

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 – CLUSTER – NON-FOREST LAND
CLUSTER EXTENT = 6.81.20 ha (1 Proposed + 1 Existing Quarry)
**M/S. VISHNUSURYA PROJECTS AND INFRA LIMITED ROUGH STONE &
GRAVEL QUARRY**

Project Proponent	Proposed Project	Extent
M/s. Vishnusurya Projects and Infra Limited, Authorised Signatory - Thiru S. Viswanathan Temple Towers, IInd Floor, No. 76, North Mada Street, Mylaore, Chennai District, Tamil Nadu State – 600 004	S.F.Nos: 16/3B, 16/4, 16/5A, 16/5B, 16/6A, 16/6B & 16C Mosavadi Village, Vandavasi Taluk, Tiruvannamalai District, Tamil Nadu State	4.95.20 ha

ToR obtained vide
Identification No. TO24B0108TN5252542N Dated:01.03.2025

Environmental Consultant GEO EXPLORATION AND MINING SOLUTIONS Old No. 260-B, New No. 17, Advaita Ashram Road, Alagapuram, Salem – 636 004, Tamil Nadu, India  Accredited for sector 1 Category ‘A’, 31 Category ‘B’ & 38 Category ‘B’ Certificate No : NABET/EIA/2225/RA 0276 Dated: 06.08.2025 Phone: 0427-2431989, Email: ifthiahmed@gmail.com, geothagam@gmail.com Web: www.gemssalem.com	  Laboratory GLOBAL LAB AND CONSULTANCY SERVICES Approved by ISO:9001:2015, NABL, FSSAI, Experts in QHSE S.F No:92/3A2, Geetha Nagar, Alagapuram Pudur, Salem-636016.
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BASELINE MONITORING PERIOD - March 2025 to May 2025

PROJECT DETAILS

Proposed Quantity	:	6,95,325m ³ of Rough Stone & 4,050m ³ of Gravel
Proposed Depth	:	83m bgl
Total Project Cost	:	Rs.1,29,50,000/-

JUNE 2025

For easy representation of Proposed and Existing Quarries in the Cluster are given unique codes and identifies and studied in this EIA EMP Report.

*PROPOSED QUARRIES					
CODE	Name of the Owner	S.F. Nos	Extent	Status	Remarks
P1	M/s. Vishnusurya Projects and Infra Ltd.,	16/3B, 16/4, 16/5A, 16/5B, 16/6A, 16/6B & 16/6C	4.95.2	Tor Identification No:TO24B0108TN5252542N Dated: 01.03.2025	
Total			4.95.2 ha		
*EXISTING QUARRIES					
CODE	Name of the Owner	S.F. No	Extent	Status	Remarks
E-1	M/s. Vishnusurya Projects and Infra Ltd.,	16/3B, 16/4, 16/5A, 16/5B, 16/6A, 16/6B & 16/6C	4.95.2 ha	31.01.2020 to 30.01.2025	-
E-2	Thiru.G.Mathiyazhagan	Septankulam 394/2, 393/5 & 393/6	1.86.0 ha	02.12.2021 to 01.12.2031	Quarry in under operation
TOTAL			1.86.0 ha		
EXPIRED QUARRY					
CODE	Name of the Owner	S.F. No	Extent	Status	Remarks
Nil					
ABANDONED QUARRY					
Nil					
TOTAL CLUSTER EXTENT*			6.81.20 Ha		

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

TERMS OF REFERENCE (ToR) COMPLIANCE

M/s. Vishnusurya Projects and Infra Limited Rough Stone & Gravel Quarry

Lr.No. TO24B0108TN5252542N Dated: 01.03.2025

SEIAA SPECIFIC CONDITIONS		
1	The EMP should cover the detailed restoration plan for the site	The EMP has been prepared for the entire life of the mine and it is given in the Chapter No.10
2	The concerns of the public regarding the impact of mining activity on water bodies and agriculture shall be deliberated in detail during public hearing.	Noted and Agreed The concerns of the public hearing will be given in the Final EIA/EMP report.
SPECIFIC CONDITIONS		
1	A Cluster Management Committee (CMC) shall be constituted including all the mines in the cluster as Committee Members for the effective management of the mining operation in the cluster through systematic & scientific approach with appointment of statutory personnel, appropriate environmental monitoring, good maintenance of haul roads and village/panchayat roads, authorized blasting operation etc. The PP shall submit the following details in the form of an Affidavit during the EIA appraisal: (i) Copy of the agreement forming CMC. (ii) The Organisation chart of the Committee with defining the role of the members (iii) The 'Standard Operating Procedures' (SoP) executing the planned activities.	Cluster management committee has been formed with mutual agreement with the proponents including Existing and Proposed quarry at present are framed.
2	The Boundary pillars to be erected as per the mine rules and the evidence should be submitted along with the EIA report	Noted and agreed The boundary pillars will be erected in the boundaries and it will be submitted along with the Final EIA Appraisal.
3	Since waterbodies are situated nearby, the PP shall carry out the hydrogeological and hydrological study including the details of waterflow pattern to determine the impacts of the mining operation 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. 3
4	The project proponent shall submit a Certified Compliance Report (CCR) obtained from the RO, MoEF&CC, Chennai for the previous EC dated. 19.11.2019 and appropriate mitigating measures for the non-compliance items, if any	The Certified Compliance Report (CCR) Obtained vide EP/12.1/2024-25/SEIAA/174/TN/714 Dated:08.05.2025 and Non Compliance will be stated in the Final EIA Appraisal.
5	The details of enumeration of structures including schools, colleges, primary health centres should be submitted along with the EIA report	Noted and agreed It is detailed in the Chapter No.3
6	The structures within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m & upto 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 A structural study carried out by the Project Proponent within a 500-meter radius of the quarry, it is detailed in Chapter 3.
7	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 wire fencing around the quarry lease area and planted 500 indigenous tree species. The safety distance is maintained as per the conditions given in the precise area communication letter in the mining plan.

8	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.
9	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.
10	The PP shall carry out the comprehensive studies on the cumulative environmental impacts of the existing & proposed quarries which included drilling & blasting, loading & hauling on the surrounding village and structures	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.
11	For the safety of the persons employed in the quarry, the PP shall carry out the scientific studies to assess the slope stability of the existing quarry wall/ benches 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 Dept of Mining Engg., Anna University Chennai. A copy of such scientific study report shall be submitted with an action plan accommodating the inclusion of haul road accessibility by ensuring the slope stability of the working benches to be constructed and existing quarry wall	Noted and Agreed The Slope Stability report will be submitted in the Final EIA Appraisal.
12	The PP shall install the CCTV camera for the continuous surveillance of mining activity & furnish the photographic/videographic evidence along with the EIA report	Noted and Agreed

2.SEAC STANDARD CONDITIONS

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 illegal/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: M/s. Vishnusurya Projects and Infra Privated Limited • Previous Lease Period: 31.01.2020 to 30.01.2025, S.F. Nos 16/3B, 16/4, 16/5A, 16/5B, 16/6A, 16/6B & 16C • Proceeding No: Rc. No. 21/Kanimam/2019, Dated: 31.01.2020 • EC obtained vide Letter No SEIAA-TN/F.No.7036/1(a)/EC.No.4077/2019, Dated: 19.11.2019 • EC Granted Depth – 38m bgl • Existing Pit Dimension – 244m (L) X 177m (W) X 38m (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 & agreed. The PP obtained VAO Certificate regarding the location of habitations within 300m radius from the periphery of the site and enclosed with 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. III
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 Biodiversity study has been carried out by Functional Area Expert by the NABET accredited consultant. The detailed study is given 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.	Request to consider the secondary source data detailing the nearest reserve forest from Tamil Nadu Geographical Information System (TNGIS). The Nearest Reserve Forest Nambedu Reserve Forest 4km- NE
7	In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) 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.	Noted and agreed The Slope Stability report will be submitted in the Final EIA Appraisal.
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 The Slope Stability Plan will be submitted in the Final EIA Appraisal.
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 will submit affidavit stating that the blasting will be carried out under the supervision of Competent person along with the Final EIA Report
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. SEIAA-TN/F.No.7036/1(a)/EC.No.4077/2019, Dated: 19.11.2019
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: 31.01.2020 – 30.01.2025
14	Quantity 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-38m Actual Depth – 38m Name of the proponent; M/s. Vishnusurya Projects and Infra Limited Existing: 182m (L) X 135m (W) X 12m (D) Letter No EC: SEIAA-TN/F.No.7036/1(a)/EC.No.4077/2019, Dated: 19.11.2019
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 proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Noted and agreed Satellite imagery of the project area along with boundary coordinates is given in the Chapter No 2, Figure No.2.2, Page No.11. Geomorphology of the area is given in Chapter No 2, Figure No.2.10, Page No.23 Land use pattern of the project area is tabulated in the Chapter No.2. Table no 2.4, Pg.No.18
16	The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc.,	Noted and agreed. PP carried out the drone video survey and will be submitted during the appraisal while obtaining the EC.
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 The area has been fenced and plantation activities carried out within the project site.
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 The details of mineral reserves have been provided in Chapter No 1, Mineable reserves– 6,95,325 m ³ Peak Production – 1,83,625 m ³ Depth – 83m bgl
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 PP provided 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
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	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

	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.	the water bodies around the project area. Details are discussed under Chapter No. 3,
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 One Season (Pre-Monsoon) March – May 2025 as per CPCB Notification and MoEF & CC Guidelines. Details in 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 The Cumulative impact study due to mining operations is explained in chapter - 7
23	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	Noted and agreed
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
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.
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 Part of the working pit will be allowed to collect rain water during the spell of rain will be used for greenbelt development and dust suppression. The Mine Closure Plan is prepared for converting the excavated pit into rain water harvesting structure and serve as water reservoir for the project village during draught season.
28	Impact on local transport infrastructure due to the Project should be indicated.	Noted and agreed Transportation details mentioned in Chapter -2
29	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both	Noted and agreed Details of the trees in the buffer zone given in Chapter No.3&4

	within the mining lease applied area & 300m buffer zone and its management during mining activity.	
30	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific	Noted and agreed 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 Details are given in the Chapter No.3
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. 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 Noted & agreed. It is proposed to plant a 2480 nos of trees in the 7.5m safety barrier 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 and agreed No trees within the project site. it is proposed to plant 2480 Nos of Trees in the safety barrier and Village roads.
34	A Disaster Management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period	Noted and agreed Disaster management Plan details in Chapter-7
35	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period	Noted and agreed A Risk Assessment and management Plan Chapter- 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 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. Details of CER are discussed under Chapter 8
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 It is explained in Chapter -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.	Noted and agreed No, Litigation against the 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 Chapter-8 discussed about benefits of projects.
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 duly be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCCB.	Noted and agreed.
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 and agreed The EMP prepared for the life of the mine and discussed in chapter 10.
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.	Details in 7 salient features of quarry with existing quarry.
2	The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling, tree plantation, blasting etc..	Noted & agreed
3	The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines.	Noted & agreed
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.	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	Noted & agreed
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 & agreed
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 & agreed

8	The committee shall furnish the Emergency Management plan 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.	Details discussed in chapter 10.
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. f) Hydrothermal/Geothermal effect due to destruction in the Environment' g) Bio-geochemical processes and its foot prints including environmental stress' h) Sediment geochemistry in the surface steams.	Species Recommended for Plantation in chapter 3&10.
Agriculture & Agro-Biodiversity		
13	Impact on surrounding agricultural fields around the proposed mining Area.	Detailed discussed in chapter 4.
14	Impact on soil flora & vegetation around the project site.	Detailed discussed in chapter 4.
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.	Details in Chapter 2,3 and 7
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.	Details in Chapter 3
17	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	Noted & agreed
18	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands. Horticulture, Agriculture and livestock.	The project area is bounded by Barren land on all side.
Forest		
19	The project proponent shall detail study on impact of mining on Reserve forests free ranging wildlife.	Noted and agreed, there is no reserve forest and wildlife in the buffer zone.
20	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	Ecology and Biodiversity environment deals in Chapter-3
21	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	Ecology and Biodiversity environment deals in Chapter-3

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 ground water. Necessary data and documentation in this regard may be provided, covering the entire mine lease period.	Hydro-geological study considering the contour map of the water table detailing Chapter-3
24	Erosion Control measures.	Noted & Agreed
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.	Details in Chapter 2
26	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.	Details in Chapter 2 and 4 impact of bio diversity
27	The project proponent shall study and furnish the details on potential fragmentation impact on natural environment by the activities.	Noted & agreed
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.	Noted & agreed. Detailed under Chapter 3.
29	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil, physical, chemical components and microbial components.	Details in Chapter 3 soil environment.
30	The Environmental impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	Nearest agriculture activity is paddy plantation located West side of the project area. Proponent erected fencing in the previous lease period. The same will be reconstructed around the quarry pits
Energy		
31	The measures taken to control Noise. Air, Water. Dust Control and steps adopted to efficiently utilize the Energy shall be furnished.	Details in Chapter 3 environmental monitoring details.
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 other emission and climate mitigation activities.	Details of carbon emission and mitigation activities are given in the Chapter No.4
33	The Environmental impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	Details in Chapter-3 for meteorological and climate/weather data representation of graphs.
Mine Closure Plan		
34	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	Details in Chapter 2 mine closure plan
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 under 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.	Details in Green belt development in chapter 4
Risk Assessment		
37	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	Detailed under 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/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	Details study 7.3 Disaster Management Plan 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.	Noted & agreed. Detailed under Chapter 4
40	As per the MoEF& CC office memorandum tr.No.22-651201 7-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.	Noted and agreed
41	The project proponent shall study 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.	Details of carbon emission and mitigation activities are given in the Chapter No.4
STANDARD TERMS OF REFERENCE		
1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	Not applicable. The project is Not a violation category. This proposal falls under B1 Category (Cluster situation)
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	Document is enclosed along with Approved Mining Plan as Annexure Volume 1 for the respective projects.
3	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	Noted & agreed.
4	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an	Satellite imagery of the project area along with boundary co-ordinates is given in the Chapter No 1 Figure No .1.1

	Imagery of the 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 2.10. Land use pattern of the project area is tabulated in the Chapter No.2. Table No.2.3 Land use pattern of the Study area is tabulated in the Chapter No.3 Table No 3.2
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.	Map showing – Geology map of the project area covering 10km radius - Figure No. 2.11. Geomorphology of the area is given in Chapter No 2 Figure No 2.10.
6	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	The applied area was inspected by the officers of Department of Geology along with revenue officials and found that the land is fit for quarrying under the policy of State Government.
7	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	The proponent has framed their Environmental Policy and the same is discussed in the Chapter No 10.1.
8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	It is an opencast quarrying operation proposed to operate in Mechanized method. The rough stone formation is a hard, compact and homogeneous body. The height and width of the bench will be maintained as 5m with 90° bench angles. Quarrying activities will be carried out under the supervision of Competent Persons like Mines Manager, Mines Foreman and Mining Mate. Necessary permissions will be obtained from DGMS after obtaining Environmental Clearance.
9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc., should be for the life of the mine / lease period.	Noted & agreed. The study area considered for this study is 10 km radius and all data contained in the EIA report such as waste generation etc., is for the Life of the Mine / lease period.
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use and land cover of the study area is discussed in Chapter No. 3. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 2, Table No 2.3.
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. The proposed project area is a Patta land. Approved Mining Plan is enclosed as Annexure Volume 1.
13	Status of forestry clearance for the broken-up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	Not Applicable. The proposed project area does not involve any Forest Land.
14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not Applicable. The project doesn't attract Recognition of Forest Rights Act, 2006.
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	No Reserve Forest within the Study Area.
16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	Not Applicable. There are No National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km Radius from the periphery of the project area.
17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 KM of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished	Not Applicable. There are No National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km Radius from the periphery of the project area.
18	A detailed biological study of the study area [core zone and buffer zone (10 KM radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	Detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] was carried out and discussed under Chapter No. 3. There is no schedule I species of animals observed within study area as per Wildlife Protection Act 1972 as well as no species is in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area. Detailed in Chapter No. 3.

19	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravalli Range', (attracting court restrictions for mining operations), should also be indicated and where so 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 One Season Mar 2025-May 2025 (Summer Season) as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. 3.
23	Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.	Air Quality Modelling for prediction of incremental GLC's of pollutant was carried out using AERMOD view 9.6.1 Model. Details in Chapter No. 4.

24	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	Total Water Requirement for this project is given in the chapter No 2, Table No 2.13.
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Water for dust suppression, greenbelt development and domestic use will be obtained from accumulated rainwater/seepage water in mine pits. Drinking water will be sourced from the approved water vendors, No 2, Table No 2.13.
26	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	The rain water collected in the pits after spell of rain will be used for greenbelt development and dust suppression.
27	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	Impact Studies and Mitigation Measures of Water Quality discussed in Chapter No. 4.
28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	The ground water table is at 150m below ground level. In these projects, ultimate depth is 35m Maximum from the general ground profile. It is inferred the quarrying activities in the Cumulative EIA project (Quarry) will not intersect the Ground water table.
29	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	Highest elevation of the project area is 143m AMSL Ultimate depth of the mine is 83m AMSL Water level in the area is 150m BGL
30	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and BGL. A schematic diagram may also be provided for the same.	Progressive greenbelt development plan has been prepared and discussed along with Recommended Species details are given in the Chapter 4, Table No.4.12
31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	Traffic density survey was carried out to analyse the impact of Transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no much significant impact due to the proposed transportation from the project area. Details in Chapter 2.
32	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be	Infrastructure & other facilities will be provided to the Mine Workers after the grant of quarry lease and the same has been discussed in the Chapter No.2.

	covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Discussed in chapter No 2.
34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	Details in Chapter 10.
35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational health impact and details of the medical examination to the workers given in the Details in Chapter 10.
36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	Details in Chapter No. 4
37	Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Details of Socio Economic is given in the Chapter No 3.
38	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	Environment Management Plan Chapter 10.
39	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	Public hearing points and commitment of the project proponent will be updated in the final EIA & EMP Report.
40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation is pending in any court against this project.
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Project Cost is given in the Chapter No 2, Table No 2.15.
42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Detailed under Chapter 7
43	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Total Water Requirement for this project is given in the chapter No 2, Table No 2.13.
44	Besides the above, the below mentioned general points are also to be followed: -	
A	Executive Summary of the EIA/EMP Report	Encloses as separate volume
B	All documents to be properly referenced with index and continuous page numbering.	All the documents are properly referenced with index and continuous page numbering.
C	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	List of Tables and source of the data collected are given properly.

D	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF & CC / NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project	Copy of Baseline monitoring reports are enclosed with this draft as annexure
E	Where the documents provided are in a language other than English, an English translation should be provided.	Not Applicable.
F	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Questionnaire of the project will be submitted in final EIA report after complying the public hearing points.
G	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF & CC vide O.M. No. J-11013/41/2006-IA.II(I) Dated: 4th August, 2009, which are available on the website of this Ministry, should be followed.	Instructions issued by MoEF & CC O.M. No. J-11013/41/2006-IA. II (I) Dated: 4th August, 2009 are followed.
H	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF & CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation	There is no changes in Form-I, Mining plan and Pre-feasibility report for all the projects.
I	As per the circular no. J-11011/618/2010-IA. II(I) Dated: 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	Not applicable.
J	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	Satellite imagery of the project area along with boundary coordinates is given in the Chapter No 1 Figure No .1.1 Geomorphology of the area is given in Chapter No 2 Figure No 2.10.

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1. INTRODUCTION

1.0 PREAMBLE

Rough Stone is the major requirement for construction industry. The proposed project is categorized under category “B1” Activity 1(a) (mining lease area falls in the cluster, Total extent of the quarries within 500m radius is < 5ha). This EIA Report is prepared for **M/s. Vishnusurya Projects and Infra Limited Rough Stone and Gravel Quarry** over an extent of 4.95.2 ha at Mosavadi Village, Vandavasi Taluk, Tiruvannamalai District and Tamil Nadu State, Total Extent of the proposed and existing quarries falls in the cluster category is 6.81.20 ha, the Environmental impact assessment study carried out considering these quarry and Environmental Management plan is prepared individually for this project.

- Proponent applied for Rough Stone and Gravel quarry lease on 08.10.2024.
- Precise Area Communication Letter was issued by the District Collector, Tiruvannamalai R.C. No: 317/Kanimam/2024, Dated: 20.12.2024.
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Tiruvannamalai District, vide R.C. No: 317/Kanimam/2024 Dated: 24.12.2024.
- The Mining plan has been approved for the quantity of 6,95,325m³ of Rough Stone, and 4,050m³ of Gravel up to the depth of 83m bgl for the period of Five years.
- Proponent applied for Terms of Reference vide Proposal No. SIA/TN/MIN/516478/2024 Dated: 28.12.2024 and the ToR was Granted vide Identification No TO24B0108TN5252542N Dated: 01.03.2025.

The proponent has engaged M/s. Geo Exploration and Mining Solutions, Salem, Tamil Nadu for carrying out EIA / EMP Study. The Baseline Monitoring study has been carried out during Pre-monsoon season (March 2025 to May 2025).

The area has been quarried earlier by the other proponent in the S.F.No 16/3B, 16/4, 16/5A, 16/5B, 16/6A, 16/6B & 16C over an extent of 4.95.2 Ha vide Collector proceeding No Rc. No. 21/Kanimam/2019, Dated 31.01.2020 for the period of 31.01.2020 to 30.01.2025 five years period. After that proponent applied in the same area. The Mining plan was proposed to quarry upto the depth of 83m bgl for the quantity of Rough Stone 6,95,325m³, quantity of Gravel is 4,050 m³ for five years plan period and the ToR granted for 83m bgl. The EIA /EMP report is prepared for the quantity and depth as per the Mining plan PP request to consider the proposal based on the merits and environmental settings as per this EIA report.

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

1.1 PURPOSE OF THE REPORT

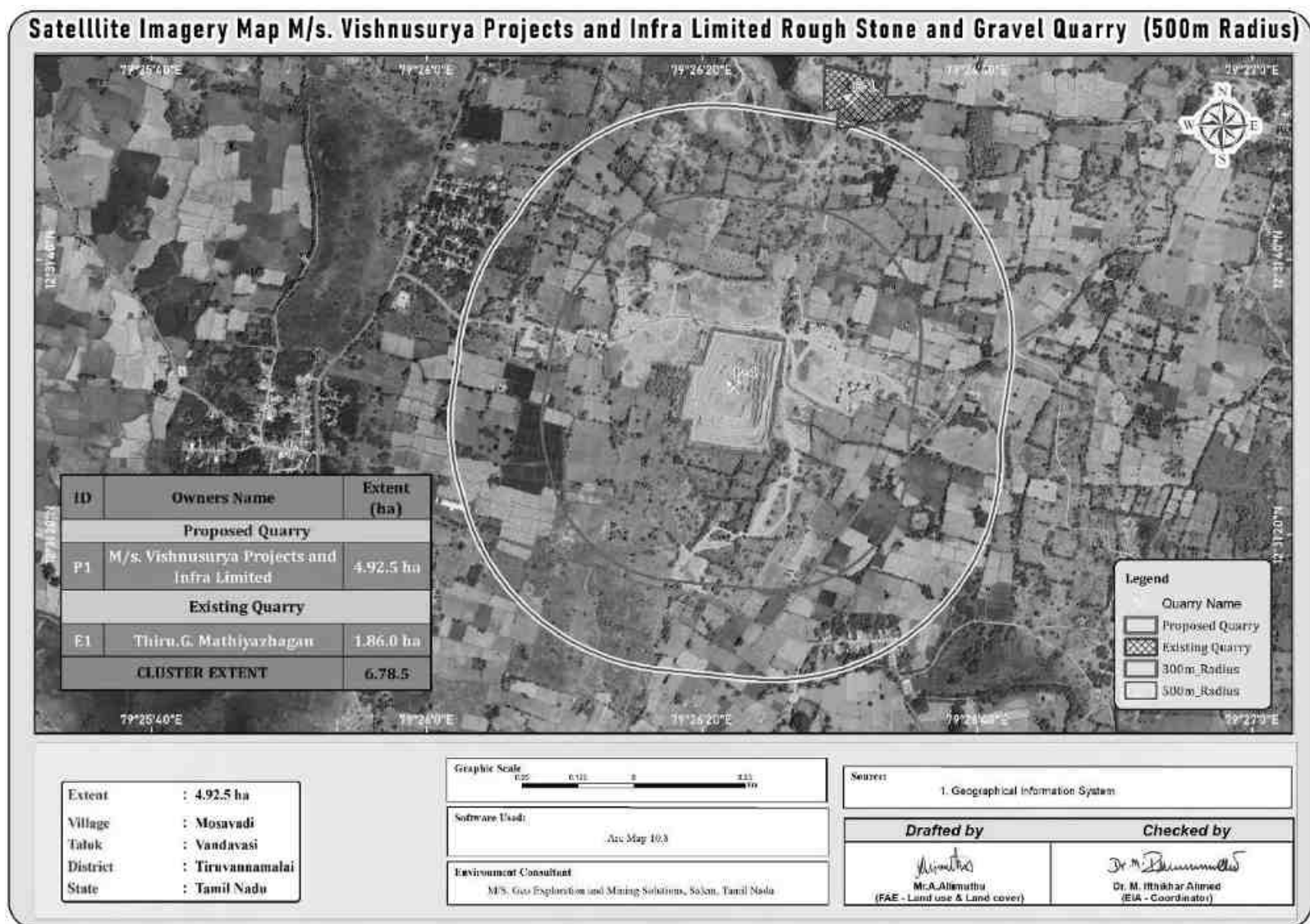
The Ministry of Environment and Forests, Govt. of India, through its EIA notification S.O. 1533(E) of 14th September 2006 and its subsequent amendments as per Gazette Notification S.O. 3977 (E) of 14th August 2018, Mining Projects are classified under two categories i.e. A (> 100 Ha) and B (≤ 100 Ha),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

Now, as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green Tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018 clarified the requirement for EIA, EMP and therefore, Public Consultation for all areas from 5 to 25 ha falling in Category B1 and appraised by SEAC/ SEIAA as well as for cluster situation.

The proposed projects are 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 CLUSTER QUARRIES



1.2 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT**1.2.1 Identification of Project**

- Proponent applied for Rough Stone and Gravel quarry lease on 08.10.2024.
- Precise Area Communication Letter was issued by the District Collector, Tiruvannamalai R.C. No: 317/Kanimam/2024, Dated: 20.12.2024.
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Tiruvannamalai District, vide R.C. No: 317/Kanimam/2024 Dated: 24.12.2024.
- The proposed project falls under “B1” Category as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018
- Proponent applied for ToR for Environmental Clearance vide online Proposal No. SIA/TN/MIN/516478/2024 Dated: 28.12.2024
- The proposal was placed in 532nd SEAC meeting held on 13.02.2025 and the committee recommended for issue of ToR.
- The proposal was considered in 798th SEIAA meeting held on 26.02.2024 and issued ToR vide Letter Identification No: TO24B0108TN5252542N Dated: 01.03.2025

TABLE 1.1: SALIENT FEATURES OF THE PROPOSED PROJECT

Name of the Project	M/s. Vishnusurya Projects and Infra Limited Rough Stone and Gravel Quarry
S.F. No.	16/3B, 16/4, 16/5A, 16/5B, 16/6A, 16/6B & 16C
Extent	4.95.2 ha
Land Type	Patta Land
Village Taluk and District	Mosavadi Village, Vandavasi Taluk, Tiruvannamalai District

Source: Approved Mining Plan

1.2.2 Identification of Project Proponent**TABLE 1.2: DETAILS OF PROJECT PROPONENT**

Name of the Project Proponent	M/s. Vishnusurya Projects and Infra Limited
Address	Authorized Signatory Thiru S. Viswanathan Temple Towers, II nd Floor, No.76, North Mada Steet, Mylaore, Chennai District.
Mobile	+91 89391 18822 & 77085 64939
Status	Limited Company

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 for Drilling & Slurry Explosive during blasting. Hydraulic Excavator and tippers are used for Loading and transportation. Rock Breakers are deployed to avoid secondary blasting.

TABLE 1.3: BRIEF DESCRIPTION OF THE PROJECT

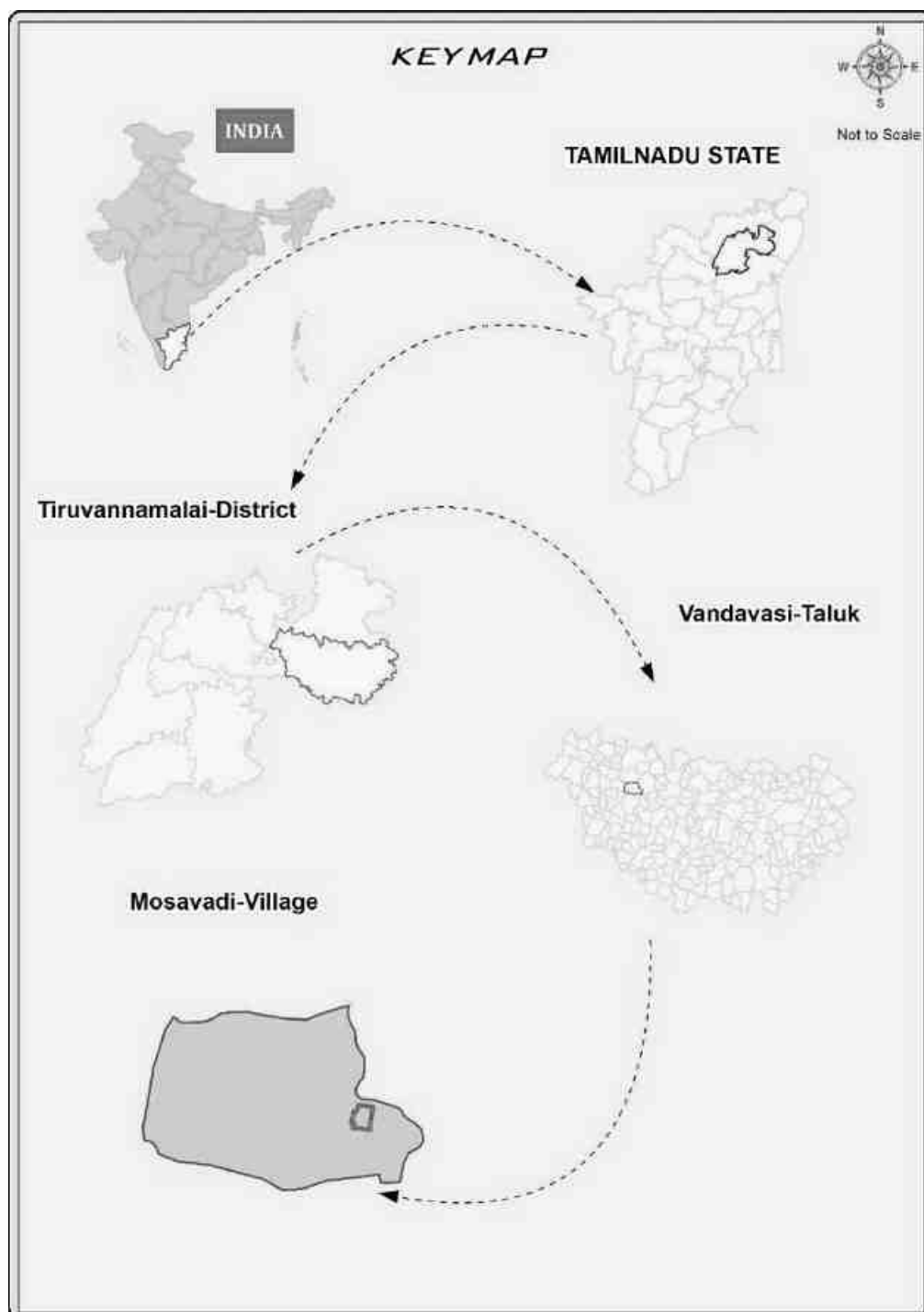
Name of the Quarry	M/s. Vishnusurya Projects and Infra Limited Rough Stone and Gravel Quarry	
Land Ownership	It is a Patta land, registered in the name of the applicant (M/s. Vishnusurya Projects and Infra Limited.,) vide patta no. 759.	
Land classification	It is a Patta Land-Punjai (Barren Land)	
SF No & Area (Ha)	16/3B, 16/4, 16/5A, 16/5B, 16/6A, 16/6B & 16C	
Village, Taluk & District	Mosavadi Village, Vandavasi Taluk, Tiruvannamalai District.	
Toposheet No	57P/06	
Latitude between	12°31'25.72"N to 12°31'34.92"N	
Longitude between	79°26'18.28"E to 79°26'26.01"E	
Highest Elevation	143m AMSL	
Proposed Depth of Mining	83m (3m Gravel + 80m Rough Stone) below the ground level	
Geological Resources	Rough Stone in m ³	Gravel m ³
	32,76,050m³	22,878m³
Mineable Reserves	Rough Stone in m ³	Gravel m ³
	6,95,325m³	4,050m³
Yearwise Production	Rough Stone in m ³	Gravel m ³
	6,95,325m³	4,050m³
Existing pit dimension (As per Approved mining plan)	244m (L) x 177m (W) x 38m (D) bgl	
Consent to Operate (CTO) from TNPCB	Proceedings No. F.1274TVM/RS/DEE/TNPCB/TVM/A/2020 Dated:03.01.2020	
Ultimate Pit Dimension	244m (L) x 182m (W) x 83m (D) bgl	
Water Level in the surrounds area	85 – 90 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 Northeastern side. The altitude of the area is 143m (max) above Mean Sea level. The area is covered by 3m thickness of Gravel formation. Massive Charnockite which is clearly inferred from the existing quarry pits.	
Machinery proposed	Jack Hammer	4 Nos
	Compressor	1 Nos
	Wagon Drill	2 Nos
	Excavator with Bucket and Rock Breaker	2 Nos
	Trucks	4 Nos
	Water Sprinkling Tanker	1 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	34 Nos	
Project Cost	Rs. 1,09,51,000/-	
EMP cost	Rs. 19,99,000/-	
CER Cost	Rs. 5,00,000/-	
Nearby Water Bodies	Odai	320m East
	Tank	330m SE
	Tank	660m NW
	Tank	820m SW
	Tank	4km NW
	Cheyyar River	6.5km NW
Greenbelt Development Plan	It is proposed to plant 2,480 Nos of trees in the safety barrier and village road.	
Proposed Water Requirement	2.5 KLD	
Nearest Habitation	410m Southeast	

Source: Approved Mining Plan

1.3.2 Location of the Project

- The proposed quarry projects fall in Mosavadi Village, Vandavasi Taluk and Tiruvannamalai District.
- The project is located about 50.0 km North East of Tiruvannamalai, 17 km North West of Vandavasi and 900 m West side of Mosavadi Village.

FIGURE 1.2 KEY MAP SHOWING THE LOCATION OF THE CLUSTER SITE



Source: Survey of India Toposheet 58-A/16

FIGURE 1.3: TOPOSHEET MAP OF THE STUDY AREA 10 KM RADIUS

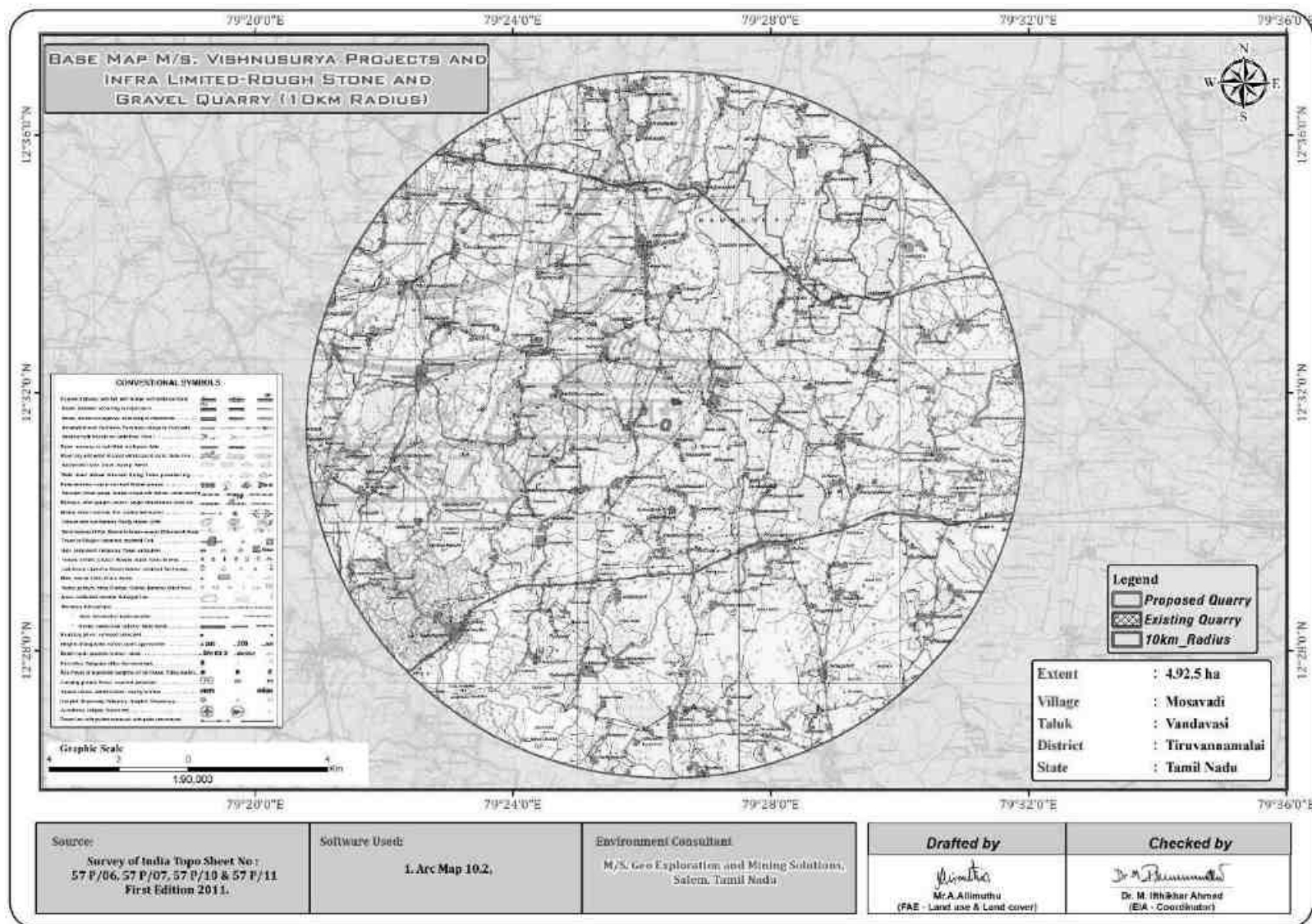
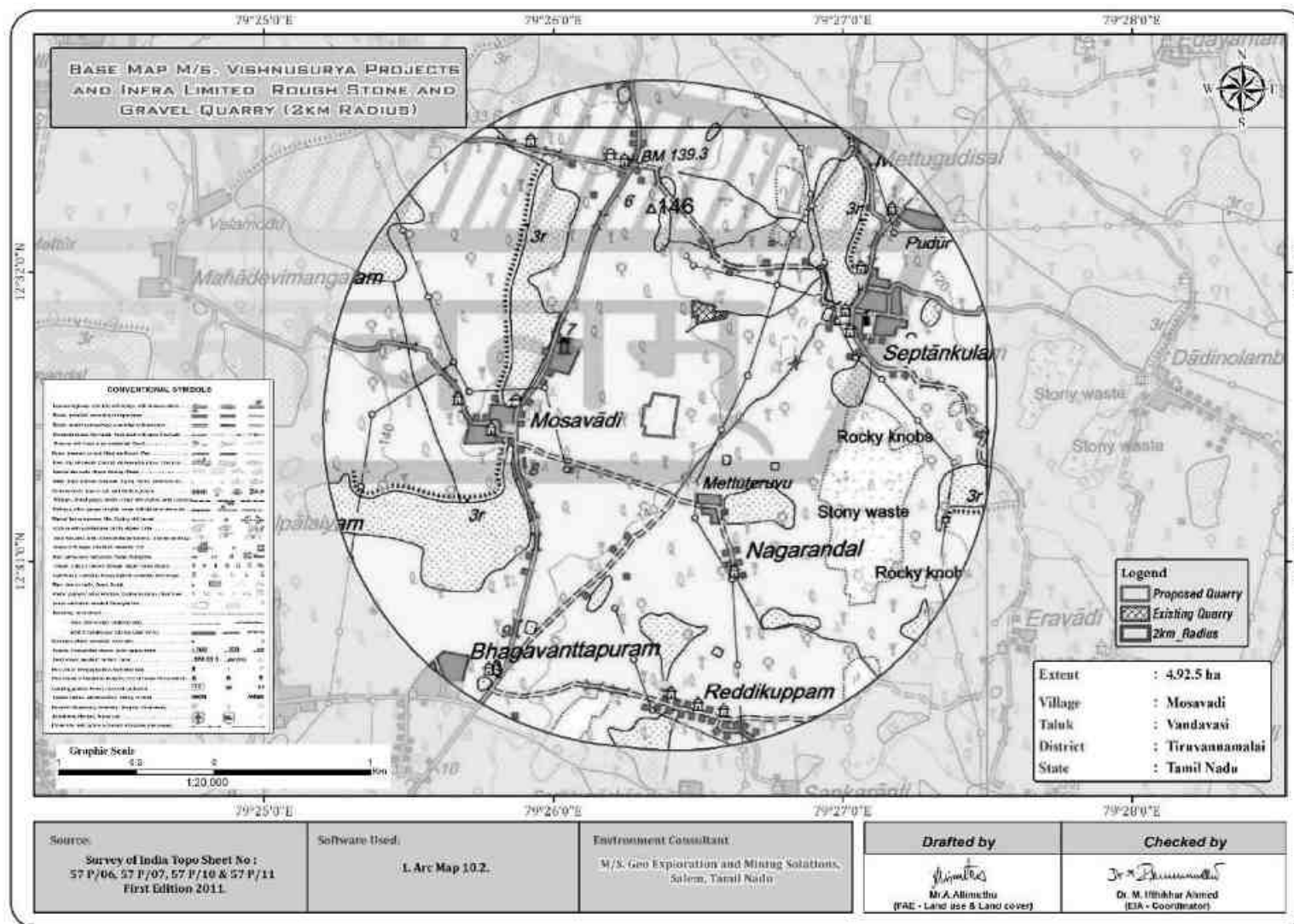


FIGURE 1.3A: TOPOSHEET MAP OF THE STUDY AREA 2KM RADIUS

Source: Survey of India Toposheet 58-A/15 & 16

1.4 ENVIRONMENTAL CLEARANCE

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

- Screening,
- Scoping
- Public consultation &
- Appraisal

SCREENING –

- Proponent applied for Rough Stone and Gravel quarry lease on 08.10.2024.
- Precise Area Communication Letter was issued by the District Collector, Tiruvannamalai R.C. No: 317/Kanimam/2024, Dated: 20.12.2024.
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Tiruvannamalai District, vide R.C. No: 317/Kanimam/2024 Dated: 24.12.2024.
- The proposed project falls under “B1” Category as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green Tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No. 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018
- Proponent applied for ToR for Environmental Clearance vide online Proposal No. SIA/TN/MIN/516478/2024 Dated: 28.12.2024

SCOPING

- The proposal was placed in 532nd SEAC meeting held on 13.02.2025 and the committee recommended for issue of ToR.
- The proposal was considered in 798th SEIAA meeting held on 26.02.2024 and issued ToR vide Letter Identification No: TO24B0108TN5252542N Dated: 01.03.2025.

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
 - ToR Identification No. TO24B0108TN5252542N Dated: 01.03.2025.
 - Approved Mining Plan

1.5 TERMS OF REFERENCE (ToR)

Compliance to ToR issued vide –

- ToR Identification No. TO24B0108TN5252542N Dated: 01.03.2025.

1.6 POST ENVIRONMENT CLEARANCE MONITORING

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

1.7 GENERIC STRUCTURE OF EIA DOCUMENT

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

1.8 THE SCOPE OF THE STUDY

The main scope of the EIA study is to quantify the cumulative impact in the study area due to cluster quarries and formulate the effective mitigation measures for 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 Post monsoon season (December 2022 to February 2023) for various environmental components so as to assess the anticipated impacts of the cluster quarry projects on the environment and suggest suitable mitigation measures for likely adverse impacts due to the proposed project.

TABLE 1.4: ENVIRONMENT ATTRIBUTES

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

Source: Field Monitoring Data

1.8.1 Regulatory Compliance & Applicable Laws/Regulations for Proposed Quarry

- Application for Quarrying Lease as per Tamil Nadu Minor Mineral Concession Rules, 1959
- Obtained Precise Area Communication Letter as per Tamil Nadu Minor Mineral Concession Rules, 1959 for Preparation of Mining Plan and obtaining Environmental Clearance
- The Mining Plan has been approved under Rule 41 & 42 as amended of Tamil Nadu Minor Mineral Concession Rules, 1959
- ToR Identification No. TO24B0108TN5252542N Dated: 01.03.2025.

2. PROJECT DESCRIPTION

2.0 GENERAL

The Proposed Rough Stone Quarries requires Environmental Clearance. There are 5 proposed and 6 existing quarries forming a cluster; calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016 and the total extent of cluster is 6.81.20 ha

As the extent of cluster are more than 5 ha, the proposal falls under B1 Category as per the Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green Tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018, and requirement for EIA, EMP and Public Consultation for obtaining Environmental Clearance.

2.1 DESCRIPTION OF THE PROJECT

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

2.2 LOCATION OF THE PROJECT

- The proposed quarry project area is located in Mosavadi village, Vandavasi taluk, Tiruvannamalai District
- The project is located about 50.0 km North East of Tiruvannamalai, 17 km North West of Vandavasi and 900 m West side of Mosavadi Village.
- The proposed area falls in the Survey of India Topo sheet No. **57P/06**.
- The Latitude between of **12°31'25.72"N to 12°31'34.92"N** The Longitude between of **79°26'18.28"E to 79°26'26.01"E** on WGS 1984 Datum.
- The project does not fall within 10 km radius of any Eco – sensitive zone, National Park, Tiger Reserve, Elephant Corridor and Biosphere Reserves.

TABLE 2.1: SITE CONNECTIVITY

Nearest Roadway	National Highway (NH-179B) Tiruvannamalai – Chengalpattu – 28.5km-South State Highway (SH-115) Polur – Vandavasi – 4.1km-South
Nearest Village	410m - South East
Nearest Town	Vandavasi – 17.8 km – South East
Nearest Railway Station	Tindivanam Railway station – 40.0Km – SE
Nearest Airport	Chennai –95.0 km – North East
Seaport	Chennai - 111 km – North East

Source: Survey of India Toposheet

The project area is bounded by 11 corners the corners are designated as 1- 11 clock wise from the South west corner. The coordinates for all the corners is given below.

TABLE 2.2: BOUNDARY CO-ORDINATES OF PROJECT

Corner Nos.	Latitude	Longitude
1	12°31'34.92"N	79°26'20.76"E
2	12°31'34.10"N	79°26'26.01"E
3	12°31'27.04"N	79°26'24.93"E
4	12°31'25.72"N	79°26'25.13"E
5	12°31'26.37"N	79°26'18.76"E
6	12°31'28.06"N	79°26'19.14"E
7	12°31'28.11"N	79°26'18.28"E
8	12°31'31.81"N	79°26'18.94"E
9	12°31'31.84"N	79°26'18.79"E
10	12°31'32.47"N	79°26'19.01"E
11	12°31'32.36"N	79°26'19.98"E

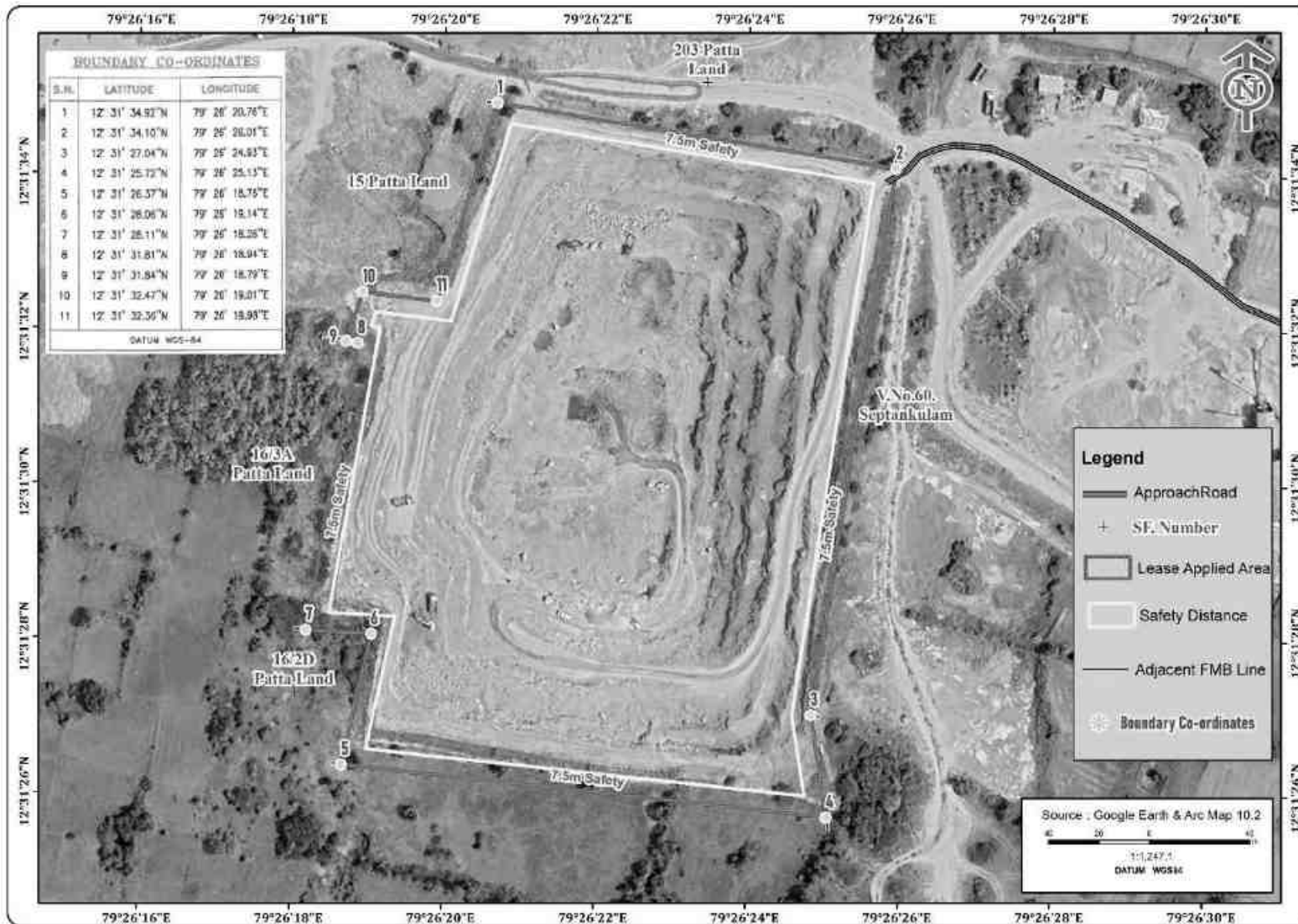
Source: Approved Mining Plan

FIGURE 2.1: PHOTOGRAPHS OF THE PROJECT SITE

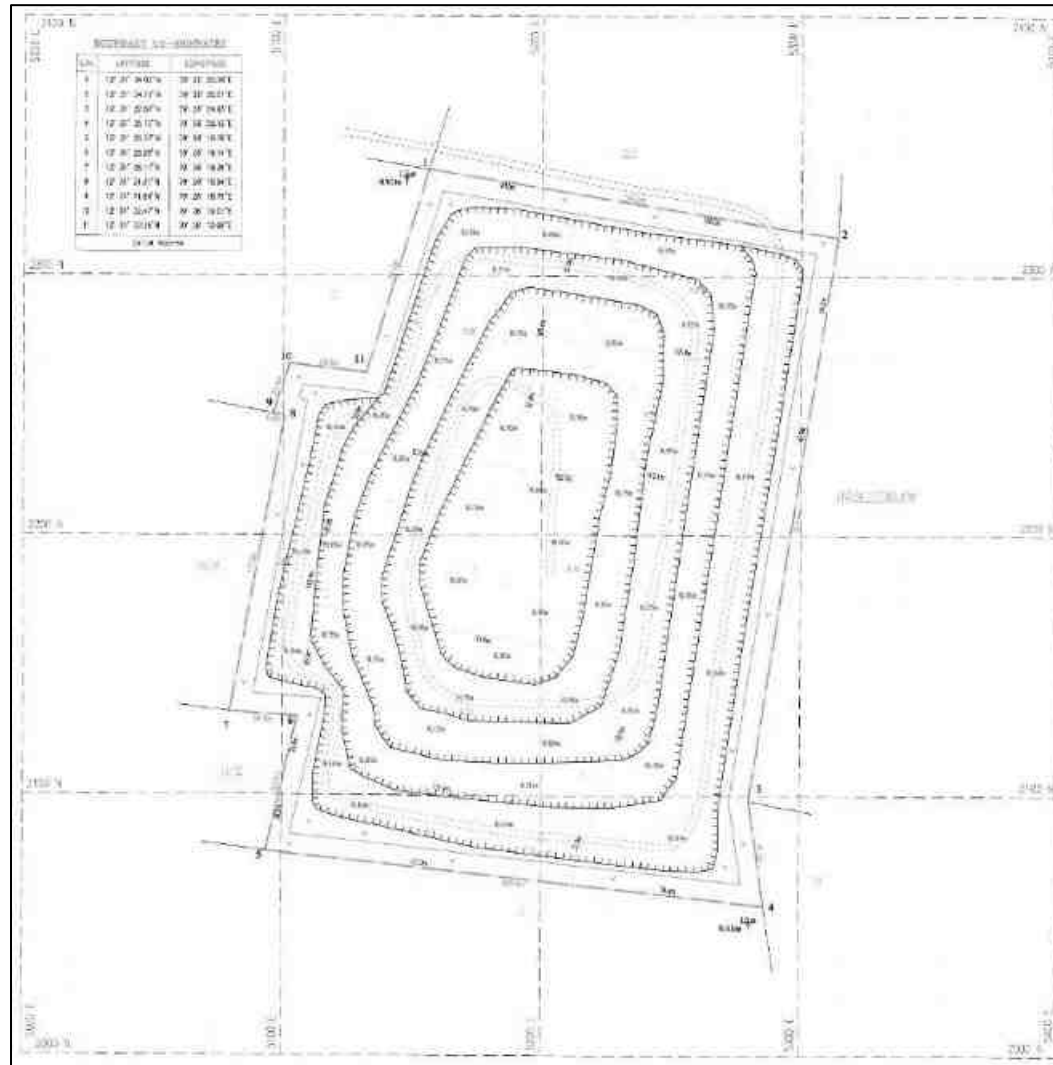


GREENBELT DEVELOPMENT PHOTOGRAPHS



FIGURE 2.2: GOOGLE IMAGE OF THE PROJECT AREA

Source: Google Earth Imagery

FIGURE 2.3: QUARRY LEASE PLAN / SURFACE PLAN

Source: Approved Mining Plan

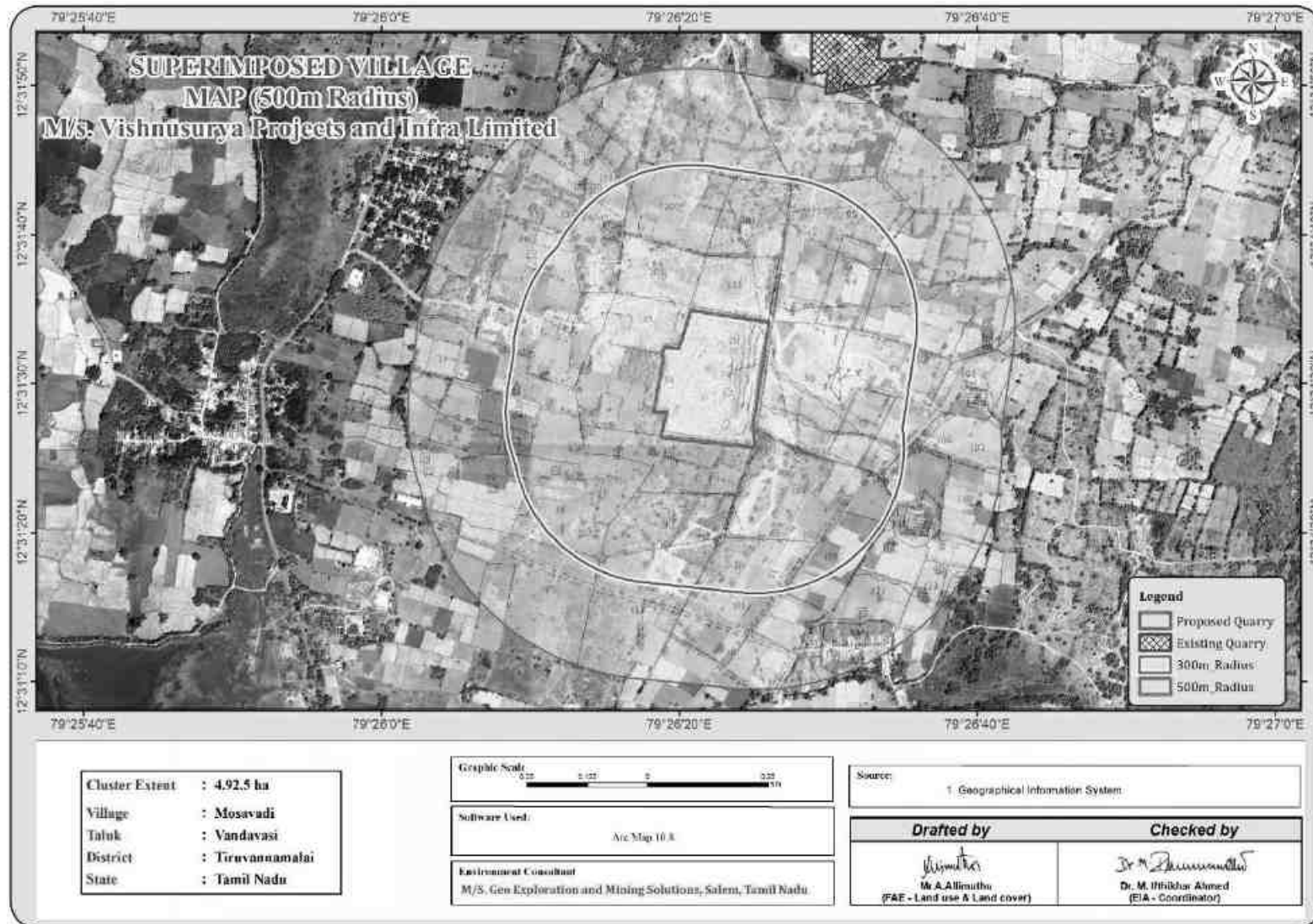
FIGURE 2.4: VILLAGE MAP SUPERIMPOSED ON GOOGLE EARTH IMAGE

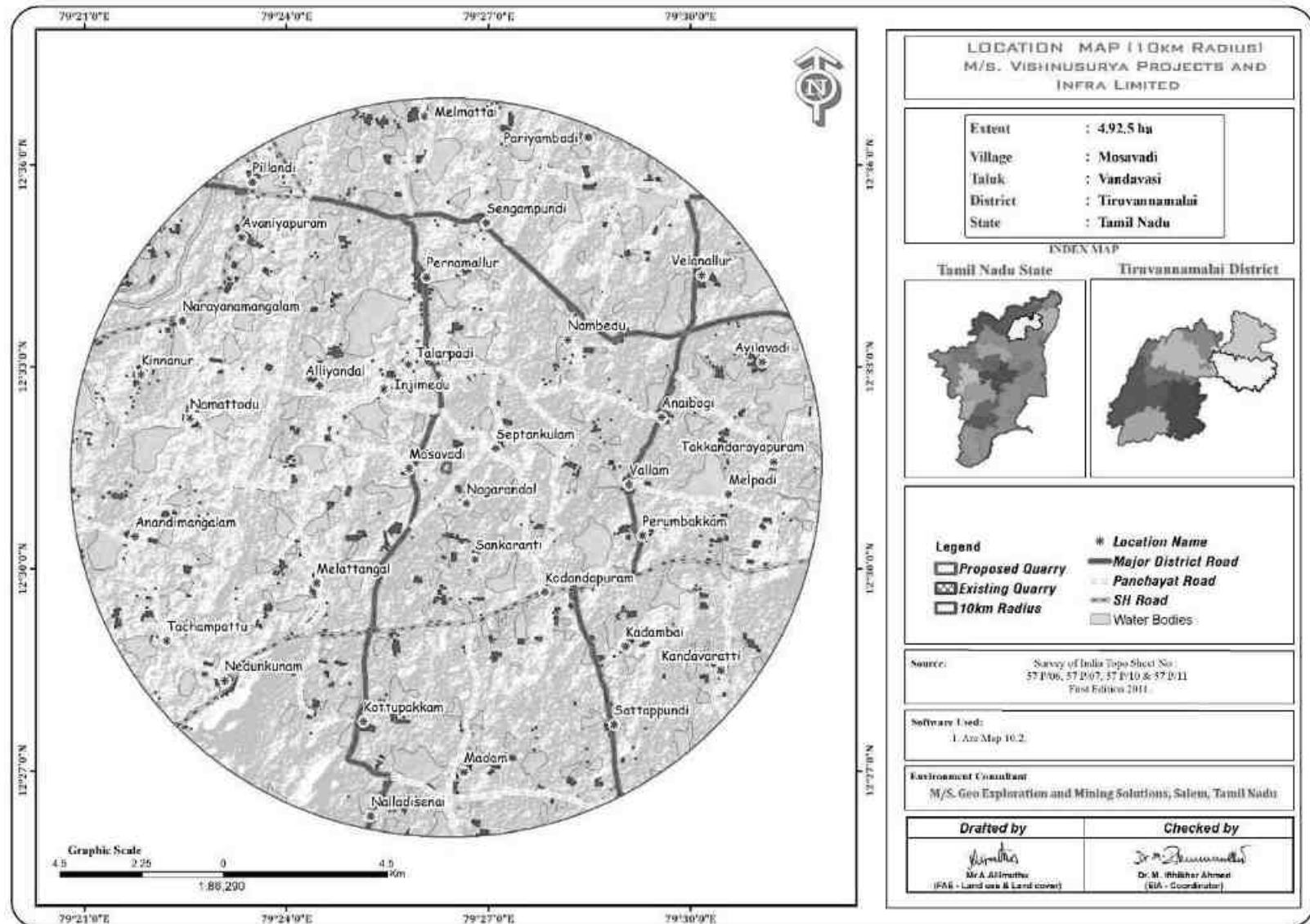
FIGURE 2.5: IMAGE SHOWING SURFACE FEATURES AROUND 10 KM RADIUS

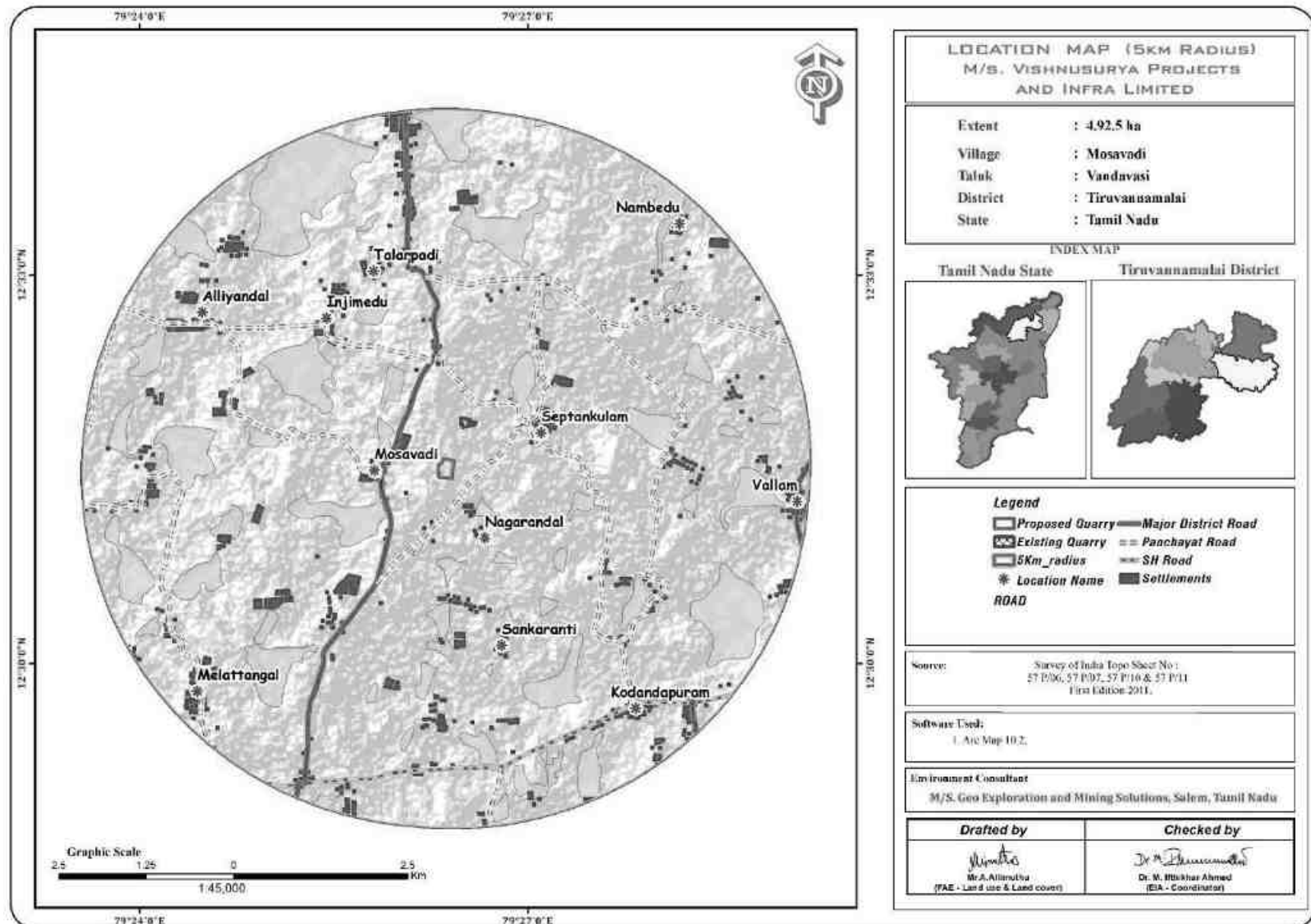
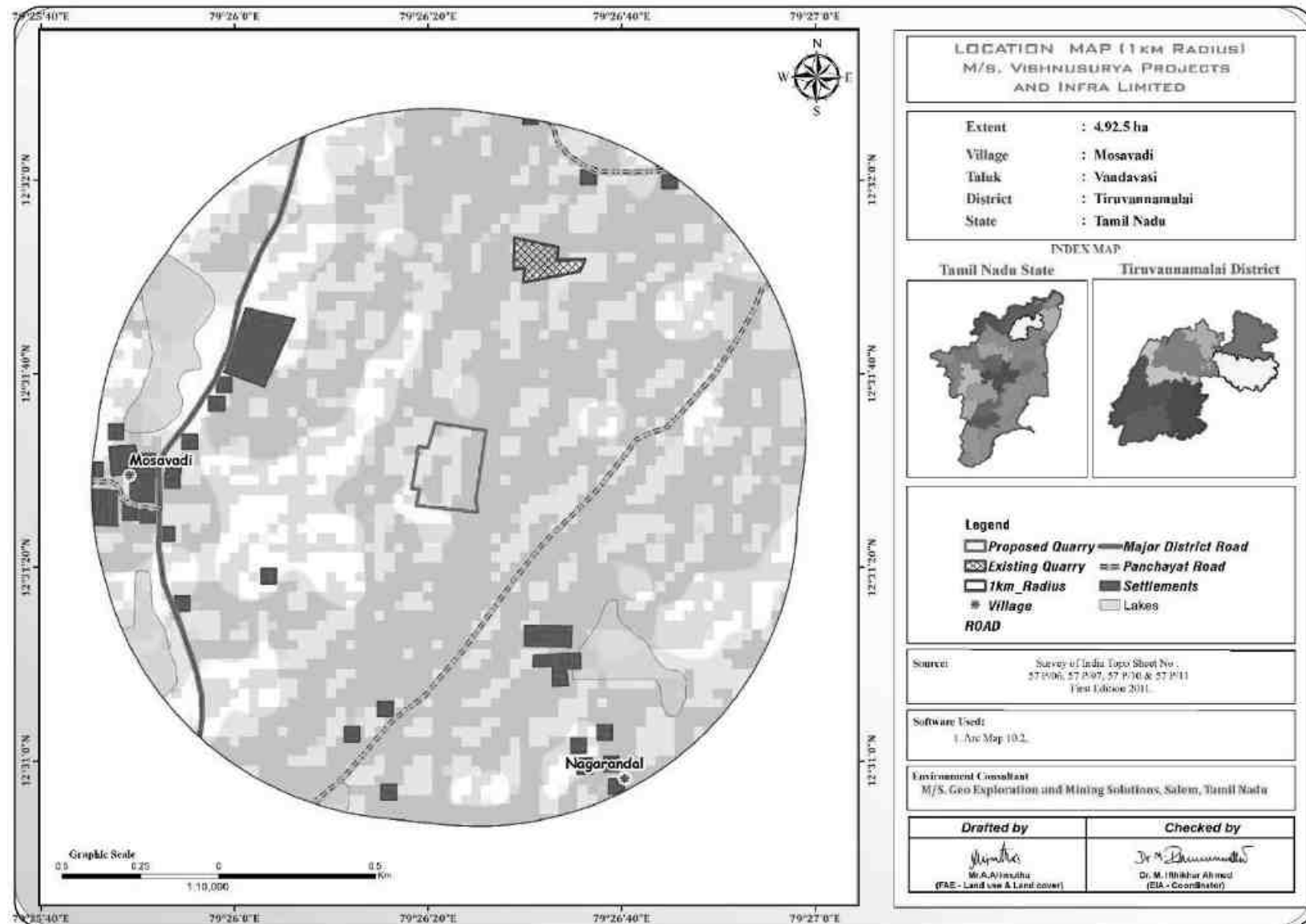
FIGURE 2.6: IMAGE SHOWING SURFACE FEATURES AROUND 5KM RADIUS

FIGURE 2.7: IMAGE SHOWING SURFACE FEATURES AROUND 1 KM RADIUS

2.2.1 Project Area

- The Rough Stone and Gravel quarry is proposed to operate by opencast mechanized method of mining and the project is site specific
- There is no beneficiation or processing proposed inside the project area
- There is no forest land involved in the proposed projects and is devoid of major vegetation and trees.

TABLE 2.3: LAND USE PATTERN OF THE PROPOSED PROJECT – CORE ZONE

Description	Present area (Ha)	Area at the end of this quarrying period (Ha)
Quarrying Pit	3.94.80	3.94.80
Infrastructure	Nil	0.01.00
Roads	0.01.00	0.02.00
Green Belt	Nil	0.67.20
Unutilized Area	0.99.40	0.30.20
Grand Total	4.95.20	4.95.20

Source: Approved Mining Plan

2.2.2 Size or Magnitude of Operation

TABLE 2.4: OPERATIONAL DETAILS FOR PROPOSED PROJECT

PARTICULARS	DETAILS	
	Rough Stone (5Year Plan period)	Gravel in m ³
Geological Resources	32,76,050	22,878
Mineable Reserves	6,95,325	4,050
Production for five-year plan period	6,95,325	4,050
Mining Plan Period	5 years	
Number of Working Days	300 days	
Production per day	464	14
No of Lorry loads (6m ³ per load)	39	1
Total Depth of Mining	83m (3m Gravel + 80m Rough Stone) below the ground level	

Source: Mining plan

2.3 GEOLOGY

2.3.1 Regional Geology

Tiruvannamalai District mainly comprises of rocks of Archaean age. The type of rocks found in the district are Charnockite, Granitic gneiss, Epidote Hornblende Gneiss, Amphibolite, Pyroxenite, Dunite, Migmatites, Banded Magnetite Quartzite, Shale and Clay. Dolerite dykes (Black Granite) are also noticed cutting across the country rocks.

The hard rock terrain comprises predominantly of Charnockite and Khondalite groups and their migmatitic derivatives, supra-crustal sequences of Sathyamangalam and Kolar groups and Peninsular Gneissic Complex (Bhavani Group), intruded by ultramafic-mafic complexes, basic dykes, granites and syenites. The sedimentary rocks of the coastal belt include fluviatile, fluvio-marine and marine sequences, such as Gondwana Supergroup (Carboniferous to Permian and Upper Jurassic to Lower Cretaceous), marine sediments of Cauvery basin (Lower Cretaceous to Paleogene), Cuddalore /Pannambarai Formation (Mio-Pliocene) and sediments of Quaternary and Recent age.

The Charnockite Group comprises pyroxene granulite and charnockite. The pyroxene granulite is dark grey, medium grained granulitic rock with typical salt and pepper texture, seen on the weathered surface. It consists of diopside, hypersthene, plagioclase, hornblende, biotite and quartz. Charnockite is the predominant rock in the area. It

is grey, medium to coarse grained, greasy looking with foliation seen prominently on the weathered surface. It is essentially made of smoky or grey quartz, pale grey microcline and hypersthene as major minerals with plagioclase, hornblende and biotite as accessories.

Migmatite Complex is represented by hornblende-biotite gneiss, granitic gneiss and pink migmatite. This Complex is a group of banded felsic rocks of varying mineralogical composition that are formed due to the influx of quartzofeldspathic material into high grade metamorphic rocks. Two types of migmatite are seen in the district, one is grey and the other is pink. Next to charnockite, migmatite gneiss is the second most extensive rock. The migmatite gneiss consists of quartz, K-feldspar, plagioclase, hornblende and biotite in varying proportions.

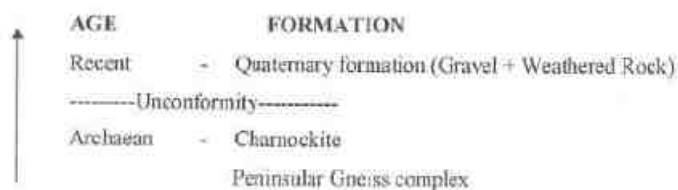
Source: District Survey Report for Minor Minerals Tiruvannamalai District – May 2019.

<https://tiruvannamalai.nic.in/document/district-survey-report-rough-stone/>

Exploration :

No Exploration is required, the Rough stone and Gravel formation is clearly inferred from the existing quarry pit situated on the south side.

The General Geological sequence of the area is given below:



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 areas are plain terrain, The project areas are covered with Gravel formation of 2m thickness; Massive Charnockite formation is found after 2m Gravel formation which is clearly inferred from the existing quarry pit.

2.3.3 Hydrogeology

Cheyar River which originates from Jawadhu Hills, flows in a southern direction at first, and turns south-east near Chengam after flowing through Polur, Vandavasi and Cheyyartaluku. Palar rising near Nandidurg in Mysore enters Vellore district passing through Gudiyatham, Walajah and Arakonam taluks before entering into Cheyyartaluk of Tiruvannamalai district and there after enters into Kancheepuram district. Pennaiyar and South Pennaiyar originate from Nandidurg of Karnataka. They pass through Dharmapuri district and enter southern part of Chengam taluk before entering into Viluppuram district. Finally, the river enters into the Bay of Bengal at Cuddalore. The river is dry for the most part of the year. Water flows during the monsoon season when it is fed by the southwest monsoon in catchment area and the northeast monsoon in Tamil Nadu. A dam has been constructed across this river at Sathanur which is a picnic spot in this district. Sathanur Reservoir provides drinking water to Tiruvannamalai town and the water is used for irrigation when the reservoir is filled with surplus water.

The origin, occurrence and movement of groundwater are controlled by geological setup of a terrain. During the study it is inferred that the entire cluster area is a Hard rock terrain and the low resistance encountered at the depth between 57m, hence it is assumed that the possibility of Ground water occurrence will be below this level and it also proved that this hard batholith above 50m will not encounter any subsurface water.

There is a possibility of seepage water from the surface levels i.e., below 30m, this surface water will be collected in the mine pits and later used for dust suppression and afforestation. In the geophysical study it has been clearly inferred that the depth of the quarrying operation will not intersect the ground water table.

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 Tiruvannamalai 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.

Alluvial Formations

In the river alluvium groundwater occurs under water table condition. The maximum thickness is 37 m and the average thickness of the aquifer is approximately 12 m. These formations are porous and permeable which have good water bearing zones.

Tertiary Cuddalore sandstone

Tertiary formations are represented by Cuddalore Sandstone and characterised as fluvial to brackish marine deposits. Predominantly this formation is divided into Lower and Upper Cuddalore formations. In the Upper Cuddalore formations the groundwater occurs in semi confined conditions, whereas in the Lower Cuddalore the groundwater occurs in confined condition with good groundwater potential.

Cretaceous Formations

Groundwater occurring in the lens shape in the sandy clay lenses and fine sand is underlain by white and black clay beds which constitute phreatic aquifer depth which ranges 10m to 15m below ground level. Phreatic aquifer in Limestone is potential due to the presence of Oolitic Limestone.

Hard Rock Formations

Groundwater occurs under water table conditions but the intensity of weathering, joint, fracture and its development is much less in other type of rocks when compared to gneissic formation. The groundwater potential is low, when compared with the gneissic formations

Granitic Gneiss

Groundwater occurs under water table conditions in weathered, jointed and fractural formations. The pore space developed in the weathered mantle acts as shallow granular aquifers and forms the potential water bearing and yielding zones water table is shallow in canal and tank irrigation regions and it is somewhat deeper in other regions.

Charnockite

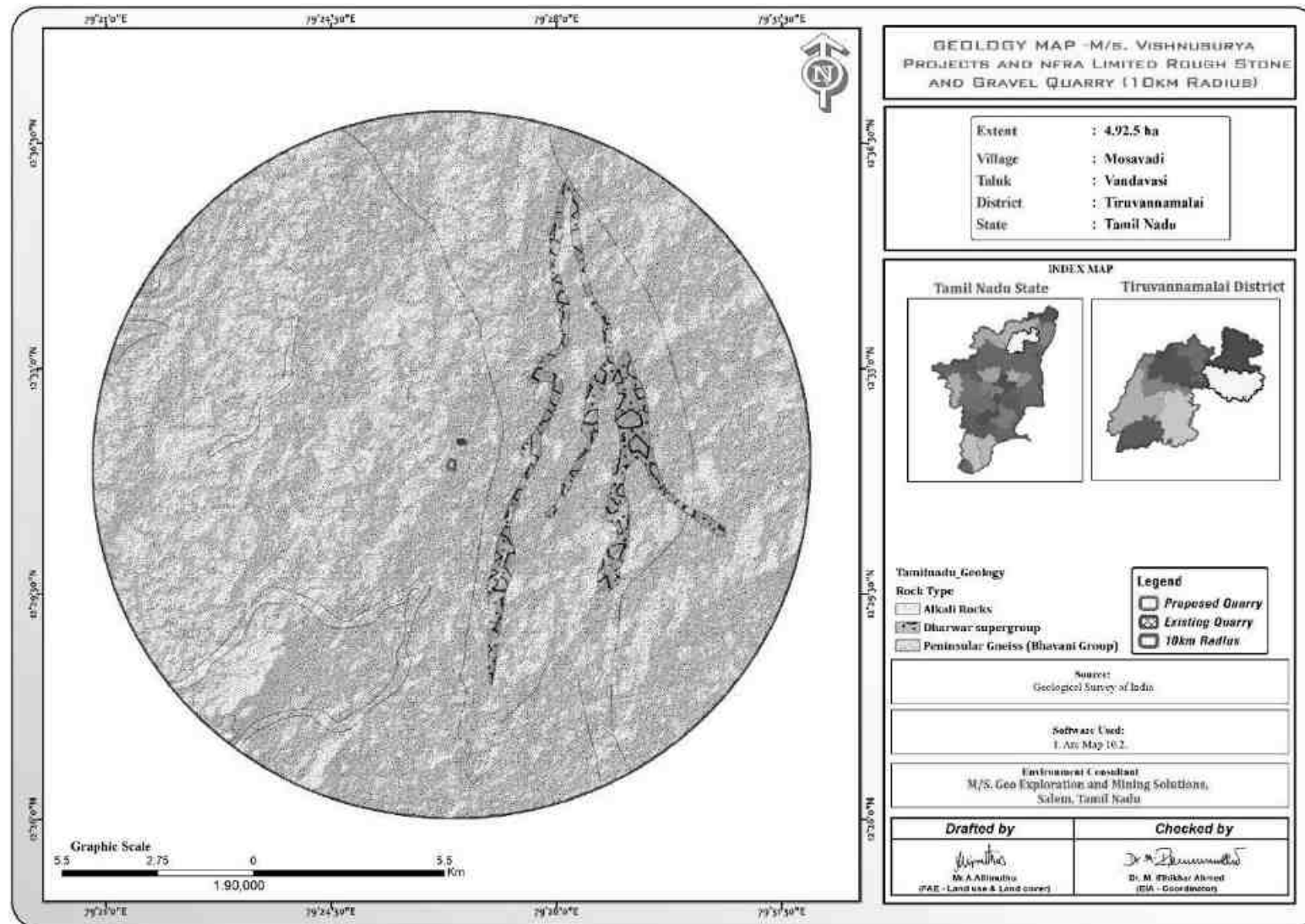
Groundwater occurs under water table conditions but the intensity of weathering, joint, fracture and its development is much less when compared to gneissic formations. The groundwater potential is low, when compared with the gneissic formations.

Aquifer Parameters

The transmissivity values of fractured aquifers range from < 1 to $141 \text{ m}^2/\text{day}$ and storativity varies between 2.84×10^{-5} and 8.9×10^{-3} . The transmissivity of sedimentary formation varies from 21 to $748 \text{ m}^2/\text{day}$ and storativity is in the order of 2.75×10^{-3}

Actual Rainfall in Mm					Normal Rainfall in Mm
2017	2018	2019	2020	2021	
1251.3	799.2	1071.9	1034.5	1592.5	985

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

FIGURE 2.8: REGIONAL GEOLOGY MAP

From the above map it is inferred that the cluster quarries fall in the hard rock terrain (Peninsular Gneiss)Source:

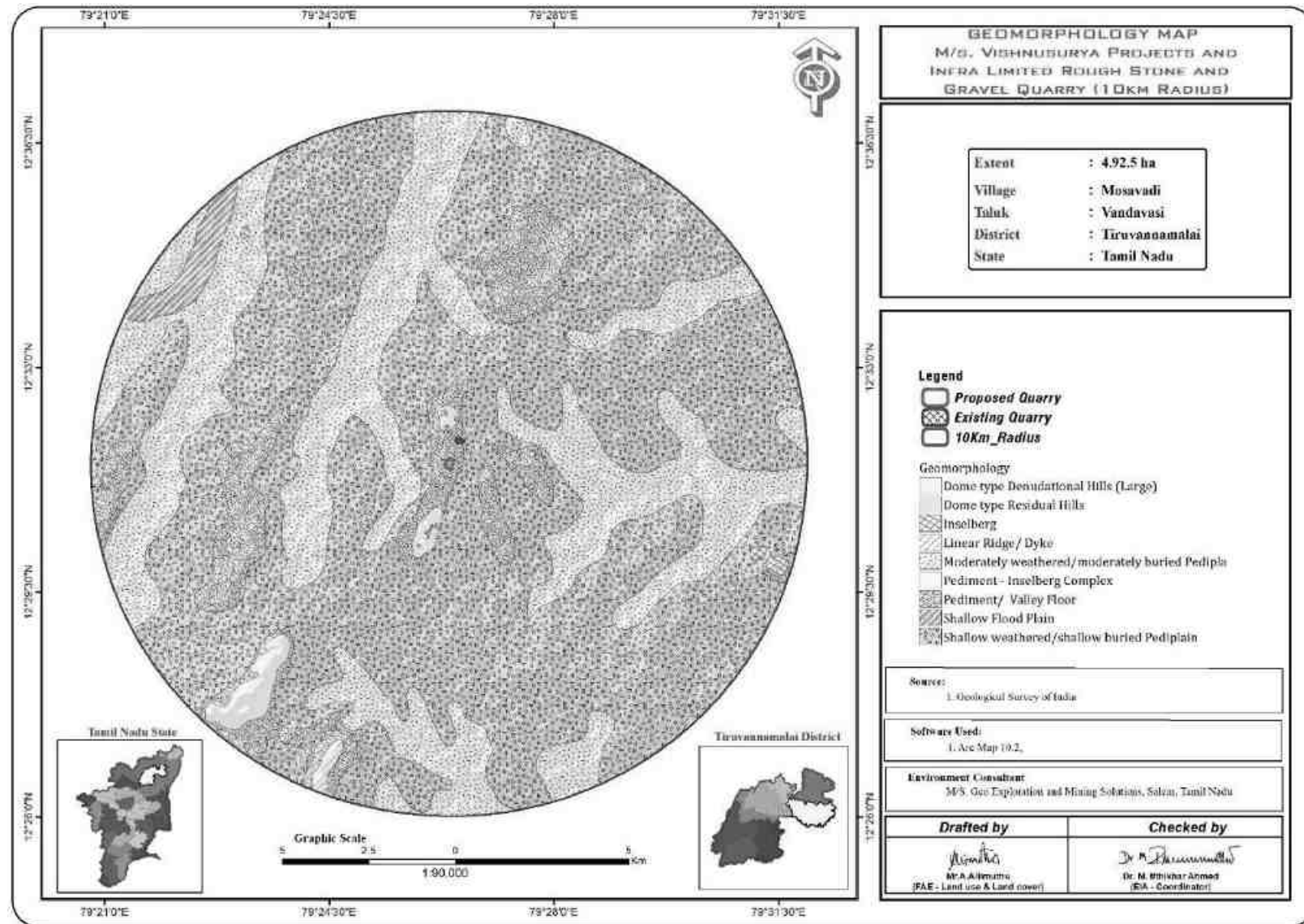
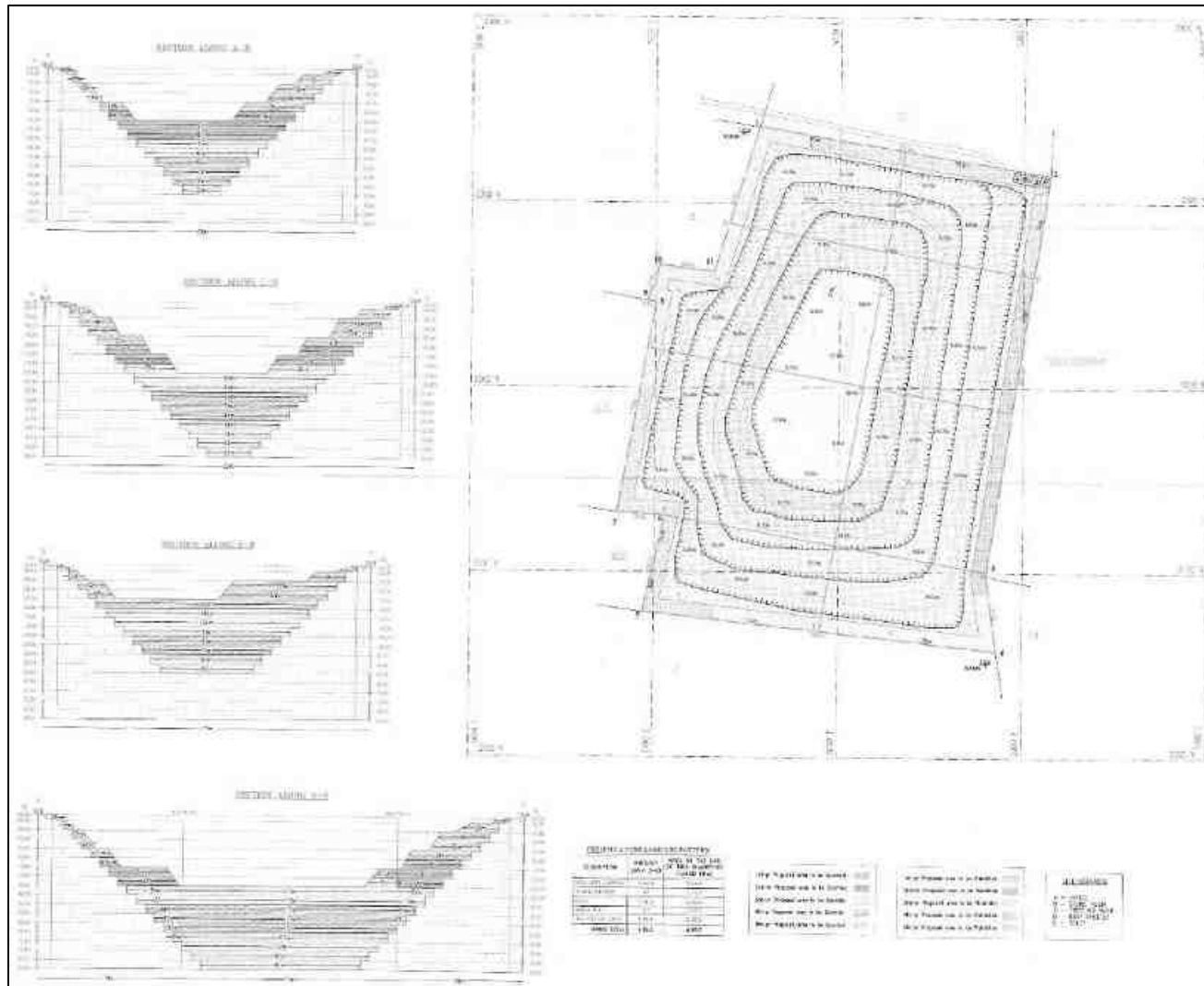
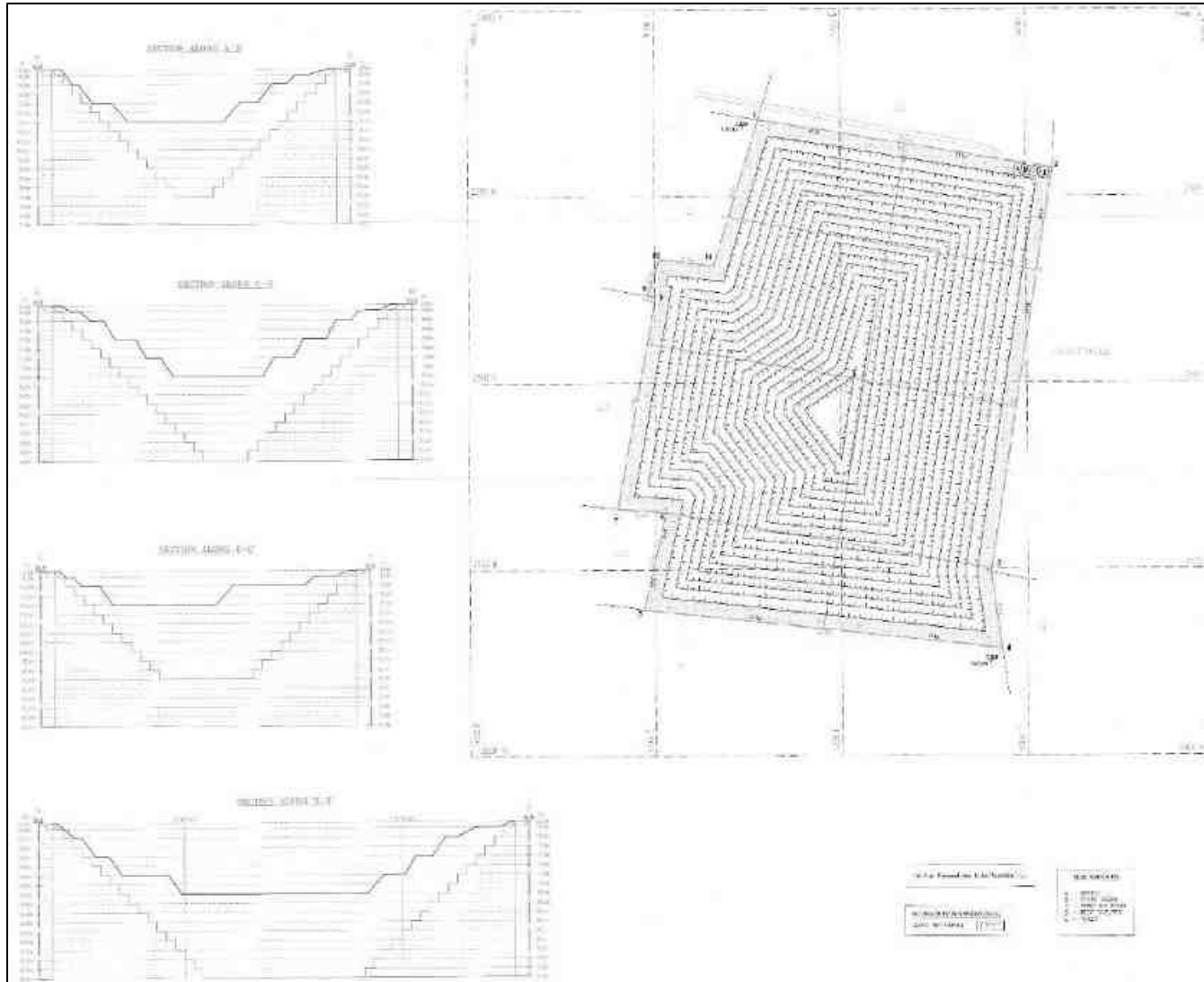
FIGURE 2.9: GEOMORPHOLOGY MAP

FIGURE 2.10: TOPOGRAPHY, GEOLOGICAL, YEAR-WISE DEVELOPMENT PRODUCTION PLAN AND SECTIONS

Source: Approved Mining Plan

FIGURE 2.11: CLOSURE PLAN AND SECTIONS



Source: Approved Mining Plan

2.4 RESOURCES AND RESERVES

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

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

TABLE 2.6: AVAILABLE GEOLOGICAL RESOURCES OF PROPOSED PROJECT

Description	Rough Stone	Gravel
Geological Resource in m ³	32,76,050	22,878
Mineable Resource in m ³	6,95,325	4,050

Source: Approved Mining Plan

The Gravel has been removed during the previous lease period.

TABLE 2.7: YEAR-WISE PRODUCTION PLAN

Year	Rough Stone (m ³)	Gravel (m ³)
I	1,43,465	4,050
II	1,43,155	-
III	1,83,625	-
IV	1,43,845	-
V	81,235	-
Total	6,95,325	4,050

Source: Approved Mining Plan

Disposal of Waste

There is no waste anticipated in these Rough Stone quarrying operation. The entire quarried out materials will be utilized (100%). Top layer of Gravel formation will be removed and sold to needy customers directly.

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 2.8: ULTIMATE PIT DIMENSION

PROPOSAL			
Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max)
I	244	182	83m bgl

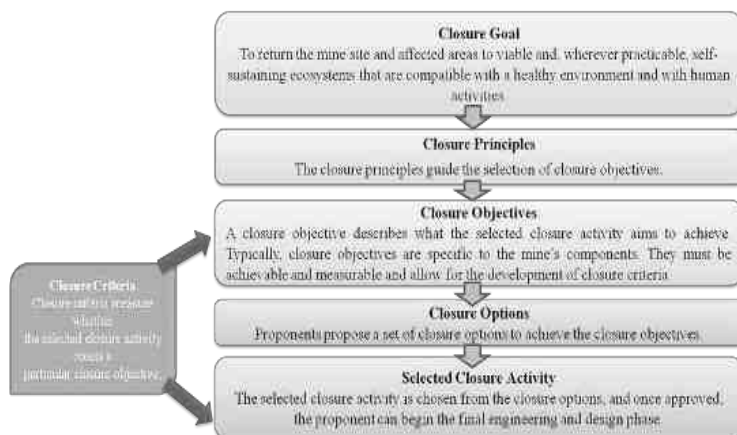
Source: Approved Mining Plan

- At the end of life of mine, the excavated mine pit / void will facilitate to collect the rainwater and the pit will act as temporary reservoir.

- 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.
- Discharge of contaminated drainage has been minimized and controlled.
- Original or desired new surface drainage patterns have been established.
- Fishy culture activities will be carried out in the mine pit after the closure



Closure Planning & Options Considerations in Mine Design –

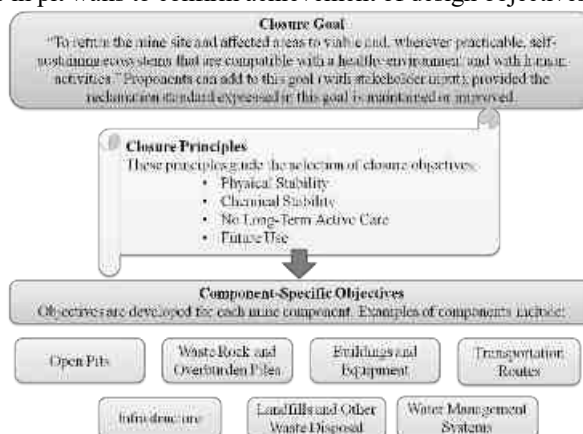
- The closure of mine is well planned at the initial stage of planning & design consideration by the internal and external stake holders
- Construction of 2m height bund all along the mine pit boundary and ensure its stability all time & construction of garland drain along the natural slope to avoid sliding and collection of soil to the pit & surface runoff during rainfall
- After complete exploitation of mineral, the lowest bench foot wall side will be maintained as plain surface without any sump pits to avoid any accidents
- All the sharp edges will be dressed to smoother face before the closure of mine and ensure no loose debris on hanging wall side
- There is a canal about 100m on Western side of the cluster project area. This river canal will not be hindered by any of mine closure activities
- The project proponent as a part of social responsibilities assures to supply the stored mine pit water to the nearby villages after effective treatment process as per the standards of TNPCB & TWAD
- Native species will be planted in 3 row patterns on the boundary barriers and 1st bench, a full-time sentry will be appointed at the gate to prevent inherent entry of public & cattle.
- The access road to the quarry will be cut-off immediately after the closure
- The layout design shall be prepared and get approved from Department of Geology and Mining.
- The proponent is instructed to construct as per the layout approved

- Physical and chemical stability of structures left in place at the site, the natural rehabilitation of a biologically diverse, stable environment, the ultimate land use is optimized and is compatible with the surrounding area and the requirements of the local community, and taking the needs of the local community into account and minimizing the socio-economic impact of closure
- There will be a positive change in the environmental and ecology due to the mine closure.

Post-Closure Monitoring –

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

- Monitor physical and geotechnical stability of remnant pit walls.
- Monitor the ground regime in pit walls to confirm achievement of design objectives.



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

TABLE 2.9: MINE CLOSURE BUDGET

ACTIVITY		YEAR					RATE	COST (Rs.)
		I	II	III	IV	V		
Plantation under safety zone	Nos.	220	220	220	220	220	@200 Rs Per sapling	2,20,000/-
	Cost	44000	44000	44000	44000	44000		
Plantation in the quarried out top benches and approach road	Nos.	300	300	100	100	100	@200 Rs Per sapling	1,80,000
	Cost	60000	60000	20000	20000	20000		
Wire Fencing (In Mtrs) 940 Mtrs		2,82,000	-	-	-	-	@300 Rs Per Meter	2,82,000/-
Garland drain (In Mtrs) 590 Mtrs		2,67,000	-	-	-	-	@300 Rs Per Meter	2,67,000/-
TOTAL								9,49,000/-

Source: Mining plan

2.5 METHOD OF MINING

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

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

2.5.1 Drilling & Blasting Parameters

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

Spacing	–	1.2m
Burden	–	1.0 m
Depth of hole	–	1.5 m
Charge per hole	–	0.50 – 0.75kg
Powder factor	–	6.0 tonnes/kg
Diameter of hole	–	32 mm

Type of Explosives to be used –

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

Storage of Explosives –

No proposal for storage of explosives within the project area, the project proponent have made agreement with authorized explosives agencies for carrying out blasting activities and competent person as per DGMS guidelines will be employed for safety and supervision of overall quarrying activities.

The explosives will be sourced from the blasting agency on daily basis and the blasting will be carried out under the supervision of competent qualified Blaster and it will be ensured that there shall be no balance of explosive stock; any balance stock will be taken back by the supplier.

2.5.2 Extent of Mechanization

TABLE 2.10 PROPOSED MACHINERY DEPLOYMENT

S.NO.	TYPE	NOS	SIZE/CAPACITY	MOTIVE POWER
1	Jack hammer	4	1.2m to 2.0m	Compressed air
2	Compressor	1	400psi	Diesel Drive
3	Wagon Drill	2	60 HP	TAM Rock
4	Excavator with Bucket / Rock Breaker	2	300 HP	Diesel Drive
5	Trucks	4	35 Tonnes	Diesel Drive
6	Water Sprinkling Tanker	1	10,000 litres	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 will be constructed as per the Mine Rule after the grant of quarry lease in all the proposed quarries.

2.6.2 Drainage Pattern

Drainage pattern is the pattern formed by the streams, rivers, and lakes in a particular drainage basin over time that reveals characteristics of the kind of rocks and geological structures in a landscape. They are governed by the topography of the land, whether a particular region is dominated by hard or soft rocks, and the gradient of the land.

Dendritic drainage pattern is one of the most common type that develop in areas where the rock (or unconsolidated material) beneath the stream has no particular fabric or structure and can be easily eroded equally in all directions.

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

2.6.3 Traffic Density

The traffic survey conducted based on the transportation route of material, the Rough Stone is proposed to be transported mainly through Septankulam Panchayat Road that connects to Pernamallur District Road on South Eastern Side.

Traffic density measurements were performed at two locations

1. Pernamallur District Road
2. Septankulam Panchayat Road.

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 LOCATIONS

Station Code	Road Name	Distance and Direction	Type of Road
TS1	Pernamallur District Road	1.0 km-NW	Major District Road (Two Lane)
TS2	Septankulam Panchayat Road	400m-SE	Village road (Single Lane)

Source: On-site monitoring by GEMS FAE & TM

TABLE 2.12: EXISTING TRAFFIC VOLUME

Station code	HMV		LMV		2/3 Wheelers		Total PCU
	No	PCU	No	PCU	No	PCU	
TS1	195	585	96	96	310	155	836
TS2	86	258	22	22	104	52	332

Source: On-site monitoring by GEMS FAE & TM

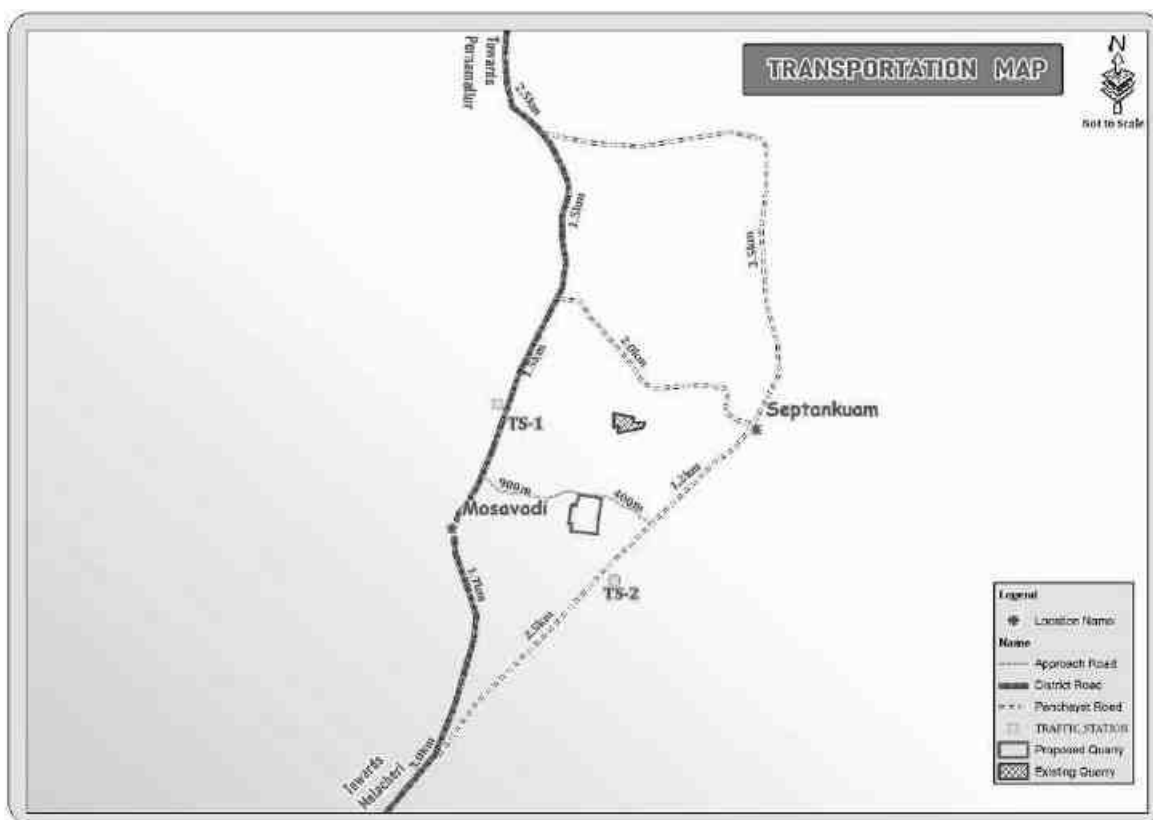
* PCU conversion factor: HMV (Trucks and Bus) = 3, LMV (Car, Jeep and Auto) = 1 and 2/3 Wheelers = 0.5

TABLE 2.13: ROUGH STONE & GRAVEL HOURLY TRANSPORTATION REQUIREMENT

Transportation of Rough Stone & Gravel per day		
Capacity of trucks	No. of Trips per day Cumulatively	Volume in PCU
10 tonnes	39	117

Source: Data analysed from Approved Mining Plan

FIGURE.2.12: MINERAL TRANSPORTATION ROUTE MAP

**TABLE 2.14: SUMMARY OF TRAFFIC VOLUME**

Route	Existing Traffic volume in PCU	Incremental traffic due to the project	Total traffic volume	Hourly Capacity in PCU as per IRC – 1960 guidelines
Pernamallur District Road	836	117	953	1500
Septankulam Panchavat Road	332	117	449	1200

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

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

2.6.4 Mineral Beneficiation and Processing

There is no proposal for the mineral processing or ore beneficiation in any of the proposed project.

2.7 PROJECT REQUIREMENT

2.7.1 Water Source & Requirement

Detail of water requirements in KLD as given below:

TABLE 2.15: WATER REQUIREMENT FOR THE PROJECT

*Purpose	Quantity	Source
Dust Suppression	1.0 KLD	From Existing bore wells from nearby area
Green Belt development	1.0 KLD	From Existing bore wells from nearby area

Sanitation & Drinking	0.5 KLD	From existing, bore wells and drinking water will be sourced from Approved water vendors.
Total	2.5 KLD	

Source: Prefeasibility report

* Drinking water will be sourced from Approved Water Vendors

2.7.2 Power and Other Infrastructure Requirement

The project is not required power supply for the mining operations. Machineries will be operated by the source of Diesel. 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.

No workshops are proposed inside the project area hence there will not be any process effluent generation from the project area. Domestic effluent from the mine office will be discharged to septic tank and soak pit. There is no toxic effluent expected to generate in the form of solid, liquid or gaseous form hence there is no requirement of waste treatment plant.

2.7.3 Fuel Requirement

High speed Diesel (HSD) will be used for mining machineries. Diesel will be brought from nearby Fuel Stations.

Gravel:

Per hour Excavator will consume	=	10 liters / hour
Per hour Excavator will excavate	=	60m ³ of Gravel
Gravel quantity	=	4,050/60 = 68 hours
Diesel consume	=	68 hours x 10 liters
Total diesel consumption	=	680 Liters of HSD will be utilized for Gravel

Rough stone:

Per hour Excavator will consume	=	16 liters / hour
Per hour Excavator will excavate	=	20m ³ of Rough Stone
Rough stone quantity	=	6,95,325/20 = 34,767 hours
Diesel consume	=	34,767 hours x 16 liters
Total diesel consumption	=	5,56,260 Liters of HSD will be utilized for Rough stone
Total diesel consumption	=	5,56,940 Liters of HSD will be utilized for entire project life.

2.7.4 Project Cost

Proposed Project Cost is Rs.1,09,51,000/- Corporate Environmental Responsibility Cost is Rs 5,00,000/-

2.8 EMPLOYMENT REQUIREMENT:

The following manpower's are proposed in the mining plan to carry out the day-to-day quarrying activities, the same employment is maintaining aimed at the proposed production target and also to comply with the statutory provisions of The Metalliferous mine's regulations, 1961.

TABLE 2.16: PROPOSED MANPOWER DEPLOYMENT

Particulars	Workers	Numbers
A) Supervisory Category		
	Mine Manager	1
	Geologist	1
B) Skilled Labour		
	Mine Foreman	1
	Mine Mate / Blaster	1
	Excavator Operator	2
	Drivers	4

	Wagon Drill Operator	2
	Water Sprinkling Driver	1
	Jack-Hammer Operator	8
C) Unskilled	Security	1
	Labour & Helper	4
	Co-operator and Cleaner	8
	Total	34

Source: Approved Mining Plan

2.9 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 2.17: EXPECTED TIME SCHEDULE

Sl.No.	Particulars	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
Time line may vary; subjected to rules and regulations /& other unforeseen circumstances							

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

3. DESCRIPTION OF ENVIRONMENT

3.0 GENERAL

This chapter presents a regional background to the baseline data at the very onset, which will help in better appreciation of micro-level field data, generated on several environmental and ecological attributes of the study area. The baseline status of the project environment is described section wise for better understanding of the broad-spectrum conditions. The baseline environment quality represents the background environmental scenario of various environmental components such as Land, Water, Air, Noise, Biological and Socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out covering March, April and May 2025 with CPCB guidelines. Environmental data has been collected with reference to cluster quarries by Global Lab and Consultancy Services, – An accredited by ISO:9001:2015 (NABL) Laboratory for the below attributes –

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

Study Area

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

Study Period

The baseline study was conducted during the Winter season i.e., March, April and May 2025

Study Methodology

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

- Socio-Economic survey was conducted at village and household level in the study area to understand the present socio-economic conditions and assess the extent of impact due to the proposed mining project. The sampling methodologies for the various environmental parameters required for the study, frequency of sampling, method of samples analysis, etc., are given below Table 3.1.

TABLE 3.1: MONITORING ATTRIBUTES AND FREQUENCY OF MONITORING

Attribute	Parameters	Frequency of Monitoring	No. of Locations	Protocol
Land-use Land cover	Land-use Pattern within 10 km radius of the study area	Data's from census handbook 2011 and from the satellite imagery	Study Area	Satellite Imagery Primary Survey
*Soil	Physio-Chemical Characteristics	Once during the study period	6 (1 core & 5 buffer zone)	IS 2720 Agriculture Handbook - Indian Council of Agriculture Research, New Delhi
*Water Quality	Physical, Chemical and Bacteriological Parameters	Once during the study period	6 (2 surface water & 4 ground water)	IS 10500& CPCB Standards
Meteorology	Wind Speed Wind Direction Temperature Cloud cover Dry bulb temperature Rainfall	1 Hourly Continuous Mechanical/Auto matic Weather Station	1	Site specific primary data& Secondary Data from IMD Station
*Ambient Air Quality	PM10 PM2.5 SO2 NOX Fugitive Dust	24 hourly twice a week (December 2022 – February 2023)	7 (2 core & 5 buffer)	IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB
*Noise Levels	Ambient Noise	Hourly observation for 24 Hours per location	7 (1 core & 6 buffer zone)	IS 9989 As per CPCB Guidelines
Ecology	Existing Flora and Fauna	Through field visit during the study period	Study Area	Primary Survey by Quadrate & Transect Study Secondary Data – Forest Working Plan
Socio Economic Aspects	Socio-Economic Characteristics, Population Statistics and Existing Infrastructure in the study area	Site Visit & Census Handbook, 2011	Study Area	Primary Survey, census handbook & need based assessments.

Source: On-site monitoring/sampling by EHS360 Labs Private Limited in association with GEMS

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

3.1 LAND ENVIRONMENT

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

3.1.1 Land Use/ Land Cover

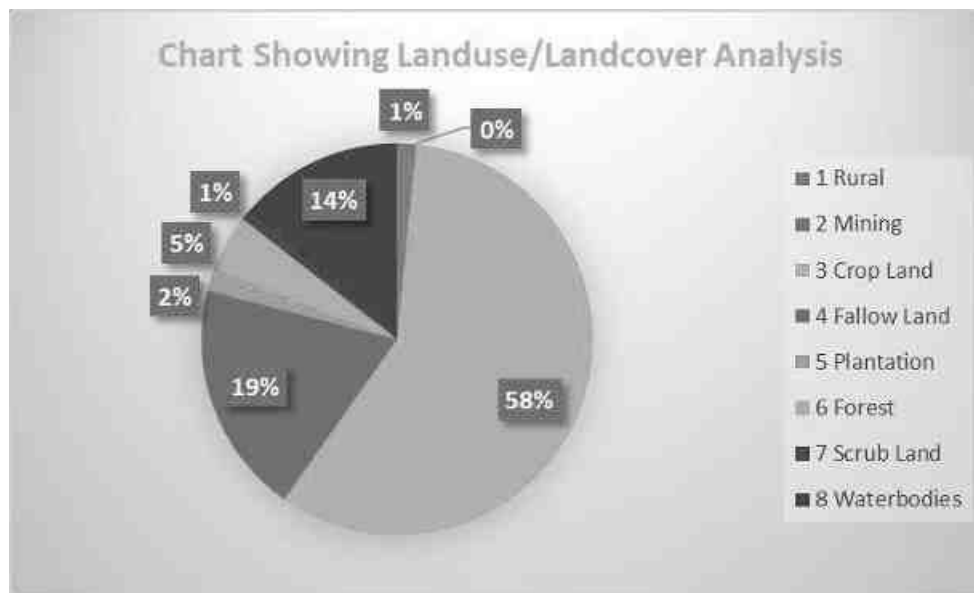
A visual interpretation technique has been adopted for land use classification based on the keys suggested in the chapter – V of the guidelines issued by NNRMS Bangalore & Level III classification with 1:50,000 scale for the preparation of land use mapping. Land use pattern of the area was studied through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

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

S.No	CLASSIFICATION	AREA_HA	AREA_%
BUILTUP			
1	Rural	477.67	1.48
2	Mining	32.44	0.10
AGRICULTURAL LAND			
3	Crop Land	18813.56	58.22
4	Fallow Land	6210.26	19.22
5	Plantation	569.04	1.76
FOREST			
6	Forest	1532.64	4.74
BARREN/WASTE LANDS			
7	Scrub Land	239.20	0.74
WETLANDS/ WATER BODIES			
8	Waterbodies	4437.38	13.73
TOTAL		32312.19	100.00

Source: Survey of India Toposheet and Landsat Satellite Imagery

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



Source: Table 3.2

From the above table, pie diagram and land use map it is inferred that the majority of the land in the study area is Agriculture and fallow land (includes crop land) 79.20% followed by Built-up Lands – 1.58%, Scrub & Forest land – 5.48%, and Water bodies 13.73%.

The total mining area within the study area is 32.44 ha i.e., 0.10%. The cluster area of 6.81.20 ha contributes about 20.9% of the total mining area within the study area. This small percentage of Mining Activities shall not have any significant impact on the environment.

3.1.2 Topography

All the proposed project area is plain terrain, covered with gravel and weathered formation of 2 to 4m thickness; Massive Charnockite formation is found after 2 to 4m gravel and weathered formation which is clearly inferred from the existing quarry pits.

3.1.3 Drainage Pattern of the Area

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

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

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

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

3.1.4 Seismic Sensitivity

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

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

3.1.5 Environmental Features in the Study Area

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

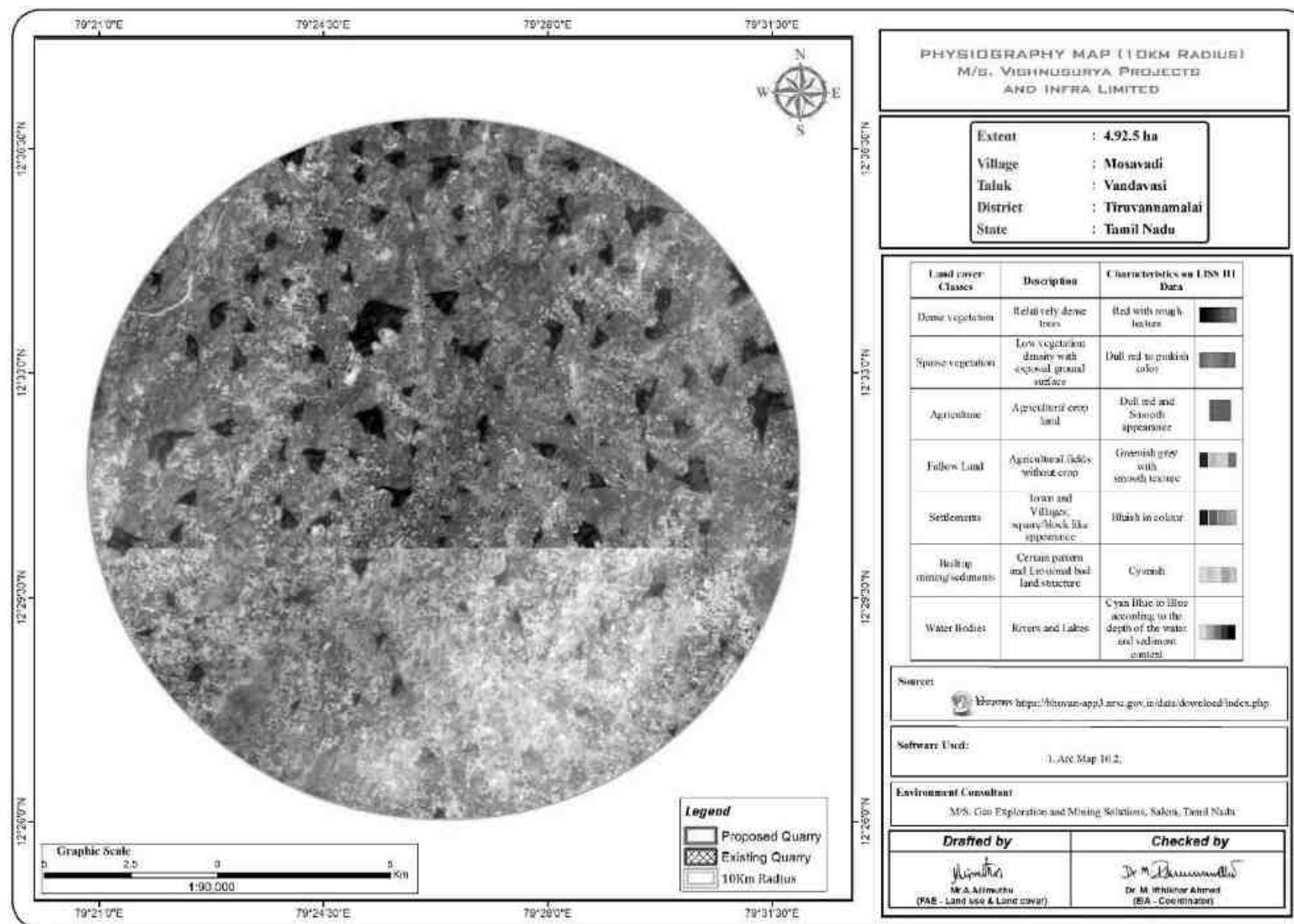
FIGURE 3.2: PHYSIOGRAPHIC MAP OF LISSIII IMAGE AROUNDS 10KM RADIUS

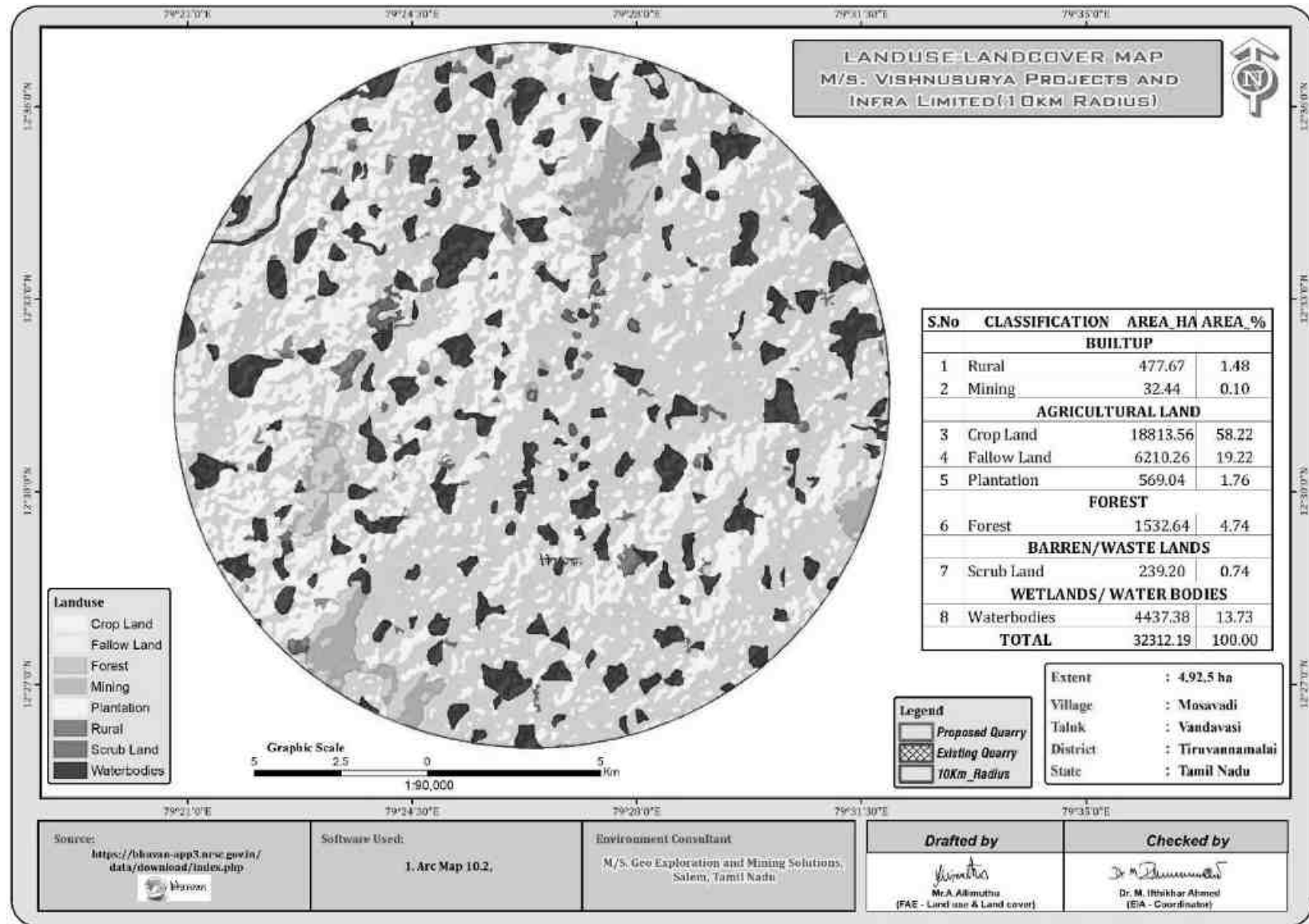
FIGURE 3.2-A: LAND USE LAND COVER MAP 10KM RADIUS

TABLE 3.3: DETAILS OF ENVIRONMENT SENSITIVITY AROUND THE CLUSTER

Sl.No	Sensitive Ecological Features	Name	Arial Distance in km from Cluster
1	National Park / Wild life Sanctuaries	Karikili Bird Sanctuary Vedanthangal Bird Sanctuary	44km-NE 45Km - NE
2	Reserve Forest	Nambedu R.F	4.0 Km North East
3	Tiger Reserve/ Elephant Reserve/ Biosphere Reserve	None	Nil within 10Km Radius
4	Critically Polluted Areas	None	Nil within 10km Radius
5	Mangroves	None	Nil within 10km Radius
6	Mountains/Hills	None	Nil within 10km Radius
7	Notified Archaeological Sites	None	Nil within 10km Radius
8	Industries/ Thermal Power Plants	None	Nil within 10km Radius
9	Defence Installation	None	Nil within 10km Radius

Source: Survey of India Toposheet

TABLE 3.4: NEARBY WATER BODIES FROM THE PROPOSED PROJECT SITE

Sl.No	NAME	DISTANCE & DIRECTION
1	Odai	320m East
2	Tank	330m SE
3	Tank	660m NW
4	Tank	820m SW
5	Tank	4km NW
6	Cheyar River	6.5km NW

Source: Village Cadastral Map and Field Survey

3.1.6 Soil Environment

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

The objective of the soil sampling is -

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

TABLE 3.5: SOIL SAMPLING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	S-1	Core Zone	Project Area	12°31'25.91"N 79°26'23.74"E
2	S-2	Mosavadi	700m SW	12°31'22.66"N 79°25'56.05"E
3	S-3	Pernamallur	4.8km North	12°34'5.42"N 79°25'54.58"E
4	S-4	Mazhaiyur	4.3km SE	12°29'32.52"N 79°27'53.44"E
5	S-5	Tellarampattu	6.7km NW	12°32'6.43"N 79°22'40.03"E
6	S-6	Anaibogi	5.8km East	12°32'14.29"N 79°29'30.55"E

Source: On-site monitoring/sampling by Global Lab and Consultancy Services in association with GEMS

Methodology –

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

TABLE 3.6: METHODOLOGY OF SAMPLING COLLECTION

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

Source: On-site monitoring/sampling by Global Lab and Consultancy Services in association with GEMS

Soil Testing Result –

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

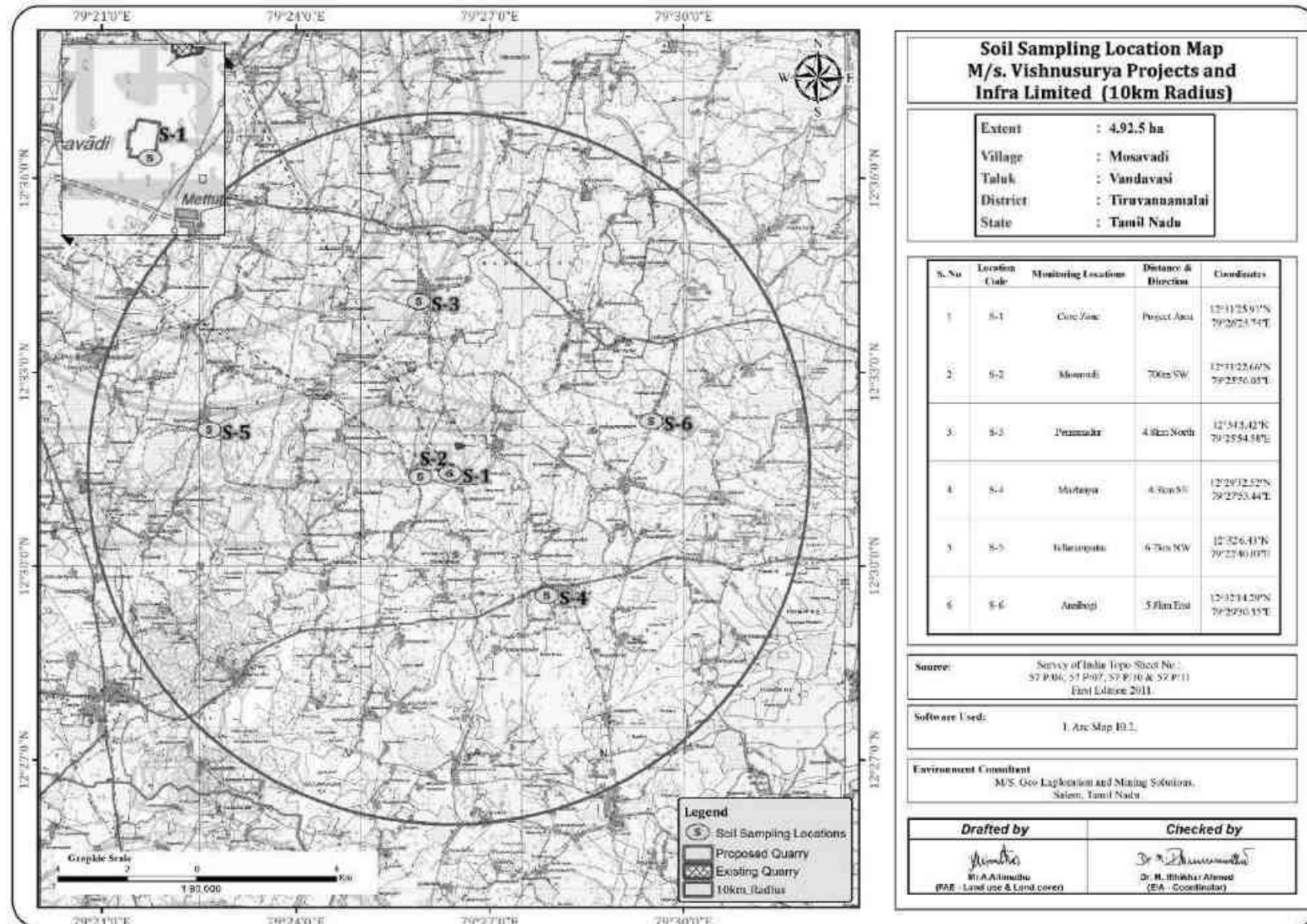
FIGURE 3.3: SOIL SAMPLING LOCATIONS AROUND 10 KM RADIUS

FIGURE 3.4: SOIL MAP

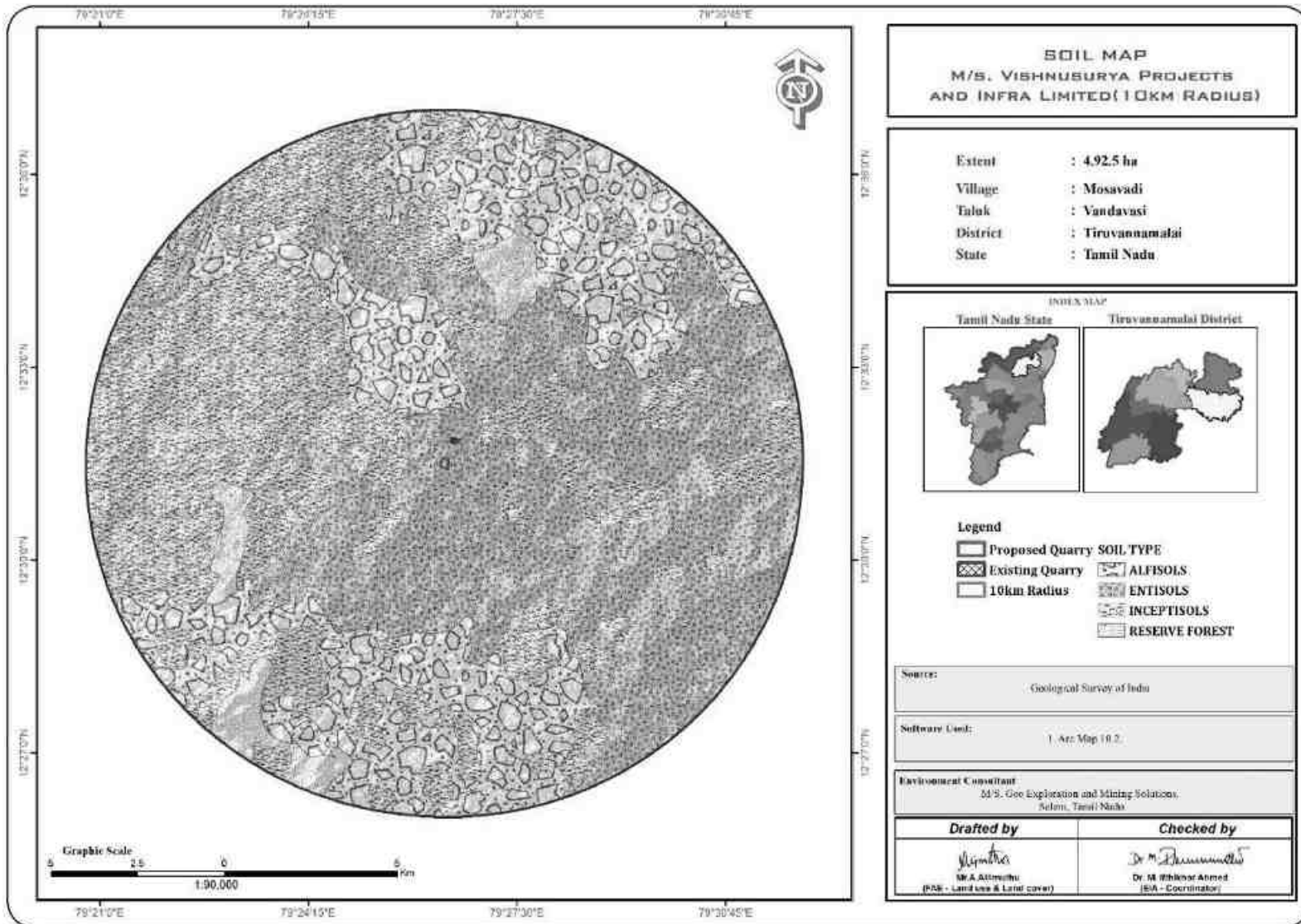


TABLE 3.7: SOIL QUALITY OF THE STUDY AREA

Parameter		Units	S-1 Core Zone	S-2 Near Existing Quarry	S-3 Vallam	S-4 Perumanallur	S-5 Thellarampattu	S-6 Panthamangala m
1	Available Nitrogen as N	kg/ha	413.1	330.9	411.3	350.9	300.4	335.9
2	Available Phosphorous(as P)	mg/kg	14.0	14.2	14.4	15.0	15.4	15.9
3	Boron	mg/kg	11.21	8.54	7.50	6.93	7.99	8.25
4	Bulk Density	g/cc	1.108	1.005	1.004	1.002	0.99	0.98
5	Cadmium	mg/kg	7.68	3.42	BDL(DL:0.5)	5.20	3.93	4.48
6	Cation Exchange Capacity	meq/100g	52.5	33.5	44.7	37.7	41.2	44.8
7	Chlorides (as Cl-) in saturation extract	meq/l	6.8	10.1	9.7	14.6	8.3	11.5
8	Chromium	mg/kg	21.79	8.80	6.61	16.52	8.62	8.54
9	Copper	mg/kg	7.89	0.39	0.13	4.13	0.38	3.62
10	Exchangeable Calcium (as Ca)	meq/100g	0.4	2.3	3.6	2.1	1.7	1.7
11	Exchangeable Magnesium (as Mg)	meq/100g	0.2	1.8	1.8	1.2	1.1	0.9
12	Iron	mg/kg	46.28	28.78	23.51	36.65	23.58	44.56
13	Lead	mg/kg	0.83	0.92	0.51	0.53	1.90	1.01
14	Manganese	mg/kg	17.02	5.12	1.91	13.46	11.66	BDL(DL:0.5)
15	Organic Carbon	%	0.085	0.2518	0.3155	0.38	0.3764	0.3888
16	Organic Matter	%	0.147	0.434	0.544	0.660	0.6489	0.67
17	pH Value	-	6.80	7.02	6.81	7.09	6.28	5.86
18	Soluble Potassium (as K) in saturation extract	mg/100g	0.89	0.64	0.83	0.85	0.91	0.987
19	Specific Electrical Conductivity	μS/cm	380	457	501	436	329	394
20	Sulphate (as SO4)	mg/100g	2.82	4.07	4.04	4.40	5.15	5.2
21	Texture : Clay	%	37.13	41.22	36.35	37.11	36.26	37.68
22	Texture : Sand	%	19.51	12.36	21.55	14.00	17.17	18.38
23	Texture : Silt	%	43.36	46.61	42.10	48.89	46.56	43.94
24	Water Holding Capacity	%	50	37.0	46.0	48.0	40.0	43.6
25	Zinc	mg/kg	22.83	16.95	16.27	8.80	11.03	17.51

Source: Sampling Results by EHS360 Labs 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 Loam Soil and Bulk Density of Soils in the study area varied between 0.98 – 1.108 g/cc. The Water Holding Capacity of the soil samples is found to be medium i.e. ranging from 37 – 50 %.

Chemical Characteristics –

- The nature of soil is slightly alkaline to strongly alkaline with pH range 5.86 to 7.09
- The available Nitrogen content range between 300.4 to 413.1 kg/ha
- The available Phosphorus content range between 14 to 15.9 kg/ha
- The available Potassium range between 0.64 to 0.98 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:

Cheyar River is the major surface water body in the study area and the rainfall over the area is moderate, the rainwater storage in open wells and trenches are in practice over the area and the stored water acts as source of drinking water for few months after rainy season.

3.2.2 Ground Water Resources:

Groundwater occurs in all the crystalline formations of oldest Achaeans and Recent Alluvium. The occurrence and behaviour of groundwater are controlled by rainfall, topography, geomorphology, geology, structures etc.

Ground water occurring in phreatic conditions in weathered and fractured gneiss rock formation. The weathering is controlled by the intensity of weathering and fracturing. Dug wells as wells as bore wells are more common ground water abstraction structures in the area. The diameter of the dug well is in the range of 7 to 10 m and depth of dug wells range from 7.2 to 13 m bgl. The dug wells yield up to 1 lps in summer months and few wells remains dry. The yield is adequate for irrigation for one or two crops in monsoon period.

3.2.3 Methodology

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

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

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

TABLE 3.8: WATER SAMPLING LOCATIONS

S.NO	CODE	LOCATIONS	DISTANCE & DIRECTION	COORDINATES
SURFACE WATER				
1	SW-1	Cheybaru River	9km NW	12°34'41.36"N 79°22'32.70"E
2	SW-2	Tank Near Thenkarai	4.7km SE	12°30'24.90"N 79°28'49.79"E
GROUND WATER				
3	WW-1	Near Project Area	130m SE	12°31'26.21"N 79°26'29.43"E
4	WW-2	Pernamallur	4.8km North	12°34'13.52"N 79°25'52.67"E
5	BW-1	Near Project Area	230m NW	12°31'34.92"N 79°26'11.76"E
6	BW-2	Anaibogi	5.8km East	12°32'16.33"N 79°29'31.43"E

Source: On-site monitoring/sampling by Global Lab and Consultancy Services in association with GEMS

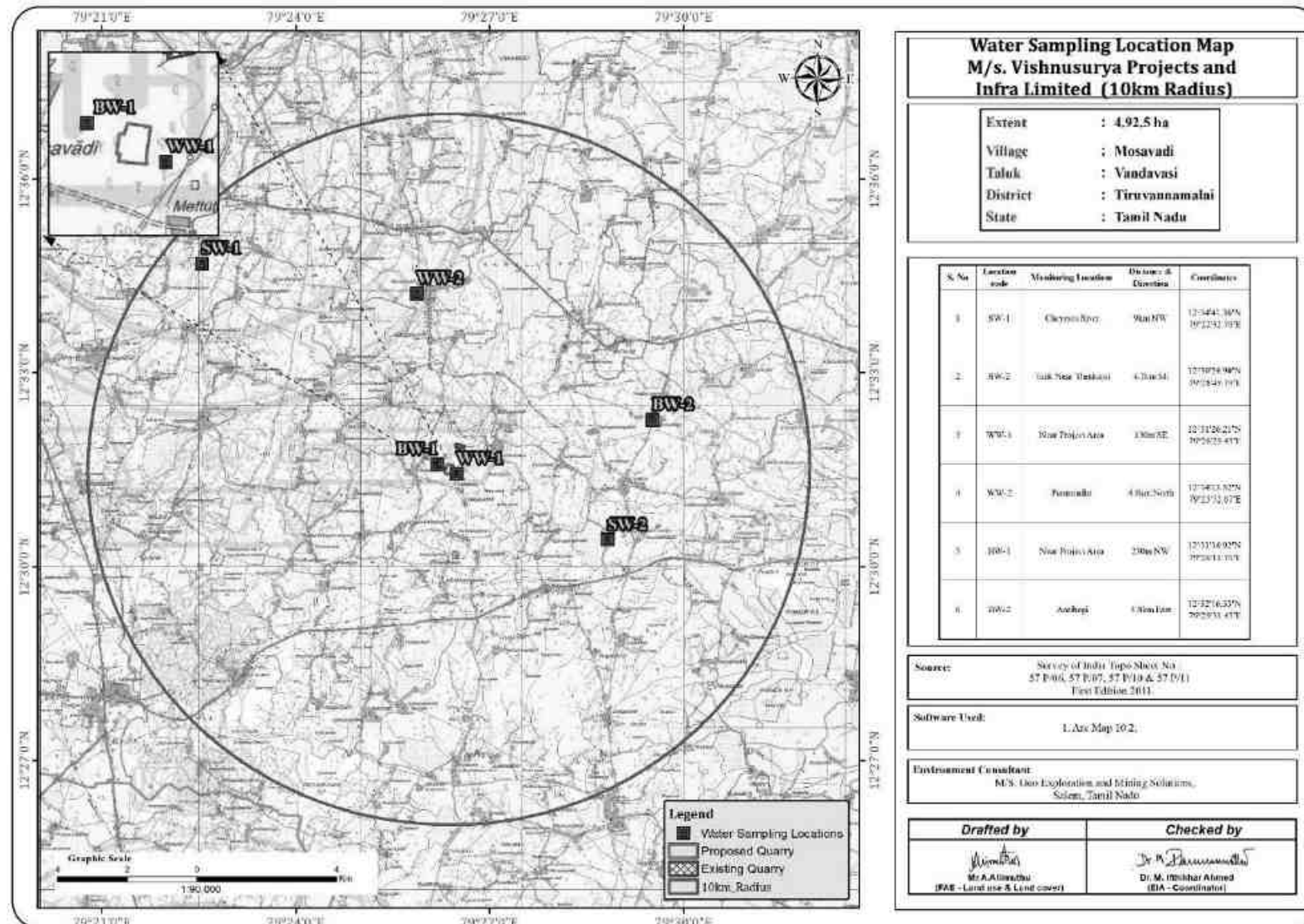
FIGURE 3.5: WATER SAMPLING LOCATIONS AROUND 10 KM RADIUS

TABLE 3.9: GROUND WATER SAMPLING RESULTS

S.NO	Parameter	Units	WW-1 Near project area	WW-2 Pernamallur	BW-1 Near Project Area	BW-2 Anaibogi
1	Aluminium	mg/l	BDL(DL: 0.01)	0.020	BDL(DL: 0.01)	BDL(DL: 2.0)
2	Ammoniacal Nitrogen as NH ₃ -N	mg/l	BDL(DL: 1.0)	BDL(DL: 1.0)	BDL(DL: 1.0)	BDL(DL: 1.0)
3	Arsenic as As	mg/l	BDL(DL: 0.002)	BDL(DL: 0.002)	BDL(DL: 0.002)	BDL(DL: 0.002)
4	Barium as Ba	mg/l	BDL(DL: 0.1)	0.01	0.012	BDL(DL: 0.01)
5	Boron as B	mg/l	BDL(DL: 0.1)	BDL(DL: 1.0)	BDL(DL: 0.1)	BDL(DL: 0.1)
6	Cadmium as Cd	mg/l	BDL(DL: 0.01)	BDL(DL: 0.01)	BDL(DL: 0.01)	BDL(DL: 0.01)
7	Calcium as Ca	mg/l	70.5	72.1	67.3	65.7
8	Chloride as Cl ⁻	mg/l	327.8	323.8	311.9	299.9
9	Chromium as Cr	mg/l	BDL(DL: 0.01)	BDL(DL: 0.01)	BDL(DL: 0.01)	BDL(DL: 0.1)
10	Color	CU	< 1	< 1	< 1	< 1
11	Copper as Cu	mg/l	BDL(DL: 0.01)	BDL(DL: 0.01)	BDL(DL: 0.01)	BDL(DL: 0.01)
12	Cyanide as CN	mg/l	BDL(DL: 0.02)	BDL(DL: 0.02)	BDL(DL: 0.02)	BDL(DL: 0.01)
13	Electrical Conductivity (EC)	μS/cm	1480.0	1458	1372	1344
14	Fluoride as F ⁻	mg/l	0.35	0.35	0.34	0.35
15	Free Residual Chlorine as Cl ₂	mg/l	BDL(DL: 1.0)	BDL(DL: 1.0)	BDL(DL: 1.0)	BDL(DL: 1.0)
16	Iron as Fe	mg/l	0.41	0.352	0.35	0.42
17	Lead as Pb	mg/l	BDL(DL: 0.01)	BDL(DL: 0.01)	BDL(DL: 0.01)	BDL(DL: 0.01)
18	Magnesium as Mg	mg/l	41.8	35.9	35.9	31.1
19	Manganese as Mn	mg/l	BDL(DL: 0.1)	BDL(DL: 0.1)	BDL(DL: 0.1)	BDL(DL: 0.1)
20	Mercury as Hg	mg/l	BDL(DL: 0.002)	BDL(DL: 0.002)	BDL(DL: 0.002)	BDL(DL: 0.002)
21	Molybdenum as Mo	mg/l	BDL(DL: 0.01)	BDL(DL: 0.01)	BDL(DL: 0.01)	BDL(DL: 0.01)
22	Nitrate as NO ₃	mg/l	BDL(DL: 2.0)	BDL(DL: 2.0)	BDL(DL: 2.0)	BDL(DL: 2.0)
23	Odor	-	Agreeable	Agreeable	Agreeable	Agreeable
24	pH	-	7.19	7.36	7.29	7.41
25	Phenols	mg/l	BDL(DL: 0.1)	BDL(DL: 0.1)	BDL(DL: 0.1)	BDL(DL: 0.1)
26	Selenium as Se	mg/l	BDL(DL: 0.005)	BDL(DL: 0.005)	BDL(DL: 0.005)	BDL(DL: 0.005)
27	Sulphate as SO ₄	mg/l	42.0	48.6	35.3	40.3
28	Sulphide as S (Iodometric Method)	mg/l	BDL(DL: 1.0)	BDL(DL: 1.0)	BDL(DL: 1.0)	BDL(DL: 1.0)
29	Total Alkalinity as CaCO ₃	mg/l	272	268	264	244
30	Total Dissolved Solids (TDS)	mg/l	873	860	809	793
31	Total Hardness as CaCO ₃	mg/l	348	328	316	292
32	Total Suspended Solids (TSS)	mg/l	BDL(DL: 2.0)	BDL(DL: 2.0)	BDL(DL: 2.0)	BDL(DL: 2.0)
33	Turbidity	NTU	< 1	< 1	< 1	< 1
34	Zinc as Zn	mg/l	BDL(DL: 0.01)	BDL(DL: 0.01)	BDL(DL: 0.01)	BDL(DL: 0.01)
35	Escherichia coli	MPN/100ml	Absent	Absent	Absent	Absent
36	Total Coliforms	MPN/100ml	Present	Present	Present	Absent

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

TABLE 3.10: SURFACE WATER SAMPLING RESULTS

Sl. No.	Parameter	Unit	RESULT	
			SW1 - (Tank Near Thenkarai)	SW2 - (Cheyyaru)
1	Aluminium	mg/l	BDL(DL: 0.01)	0.012
2	Ammoniacal Nitrogen as NH ₃ -N	mg/l	BDL(DL: 1.0)	BDL(DL: 1.0)
3	Arsenic as As	mg/l	BDL(DL: 0.002)	BDL(DL: 0.002)
4	Barium as Ba	mg/l	BDL(DL: 0.01)	0.125
5	Biochemical Oxygen Demand (BOD) at 27°C for 3 Days	mg/l	8.0	10.8
6	Boron as B	mg/l	BDL(DL: 0.1)	BDL(DL: 0.1)
7	Cadmium as Cd	mg/l	BDL(DL: 0.01)	BDL(DL: 0.01)
8	Calcium as Ca	mg/l	109	84.9
9	Chemical Oxygen Demand (COD)	mg/l	20.0	30.0
10	Chloride as Cl ⁻	mg/l	369.8	341.8
11	Chromium as Cr	mg/l	BDL(DL: 0.01)	BDL(DL: 0.01)
12	Color	CU	<1	<1
13	Copper as Cu	mg/l	BDL(DL: 0.01)	BDL(DL: 0.01)
14	Cyanide as CN	mg/l	BDL(DL: 0.01)	BDL(DL: 0.01)
15	Dissolved Oxygen (DO)	mg/l	8.2	6.9
16	Electrical Conductivity	µS/cm	1762	1660
17	Fluoride as F ⁻	mg/l	0.38	0.37
18	Free Residual Chlorine as Cl ₂	mg/l	BDL(DL: 1.0)	BDL(DL: 1.0)
19	Iron as Fe	mg/l	0.40	0.50
20	Lead as Pb	mg/l	BDL(DL: 0.01)	BDL(DL: 0.01)
21	Magnesium as Mg	mg/l	32.1	43.7
22	Manganese as Mn	mg/l	BDL(DL: 0.1)	BDL(DL: 0.1)
23	Mercury as Hg	mg/l	BDL(DL: 0.002)	BDL(DL: 0.002)
24	Molybdenum as Mo	mg/l	BDL(DL: 0.01)	BDL(DL: 0.01)
25	Nitrate as NO ₃	mg/l	2.6	5.1
26	Odor	-	Agreeable	Agreeable
27	pH	-	7.83	7.91
28	Phenols	mg/l	BDL(DL: 0.1)	BDL(DL: 0.1)
29	Selenium as Se	mg/l	BDL(DL: 0.005)	BDL(DL: 0.005)
30	Sulphate as SO ₄	mg/l	64.8	72.3
31	Sulphide as S (Iodometric Method)	mg/l	BDL(DL: 1.0)	BDL(DL: 1.0)
32	Total Alkalinity as CaCO ₃	mg/l	328	308
33	Total Dissolved Solids (TDS)	mg/l	1039	979
34	Total Hardness as CaCO ₃	mg/l	404	392
35	Total Suspended Solids	mg/l	BDL(DL: 2.0)	3.0
36	Turbidity	NTU	3.0	4.0
37	Zinc as Zn	mg/l	BDL(DL: 0.01)	BDL(DL: 0.01)
38	Escherichia coli	MPN/100ml	Absent	Absent
39	Total Coliforms	MPN/100ml	Absent	Absent

3.2.4 Interpretation & Conclusion

Surface Water

PH:

The pH varied from 7.83 to 7.91 while turbidity found within the standards (Optimal pH range for sustainable aquatic life is 6.5 to 8.5 pH).

Total Dissolved Solids:

Total Dissolved Solids varied from 979 to 1039 mg/l, the TDS mainly composed of carbonates, bicarbonates, Chlorides, phosphates and nitrates of calcium, magnesium, sodium and other organic matter.

Other parameters:

Chloride content is 341.8 – 369.8 mg/l. Nitrates varied from 2.6 to 5.1 mg/l, while sulphates varied from 64.8 to 72.3 mg/l.

Ground Water

The pH of the water samples collected ranged from 7.19 to 7.41 and within the acceptable limit of 6.5 to 8.5. pH, Sulphates and Chlorides of water samples from all the sources are within the limits as per the Standard. On Turbidity, the water samples meet the requirement. The Total Dissolved Solids were found in the range of 793 – 873 mg/l in all samples. The Total hardness varied between 292 – 348 mg/l for all samples.

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

3.2.5 Hydrology and Hydrogeological studies

The district is underlain by hard rock formation fissured and fractured crystalline rocks constitute the important aquifer systems in the district. Geophysical prospecting was carried out in that area by SSRMP-80 Instrument by qualified Geo physicist with the help of IGIS software and it was inferred that the low resistance encountered at the depth beyond 150m. The maximum depth proposed out of proposed projects is 83m BGL. Hence there is no possibilities of water table intersection during the entire mine life period besides it is also inferred topographically that there are no major water bodies intersecting the project area. There is no necessity of stream, channel diversion due to these proposed projects.

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

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

Station Code	Water Level in Meters bgl				Latitude	Longitude
	Mar-25	Apr-25	May-25	Average		
OW1	12.4	13.2	13.8	13.1	79° 26' 29.4748" E	12° 31' 26.2558" N
OW2	12.2	13	13.6	12.9	79° 26' 53.6888" E	12° 31' 28.7401" N
OW3	11.5	12.3	12.9	12.2	79° 26' 20.9423" E	12° 30' 56.2529" N
OW5	12	12.8	13.4	12.7	79° 25' 57.4846" E	12° 31' 17.7309" N
OW4	11.4	12.2	12.8	12.1	79° 25' 47.3271" E	12° 31' 39.2174" N
OW6	11.9	12.7	13.3	12.6	79° 26' 04.2811" E	12° 32' 09.2674" N
OW7	11.3	12.1	12.7	12.0	79° 26' 34.9834" E	12° 31' 35.3347" N
OW8	11.2	12	12.6	11.9	79° 27' 18.9041" E	12° 31' 42.3247" N

Source: Onsite monitoring data

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

Station Code	Water Level in Meters bgl				Latitude	Longitude
	Mar-25	Apr-25	May-25	Average		
BW1	84	84.8	85.2	84.7	79° 26' 11.6661" E	12° 31' 34.9678" N
BW2	84.7	85.5	85.9	85.4	79° 25' 45.4380" E	12° 31' 27.6383" N
BW3	84.2	85	85.4	84.9	79° 27' 10.3952" E	12° 31' 39.4235" N
BW4	84.9	85.7	86.1	85.6	79° 26' 24.0203" E	12° 32' 03.1782" N
BW5	84.8	85.6	86	85.5	79° 26' 34.6063" E	12° 31' 10.3415" N
BW6	84.6	85.4	85.8	85.3	79° 26' 04.9971" E	12° 31' 45.3448" N
BW7	84.5	85.3	85.7	85.2	79° 26' 05.4551" E	12° 32' 08.9376" N

Source: Onsite monitoring data

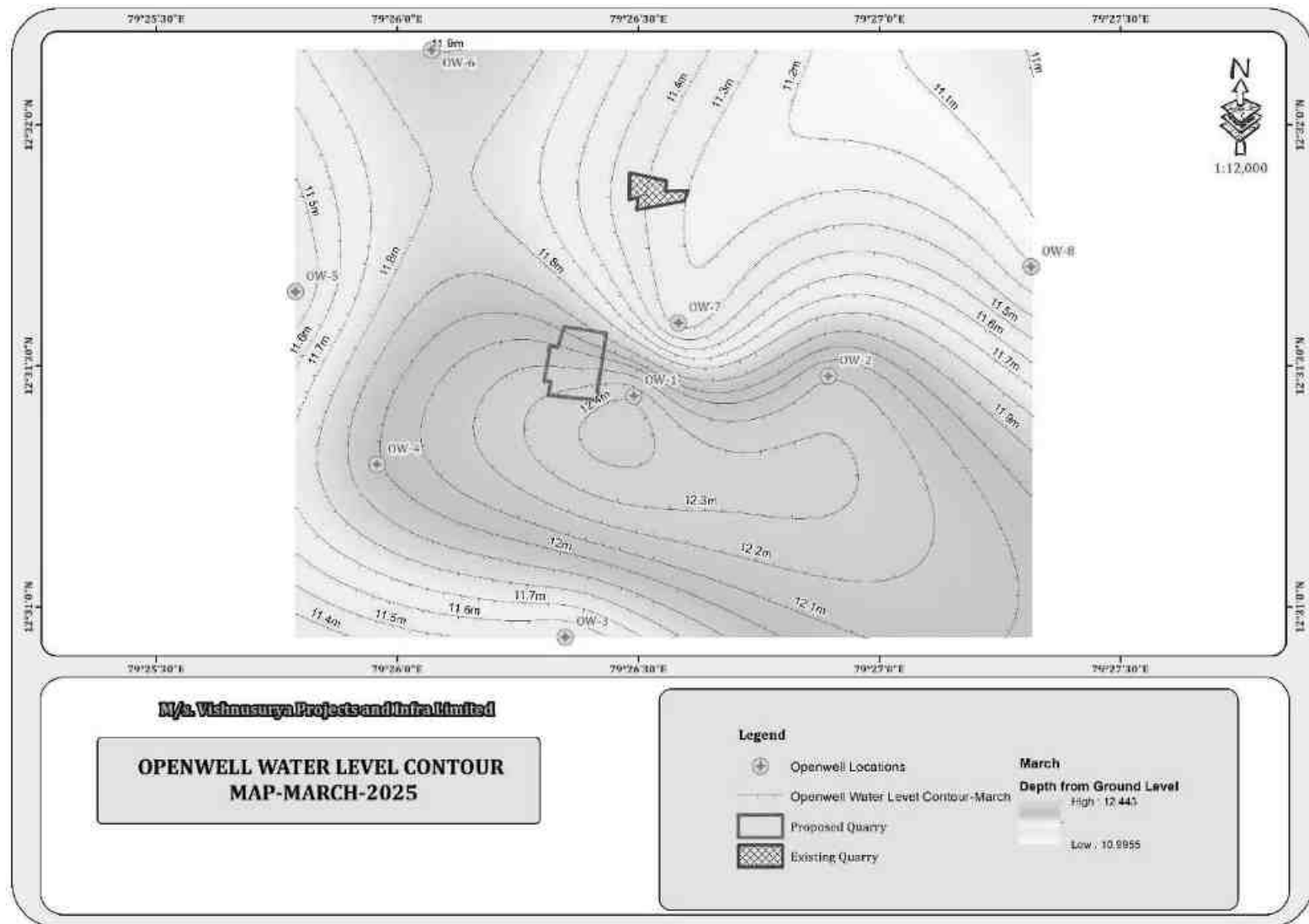
FIGURE 3.6: OPEN WELL CONTOUR MAP – MARCH 2025

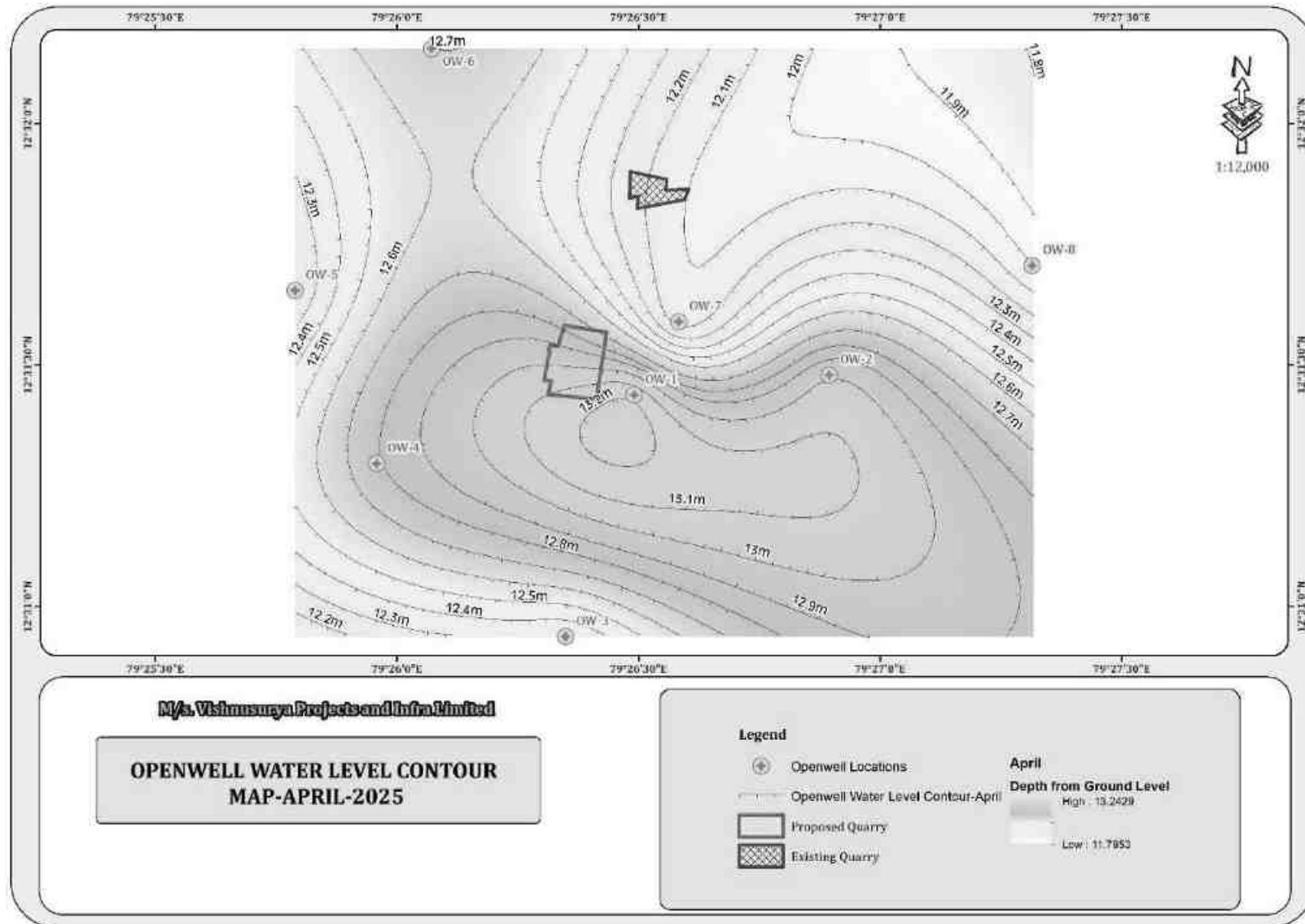
FIGURE 3.7: OPEN WELL CONTOUR MAP – APRIL 2025

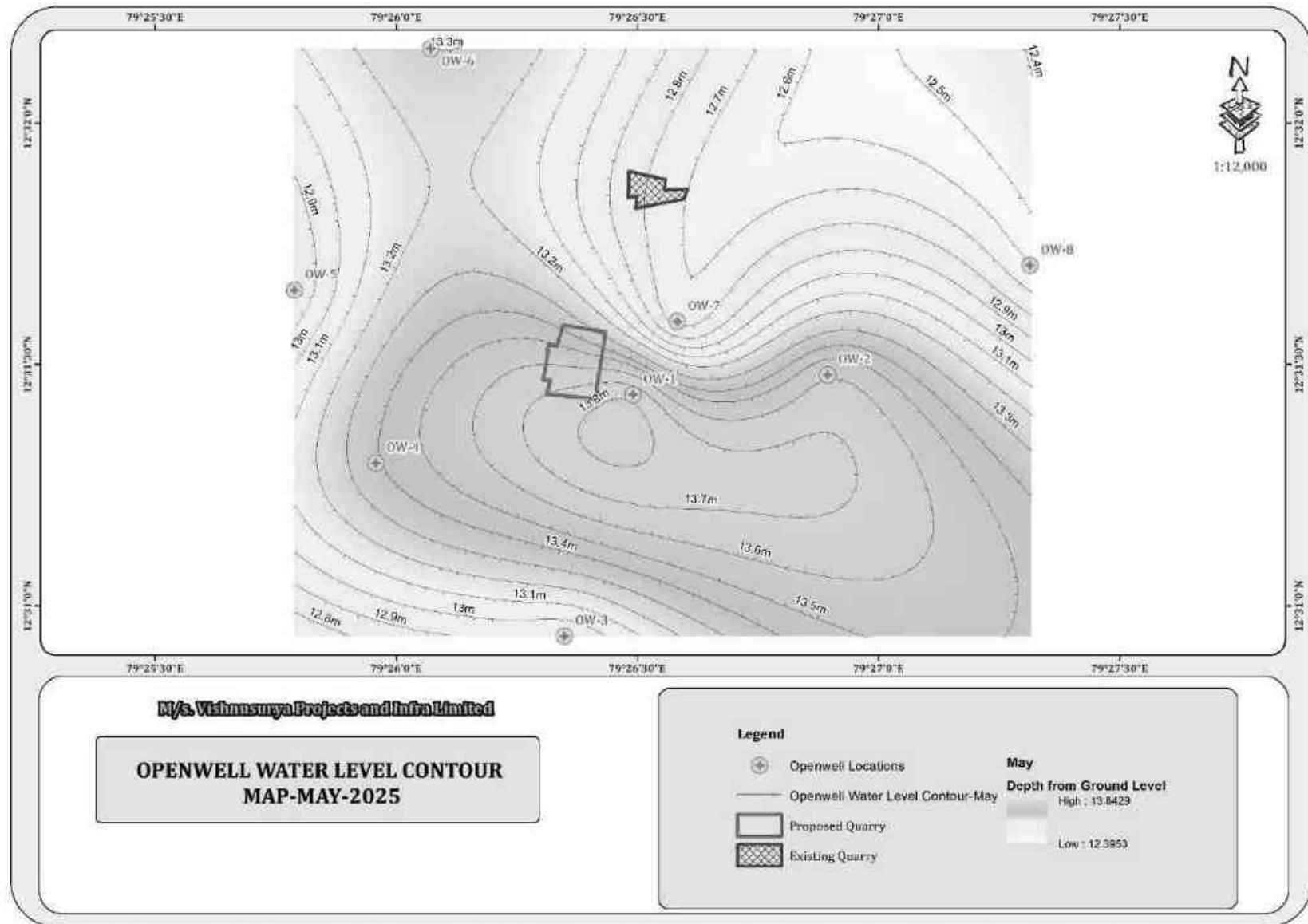
FIGURE 3.8: OPEN WELL CONTOUR MAP – MAY 2025

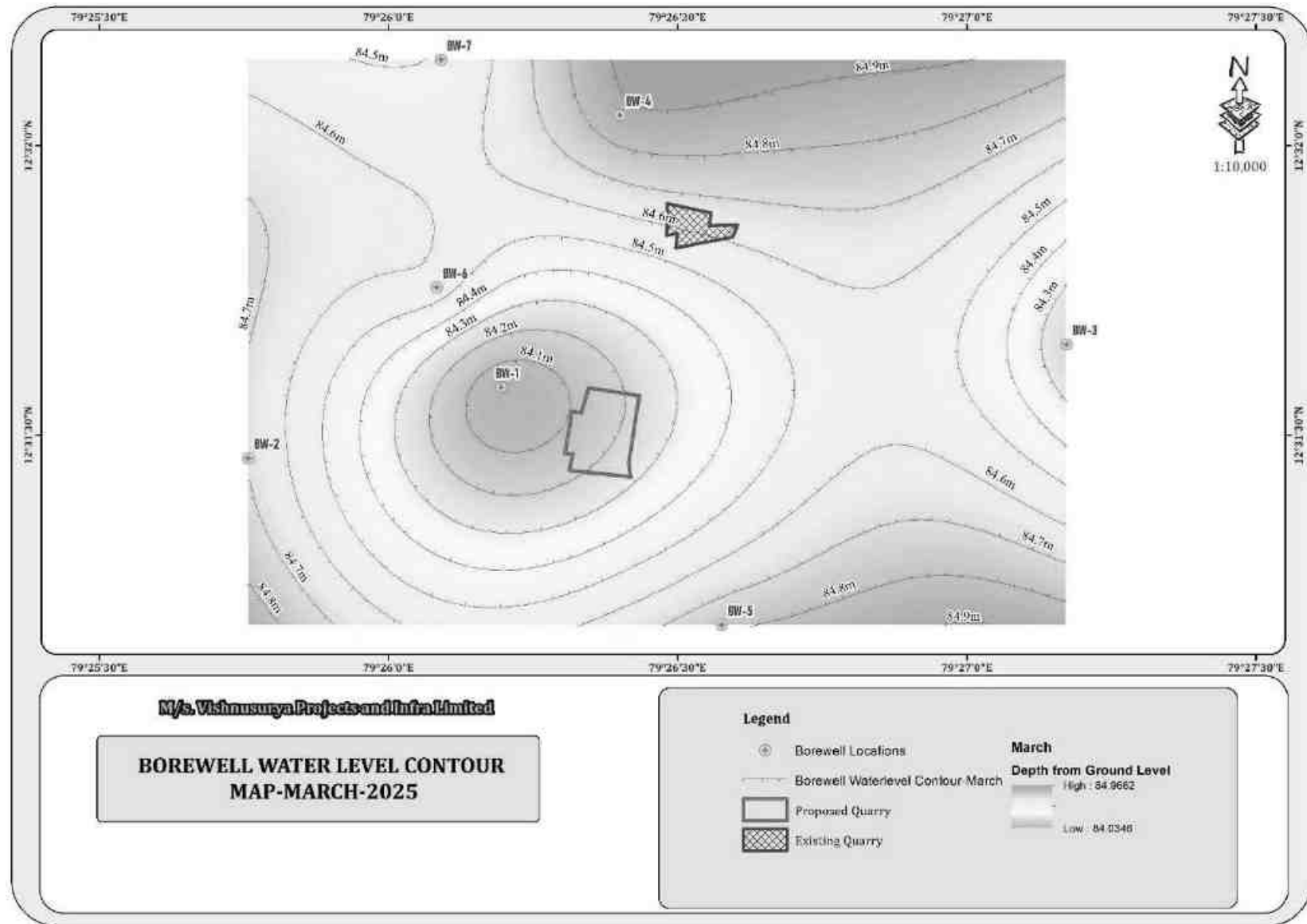
FIGURE 3.9: BOREWELL CONTOUR MAP – MARCH 2025

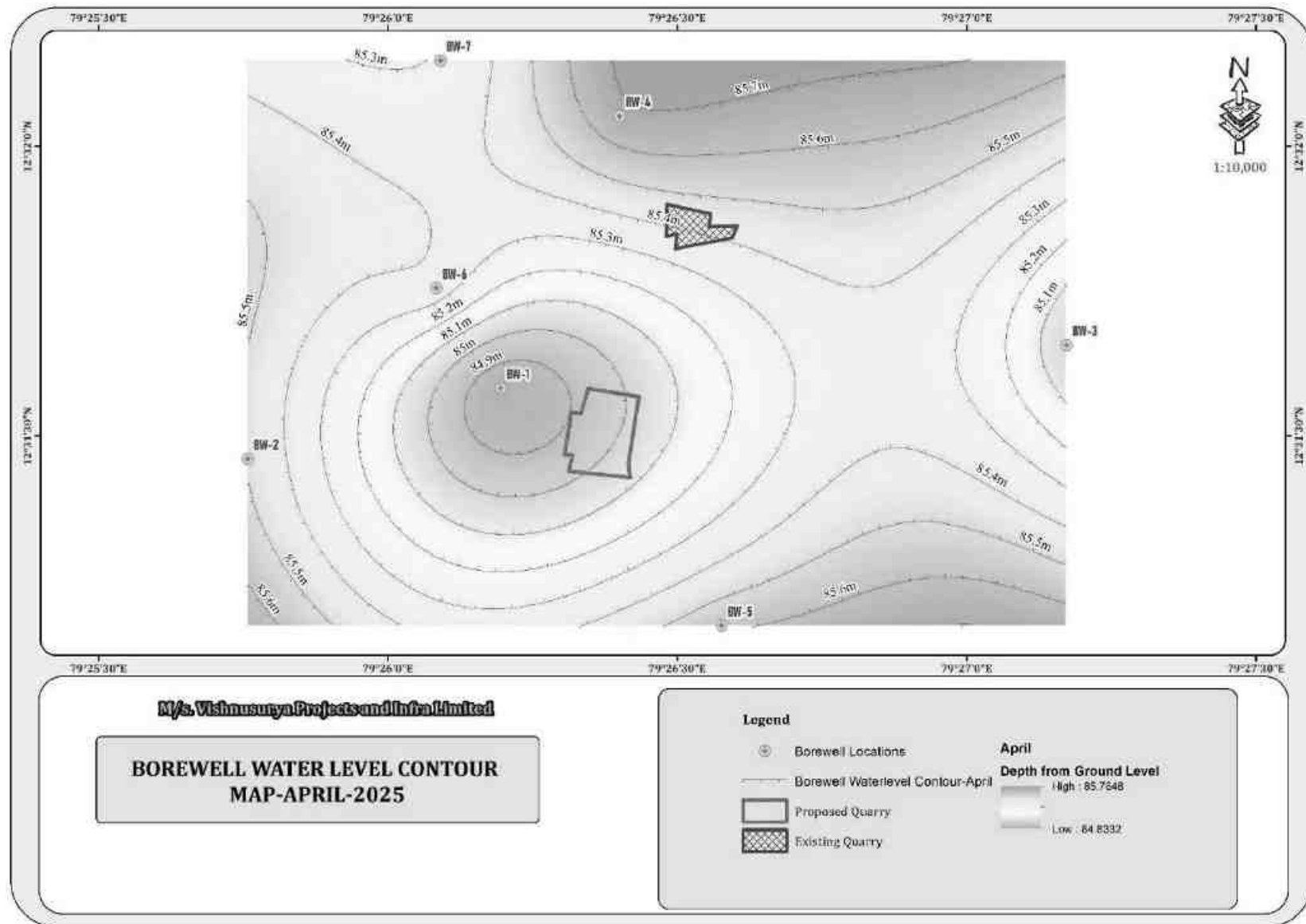
FIGURE 3.10: BOREWELL CONTOUR MAP – APRIL 2025

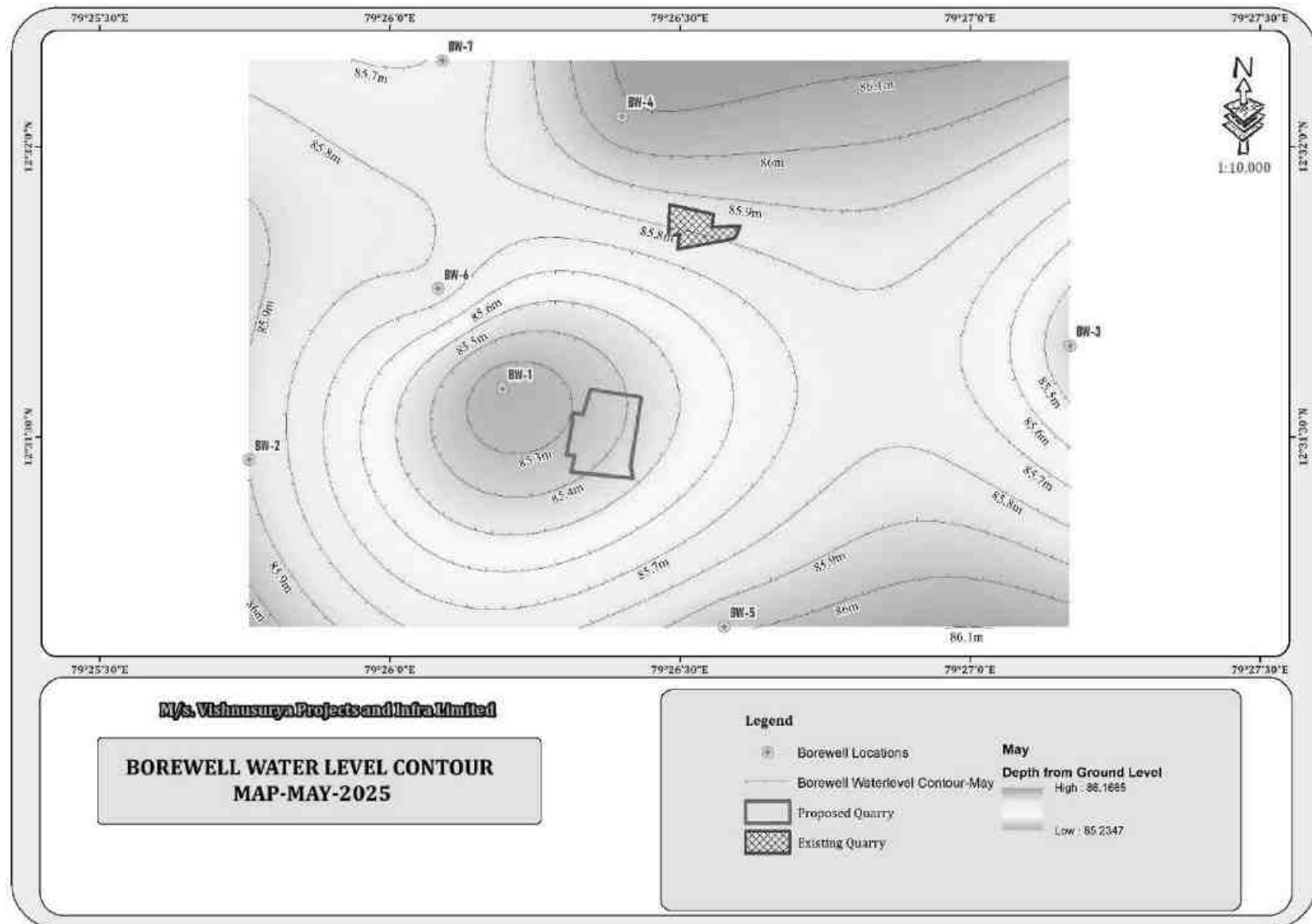
FIGURE 3.11: BOREWELL CONTOUR MAP – MAY 2025

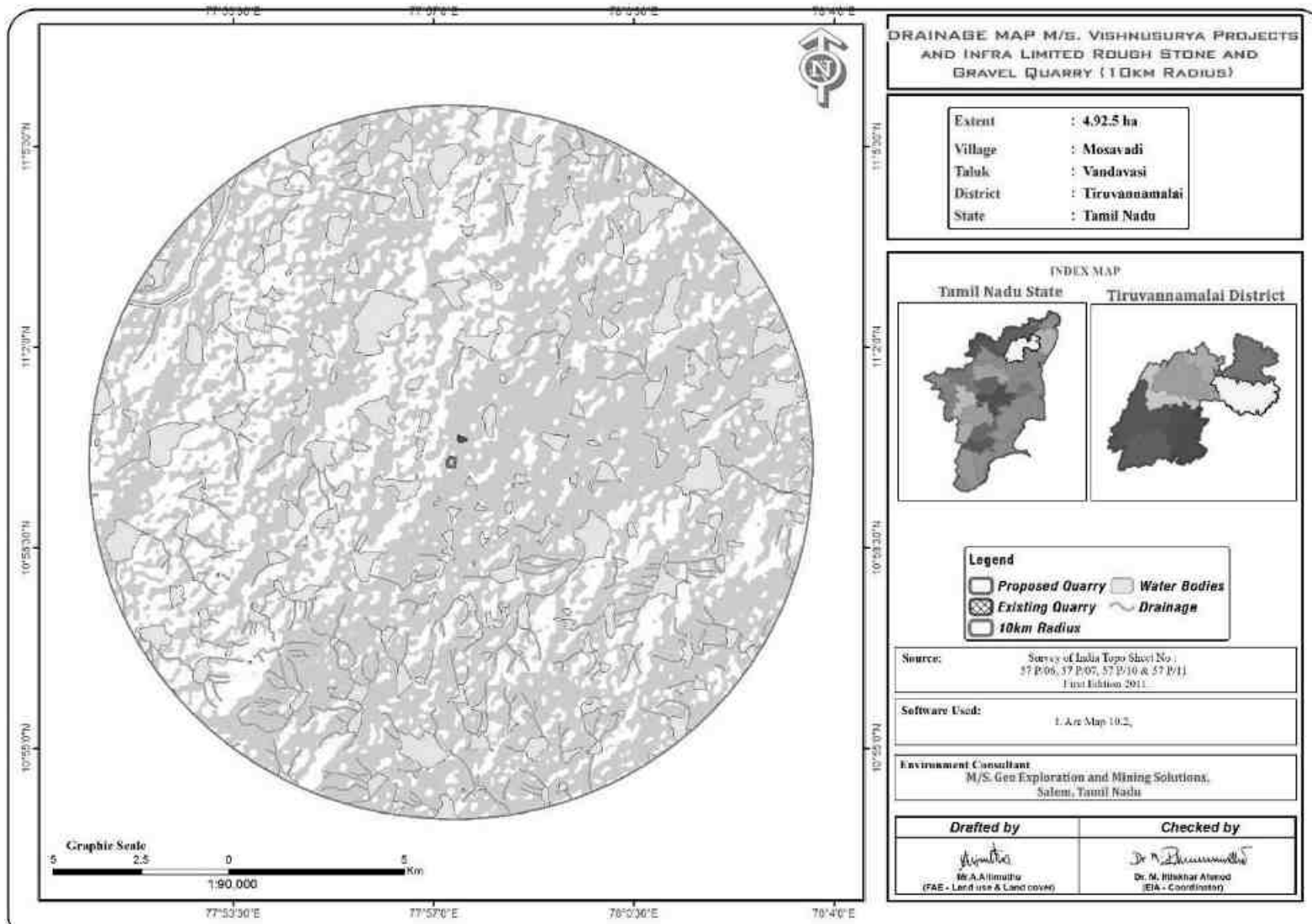
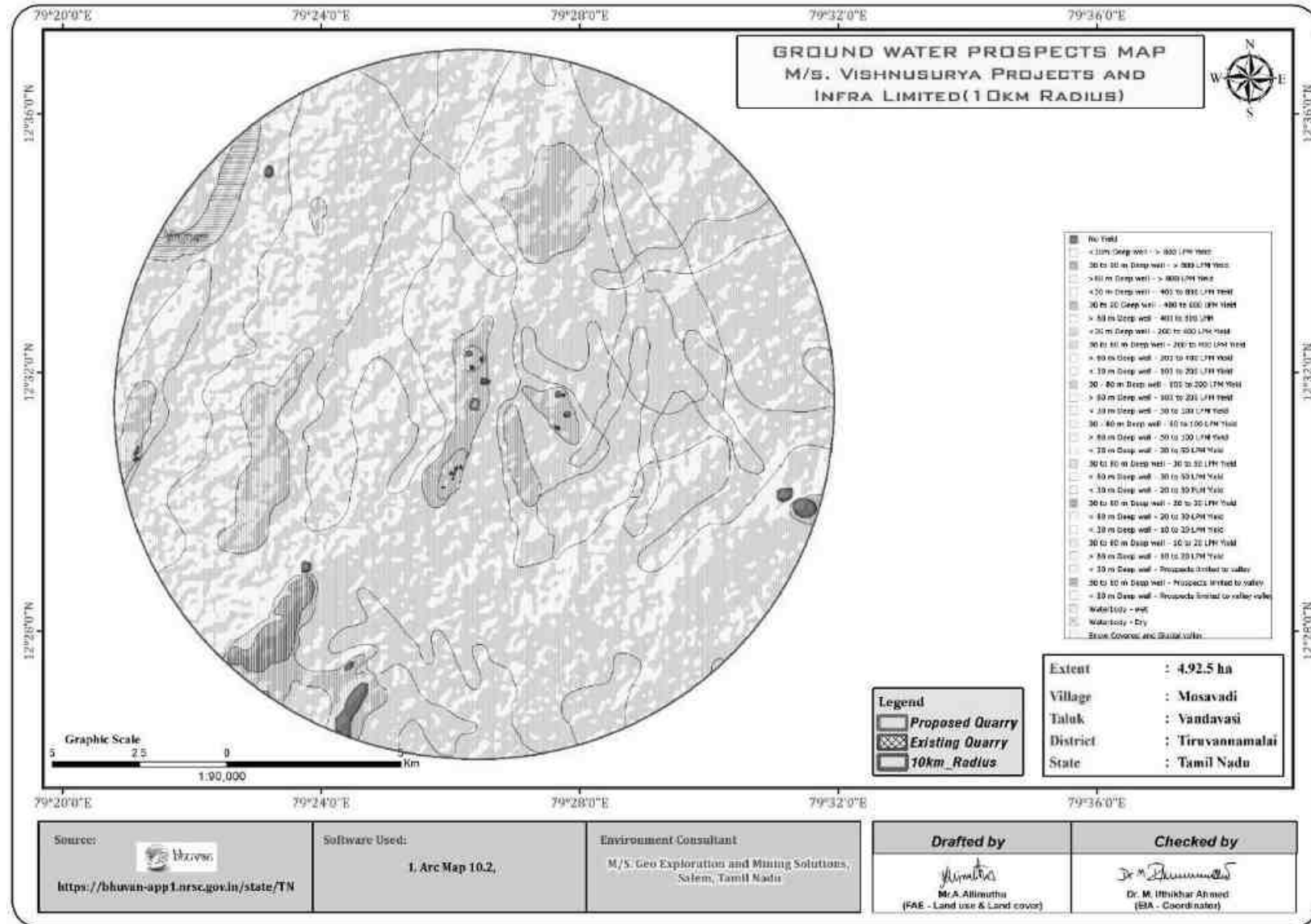
FIGURE 3.12: DRAINAGE MAP AROUND 10 KM RADIUS FROM PROJECT SITE

FIGURE 3.13: GROUND WATER PROSPECT MAP

3.2.5.1 Methodology and Data Acquisition

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

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

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

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

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

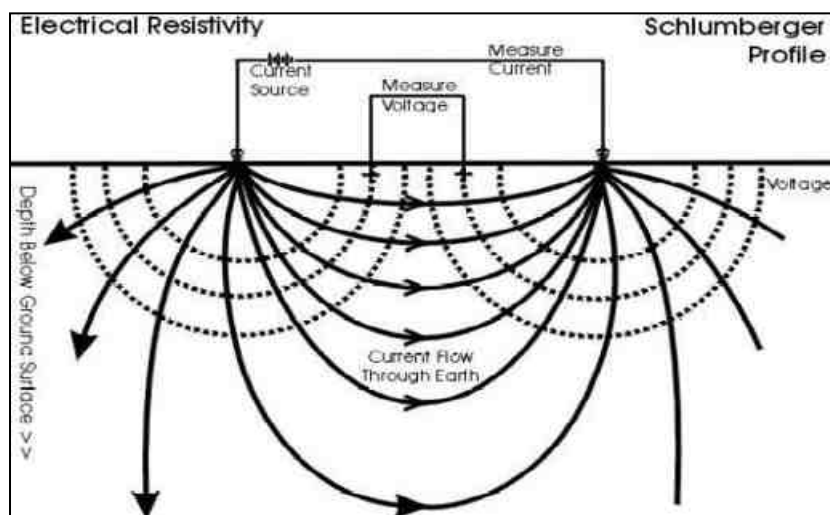
A = Constants with values ranging from 0.5 to 2.5

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 beyond 150m. The maximum depth proposed out of proposed projects is 83m BGL. Hence there is no possibilities of water table intersection during the entire mine life period besides it is also inferred topographically that there are no major water bodies intersecting the project area.

3.2.5.4 Geophysical Data Interpretation

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

3.3 AIR ENVIRONMENT

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

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

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

3.3.1 Meteorology & Climate

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

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

Climate –

- The climatic conditions of Tiruvannamalai are characterized by a tropical climate. In Tiruvannamalai, the quantity of rainfall during summers surpasses that of winters. This location is classified as Aw by Köppen and Geiger. The average annual temperature is 27.4 °C | 81.3 °F in Tiruvannamalai. The rainfall here is around 811 mm | 31.9 inch per year.
- Tiruvannamalai are in the middle of our planet and the summers are not easy to define. The optimal period to plan a visit would be during the months of January, February, March, September, December.
- In terms of precipitation, the month with the lowest amount of rainfall is February, recording a mere 7 mm | 0.3 inch in its entirety. This denotes an exceptionally dry period within that particular time frame. On average, the highest amount of rainfall occurs during October with a mean value of 154 mm | 6.1 inch.
- The month that experiences the highest temperatures throughout the year is referred to as May, where an average temperature of 31.3 °C | 88.4 °F prevails. On average, the month of January is considered to be the coldest time of year with temperatures averaging at around 23.3 °C | 73.9 °F.

Source: <https://en.climate-data.org/asia/india/tamil-nadu/tiruvannamalai-24067/>

Rainfall –

TABLE 3.13: RAINFALL DATA

Actual Rainfall in mm						Normal Rainfall in mm
2019	2020	2021	2022	2023	2024	
1071.9	432.9	1592.5	1174.4	1161.4	684.1	1019.7

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

TABLE 3.14: METEOROLOGICAL DATA RECORDED AT SITE

S.No	Parameters		Mar-2025	Apr-2025	May-2025
1	Temperature (°C)	30.09	32.15	33.2	25.9
		25.95	28.26	24.46	23.3
		28.02	30.20	28.83	24.6
2	Relative Humidity (%)	65.74	63.80	62.93	74.8
3	Wind Speed (m/s)	4.7	3.47	4.59	3.125
		2.07	1.89	2.03	0.000
		3.38	2.68	3.31	1.562
4	Cloud Cover (OKTAS)	0-8	0-8	0-8	0-8
5	Wind direction	SE,ESE	SE,SSE	SSE,ESE	NE,NNE

Source: On-site monitoring/sampling by Global Lab and Consultancy Services in association with GEMS

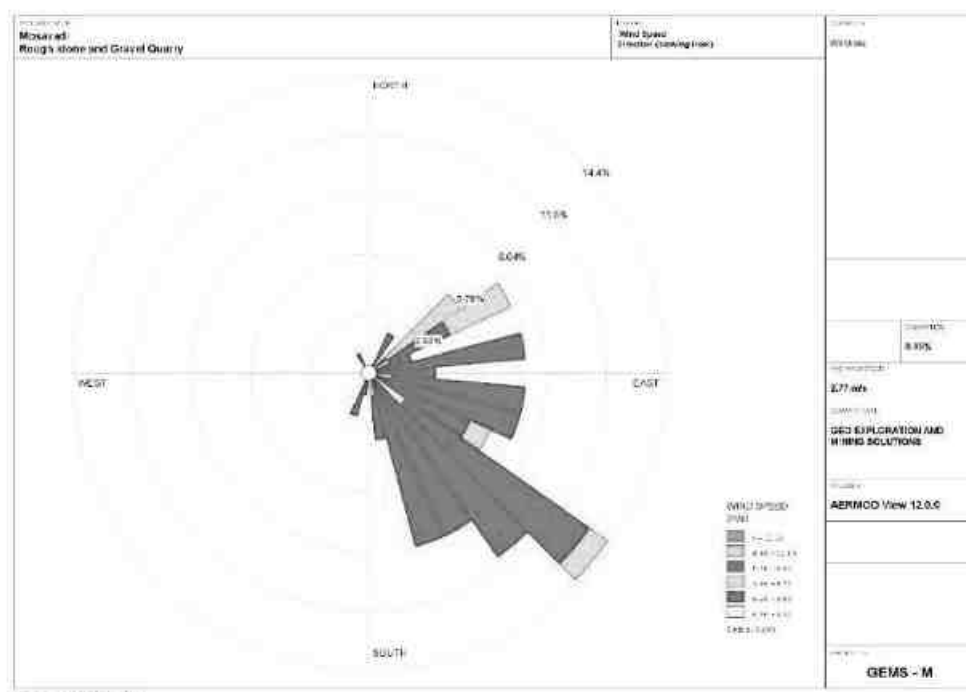
Correlation between Secondary and Primary Data

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

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

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

FIGURE 3.14: WINDROSE DIAGRAM



3.3.2 Methodology and Objective

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

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

3.3.3 Sampling and Analytical Techniques

TABLE 3.15: METHODOLOGY AND INSTRUMENT USED FOR AAQ ANALYSIS

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

Source: Sampling Methodology followed by EHS360 Labs Private Limited & CPCB Notification

TABLE 3.16: NATIONAL AMBIENT AIR QUALITY STANDARDS

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

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

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

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

3.3.4 Frequency & Parameters for Sampling

Ambient air quality monitoring has been carried out with a frequency of two samples per week at eight (8) locations, adopting a continuous 24 hourly (3 shift of 8-hour) schedule for the period March – May 2025. The baseline data of ambient air has been generated for PM₁₀, PM_{2.5}, Sulphur Dioxide (SO₂) & Nitrogen Dioxide (NO₂) Monitoring has been carried out as per the CPCB, MoEF guidelines and notifications.

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

3.3.5 Ambient Air Quality Monitoring Stations

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

TABLE 3.17: AMBIENT AIR QUALITY (AAQ) MONITORING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	AAQ1	Core Zone	Project Area	12°31'26.98"N 79°26'19.34"E
2	AAQ2	Near Existing Quarry	460m NE	12°31'48.49"N 79°26'29.63"E
3	AAQ3	Mosavadi	700m SW	12°31'23.61"N 79°25'54.67"E
4	AAQ4	Pernamallur	5km North	12°34'15.03"N 79°25'54.77"E
5	AAQ5	Mazhaiyur	4.3km SE	12°29'36.73"N 79°27'55.19"E
6	AAQ6	Tellarampattu	6.7km NW	12°32'7.01"N 79°22'40.36"E
7	AAQ7	Anaibogi	5.8km East	12°32'20.12"N 79°29'31.44"E

Source: On-site monitoring/sampling by Global Lab and Consultancy Services in association with GEMS.

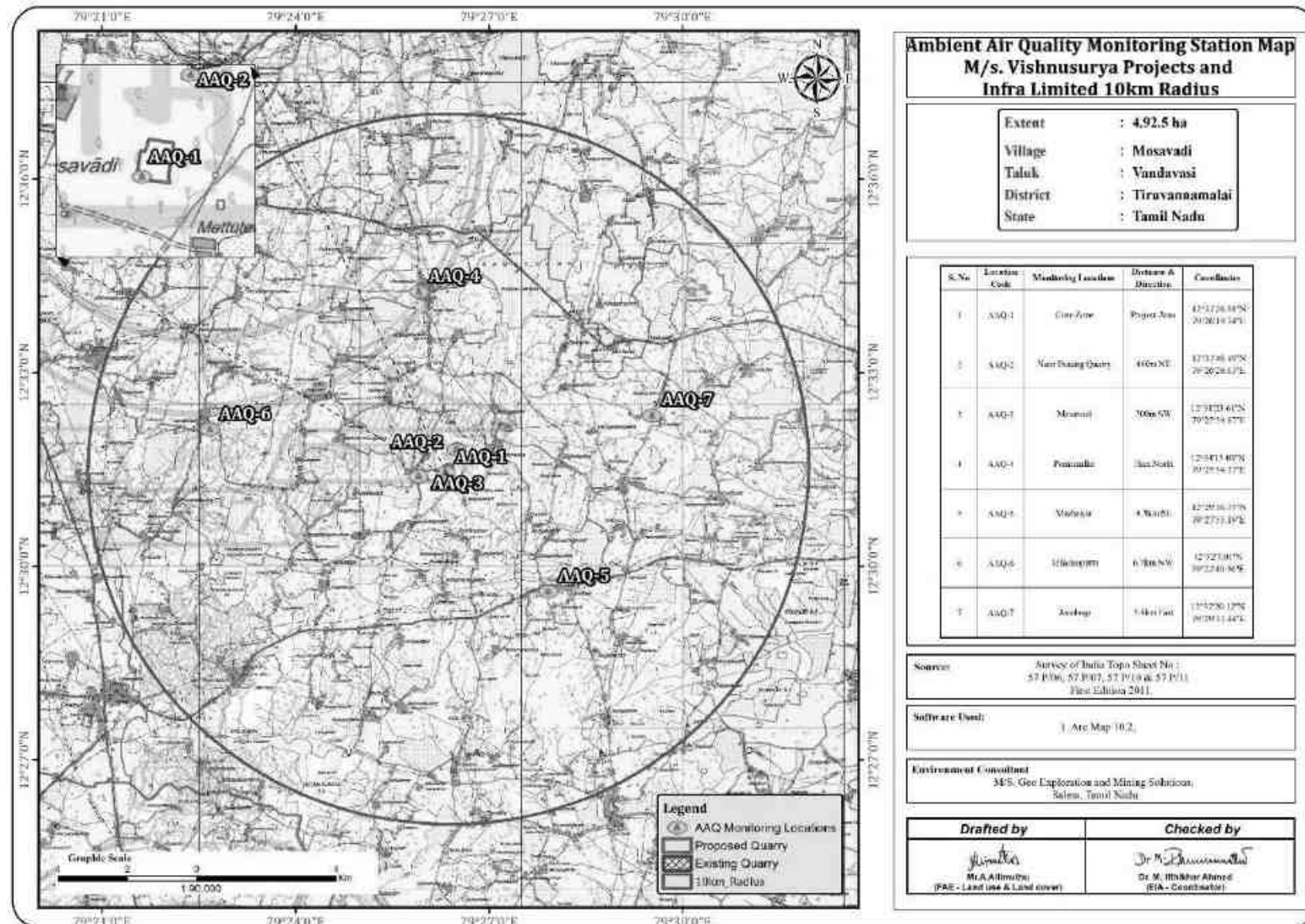
FIGURE 3.15: AMBIENT AIR QUALITY LOCATIONS AROUND 10 KM RADIUS

TABLE 3.18: SUMMARY OF AAQ – 1 to AAQ – 7

PM2.5	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8	AAQ9
Arithmetic Mean	18.9	19.6	21.1	21.8	22.1	21.8	22.4	17.0	18.9
Minimum	17.0	17.5	18.3	19.5	19.5	18.7	17.9	14.8	17.0
Maximum	20.8	22.0	24.5	24.1	24.5	23.7	26.6	19.9	20.8
NAAQ Norms	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60

PM10	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8	AAQ9
Arithmetic Mean	39.0	40.0	42.0	42.7	42.8	42.7	43.1	46.6	39.0
Minimum	35.6	36.5	39.6	40.1	40.2	38.7	40.2	42.8	35.6
Maximum	40.2	42.3	44.6	45.8	45.1	45.2	44.9	48.2	40.2
NAAQ Norms	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100

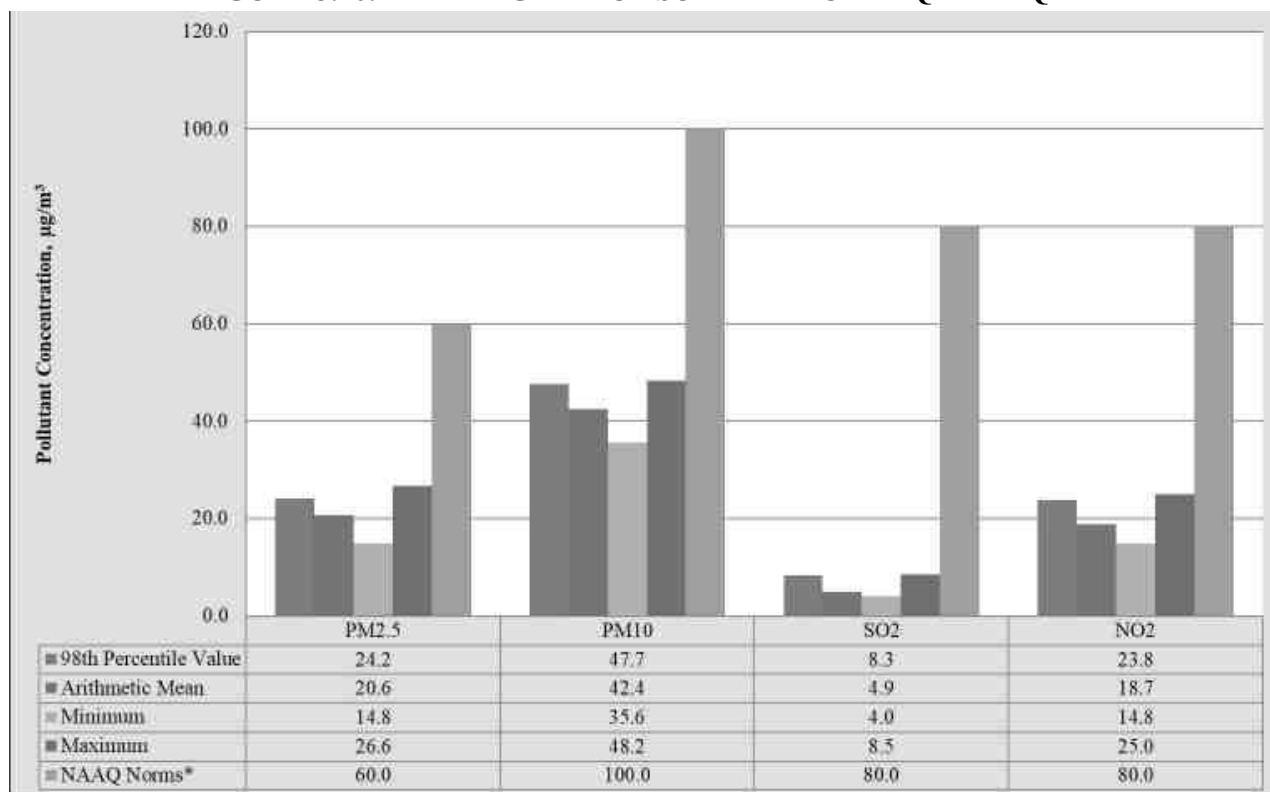
SO₂	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8	AAQ9
Arithmetic Mean	4.5	4.4	4.5	4.5	4.6	4.5	4.6	7.2	4.5
Minimum	4.0	4.0	4.0	4.0	4.0	4.1	4.2	5.4	4.0
Maximum	5.7	5.5	5.1	5.2	5.7	5.3	5.3	8.5	5.7
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	100

NO₂	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8	AAQ9
Arithmetic Mean	18.9	18.7	18.8	18.7	19.2	19.2	18.8	17.5	18.9
Minimum	16.1	16.1	16.1	16.1	16.1	16.3	16.4	14.8	16.1
Maximum	23.7	23.8	24.0	24.3	22.9	25.0	25.0	19.6	23.7
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	100

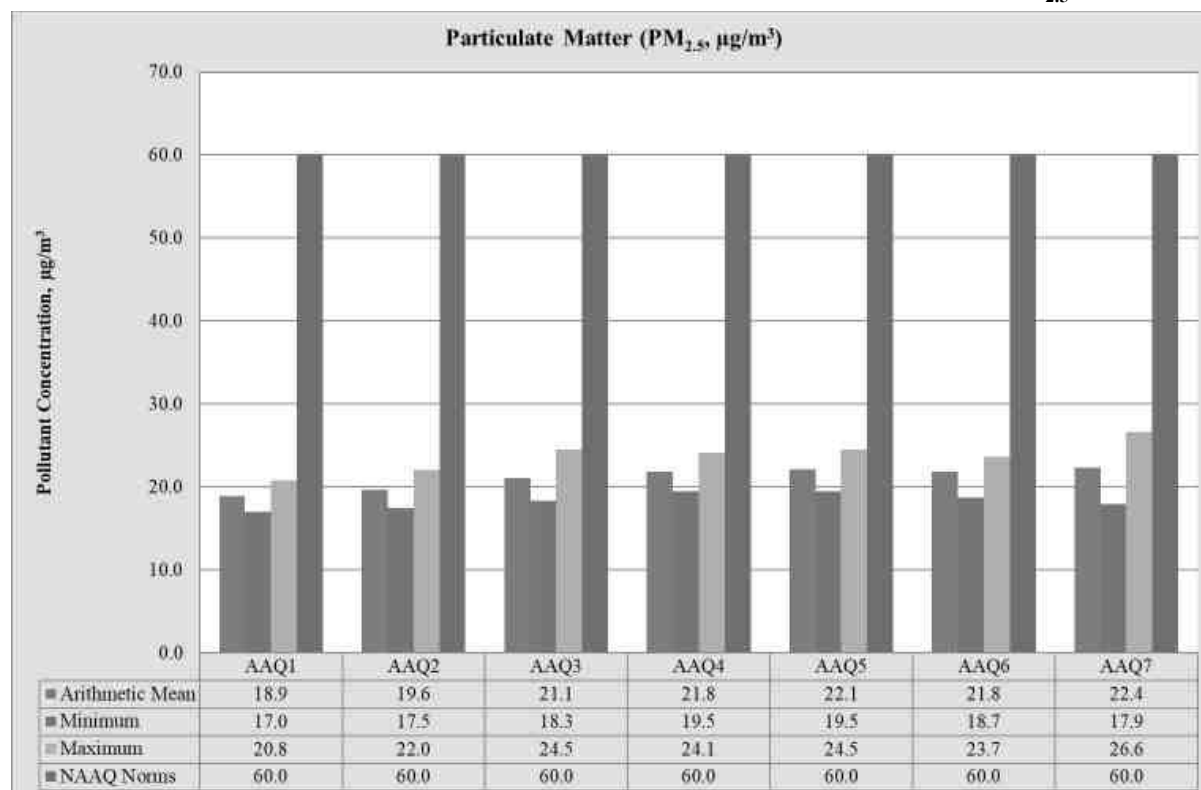
TABLE 3.19: ABSTRACT OF AMBIENT AIR QUALITY DATA

1	Parameter	PM2.5	PM10	SO₂	NO₂
2	No. of Observations	192	192	168	192
3	10 th Percentile Value	17.5	39.2	4.1	16.8
4	20 th Percentile Value	18.6	40.1	4.2	17.4
5	30 th Percentile Value	19.5	41.0	4.3	17.8
6	40 th Percentile Value	20.1	41.7	4.4	18.1
7	50 th Percentile Value	20.8	42.4	4.5	18.5
8	60 th Percentile Value	21.2	42.8	4.6	18.9
9	70 th Percentile Value	22.0	43.5	4.8	19.1

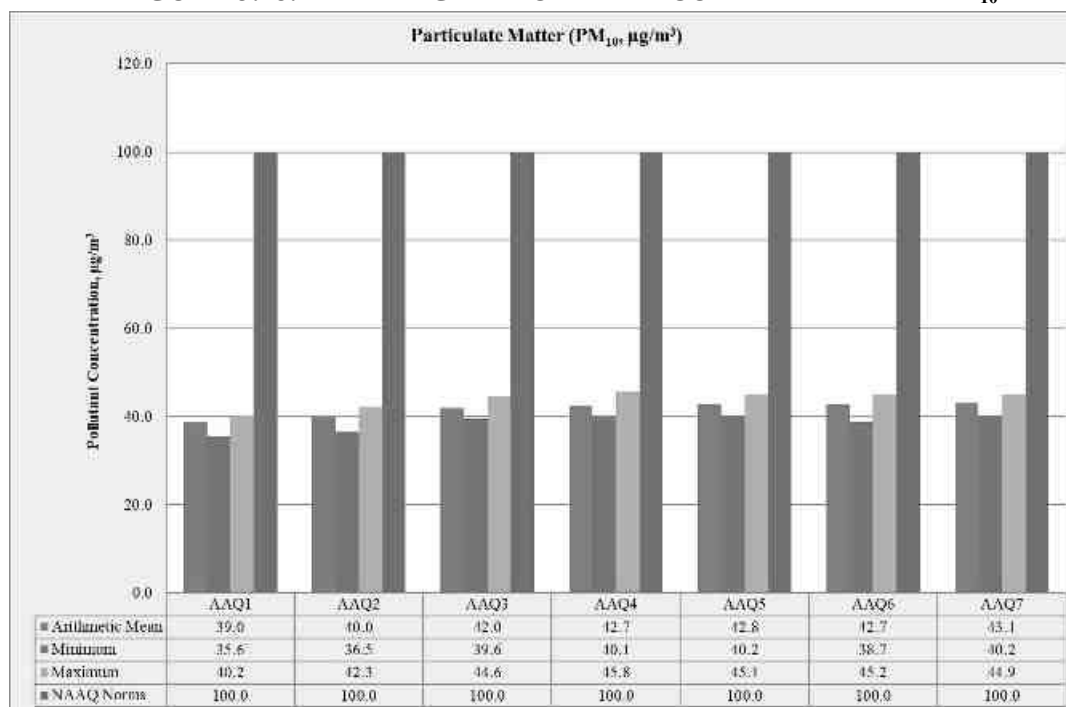
10	80 th Percentile Value	22.4	44.5	5.1	19.7
11	90 th Percentile Value	23.3	45.8	6.7	20.8
12	95 th Percentile Value	23.7	47.0	7.6	22.4
13	98 th Percentile Value	24.2	47.7	8.3	23.8
14	Arithmetic Mean	20.6	42.4	4.9	18.7
15	Geometric Mean	20.5	42.3	4.8	18.6
16	Standard Deviation	2.2	2.5	1.1	1.8
17	Minimum	14.8	35.6	4.0	14.8
18	Maximum	26.6	48.2	8.5	25.0
19	NAAQ Norms*	100.0	60.0	80.0	80.0
	% Values exceeding Norms*	0.0	0.0	0.0	0.0

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

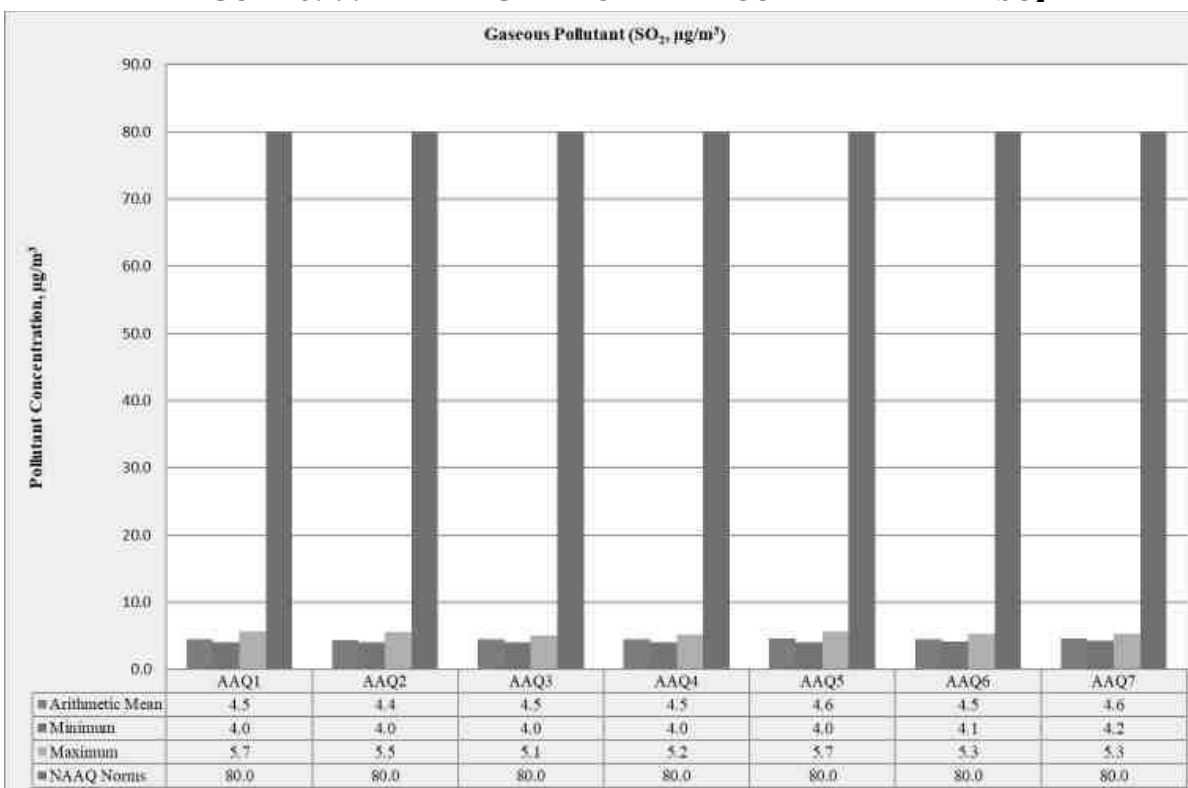
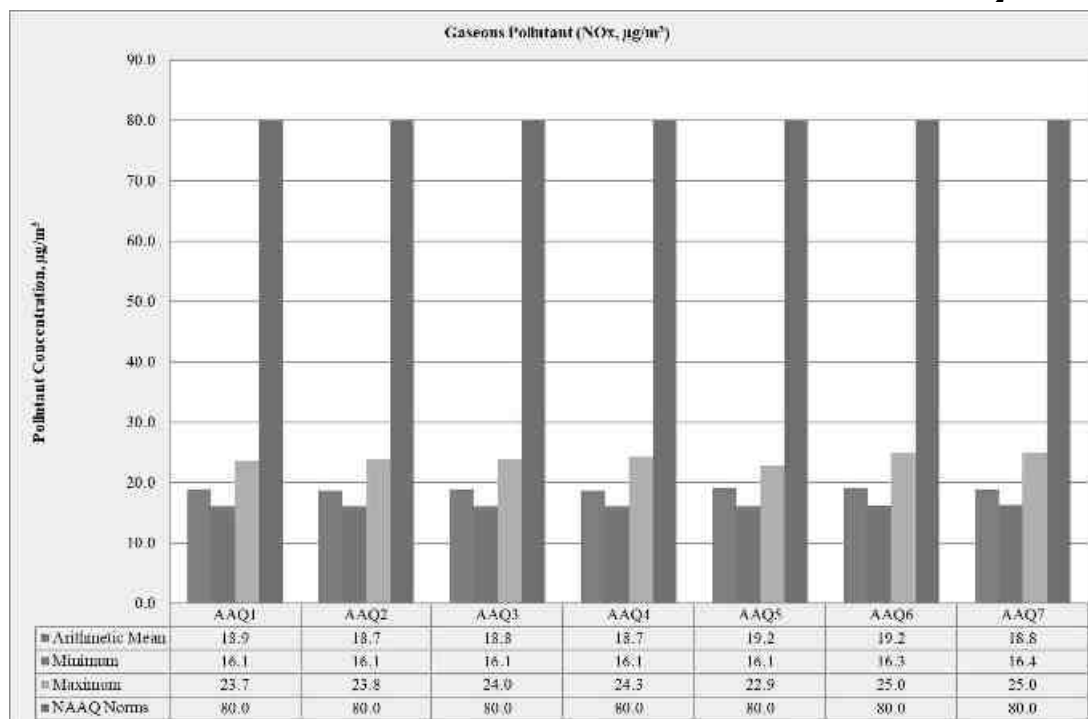
Source: Table 3.17 to 3.27

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

Source: Table 3.17 to 3.27

FIGURE 3.18: BAR DIAGRAM OF PARTICULATE MATTER PM₁₀

Source: Table 3.17 to 3.27

FIGURE 3.19: BAR DIAGRAM OF PARTICULATE MATTER SO₂**FIGURE 3.20: BAR DIAGRAM OF PARTICULATE MATTER NO₂**

3.3.6 Interpretations & Conclusion

As per monitoring data, PM₁₀ ranges from 35.6 µg/m³ to 48.2 µg/m³, PM_{2.5} data ranges from 14.8 µg/m³ to 26.6 µg/m³, SO₂ ranges from 4.0 µg/m³ to 8.5 µg/m³ and NO₂ data ranges from 14.8 µg/m³ to 25.0 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 it best suited the purpose and objectives of the study.

TABLE 3.20: DETAILS OF SURFACE NOISE MONITORING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	N1	Core Zone	Project Area	12°31'33.86"N 79°26'25.73"E
2	N2	Near Existing Quarry	600m NE	12°31'53.82"N 79°26'28.61"E
3	N3	Mosavadi	700m SW	12°31'24.22"N 79°25'52.24"E
4	N4	Pernamallur	5km North	12°34'15.77"N 79°25'54.73"E
5	N5	Mazhaiyur	4.3km SE	12°29'35.73"N 79°27'54.89"E
6	N6	Tellarampattu	6.7km NW	12°32'6.81"N 79°22'40.55"E
7	N7	Anaibogi	5.8km East	12°32'19.66"N 79°29'32.39"E

Source: On-site monitoring/sampling by Global Lab and Consultancy Services in association with GEMS

3.4.2 Method of Monitoring

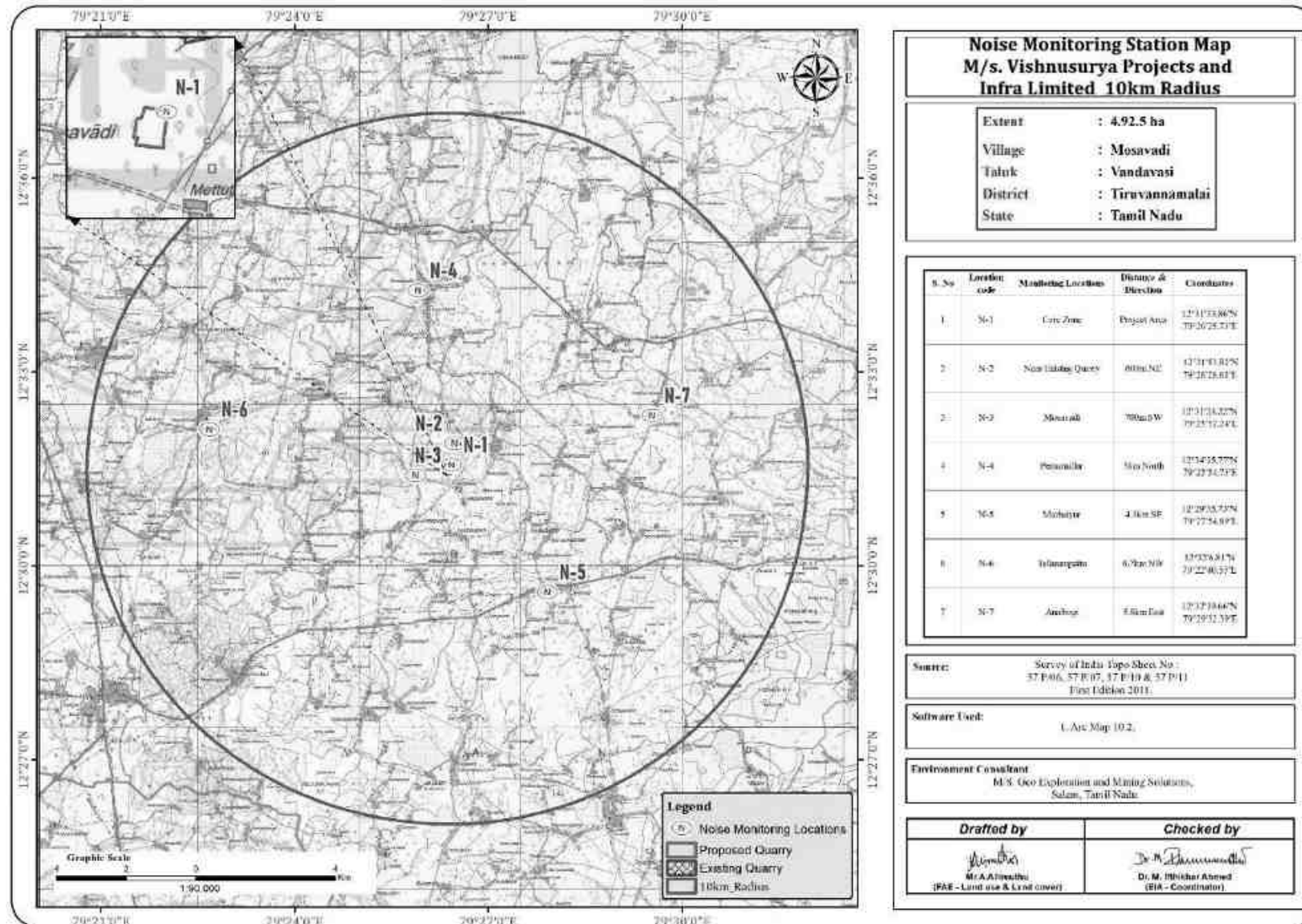
Digital Sound Level Meter was used for the study. All reading was taken on the 'A-Weighting' frequency network, at a height of 1.5 meters from ground level. The sound level meter does not give a steady and consistent reading and it is quite difficult to assess the actual sound level over the entire monitoring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

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

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

T = Time interval of observation

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

FIGURE 3.23: NOISE MONITORING STATIONS AROUND 10 KM RADIUS

3.4.3 Analysis of Ambient Noise Level in the Study Area

The Digital Sound pressure level has been measured by a sound level meter (Model: HTC SL-1352) An analysis of the different Leq data obtained during the study period has been made. Variation was noted during the day-time as well as night-time. The results are presented in below Table 3.32.

Day time: 6:00 hours to 22:00 hours.

Night time: 22:00 hours to 6:00 hours.

TABLE 3.21: AMBIENT NOISE QUALITY RESULT

S. No	Locations	Noise level (dB (A) Leq)		Ambient Noise Standards
		Day Time	Night Time	
1	Core Zone	43.3	36.5	Industrial Day Time- 75 dB (A) Night Time- 70 dB (A)
2	Near Existing Quarry	45.6	37.7	
3	Mosavadi	49.2	39.5	
4	Pernamallur	45.7	42.4	
5	Mazhaiyur	46.5	44.1	Residential Day Time- 55 dB (A) Night Time- 45 dB (A)
6	Tellarampattu	44.4	40.8	
7	Anaibogi	43.0	43.9	

Source: On-site monitoring/sampling by Global Lab and Consultancy Services in association with GEMS

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

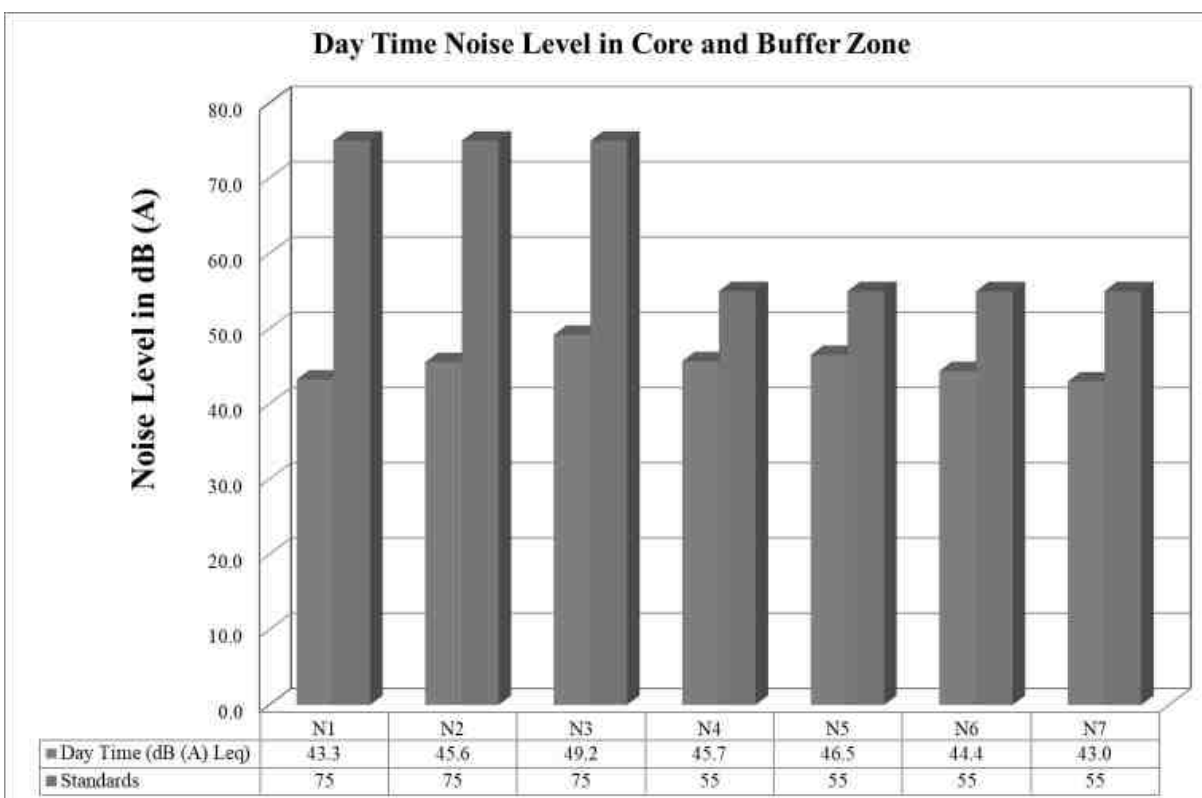
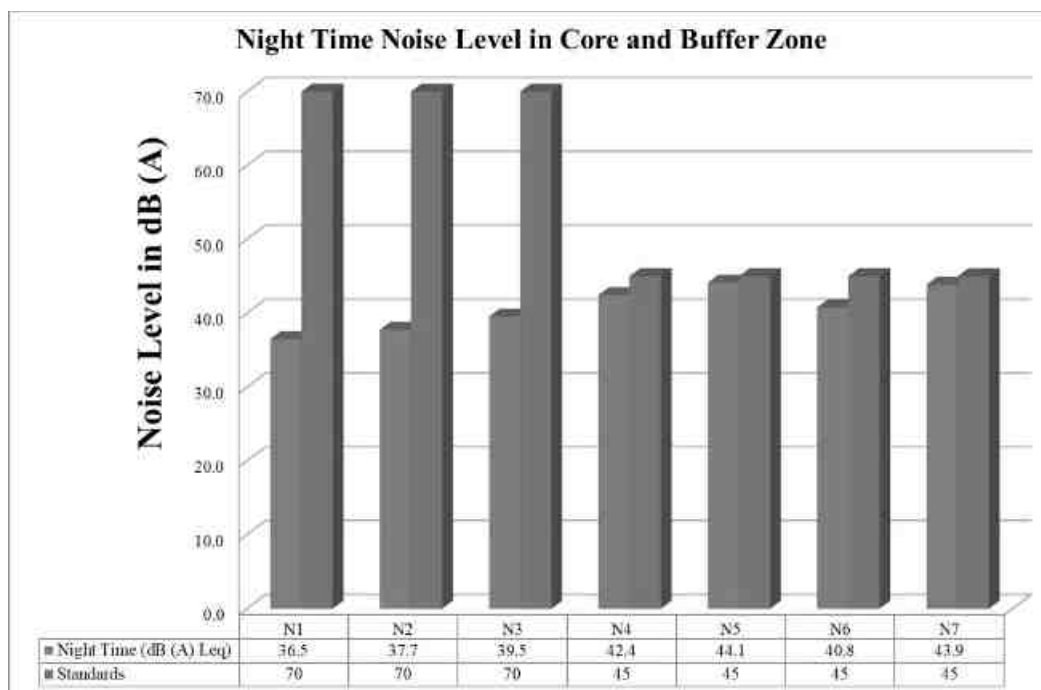


FIGURE 3.25: NIGHT TIME NOISE LEVELS IN CORE AND BUFFER ZONE

3.4.4 Interpretation & Conclusion:

Ambient noise levels were measured at 7 (Seven) locations around the proposed project area. Noise levels recorded in core zone during day time were from 43.3 to 45.6 dB (A) Leq and during night time were from 36.5 to 37.7 dB (A) Leq. Noise levels recorded in buffer zone during day time were from 43.0 to 49.2 dB (A) Leq and during night time were from 39.5 to 44.1 dB (A) Leq.

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

3.5 ECOLOGICAL ENVIRONMENT

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

3.5.1 Scope of Work

Scope of work for this study includes identification of ecologically sensitive receptors, based on literature survey, field investigations and their mitigation with conservation action plan. The study was carried out in the core as well as buffer zone of the Proposed Rough stone quarry. The study was carried out systematically and scientifically using primary and secondary data in order to bring out factual information on the ecological conditions of the mine site and 10 km radius study area.

The study involved assessment of general habitat type, vegetation pattern, preparation of inventory of flora and fauna of terrestrial ecosystem within 10 km radius from the boundary of all the Proposed Mine site. Biological assessment of the site was done to identify ecologically sensitive areas and whether there are any rare, endangered, endemic or threatened (REET) species of flora & fauna in the core area as well its buffer zone to be impacted. The study also designed to suggest suitable mitigation measures, if necessary, for protection of wildlife habitats and conservation of REET species if any.

3.5.2 Objectives of Biological Studies

The present study was undertaken with the following objectives:

1. To study the likely impact of the proposed mining project on the local biodiversity and to suggest mitigation measure, if required, for vulnerable biota.
2. To assess the nature and distribution of vegetation (Terrestrial and Aquatic) in and around the mining activity.
3. Detail of flora and fauna, Endemic, Rare, Endangered and Threatened (RET Species) separately for core and buffer area based on such primary field survey and clearly indicating the Schedule of fauna present. In case of any schedule- 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.
4. Devise management & conservation measures for biodiversity.

3.5.3 Methodology of Sampling

The present study was carried out in given steps

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

Site selection criteria: The core study area is located at Village: Mosavadi, Taluk: Vandavasi, District: Tiruvannamalai, Tamil Nadu. The buffer study area comprises of 10 km radius from all the proposed Rough stone quarry area.

Selection of sampling locations was made with reference to topography, land use, vegetation pattern, etc. The observations were taken on natural vegetation, roadside plantation and non-forest area (agricultural field, in plain areas, village wasteland, etc.) for quantitative representation of different species.

A methodology of Sampling Flora and fauna studies were carried out to assess the list of terrestrial plant and animal species that occur in the core area and the buffer area up to 10 km radius from the project site. No damage is created to flora and fauna during the sampling.

In order to provide representative ecological status for the study area, the 10-km buffer zone has been divided into four quartiles for biodiversity sampling, i.e., NE (Quartile-1), NW (Quartile-2) SW (Quartile-3) and SE (Quartile-4) is given in Fig. 3.26. Each of the quartiles have been examined for representative flora on randomly sampled quadrats for trees (25x25-m), shrubs (10x10-m) and herbs (2x2-m) depending upon prevailing geographical conditions and bio-diversity aspects of study area.

Phyto-sociological Survey method

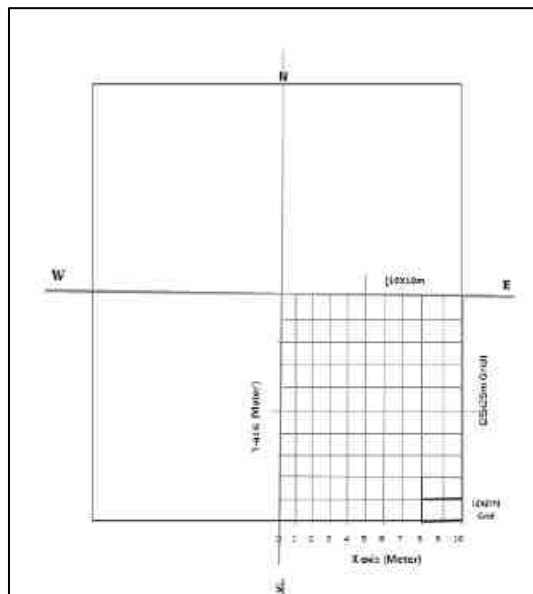
Phyto-sociological parameters, viz., Abundance, Density, Frequency (%) were measured. A total of 10 quadrats were laid down randomly within core area and 40 quadrats were laid down within four quartiles randomly (10/quartile) in buffer area. In core area 10 quadrats were laid randomly to enumerated trees, shrubs, and herbs as per the Following formulae used for calculating the frequency (%), abundance and density of the floral species encountered in the 10 quadrats studied.

Quadrats method

Quadrats of 25 × 25-m were laid down randomly within core and 5-km buffer area; each quadrat was laid to assess the trees (>5 cm GBH) and one, 10 × 10-m sub-quadrat nested within the quadrat for shrubs. The quadrats were laid randomly to cover the area to maximize the sampling efforts and minimize the species homogeneity, such as small stream area, trees in agricultural bunds, tank bunds, farm forestry plantations, wildlife areas, natural forest area, avenue plantations, house backyards, etc. In each quadrat individuals belonging to tree (25 × 25-m) and shrub

(10 × 10-m) were recorded separately and have been identified on the field. Quadrates sampling methods is given in Fig no.3.26.

FIGURE 3.26: A SCHEMATIC DIAGRAM FOR FLORAL RANDOM SAMPLING



FLORA IN CORE ZONE

Core zone flora samplings were conducted between 8.30 am to 10.30 am in three locations. The applied area is an exhibiting flat terrain, so we used quadrat sampling methods. Taxonomically a total of 25 species belonging to 15 families have been recorded from the core mining lease area based on habitat classification of the enumerated plants the majority of species were Trees 8, followed by Herbs 6, Shrubs 6, creepers 1, and Grasses 4. Details of flora with the scientific name were mentioned in Table No. 3.53. The result of the core zone of flora studies shows that Fabaceae and Poaceae are the main dominating species in the study area mentioned in Table No.3.53. No species were found as a threatened category Table No.3.53. The percentage distribution of floral life forms in Core Zone is given in Fig No.3.35.

FLORA IN BUFFER ZONE

Buffer zone flora sampling was conducted between 10.30 am to 1.00 pm in eight different locations in 10 km radius as per the ToR. The most important and widely used methods for a general assessment is belt transect/quadrat methods. The study area was divided according to habitat types followed the random sampling methods in the selected area. For plant biodiversity study in the ecosystems, the quadrat methods were followed. The proposed project site there are 115 species in the buffer zone study area in total, based on records. The floral (115) varieties among them Trees 40, Herbs 36, Shrubs 24, Climbers/ Creepers 9 and Grasses 6 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.3.55. 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 No 3.56 and their % distribution is shown in Figure No 3.37.

TABLE 3.22: FLORA IN CORE ZONE

Sl. No	English Name	Vernacular Name	Scientific Name	Family Name
Trees				
1.	Neem	Vembu	<i>Azadirachta indica</i>	Meliaceae
2.	Indian date	Echa maram	<i>Phoenix sylvestris</i>	Arecaceae
3.	Mullu maram	Sema Karuvelam maram	<i>Neltuma juliflora</i>	Fabaceae
4.	Palmyra palm	Pannai maram	<i>Borassus flabellifer</i>	Arecaceae
5.	Indian Jujube	Elanthai maram	<i>Ziziphus mauritiana</i>	Rhamnaceae
6.	Indian mulberry	Nuna maram	<i>Morinda coreia</i>	Rubiaceae
7.	Indian siris	Vagai	<i>Albizia lebbek</i>	Fabaceae
8.	Pongame oiltree	Pungam	<i>Pongamia pinnata</i>	Fabaceae
Shrubs				
1.	Milk Weed	Erukku	<i>Calotropis gigantea</i>	Apocynaceae
2.	Avaram	Avaram	<i>Senna auriculata</i>	Fabaceae
3.	Lantana	Unni sedi	<i>Lantana camara</i>	Verbenaceae
4.	Indian abutilon	Thuthi	<i>Abutilon indicum</i>	Malvaceae
5.	Indian thornapple	Umathai	<i>Datura metel</i>	Solanaceae
6.	Flannel weed	Paniyar Tuttul	<i>Sida cordifolia</i>	Malvaceae
Herbs				
1.	Common leucas	Thumbai	<i>Leucas aspera</i>	Lamiaceae
2.	Fish poison	Kolinch	<i>Tephrosia purpurea</i>	Fabaceae
3.	Coat buttons	Thatha poo	<i>Tridax procumbens</i>	Asteraceae
4.	Prickly chaff flower	Nayuruvi	<i>Achyranthes aspera</i>	Amaranthaceae
5.	Adamant creeper	Pirandai	<i>Cissus quadrangularis</i>	Vitaceae
6.	Common wire weed	Arrivalmanai poond	<i>Sida acuta</i>	Malvaceae
Creepers				
1.	Passion fruit	Siru punaikalli	<i>Passiflora foetida</i>	Passifloraceae
Grasses				
1.	Great brome	Thodappam	<i>Bromus diandrus</i>	Poaceae
2.	Natal grass	Red pullu	<i>Melinis repens</i>	Poaceae
3.	Bermuda Grass	Arugampul	<i>Cynodon dactylon</i>	Poaceae
4.	Pampas grass	White tall pul	<i>Cortaderia selloana</i>	Poaceae

TABLE 3.23: FLORA IN BUFFER ZONE

Sl.No.	English Name	Vernacular Name	Scientific Name	Resource use type *(E,M,EM)
Trees				
1.	Kassod Tree	Manjal Konnai	<i>Cassia siamea</i>	EM
2.	Coconut	Thennai maram	<i>Cocos nucifera</i>	EM
3.	Peepal	Arasanmaram	<i>Ficus religiosa</i>	M
4.	Neem or Indian lilac	Vembu	<i>Azadirachta indica</i>	M
5.	Creamy peacock flower	Perungondrai	<i>Delonix elata</i>	M
6.	Henna	Marudaani	<i>Lawsonia inermis</i>	EM
7.	Mango	Manga	<i>Mangifera indica</i>	E
8.	Tamarind	Puliyamaram	<i>Tamarindus indica</i>	EM
9.	Banyan tree	Alamaram	<i>Ficus benghalensis</i>	E
10.	Monoon longifolium	Asoka maram	<i>Polyalthia longifolia</i>	M
11.	Java Plum	Naval pazham	<i>Syzygium cumini</i>	EM
12.	Horsetail Tree	Savukku	<i>Casuarina</i>	E
13.	Asian Palmyra palm	Panai maram	<i>Borassus flabellifer</i>	E
14.	Sacred fig	Arasan	<i>Ficus religiosa</i>	E
15.	Kapok Tree	Elavam Panji	<i>Ceiba pentandra</i>	E
16.	Flame Tree	Neruppu Kondrai	<i>Delanix regia</i>	E
17.	wild date palm	Echamaram	<i>Phoenix sylvestris</i>	EM
18.	Giant thorny bamboo	Perumungil	<i>Bambusa bambos</i>	M
19.	Yellow elder	Manjarali	<i>Tecoma stans</i>	E
20.	Black plum	Navalmaram	<i>Syzygium cumini</i>	EM
21.	Custard apple	Seethapazham	<i>Annona reticulata</i>	E
22.	Lemon	Ezhumuchaipalam	<i>Citrus lemon</i>	EM
23.	Indian-almond	Naatu Vaadhumai	<i>Terminalia catappa</i>	EM
24.	Indian gooseberry	Nelli	<i>Emblica officinalis</i>	EM
25.	Indian mulberry	Nuna	<i>Morinda tinctoria</i>	E
26.	Mesquite	Velikathan maram	<i>Prosopis juliflora</i>	M
27.	Tahitian gooseberry tree	Nelli	<i>Phyllanthus acidus</i>	M
28.	Indian tulip tree	Poovarasu maram	<i>Thespesia populnea</i>	E
29.	Madras Thorn	Kodukapuli	<i>Pithocelopium dulce</i>	E
30.	Teak	Thekku	<i>Tectona grandis</i>	E
31.	Banana Tress	Vazhaimaram	<i>Musa paradisiaca</i>	EM

32.	Millettia pinnata	Pongam oiltree	<i>Pongamia pinnata</i>	E
33.	Guava	Koyya	<i>Psidium guajava</i>	EM
34.	Curry tree	Karuveppilai	<i>Murraya koenigii</i>	EM
35.	Gliricidia	Seemai Agathi	<i>Gliricidia sepium</i>	M
36.	Chinese chaste tree	Nocchi	<i>Vitex negundo</i>	EM
37.	Drumstick tree	Murunga maram	<i>Moringa oleifera</i>	EM
38.	Indian almond	Padam maram	<i>Terminalia catappa</i>	EM
39.	Banyan	Alamaram	<i>Ficus bengalensis</i>	M
40.	Pappaya	Papalli	<i>Carica papaya</i>	EM
Shrubs				
1.	Indian jujube	Elanthai	<i>Ziziphus mauritiana</i>	M
2.	Coffee senna	Kattuttakarai	<i>Senna occidentalis</i>	M
3.	Castor oil plant	Amanakku	<i>Ricinus communis</i>	M
4.	Indian Oleander	Arali	<i>Nerium indicum</i>	M
5.	Rough cocklebu	Ottarachedi	<i>Xanthium strumarium</i>	M
6.	Night shade plan	Sundaika	<i>Solanum torvum</i>	EM
7.	Triangular spruge	Chaturakalli	<i>Euphorbia antiquorum</i>	NE
8.	Lantana	Unnichedi	<i>Lantana camara</i>	M
9.	Thorn apple	Oomathai	<i>Datura stramonium</i>	E
10.	Rosy Periwinkle	Nithyakalyani	<i>Catharanthus roseus</i>	M
11.	Milk Weed	Erukku	<i>Calotropis gigantea</i>	M
12.	Avaram	Avarai	<i>Senna auriculata</i>	M
13.	Indian mallow	Thuthi	<i>Abutilon indicum</i>	M
14.	Bush Morning Glory	Neyvelik Kattamanakku	<i>Ipomoea carnea</i>	E
15.	Shoe flower	Chemparuthi	<i>Hibiscus rosa-sinensis</i>	EM
16.	Puriging nut	Kattamanakku	<i>Jatropha curcas</i>	EM
17.	Columnar Cactus	Sappathikalli	<i>Cereus pterogonus</i>	M
18.	Water spinach	Nalika	<i>Ipomoea aquatica</i>	E
19.	Jackal jujube	Soorai pazham	<i>Ziziphus oenopolia</i>	M
20.	Paper flower	Kahitha poo	<i>Bougainvillea glabra</i>	M
21.	Flame of the Woods	Idlipoo	<i>Xorococ cine</i>	M
22.	Peacock Flower	Mayil Kontai	<i>Caesalpinia pulcherrima</i>	M
23.	Tiger nail	Eli verandi	<i>Martynia annua</i>	M
24.	Hopbush	Virali	<i>Dodonaea viscosa</i>	E
Herbs				

1.	Indian Catmint Plant	Pei viratti	<i>Anisomeles malabarica</i>	M
2.	Common leucas	Thumbai	<i>Leucas aspera</i>	M
3.	Tridax daisy	Veetukaayapoond	<i>Tridax procumbens</i>	M
4.	Holy basil	Thulasi	<i>Ocimum tenuiflorum</i>	M
5.	Indian Copperleaf	Kuppaimeni	<i>Acalypha indica</i>	M
6.	Fish poison	Kolunchi	<i>Tephrosia purpurea</i>	M
7.	Asthma-plant	Ammanpacharisi	<i>Euphorbia hirta</i>	M
8.	Common Wireweed	Arivalmanai poond	<i>Sida acuta</i>	M
9.	Carrot grass	Partiniyam	<i>Parthenium hysterophorus</i>	NE
10.	Common Purslane	Paruppu keerai	<i>Portulaca oleracea</i>	M
11.	Prickly chaff flower	Nayuruv	<i>Achyranthes aspera</i>	M
12.	Spiny amaranth	Mullu keerai	<i>Amaranthus spinosus</i>	M
13.	Aloe barbadensis	Katrachai	<i>Aloe vera</i>	EM
14.	Bara Gokhru	Yanai Nerunchi	<i>Pedaliu murex</i>	M
15.	Green amaranth	Mulai keerai	<i>Amaranthus viridis</i>	M
16.	Marsh barbel	Neermulli	<i>Hygrophila auriculata</i>	M
17.	Yellow-fruit nightshade	Kandakathirika	<i>Solanum surattense</i>	M
18.	Flannel Weed	Sida mutti	<i>Sida cordifolia</i>	M
19.	Threadstem carpetweed	Parpatakam	<i>Mollugo cerviana</i>	M
20.	Node Flower	Kumattikkirai	<i>Allmania nodiflora</i>	M
21.	Sessile Joyweed	Ponnankanni	<i>Alternanthera sessilis</i>	M
22.	Pignut	Nattapoochedi	<i>Hyptis suaveolens</i>	M
23.	Coat buttons	Thatha poo	<i>Tridax procumbens</i>	M
24.	Madagascar Periwinkle	Nithykalyani Po	<i>Catharanthus roseus</i>	E
25.	Asian spiderflower	Naaikaduku	<i>Cleome viscosa L</i>	M
26.	Red Spiderling	Mukirattai	<i>Boerhavia diffusa</i>	M
27.	Mountain knotgrass	Thengaipoo kirai	<i>Aerva lanata</i>	M
28.	Bindii	Nerunchi	<i>Tribulus terrestris</i>	M
29.	Shameplant	Thottachenunki	<i>Mimosa pudica</i>	M
30.	Tomato	Thakkali	<i>Solanum lycopersicum</i>	EM
31.	False daisy	Karisalankanni	<i>Eclipta alba</i>	M
32.	Chilli	Milakai	<i>Capsicum annuum</i>	EM
33.	Chrysanthemum	Samanthi Poo	<i>Chrysanthemum</i>	E
34.	Eggplant	Kathrikkai	<i>Solanum melongena</i>	EM
35.	Indian mint	Karpura valli	<i>Coleus amboinicus</i>	EM

36.	Railway Weed	Aatthuppoond	<i>Croton bonplandianus</i>	E
Climber/ Creepers				
1.	Merremia	Muthiyar koontha	<i>Merremia tridentata</i>	M
2.	Pointed gourd	Kovakkai	<i>Trichosanthes dioica</i>	EM
3.	Ivy gourd	Kovai	<i>Coccinia grandis</i>	M
4.	Butterfly pea	Sangu poo	<i>Clitoria ternatea</i>	M
5.	Rosary Pea	Gundumani	<i>Abrus precatorius</i>	M
6.	Stemmed vine	Perandai	<i>Cissus quadrangularis</i>	M
7.	Bottle Guard	Sorakkai	<i>Lagenaria siceraria</i>	EM
8.	Ipomoea reniformis chois	Elikkathilai	<i>Merremia gangetica</i>	M
9.	Red Pea Eggplant	Thuthuvalai	<i>Solanum trilobatum</i>	EM
Grass				
1.	Jungle rice	Kozhikalpul	<i>Echinochloa colona</i>	NE
2.	Swollen Windmill Grass	Kondai Pul	<i>Chloris barbata</i>	NE
3.	Windmill grass	Chevvarakupul	<i>Chloris barbata</i>	NE
4.	Needle Grass	Thodappam	<i>Aristida adscensionis</i>	E
5.	Eragrostis	Pullu	<i>Eragrostis ferruginea</i>	E
6.	Mauritian Grass	Moongil pul	<i>Apluda mutica</i>	NE

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

FAUNA

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

FAUNA METHODOLOGY

The study of fauna takes substantial amount of time to understand the specific faunal characteristics of the area. The assessment of fauna has been done on the bases of primary data collected from the lease sites. The presence was also confirmed from the local inhabitants depending on the animal sightings and the frequency of their visits in the project area. In addition, officials, local peoples were another source of information for studying the fauna of the area. Field activities are physical/active search, covering rocks, burrows, hollow inspection and location of nesting sites and habitat assessment etc. Taxonomical identification was done by the field guide book and wildlife envis data base (wiienvs.nic.in/Database/Schedule Species Database) and Zoological Survey of India (ZSI). Detailed faunas are mentioned in the Table No. 3.36 and 3.37.

Survey and Monitoring of Mammals

Intensive survey has been done by line transect methods (Walking and in vehicle) for all major habitats for surveying of mammals by direct and indirect evidence. Indirect methods such as faecal matter (i.e., scat) and pug mark by establishing 10 × 100-m linear transects depending on the habitat (i.e., existing wildlife game routes/forest trails used).

Direct observation technique has been used for surveying large and medium sized mammals. But this technique is perfectly suitable for surveying of diurnal mammals; however, good photographs were also taken for species identification.

Survey and Monitoring of Birds

Birds are sampled by using point count methods, and opportunistic bird sightings. By this bird vocal sounds and photographs, the species were identified in consultation with village local people.

Point count: in these methods, the observer will stand in a randomly chosen point and birds seen or heard in 50m radius are recorded for 5-min. this observation is repeated in another point at least 30m from the first point. We have enumerated 20 point – counts in each quartile, which constitute a total of 80 points-count (20 x 4) within 10 km radius area.

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

Survey and Monitoring of reptiles

Several survey techniques such as standard walk transect visual encounter survey methods were used to sampling reptiles in each and every habitat of the study area. While doing this survey, photographs were taken for identification of species. Species identification was done by using standard field guides in consultation with village people expert.

The butterfly was enumerated by 2 linear transects of 10 × 100 m were laid within each quartile at minimum interval of 1 km. Further, amphibians and fishes documented in existing literature and secondary information in consultation with local people and wildlife experts.

FAUNA IN CORE ZONE

Core zone fauna samplings were conducted between 12.30 pm to 1.30 pm in two locations. A total of 16 varieties of species were observed in the Core zone of Mosavadi Village, Rough stone and gravel quarry (Table No.3.60) among them numbers of Insects/Butterfly 8, Reptiles 2, Mammals 1 and Avian 5. The percentage of distribution of fauna life forms in Core Zone is given in Fig No.3.38. None of these species are threatened or endemic in the study area and surroundings. There is no Schedule I species and Nine species are under schedule II according to the Indian wild life Protection Amendment Act 2022. A total of 5 species of bird were sighted in the mining lease area.

TABLE 3.24: FAUNA IN CORE ZONE

Sl. No	Common Name/English Name	Scientific Name	Schedule list The Wildlife (Protection) Amendment Act, 2022
Insects/Butterflies			
1.	Common Tiger	<i>Danaus genutia</i>	---
2.	Mottled emigrant	<i>Catopsilia pyranthe</i>	---
3.	Red-veined darter	<i>Sympetrum fonscolombii</i>	---
4.	Plain Tiger Butterfly	<i>Danaus chrysippus</i>	---
5.	Blue Tiger	<i>Tirumala limniace</i>	---
6.	Carolina Mantis	<i>Stagmomantis carolina</i>	---
7.	Common Red Soldier Beetle	<i>Rhagonycha fulva</i>	---
8.	Gray Bird Grasshopper	<i>Schistocerca nitens</i>	---
Reptiles			
1.	Oriental Garden lizard	<i>Calotes versicolor</i>	---
2.	Indian forest skink	<i>Sphenomorphus indicus</i>	---
Mammals			
1.	Common rat	<i>Rattus rattus</i>	---
Aves			
1.	Common myna	<i>Acridotheres tristis</i>	Schedule II
2.	Green Bee Eater	<i>Merops orientalis</i>	Schedule II
3.	Ashy Drongo	<i>Dicrurus leucophaeus</i>	Schedule II
4.	Yellow-billed Babbler	<i>Argya affinis</i>	Schedule II
5.	House crow	<i>Corvus splendens</i>	---

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

FAUNA IN BUFFER ZONE

The Buffer zone fauna samplings were conducted between 3.00 pm to 6.00 pm in different locations. As animals, especially vertebrates move from place to place in search of food, shelter, mate or other biological needs, separate lists for core and buffer areas are not feasible however, a separate list of fauna pertaining to core and buffer zone are listed separately. Though there are no reserved forests in the buffer zone. As such there are no chances of 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 Bee-eaters, Mynas, Reed Kites and Drongos etc.

The list of Mammals (*directly sighted animals & Secondary data) is given in table No.3.61. The list of bird species recorded during the field survey and literature from the study area are given in Table No 3.62. The list of reptilian species recorded during the field survey and literature from the study area is given in Table No 3.63. The list of insect species recorded during the field survey and literature from the study area are given in Table No 3.64. The list of Butterflies species recorded during the field survey and literature from the study area are given in Table No 3.65. It is apparent from the list that none of the species either spotted or reported is included in Schedule I of the Wildlife Protection Amendment Act, 2022. Similarly, none of them comes under the REET category.

Taxonomically a total of 80 species recorded were from the buffer zone area. Based on habitat classification the majority of species were birds 35, followed by Butterflies 27, Reptiles 5, Insects 5, Mammals 4, and Amphibians 4. There are 40 Schedule II species according to the Indian Wildlife Protection Amendment Act 2022. 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 amphibians was observed during the extensive field visit *Sphaerotheca breviceps*, *Duttaphrynus 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 No: 3.25. List of Fauna & Their Conservation Status,
Mammals: (*directly sighted animals & Secondary data)**

SI. No	Common Name/English Name	Scientific Name	Schedule list The Wildlife (Protection) Amendment Act, 2022
1.	Indian palm squirrel	<i>Funambulus palmarum</i>	---
2.	Indian Field Mouse	<i>Mus booduga</i>	---
3.	Indian hare	<i>Lepus nigricollis</i>	Schedule II
4.	Brown rat	<i>Rattus norwegicus</i>	---

Table No: 3.26. Listed birds (Primary & Secondary data)

SI. No	Common Name/English Name	Scientific Name	Schedule list The Wildlife (Protection) Amendment Act, 2022
1.	Indian robin	<i>Copsychus fulicatus</i>	Schedule II
2.	Asian Koel	<i>Eudynamys scolopaceus</i>	Schedule II
3.	House crow	<i>Corvus splendens</i>	---
4.	Black Kite	<i>Milvus migrans</i>	Schedule II
5.	Rock pigeon	<i>Columba livia</i>	---
6.	Common myna	<i>Acridotheres tristis</i>	Schedule II
7.	House sparrow	<i>Passer domesticus</i>	Schedule II
8.	Brown headed Barbet	<i>Psilopogon zeylanicus</i>	Schedule II
9.	Red Vented Bulbul	<i>Pycnonotus cafer</i>	Schedule II
10.	Ashy Drongo	<i>Dicrurus leucophaeus</i>	Schedule II
11.	Cattle egret	<i>Bubulcus ibis</i>	Schedule II
12.	Green Bee Eater	<i>Merops orientalis</i>	Schedule II
13.	Purple sunbird	<i>Cinnyris asiaticus</i>	Schedule II
14.	Large Woodshrike	<i>Tephrodornis virgatus</i>	Schedule II
15.	Yellow-billed Babbler	<i>Argya affinis</i>	Schedule II
16.	Brahminy Starling	<i>Sturnia pagodarum</i>	Schedule II
17.	Baya Weaver	<i>Ploceus philippines</i>	Schedule II
18.	Rose-ringed parakeet	<i>Psittacula krameri</i>	Schedule II
19.	Common quail	<i>Coturnix coturnix</i>	Schedule II
20.	Pond herons	<i>Ardeola grayii</i>	Schedule II
21.	Black drongo	<i>Dicrurus macrocercus</i>	Schedule II
22.	Greater Coucal	<i>Centropus sinensis</i>	Schedule II
23.	Jungle Bush Quail	<i>Perdica asiatica</i>	Schedule II
24.	Wood Sandpiper	<i>Tringa glareola</i>	Schedule II
25.	Blue-Tailed Bee Eater	<i>Merops philippinus</i>	Schedule II
26.	Indian Roller	<i>Coracias benghalensis</i>	Schedule II
27.	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	Schedule II
28.	Purple Rumped Sunbird	<i>Leptocoma zeylonica</i>	Schedule II
29.	Spotted Dove	<i>Streptopelia chinensis</i>	Schedule II
30.	Little Cormorant	<i>Microcarbo niger</i>	Schedule II
31.	Common Sandpiper	<i>Actitis hypoleucos</i>	Schedule II

32.	Common Kingfisher	<i>Alcedo atthis</i>	Schedule II
33.	Spotted Owlet	<i>Athene brama</i>	Schedule II
34.	Red-wattled Lapwing	<i>Vanellus indicus</i>	Schedule II
35.	Common Tailorbird	<i>Orthotomus sutorius</i>	Schedule II

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

<https://ebird.org/region/IN-TN-CP>

<https://ebird.org>

**Table No: 3.27. List of Reptiles either spotted or reported from the study area
(*indicates direct observations & Secondary data)**

SI. No	Common Name	Scientific Name	Schedule list The Wildlife (Protection) Amendment Act, 2022
1.	Oriental garden lizard	<i>Calotes versicolor</i>	---
2.	Common skink	<i>Mabuya carinatus</i>	---
3.	Green vine snake	<i>Ahaetulla nasuta</i>	---
4.	House lizards	<i>Hemidactylus frenatus</i>	---
5.	Common krait	<i>Bungarus caeruleus</i>	---

Table No: 3.28. List of insects either spotted or reported from the study area

SI. No	Common Name	Scientific Name	Schedule list The Wildlife (Protection) Amendment Act, 2022
1.	Indian honey bee	<i>Apis cerana</i>	---
2.	Grasshopper	<i>Hieroglyphus daganensis</i>	---
3.	Dragonfly	<i>Ceratogomphus pictus</i>	---
4.	Ant	<i>Camponotus Vicinus</i>	---
5.	Termite	<i>Hamitermes silvestri</i>	---

Table No: 3.29. List of Butterflies reported from the study area and Secondary data

SI. No	Common Name	Scientific Name	Schedule
1.	Common emigrant	<i>Catopsilia pomona</i>	---
2.	Common Mormon	<i>Papilio polytes</i>	---
3.	Lemon Pansy	<i>Junonia lemonias</i>	---
4.	Common Crow	<i>Euploea core</i>	---
5.	Common rose	<i>Pachliopta aristolochiae</i>	---
6.	Spotless grass yellow	<i>Eurema laeta</i>	---
7.	Common Evening Brown	<i>Melanitis leda</i>	---
8.	Peacock Royal	<i>Tajuria cippus</i>	Schedule II
9.	Common Tiger	<i>Danaus genutia</i>	---
10.	Indian palm bob	<i>Suastus gremius</i>	---
11.	Psyche	<i>Leptosia nina</i>	---
12.	Danaid Eggfly	<i>Hypolimnas misippus</i>	Schedule II
13.	Great Eggfly	<i>Hypolimnas bolina</i>	---
14.	Chocolate Pansy	<i>Junonia iphita</i>	---

15.	Tiny Grass Blue	<i>Zizula hylax</i>	---
16.	Crimson tip	<i>Colotisdanae</i>	---
17.	Common Indian crow	<i>Euploea core</i>	---
18.	Yellow Pansy	<i>Junonia hierta</i>	---
19.	Blue Mormon	<i>Papilio polymnestor</i>	---
20.	Double-branded Black Crow	<i>Euploea sylvester</i>	---
21.	Peacock Pansy	<i>Junonia almana</i>	---
22.	Common Mime	<i>Papilio clytia</i>	Schedule II
23.	Plain Tiger Butterfly	<i>Danaus chrysippus</i>	---
24.	Lesser Grass Blue	<i>Zizina otis</i>	---
25.	Pale Grass Blue	<i>Pseudozizeeria maha</i>	---
26.	Crimson Rose	<i>Pachliopta hector</i>	Schedule II
27.	Blue Tiger	<i>Tirumala limniace</i>	---

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

FIGURE 3.27: FLORAL DIVERSITY IN CORE ZONE

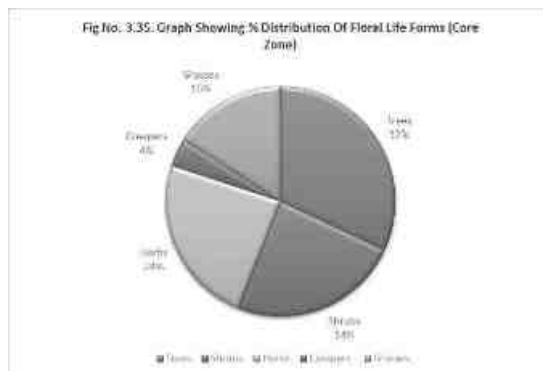


FIGURE 3.28: FLORAL DIVERSITY IN BUFFER ZONE

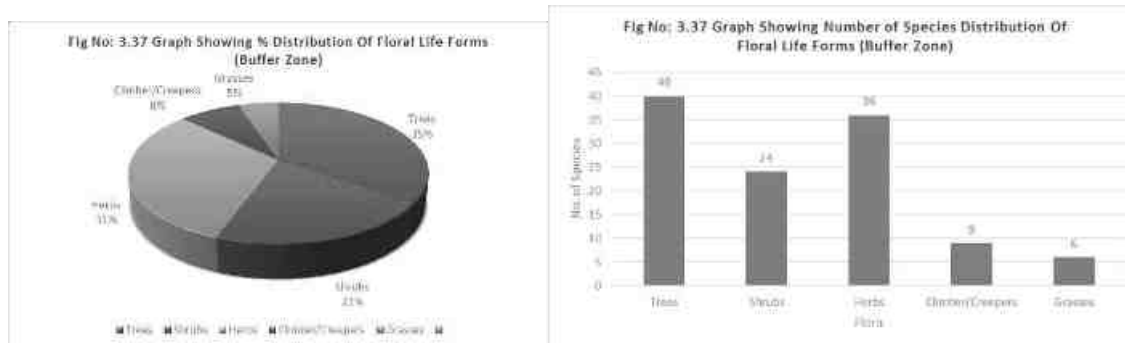
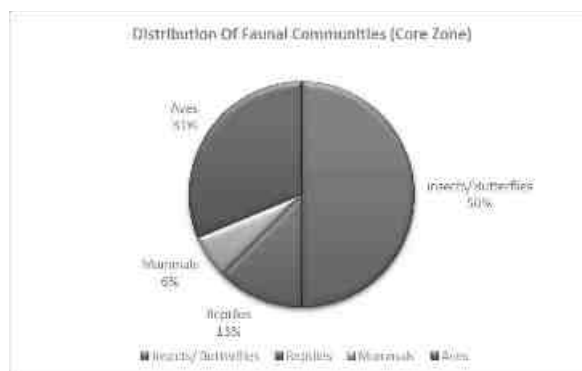
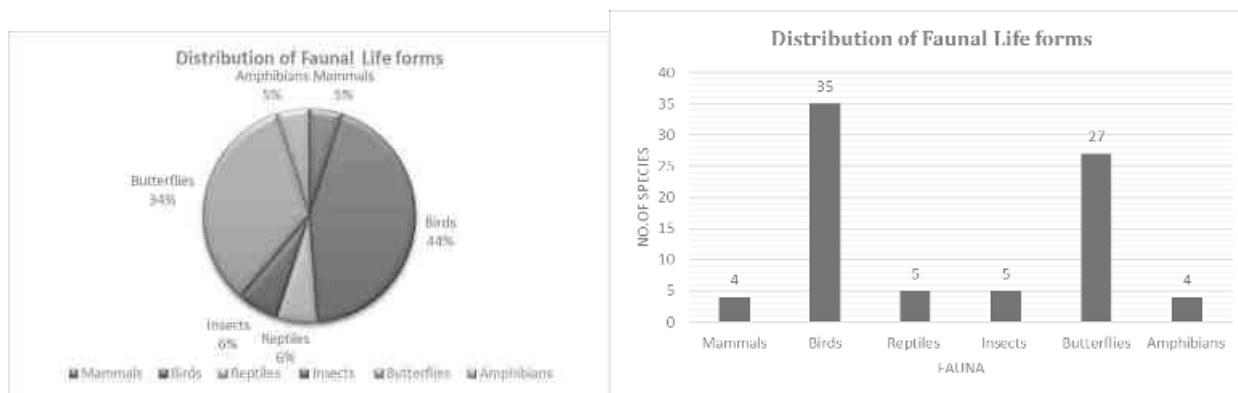


FIGURE 3.29: FAUNA DIVERSITY IN CORE ZONE**FIGURE 3.30: FAUNA DIVERSITY IN BUFFER ZONE****3.5.4 Interpretation& Conclusion:**

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

3.6 SOCIO ECONOMIC ENVIRONMENT

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

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

3.6.1 Objectives of the Study

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

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

3.6.2 Scope of Work

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

3.6.3 District Profile

Tiruvannamalai district is divided into 12 taluks. The taluks are further divided into 18 blocks, which further divided into 860 villages. In 2011, Tiruvannamalai had population of 24,64,875 of which male and female were 12,35,889 and 12,28,986 respectively. In 2001 census, Tiruvannamalai had a population of 21,86,125 of which males were 10,95,859 and remaining 10,90,266 were females. Tiruvannamalai District population constituted 3.42 % of total Maharashtra population. In 2001 census, this figure for Tiruvannamalai District was at 3.50 % of Maharashtra population.

There was change of 12.75 % in the population compared to population as per 2001. In the previous census of India 2001, Tiruvannamalai District recorded increase of 7.01 % to its population compared to 1991.

3.6.4 Study area:

MOSAVADI VILLAGE

Mosavadi is a medium size village located in Vandavasi Taluka of Tiruvannamalai district, Tamil Nadu with total 225 families residing. The Mosavadi village has population of 823 of which 389 are males while 434 are females as per Population Census 2011.

In Mosavadi village population of children with age 0-6 is 76 which makes up 9.23 % of total population of village. Average Sex Ratio of Mosavadi village is 1116 which is higher than Tamil Nadu state average of 996. Child Sex Ratio for the Mosavadi as per census is 1111, higher than Tamil Nadu average of 943.

Mosavadi village has lower literacy rate compared to Tamil Nadu. In 2011, literacy rate of Mosavadi village was 76.71 % compared to 80.09 % of Tamil Nadu. In Mosavadi Male literacy stands at 87.54 % while female literacy rate was 67.01 %.

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

TABLE 3.30: CHIKKIRAMPALAYAM VILLAGE POPULATION FACTS

Number of Households	225
Population	823
Male Population	389
Female Population	434
Children Population	76
Literacy	76.71%
Male Literacy	87.54%
Female Literacy	67.01%
Scheduled Tribes (ST) %	10
Scheduled Caste (SC) %	305

Source: <https://www.census2011.co.in/data/village/631492-mosavadi-tamil-nadu.html>

Gram Panchayat name of the Mosavadi village is Mosavadi. CD Block name is Peranamallur and Teshil/Taluk or sub-district is Vandavasi. Data Reference year is 2009 of Census 2011. Sub District HQ Name is VANDAVASI and Sub District HQ Distance is 25 Km from the village. District Head Quarter name is TIRUVANNAMALAI and it's distance from the village is 60KM. Nearest Town of the Mosavadi village is PERANAMALLUR and nearest town distance is 5 km. Pincode of Mosavadi village is 604503. As per census 2011 village code of village Mosavadi is 631492..

TABLE 3.31: DEMOGRAPHICS POPULATION OF VILLAGE CHIKKIRAMPALAYAM

Total Population	Male Population	Female Population
823	389	434

Source: <https://etrace.in/census/village/mosavadi-vandavasi-district-tiruvannamalai-tamil-nadu-631492/>

Sex Ratio of Mosavadi Village -Census 2011

As per the Census Data 2011 there are 1116 Femals per 1000 males out of 823 total population of village. There are 1111 girls per 1000 boys under 6 years of age in the village.

Literacy of Mosavadi Village

Out of total poplation total 573 people in Mosavadi Village are literate, among them 309 are male and 264 are female in the village. Total literacy rate of of Mosavadi is 76.71%, for male literacy is 87.54% and for female literacy rate is 67.01%.

Worker's profile of Mosavadi Village

Total working population of Mosavadi is 438 which are either main or marginal workers. Total workers in the village are 438 out of which 242 are male and 196 are female. Total main workers are 344 out of which female main workers are 202 and male main workers are 142. Total marginal workers of village are 94.

TABLE 3.32: POPULATION DATA OF STUDY AREA

Sl.No.	Village Name	No of House Holds	Total Population	Male	Female	Total Literate Population	Male Literate	Female Literate	Total Illiterate Population	Male Illiterate	Female Illiterate
1	Alliandal	377	1669	801	868	1157	613	544	512	188	324
2	Ariyapadi	269	1049	531	518	622	375	247	427	156	271
3	Chandirambadi	180	769	377	392	622	325	297	147	52	95
4	Endal	49	197	112	85	117	73	44	80	39	41
5	Injimedu	402	1504	742	762	958	545	413	546	197	349
6	Kolipuliyur	217	903	445	458	602	349	253	301	96	205
7	Kothandapuram	430	1762	898	864	1194	682	512	568	216	352
8	Mahadevimangalam	271	963	489	474	675	397	278	288	92	196
9	Malaiyur	570	2222	1094	1128	1503	845	658	719	249	470
10	Manickkamangalam	141	600	288	312	419	230	189	181	58	123
11	Melathangal	510	1995	970	1025	1393	768	625	602	202	400
12	Melpalayam	105	399	205	194	273	170	103	126	35	91
13	Mosavadi	225	823	389	434	573	309	264	250	80	170
14	Nambedu	476	1977	1009	968	1274	743	531	703	266	437
15	Ragunathasamudram	395	1758	887	871	1322	746	576	436	141	295
16	Reddikuppam	244	1036	529	507	632	364	268	404	165	239
17	Septankulam	420	1785	898	887	1071	624	447	714	274	440
18	Thadinolambai	296	1068	530	538	738	414	324	330	116	214
19	Thavani	272	1086	551	535	727	427	300	359	124	235
20	Thellarampattu	87	302	153	149	213	135	78	89	18	71
21	Thenkkarai	548	2172	1053	1119	1213	690	523	959	363	596
22	Vadugamangalam	89	330	150	180	175	91	84	155	59	96
23	Vallan	544	2401	1200	1201	1495	816	679	906	384	522
24	Visamangalam	402	1651	817	834	1063	614	449	588	203	385

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

TABLE 3.33: WORKERS PROFILE OF STUDY AREA

Sl.No.	Village Name	Total Workers Population	Male Workers	Female Workers	Total Main Workers	Main Workers Male	Main Workers Female	Main Cultivation Workers	Main Agriculture Workers	Main Other Workers	Non-Worker Population
1	Alliandal	867	481	386	481	287	194	29	250	180	802
2	Ariyapadi	644	334	310	379	246	133	51	268	59	405
3	Chandirambadi	373	215	158	373	215	158	227	53	91	396
4	Endal	139	80	59	87	56	31	30	47	10	58
5	Injimedu	926	521	405	796	477	319	419	150	223	578
6	Kolipuliur	555	283	272	222	129	93	155	12	51	348
7	Kothandapuram	1197	632	565	1023	539	484	415	218	206	565
8	Mahadevimangalam	648	338	310	426	242	184	255	93	77	315
9	Malaiyur	1455	774	681	1106	623	483	207	736	149	767
10	Manickkamangalam	360	180	180	15	10	5	2	1	11	240
11	Melathangal	1177	643	534	1075	583	492	376	411	279	818
12	Melpalayam	240	129	111	227	124	103	63	150	13	159
13	Mosavadi	438	242	196	344	202	142	73	160	109	385
14	Nambedu	1053	614	439	1016	591	425	445	300	242	924
15	Ragunathasamudram	1193	616	577	276	153	123	16	200	57	565
16	Reddikuppam	698	353	345	366	200	166	13	342	10	338
17	Septankulam	1003	598	405	978	585	393	213	707	55	782
18	Thadinolambai	761	384	377	761	384	377	463	253	40	307
19	Thavani	652	354	298	651	354	297	131	329	187	434
20	Thellarampattu	187	103	84	164	89	75	52	91	18	115
21	Thenkkarai	1067	610	457	977	567	410	726	94	150	1105
22	Vadugamangalam	173	100	73	82	60	22	31	43	8	157
23	Vallan	1352	751	601	837	492	345	164	590	77	1049
24	Visamangalam	1065	548	517	677	363	314	401	147	129	586

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

TABLE 3.34: COMMUNICATION & TRANSPORT FACILITIES IN THE STUDY AREA

Sl.No	Village Name	PO	SPO	PTO	T	PCO	MP	IC / CSC	PCF	BS	PBS	RS	NH	SH	MDR	BTR	GR	NWR	FP
1	Alliandal	2	2	2	1	1	1	2	2	1	2	2	2	2	2	1	1	2	1
2	Ariyapadi	2	2	2	1	1	1	2	2	2	2	2	2	2	2	1	1	2	1
3	Chandirambadi	2	2	2	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
4	Endal	2	1	2	1	1	1	2	2	1	1	2	2	1	1	1	1	2	1
5	Injimedu	2	2	2	1	1	1	2	2	2	2	2	2	2	1	1	1	2	1
6	Kolipuliyur	2	2	2	1	1	1	2	2	1	1	2	2	1	1	1	1	2	1
7	Kothandapuram	2	2	2	1	1	1	1	1	1	1	2	2	1	1	1	1	2	1
8	Mahadevimangalam	2	2	2	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
9	Malaiyur	1	2	1	1	1	1	1	1	1	1	2	1	2	1	1	1	2	1
10	Manickkamangalam	2	2	2	1	1	1	2	2	2	2	2	2	2	1	1	1	2	1
11	Melathangal	2	1	2	1	1	1	2	2	1	1	2	2	1	1	1	1	2	1
12	Melpalayam	2	2	2	1	1	2	2	2	1	1	2	2	2	2	1	1	2	1
13	Mosavadi	2	2	2	1	1	1	2	2	1	1	2	2	2	1	1	1	2	1
14	Nambedu	2	1	2	1	1	1	2	2	1	1	2	2	2	1	1	1	2	1
15	Ragunathasamudram	2	1	2	1	1	1	2	2	1	1	2	2	1	1	1	1	2	1
16	Reddikuppam	2	2	2	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
17	Septankulam	2	2	2	1	2	1	2	2	2	2	2	2	2	2	1	1	2	1
18	Thadinolambai	2	2	2	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
19	Thavani	2	2	2	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
20	Thellarampattu	2	2	2	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
21	Thenkkarai	2	2	2	1	1	1	2	2	1	1	2	2	2	1	1	1	2	1
22	Vadugamangalam	2	2	2	1	1	1	2	2	2	2	2	2	2	2	1	1	2	1
23	Vallan	1	2	1	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
24	Visamangalam	2	2	2	1	1	1	2	2	1	1	2	2	2	1	1	1	2	1

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

TABLE 3.35: WATER & DRAINAGE FACILITIES IN THE STUDY AREA

Sl.No	Village Name	TP	CW	UCW	HP	TW/BH	S	R/C	T/P/L	CD	OD	CT
1	Alliandal	1	2	2	2	1	2	2	2	1	1	2
2	Ariyapadi	1	2	1	1	2	2	2	2	2	1	1
3	Chandirambadi	1	2	2	2	2	2	2	2	1	1	2
4	Endal	1	1	1	2	2	2	2	2	1	1	2
5	Injimedu	1	2	2	2	1	2	2	2	1	1	1
6	Kolipuliyur	1	2	2	2	2	2	2	2	1	1	2
7	Kothandapuram	1	2	1	2	2	2	2	2	2	2	1
8	Mahadevimangalam	1	2	1	2	1	2	2	2	1	1	2
9	Malaiyur	1	1	1	1	1	2	2	1	1	1	1
10	Manickkamangalam	1	1	1	2	2	2	2	2	2	2	2
11	Melathangal	1	2	1	1	1	2	2	2	1	1	2
12	Melpalayam	1	1	2	1	2	2	2	2	2	1	2
13	Mosavadi	1	2	2	2	2	2	2	2	1	1	2
14	Nambedu	1	1	1	1	1	1	2	2	1	1	1
15	Ragunathasamudram	1	1	2	2	2	2	2	2	1	1	2
16	Reddikuppam	1	1	1	2	2	2	2	2	2	2	1
17	Septankulam	1	1	1	1	2	2	2	2	1	1	1
18	Thadinolambai	1	2	1	2	2	2	2	2	2	1	1
19	Thavani	1	2	1	2	2	2	2	2	2	1	2
20	Thellampattu	1	2	2	2	2	2	2	2	2	1	2
21	Thenkkarai	1	1	1	2	2	2	2	2	1	1	1
22	Vadugamangalam	1	2	2	2	2	2	2	2	2	1	1
23	Vallan	1	2	1	2	2	2	2	2	1	1	1
24	Visamangalam	1	1	1	1	2	2	2	2	1	1	2

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

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

TABLE 3.36: OTHER FACILITIES IN THE STUDY AREA

Sl.No	Village Name	ATM	CB	COB	ACS	SHG	PDS	RM	AMS	NC	NC-AC	CC	SF	PL	NPS	APS	BDRO	PS
1	Alliandal	2	2	2	2	1	1	2	2	1	1	1	1	2	1	1	1	1
2	Ariyapadi	2	2	2	2	1	1	2	2	2	1	2	1	1	1	1	1	1
3	Chandirambadi	2	2	2	2	1	1	2	2	1	1	2	1	1	1	1	2	1
4	Endal	2	2	2	2	1	1	2	2	2	1	2	2	1	1	1	1	1
5	Injimedu	2	2	2	2	1	1	2	2	1	1	2	1	1	1	1	1	1
6	Kolipuliyur	2	2	2	2	1	1	2	2	2	1	2	1	1	1	1	2	1
7	Kothandapuram	2	1	1	1	1	1	2	2	2	1	2	1	1	1	1	1	1
8	Mahadevimangalam	2	2	2	2	1	1	2	2	1	1	1	1	2	1	1	1	1
9	Malaiyur	2	1	1	1	1	1	2	2	2	1	1	1	1	1	1	1	1
10	Manickkamangalam	2	2	2	2	1	1	2	2	2	1	2	2	2	1	2	2	1
11	Melathangal	2	2	2	1	1	1	2	2	2	1	1	1	1	1	1	1	1
12	Melpalayam	2	2	2	2	1	2	2	2	1	1	1	1	1	1	1	1	1
13	Mosavadi	2	2	1	1	1	1	2	2	1	1	2	1	2	1	1	1	1
14	Nambedu	2	2	2	2	1	1	2	2	1	1	2	1	1	1	1	1	1
15	Ragunathasamudram	2	2	2	2	1	1	2	2	1	1	2	1	1	1	1	1	1
16	Reddikuppam	2	2	2	2	1	1	2	2	1	1	2	1	1	1	1	1	1
17	Septankulam	2	2	2	2	1	1	2	2	2	1	2	1	1	1	1	1	1
18	Thadinolambai	2	2	2	2	1	1	2	2	2	1	2	1	1	1	1	1	1
19	Thavani	2	2	2	2	1	1	2	2	1	1	1	1	1	1	1	1	1
20	Thellarampattu	2	2	2	2	1	1	2	2	2	1	1	2	2	1	1	1	1
21	Thenkkarai	2	2	2	2	1	1	2	2	2	1	1	1	1	1	1	1	1
22	Vadugamangalam	2	2	2	2	1	1	2	2	2	1	2	1	1	1	1	1	1
23	Vallan	2	2	2	2	1	1	2	2	1	1	2	1	1	1	1	1	1
24	Visamangalam	2	2	2	2	1	1	2	2	2	1	1	1	1	1	1	1	1

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

TABLE 3.37: EDUCATIONAL FACILITIES IN THE STUDY AREA

Sl.No	Village Name	PPS		PS		MS		SS		SSS		DC		EC		MC		MI		PT		VTS		SSD	
		G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P
1	Alliandal	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2	Ariyapadi	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	Chandirambadi	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
4	Endal	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
5	Injimedu	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
6	Kolipuliyur	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
7	Kothandapuram	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
8	Mahadevimangalam	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
9	Malaiyur	1	2	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
10	Manickkamangalam	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
11	Melathangal	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
12	Melpalayam	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
13	Mosavadi	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
14	Nambodu	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
15	Ragunathasamudram	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
16	Reddikuppam	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
17	Septankulam	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
18	Thadinolambai	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
19	Thavani	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
20	Thellarampattu	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21	Thenkkarai	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
22	Vadugamangalam	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
23	Vallan	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
24	Visamangalam	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Abbreviations: PPS-Pre Primary School; SSS-Senior Secondary School; DC-Degree School; PT-Polytechnic; PS-Primary School; G-Government; EC-Engineering College; VTS-Vocational School/ITI; MS-Middle School; P-Private; MC-Medical College; SSD-Special School For Disabled; SS-Secondary School; MI-Management College/Institute;

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

TABLE 3.38: MEDICAL FACILITIES IN THE STUDY AREA

Sl.No	Village Name	CHC	PHC	PHSC	MCW	TBC	HA	HAM	D	VH	MHC	FWC	NGM-I/O
1	Alliandal	0	0	0	0	0	0	0	0	0	0	0	5
2	Ariyapadi	0	0	0	0	0	0	0	0	0	0	0	2
3	Chandirambadi	0	0	0	0	0	0	0	0	0	0	0	3
4	Endal	0	0	0	0	0	0	0	0	0	0	0	3
5	Injimedu	0	0	1	0	0	0	0	0	0	0	0	4
6	Kolipuliyur	0	0	0	0	0	0	0	0	0	0	0	3
7	Kothandapuram	0	0	0	0	0	0	0	0	0	0	0	6
8	Mahadevimangalam	0	0	0	0	0	0	0	0	0	0	0	7
9	Malaiyur	0	1	1	1	1	0	0	1	1	0	1	0
10	Manickkamangalam	0	0	0	0	0	0	0	0	0	0	0	5
11	Melathangal	0	0	0	0	0	0	0	0	1	0	0	8
12	Melpalayam	0	0	0	0	0	0	0	0	0	0	0	9
13	Mosavadi	0	0	0	0	0	0	0	0	0	0	0	5
14	Nambedu	0	0	1	0	0	0	0	0	0	0	0	6
15	Ragunathasamudram	0	0	1	1	0	0	0	0	0	0	0	10
16	Reddikuppam	0	0	0	0	0	0	0	0	0	0	0	4
17	Septankulam	0	0	0	0	0	0	0	0	0	0	0	5
18	Thadinolambai	0	0	0	0	0	0	0	0	0	0	0	7
19	Thavani	0	0	0	0	0	0	0	0	0	0	0	8
20	Thellarampattu	0	0	0	0	0	0	0	0	0	0	0	3
21	Thenkkarai	0	0	0	0	0	0	0	0	0	0	0	2
22	Vadugamangalam	0	0	0	0	0	0	0	0	0	0	0	3
23	Vallan	0	0	1	0	0	0	0	0	0	0	0	6
24	Visamangalam	0	0	0	0	0	0	0	0	0	0	0	8

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

Note – 1 - Available within the village; 2 - Not available a-facility available at <5kms b-facility available at >10kms

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

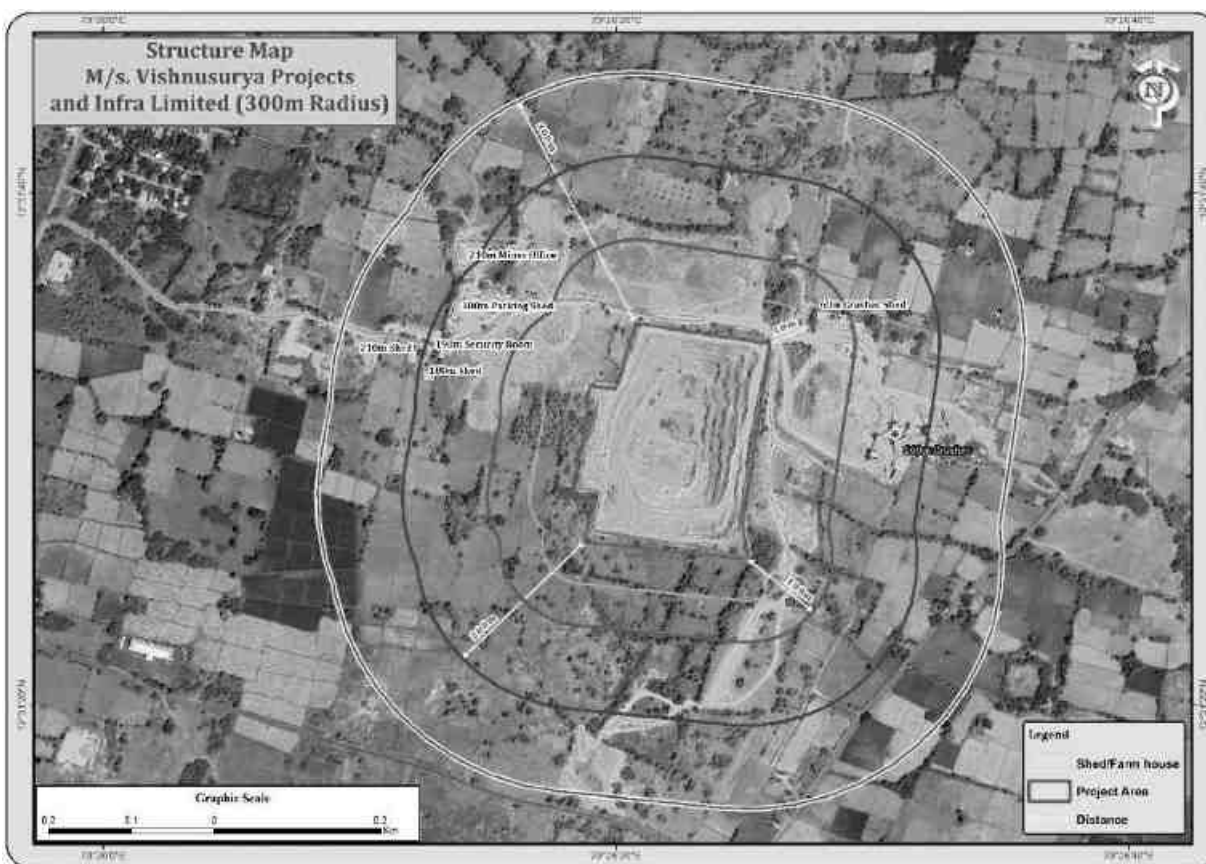
3.6.6 Recommendation and Suggestion

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

3.6.7 Summary & Conclusion

The socio-economic study of surveyed villages gives a clear picture of its population, average household size, literacy rate and sex ratio etc. It is also found that a part of population is suffering from lack of permanent job to run their day-to-day life. Their expectation is to earn some income for their sustainability on a long-term basis. The proposed project will aim to provide preferential employment to the local people there by improving the employment opportunity in the area and in turn the social standards will improve.

3.7 STRUCUTRE STUDY



Enumeration of Structure 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	60m – North East	Crusher shed	Sheet Structure	Nil	Yes	Used to store Crusher equipment's and Crusher Materials– No Stay
2	160m – East	Crusher	Framed Structure	4 Nos	Yes	Production of M-Sand, P-Sand and Jelly– No Stay
3	180m – West	Shed	Sheet Structure	Nil	Yes	Used for Storage purpose– No Stay
4	180m – North West	Parking Shed	Sheet Structure	Nil	Yes	Used for parking the Vehicles– No Stay
5	190m – West	Security Room	Sheet Structure	Nil	Yes	Used as shelter for the Security– No Stay
6	210m – North West	Mines Office	RCC Structure	Nil	Yes	Used to store mine documents and records – No Stay
7	210m – West	Shed	Sheet Structure	Nil	Yes	Used for Storage purpose– No Stay

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.

In order to maintain the environmental commensuration with the mining operation, it is essential to undertake studies on the existing environmental scenario and assess the impact on different environmental components. This would help in formulating suitable management plans sustainable resource extraction.

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

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

- Land environment
- Soil environment
- Water Environment
- Air Environment
- Noise Environment
- Socio economic environment
- Biological Environment

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

4.1 LAND ENVIRONMENT:

4.1.2 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 Mitigation Measures for Proposed Project

- The mining activity will be gradual confined in blocks and excavation will be undertaken progressively along with other mitigative measures like phase wise development of greenbelt etc.
- Construction of garland drains all around the quarry pits and construction of check dam at strategic location in lower elevations to prevent erosion due to surface runoff during rainfall and also to collect the storm water for various uses within the proposed area.
- Green belt development along the boundary within safety zone. The small quantity of water stored in the mined-out pit will be used for greenbelt.
- Thick plantation will be carried out on unutilized area, top benches of mined out pits, on safety barrier, etc.,
- At conceptual stage, the land use pattern of the quarry will be changed into Greenbelt area and temporary reservoir
- In terms of aesthetics, natural vegetation surrounding the quarry will be retained (such as in a buffer area i.e., 7.5 m safety barrier and other safety provided) so as to help minimise dust emissions.
- Proper fencing will be carried out at the conceptual stage, Security will be posted round the clock, to prevent inherent entry of the public and cattle.

4.1.3 Soil Environment

The proposed projects area is covered by thin layer of gravel formation and the average thickness is about 3m, the excavated gravel will be directly sold to needy customers in open market.

4.1.4 Impact on Soil Environment from Proposed Project

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 sediment and reduce suspended sediment loads before runoff is discharged from the quarry site. Sedimentation ponds should be designed based on runoff, retention times, and soil characteristics. There may be a need to provide a series of sedimentation ponds to achieve the desired outcome.
- Retain vegetation – Retain existing or re-plant the vegetation at the site wherever possible.
- Monitoring and maintenance – Weekly monitoring and daily maintenance of erosion control systems so that they perform as specified specially during rainy season.

4.1.6 Waste Dump Management

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

4.2 WATER ENVIRONMENT

4.2.1 Anticipated Impact from Proposed Project

- The major sources of water pollution normally associated due to mining and allied operations are:
 - Generation of waste water from vehicle washing.
 - Washouts from surface exposure or working areas
 - Domestic sewage
 - Disturbance to drainage course in the project area
 - Mine Pit water discharge

- Increase in sediment load during monsoon in downstream of lease area
- This being a mining project, there will be no process effluent. Waste from washing of machinery may result in discharge of Oil & grease, suspended solids.
- The sewage from soak pit may percolate to the ground water table and contaminate it.
- Surface drainage may be affected due to Mining
- Abstraction of water may lead to depletion of water table

Detail of water requirements in KLD as given below:

TABLE 4.1: WATER REQUIREMENT

*Purpose	Quantity	Source
Dust Suppression	1.0 KLD	From Existing bore wells from nearby area
Green Belt development	1.0 KLD	From Existing bore wells from nearby area
Domestic purpose	0.5 KLD	From existing, bore wells and drinking water will be sourced from Approved water vendors.
Total	2.5 KLD	

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

Source: Approved Mining Plan Pre-Feasibility Report

4.2.2 Mitigation Measures for Proposed Project

- 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 settling tank of 15 m x 10m x 3m to remove suspended solids if any. This collected water will be judiciously used for dust suppression and such sites where dust likely to be generated and for developing green belt. The proponent will collect and judiciously utilize the rainwater as part of rainwater harvesting system.
- Providing benches with inner slopes and through a system of drains and channels, allowing rain water to descent into surrounding drains, so as to minimize the effects of erosion & water logging arising out of uncontrolled descent of water.
- Reuse the water collected during storm for dust suppression and greenbelt development within the mines
- Installing interceptor traps/oil separators to remove oils and greases. Water from the tipper wash-down facility and machinery maintenance yard will pass through interceptor traps/oil separators prior to its reuse;
- Using flocculating or coagulating agents to assist in the settling of suspended solids during monsoon seasons;
- Periodic (every 6 month once) analysis of quarry pit water and ground water quality in nearby villages.
- Domestic sewage from site office & urinals/latrines provided in ML is discharged in septic tank followed by soak pits.
- Waste water discharge from mine will be treated in settling tanks before using for dust suppression and tree plantation purposes.
- De-silting will be carried out before and immediately after the monsoon season.
- Regular monitoring (every 6 month once) and analysing the quality of water in open well, bore wells and surface water

4.3 AIR ENVIRONMENT

4.3.1. Anticipated Impact from Proposed Project

- 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.

4.3.2.1 Emission Estimation

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

The general equation for emissions estimation is:

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

Where:

E = emissions;

A = activity rate;

EF = emission factor, and

ER = overall emission reduction efficiency, %

The proposed mining activity includes various activities like ground preparation, excavation, handling and transport of Rough Stone. 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.

4.3.2 Frame work of Computation & Model details

By using the above-mentioned inputs, ground level concentrations due to the quarrying activities have been estimated to know the incremental concentration in ambient air quality and impact in the study area. The effect of air pollutants upon receptors are influenced by concentration of pollutants and their dispersion in the atmosphere. Air quality modelling is an important tool for prediction, planning and evaluation of air pollution control activities besides identifying the requirements for emission control to meet the regulatory standards and to apply mitigation measures to reduce impact caused by quarrying activities. Suspended Particulate Matter (SPM) is the major pollutant occurred during quarrying activities. The prediction included the impact of Excavation, Drilling, Blasting (Occasionally),

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

TABLE 4.2: ESTIMATED EMISSION RATE FOR PM₁₀

Activity	Source type	Value	Unit
Drilling	Point Source	0.114072128	g/s
Blasting	Point Source	0.004672100	g/s
Mineral Loading	Point Source	0.046004986	g/s
Haul Road	Line Source	0.00250437	g/s/m
Overall Mine	Area Source	0.078546655	g/s

TABLE 4.3: ESTIMATED EMISSION RATE FOR SO₂

Activity	Source type	Value	Unit
Overall Mine	Area Source	0.001633816	g/s

TABLE 4.4: ESTIMATED EMISSION RATE FOR NO_x

Activity	Source type	Value	Unit
Overall Mine	Area Source	0.000173467	g/s

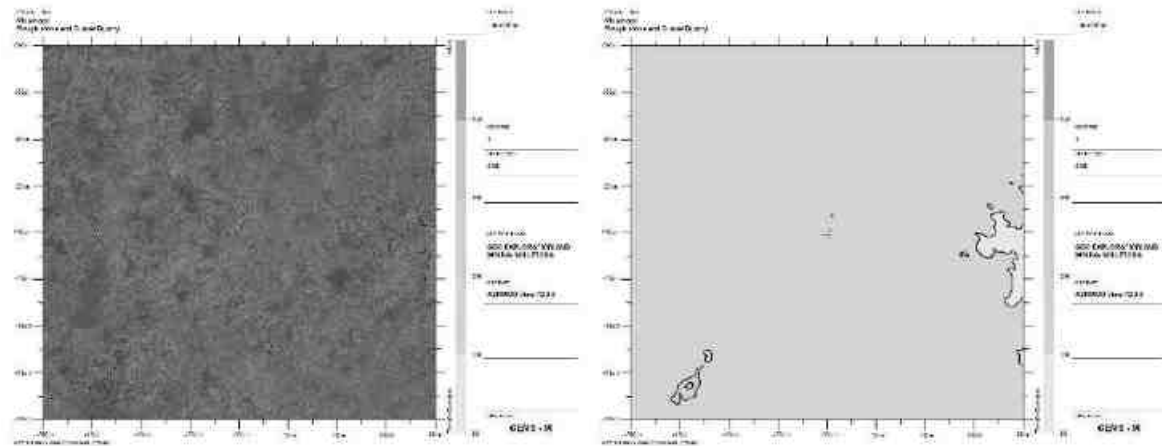
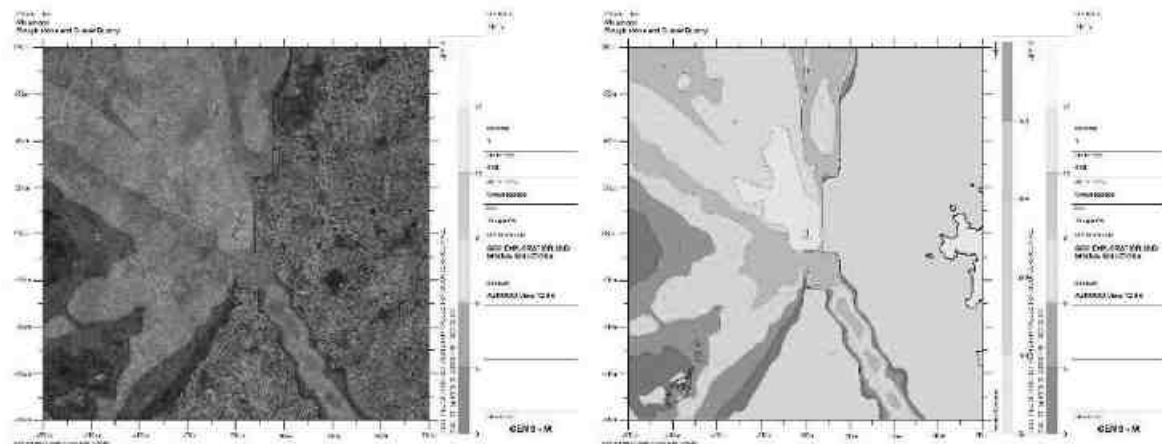
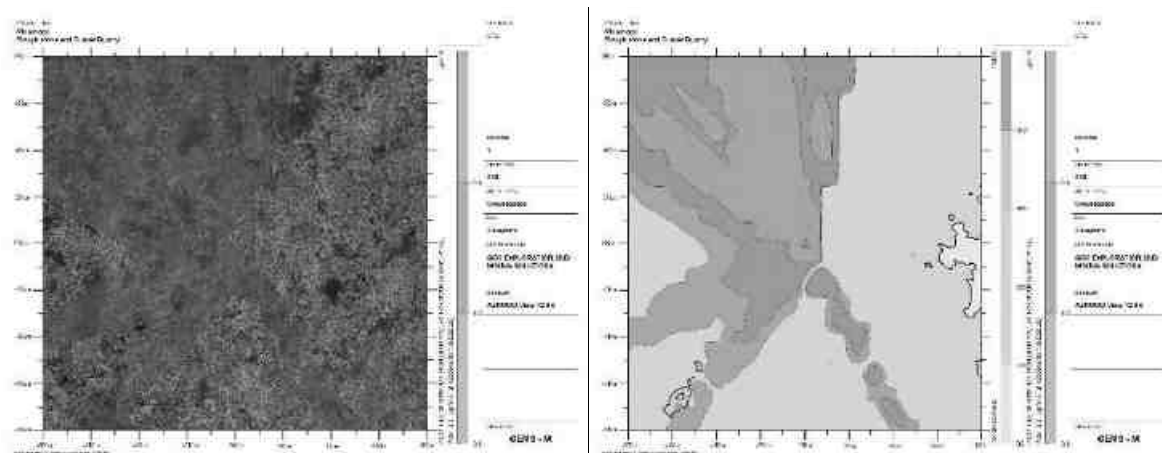
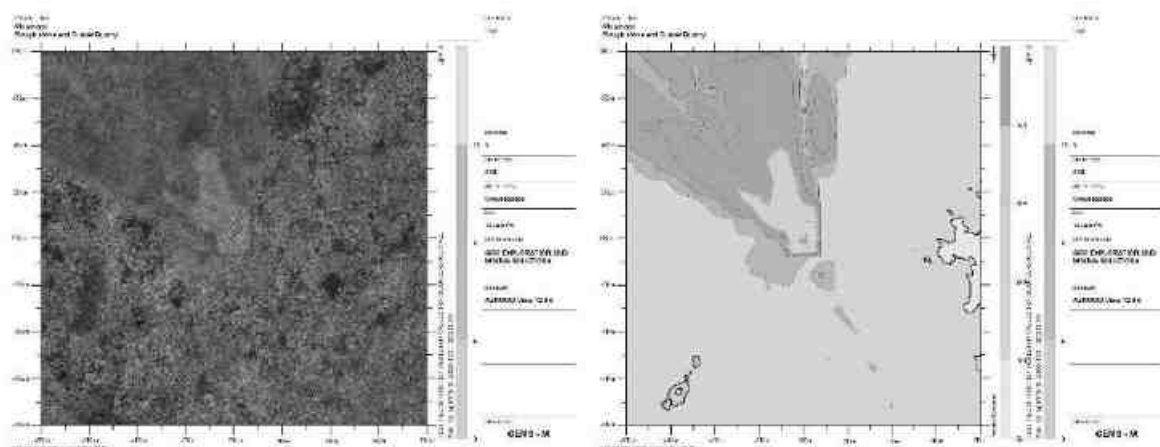
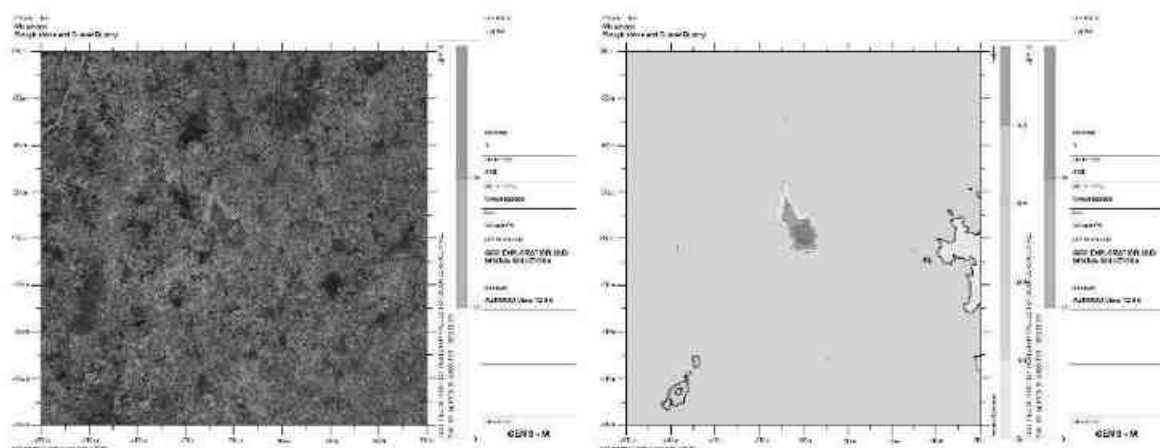
FIGURE 4.1: AERMOD TERRAIN MAP**FIGURE 4.2: PREDICTED INCREMENTAL CONCENTRATION OF PM₁₀****FIGURE 4.3: PREDICTED INCREMENTAL CONCENTRATION OF SO₂**

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

4.3.2.1 Model Results

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

TABLE 4.5: 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)
AAQ1	12°31'27.02"N 79°26'19.36"E	-91	-101	39.0	17.49	56.49
AAQ2	12°31'33.93"N 79°26'25.69"E	100	110	40.0	17.25	57.25
AAQ3	12°31'53.84"N 79°26'29.05"E	201	727	42.0	17.10	59.1
AAQ4	12°31'15.33"N 79°29'6.31"E	4977	-461	42.7	0	42.7
AAQ5	12°34'16.00"N 79°25'55.01"E	-834	5124	42.8	16.00	58.8
AAQ6	12°31'15.47"N 79°23'14.76"E	-5701	-459	42.7	4.60	47.3
AAQ7	12°28'37.95"N 79°27'1.33"E	1187	-5206	43.1	0	43.1

TABLE 4.6: 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)
AAQ1	12°31'27.02"N 79°26'19.36"E	-91	-101	18.9	9.81	28.71
AAQ2	12°31'33.93"N 79°26'25.69"E	100	110	19.6	9.67	29.27
AAQ3	12°31'53.84"N 79°26'29.05"E	201	727	21.1	9.39	30.49
AAQ4	12°31'15.33"N 79°29'6.31"E	4977	-461	21.8	0	21.8
AAQ5	12°34'16.00"N 79°25'55.01"E	-834	5124	22.1	9.00	31.1
AAQ6	12°31'15.47"N 79°23'14.76"E	-5701	-459	218	3.33	221.33
AAQ7	12°28'37.95"N 79°27'1.33"E	1187	-5206	22.4	0.21	22.61

TABLE 4.7: INCREMENTAL & RESULTANT GLC OF SO₂

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline SO ₂ (µg/m ³)	Incremental value due to mining (µg/m ³)	Total SO ₂ (µg/m ³)
AAQ1	12°31'27.02"N 79°26'19.36"E	-91	-101	4.5	3.10	7.6
AAQ2	12°31'33.93"N 79°26'25.69"E	100	110	4.4	3.08	7.48
AAQ3	12°31'53.84"N 79°26'29.05"E	201	727	4.5	3.04	7.54
AAQ4	12°31'15.33"N 79°29'6.31"E	4977	-461	4.5	0	4.5
AAQ5	12°34'16.00"N 79°25'55.01"E	-834	5124	4.6	3.00	7.6
AAQ6	12°31'15.47"N 79°23'14.76"E	-5701	-459	4.5	0	4.5
AAQ7	12°28'37.95"N 79°27'1.33"E	1187	-5206	4.6	0	4.6

TABLE 4.8: INCREMENTAL & RESULTANT GLC OF NO_x

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline NO _x (µg/m ³)	Incremental value due to mining (µg/m ³)	Total NO _x (µg/m ³)
AAQ1	12°31'27.02"N 79°26'19.36"E	-91	-101	18.9	12.71	31.61
AAQ2	12°31'33.93"N 79°26'25.69"E	100	110	18.7	12.32	31.02
AAQ3	12°31'53.84"N 79°26'29.05"E	201	727	18.8	12.16	30.96
AAQ4	12°31'15.33"N 79°29'6.31"E	4977	-461	18.7	0	18.7
AAQ5	12°34'16.00"N 79°25'55.01"E	-834	5124	19.2	10.00	29.2
AAQ6	12°31'15.47"N 79°23'14.76"E	-5701	-459	19.2	0	19.2
AAQ7	12°28'37.95"N 79°27'1.33"E	1187	-5206	18.8	0	18.8

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 µg/m³ 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 tippers will be avoided to prevent spillage.
- It will be ensured that all transportation vehicles carry a valid PUC certificate
- Grading of haul roads and service roads to clear accumulation of loose materials

Green Belt –

- Planting of trees all along main mine haul roads and regular grading of haul roads will be practiced to prevent the generation of dust due to movement of dumpers/trucks
- Green belt of adequate width will be developed around the project areas

Occupational Health –

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

4.4 NOISE ENVIRONMENT

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

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

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

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

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

Where:

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

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

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

4.4.1 Anticipated Impact from all Proposed Projects

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 4.10: 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 4.11: PREDICTED NOISE INCREMENTAL VALUES

Location ID	N1	N2	N3	N4	N5	N6	N7
Maximum Monitored Value (Day) dB(A)	51.9	54.4	58.1	55.2	58.1	58.2	54.3
Incremental Value dB(A)	60.1	44.5	43.2	26.1	27.4	23.6	24.8
Total Predicted Noise level dB(A)	60.7	54.8	58.2	55.2	58.1	58.2	54.3

The incremental noise level is found within the range of 60.7 dB (A) in Core Zone and 54.3 – 58.2 dB (A) in Buffer zone. The noise level at different receptors in buffer zone is lower due to the distance involved and other topographical features adding to the noise attenuation. The resultant Noise level due to monitored values and calculated values at the receptors are based on the mathematical formula considering attenuation due to Green Belt as 4.9 dB (A) the barrier effect. From the above table, it can be seen that the ambient noise levels at all the locations are within permissible limits of Industrial area (core zone) & Residential area (buffer zone) as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 (The Principal Rules were published in the Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act, 1986.).

4.4.2 Mitigation Measures for Proposed Project

The following noise mitigation measures are proposed for control of Noise

- Usage of sharp drill bits while drilling which will help in reducing noise;
- Secondary blasting will be totally avoided and hydraulic rock breaker will be used for breaking boulders;
- Controlled blasting with proper spacing, burden, stemming and optimum charge/delay will be maintained;
- The blasting will be carried out during favourable atmospheric condition and less human activity timings by using nonelectrical initiation system;
- Proper maintenance, oiling and greasing of machines will be done every week to reduce generation of noise;
- Provision of sound insulated chambers for the workers working on machines (HEMM) producing higher levels of noise;
- Silencers / mufflers will be installed in all machineries;
- Green Belt/Plantation will be developed around the project area and along the haul roads. The plantation minimizes propagation of noise;
- Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators of HEMM and persons working near HEMM and their use will be ensured through training and awareness.
- Regular medical check-up and proper training to personnel to create awareness about adverse noise level effects

4.4.3 Ground Vibrations

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

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

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

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

Where –

V = peak particle velocity (mm/s)

K = site and rock factor constant

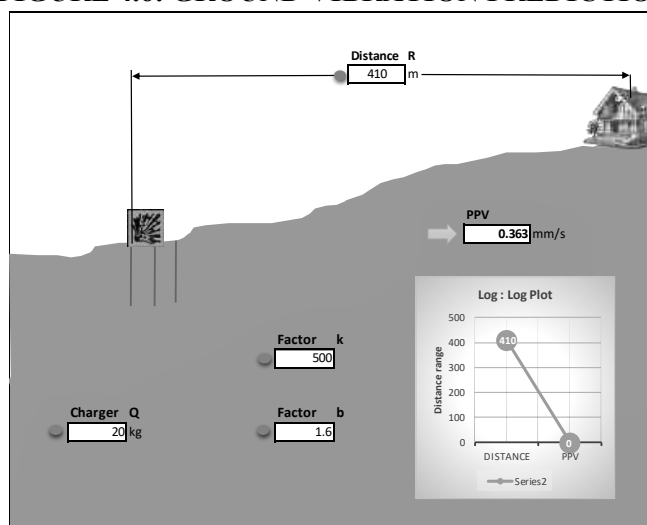
Q = maximum instantaneous charge (kg)

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

R = distance from charge (m)

TABLE 4.12: PREDICTED PPV VALUES DUE TO BLASTING

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
M/s. Vishnusurya Projects and Infra Limited	20	410m	0.363

FIGURE 4.6: GROUND VIBRATION PREDICTION

From the above graph, the charge per blast of 20kg is well below the Peak Particle Velocity of 8 mm/s as per Directorate General of Mines Safety for safe level criteria through Circular No. 7 dated 29/8/1997. But the all the project proponents ensure that the charge per blast shall be less than 85 kg and carry out blasting twice or thrice a day based on the onsite conditions under the supervision of competent person employed. 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 mm/s.
- Vibration monitoring will be carried out every 6 months to check the efficacy of blasting practices

4.5 ECOLOGY AND BIODIVERSITY

4.5.1 Impact on Ecology and Biodiversity

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

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

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

- I. None of the plants will be cut during operational phase of the mine.
- II. There shall be negligible air emissions or effluents from the project site. During loading the truck, dust generation will be likely. This shall be a temporary effect and not anticipated to affect the surrounding vegetation significantly.
- III. Most of the land in the buffer area is undulating terrain with crop lands, grass patches and small shrubs. Hence, there will be no effect on flora of the region

4.5.2 Mitigation Measures for Proposed Project

Keeping all this in mind the mitigations have been suggested under environmental management plan. With the understanding of the role of plant species as bio-filter to control air pollution, appropriate plant species (mainly tree species) have been suggested conceding the area/site requirements and needed performance of specific species. The details of year wise proposed plantation program are given in Table 4.13.

The main objective of the green belt is to provide a barrier between the source of pollution and the surrounding areas. In order to compensate the loss of vegetation cover, it is suggested to carry out afforestation program mainly in proposed areas falls in the cluster earmarked for plantation program as per Approved Mining Plan in different phases. This habitat improvement program would ensure the faunal species to re-colonize and improve the abundance status in the core zone.

The objectives of the green belt cover will cover the following:

- Noise abatement
- Ecological restoration
- Aesthetic, biological and visual improvement of area due to improved vegetative and plantations cover.

4.5.2.2.1. Species Recommendation for Plantation granted in the district

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

- Natural growth of existing species and survival rate of various species.
- Suitability of a particular plant species for a particular type of area.
- Creating of biodiversity.
- Fast growing, thick canopy copy, perennial and evergreen large leaf area.
- Efficient in absorbing pollutants without major effects of natural growth.

- The following species may be considering primary for plantation best suited for the prevailing climate condition in the area.

TABLE 4.13: RECOMMENDED SPECIES FOR GREENBELT DEVELOPMENT PLAN

Sl.No	Name of the plant (Botanical)	Family Name	Common Name	Habit
1	<i>Azadirachta indica</i>	Meliaceae	Neem, Vembu	Tree
2	<i>Polyalthialongifolia</i>	Annonaceae	Kattumaram	Tree
3	<i>Borassus Flabellifer</i>	Arecaceae	Palmyra Palm	Tree

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

TABLE 4.14: GREENBELT DEVELOPMENT PLAN

Year	No. of trees proposed to be planted	Area to be covered in m2	Name of the species	Survival rate expected in %	No. of trees expected to be grown
I	2,480	Plantation along 7.5m safety distance, along approach road.	Neem, Pongamia Pinnata, Navaletc.,	80	1990

TABLE 4.15: BUDGET FOR GREENBELT DEVELOPMENT PLAN

ACTIVITY		YEAR					RATE	COST (Rs.)
		I	II	III	IV	V		
Plantation under safety zone	Nos.	220	220	220	220	220	@200 Rs Per sapling	2,20,000/-
	Cost	44000	44000	44000	44000	44000		
Plantation in the quarried out top benches and approach road	Nos.	300	300	100	100	100	@200 Rs Per sapling	1,80,000
	Cost	60000	60000	20000	20000	20000		
Wire Fencing (In Mtrs) 940 Mtrs		2,82,000	-	-	-	-	@300 Rs Per Meter	2,82,000/-
Garland drain (In Mtrs) 590 Mtrs		2,67,000	-	-	-	-	@300 Rs Per Meter	2,67,000/-
TOTAL								9,49,000/-

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.

4.5.3. Anticipated Impact on Fauna

- There is no Wildlife Sanctuary and Biosphere Reserve within 10 km radius of the project site.
- No rare, endemic & endangered species are reported in the buffer zone. However, during the course of mining, the management will practice scientific method of mining with proper Environmental Management Plan

including pollution control measures especially for air and noise, to avoid any adverse impact on the surrounding wildlife.

- Fencing around all the proposed mine lease areas will be constructed to restrict the entry of stray animals
- Green belt development will be carried out which will help in minimizing adverse impact on the flora found in the area.

4.5.3.1. Measures for protection and conservation of wildlife species

- Undertaking mitigative measures for conducive environment to the flora and fauna in consultation with Forest Department.
- Dust suppression system will be installed within mine and periphery of mine for all proposed projects
- Plantation around mine area will help in creating habitats for small faunal species and to create better environment for various fauna. Creating and developing awareness for nature and wildlife in the adjoining villages.

4.5.3.2. Mitigation Measures

- 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.

4.5.4. Impact on Aquatic Biodiversity

Mining activities will not disturb the existing aquatic ecology as there is no effluent discharge proposed from the rough stone quarry. There is no natural perennial surface water body within the mine lease area. Hence, aquatic biodiversity is not observed in the mine lease area.

4.5.5. Impact Assessment on Biological Environment

A detail of impact and assessments was mentioned in Table No 4.16.

TABLE 4.16: ECOLOGICAL IMPACT ASSESSMENTS

Sl.No	Attributes	Assessment
1	Proximity to national park/wildlife sanctuary/reserve forest /mangroves/coastline/estuary/sea	Karikili Bird Sanctuary-44km - North East Vedanthangal Bird Sanctuary-45km - North East Nambedu R.F 4.0 Km North East
2	Proposed mining project impact surface water quality that also provide water to wildlife	‘NO’ ‘scheduled or threatened wildlife animal sighted regularly core in core area.
3	Located near an area populated by rare or endangered species	NO endangered, critically endangered, vulnerable species sighted in core mining lease area.
4	Proposed project restricts access to waterholes for wildlife	‘NO’
5	Project likely to affect migration routes	‘NO’ ‘migration route observed during monitoring period.
6	Proposed mining project increase siltation that would affect nearby biodiversity area.	Surface runoff management such as garland drains is proposed to be constructed, so there will be no siltation nearby mining area.
7	Risk of fall/slip or cause death to wild animals due to project activities	‘NO’
8	Activities of the project affects the breeding/nesting sites of birds and animals	No breeding and nesting site was identified in mining lease site. The fauna sighted mostly migrated from buffer area.

9	Mining project effect the forest-based livelihood/ any specific forest product on which local livelihood depended	‘NO ‘
10	The project release effluents into a water body that also supplies water to a wildlife	No water body near to core zone so chances of water become polluted is low.
11	The project likely to affect wetlands, Fish breeding grounds, marine ecology	‘NO’. Wetland was not present in near core Mining lease area. No breeding and nesting ground present in core mining area.
12	Project likely to affect flora of an area, which have medicinal value	‘NO’
13	Forestland is to be diverted, has carbon high sequestration	‘NO ‘There was no forest land diverted.

TABLE 4.17: ANTICIPATED IMPACT OF ECOLOGY AND BIODIVERSITY

TABLE 4.17: ANTICIPATED IMPACT OF ECOLOGY AND BIODIVERSITY					
Sl. No	Aspect Description	Likely Impacts on Ecology and Biodiversity (EB)	Impact Consequence - Probability Description / Justification	Significance	Mitigation Measures
Pre-Mining Phase					
1	Uprooting of vegetation of lease area	Site specific loss of common floral diversity (Direct impact)	Site possesses common floral (not trees) species. Clearance of these species will not result in loss of flora	Less severe	No immediate action required. However Greenbelt /plantation will be developed in project site and in periphery of the project boundary, which will improve flora and fauna diversity of the project area.
		Site specific loss of associated faunal diversity (Partial impact)	Site supports only common species, Which use wide variety of habitats of the buffer zone reserve forest area. So there is no threat of faunal diversity.		
		-Loss of Habitat (Direct impact)	Site does not form Unique / critical habitat structure for unique flora or fauna.		
Mining phase					
2	Excavation of mineral using machine and labours, Transportation activities will generate noise.	Site-specific disturbance to normal faunal movements at the site due to noise. (Partial impact)	Site does not form unique / critical habitat structure for unique flora or fauna.	Less severe	Mining activity should not be operated after 5PM. Excavation of dump and transportation work should stop before 7PM.
3	Vehicular Movement for transportation of materials will result in generation of dust (SPM) due to haul roads and emission of	Impact on surrounding agriculture and associated fauna due to deposition of dust and Emission of CO. (Indirect impact)	Impact is less as the agricultural land far from core area.	Less severe	All vehicles will be certified for appropriate Emission levels. More plantation have been suggested Upgrade the vehicles with alternative fuel such biodiesel, methanol and biofuel around the mining area.

	SO ₂ , NO ₂ , CO etc.				
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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

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

4.7.2 Noise

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

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

4.7.3 Physical Hazards

The following measures are proposed for control of physical hazards

- Specific personnel training on work-site safety management will be taken up;

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

4.7.4 Occupational Health Survey

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

- General physical tests
- Audiometric tests
- Full chest, X-ray, Lung function tests, Spirometry 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 any of the proposed quarries.

4.9 MINE CLOSURE

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

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

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

4.9.1 Mine Closure Criteria

The criteria involved in mine closure are discussed below:

4.9.1.1 Physical Stability

All anthropogenic structures, which include mine workings, buildings, rest shelters etc., remaining after mine decommissioning should be physically stable. They should present no hazard to public health and safety as a result of failure or physical deterioration and they should continue to perform the functions for which they were designed. The

design periods and factors of safety proposed should take full account of extreme events such as floods, hurricane, winds or earthquakes, etc. and other natural perpetual forces like erosion, etc.,

4.9.1.2 Chemical Stability

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

4.9.1.3 Biological Stability

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

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

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

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

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

M/s. Vishnusurya Projects and Infra Limited Rough Stone & Gravel Quarry Project at Mosavadi Village is a mining project for excavation of Rough Stone, which is site specific. The proposed project has following advantages:

-

- It is an existing quarry already mining operation is carried out
- The mineral deposit occurs in a non-forest area.
- There is no habitation within the project area; hence no R & R issues exist.
- 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 – II, 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 is being practiced in this project. This technology is having least gestation period, economically viable, safest and less labour intensive. The method has inbuilt flexibility for increasing or decreasing the production as per market condition.

6. ENVIRONMENTAL MONITORING PROGRAMME

6.0 GENERAL

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

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

6.1 METHODOLOGY OF MONITORING MECHANISM

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

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

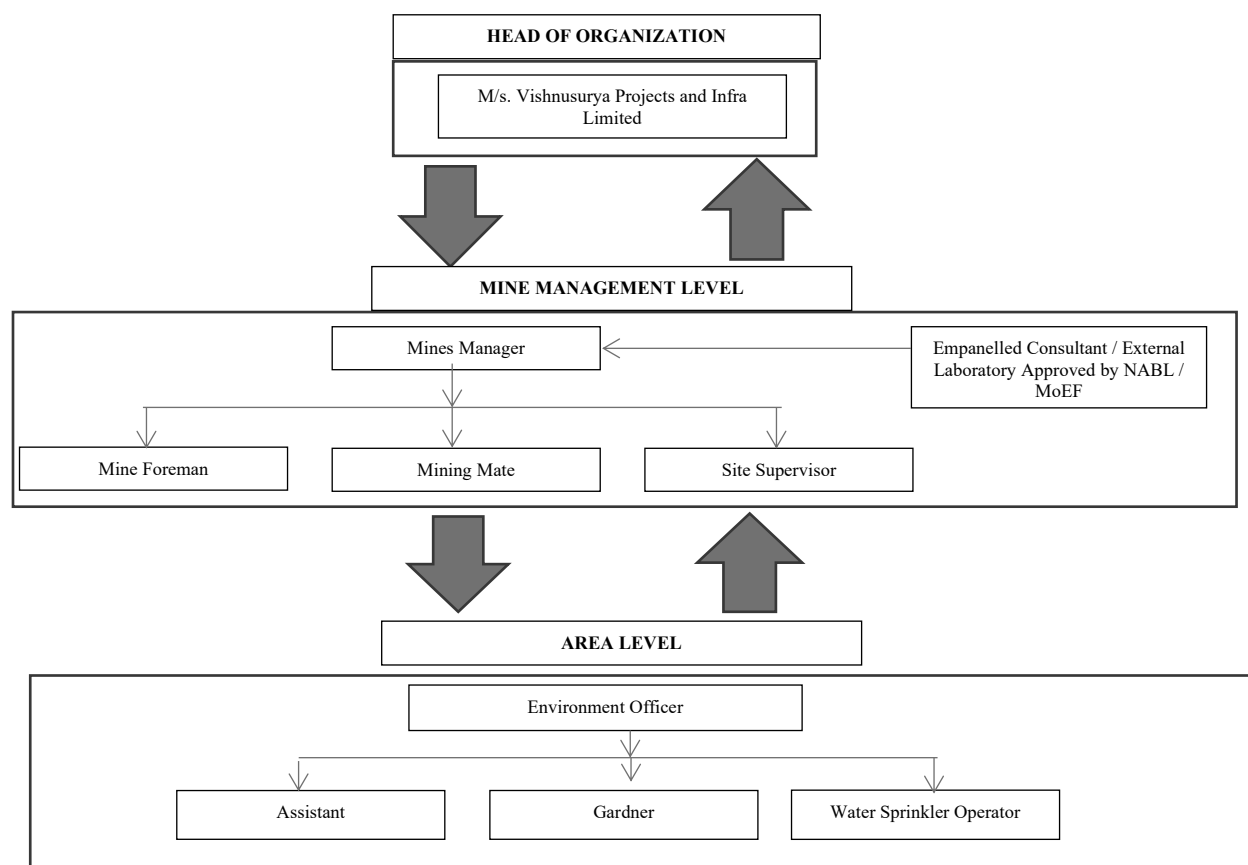
The responsibilities of this cell will be:

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

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

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

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

FIGURE 6.1: PROPOSED ENVIRONMENTAL MONITORING CELL

6.2 IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES

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

TABLE 6.1 IMPLEMENTATION SCHEDULE

SI No.	Recommendations	Time Period	Schedule
1	Land Environment Control Measures	Before commissioning of the project	Immediately after the commencement of project
2	Soil Quality Control Measures	Before commissioning of the project	Immediately after the commencement of 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

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

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

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

The details of monitoring 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	Monitoring water level depth variations
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 BUDGETARY PROVISION FOR EMP

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

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

TABLE 6.3 ENVIRONMENT MONITORING BUDGET

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

Source: Approved Mining Plan

6.5 REPORTING SCHEDULES OF MONITORED DATA

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

Periodical reports to be submitted to: -

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

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

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

7. ADDITIONAL STUDIES

7.0 GENERAL

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

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

7.1. PUBLIC CONSULTATION

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

7.2 RISK ASSESSMENT

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

The whole quarry operation will be carried out under the direction of a Qualified Competent Mine Manager holding certificate of competency to manage a metalliferous mine granted by the DGMS, Dhanbad for all proposed projects. 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 these proposed mining & allied activities with detailed analysis of causes and control measures for the mine is given in below Table 7.1.

TABLE 7.1 RISK ASSESSMENT& CONTROL MEASURES

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

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

Source: Analysed and Proposed by FAE & EC

7.3 DISASTER MANAGEMENT PLAN

Natural disasters like Earthquake, Landslides have not been recorded in the past history as the terrain is categorized under seismic zone II. The area is far away from the sea hence the disaster due to heavy floods and tsunamis are not anticipated

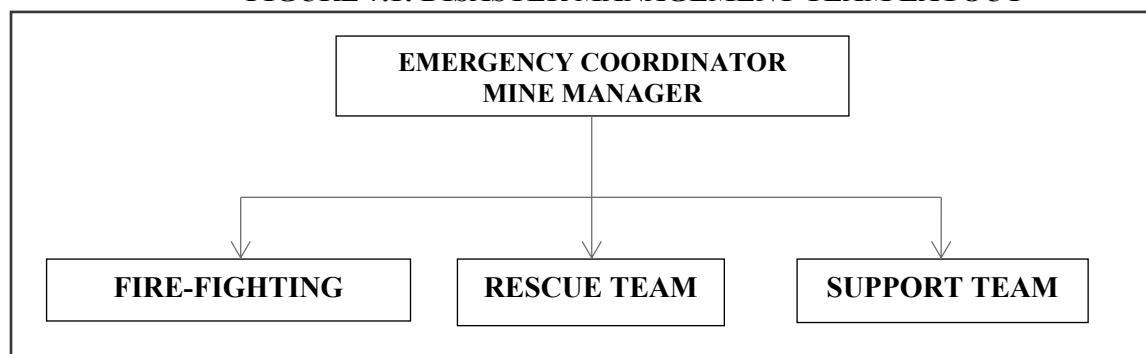
The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities.

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

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

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

FIGURE 7.1: DISASTER MANAGEMENT TEAM LAYOUT



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

TABLE 7.2: PROPOSED TEAMS TO DEAL WITH EMERGENCY SITUATION

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

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

Roles and responsibilities of emergency team –

(a) Emergency coordinator (EC)

The emergency coordinator shall assume absolute control of site and shall be located at MECR.

(b) Incident controller (IC)

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

(c) Communication and advisory team

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

(d) Roll call coordinator

The Mine Foreman shall be 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 has been proposed at strategic locations within the mine.

TABLE 7.3: PROPOSED FIRE EXTINGUISHERS AT DIFFERENT LOCATIONS

LOCATION	TYPE OF FIRE EXTINGUISHERS
Electrical Equipment's	CO ₂ type, foam type, dry chemical powder type

Fuel Storage Area	CO ₂ type, foam type, dry chemical powder type, Sand bucket
Office Area	Dry chemical type, foam type

Alarm system to be followed during disaster –

On receiving the message of disaster from Site Controller, fire-fighting team, the mine control room attendant will sound siren wailing for 5 minutes. Incident controller will arrange to broadcast disaster message through public address system. On receiving the message of "Emergency Over" from Incident Controller the emergency control room attendant will give "All Clear Signal", by sounding alarm straight for 2 minutes.

The features of alarm system will be explained to one and all to avoid panic or misunderstanding during disaster. In order to prevent or take care of hazard / disasters if any the following control measures have been adopted.

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

7.4 CUMULATIVE IMPACT STUDY

For easy representation of Proposed and Existing Quarries in the Cluster are given unique codes and identifies and studied in this EIA/ EMP Report.

TABLE 7.4: LIST OF QUARRIES WITHIN 500 METER RADIUS

*PROPOSED QUARRIES					
CODE	Name of the Owner	S.F. Nos	Extent	Status	Remarks
P1	M/s. Vishnusurya Projects and Infra Ltd.,	16/3B, 16/4, 16/5A, 16/5B, 16/6A, 16/6B & 16/6C	4.95.2	Tor Identification No:TO24B0108TN5252542N Dated: 01.03.2025	
Total			4.95.2 ha		
*EXISTING QUARRIES					

CODE	Name of the Owner	S.F. No	Extent	Status	Remarks
E-1	M/s. Vishnusurya Projects and Infra Ltd.,	16/3B, 16/4, 16/5A, 16/5B, 16/6A, 16/6B & 16/6C	4.95.2 ha	31.01.2020 to 30.01.2025	-
E-2	Thiru.G.Mathiyazhagan	Septankulam 394/2, 393/5 & 393/6	1.86.0 ha	02.12.2021 to 01.12.2031	Quarry in under operation
TOTAL			1.86.0 ha		
EXPIRED QUARRY					
CODE	Name of the Owner	S.F. No	Extent	Status	Remarks
Nil					
ABANDONED QUARRY					
Nil					
TOTAL CLUSTER EXTENT*			6.81.20 Ha		

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

TABLE 7.5: SALIENT FEATURES OF PROPOSAL “P1”

Name of the Quarry	M/s. Vishnusurya Projects and Infra Limited Rough Stone and Gravel Quarry	
Land Ownership	It is a Patta land, registered in the name of the applicant (M/s. Vishnusurya Projects and Infra Limited.,) vide patta no. 759.	
Land classification	It is a Patta Land-Punjai (Barren Land)	
SF No & Area (Ha)	16/3B, 16/4, 16/5A, 16/5B, 16/6A, 16/6B & 16C	
Village, Taluk & District	Mosavadi Village, Vandavasi Taluk, Tiruvannamalai District.	
Toposheet No	57P/06	
Latitude between	12°31'25.72"N to 12°31'34.92"N	
Longitude between	79°26'18.28"E to 79°26'26.01"E	
Highest Elevation	143m AMSL	
Proposed Depth of Mining	83m (3m Gravel + 80m Rough Stone) below the ground level	
Geological Resources	Rough Stone in m ³	Gravel m ³
	32,76,050m³	22,878m³
Mineable Reserves	Rough Stone in m ³	Gravel m ³
	6,95,325m³	4,050m³
Yearwise Production	Rough Stone in m ³	Gravel m ³
	6,95,325m³	4,050m³
Existing pit dimension (As per Approved mining plan)	244m (L) x 177m (W) x 38m (D) bgl	
Consent to Operate (CTO) from TNPCB	Proceedings No. F.1274TVM/RS/DEE/TNPCB/TVM/A/2020 Dated:03.01.2020	
Ultimate Pit Dimension	244m (L) x 182m (W) x 83m (D) bgl	
Water Level in the surrounds area	85 – 90 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 Northeastern side. The altitude of the area is 143m (max) above Mean Sea level. The area is covered by 3m thickness of Gravel formation. Massive Charnockite which is clearly inferred from the existing quarry pits.	
Machinery proposed	Jack Hammer	4 Nos
	Compressor	1 Nos
	Wagon Drill	2 Nos
	Excavator with Bucket and Rock Breaker	2 Nos
	Trucks	4 Nos
	Water Sprinkling Tanker	1 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	34 Nos	
Project Cost	Rs. 1,09,51,000/-	
EMP cost	Rs. 19,99,000/-	
CER Cost	Rs. 5,00,000/-	
Nearby Water Bodies	Odai	320m East
	Tank	330m SE
	Tank	660m NW
	Tank	820m SW
	Tank	4km NW
	Cheyyar River	6.5km NW
Greenbelt Development Plan	It is proposed to plant 2,480 Nos of trees in the safety barrier and village road.	

Proposed Water Requirement	2.5 KLD
Nearest Habitation	410m Southeast

TABLE 7.6: SALIENT FEATURES OF PROPOSAL “E1”

Name of the Quarry	Thiru. G. Mathiyazhagan Roughstone and Gravel Quarry		
Toposheet No	58-P/06		
Latitude between	12°31'49.43"N to 12°31'54.03"N		
Longitude between	79°26'28.86"E to 79°26'36.25"E		
Geological Resources	Rough Stone in m ³	Weathered Rock in m ³	Gravel m ³
	6,51,000	55,800	37,200
Mineable Reserves	Rough Stone in m ³	Weathered Rock in m ³	Gravel m ³
	1,77,070	38,862	25,908
Yearwise Production	Rough Stone in m ³	Weathered Rock in m ³	Gravel m ³
	1,20,710	38,862	25,908
Ultimate Pit Dimension	167m(L) x 98m(W) x40m(D)		
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting		
Machinery proposed	Jack Hammer		3 Nos
	Compressor		1 Nos
	Hydraulic Excavator		1 Nos
	Tippers		2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.		
Proposed Manpower Deployment	18 Nos		
Project Cost	Rs. 44,47,000/-		
CER Cost @ 2% of Project Cost	Rs.89,000/-		

Source: Approved Mining Plan

The Cumulative Impact is mainly anticipated due to drilling & blasting and 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.

Air Environment –

Calculating the Cumulative Load of Mining within the cluster is as shown in table 7.16 & 7.17.

TABLE 7.7: CUMULATIVE PRODUCTION LOAD OF ROUGH STONE

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
P1	6,95,325	1,39,065	464	39
Total	6,95,325	1,39,065	464	39
E1	1,20,710	24,142	81	7
Total	1,20,710	24,142	81	7
Grand Total	8,16,035	1,63,207	545	46

TABLE 7.8: CUMULATIVE PRODUCTION LOAD OF GRAVEL

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
P1	4,050	4,050	14	2
Total	4,050	4,050	14	2
E1	25,908	8,636	29	3
Total	25,908	8,636	29	3
Grand Total	29,958	12,686	43	5

TABLE 7.8A: CUMULATIVE PRODUCTION LOAD OF WEATHERED ROCK

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
P1	-	-	-	-
Total	-	-	-	-
E1	38,862	12,954	43	4
Total	38,862	12,954	43	4
Grand Total	38,862	12,954	43	4

On a cumulative basis considering the proposed quarries, it can be seen that the overall production of Rough Stone is 545m³ per day, Weathered Rock is 43m³ per day and overall production of Gravel is 43m³ per day with a capacity of 46 trips of Rough Stone per day, 4 trips of Weathered Rock per day and 5 Trips per day of Gravel from the cluster.

Note: Per day production of Rough Stone is calculated for 5 Years Lease Period and for Gravel production with 1 or 3 years of production period. And the load of existing quarries is covered under existing environment of the cluster.

Based on the above production quantities the emissions due to various activities in all the 11 mines includes various activities like ground preparation, excavation, handling and transport of ore. These activities have been analysed systematically basing on USEPA-Emission Estimation Technique Manual, for Mining AP-42, to arrive at possible emissions to the atmosphere and estimated emissions are given in Table 7.18.

TABLE 7.9: EMISSION ESTIMATION FROM QUARRIES WITHIN 500 METER RADIUS

EMISSION ESTIMATION FOR QUARRY “P1”				
Estimated Emission Rate for PM ₁₀	Activity	Source type	Value	Unit
	Drilling	Point Source	0.114072128	g/s
	Blasting	Point Source	0.004672100	g/s
	Mineral Loading	Point Source	0.046004986	g/s
	Haul Road	Line Source	0.00250437	g/s
	Overall Mine	Area Source	0.078546655	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.001633816	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000173467	g/s
EMISSION ESTIMATION FOR QUARRY “E1”				
Estimated Emission Rate for PM ₁₀	Activity	Source type	Value	Unit
	Drilling	Point Source	0.123992019	g/s
	Blasting	Point Source	0.007088970	g/s
	Mineral Loading	Point Source	0.047269067	g/s
	Haul Road	Line Source	0.002511286	g/s
	Overall Mine	Area Source	0.080555511	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.002109499	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000227785	g/s

Source: Emission Calculation

TABLE 7.10: INCREMENTAL & RESULTANT GLC WITHIN CLUSTER

PM₁₀ in µg/m³	
Background	39
Incremental	17.5
Resultant	56.5
NAAQ Norms	100 µg/m³
PM_{2.5} in µg/m³	
Background	18.9
Incremental	9.81
Resultant	28.7
NAAQ Norms	60 µg/ m³

So2 in $\mu\text{g}/\text{m}^3$	
Background	4.5
Incremental	3.1
Resultant	7.6
NAAQ Norms	80 $\mu\text{g}/\text{m}^3$
No2 in $\mu\text{g}/\text{m}^3$	
Background	18.9
Incremental	12.7
Resultant	31.6
NAAQ Norms	80 $\mu\text{g}/\text{m}^3$

Noise Environment –

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

$$Lp_{\text{total}} = 10 \log \{10^{(Lp_1/10)} + 10^{(Lp_2/10)} + 10^{(Lp_3/10)} + \dots\}$$

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 CLUSTER

Location ID	Background Value (Day) dB(A)	Incremental Value dB(A)	Total Predicted dB(A)	Residential Area Standards dB(A)
Proposed				
Habitation Near P1	51.9	60.1	60.7	55
Existing				
Habitation Near E1	40.5	46.3	47.5	

Source: Lab Monitoring Data

The incremental noise level is found within the range of 51.9 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 Mines within cluster are anticipated due to operation of Mining Machines like Excavators, drilling and blasting, transportation vehicles, etc. However, the major source of

ground vibration from the all the 2 mines is blasting. The major impact of the ground vibrations is observed on the domestic houses located in the villages nearby the mine lease 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 2 mines respectively are as in below Table 7.23.

TABLE 7.12: NEAREST HABITATION FROM EACH MINE

Location ID	Distance & Direction
Proposed	
Habitation Near P1	410m-SE
Existing	
Habitation Near E1	740m SW

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 2 MINES

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in mm/s
P1	20	410m-SE	0.363
E1	20	740m SW	0.141

Source: Blasting Calculations

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 2 mines shall contribute towards CER and the community shall develop.

TABLE 7.14: SOCIO ECONOMIC BENEFITS FROM 2 MINES

Location ID	Project Cost	CER Cost
P1	Rs.1,09,51,000	Rs. 5,00,000/-
Total	Rs. 1,09,51,000	Rs.5,00,000/-
E1	Rs. 44,47,000/-	Rs.89,000
Total	Rs. 44,47,000/-	Rs.89,000
Grand Total	Rs. 1,53,98,000	Rs. 5,89,000/-

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 Projects shall fund towards CER – **Rs 5,00,000/-**
- Existing Projects shall fund towards CER – **Rs.89,000/-**
- Projects in Cluster shall fund towards CER – **Rs 5,89,000/-**

TABLE 7.15: EMPLOYMENT BENEFITS FROM 2 MINES

Description	Employment
P1	34
Total	34
E1	18
Total	18
Grand Total	52

A total of 34 people will get employment due to 1 proposed mine in cluster and 52 people are already employed at existing mines.

TABLE 7.16: GREENBELT DEVELOPMENT

Code	No of Trees proposed to be planted	Survival %	Area to be covered	Name of the Species
P1	2,480	80%	Safety barrier & village road	Neem, Pungan
Total	2,480	80 %		
E1	500	80 %		Neem, Pungan
Total	2,980	80 %		Neem, Pungan

Based on the Proposed Mining Plan it's anticipated that there shall growth of native species of Neem, Pungan, Casuarina etc., in the Cluster at a rate of 2,980 Trees Planted over a period of 5 Years with Survival Rate of 80 %.

7.5 PLASTIC WASTE MANAGEMENT PLAN

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 7.17: 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 POST COVID HEALTH MANAGEMENT PLAN

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

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

Post-COVID Follow Up Protocol –

- Continue COVID appropriate behaviour (use of mask, hand & respiratory hygiene, physical distancing).
- Drink adequate amount of warm water (if not contra-indicated).
- Make sure your workplaces are clean and hygienic
- Surfaces (e.g., desks and tables) and objects (e.g. telephones, helmet) need to be wiped with disinfectant regularly
- Put sanitizing hand rub dispensers in prominent places around the workplace. Make sure these dispensers are regularly refilled
- Display posters promoting hand-washing
- Make sure that staff, contractors and customers have access to places where they can wash their hands with soap and water
- Display posters promoting respiratory hygiene.
- Brief your employees, contractors and customers that if COVID-19 starts spreading in your community anyone with even a mild cough or low-grade fever (37.3°C or more) need to stay at home. They should also stay home (or work from home) if they have had to take simple medications, such as paracetamol/acetaminophen, ibuprofen or aspirin, which may mask symptoms of infection
- Keep communicating and promoting the message that people need to stay at home even if they have just mild symptoms of COVID-19.
- Consider whether a face-to-face meeting or event is needed. Could it be replaced by a teleconference or online event?
- Could the meeting or event be scaled down so that fewer people attend?
- Pre-order sufficient supplies and materials, including tissues and hand sanitizer for all employees. Have surgical masks available to offer anyone who develops respiratory symptoms.
- It is also suggested by the Ministry of AYUSH that the use of Chyawanprash in the morning (1 teaspoonful) with Luke warm water/milk is highly recommended (under the direction of Registered Ayurveda physician) as in the clinical practice Chyawanprash is believed to be effective in post-recovery period.
- If there is persistent dry cough / sore throat, do saline gargles and take steam inhalation. The addition of herbs/spices for gargling/steam inhalation. Cough medications, should be taken on advice of medical doctor or qualified practitioner of Ayush.
- Look for early warning signs like high grade fever, breathlessness, SpO₂ < 95%, unexplained chest pain, new onset of confusion, focal weakness.
- Avoid smoking and consumption of alcohol.
- Communicate to your employees and contractors about the plan and make sure they are aware of what they need to do – or not do – under the plan. Emphasize key points such as the importance of staying away from work even if they have only mild symptoms or have had to take simple medications (e.g. paracetamol, ibuprofen) which may mask the symptoms.
- The plan should address how to keep your business running even if a significant number of employees, contractors and suppliers cannot come to your place of business - either due to local restrictions on travel or because they are ill.

8. PROJECT BENEFITS

8.0 GENERAL

The Proposed Project for Quarrying Rough Stone at Mosavadi Village aims to produce **6,95,325m³** Rough Stone over a period of 5 Years and Gravel 4,050m³. 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 34 persons for carrying out mining operations and give preference to the local people in providing employment. In addition, there will be opportunity for indirect employment to many people in the form of contractual jobs, business opportunities, service facilities etc. the economic status of the local people will be enhanced due to mining project.

8.2 SOCIO-ECONOMIC WELFARE MEASURES PROPOSED

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

8.3 IMPROVEMENT IN PHYSICAL INFRASTRUCTURE

The project area is located in Mosavadi Village, Vandavasi Taluk and Tiruvannamalai District of Tamil Nadu and the area have communications, roads and other facilities already well established. The following physical infrastructure facilities will further improve due to this 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

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

8.5 OTHER TANGIBLE BENEFITS

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

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

CORPORATE SOCIAL RESPONSIBILITY

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 Mosavadi 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.

The project proponent will spent Rs 5,00,000/- towards Corporate Environmental Responsibility for the Nearby Government School

TABLE 8.1: CER – ACTION PLAN

Activity	Beneficiaries	Total
Providing Sanitation facilities to the school	Mosavadi villagers	Rs 5,00,000/-
Planting and maintaining of trees in the school compound	Mosavadi villagers	
Providing Environmental related books to the school library	Mosavadi villagers	

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

9. ENVIRONMENTAL COST BENEFIT ANALYSIS

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

10. ENVIRONMENTAL MANAGEMENT PLAN

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 M/s. Vishnusurya Projects and Infra Limited Rough Stone & Gravel Quarry will –

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

Description of the Administration and Technical Setup –

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

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

TABLE 10.1: PROPOSED CONTROLS FOR LAND ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.3. SOIL MANAGEMENT

There is no overburden or waste anticipated from proposed project.

TABLE 10.2: PROPOSED CONTROLS FOR SOIL MANAGEMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.4. WATER MANAGEMENT

In the proposed quarrying project, no process is involved for the effluent generation, only oil & grease from the machinery wash is anticipated and domestic sewage from mine office. The quarrying operation is proposed upto a depth of 83 m BGL, the water table in the area is 150m 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 proposed quarrying activity would result in the increase of particulate matter concentrations due to fugitive dust. Daily water sprinkling on the haul roads, approach roads in the vicinity would be undertaken and will be continued as there is possibility for dust generation due to truck mobility. It will be ensured that vehicles are properly maintained to comply with exhaust emission requirements

TABLE 10.4: PROPOSED CONTROLS FOR AIR ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.6. NOISE POLLUTION CONTROL

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

TABLE 10.5: PROPOSED CONTROLS FOR NOISE ENVIRONMENT

CONTROL	RESPONSIBILITY
Development of thick greenbelt all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Preventive maintenance of mining machinery and replacement of worn out accessories to control noise generation	Mines Foreman
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Mines Manager
Provision of earmuff/ ear plugs to workers working in noise prone zones in the mines	Mining Mate
Provision of effective silencers for mining machinery and transport vehicles	Mines Manager

Provision of sound proof AC operator cabins to HEMM	Mines Manager
Sharp drill bits are used to minimize noise from drilling	Mines Foreman
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring are carried out in the project area and in surrounding villages to 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.C GROUND VIBRATION AND FLY ROCK CONTROL

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

TABLE 10.6: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK

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

Source: Proposed by FAE's & EIA Coordinator

10.8. BIOLOGICAL ENVIRONMENT MANAGEMENT

The proponent 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 2480 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier of applied mine lease area with survival rate 80%. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

TABLE 10.7. PROPOSED GREENBELT ACTIVITIES

Year	No. of trees proposed to be planted	Survival %	Recommended area	Name of the species
I	2480	80%	Safety barrier, Unutilized land, Village roads	Neem, Pongamia Pinnata, 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.	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree
3.	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 detailed medical examination at the time of employment. The medical examination covers the following tests under mines act 1952.

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

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

TABLE 10.9.: MEDICAL EXAMINATION SCHEDULE

Sl.No	Activities	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year
1	Initial Medical Examination (Mine Workers)					
A	Physical Check-up					
B	Psychological Test					
C	Audiometric Test					
D	Respiratory Test					
2	Periodical Medical Examination (Mine Workers)					
A	Physical Check – up					
B	Audiometric Test					
C	Eye Check – up					
D	Respiratory Test					
3	Medical Camp (Mine Workers & Nearby Villagers)					
4	Training (Mine Workers)					

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

10.9.2.: Proposed Occupational Health and Safety Measures –

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

FIGURE 10.1.: PERSONAL PROTECTIVE EQUIPMENT TO THE MINE WORKERS

10.9.3.: Health and Safety Training Programme

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

TABLE 10.10.: LIST OF PERIODICAL TRAININGS PROPOSED FOR EMPLOYEES

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

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

10.9.4.: Budgetary Provision for Environmental Management –

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

TABLE 10.11: EMP BUDGET FOR PROPOSED PROJECT

Activities	Mitigation Measure	Provision for Implementation	Capital	Recurring
Air Environment	Haul road maintenance & Water sprinkling	Lump sum fund allocation for daily maintenance of haul roads and thrice a day water sprinkling by fixed sprinklers or water tankers	0	50000
	Muffle blasting – To control fly rocks during blasting	Lump sum fund allocation Blasting face will be covered with sand bags / steel mesh / old tyres / used conveyor belts	0	5000
	Wet drilling procedure	Lump sum fund allocation for ensuring wet drilling by covering drill holes with wet gunny bags and spraying water while drilling	0	10000
	No overloading of trucks/tippers/tractors	Lump sum fund allocation Manual Monitoring through Security guard	0	5000
	Stone carrying trucks will be covered by tarpaulin	Lump sum fund allocation Manual Monitoring through Security guard	0	5000
	Enforcing speed limits of 20 km/hr within ML area	Lump sum fund allocation Manual Monitoring through Security guard	0	5000
	Regular monitoring of exhaust fumes as per RTO norms	Lump sum fund allocation Manual Monitoring through Security guard	0	5000
	Installing wheel wash system near gate of quarry	Installation + Maintenance + Supervision	50000	5000
Noise Environment	Source of noise will be during operation of transportation vehicles, HEMM for this proper maintenance will be done at regular intervals.	Provision made in Operating Cost	0	0
	Oiling & greasing of Transport vehicles and HEMM at regular interval will be done	Provision made in Operating Cost	0	0

	Adequate silencers will be provided in all the diesel engines of vehicles.	Provision made in Operating Cost	0	0
	It will be ensured that all transportation vehicles carry a fitness certificate.	Provision made in Operating Cost	0	0
	Safety tools and implements that are required will be kept adequately near blasting site at the time of charging.	Provision made in OHS part	0	0
	Line Drilling all along the boundary to reduce the PPV from blasting activity and implementing controlled blasting.	Provision made in Operating Cost	0	0
	Proper warning system before blasting will be adopted and clearance of the area before blasting will be ensured.	Blowing Whistle by Mining Mate / Blaster / Compentent Person	0	0
	Provision for Portable blaster shed	Installation of Portable blasting shelter	50000	2000
	NONEL Blasting will be practiced to control Ground vibration and fly rocks	Rs. 30/- per 6 Tonnes of Blasted Material	0	0
Waste Management	Waste management (Spent Oil, Grease etc.,)	Provision for domestic waste collection and disposal through authorized agency	5000	20000
		Installation of dust bins	5000	2000
	Bio toilets will be made available outside mine lease on the land of owner itself	Provision made in Operating Cost	0	0
Mine Closure	1. Progressive Closure Activity - Surface Runoff managent	Provision made in Operating Cost	0	0
	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 Scheme period (150 Saplings)	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 check up for workers will be provisioned	IME & PME Health check up 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	200000	0
TOTAL			4,60,000	3,02,000

10.10.: CONCLUSION –

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

11. SUMMARY AND CONCLUSION

M/s. Vishnusurya Projects and Infra Limited Rough Stone & Gravel Quarry (Extent – 4.95.20 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.

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 – 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 as per market demand.

Sustainable and modern mining leads us to see positive impact of mining operation and providing consistent employment for 34 people directly in the proposed project and indirectly around 40-50 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 M/s. Vishnusurya Projects and Infra Limited Rough Stone & Gravel Quarry.

12. DISCLOSURE OF CONSULTANT

Thiru. S. Viswanathan Authorised signatory of M/s. Vishnusurya Projects and Infra Limited 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 for the proposed project.

Name and address of the consultancy:

GEO EXPLORATION AND MINING SOLUTIONS

No 17, Advaita Ashram Road,

Alagapuram, Salem – 636 004

Tamil Nadu, India

Email: info@geoexploration@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	EB	Ecology and bio-diversity
AEC	Associate EIA Coordinator	NV	Noise and vibration
FAE	Functional Area Expert	SE	Socio economics
FAA	Functional Area Associates	HG	Hydrology, ground water and water conservation
TM	Team Member	SC	Soil conservation
GEO	Geology	RH	Risk assessment and hazard management
WP	Water pollution monitoring, prevention and control	SHW	Solid and hazardous wastes
AP	Air pollution monitoring, prevention and control	MSW	Municipal Solid Wastes
LU	Land Use	ISW	Industrial Solid Wastes
AQ	Meteorology, air quality modeling, and prediction	HW	Hazardous Wastes

DECLARATION BY EXPERTS CONTRIBUTING TO THE EIA/EMP

Declaration by experts contributing to the EIA/EMP for M/s. Vishnusurya Projects and Infra Limited Rough Stone & Gravel Quarry Project over an Extent of 4.95.2 ha in Mosavadi Village of Vandavasi Taluk, Tiruvannamalai District of Tamil Nadu. It is also certified that information furnished in the above EIA study are true and correct to the best of our knowledge.

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

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

Designation: **EIA Coordinator**

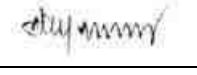
Date & Signature:

Period of Involvement: **January 2019 to till date**

Associated Team Member with EIA Coordinator:

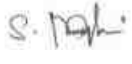
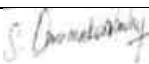
1. **Mr. S. Nagamani**
2. **Mr.P. Viswanathan**
3. **Mr. M.Santhoshkumar**
4. **Mr. S. Ilavarasan**

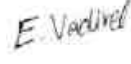
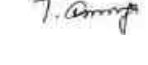
FUNCTIONAL AREA EXPERTS ENGAGED IN THE PROJECT

Sl. No.	Functional Area	Involvement	Name of the Expert/s	Signature
1	AP	- Identification of different sources of air pollution due to the proposed mine activity - Prediction of air pollution and propose mitigation measures / control measures	Mr. A. Jagannathan	
2	WP	- Suggesting water treatment systems, drainage facilities - Evaluating probable impacts of effluent/waste water discharges into the receiving environment/water bodies and suggesting control measures.	Dr. M. Ifthikhar Ahmed	
			Mr. N. Senthilkumar	
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. Viswathanan	AP; WP; LU	- Site Visit with FAE - Provide inputs & Assisting FAE with sources of Air Pollution, its impact and suggest control measures - Assisting FAE on sources of water pollution, its impacts and suggest control measures - Assisting FAE in preparation of land use maps	
3	Mr. Santhoshkumar	GEO; SC	- Site Visit with FAE - Provide inputs on Geological Aspects - Assist in Resources & Reserve Calculation and preparation of Production Plan & Conceptual Plan - Provide inputs & Assisting FAE with soil conservation methods and identifying impacts	
4	Mr. Umamahesvaran	GEO	- Site Visit with FAE - Provide inputs on Geological Aspects	

			Assist in Resources & Reserve Calculation and preparation of Production Plan & Conceptual Plan	
5	Mr. A. Allimuthu	SE	- Site Visit with FAE - Assist FAE with collection of data's - Provide inputs by analysing primary and secondary data	
6	Mr. S. Ilavarasan	LU; SC	- Site Visit with FAE - Assisting FAE in preparation of land use maps - Provide inputs & Assisting FAE with soil conservation methods and identifying impacts	
7	Mr. E. Vadivel	HG	- Site Visit with FAE - Assist FAE & provide inputs on aquifer characteristics, ground water level/table - Assist with methods of ground water recharge and conduct pump test, flow rate	
8	Mr. D. Dinesh	NV	- Site Visit with FAE - Assist FAE and provide inputs on impacts due to proposed mine activity and suggest mitigation measures - Assist FAE with prediction modelling	
9	Mr. Panneer Selvam	EB	- Site Visit with FAE - Assist FAE with collection of baseline data - Provide inputs and assist with labelling of Flora and Fauna	
10	Mrs. Nathiya	EB	- Site Visit with FAE - Assist FAE with collection of baseline data - Provide inputs and assist with labelling of Flora and Fauna	

DECLARATION BY THE HEAD OF THE ACCREDITED CONSULTANT ORGANIZATION

I, Dr. M. Ifthikhar Ahmed, Managing Partner, Geo Exploration and Mining Solutions, hereby, confirm that the above-mentioned Functional Area Experts and Team Members prepared the EIA/EMP for M/s. Vishnusurya Projects and Infra Limited Rough Stone & Gravel Quarry Project over an Extent of 4.95.2 ha in Mosavadi Village of Vandavasi Taluk, Tiruvannamalai 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/RA0276 Dated: 20.02.2023

Validity:

Valid till 06.08.2025