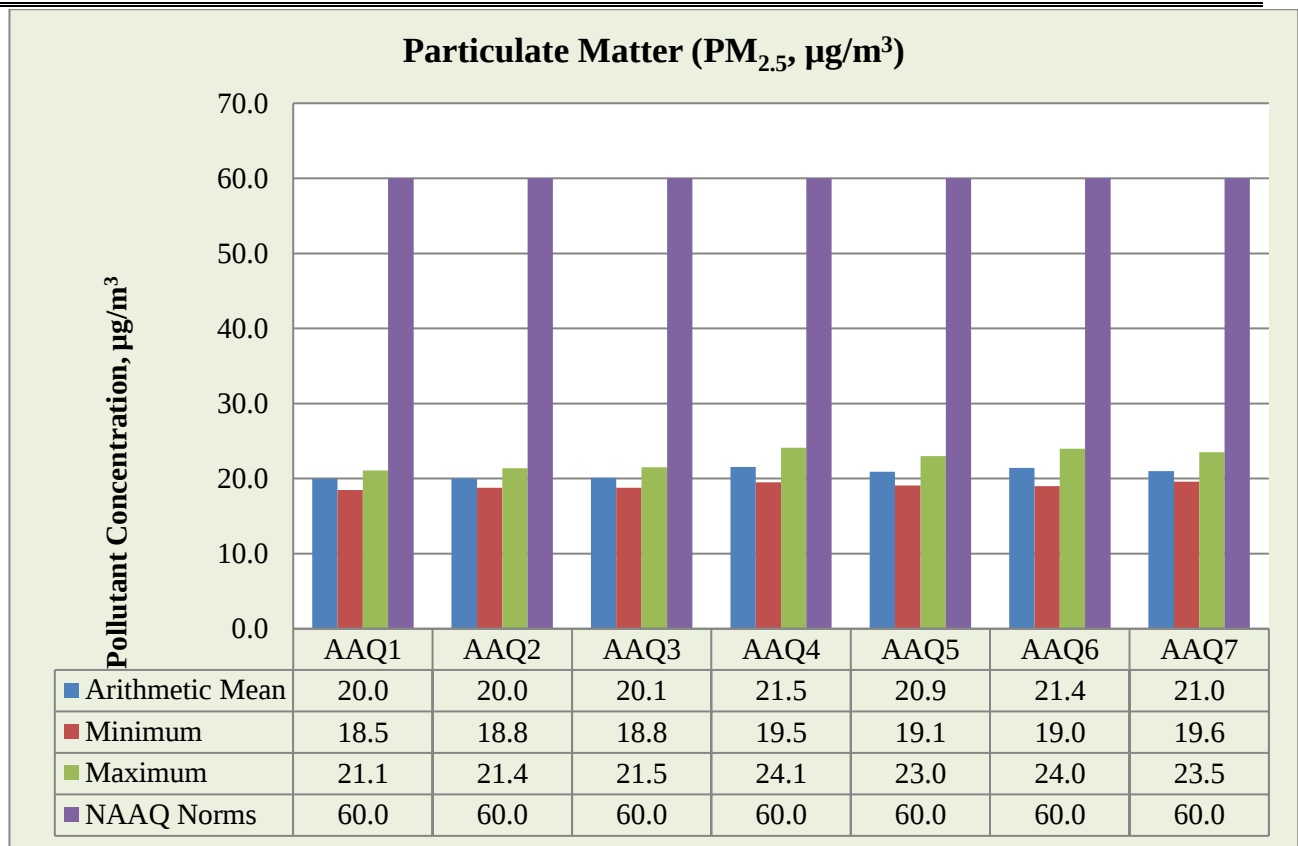
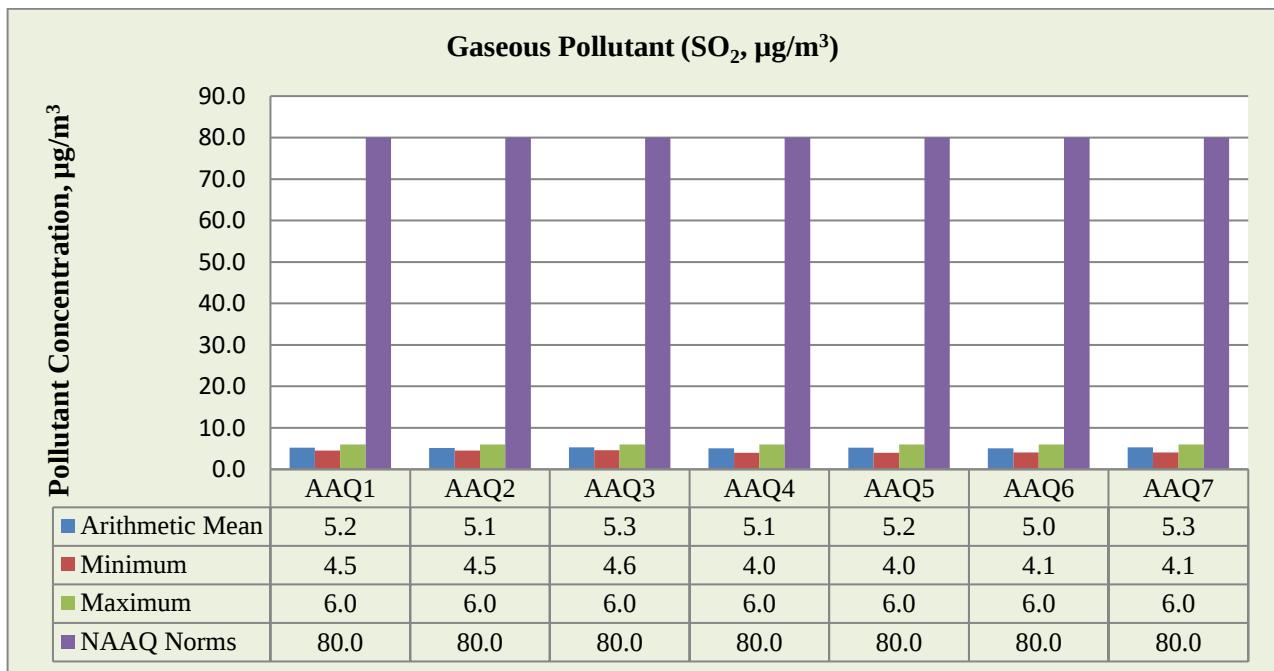
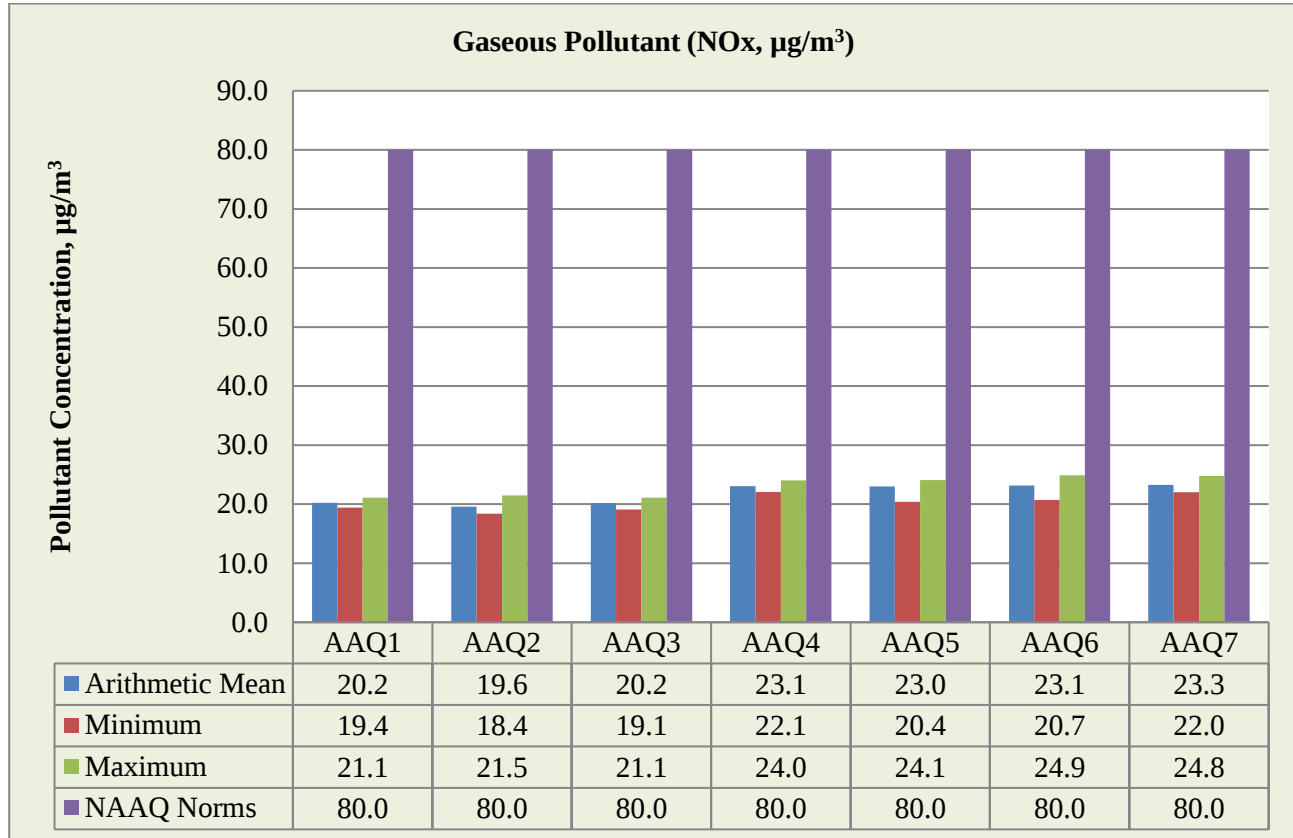
**FIGURE 3.15: BAR DIAGRAM OF PARTICULATE MATTER (PM_{2.5})****FIGURE 3.16: BAR DIAGRAM OF SO₂)**

FIGURE 3.17: BAR DIAGRAM OF (NO_x)

3.3.6 Interpretations & Conclusion

As per monitoring data, PM₁₀ ranges from 41.5 µg/m³ to 45.0 µg/m³, PM_{2.5} data ranges from 18.5 µg/m³ to 24.1 µg/m³, SO₂ ranges from 4.0 µg/m³ to 6.0 µg/m³ and NO_x data ranges from 18.4 µg/m³ to 24.9 µg/m³. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB.

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 best suited the purpose and objectives of the study.

TABLE 3.23 – DETAILS OF SURFACE NOISE MONITORING LOCATIONS

S. No	Location code	Monitoring Locations	Distance & Direction	Coordinates
1	N-1	Project Area	Core Zone	11° 1'2.70"N 77°30'32.76"E
2	N-2	Project Area	Core Zone	11° 1'0.20"N 77°30'37.36"E
3	N-3	Near Project Area	300m SE	11° 0'54.88"N 77°30'47.01"E
4	N-4	Andipalayam	7km NW	11° 3'10.35"N 77°27'15.21"E
5	N-5	Sivanmalai	3.3km NE	11° 2'13.05"N 77°32'1.78"E
6	N-6	Sambanthampalayam	2.3km SW	10°59'53.87"N 77°29'52.23"E
7	N-7	Kangeyam	4.5km SE	11° 0'23.41"N 77°33'3.70"E

Source: On-site monitoring/sampling by EHS Laboratory Private Limited 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.

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

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

T = Time interval of observation

3.4.3 Analysis of Ambient Noise Level in the Study Area

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

Day time : 6:00 hours to 22.00 hours.

Night time : 22:00 hours to 6.00 hours

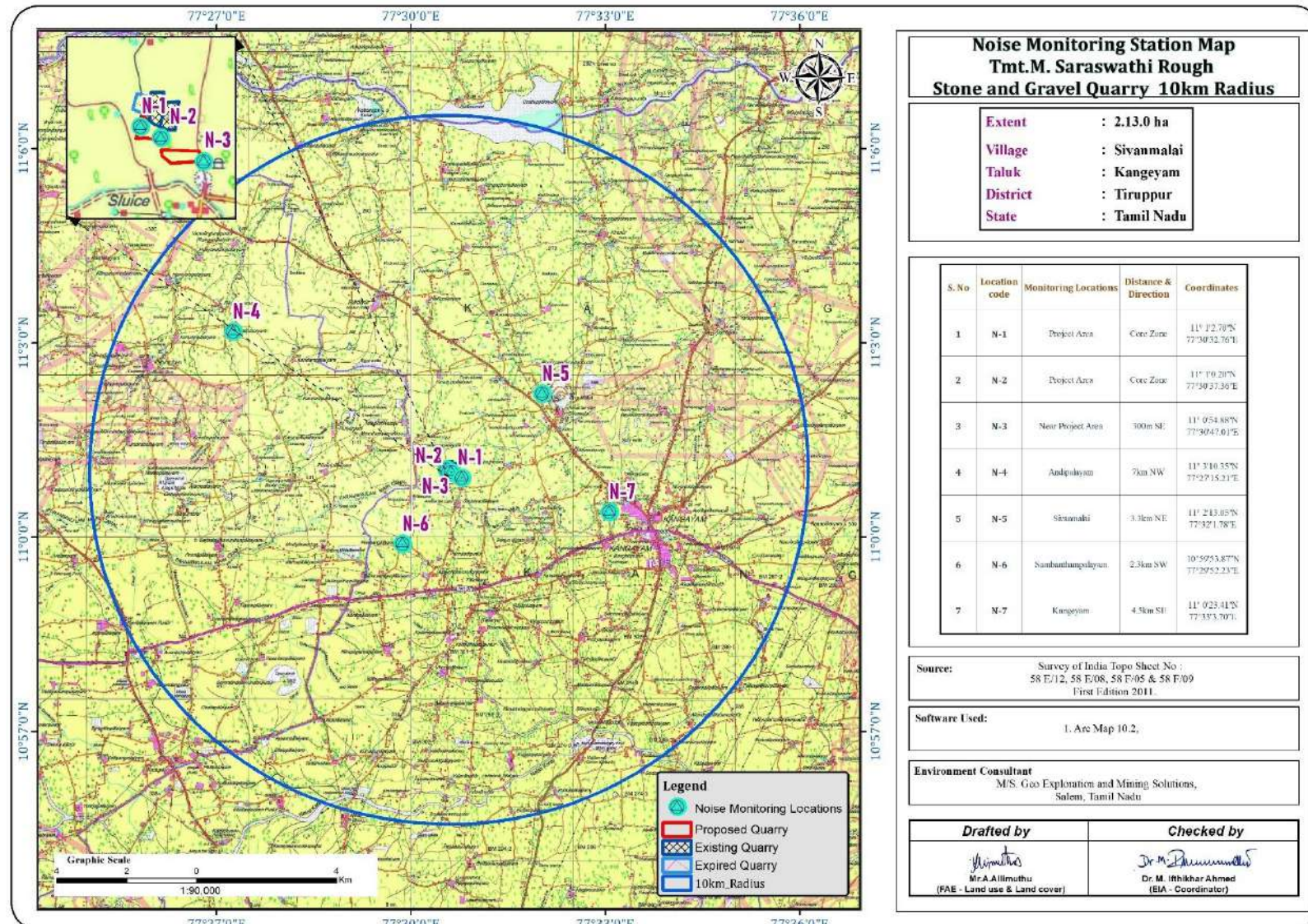
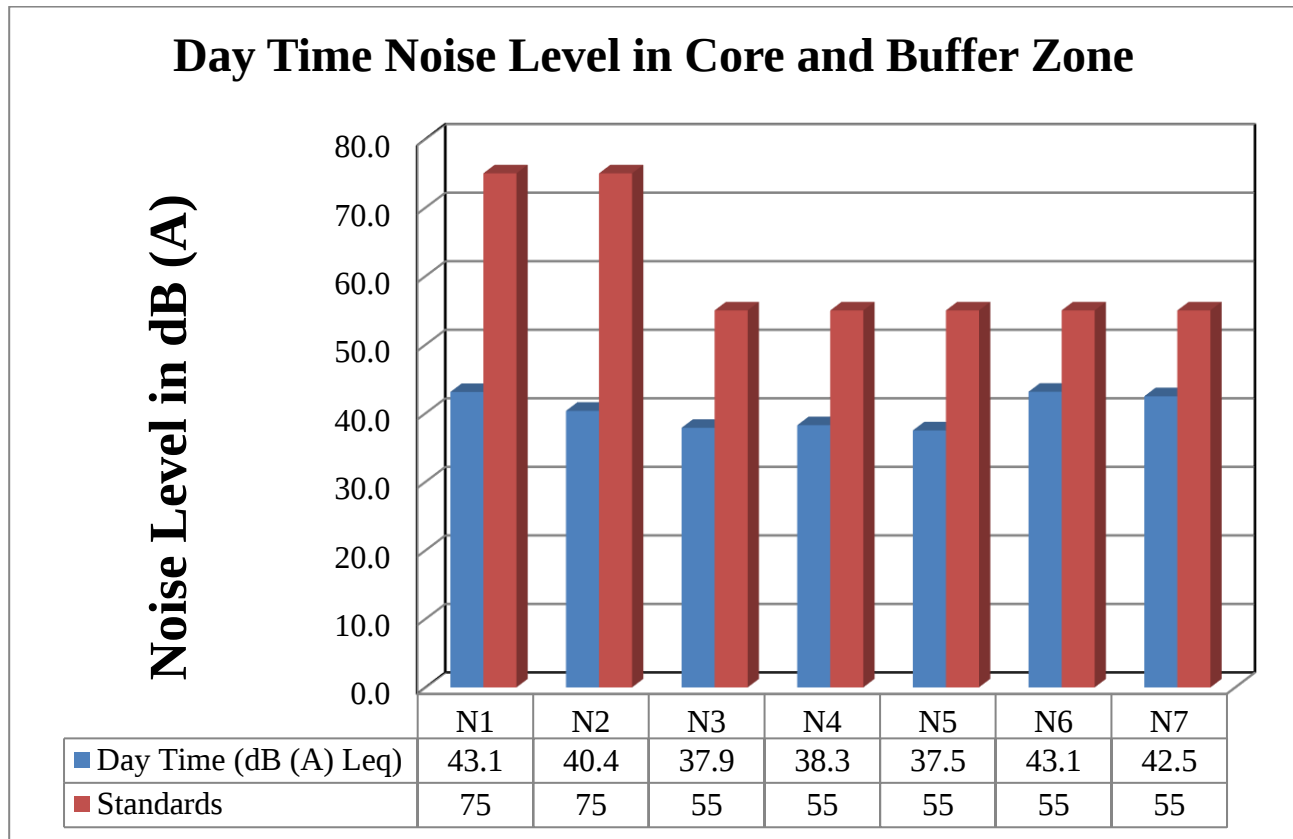
FIGURE 3.18: NOISE MONITORING STATIONS AROUND 10 KM RADIUS

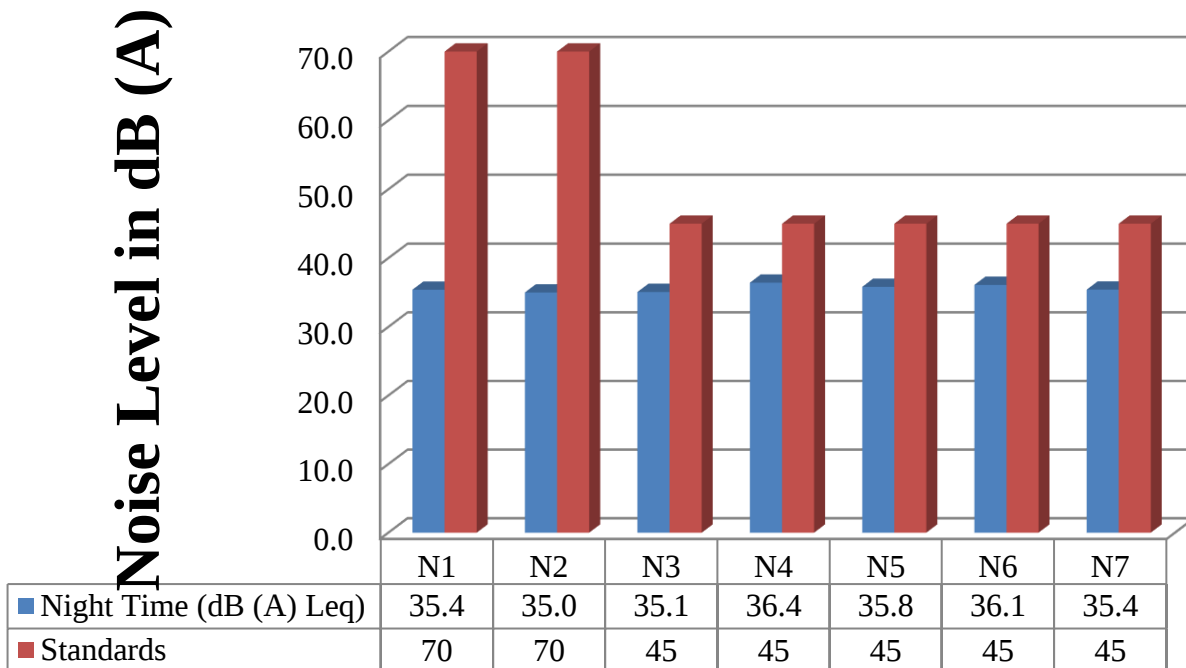
TABLE 3.24 – NOISE MONITORING RESULTS IN CORE AND BUFFER ZONE

S. No	Locations	Noise level (dB (A) Leq)		Ambient Noise Standards
		Day Time	Night Time	
N-1	Project Area	41.7	35.4	Industrial Day Time- 75 dB (A) Night Time- 70 dB (A)
N-2	Project Area	40.3	35.0	
N-3	Near Project Area	37.9	35.1	
N-4	Andipalayam	38.3	36.4	
N-5	Sivanmalai	37.5	35.8	Residential Day Time- 55 dB (A) Night Time- 45 dB (A)
N-6	Sambanthampalayam	43.1	36.1	
N-7	Kangeyam	42.5	35.4	

Source: On-site monitoring/sampling by EHS 360 Lab Private Limited in association with GEMS

FIGURE 3.19: DAY & NIGHT TIME NOISE LEVELS IN CORE AND BUFFER ZONE

Night Time Noise Level in Core and Buffer Zone



3.4.4 Interpretation & Conclusion:

Ambient noise levels were measured at 7 (Seven) locations around the project area considering cluster quarries. Noise levels recorded in core zone during day time were from 40.4 to 43.1 dB (A) Leq and during night time were from 35.4 to 35.0 dB (A) Leq. Noise levels recorded in buffer zone during day time were from 37.5 – 43.1dB (A) Leq and during night time were from 35.0 -36.4 dB (A) Leq. Thus, the noise level for Industrial and Residential area meets the requirements of CPCB.

3.5. Biological Environment

3.5.1. Study area Ecology

In this project, the total area of the Cluster within 10km radius from the periphery of this quarry is reported as **8.06.50 Ha with cluster quarries**. In such a Cluster situation, a common Ecology and Biodiversity study for the entire cluster of quarries is enough to capture all the possible externalities. This baseline data can be used for all quarries that fall under this cluster but the present work was carried out on the detailed study of the impacts of Sivanmalai Village Rough stone and gravel quarry on the ecology and biodiversity of the core lease area with the proper mitigation and sustainable management plan. The proposed mine lease applied area exhibits flat terrain. The following methods were applied during the baseline study of flora, fauna and diversity assessment.

3.5.2. Objectives of Biological Studies

- To study the likely impact of the proposed mining project on the local biodiversity and to suggest mitigation measures, if required, for vulnerable biota.
- Undertake intensive field survey to assess the status of floral & faunal component in different habitats in the core and buffer areas of the project site.
- Identification and listing of flora and fauna which are important as per the Wildlife (Protection) Act 1972.

-
- d) Suggest Wildlife conservation (species specific/habitat specific) and management plan for the threatened (critically endangered & endangered species - schedule I) faunal species if any reported within the study area.
 - e) To identify the impacts of mining on agricultural lands and how it affects.
 - f) Proper collection of information about wildlife Sanctuaries/ national parks/ biosphere reserves of the project area.
 - g) Devise management & conservation measures for biodiversity.

3.5.3. Methodology of Sampling

Identification of vegetation in relation to the natural flora and crops was conducted through reconnaissance field surveys and onsite observations in 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 ordinales. The 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).

3.5.3.1. 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.

3.5.3.2. 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.

3.5.3.3. 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.

3.5.3.4. Observations from Sampling

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

3.5.3.5. Equipment/ References

- Canon Mark III Camera with 50-500mm lens– Snap shots taken
- Leica Binoculars (8 X 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.

3.5.4. Part I Field Sampling Techniques

3.5.4.1. 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 07:00 to 11:00Hrs and 14:30 to 17:30Hrs (Bibby et al. 2000). All avifauna found along these transects were recorded for analysing of the data. Counts were conducted while there is no heavy rain, mist or strong wind.

3.5.4.2. 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).

3.5.4.4. 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.

3.5.4.5. 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).

3.5.5 Flora

The quadrat sampling technique was used for sampling vegetation. Sampling quadrats of the regular shape of dimensions 10 × 10 m, 5 × 5 m, and 1 × 1 m, were nested within each other and were defined as the units for sampling the area and measuring the diversity for trees, Shrubs, and herbs respectively.

3.5.6 Flora Composition in the Core Zone

Taxonomically a total of 24 species belonging to 15 families have been recorded from the core mining lease area. It is exhibit plain topography. Based on habitat classification of the enumerated plants the majority of species were Herbs 11 (46%) followed by Shrubs 5 (21%), Trees 4 (17%), Grasses 3 (12%), and Climbers/Creepers 1 (4%). Details of flora with the scientific name were mentioned in Table No. 3.31. The result of the core zone of flora studies shows that Fabaceae and Poaceae and Lamiaceae are the main dominating species in the study area mentioned in Table No.3.31. No species were found as a threatened category (Table No. 3.31).

TABLE NO: 3.25. FLORA IN THE CORE ZONE OF CLUSTER

Sl .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.	River tamarind	Saluda	<i>Leucaenaleucocephala</i>	Fabaceae
4.	Pala indigo	Pala maram	<i>Wrightia tinctoria</i>	Apocynaceae
Shrubs				
1.	Milk Weed	Erukku	<i>Calotropis gigantea</i>	Apocynaceae
2.	Avaram	Avarai	<i>Senna auriculata</i>	Fabaceae
3.	Thorn apple	Oomathai	<i>Datura stramonium</i>	Solanaceae
4.	Lantana	Unni chedi	<i>Lantana camara</i>	Verbenaceae
5.	Night shade plan	Sundaika	<i>Solanum torvum</i>	Solanaceae
Herbs				
1.	Common leucas	Thumbai	<i>Leucas aspera</i>	Lamiaceae
2.	Devil's thorn	Nerunji	<i>Tribulus terrestris</i>	Zygophyllales
3.	Asthma-plant	Amman pacharisi	<i>Euphorbia hirta</i>	Euphorbiaceae
4.	Indian Catmint	Pei viratti	<i>Anisomeles malabarica</i>	Lamiaceae
5.	Indian mallow	Thuthi	<i>Abutilon indicum</i>	Meliaceae
6.	Common nut	Korai	<i>Cyperus rotundus</i>	Cyperaceae
7.	Indian doab	Arugampul	<i>Cynodon dactylon</i>	Poaceae
8.	Holy basil	Thulasi	<i>Ocimum tenuiflorum</i>	Lamiaceae
9.	Ban Tulsi	Melakai poondu	<i>Croton bonplandianus</i>	Euphorbiaceae
10.	Prickly chaff	Nayuruv	<i>Achyranthes aspera</i>	Amaranthaceae
11.	Coat buttons	Thatha poo	<i>Tridax procumbens</i>	Asteraceae
Creepers /Climbers				
1	Stemmed vine	Perandai	<i>Cissus quadrangularis</i>	Vitaceae
Grass				
1.	Eragrostis	Pullu	<i>Eragrostis ferruginea</i>	Poaceae
2.	Great brome	Thodappam	<i>Bromus diandrus</i>	Poaceae
3.	Nut grass	Korai	<i>Cyperus rotundus</i>	Poaceae

Sources: [Species observation in the field study](#)

a. *Azadirachta indica*b. *Calotropis gigantea*c. *Leucaenaleucocephala*d. *Datura stramonium*



e. *Wrightia tinctoria*



f. *Abutilon indicum*



g. *Tridax procumbens*



h. *Leucas aspera*



i. *Anisomeles malabarica*



j. *Croton bonplandianus*



k. *Prosopis juliflora*



l. *Cissus quadrangularis*

FIGURE: 3.20. FLORA SPECIES OBSERVATION IN THE CORE ZONE AREA

TABLE NO: 3.26. FLORA IN THE BUFFER ZONE OF CLUSTER

Sl.No.	English Name	Vernacular Name	Scientific Name	Resource use type *(E,M,EM)
Trees				
1.	Millettia pinnata	Pongam oiltree	Pongamia pinnata	E
2.	Tamarind	Puliyamaram	Tamarindus indica	EM
3.	Asian Palmyra palm	Panai maram	Borassus flabellifer	E
4.	Wild Date Palm	Pericham	Phoenix sylvestris	E
5.	Coconut	Thennai maram	Cocos nucifera	EM
6.	River tamarind	Savunda	Leucaena leucocephala	E
7.	Lemon	Ezhumuchaipalam	Citrus lemon	EM
8.	Mango	Manga	Mangifera indica	E
9.	Banyan tree	Alamaram	Ficus benghalensis	E
10.	Neem or Indian lilac	Vembu	Azadirachta indica	M
11.	Creamy Peacock flower	Vadanarayani	Delonix elata	M
12.	Mesquite	Sema Karuvelam	Prosopis juliflora	E
13.	Beauty leaf	Punnai	Calophyllum inophyllum	M
14.	Madras Thorn	Kodukapuli	Pithecellobium dulce	E
15.	Castor oil plant	Amanakku	Ricinus communis	M
16.	Gum arabic tree	Karuvelam	Acacia nilotica	NE
17.	False ashoka	Asoka maram	Polyalthia longifolia	E
18.	Monkey pod tree	Thungumoonchi	Samanea saman	E
19.	Bitter Albizia	Arappu	Albizia amara	M
20.	Giant thorny bamboo	Perumungil	Bambusa bambos	M
21.	Wood-apple	Vilamaram	Limonia acidissima	M
22.	Orange jessamine	Venkarai	Murraya paniculata	E
23.	Black plum	Navalmaram	Syzygium cumini	EM
24.	Eucalyptus	Eucalyptus	Eucalyptus globules	EM
25.	Custard apple	Seethapazham	Annona reticulata	E
26.	Copperpod	Iyal Vaagai	copperpod	E
27.	Acacia Nilotica	Karuvelam maram	Vachellia nilotica	M
28.	Indian gooseberry	Nelli	Emblica officinalis	EM
29.	Henna	Marudaani	Lawsonia inermis	EM
30.	Sacred fig	Arasan	Ficus religiosa	E
31.	Indian mulberry	Nuan	Morinda tinctoria	E
32.	Teak	Thekku	Tectona grandis	E
33.	Papaya	Pappali maram	Carica papaya	EM
34.	Chinese chaste tree	Nochi	Vitex negundo	E
35.	Peepal	Arasanmaram	Ficus religiosa	M
36.	Indian fir tree	Nettilinkam	Polylathia longifolia	E
37.	Guava	Koyya	Psidium guajava	EM
38.	Curry tree	Velipparuthi	Murraya koenigii	EM
39.	Bamboo	Moonghil	Bambusa bambo	E
40.	Drumstick tree	Murunga maram	Moringa oleifera	EM
41.	Indian almond	Padam maram	Terminalia catappa	EM

42.	Mesquite	Velikathan maram	Prosopis juliflora	M
43.	Portia tree	Poovarasam	Thespesia populnea	E
Shrubs				
1.	Avaram	Avarai	Senna auriculata	M
2.	Night shade plan	Sundaika	Solanum torvum	EM
3.	Lantana	Unnichedi	Lantana camara	M
4.	Rough cocklebu	Ottarachedi	Xanthium strumarium	M
5.	Triangular spruge	Chaturakalli	Euphorbia antiquorum	NE
6.	Indian jujube	Elanthai	Ziziphus mauritiana	M
7.	Coffee senna	Kattuttakarai	Senna occidentalis	M
8.	Rosy Periwinkle	Nithyakalyani	Cathranthus roseus	M
9.	Bush Morning Glory	Neyvelik	Ipomoea carnea	E
10.	Chinese chastetree	Nochi	Vitex negundo	M
11.	Water spinach	Nalikam	Ipomoea aquatica	E
12.	Indian Oleander	Arali	Nerium indicum	M
13.	Shoe flower	Chemparuthi	Hibiscu rosa-sinensis	EM
14.	Puriging nut	Kattamanakku	Jatropha curcas	EM
15.	Columnar Cactus	Sappathikalli	Cereus pterogonus	M
16.	Thorn apple	Oomathai	Datura stramonium	E
17.	Century plant	Anaikathalai	Agave americana	M
18.	Jackal jujube	Soorai pazham	Ziziphus oenopolia	M
19.	Indian mallow	Thuthi	Abutilon indicum	M
20.	Flame of the Woods	Idlipoo	Xoracoc cineia	M
21.	Peacock Flower	Mayil Kontai	Caesalpinia pulcherrima	M
22.	Datura metel	Uumaththai	Datura metel	NE
23.	Milk Weed	Erukku	Calotropis gigantea	M
24.	Cassava	Maravalli kizhangu	Manihot esculenta	EM
25.	Hopbush	Virali	Dodonaea viscosa	E
26.	Paper flower	Kahitha poo	Bougainvillea glabra	M
27.	Tiger nail	Eli verandi	Martynia annua	M
Herbs				
1.	Prickly chaff flower	Nayuruv	Achyranthes aspera	M
2.	Tridax daisy	Veetukaayapoondur	Tridax procumbens	M
3.	Indian Copperleaf	Kuppaimeni	Acalypha indica	M
4.	Indian doab	Arugampul	Cynodon dactylon	E
5.	Copperleaf	Kuppaimeni	Acalypha indica	M
6.	Indian Catmint Plant	Pei viratti	Anisomeles malabarica	M
7.	Cleome viscosa	Nai kadugu	Celome viscosa	M
8.	Porcupine flower	Shemmuli	Barleria prionitis	E
9.	Common Wireweed	Arivalmanai poondur	Sida acuta	M
10.	Punarnava	Mukkirattai	Boerhaavia diffusa	EM
11.	Mexican prickly poppy	Kudiyotti	Argemone mexicana	M
12.	Common leucas	Thumbai	Leucas aspera	M
13.	Licorice weed	Kallurukki	Scoparia dulcis	M
14.	Chay root	Chaaya ver	Oldenlandia umbellata	M
15.	Slender dwarf morning-	Vittunu-k-kiranti	Evolvulus alsinoides	M

16.	Spiny amaranth	Mullu keera	Amaranthus spinosus	M
17.	Cracker plant	Tapas kaaya	Ruellia tuberosa	M
18.	Flannel Weed	Sida mutti	Sida cordifolia	M
19.	Green amaranth	Mulai keera	Amaranthus viridis	M
20.	Marsh barbel	Neermulli	Hygrophila auriculata	M
21.	Yellow-fruit nightshade	Kandakathirika	Solanum surattense	M
22.	Shameplant	Thottachenunki	Mimosa pudica	M
23.	Common Purslane	Paruppu keera	Portulaca oleracea	M
24.	Water willow	Kodakasalai	Justicia procumbens	M
25.	Threadstem carpetweed	Parpatakam	Mollugo cerviana	M
26.	Perennial Water Primrose	Muyalkathu Ilai	Ludwigia perennis	M
27.	Prostrate Globe Amaranth	-	Gomphrena serrata	M
28.	Node Flower	Kumattikkirai	Allmania nodiflora	M
29.	Sessile Joyweed	Ponnankanni	Alternanthera sessilis	M
30.	Asthma-plant	Ammanpacharisi	Euphorbia hirta	M
31.	Pignut	Nattapoochedi	Hyptis suaveolens	M
32.	Holy basil	Thulasi	Ocimum tenuiflorum	M
33.	Pink Blumea	Suvattru mullangi	Blumea mollis	M
34.	Madagascar Periwinkle	Nithykalyani Podi	Catharanthus roseus	E
35.	Asian spiderflower	Naaikaduku	Cleome viscosa L	M
36.	Digeria muricata	Thoiya keera	Digeria muricata	EM
37.	Carrot grass	Parttiniyam	Parthenium hysterophorus	NE
38.	Europeanblack nightshade	Manathakkali	Solanumnigrum	EM
39.	Mountain knotgrass	Thengaipoo kirai	Aerva lanata	M
40.	Bindii	Nerunchi	Tribulus terrestris	M
41.	Fish poison	Kolinch	Tephrosia purpurea	M
42.	Chrysanthemum	Samanthi Poo	Chrysanthemum	E
43.	East Indian globe thistle	Kottakarantai	Sphaeranthus indicus	M
44.	Tomato	Thakkali	Solanum lycopersicum	EM
45.	False daisy	Karisalankanni	Eclipta alba	M
46.	Chilli	Milakai	Capsicum annuum	EM
47.	Red Spiderling	Mukirattai	Boerhavia diffusa	M
48.	Aloe	Katrashai	Aloe vera	M
49.	Eggplant	Kathrikkai	Solanum melongena	EM
50.	Coat buttons	Thatha poo	Tridax procumbens	M
51.	Indian mint	Karpura valli	Coleus amboinicus	EM
52.	Aloe barbadensis	Katrashai	Aloe vera	EM
Climber/ Creeper				
1.	Stemmed vine	Perandai	Cissus quadrangularis	M
2.	Wild bitter	Pavarkai	Momordica charantia	EM
3.	Pointed gourd	Kovakkai	Trichosanthes dioica	EM
4.	Ivy gourd	Kovai	Coccinia grandis	M
5.	Bottle Guard	Sorakkai	Lagenaria siceraria	EM
6.	Ground Spurge	Sithrapaalavi	Euphorbia prostrata	EM
Grass				
1.	Jungle rice	Kuthirai vaalKattu	Echinochloa colona	NE

2.	Mauritian Grass	Moongil pul	Apluda mutica	NE
3.	Swollen Windmill Grass	Kondai Pul	Chloris barbata	NE
4.	Needle Grass	Thodappam	Aristida adscensionis	E
5.	Eragrostis	Pullu	Eragrostis ferruginea	E
6.	Needle Grass	-	Aristida funiculata	NE
7.	Windmill grass	Chevvarakupul	Chloris barbata	NE
8.	Sugarcane	Karumbu	Saccharum	E
Cactus				
1.	Prickly pear	Nagathali	Opuntia dillenii	M

Sources: Species observation in the field study and secondary data

3.5.7 Flora Composition in the Buffer Zone

Similar habitats may be found in the buffer area as well, although there is a wider variety of plants there than in the core zone area. The proposed project site there are 137 species in the buffer zone study area in total, based on records. The floral (137) varieties among them Trees 43, Herbs 52, Shrubs 27, Climbers/ Creepers 6, Grasses 8, and Cactus 1 were identified. The result of the buffer zone of flora studies shows that Fabaceae and Cucurbitaceous, Euphorbiaceae is the main dominating species in the study area mentioned in Table No.3.32. There are no impacts due to this mining activity. There are no Rare, Endangered, and Threatened Flora species in the mining area and their surrounding study area. Apart from the proposed project area, there is agricultural land. Horticulture and agricultural land are untouched. There are no Rare, Endangered, and Threatened Flora species in the mining area and their surrounding study area. A list of floral species has been prepared based on primary survey (site observations) and discussion with local people. The total number of different plant life forms under trees, shrubs, herbs, and climbers is shown in Table 3.33 and their % distribution is shown in Figure 3.19

TABLE 3.27: NUMBER OF FLORAL LIFE FORMS IN THE STUDY AREA

S. No	Plant Life Form	Number of Species
1	Trees	43
2	Shrubs	27
3	Herbs	52
4	Climber/Creepers	6
6	Grasses	8
7	Cactus	1
Total No. of Species		137

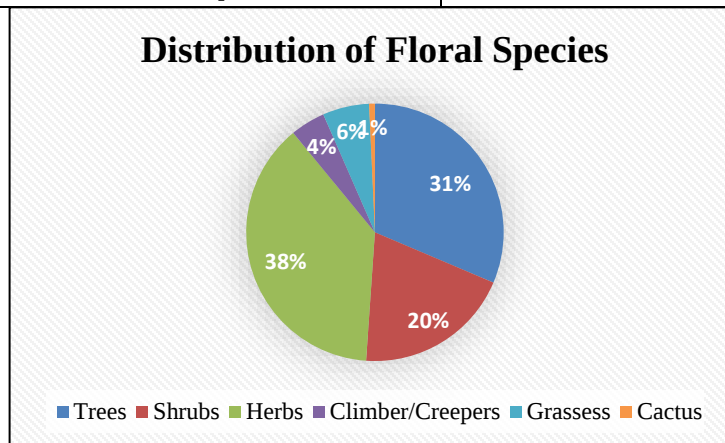


FIGURE. 3.21: DIAGRAM SHOWING % DISTRIBUTION OF FLORAL LIFE FORMS



a. *Calotropis gigantea*



b. *Azadirachta indica*



c. *Ocimum tenuiflorum*



d. *Celome viscosa*



e. *Amaranthus spinosus*



f. *Annona reticulata*



g. *Tridax procumbens*



h. *Pongamia pinnata*



i. *Cynodon dactylon*



j. *Boerhaavia diffusa*



k. *Jatropha curcas*



l. *Morinda tinctoria*



m.Coleus amboinicus



n.Aloe vera



o.Solanum melongena



p.Carica papaya L



q.Thespesia populnea



r.Euphorbia antiquorum



s.Solanum nigrum



t.Chrysanthemum



u.Solanum lycopersicum



v.Solanum torvum



w.Datura stramonium



x.Abutilon indicum



Hibiscus rosa-sinensis

Ficus benghalensis

Mangifera indica

FIGURE 3.22. FLORA SPECIES OBSERVATION IN THE BUFFER ZONE AREA**3.5.8. Major Agricultural Crops**

Tiruppur district though an industrial district plays important role in Agriculture also. The food production required to be enhanced to provide food and nutritional security to the growing district population. In Tiruppur more than 80% of the farmers belong to small and marginal category and they play a key role in overall development in Agriculture. The total area of cultivation is around 2,28,556 hectares, mainly food and commercial crops. The chief food crops are paddy, millets and pulses. The non-food or commercial crops in the district are cotton, oil seeds and coconut. Details of the major crops are given in Table No: 3.34.

TABLE NO: 3.28. MAJOR CROPS IN TIRUPPUR DISTRICT

S.No	Major crops	Scientific name	Families
1	Paddy	<i>Oryza sativa</i>	Grasses
2	Sorghum	<i>Sorghum bicolor</i>	Grasses
3	Maize	<i>Zea mays</i>	Grasses

(Source: Agriculture Contingency Plan– Tiruppur-2013)

3.5.8.1. Horticulture

Major horticulture crops cultivated in this district are fruits crops like mango, banana, aonla, sapota and papaya, vegetables like bhendi, tomato, brinjal, onion, tapioca, moringa, spices and condiments like chillies and turmeric, plantation crops like cocoa, flower crops like jasmine, tube rose, marigold, cock's comb and medicinal plants like gloriosa and coleus. Details of major field crops and horticulture in Tiruppur district is given in Table No: 3.35.

TABLE NO: 3.29. MAJOR FIELD CROPS & HORTICULTURE IN TIRUPPUR DISTRICT.

Sl.No	Common Name	Scientific Name	Family
Major Horticultural Crops			
1	Banana	<i>Musa</i>	Musaceae
2	Mango	<i>Mangifera indica</i>	Anacardiaceae
3	Jack	<i>Artocarpus heterophyllus</i>	Mulberry
4	Guava	<i>Psidium guajava</i>	Myrtle
5	Sapota	<i>Manilkara zapota</i>	Sapotaceae
6	Lemon	<i>Citrus × limon</i>	Rutaceae
Vegetables			
7	Onion	<i>Allium cepa</i>	Amaryllidaceae
8	Tapioca	<i>Manihot esculenta</i>	Spurges
9	Brinjal	<i>Solanum melongena</i>	Nightshade
10	Tomato	<i>Solanum lycopersicum</i>	Nightshade

11	Gourds	<i>Lagenaria siceraria</i>	Cucurbits
12	Bhendi	<i>Abelmoschus esculentus</i>	Mallows
13	Moringa	<i>Moringa oleifera</i>	Moringaceae
Medicinal and Aromatic Plants			
14	Gloriosa superba	<i>Colchicaceae</i>	Colchicaceae
15	Coleus	<i>Plectranthus scutellarioides</i>	Mints
Flowers			
16	Jasmine	<i>Jasminum</i>	Jasminaceae
17	Crossandra	<i>Crossandra infundibuliformis</i>	
18	Crysanthimum	<i>Asteraceae</i>	Asteraceae
19	Rose & Jathi	<i>Rosa</i>	Rosaceae
20	Tuberose	<i>Polianthes tuberosa</i>	Asparagus
Spices and Condiments			
21	Chillies	<i>Capsicum frutescens</i>	Solanaceae
22	Turmeric	<i>Curcuma longa</i>	Zingiberaceae
23	Tamarind	<i>Tamarindus indica</i>	Legumes
24	Curry leaf	<i>Murraya koenigii</i>	Rutaceae
Plantation Crops			
25	Cashew	<i>Anacardium occidentale</i>	Cashews
26	Cocoa	<i>Theobroma cacao</i>	Mallows

(Source: Statistical handbook of Tamil Nadu-2013)

3.5.8.2 Types of Irrigation

Irrigation is the artificial application of water to the soil for normal growth of plants. Water is an important determinant factor for production of crops in agriculture sector. Intensive and extensive cultivation of land depends mainly on the availability of water. Medium and minor irrigation schemes are implemented in the state for augmenting the water supply for agriculture. The various sources of irrigation are canals, tanks, tube wells, ordinary wells, springs and channels. The Following Table No: 3.36. Shows the area irrigated in Tiruppur District.

TABLE NO: 3.30. IRRIGATED AREA IN THE DISTRICT

S.No	Irrigation	Area ('000 ha)
1	Net irrigated area	119.3
2	Gross irrigated area	123.1
3	Rain fed area	72.9

(Source: Statistical handbook of Tamil Nadu-2013)

Dug wells are the major source of water for irrigation in Tiruppur district, accounting for about 59.97 percent of the total area irrigated in this district. Tube wells accounting for about 9.48 percent of the total area irrigated in this district. Of the net area irrigated, the canal irrigated area is only 29.45 percent. The area irrigated under tank is 1.10 percent. (Source: Statistical handbook of Tamil Nadu-2013)

3.5.8.3 Vegetation in the RF / PF areas, ecologically sensitive areas

There are neither reserved (RF) nor 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.

3.5.9 Fauna

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

3.5.10. Fauna Composition in the Core Zone

A total of 16 varieties of species were observed in the Core zone of Sivanmalai Village, Rough stone and gravel quarry (Table No.3.7) among them numbers of Insects 5 (31%), Reptiles 2 (13%), Mammals 2 (12%) and Avian 7 (44%). A total of 15 species belonging to 13 families have been recorded from the core mining lease area. None of these species are threatened or endemic in the study area and surroundings. There is no Schedule I species and six species are under schedule IV according to the Indian wild life Act 1972. A total of 7 species of bird were sighted in the mining lease area.

There are no critically endangered, endangered, vulnerable and endemic species were observed. Details of fauna in core zone with the scientific name were mentioned in Table No. 3.7.

TABLE NO: 3.31. FAUNA IN THE CORE ZONE OF CLUSTER

SI. No	Common name/English Name	Scientific Name	Schedule list wildlife Protection act 1972
Insects			
1.	Mottled emigrant	Catopsilia pyranthe	NL
2.	Striped tiger	Danaus plexippus	Schedule IV
3.	Common Tiger	Danaus genutia	NL
4.	Red-veined darter	Sympetrum fonscolombii	NL
5.	Danaid egg fly	Hypolimnasmisippus	Schedule IV
Reptiles			
1.	Garden lizard	Calotes versicolor	Schedule IV
2.	Common skink	Mabuya carinatus	Schedule IV
Mammals			
1.	Indian Field Mouse	Mus booduga	Schedule IV
2.	Common rat	Rattus rattus	Schedule IV
Aves			
1.	Common myna	Acridotheres tristis	Schedule IV
2.	House crow	Corvus splendens	Schedule IV
3.	Common quail	Coturnix coturnix	Schedule IV
4.	Koel	Eudynamys	Schedule IV
5.	Cattle egret	Bubulcus ibis	Schedule IV
6.	Asian green bee-eater	Merops orientalis	Schedule IV
7.	Black drongo	Dicrurus macrocercus	Schedule IV

*NL- Not listed, LC- Least Concern

(Sources: [Species observation in the field study](#))

3.5.11 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 is no reserved forests in the buffer zone. As such there are no chances of 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 reserves or Elephant Corridor or other protected areas within 10 km radius of 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 Red-whiskered Bulbul, Asian Koel, House crow, Black drongos, Crows, Pond heron etc.

The list of Mammals (*directly sighted animals & Secondary data) is given in table No.3.38. The list of bird species recorded during the field survey and literature from the study area are given in Table 3.39. The list of reptilian species recorded during the field survey and literature from the study area is given in Table 3.40. The list of insect species recorded during the field survey and literature from the study area are given in Table 3.41. The list of Butterflies species recorded during the field survey and literature from the study area are given in Table 3.42. 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 71 species recorded were from the buffer zone area. Based on habitat classification the majority of species were birds 35, followed by Butterflies 12, Reptiles 10, Insects 5, Mammals 5, and Amphibians 4. There are five Schedule II species, two species are under the schedule III and fifty four species are under Schedule IV according to the Indian Wildlife Act 1972. A total of 35 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, butterflies, and insects, and four amphibian was observed during the extensive field visit *Sphaerothera breviceps*, *Euphlyctis hexadactylus*, *Bufo melanostictus*, etc., There is no Schedule I Species in the study area. There are no critically endangered, endangered, vulnerable, and endemic species were observed.

TABLE 3.32. LIST OF FAUNA & THEIR CONSERVATION STATUS,

Mammals: (*directly sighted animals & Secondary data)

SI. No	Common Name/English Name	Scientific Name	Schedule list wildlife Protection act 1972
1.	Indian palm squirrel	<i>Funambulus palmarum</i>	Schedule IV
2.	Indian Field Mouse	<i>Mus booduga</i>	Schedule IV
3.	Asian Small Mongoose	<i>Herpestes javanicus</i>	Schedule (Part II)
4.	Indian hare	<i>Lepus nigricollis</i>	Schedule (Part II)
5.	Brown rat	<i>Rattus norvegicus</i>	Schedule IV

TABLE 3.33. LISTED BIRDS

SI. No	Common Name/English Name	Scientific Name	Schedule list wildlife Protection act 1972
1.	Black kite	<i>Milvus migrans</i>	Schedule IV
2.	Jungle babbler	<i>Turdoides striata</i>	Schedule IV
3.	Indian robin	<i>Saxicoloides fulicatus</i>	Schedule IV
4.	Asian Koel	<i>Eudynamis</i>	Schedule IV
5.	Cattle egret	<i>Bubulcus ibis</i>	Schedule IV
6.	Rock pigeon	<i>Columbidae</i>	Schedule IV
7.	Common myna	<i>Acridotheres tristis</i>	Schedule IV
8.	House crow	<i>Corvus splendens</i>	Schedule IV
9.	Red Vented Bulbul	<i>Pycnonotus cafer</i>	Schedule IV
10.	Small Bee Eater	<i>Merops orientalis</i>	Schedule IV

11.	Purple sunbird	Cinnyris asiaticus	Schedule IV
12.	Common hawk-cuckoo	Hierococcyx varius	Schedule IV
13.	House sparrow	Passer domesticus	Schedule IV
14.	Brahminy myna	Temenuchus pagodarum	Schedule IV
15.	Small blue Kingfisher	Alcedo atthis	Schedule IV
16.	Rose-ringed parakeet	Psittacula krameri	Schedule IV
17.	The common woodshrike	Tephrodornis pondicerianus	Schedule IV
18.	Asian Palm Swift	Cypsiurus balasiensis	Schedule IV
19.	Common quail	Coturnix coturnix	Schedule IV
20.	Pond herons	Ardeola grayii	Schedule IV
21.	Black-headed Cuckooshrike	Lalage sykesi	Schedule IV
22.	Black drongo	Dicrurus macrocercus	Schedule IV
23.	Woodpecker bird	Picidae	Schedule IV
24.	Weaver bird	Ploceus philippines	Schedule IV
25.	Two-tailed Sparrow	Dicrurus macrocercus	Schedule IV
26.	Grey drongo	Dicrurus longicaudatus	Schedule IV
27.	Grey Francolin	Francolinus pondicerianus	Schedule IV
28.	Wood Sandpiper	Tringa glareola	Schedule IV
29.	Blue-Tailed Bee Eater	Merops philippinus	Schedule IV
30.	Indian Roller	Coracias benghalensis	Schedule IV
31.	Common Swallow	Hirundo rustica	Schedule IV
32.	Purple Rumped Sunbird	Leptocoma zeylonica	Schedule IV
33.	Common Tailor Bird	Orthotomus sutorius	NL
34.	Purple Sunbird	Cinnyris asiaticus	NL
35.	Lesser Golden Backed Woodpecker	Dinopium benghalense	Schedule IV

Reference: [Ali, S. \(2002\). The Book of Indian Birds \(13th revised edition\). Oxford University Press, New Delhi. 326pp.](#)

TABLE 3.34. LIST OF REPTILES EITHER SPOTTED OR REPORTED FROM THE STUDY AREA.

(*indicates direct observations & Secondary data)

SI. No	Common Name/English Name	Scientific Name	Schedule list wildlife Protection act 1972
1.	Oriental garden lizard	Calotes versicolor	NL
2.	House lizards	Hemidactylus flaviviridis	Schedule IV
3.	Indian cobra	Naja naja	Sch II (Part II)
4.	Green vine snake	Ahaetulla nasuta	Schedule IV
5.	Rat snake	Ptyas mucosa	Sch IV (Part II)
6.	Common krait	Bungarus caeruleus	Schedule IV
7.	Common skink	Mabuya carinatus	NL
8.	Russell's viper	Vipera russeli	Sch II (Part II)
9.	Fresh water snake	Nerodia piscator	Sch III (Part II)
10.	Fresh water tortoise	Groemyda bijuga	Sch III (Part II)

TABLE 3.35. LIST OF INSECTS EITHER SPOTTED OR REPORTED FROM THE STUDY AREA

SI. No	Common Name/English Name	Scientific Name	Schedule list wildlife Protection act 1972
1.	Indian honey bee	Apis cerana	-
2.	Termite	Hamitermes silvestri	NE
3.	Grasshopper	Hieroglyphus sp	NL
4.	Ant	Camponotus Vicinus	NL
5.	Dragonfly	Ceratogomphus pictus	-

TABLE.3.36. LIST OF BUTTERFLIES REPORTED FROM THE STUDY AREA

SI. No	Common Name/English Name	Scientific Name	Schedule
1.	Indian palm bob	Suastusgremius	Schedule IV
2.	Common Mormon	Papilio polytes	Schedule IV
3.	Common rose	Pachlioptaaristolochiaee	Schedule IV
4.	Spotless grass yellow	Eurema laeta	Schedule IV
5.	Common Tiger	Danaus genutia	Schedule IV
6.	Common emigrant	Catopsiliapomona	Schedule IV
7.	Crimson tip	Colotisdanae	Schedule IV
8.	Common Indian crow	Euploea core	Schedule IV
9.	Lime Butterfly	Papilio demoleus	Schedule IV
10.	Yellow Pansy	Junonia hierta	Schedule IV
11.	Chocolate Pansy	Junonia iphita	Schedule IV
12.	Double-branded Black Crow	Euploea sylvester	Schedule IV

3.5.12 Aquatic Ecology

Mining activities will not have an impact on aquatic ecosystems because no effluent discharge from the Limestone mine is planned. There are no natural perennial surface water bodies, such as marshes, rivers, streams, lakes, or agricultural sites, inside the mining lease area. The study region contains a few seasonal bodies of water. There is no aquatic flora and, aquatic faun. Hence, it does not harbour any significant aquatic life. Therefore, the project is not likely to affect the aquatic ecology. 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.

3.5.12.1. Objectives of Aquatic Studies

- ✓ Generating data through actual field collection in these locations over the study period; and
- ✓ Impacts on aquatic fauna/flora
- ✓ Consulted with locals to obtain knowledge about aquatic flora and animals.

3.5.12.2. Macrophytes

The macrophytes observed within the study area are tabulated in Table 3.43

TABLE NO.3.37 DESCRIPTION OF MACROPHYTES

Sl. No	Scientific name	Common Name	Vernacular Name (Tamil)	IUCN Red List of Threatened Species
1.	<i>Eichornia crassipe</i>	Water hyacinth	Agayatamarai	NA
2.	<i>Aponogeton natans</i>	Floating lace plant	Kottikizhnagu	NA
3.	<i>Nymphaea nouchali</i>	Blue water lily	Nellambal	LC
4.	<i>Typha angustifolia</i>	Sambu	Narrowleaf cattail	LC
5.	<i>Carex cruciata</i>	Cross Grass	Koraipullu	NA
6.	<i>Cyperus exaltatus</i>	Tall Flat Sedge	Koraikizhangu	LC

[Sources: Species observation in the field study](#)

3.5.12.3 Aquatic Faunal Diversity

Amphibian species like the common Indian Burrowing frog, and Green pond frog, and etc. were sighted near the water bodies located in the study area.

TABLE NO. 3.38. AMPHIBIANS OBSERVED/RECORDED FROM THE STUDY AREA

Sl. No	Common Name/English Name	Scientific Name	Schedule list wildlife Protection act 1972
1.	Indian Burrowing frog	Sphaerotheca breviceps	Schedule IV
2.	Green pond frog	Euphlyctis hexadactylus	Schedule IV
3.	Indian Toad	Bufo melanostictus	Schedule IV
4.	Skipper	Euphlyctis cynophlyctis	Schedule IV

3.5.13 Other Aquatic Fauna

3.5.13.1. Fishes

The study area has low aquatic diversity, with few types of fish living. The species of fish reported during the primary visit are Rohu, Catla, Catfish, etc. Species of fish reported in the study area are given in table 3.45.

TABLE 3.39. BASED ON ACTUAL SIGHTING, BASED ON INPUTS FROM LOCALS AND PERUSED FROM SECONDARY DATA

S.No	Common name	Scientific name	Family
1.	Ponithia	Puntius sophore	Cyprinidae
2.	Catla	Catla Catla	Cyprinidae
3.	Silver scabbardfish	Lepidopus caudatus	Trichiuridae
4.	Catfish	Siluriformes	-
5.	Rohu	Labeo rohita	Cyprinidae
6.	Eel fish	Electrophorus electricus	Gymnotidae

3.5.14 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 10km 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 is no endangered, endemic and RET Species. There is no Schedule I species in 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.

3.9. 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

The major developmental activities in mining /Industrial sector are required for economic development as well as creation of employment opportunities (direct and indirect) and to meet the basic/modern needs of the society, which ultimately results in overall improvement of the quality of life through upliftment of social, economic, health, education and nutritional status in the project region, state as well as the country. In this manner all developmental projects have direct as well as indirect relationships with socioeconomic aspects, which also include public acceptability for new developmental projects. Thus, the study of socioeconomic component incorporating various facets related to prevailing social and cultural conditions and economic status of the Rough stone and Gravel quarry project region is an important part of EIA study. The study of these parameters helps in identification, prediction and evaluation of the likely impacts on the socio economics and parameters of human interest due to the project.

3.6.1 Objectives of the Study

The objectives of the socio-economic impact assessment are as follows:

- a) To study the socio-economic status of the people living in the study area of the project.
- b) To identify the basic needs of the nearby villages within the study area.
- c) To assess the impact on socio-economic environment due to the project.
- d) To provide the employment and improved living standards.
- e) To study the socio-economic status of the people living in the study area Rough stone and Gravel quarry project region.
- f) To assess the impact on socio-economic environment due to Rough stone and Gravel quarry project region.
- g) To analysis of impact of socio economic and Environmental Infrastructure facilities and road accessibility.

3.6.2 Scope of Work

- To study the Socio-economic Environment of area from the secondary sources

- Developing a questionnaire for Survey
- Data Collection and Analysis
- Identification of impacts due to the mining projects
- Mitigation Measures

3.6.3 Methodology

The methodology adopted for the socio-economic impact assessment is as follows:

- a) The details of the activities and population structure have been obtained from Census 2001 and 2011 and analyzed.
- b) Based on the above data, impacts due to plant operation on the community have been assessed and recommendations for further improvement have been made.

3.6.4 Sources of Information and Data Base

To achieve the above objectives, the information has been collected from both primary and secondary sources. Both primary data and secondary data have been analyzed by means of suitable statistical techniques for the purpose of verifying the above selected hypotheses concerned with the surrounding area.

3.6.5 Primary Survey

The primary data collection includes the collection of data through a structured interview schedule by direct observation method. The questionnaire survey includes both open and closed methods. The sample size is limited respondents, who were selected on the basis of simple random sampling from Sivanmalai Village, Kangeyam Taluk, Tiruppur District, Tamilnadu State. in the field survey has been divided into three major segments namely Primary Zone (0 - 3 km), Secondary Zone (3 - 7 km) and tertiary Zone (7 - 10 km).

The questionnaires were designed to suit the subjects considering their rural background enabling to furnish correct information and data as far as possible. Data were collected at village level and household level by questionnaires and focused group discussions.

3.6.6 Collection of Data from Secondary Sources

Data from secondary sources were collected on following aspects:

- Demographic profile of the area
- Economic profile of the area

TABLE 3.40 TYPE OF INFORMATION AND SOURCES

Information	Source
Demography	District Census Handbook, Govt. of India
Economic profile of the area	Census of India, Tamil Nadu State

b) Data Presentation and Analysis

The data collected were presented in a suitable, concise form i.e., tabular or diagrammatic or graphic form for further analysis. These tabulated data were interpreted and analysed with the help of various qualitative techniques and ideographic approaches.

3.7 Background Information of the Area

3.7.1 Tiruppur District

Tiruppur district was formed after separating from Coimbatore and Erode districts in Tamilnadu by the year 2008. Taluks like Avinashi, Palladam, Udumalaipettai, and Tiruppur from Coimbatore and Taluks like Kangeyam, Dharapuram from Erode were separated and formed new district Tiruppur in Tamilnadu. The districts of Coimbatore, Erode, Karur and Dindigul and the state of Kerala border Tiruppur district.

Tiruppur is the 32nd district of Tamilnadu. Tiruppur is well known as the textile city of Tamilnadu. The district is famous for its cotton market and banyan mills. Tiruppur is a wonderful district which brings good income to India through banyan export.

There cannot be anyone who does not know about Uthukuli Butter near Tiruppur. Rivers like Noyyal, Amaravathi, Somanur, Uthukuli, Vanchipalayam, Koolipalayam flow here.

Tiruppur Administration

Revenue Divisions	- 3 (Tiruppur, Dharapuram, Udumalaipettai)
Taluks	- 7 (Avinashi, Dharapuram, Kangayam, Madathukulam, Palladam, Tiruppur, Udumalaipettai)
Corporation	- 1 (Tiruppur)
Municipalities	- 7 (S.Nallur, Dharapuram, Palladam, Udumalaipettai, Velampalayam, Vellakoil, Kangayam)
Blocks	- Avinashi, Gudimangalam, Kundah Dam, Mulanur, Pongalur, Udumalaipettai, Vellakoil, Dharapuram, Kangayam, Madathukulam, Palladam, Tiruppur, Uthukuli
Town Panchayats	- Muthur, Kannivadi, Chinnakapalayam, Madathukulam, Samalapuram, Kunnathur, Kangayam, Mulanur, Avinashi, Kaniyur, Sankararamanallur, Uthukuli, Ruthravathy, kolathupalayam, Thali, Kumaralingam, Thirumuruganpoondi

Parliamentary Constituency - 1 (Tiruppur)

State Assembly Constituency - 8 (Kangayam, Avinashi, Palladam, Udumalaipettai, Tiruppur North, Tiruppur South, Dharapuram, Madathukulam)

3.11 Study Area

Detailed socio-economic survey was conducted in the study area (Core and buffer zone) within 10 km radius of the area at Sivanmalai Village, Kangayam Taluk, Tiruppur District, Tamil Nadu State. In order to determine the impact of the proposed project on nature and inhabitant. To get an overview of the villagers and their perspectives about this proposed activity, different demographic parameters and social aspects such population density, sex ratio, literacy rate, worker ratio etc. has been identified, analysed, studied together. These impacts may be beneficial or disadvantageous. If disadvantageous anticipated suggestions measures are advocated in order to have collective development.

3.12 Demographic pattern of 10km study area characteristics a comparative analysis

TABLE 3.41 SHOWS THE SOCIO-ECONOMIC PROFILE OF THE STUDY AREA

Particular	India	Tamil Nadu	Tiruppur District
Area (in sq. km.)	3,287,263	130058	5087
Population Density/ sq. Km.	368	554	487
No. of Households	249454252	13357027	712210
Population	1210569573	72147030	2479052
Male	623121843	36137975	1246159
Female	587447730	36009055	1232893
Scheduled Tribes	104281034	794697	5458
Scheduled Castes	201378086	14438445	395876
Literacy Rate (%)	72.99	80	71
Sex Ratio (Females per 1000 Males)	943	996	989

Source: Census of India, 2011

Sivanmalai village is situated in Teshil Kangeyam, District Tiruppur and in State of Tamil Nadu India. Village has population of 7927 as per census data of 2011, in which male population is 3972 and female population is 3955. Total geographical area of Sivanmalai village is 4094.26 Hectares. Population density of Sivanmalai is 2 persons per Hectares. Total number of house hold in village is 2377..

Sex Ratio of Sivanmalai Village -Census 2011

As per the Census Data 2011 there are 996 Femals per 1000 males out of 7927 total population of village. There are 846 girls per 1000 boys under 6 years of age in the village.

Literacy of Sivanmalai Village

Out of total poplation total 5078 people in Sivanmalai Village are literate, among them 2852 are male and 2226 are female in the village. Total literacy rate of of Sivanmalai is 69.74%, for male literacy is 78.74% and for female literacy rate is 60.84%.

	Total	Male	Female
Total Workers	4681	2749	1932
Main Workers	4211	2623	1588
Main Workers Cultivators	847	478	369
Agriculture Labourer	685	392	293
Household Industries	177	88	89
Other Workers	2502	1665	837
Marginal Workers	470	126	344
Non Working Persons	3246	1223	2023

3.16 Workers Population

Total working population of Sivanmalai is 4681 which are either main or marginal workers. Total workers in the village are 4681 out of which 2749 are male and 1932 are female. Total main workers are 4211 out of which female main workers are 2623 and male main workers are 1588. Total marginal workers of village are 470.

3.17 Basic Amenities

A better network of physical infrastructure facilities (well-built roads, rail links, irrigation, power and telecommunication, information technology, market-network and social infrastructure support, viz. health and education, water and sanitation, veterinary services and co-operatives) is essential for the development of the rural economy. A review of infrastructure facilities available in the area has been done based on the information from baseline survey of the study area. In this review, the villages which fall within 10Km radius round the site has been considered. Infrastructure facilities available in the area have been described in the subsequent sections as below:

Sivanmalai Village Data ---Census 2011

Description	Data
Village Name	Sivanmalai
Gram Panchayat Name	Sivanmalai
CD Block Name	Kangeyam
Teshil Name	Kangeyam
Reference Year	2009
Sub District HQ Name	KANGEYAM
Sub District HQ Distance	4 Km
District HQ Name	TIRUPPUR
District HQ Distance	26 Km
Nearest Town	KANGEYAM
Nearest Town Distance	4 Km
Pincode	641701

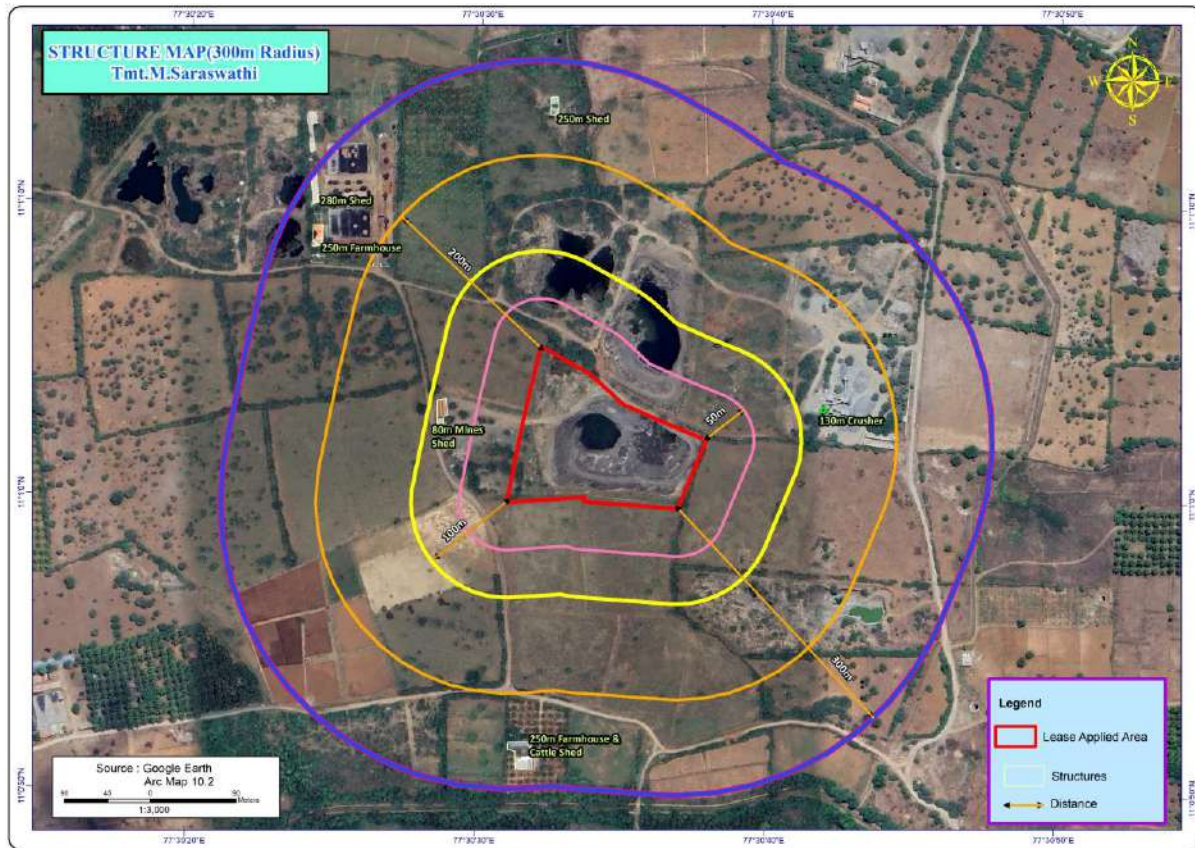
Sivanmalai Manufacturers and Agricultural Commodities Data

Description Type	Commodities
Agricultural Commodities (First)	COCONUT
Manufacturers Commodities (First)	DRY COCONUT
Agricultural Commodities (Second)	PADDY
Manufacturers Commodities (Second)	RICE
Agricultural Commodities (Third)	GROUND NUT
Manufacturers Commodities (Third)	GROUNDNUT OIL Km
Forest Area (in Hectares)	21.64

3.22 Interpretation

Based on the data, following inferences could be drawn:

- Total literacy rate in the study area is 69.74%.
- The study area had average educational facilities. The overall status depicts that the education is limited to primary and middle level.
- The study area is well connected by District/Village Road.
- The study area well health facilities of primary level.
- Considering the above facts, the proposed project will boost the socio-economic development activities in the area and hence will leave positive impact.
- The study area has mobile connectivity

FIGURE .3.23 STRUCTURE MAP AROUND 300M RADIUS**TABLE 3.42 STRUCTURE MAP AROUND 300M RADIUS**

Enumeration of Structures from 0 - 300m Radius						
Structure Numbers	Distance & Direction from the project site	Structure Details and Usage Purpose	Type of Structure Structures (Kutch/ Brick/ Cement/ RCC/ Framed Structures)	No of Occupants	Structure belongs to owner (Yes/No)	Remarks
1	80m - West	Mines Shed	Tiled & Brick Structure	4 Nos	Yes	Used to store Mines equipment's – No stay
2	130m - NE	Crusher	Framed Structure	2 Nos	No	Production of M & P sand and Jelly
3	250m - North	Shed	Sheet Structure	Nil	No	Used to store agricultural products
4	250m - South	Farmhouse & Cattle Shed	Concrete, Sheet & Brick Structure	3 Nos	No	Used to store agricultural products & Shelter for domestic animals
5	250m - NW	Farmhouse	Concrete & Brick Structure	3 Nos	No	Used to store agricultural products
6	280m - NW	Shed	Sheet Structure	Nil	No	Used to store agricultural products

3.18 Recommendations and Suggestion

- ❖ There is no habitation within the radius of 300m. The Structures located within 300m are enumerated in the above table
- ❖ It is an existing quarry and the mining activities are carried out in this region without major hindrance to the public
- ❖ It is recommended to follow the Environmental Management plan as per this report to control the Noise, Vibration and dust propagation
- ❖ Education Awareness program is being/will be conducted to make the population aware and better treatment for livelihood.
- ❖ Vocational training session is being/will be organized to provide self-employment to the women and unemployment youth.
- ❖ Healthcare Centre and Ambulance facility is being/will be provided to make the population get easy medical facilities.
- ❖ Natural Resource Management and Environmental Conservation.
- ❖ On the basis of qualification and skills local youths is being/will be employed. Long term and short-term employments is being/will be generated.
- ❖ Health care center and ambulance facility is being/will be provided to make the population get easy medical facilities.
- ❖ Basic amenities and facilities are being/will be made available to the people and there will be proper maintenance of the facilities already provided by the government in the study area through various CSR activities conducted by Proposal proponent.

3.19 CONCLUSION

To evaluate the impacts of proposed rough stone and gravel quarry project on the surrounding area, it is vital to assess the baseline status of the environmental quality in the locality of the site. Socio-Economic Survey was also conducted during the study period which revealed that area further require improvement in the Economy and Infrastructure Development of the area. Hence it can be concluded that the present baseline environment status of the study area will not be affected by the proposed project as **Thiru.M.Saraswathi Rough Stone and Gravel Quarry** will adopt adequate control measures to protect the surrounding environment and will contribute in development of the study areas.

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

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

To identify and validate a model for a particular situation, predictions have been arrived at based on logical reasoning / consultation / extrapolation.

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

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

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

4.1.2.1 Mitigation Measures for Proposed Project

- It is an existing project the area has been already broken up. The mining activity has been carried out in this surrounding region for the past 15 years
- 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
- 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
- Thick plantation will be carried out on unutilized area, top benches of mined out pits, on safety barrier, etc.,
- At conceptual stage, the land use pattern of the quarry will be changed into Greenbelt area and temporary reservoir
- In terms of aesthetics, natural vegetation surrounding the quarry will be retained (such as in a buffer area i.e., 7.5 m safety barrier and other safety provided) so as to help minimise dust emissions.

- Proper fencing will be carried out at the conceptual stage, Security will be posted round the clock, to prevent inherent entry of the public and cattle

4.1.3 Soil Environment

4.1.4 Impact on Soil Environment

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 projects. 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 for Proposed Project

- 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 sediments 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 in the cluster is 42m and water table is found at a depth of 58-62m BGL. 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

*Purpose	Quantity	Source
Domestic & Drinking purpose	0.4KLD	From existing, bore wells and drinking water will be sourced from Approved water vendors.
Dust Suppression	0.6KLD	From Existing bore wells from nearby area
Green Belt	1.0KLD	From Existing bore wells from nearby area
Total	2.0 KLD	

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

Source: Approved Mining Plan Pre-Feasibility Report

Total water requirement in the cluster quarries is about 2.0 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 drain, settling tank will be constructed along the proposed 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 months 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 months once) and analysing the quality of water in open well, bore wells and surface water

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 quarries. 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

	Activity	Source type	Value	Unit
Estimated Emission Rate for PM ₁₀	Drilling	Point Source	0.074883118	g/s
	Blasting	Point Source	0.000569553	g/s
	Mineral Loading	Point Source	0.039868170	g/s
	Haul Road	Line Source	0.002487465	g/s/m
	Overall Mine	Area Source	0.052570929	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.000376325	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000017926	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 6 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 7 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, Tiruppur agro for the month of Mar – May2025 to correlate with site data and found not much of change in the parameters.

FIGURE 4.1: AERMOD TERRAIN MAP

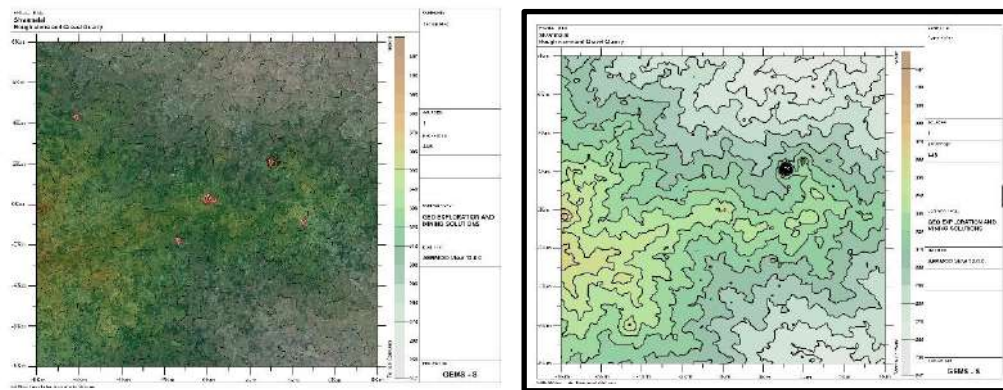


FIGURE 4.2: PREDICTED INCREMENTAL CONCENTRATION OF PM₁₀

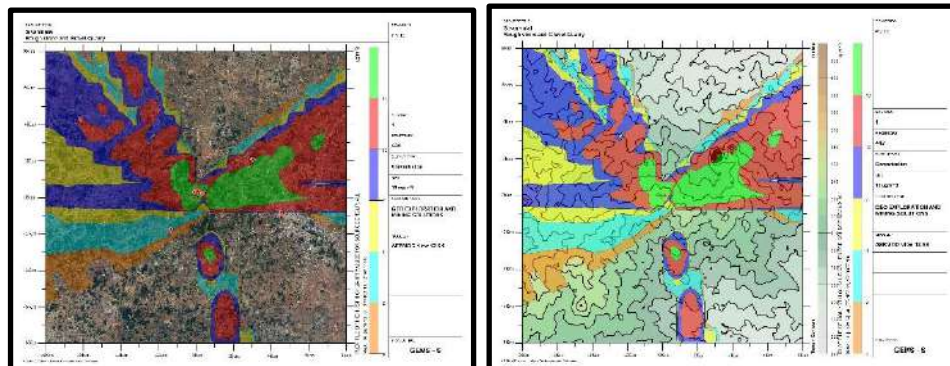
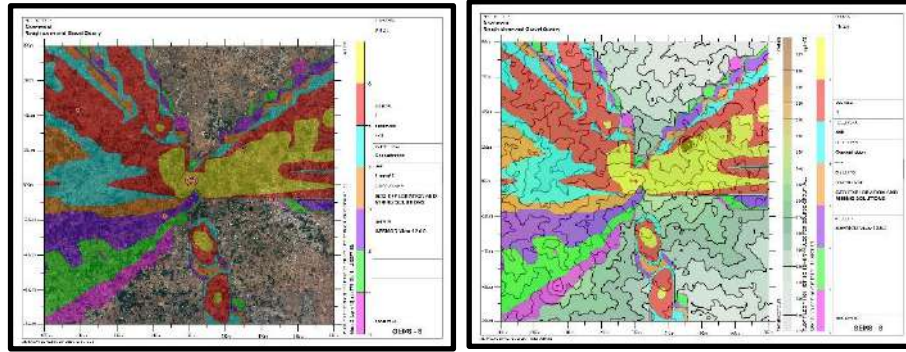
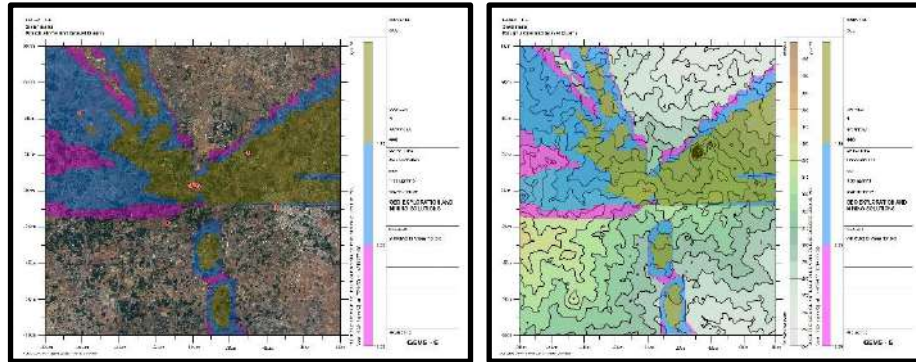
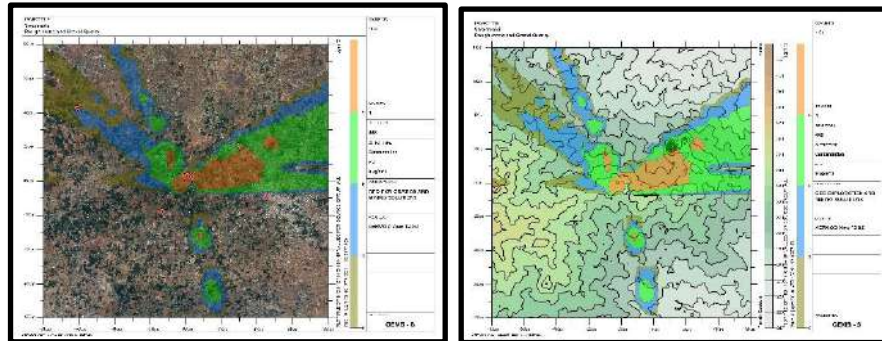
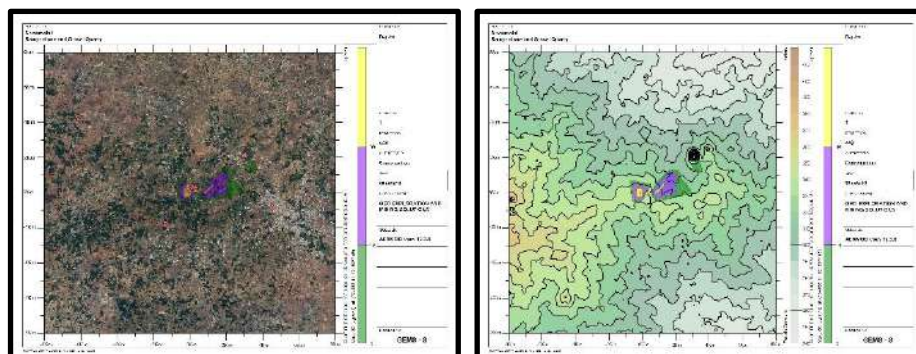


FIGURE 4.3: PREDICTED INCREMENTAL CONCENTRATION OF PM_{2.5}**FIGURE 4.4: PREDICTED INCREMENTAL CONCENTRATION OF SO₂****FIGURE 4.5: PREDICTED INCREMENTAL CONCENTRATION OF NO_x****FIGURE 4.6: PREDICTED INCREMENTAL CONCENTRATION OF FUGITIVE DUST**

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	11° 1'0.25"N 77°30'32.20"E	-80	-47	43.0	13.70	56.70
AAQ2	11° 1'2.09"N 77°30'38.05"E	97	13	42.9	13.40	56.30
AAQ3	11° 0'55.29"N 77°30'46.24"E	337	-105	42.6	9.80	52.40
AAQ4	11° 3'9.66"N 77°27'14.36"E	-6136	3963	43.7	11.00	54.70
AAQ5	11° 2'10.14"N 77°31'56.83"E	3003	1770	43.4	13.10	56.5
AAQ6	10°59'53.45"N 77°29'51.32"E	-1335	-2113	43.5	1.00	44.5
AAQ7	11° 0'23.38"N 77°33'3.01"E	4532	-1179	43.8	0	43.8

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	11° 1'0.25"N 77°30'32.20"E	-80	-47	20.0	6.90	26.90
AAQ2	11° 1'2.09"N 77°30'38.05"E	97	13	20.0	6.72	26.72
AAQ3	11° 0'55.29"N 77°30'46.24"E	337	-105	20.1	6.20	26.30
AAQ4	11° 3'9.66"N 77°27'14.36"E	-6136	3963	21.5	5.39	26.89
AAQ5	11° 2'10.14"N 77°31'56.83"E	3003	1770	20.9	6.47	26.37
AAQ6	10°59'53.45"N 77°29'51.32"E	-1335	-2113	21.4	2.15	23.55
AAQ7	11° 0'23.38"N 77°33'3.01"E	4532	-1179	21.0	0	21.0

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	11° 1'0.25"N 77°30'32.20"E	-80	-47	5.2	1.39	6.59
AAQ2	11° 1'2.09"N 77°30'38.05"E	97	13	5.1	1.35	6.45
AAQ3	11° 0'55.29"N 77°30'46.24"E	337	-105	5.3	1.11	6.41
AAQ4	11° 3'9.66"N 77°27'14.36"E	-6136	3963	5.1	1.00	6.1
AAQ5	11° 2'10.14"N 77°31'56.83"E	3003	1770	5.2	1.32	6.52
AAQ6	10°59'53.45"N 77°29'51.32"E	-1335	-2113	5.0	0	5.0
AAQ7	11° 0'23.38"N 77°33'3.01"E	4532	-1179	5.3	0	5.3

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)
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AAQ1	11° 1'0.25"N 77°30'32.20"E	-80	-47	20.2	9.48	29.68
AAQ2	11° 1'2.09"N 77°30'38.05"E	97	13	19.6	9.12	28.72
AAQ3	11° 0'55.29"N 77°30'46.24"E	337	-105	20.2	0	20.2
AAQ4	11° 3'9.66"N 77°27'14.36"E	-6136	3963	23.1	3.30	26.40
AAQ5	11° 2'10.14"N 77°31'56.83"E	3003	1770	23.0	8.77	31.77
AAQ6	10°59'53.45"N 77°29'51.32"E	-1335	-2113	23.1	0	23.1
AAQ7	11° 0'23.38"N 77°33'3.01"E	4532	-1179	23.3	0	23.3

TABLE 4.7: INCREMENTAL & RESULTANT GLC OF FUGITIVE DUST

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline Fugitive ($\mu\text{g}/\text{m}^3$)	Incremental value of Fugitive due to mining ($\mu\text{g}/\text{m}^3$)	Total Fugitive ($\mu\text{g}/\text{m}^3$) (5+6)
AAQ1	11° 1'0.25"N 77°30'32.20"E	-80	-47	85.1	30.19	115.29
AAQ2	11° 1'2.09"N 77°30'38.05"E	97	13	86.3	30.00	116.3
AAQ3	11° 0'55.29"N 77°30'46.24"E	337	-105	89.5	0	89.5
AAQ4	11° 3'9.66"N 77°27'14.36"E	-6136	3963	90.5	0	90.5
AAQ5	11° 2'10.14"N 77°31'56.83"E	3003	1770	97.8	0	97.8
AAQ6	10°59'53.45"N 77°29'51.32"E	-1335	-2113	93.5	0	93.5
AAQ7	11° 0'23.38"N 77°33'3.01"E	4532	-1179	94.7	0	94.7

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 PM₁₀, SO₂ & NO_x respectively. By adopting suitable mitigation measures, the pollutant levels in the atmosphere can be further being controlled.

4.3.4. Mitigation Measures for Proposed Project

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 tipper 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

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.

$$L_{p2} = L_{p1} - 20 \log (r_2/r_1) - Ae_{1,2}$$

Where:

L_{p1} & L_{p2} 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.

$$L_{p\text{total}} = 10 \log \{10^{(L_{p1}/10)} + 10^{(L_{p2}/10)} + 10^{(L_{p3}/10)} + \dots\}$$

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)	43.1	40.4	37.9	38.3	37.5	43.1	42.5
Incremental Value dB(A)	47.30	48.12	32.14	27.43	24.25	26.48	23.84
Total Predicted Noise level dB(A)	46.30	46.19	40.99	39.33	38.43	44.29	43.03
NAAQ Standards	Industrial		Day Time- 75 dB (A)		Night Time- 70 dB (A)		
	Residential		Day Time- 55 dB (A)		Night Time- 45 dB (A)		

4.4.2 Mitigation Measures for Proposed Project

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 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 710m west. 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

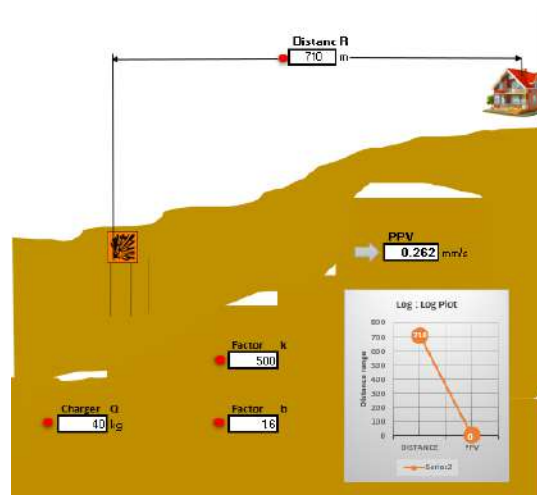
Q = maximum instantaneous charge (kg)

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

Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
20	710m-W	0.262



From the above, the charge per blast of Maximum 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 should be ensured that the explosives used for blasting at one blast should not exceed more than 2 Kg at any point of time. 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 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
-

4.5 Ecology and Biodiversity

Environmental impact studies are required for systematic identification, qualification, and interpretation of the anticipated changes. The main environmental problems associated with mining activities are deforestation, land degradation (change in topography, soil erosion), visual intrusion, disturbance to the hydrological system, and water, air, and noise pollution which ultimately impact the floral and faunal status of the project area. However, the occurrence and magnitude of these impacts entirely depend on project location, mode of operation, and adoption of the latest technologies.

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 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. There is no National Park or Wildlife Sanctuary in the study area. In addition, No Biosphere Reserves, Wildlife corridors, or, Tiger / Elephant reserves within 10 km of the project area. No Schedule- I species were found in the buffer zone of the proposed project area during the biodiversity assessment.

4.5.2. Impact on Flora

The mine lease area is an existing quarry exhibits plain topography and it is Patta land which is not fit for cultivation. It is mostly devoid of any considerable vegetation. The proposed mine lease area (core zone) does not encompass any designated forest land within it. The vegetation is very sparse and scanty. So, there will be no impact on flora from the mining operation. There will not be much contamination of soil or any other materials from the mining operation. No threatened plant species were reported in the core and buffer study area during the field survey.

4.5.2.1. Anticipated Impact on agricultural land associated with flora

1. There are no impacts on the nearby agricultural land due to this mining activity.
2. None of the plants will be cut during the operational phase of the mine.
3. There shall be negligible air emissions or effluents from the project site. During the loading of the truck, dust generation will be likely. This shall be a temporary effect and not anticipated to affect the surrounding vegetation significantly.

Most of the land in the buffer area is undulating terrain with croplands, grass patches, and small shrubs. Hence, there will be no effect on the flora of the region.

4.5.3 Mitigation Measures

4.5.3.1. General Guidelines for Green Belt Development

In selecting plant species for 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.

Characteristic features of plants to be used for Absorption of pollutant gases

- Plant species should be perennial and evergreen with thick canopy cover.
 - The crown of the tree (mass of foliage/leaves and branches growing outward from the trunk of the tree) should be either Oblong, Round or Spreading for effective absorption of pollutant gases.
 - Plants should have foliage of longer duration.
-

- The foliage should be freely exposed through the adequate height of the crown, Openness of foliage/leaves in the canopy, and Big leaves (long and broad laminar surfaces).

The project site should have land to develop a greenbelt in and around the limits of the mine, along roads, and another vacant area. The main objective of the green belt is to provide a barrier between the source of pollution and the surrounding areas. Although the project will not lead to any tree cutting, it is proposed to improve the greenery of the locality through plantation services. To avoid dust emissions, the mined materials will be covered with tarpaulin during transportation.

TABLE NO. 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

TABLE NO. 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

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.

4.5.4. Anticipated Impact on Fauna

- Since the terrestrial fauna in the study area is distributed away from the mine site, the impacts of the project are likely to be much low on the terrestrial fauna of the region. The proposed mining lease area is devoid of any significant vegetation; it is not suitable for permanent habitat for any specific wildlife.
- Habitat degradation and disturbance to the faunal group due to ground vibration and increase in noise level will be minimized or resolved by modern technologies. So, from the above facts, it is revealed that there will be no impact on fauna. No threatened fauna species were reported in the core and buffer study area.

4.5.4.1. Measures for protection and conservation of wildlife species

- Topsoil has a large number of seeds of native plant species in the mining area.

- Checks and controls the movement of vehicles in and out of the mine.
- Undertaking mitigate measures for a conducive environment for the flora and fauna in consultation with the Forest Department.
- Plantation around the mine area will help in creating habitats for small faunal species and create a better environment for various fauna. Creating and developing awareness for nature and wildlife in the adjoining villages.

4.5.5. Impact on Aquatic Biodiversity

Mining activities will not disturb the aquatic ecology as there is no effluent discharge proposed from the Rough Stone and Gravel quarry. There is no natural perennial surface water body within the mine lease area, like wetlands, rivers streams, lakes, and farmer sites. There is no impact on fish habitats and the food WEB/ food chain in the water body and Reservoir. There are a few seasonal water bodies located away from the proposed project site (10 km radius). Aquatic biodiversity is observed in the study area. Please refer the clause No.3.7. The project is not likely to affect the aquatic ecology.

TABLE NO: 4.13. GENERAL IMPACTS VS. MITIGATION MATRIX

Particulars	Issues	Reason/Status in relation to the mine site	Reference/Method	Suggestions
Species	Rare/ Endangered/ Threatened species	Not reported	Field observation, interviews of local people	Nil
	Endemic Species	No endemic species of any flora, fauna or wildlife are present in the study area.	Field survey, Literature review	Nil
Important Natural Habitats	Protected Areas	No National Park, Wildlife Sanctuary, Tiger reserve, and Biosphere Reserve falls in the 10-km radius study area	ENVIS, Government of Tamil Nadu protected area website, Google Earth, Project Maps, etc.	Nil
	Important Bird Areas	No Important Bird Areas are falling in the 10-km radius area for Migratory Bird Habitat	ENVIS Centre on Wildlife & Protected Areas, Important Bird Area in India, IBA Book (Birdlife International)	Nil
	Ramsar site	No Ramsar sites present in the surrounding area region	Ramsar Web site	Nil
	Wetlands of National Importance	Nil	ENVIS Centre on Wildlife & Protected Areas, Wetlands directory of Government of India	Nil
	Wetlands of International Importance	Nil	Nil	Nil
	Wildlife Corridors	No Wildlife Corridor is falling in 10 km radius project study area	Protected Areas, Consultation with local naturalists & authenticated location map.	Nil
	Eco-sensitive zone identified by the government	No Eco-sensitive zone is falling 10 km radius project study area	ENVIS, Consultation with local naturalists & authenticated location map	Nil
	Forest Areas	No Reserve Forest is falling in 10 km radius project study area	ENVIS, Government of Tamil Nadu protected area website, Google Earth, Project Maps, etc.	NIL, Applicant will create the green belt plantation on the

				periphery of mine sites.
	Water bodies	Nil	Project Map and local maps, Google Earth	Ensure minimum destruction during in operation phase.
	Breeding/nesting areas	No breeding/Nesting site are falling in the study area	Literature Survey Project Map and local maps, Google Earth	NIL

TABLE 4.14: GREENBELT DEVELOPMENT PLAN

No. of trees proposed to be planted	Area to be covered	Name of the species
615	Near 7.5m safety distance, panchayat road and village road	Neem, Iluppai, Marudhu, Poovarasu, Eati, Mahagani, Magilam etc.,

After complete extraction of mineral, the excavated pits will be allowed to collect rainwater and seepage water to serve as a reservoir to charge the nearby wells. Fish culture will also be attempted. A bund will be constructed around the pits. In order to minimize the impact of mining on the vegetation outside the mine lease area, it is recommended that adequate protection measures must be implemented. As mining involves movement of vehicles and increased anthropogenic activities, some of the areas can be fenced by involving local people and educating them about increased benefits of such activities.

4.6 Socio Economic

4.6.1 Anticipated Impact from Proposed Project

- Dust generation from mining activity can have negative impact on the health of the workers and people in the nearby area.
- Approach roads can be damaged by the movement of tippers
- Increase in Employment opportunities both direct and indirect thereby increasing economic status of people of the region

4.6.2 Mitigation Measures for Proposed Project

- The area is already broken up and the surrounding areas are depending upon quarries. The surrounding units are grinder manufacturing units and crusher units depending upon the project hence this project will give a positive impact on the surroundings
- 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

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 tipplers 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, Spiro metric tests
- Periodic medical examination – yearly
- Lung function test – yearly, those who are exposed to dust
- Eye test

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

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

4.8 *Mine Waste Management*

No waste is anticipated from this project site.

4.9 *Mine Closure*

Mine closure plan is the most important environmental requirement in mining projects. The 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.

It is a Rough stone quarry project after completion of quarrying operation this land will be facilitate to store the rainwater hence forth the pit will act as temporary reservoir to supply the water during the drought seasons.

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

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

4.9.1 Mine Closure Criteria

The criteria involved in mine closure are discussed below:

4.9.1.1 Physical Stability

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

4.9.1.2 Chemical Stability

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

4.9.1.3 Biological Stability

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

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

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

The Mine closure plan should be as per the approved 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. During the scoping process, alternatives to a proposal can be considered or refined, either directly or by reference to the key issues identified. A comparison of alternatives helps to determine the best method of achieving the project objectives with minimum environmental impacts or indicates the most environmentally friendly and cost-effective options.

5.1 FACTORS BEHIND THE SELECTION OF PROJECT SITE

Tmt. M.Saraswathi Rough Stone and Gravel Quarry Project at Sivanmalai Village is a mining project for excavation of Rough Stone, which is site specific. All the proposed mining lease areas have 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 in the applied mine lease areas.
- Availability of skilled, semi-skilled and unskilled workers in this region.
- All the basic amenities such as medical, firefighting, education, transportation, communication and infrastructural facilities are 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

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

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 in the area. All the applied mining lease areas have following advantages –

- As the mineral deposition is homogeneous and batholith formation, therefore opencast method of working is preferred over underground method
- The material will be loaded 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 these projects. 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

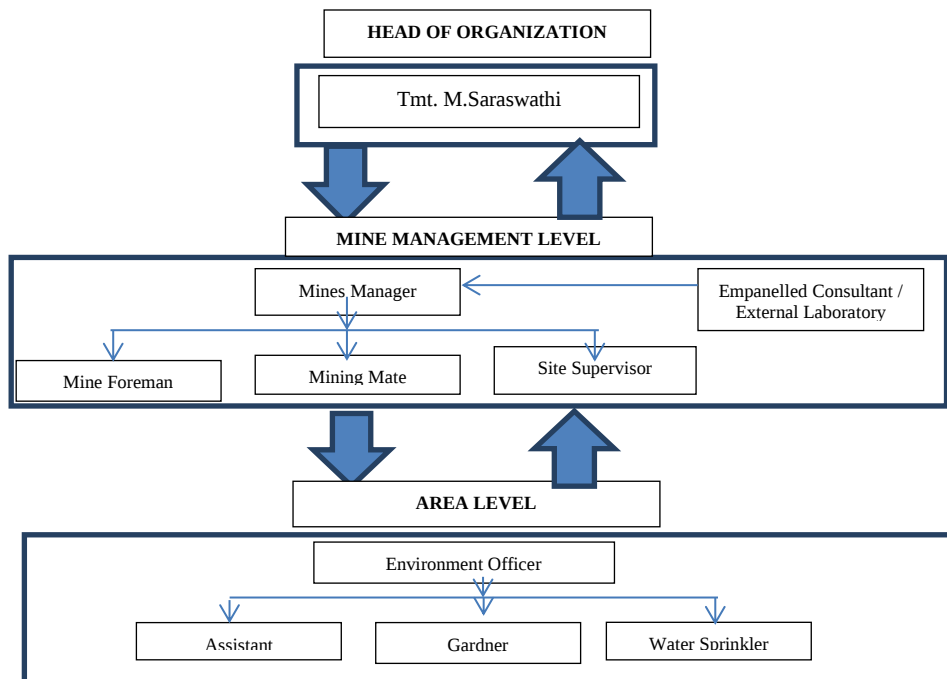
Environmental Monitoring will be taken up for various environmental components as per conditions stipulated in Environmental Clearance Letter issued by MoEF & Consent to Operate issued by the State Pollution Control Board. Monitoring reports will be submitted to regulator as per statutory requirements. 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 proponent. 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 Environment 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 proponents in the proposed quarries are 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 two proposed quarries in cluster for the mining plan period is Rs 7,60,000/-

TABLE 6.3 ENVIRONMENT MONITORING BUDGET

Parameter	EMP Cost
Air Quality, Meteorology, Water Quality, Hydrology, Soil Quality, Noise Quality, Vibration Study Greenbelt	Rs.3,80,000/-
Total	Rs. 3,80,000/-

Source: Approved Mining Plan

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. 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
- Cluster Management Committee

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 7.3 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 While reversal & overtaking of vehicle Operator of truck leaving his cabin when it is loaded.	▪ Before commencing work, drivers personally check the dumper/truck/tipper for oil(s), fuel and water levels, tyre inflation, general cleanliness and inspect the brakes, steering system, warning devices including automatically operated audio-visual reversing alarm, rear view mirrors, side indicator lights etc., are in good condition. ▪ Not allow any unauthorized person to ride on the vehicle nor allow any unauthorized person to operate the vehicle. ▪ Concave mirrors should be kept at all corners.

			▪ All vehicles should be fitted with reverse horn with one spotter at every tipping point. ▪ Loading according to the vehicle capacity ▪ Periodical maintenance of vehicles as per operator manual
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

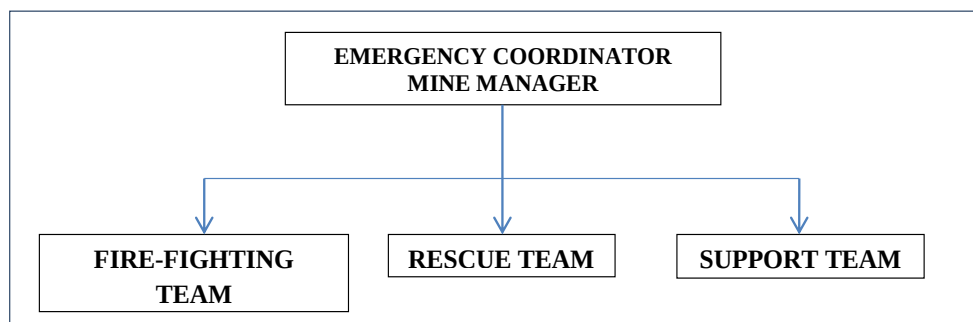
Natural disasters like Earthquake, Landslides has not been recorded in the past history as the terrain is categorized under seismic zone III. The area is far away from the sea hence the disaster due to heavy floods and tsunamis are not anticipated. The Disaster Management Plan is aimed to ensure safety 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 7.4: 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
- Firefighting 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

There are One (1) proposed and three (3) existing quarries, 1 abandoned & expired quarry falls in the cluster. The list of quarries is as below –

TABLE 7.5: LIST OF QUARRIES WITHIN 500 METER RADIUS FROM THIS PROPOSAL

–PROPOSED QUARRIES				
CODE	Name of the Proponent and Address	S.F. Nos & Village	Extent in Ha	Status
P1	Thiru. M. Saraswathi W/o. Hariharasudhan, No.9, New Ramakrishnapuram main Road, Tiruppur District, Tamil Nadu – 641 607.	1284/2 (Part) & 1284/4 Sivanmalai Village,	2.13.0	Obtained ToR vide, File No.11251 TOR Identification No. TO24B0108TN5962901N Dated: 29.11.2024
P2	Thiru. C. Ramji	1286/1 (Part)	1.95.0	Applied for Quarry Lease
Total			4.08.0	
EXISTING QUARRIES				
CODE	Name of the Proponent and Address	S.F.Nos	Extent in Ha	Lease Period
E-1	Thiru.K.Murugasamy	1258(Part)	1.96.0	19.04.2023 – 18.04.2028
E-2	Thiru.V.Maruthachalam	1259/3	2.02.5	19.04.2023 – 18.04.2028
Total			3.98.5 Ha	
ABANDONED/EXPIRED QURRIES				
CODE	Name of the Proponent and Address	S.F. Nos	Extent in Ha	Lease Period
EX-1	Thiru.S.M.Palanisamy	1259/1	1.95.5	08.02.2008 – 07.02.2013
Total			1.95.5	
*TOTAL CLUSTER EXTENT			8.06.5 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”

TABLE 7.6: SALIENT FEATURES OF THE PROPOSAL “P1”

Name of the Quarry	Tmt. M. Saraswathi Rough stone and Gravel quarry	
Land Ownership	It is a Patta land,registered in the name of applicant Tmt. M. Saraswathi	
Land classification	It is a Patta Land (Barren Land)	
SF No & Area (Ha)	1284/2 (Part) & 1284/4	
Village, Taluk & District	Sivanmalai Village, Kangeyam Taluk & Tiruppur District.	
Toposheet No	58E/12	
Latitude between	11°00'59.6649"N to 11°05.12058 "N	
Longitude between	77°30'31.74788"E to 77°38.36491 "E	
Highest Elevation	339m AMSL	
Proposed Depth of Mining	42m (2m Gravel + 40m Rough Stone) below the ground level	
Geological Resources	Rough Stone in m ³	Gravel m ³
	6,38,479	5,122m³
Mineable Reserves	Rough Stone in m ³	Gravel m ³
	1,39,732	-
Year wise Production for five Years	Rough Stone in m ³	Gravel m ³
	1,39,732	-
Ultimate Pit Dimension	174m (L) X 128m (W) X 42m BGL (D)	
Water Level in the surrounds area	58-62 m bgl	

Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits Flat terrain. The area has gentle sloping towards Southeastern side. The altitude of the area is 339m (max) above Mean Sea level. The area is covered by 2m thickness of Gravel formation. Massive Charnockite which is clearly inferred from the existing quarry pits.	
Machinery proposed	Jack Hammer	4 Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	1 No
	Tipper	3 Nos
	Water Sprinkler	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	27 Nos	
Project Cost	Rs. 66,12,000/-	
EMP cost	Rs. 3,80,000/-	
CER Cost	Rs. 5,00,000/-	
Nearby Water Bodies	Canal	280m East
	PAP Vaikkal	310m South
	Canal	470m NW
	Noyyal River	9.8km North
Greenbelt Development Plan	It is proposed to plant 1,065 Nos of trees in the safety barrier and village road.	
Proposed Water Requirement	2.0 KLD	
Nearest Habitation	710m – West	

Source: Approved Mining Plan of the respective proposals

TABLE 7.6: SALIENT FEATURES OF THE EXISTING “E1” & “E2”

PARTICULARS	DETAILS		
	Rough Stone (5Year Plan period)	Weathered Gravel (3 Years Plan period)	Gravel (3 Years Plan period)
PROPOSAL – E1			
Geological Resources in m3	3,88,000 m3	38,800 m3	38,800 m3
Mineable Reserves in m3	1,81,860 m3	26,676 m3	29,736 m3
Mining Plan Period	5 Years		
Number of Working Days	300 Days		
Production per day in m3	121	30	33
No of Lorry loads (6m3 per load)	21	5	6
Total Depth of Mining	24m below ground level (2m Gravel + 2m Weathered Gravel + 20m Rough stone)		
PROPOSAL – E2			
Geological Resources in m3	5,72,475 m3	15,726 m3	15,544 m3
Mineable Reserves in m3	1,78,250 m3	10,500 m3	11,100 m3
Mining Plan Period	5 Years		
Number of Working Days	300 Days		
Production per day in m3	119	12	12
No of Lorry loads (6 m3 per load)	20	2	2
Total Depth of Mining	24m below ground level (2m Gravel + 2m Weathered Gravel + 20m Rough stone)		

The Cumulative Impact is mainly anticipated due to drilling & blasting, excavation and transportation activities in all the quarries (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 7.7 CUMULATIVE PRODUCTION LOAD OF ROUGH STONE IN CLUSTER

Quarry	Production for five-year plan period	Per Year Production in m ³	Per Day Production in m ³	Number of Lorry Load Per Day @ 12m ³ per load
P1	1,39,732	27,946	93	8
E-1	1,81,860	36,372	121	10
E-2	1,78,250	35,650	118	10
G.Total	12,34,315	99,968	332	28

TABLE 7.8: CUMULATIVE PRODUCTION OF GRAVEL IN CLUSTER

Quarry	Mineable Reserves in m ³	Per Year Production in m ³	Per Day in m ³	Number of Lorry Load @ 12m ³ per load
P1	-	-	-	-
E-1	29,736	9,912	33	3
E-2	11100	3,700	12	1
G.Total	40,836	13,612	55	4

Source: Approved Mining plans of the respective projects (Blue color shade is Proposed quarry)

Based on the above production quantities the emissions due to various activities in all the 3-proposal quarry 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 7.9: EMISSION ESTIMATION FROM CLUSTER

EMISSION ESTIMATION FOR QUARRY “P1”- Thiru.M.Saraswati				
Estimated Emission Rate for PM ₁₀	Activity	Source type	Value	Unit
	Drilling	Point Source	0.074883118	g/s
	Blasting	Point Source	0.000569553	g/s
	Mineral Loading	Point Source	0.039868170	g/s
	Haul Road	Line Source	0.002487465	g/s/m
	Overall Mine	Area Source	0.052570929	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.000376325	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000017926	g/s
EMISSION ESTIMATION FOR QUARRY “E1”- Thiru.K.Murugasamy				
Estimated Emission Rate for PM ₁₀	Activity	Source type	Value	Unit
	Drilling	Point Source	0.099787263	g/s
	Blasting	Point Source	0.002393258	g/s
	Mineral Loading	Point Source	0.044125525	g/s
	Haul Road	Line Source	0.002496795	g/s/m
	Overall Mine	Area Source	0.059623444	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.001025737	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000061218	g/s
EMISSION ESTIMATION FOR QUARRY “E2”- Thiru.V.Maruthachalam				
Estimated Emission Rate for PM ₁₀	Activity	Source type	Value	Unit
	Drilling	Point Source	0.076102211	g/s
	Blasting	Point Source	0.000617441	g/s
	Mineral Loading	Point Source	0.040525067	g/s
	Haul Road	Line Source	0.002488405	g/s/m
	Overall Mine	Area Source	0.049523445	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.000426245	g/s

Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000017618	g/s
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Source: Emission Formula

TABLE 7.10: INCREMENTAL & RESULTANT GLC WITHIN CLUSTER

PM ₁₀ in µg/m ³	
Location	AAQ1 – CORE
Background (average)	43.0
Highest Incremental	13.70
Resultant	56.70
NAAQ Norms	100 µg/m ³
PM _{2.5} in µg/m ³	
Background (average)	20
Highest Incremental	6.90
Resultant	26.90
NAAQ Norms	60 µg/m ³
SO ₂ in µg/m ³	
Location	AAQ1 – CORE
Background (average)	5.2
Highest Incremental	1.39
Resultant	6.59
NAAQ Norms	80 µg/m ³
NO _x in µg/m ³	
Location	AAQ1 – CORE
Background (average)	20.2
Incremental	9.48
Resultant	29.68
NAAQ Norms	80 µg/m ³

Noise Environment –

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

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

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

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.

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

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 7.11: PREDICTED NOISE INCREMENTAL VALUES FROM MINES

Location ID	N1	N2	N3	N4	N5	N6	N7
Maximum Monitored Value (Day) dB(A)	43.1	40.4	37.9	38.3	37.5	43.1	42.5
Incremental Value dB(A)	47.30	48.12	32.14	27.43	24.25	26.48	23.84
Total Predicted Noise level dB(A)	46.30	46.19	40.99	39.33	38.43	44.29	43.03
NAAQ Standards	Industrial Residential		Day Time- 75 dB (A) Day Time- 55 dB (A)		Night Time- 70 dB (A) Night Time- 45 dB (A)		

Source: Lab Monitoring Data

The incremental noise level is found within the range of 23.84 to 48.12 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 3-proposal quarry 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 the all the 3 proposal quarries is blasting. The major impact of the ground vibrations is observed on the domestic houses located in the villages nearby the mine lease area. The kuchha houses are more prone to cracks and damage due to the vibrations induced by blasting whereas RCC framed structures can withstand more ground vibrations. Apart from this, the ground vibrations may develop a fear factor in the nearby settlements.

Another impact due to blasting activities is fly rocks. These may fall on the houses or agricultural fields nearby the mining areas and may cause injury to persons or damage to the structures. Nearest Habitations from 8mines respectively are as in below Table 7.9

TABLE 7.12: NEAREST HABITATION FROM EACH MINE

Location ID	Distance in Meters
Habitation Near P1	710m-W
Habitation Near E1	805m-W
Habitation Near E2	875m-W

Source: Satellite Imagery and Field Data

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 4 MINES

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	20	710m-W	0.262
E1	20	805m-W	0.297
E2	20	875m-W	0.260

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

TABLE 7.14: SOCIO ECONOMIC BENEFITS FROM 4 MINES

Location Code	Employment	Project Cost	CER
P1	27	₹ 66,12,000/-	₹ 3,00,000/-
E1	25	₹ 41,01,000	₹ 82,000
E2	25	₹ 42,33,000	₹ 85,000
Total	77	₹ 1,49,46,000/-	₹ 4,67,000/-

A total of 77 people will get employment due to this Proposal in cluster. Allocation for Corporate Environment Responsibility (CER) shall be made as per Government of India, MoEF & CC Office Memorandum F.No.22-65/2017-IA.III, Dated: 01.05.2018 by all the mines.

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

- Proposed project shall fund towards CER – **Rs 3,00,000/-**
- Existing Quarry CER Cost-**Rs.1,67,000/-**

TABLE 7.15: GREENBELT DEVELOPMENT BENEFITS FROM 4 MINES

Code	No. of trees proposed to be planted	Area to be covered	Name of the species
P1	615	Near 7.5m safety distance, panchayat road and village road	Neem, Iluppai, Marudhu, Poovarasu, Eati, Mahagani, Magilam, etc.,
E1	375		
E2	425		
Total	1415		

Based on the Proposed Mining Plans it's anticipated that there shall growth of native species of Neem, Iluppai, Marudhu, Poovarasu, Eati, etc in the Cluster at a rate of 500 trees per ha is proposed to plant with Survival Rate of 100 %.

7.5 PLASTIC WASTE MANAGEMENT PLAN

All the Project Proponent shall comply with Tamil Nadu Government Order (Ms) No. 84 Environment and Forest (EC.2) Department Dated: 25.06.2018 regarding ban on one time use and throw away plastics irrespective of thickness with effect from 01.01.2019 under Environment (Protection) Act, 1986.

Objective –

- To investigate the actual supply chain network of plastic waste.
- To identify and propose a sustainable plastic waste management by installing bins for collection of recyclables with all the plastic waste
- Preparation of a system design layout, and necessary modalities for implementation and monitoring.

TABLE 7.16: ACTION PLAN TO MANAGE PLASTIC WASTE

Sl. No.	Activity	Responsibility
1	Framing of Layout Design by incorporating provision of the Rules, user fee to be charged from waste generators for plastic waste management, penalties/fines for littering, burning plastic waste or committing any other acts of public nuisance	Mines Manager
2	Enforcing waste generators to practice segregation of bio-degradable, recyclable and domestic hazardous waste	Mines Manager
3	Collection of plastic waste	Mines Foreman

4	Setting up of Material Recovery Facilities	Mines Manager
5	Segregation of Recyclable and Non-Recyclable plastic waste at Material Recovery Facilities	Mines Foreman
6	Channelization of Recyclable Plastic Waste to registered recyclers	Mines Foreman
7	Channelization of Non-Recyclable Plastic Waste for use either in Cement kilns, in Road Construction	Mines Foreman
8	Creating awareness among all the stakeholders about their responsibility	Mines Manager
9	Surprise checking's of littering, open burning of plastic waste or committing any other acts of public nuisance	Mine Owner

Source: Proposed by FAE's and EC

7.6 Cluster Management Committee

The cluster management committee is proposed to form including of 2 Proposed quarry and 2 existing quarries total extent of the cluster is 8.06.50 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

STANDARD OPERATING PROCEDURE FOR MORATTUPALAYAM 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

8.0 General

The Proposed Project for Quarrying Rough Stone and Gravel at Sivanmalai Village aims to produce cumulatively 1,39,782m³ Rough Stone over a period of 5 Years. This will enhance the socio-economic activities in the adjoining areas and will result in the following benefits

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



8.1 Employment Potential

It is proposed to provide employment to about 27 persons for carrying out mining operations and give preference to the local people in providing employment. In addition, there will be opportunity for indirect employment to many people in the form of contractual jobs, business opportunities, service facilities etc. the economic status of the local people will be enhanced due to mining project.

8.2 Socio-Economic Welfare Measures Proposed

The impact of mining activity in the area will be more positive 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.

8.3 Improvement in Physical Infrastructure

The proposed project site is located in Sivanmalai Village, Kangeyam Taluk, Tiruppur District of Tamil Nadu and area have communications, roads and other facilities already well established. The following physical infrastructure facilities will further improve due to the project.

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

8.4 Improvement in Social Infrastructure

The quarry projects 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 quarries 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.

8.5 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

CSR Cost Estimation

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

CORPORATE ENVIRONMENT RESPONSIBILITY–

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

As per para 6 (II) of the office memorandum, all the mines being a green field project & Capital Investment is ≤ 100 crores, they shall contribute 2% of Capital Investment towards CER as per directions of EAC/SEAC and the total CER amount from the proposed mines is Rs. 3,00,000/-.

The Project Proponent Tmt. M.Saraswathi, agreed to spend Rs 3,00,000/- for the CER Activity to Government High School, Sivanmalai Village, Kangeyam Taluk, Tiruppur District

TABLE 8.1 CER – ACTION PLAN

Activities to the Government school	Cost
• Renovation of Existing toilets • Providing Environmental related books to the school library • Carrying out plantation in school ground • Construction of an auditorium with stage	Rs 3,00,000/-
Total	Rs. 3,00,000/-

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.M.Saraswathi** 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, Inhibition 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 fuelling 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 topsoil in this project, it is an existing quarry covered with Gravel formation of 2m thickness.

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 42 m BGL, the water table in the area is 58-62m 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.

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) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Preventive maintenance of mining machinery and replacement of worn-out accessories to control noise generation	Mines Foreman
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Mines Manager
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Mining Mate
Provision of effective silencers for mining machinery and transport vehicles	Mines Manager
Provision of sound proof AC operator cabins to HEMM	Mines Manager
Sharp drill bits are used to minimize noise from drilling	Mines Foreman
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring shall be carried out in the project area and in surrounding villages to assess 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 1000 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier of applied mine lease area. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

TABLE 10.7 PROPOSED GREENBELT ACTIVITIES FOR 5 YEAR PLAN PERIOD

Year	No. of trees proposed to be planted	Area to be covered	Name of the species
I	1000	Near 7.5m safety distance, panchayat road and village road	Neem, Iluppai, Marudhu, Poovarasu, Eati, Mahagani, Magilam 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	Importance
1.	Azadirachta indica	Neem, Vembu	Neem oil & neem products
2.	Tamarindus indica	Tamarind	Edible & Medicinal and other Uses
3.	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree
4.	Borassus Flabellifer	Palmyra Palm	Tall Wind breaker tree and its fruits are edible

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 quarries are fugitive dust and noise. Safety of employees during quarrying operation and maintenance of mining equipment will be taken care as per Mines Act 1952 and Rule 29 of Mines Rules 1955. To avoid any adverse effect on the health of workers due to dust, noise and vibration sufficient measures have been provided.

10.9.1 Medical Surveillance and Examinations –

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

The health status of workers in the mine shall be regularly monitored under an occupational surveillance program. Under this program, all the employees are subjected to a 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 per annum
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
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.,)		5000	20000

		Provision for domestic waste collection and disposal through authorized agency		
		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 & DGMS Condition	Size 6' X 5' with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	Fixed Display Board at the Quarry Entrance as permanent structure mentioning Environmental Conditions	10000	1000
	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	300000	0
TOTAL			5,65,000	3,03,000

In order to implement the environmental protection measures, an amount of Rs5.65 lakhs as capital cost and recurring cost as Rs. 3.03 lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project.

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.M. Saraswathi Rough Stone and Gravel Quarry (Extent: **2.13.0** 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 final EIA/ EMP Report is prepared for public and other stakeholders' suggestions and a Final EIA/ EMP Report is prepared based on the outcome of Public Consultation.

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 quarries 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 March to May 2025 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 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 & Gravel as per market demand.

Sustainable and modern mining leads us to see positive impact of mining operation and providing consistent employment for nearly 27people directly in the cluster and indirectly around 50 people.

As discussed, it is safe to say that the proposed quarries are 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 the Tmt. M.Saraswathi Rough Stone and Gravel Quarry (Extent: **2.13.0**ha).

CHAPTER 12.0: DISCLOSURE OF CONSULTANTS

The Project Proponent Tmt. M.Saraswathi 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	A	WP GEO SC	B A A
2	Dr. P. Thangaraju	In-house	-	-	HG GEO	A A
3	Mr. A. Jagannathan	In-house	-	-	AP NV SHW	B A B
4	Mr. N. Senthilkumar	Empanelled	38 28	B B	AQ WP RH	B B A
5	Mrs. Jisha parameswaran	In-house	-	-	SW	B
6	Mr. Govindasamy	In-house	-	-	WP	B
7	Mrs. K. Anitha	In-house	-	-	SE	A
8	Mrs. Amirtham	In-house	-	-	EB	B
9	Mr. Alagappa Moses	Empanelled	-	-	EB	A
10	Mr. A. Allimuthu	In-house	-	-	LU	B
11	Mr. S. Pavel	Empanelled	-	-	RH	B
12	Mr. J. R. Vikram Krishna	Empanelled	-	-	SHW RH	A A
Abbreviations						
EC	EIA Coordinator					
AEC	Associate EIA Coordinator					
FAE	Functional Area Expert					
FAA	Functional Area Associates					
TM	Team Member					
GEO	Geology					
WP	Water pollution monitoring, prevention and control					
AP	Air pollution monitoring, prevention and control					
LU	Land Use					
AQ	Meteorology, air quality modeling, and prediction					
EB	Ecology and bio-diversity					
NV	Noise and vibration					
SE	Socio economics					
HG	Hydrology, ground water and water conservation					
SC	Soil conservation					
RH	Risk assessment and hazard management					
SHW	Solid and hazardous wastes					
MSW	Municipal Solid Wastes					
ISW	Industrial Solid Wastes					
HW	Hazardous Wastes					

DECLARATION BY EXPERTS CONTRIBUTING TO THE EIA/EMP

Declaration by experts contributing to the EIA/EMP for Tmt. M.Saraswathi Rough Stone & Gravel Quarry over an Extent of **2.13.0** ha in Sivanmalai Village, Kangeyam Taluk, Tiruppur District of Tamil Nadu. It is also certified that information furnished in the above EIA study are true and correct to the best of our knowledge.

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

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

Designation: **EIA Coordinator**

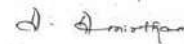
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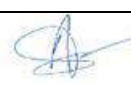
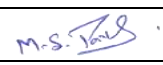
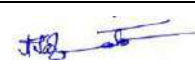
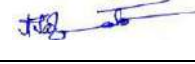
Period of Involvement: **January 2022 to till date**

Associated Team Member with EIA Coordinator:

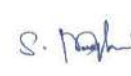
1. **Mr. Viswanathan**
2. **Mr. Santhoshkumar**
3. **Mr. S. Ilavarasan**

FUNCTIONAL AREA EXPERTS ENGAGED IN THE PROJECT

Sl. No.	Functional Area	Involvement	Name of the Expert/s	Signature
1	AP	- Identification of different sources of air pollution due to the proposed mine activity - Prediction of air pollution and propose mitigation measures / control measures	Mr. A. Jagannathan	
2	WP	- Suggesting water treatment systems, drainage facilities - Evaluating probable impacts of effluent/waste water discharges into the receiving environment/water bodies and suggesting control measures.	Dr. M. Ifthikhar Ahmed	
			Mr. N. Senthilkumar	
3	HG	- Interpretation of ground water table and predict impact and propose mitigation measures. - Analysis and description of aquifer Characteristics	Dr. P. Thangaraju	
4	GEO	- Field Survey for assessing the regional and local geology of the area. - Preparation of mineral and geological maps. - Geology and Geo morphological analysis/description and Stratigraphy/Lithology.	Dr. M. Ifthikhar Ahmed	
			Dr. P. Thangaraju	
5	SE	- Revision in secondary data as per Census of India, 2011. - Impact Assessment & Preventive Management Plan - Corporate Environment Responsibility.	Mrs. K. Anitha	
6	EB	- Collection of Baseline data of Flora and Fauna. - Identification of species labelled as Rare, Endangered and threatened as per IUCN list.	Mrs. Amirtham	

		- Impact of the project on flora and fauna. - Suggesting species for greenbelt development.	Mr. Alagappa Moses	
7	RH	- Identification of hazards and hazardous substances - Risks and consequences analysis - Vulnerability assessment - Preparation of Emergency Preparedness Plan - Management plan for safety.	Mr. N. Senthilkumar	
			Mr. S. Pavel	
			Mr. J. R. Vikram Krishna	
8	LU	- Construction of Land use Map - Impact of project on surrounding land use - Suggesting post closure sustainable land use and mitigative measures.	Mr. A. Allimuthu	
9	NV	- Identify impacts due to noise and vibrations - Suggesting appropriate mitigation measures for EMP.	Mr. A. Jagannathan	
10	AQ	- Identifying different source of emissions and propose predictions of incremental GLC using AERMOD. - Recommending mitigations measures for EMP	Mr. N. Senthilkumar	
11	SC	Assessing the impact on soil environment and proposed mitigation measures for soil conservation	Dr. M. Ifthikhar Ahmed	
12	SHW	- Identify source of generation of non-hazardous solid waste and hazardous waste. - Suggesting measures for minimization of generation of waste and how it can be reused or recycled.	Mr. A. Jagannathan	
			Mr. J. R. Vikram Krishna	

LIST OF TEAM MEMBERS ENGAGED IN THIS PROJECT

Sl.No.	Name	Functional Area	Involvement	Signature
1	Mr. S. Nagamani	AP; GEO; AQ	- Site Visit with FAE - Provide inputs & Assisting FAE with sources of Air Pollution, its impact and suggest control measures - Provide inputs on Geological Aspects - Analyse & provide inputs and assist FAE with meteorological data, emission estimation, AERMOD modelling and suggesting control measures	
2	Mr. Viswanathan	AP; WP; LU	- Site Visit with FAE - Provide inputs & Assisting FAE with sources of Air Pollution, its impact and suggest control measures - Assisting FAE on sources of water pollution, its impacts and suggest control measures - Assisting FAE in preparation of land use maps	
3	Mr. Santhoshkumar	GEO; SC	- Site Visit with FAE - Provide inputs on Geological Aspects - Assist in Resources & Reserve Calculation and preparation of Production Plan & Conceptual Plan - Provide inputs & Assisting FAE with soil conservation methods and identifying impacts	
4	Mr. Umamahesvaran	GEO	- Site Visit with FAE - Provide inputs on Geological Aspects - Assist in Resources & Reserve Calculation and preparation of Production Plan & Conceptual Plan	

5	Mr. A. Allimuthu	SE	- Site Visit with FAE - Assist FAE with collection of data's - Provide inputs by analysing primary and secondary data	<i>A. Allimuthu</i>
6	Mr. S. Ilavarasan	LU; SC	- Site Visit with FAE - Assisting FAE in preparation of land use maps - Provide inputs & Assisting FAE with soil conservation methods and identifying impacts	<i>S. Ilavarasan</i>
7	Mr. E. Vadivel	HG	- Site Visit with FAE - Assist FAE & provide inputs on aquifer characteristics, ground water level/table - Assist with methods of ground water recharge and conduct pump test, flow rate	<i>E. Vadivel</i>
8	Mr. D. Dinesh	NV	- Site Visit with FAE - Assist FAE and provide inputs on impacts due to proposed mine activity and suggest mitigation measures - Assist FAE with prediction modelling	<i>D. Dinesh</i>
9	Mr. Panneer Selvam	EB	- Site Visit with FAE - Assist FAE with collection of baseline data - Provide inputs and assist with labelling of Flora and Fauna	<i>P. Panneer Selvam</i>
10	Mrs. Nathiya	EB	- Site Visit with FAE - Assist FAE with collection of baseline data - Provide inputs and assist with labelling of Flora and Fauna	<i>T. Nathiya</i>

DECLARATION BY THE HEAD OF THE ACCREDITED CONSULTANT ORGANIZATION

I, Dr. M. Ifthikhar Ahmed, Managing Partner, Geo Exploration and Mining Solutions, hereby, confirm that the above-mentioned Functional Area Experts and Team Members prepared the Draft EIA/EMP for Tmt. M.Saraswathi Rough Stone & Gravel Quarry over an Extent of **2.13.0** ha in Sivanmalai Village, Kangeyam Taluk, Tiruppur 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/2225/RA 0276 Dated: 20-2-2023

Validity:

Valid till 06.08.2025