

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 – CAPATIVE USE

PATTA LAND- FRESH QUARRY

THIRU. S. SUBRAMANIAN LIMEKANKAR QUARRY

Cluster Extent – 13.33.5 Ha

Project Proponent

Thiru.S.Subramanian

No. 69, Ganapathy Nagar,
Thiruvanaikovil, Trichy District – 620 005.

PROJECT LOCATION	PROPOSED PRODUCTION
Thiru.S. Subramanian, S.F.Nos. 189/2A, 2B, 190/1A, 1B, 2, 4, 5 Keelapalur Village & 31/1 - Karuppur Senapathy Village, Ariyalur Taluk, Ariyalur District Extent: 3.54.5 Ha	Reserves: 69,449T _s of ROM, 69,449 T _s of Limekankar (100% Recovery) Peak Production = 37,908 T _s of Limekankar Proposed Depth = 2.3m (0.3m Top Soil+ 2m Lime Kankar)
ToR obtained vide File No.10926 TOR Identification No. TO24B0108TN5928344N Dated:12.07.2024	
Environmental Consultant GEO EXPLORATION AND MINING SOLUTIONS Old No. 260-B, New No. 17, Advaitha Ashram Road, Alagapuram, Salem – 636 004, Tamil Nadu, India Accredited for sector 1 Cat ‘A’, sector 31 & 38 Cat ‘B’ Certificate No : NABET/EIA/2225/RA 0276 Phone: 0427-2431989, Email: infogeoexploration@gmail.com Web: www.gemssalem.com	 Laboratory EHS 360 LABS PRIVATE LIMITED, NABL Accredited laboratory 10/2 Ground floor, 50 th street, 7 th Avenue, Ashok Nagar, Chennai – 600 083.
<u>Baseline Monitoring Period</u> DEC 2024 – FEB 2025	
MAY 2025	

UNDERTAKING

I, Thiru. S. Subramanian given undertaking that this EIA & EMP report prepared for our Limekankar quarry situated in over an extent of 3.54.5 Ha S.F.Nos. 189/2A, 2B, 190/1A, 1B, 2, 4, 5 Keelapalur Village & 31/1 Karuppur Senapathy Village, , Ariyalur Taluk, Ariyalur District, over an extent of 3.54.5 Ha based on the ToR issued by the State Level Environmental Impact Assessment Authority (SEIAA), Tamil Nadu vide File No.10926 TOR Identification No. TO24B0108TN5928344N Dated:12.07.2024

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

Signature of the Project Proponent



S. Subramanian

Place: Ariyalur

Dated:

DECLARATION

I Dr. M. Ifthikhar Ahmed – EIA Coordinator declare that the EIA & EMP report prepared for Limekankar Deposit quarry situated in over an extent of 3.54.5 Ha S.F.Nos. 189/2A, 2B, 190/1A, 1B, 2, 4, 5 Keelapalur Village & 31/1 Karuppur Senapathy Village, over an extent of 3.54.5 Ha, Ariyalur Taluk, Ariyalur District has been prepared by Geo Exploration and Mining Solutions, Salem, Tamil Nadu.

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

Signature of the EIA Coordinator



Dr. M. Ifthikhar Ahmed

Managing Partner

M/s. Geo Exploration and Mining Solutions

Place: Salem

Dated:

- 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	Village	S.F. Nos	Extent in Ha	Status
P1	Thiru.S.Subramanian	Keelapalur & Karuppur Senapathy	189/2A, 2B, 190/1A, 1B, 2, 4, 5 &31/1	3.54.5	File No.10926 TOR Identification No. TO24B0108TN5928344N Dated:12.07.2024
	TOTAL EXTENT			3.54.5	
EXISTING QUARRIES					
Mineral: Limestone					
Code	Name of the Owner	Village	S.F. Nos	Extent in Ha	Status
E-1	Tvl.Chettinad Cement Corporation Private Limited	Karuppur Senapathy	31/2A,2B etc	4.00.0	29.04.2013 to 28.04.2033
E-2	S.Saravanan	Karuppur Senapathy	6/4 etc	4.67.0	03.03.2006 to 02.03.2026
E-3	Tvl.Vijay Cements	Karuppur Senapathy	30/2D, 30/3B etc	3.88.0	20.05.2003 to 19.05.2023
	TOTAL EXTENT			12.55.0	
Mineral: Limekankar					
E-4	S.Saravanan	Karuppur Senapathy	6/1,2,3A etc.	4.86.5	14.11.2022 to 13.1.2032
E-5	S.Saravanan	Karuppur Senapathy	32/1,3,33/2A etc	4.92.5	10.12.2021 to 09.12.2031
	TOTAL EXTENT			9.79.0	
ABANDONED / EXPIRED QUARRIES					
Nil					
	TOTAL CLUSTER EXTENT			13.33.5Ha	

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

TERMS OF REFERENCE (ToR) COMPLIANCE

File No. **10926** TOR Identification No. **TO24B0108TN5928344N** Dated: **12.07.2024**

SEIAA SPECIFIC CONDITIONS		
1	The detailed studies on the Loss of Vegetation, Loss of Biodiversity shall be carried out and the action plan to prevent the same shall be included in the EIA report.	Noted & agreed. It has been detailed in Chapter - 3
2	The detailed studies on the Impact on water bodies and human health shall be carried out and the action plan to prevent the same shall be included in the EIA report.	Noted and agreed It has been detailed in chapter - 3
3	The PP shall carry out the scientific studies to assess the hydrogeological condition of the quarry by involving any one of the reputed Research and Academic Institution. A copy of such scientific study report shall be included in the EIA report.	Noted and agreed. The Hydrogeological study has been carried out by the geologist and it has been detailed in the chapter – 3 and the hydrogeological report has been attached as annexure
4	The PP shall carry out the scientific studies with prior permission from the DMS/Chennai Region, to design the controlled blast parameters for reducing the blast-induced ground/air vibrations and eliminating the fly rock from the blasting operations carried out in the quarry, by involving anyone of these reputed Research and Academic Institution. A copy of such scientific study report shall be included in the EIA report..	Noted and agreed
5	The PP shall carry out the scientific studies to assess the slope stability of the working benches and existing quarry wall by involving any one of the reputed Research and Academic Institutions. A copy of such scientific study report shall be included in the EIA report.	Noted and agreed
SPECIFIC CONDITIONS- SEAC		
1	Considering that there is an educational institution nearby, the PP shall furnish the mitigation measures proposed for the anticipated impacts due to the mining activity with special reference to air, water and land pollutions.	Noted & agreed. PP has explicated effective mitigation measures for the anticipated impacts of the limekankar quarry mining activities on land, water, and air in chapter 4
2	A Cluster Management Committee (CMC) shall be constituted including all the mines in the cluster as Committee Members for the effective management of the mining operation in the cluster through systematic & scientific approach with appointment of statutory personnel, appropriate environmental monitoring, good maintenance of haul roads and village/panchayat roads, authorized blasting operation etc. The PP shall submit the following details in the form of an Affidavit during the EIA appraisal: (i) Copy of the agreement forming CMC. (ii) The Organisation chart of the Committee with defining the role of the members (iii) The 'Standard Operating Procedures' (SoP) executing the planned activities.	Noted and agreed PP established a committee for cluster management to ensure the efficient administration of mining operations within the cluster, utilizing a systematic and scientific methodology. Copy of the agreement will be submitted during the Appraisal meeting.
3	As accepted by the Project Proponent, an amount of Rs. 5 lakhs shall be remitted to the Chief Wildlife warden, o/o PCCF, Chennai, for undertaking conservation measures in Karaivetti Bird Sanctuary before obtaining CTO from TNPCB..	Noted and agreed. PP has agreed to allocate Rs. 5 Lakhs to the Chief Wildlife Warden, Office of the Principal Chief Conservator of Forests, Chennai, for the implementation of conservation initiatives in the Karaivetti Bird Sanctuary.
4	The PP shall furnish the AAQ report carried out during the operation of adjacent Limekankar quarries by the PP.	Noted and agreed .
5	The proponent shall furnish photographs of adequate fencing, garland drainage built with siltation tank & green belt along the periphery including replantation of existing trees; maintaining the safety distance between	Noted and agreed PP erected wire fencing around the quarry lease area and planted 1800 indigenous tree species. Relevant photographs given in chapter II.

	the adjacent quarries & water bodies nearby provided as per the approved mining plan.	Additionally, it was agreed to build garland drainage around the lease area.
6	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.
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.	Fresh lease
2	Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery of the site.	Noted and agreed. Letter obtained from the VAO regarding surface features within 300m radius
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 The Bio diversity study has been conducted by the Functional Area Expert approved by the NABET. The same has been detailed in the Chapter No. 3.
6	The DFO letter stating that the proximity distance of Reserve Forests, Protected Areas, Sanctuaries, Tiger reserve etc., up to a radius of 25 km from the proposed site.	Request to consider the secondary source data detailing the nearest reserve forest from Tamil Nadu Geographical Information System (TNGIS). The Nearest Reserve Forest Vilangudi Reserve Forest 13.30km- NE Sanctuary is Karaivetti Birds Sanctuary – 7.2Km - SW
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	It is a Fresh lease

	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.	
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.	Not applicable It is a fresh quarry; the slope stability plan will be submitted along with the Half yearly compliance report.
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.	Not Applicable. There is no blasting activity carried out.
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.	Not Applicable. There is no blasting activity carried out.
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,	It is a Fresh Lease.
13	What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?	It is a Fresh Lease.
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.	It is a Fresh Lease.
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 The project site has been superimposed on the high resolution imagery. The Satellite imagery of the project site is enclosed in Chapter II Geomorphology map of the area is enclosed in Chapter II . Lithology and Geology Map of the area is enclosed in Chapter II.
16	The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc.,	Noted and agreed The Drone Video of the project site is taken covering the Greenbelt and Fencing around the Project site.
17	The proponent shall furnish photographs of adequate fencing, green belt along the periphery including	Noted and agreed As per the recommendations during SEAC ToR Presentation of the proposal and commitment of

	replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	PP a count of 1800 Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads. As well the pp has provided wire fencing as recommended all along the boundary of the lease applied area.
18	The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment, and the remedial measures for the same.	Noted and agreed Details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology justifications are provided in Chapter 2. The anticipated impacts of the mining operations on the surrounding environment and the remedial measures for the same are provided in Chapter 4.
19	The Project Proponent shall provide the Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of the Mines Act'1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	Noted and agreed The Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of Mines Act, 1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.
20	The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of groundwater pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds, etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD / TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided.	Noted and agreed The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on 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 Winter season Dec 2024 to Feb 2025 The Details of the Baseline Monitoring is given in the Chapter No. 3.
22	The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of soil health, biodiversity, air pollution, water pollution, climate change and flood control & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.	Noted and agreed Cumulative impact study has been carried out covering proposed and existing quarries in the cluster and results related to air pollution, water pollution, & health impacts have been given in chapter No. 7, Based on the results, environmental management plan has been prepared and given in Chapter No. 10.
23	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	Noted and agreed The lower part of the mine pit will be utilized as rain water harvesting structure (Temporary) and the water will be used for the water sprinkling on haul roads and Greenbelt development purpose. Rainwater harvesting structure will be constructed near the mine office.
24	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational	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

	and post operational phases and submitted. Impact, if any, of change of land use should be given.	phases are discussed in Chapter No. 3, Table No 3.3
25	Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be provided.	Not applicable.
26	Proximity to Areas declared as 'Critically Polluted' (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable. Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range.
27	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Noted and agreed The lower part of the mine pit will be utilized as rain water harvesting structure (Temporary) and the water will be used for the water sprinkling on haul roads and Greenbelt development purpose. Rainwater harvesting structure will be constructed near the mine office.
28	Impact on local transport infrastructure due to the Project should be indicated.	Noted and agreed Traffic density survey was carried out to analyze the impact of transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no significant impact due to the proposed transportation from the project area. Details have been provided in Chapter No. 2.
29	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	Noted and agreed
30	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific	Noted & agreed. Mine closure plan is detailed in 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
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 As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 1800 Nos of trees were planted as a part of greenbelt development program all along the periphery of the lease applied area and approach roads and village roads.
33	Taller/one-year-old Saplings raised in appropriate size of bags, preferably eco-friendly bags should be planted as per the advice of local forest authorities/botanist/Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized	Noted and agreed As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 1800 Nos of trees were planted as a part of greenbelt development program all along the periphery of the lease applied area and approach roads and village roads.

	manner	
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	Disaster management Plan is detailed 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	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 are discussed in chapter- 10
37	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	Noted and agreed No Public Health Implications anticipated due to this project. The anticipated impact and effective mitigation measures are discussed in the Chapter No. 4
38	The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Noted and agreed Details are listed in Chapter No 3.
39	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No Litigation is pending against this project
40	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Noted and agreed. The details of the Project benefits are given in the Chapter No. 8.
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/TNPCB.	Fresh Lease.
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 has been prepared for the entire life of the mine i.e., upto the lease period.
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 and agreed

SEIAA STANDARD CONDITIONS		
Cluster Management Committee		
1	Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry.	Noted and agreed The Cluster management committee has been formed covering the existing and proposed quarries in the cluster
2	The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling, tree plantation, blasting etc.,	Noted and agreed The information will be shared to the cluster management committee during the monthly meeting.

3	The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines.	Noted and agreed The list of members of the committee formed will be submitted to AD/Mines before resuming the mining operation.
4	Detailed Operational Plan must be submitted which must include the blasting frequency with respect to the nearby quarry situated in the cluster, the usage of haul roads by the individual quarry in the form of route map and network.	Noted and agreed It is a fresh lime kankar quarry. There is no blasting activity carried out
5	The committee shall deliberate on risk & emergency management plan, fire safety & evacuation plan and sustainable development goals pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation of the cluster and evacuation plan.	Noted and agreed The risk management plan and disaster management plan has been prepared and enclosed in this EIA report, Chapter No. 7.
6	The Cluster Management Committee shall form Environmental Policy to practice sustainable mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the environmental policy devised shall be given in detail in the EIA Report.	Noted and agreed Environmental policy of the cluster management committee is detailed in the EIA Report Chapter No. 6
7	The committee shall furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner.	Noted and agreed The Restoration strategy is discussed in the progressive mine closure plan and enclosed in the Scheme of Mining plan.
8	The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public in the vicinity.	Noted and agreed The information on the health of the workers and the local people will be updated periodically along with medical examination.
Agriculture & Agro-Biodiversity		
9	Impact on surrounding agricultural fields around the proposed mining Area.	As the proposed lease area is dominantly surrounded by mining land, barren land, and fallow land, the impact on the surrounding agricultural fields if present is considerably low. The Mining operation will be carried out to reduce the impact further to the level of negligence.
10	Impact on soil flora & vegetation around the project site.	The vegetation details have been provided in chapter III. There is no schedule I species of animals observed within study area as per Wildlife Protection Act, 1972 and no species falls in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area.
11	Details of type of vegetation including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetation all along the boundary of the proposed mining area shall committed mentioned in EMP.	Noted and agreed There are no trees within the existing quarry site, and therefore, no proposal for tree felling or removal is anticipated during the quarrying operations.
12	The Environmental Impact Assessment should study the agro-biodiversity, agro-forestry, horticultural plantations, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.	Noted and agreed The details of the soil analysis and the impacts are given in the Chapter No 3 & 4.
13	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	Noted and agreed The Eco System of the area will be retained during the mining operation by the way of planting trees in the boundary barrier and un utilized areas.

		After completion of mining operation, the quarried-out pit will be facilitated to collect the rainwater to pit act as temporary reservoir
14	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock	Noted and agreed The project area is situated centre part of the quarry lands. The proposed Limekankar quarrying operation will employ the open cast mechanized method, which is expected to have negligible impacts on nearby agricultural lands.
Forests		
15	The project proponent shall detailed study on impact of mining on Reserve forests and free ranging wildlife	Noted and agreed. There is no Reserve Forest within 1km radius from the project area. The mining operation will not cause any significant impact to the Reserve Forest and Wild life Sanctuaries
16	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	There is no forest/wildlife within 10km radius, chapter 3 details of Ecology and Biodiversity, and 4 endemic vulnerable and endangered indigenous flora and fauna.
17	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection	Details are discussed in the Chapter No.3
18	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site	Anticipated Environment Impact and Mitigation measures are detailed in Chapter No.4
Water Environment		
19	Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period	There are 6 open wells and 7 bore wells within the radius of 1km from the project area, Hydrogeological study has been conducted by the resistivity method
20	Erosion Control measures	Details discussed in the chapter No.4
21	Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby Villages, Water-bodies/ Rivers, & any ecological fragile areas.	Details in Chapter 3
22	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir	Food webs describe who eats whom in an ecological community. Made of interconnected food chains, food webs help us understand how changes to ecosystems — say, removing a top predator or adding nutrients — affect many different species, both directly and indirectly. Whereas in this proposed project is for quarrying of Limekankar and is on a hard batholith formation where no diversion of any water bodies is proposed of there is no intersection of ground water table anticipated.
23	The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities.	Details are given in the Chapter No 4.
24	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby	Details in Chapter 4 impact of bio diversity.

	caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	
25	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components	Details of impact on soil environment is detailed in Chapter No.4
26	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites	Boluvampatti R.F. 31.5-SW There is, National Parks, Eco sensitive areas, Wild life sanctuaries within the radius of 10km. An ecological survey of the study area was conducted particularly with reference to the listing of species and assessment of the existing baseline ecological (terrestrial) condition in the study area. Ecological Environment is discussed under Chapter 3
27	The EIA shall include the impact of mining activity on the following: a) Hydrothermal/Geothermal effect due to destruction in the Environment. b) Bio-geochemical processes and its foot prints including environmental stress. c) Sediment geochemistry in the surface streams.	There are 6 open wells and 7 bore wells within the radius of 1km from the project area, Hydrogeological study has been conducted by the resistivity method
Energy		
28	The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished.	Detailed discussed in chapter 4
Climate Change		
29	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities	Noted and agreed. Details discussed in chapter 4.
30	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock, soil health and physical, chemical & biological soil features	Detailed discussed in chapter 3.
31	Impact of mining on pollution leading to GHGs emissions and the impact of the same on the local livelihood.	A greenhouse gas (GHG) is a gas that absorbs and emits radiant energy within the thermal infrared range, causing the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), and ozone (O ₃) Carbon dioxide (CO ₂): Carbon dioxide enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, trees and other biological materials. Carbon dioxide is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle. Methane (CH ₄): Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices, land use and by the decay of organic waste in municipal solid waste landfills.

		Nitrous oxide (N ₂ O): Nitrous oxide is emitted during agricultural, land use, and industrial activities; combustion of fossil fuels and solid waste; as well as during treatment of wastewater
Mine Closure Plan		
32	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	Progressive Mine closure plan has been prepared considering the entire lease period in the mining plan and the same has been approved.
EMP		
33	Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued and the scope for achieving SDGs	Detailed discussed in chapter 10.
34	The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan.	Detailed discussed in chapter 10.
Risk Assessment		
35	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	A Risk Assessment and management Plan Chapter- 7
Disaster Management Plan		
36	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	Disaster management Plan details in Chapter- 7
Others		
37	The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc.	Letter obtained from the VAO regarding surface features within 300m radius
38	As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.	The issues raised during public hearing is addressed in chapter No.7
39	The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported	Plastic waste management in the project area detailed in Chapter No.7.

Standard Terms of Reference for (Mining of minerals)		
S.No	Terms of Reference	Reply
1.1	An EIA-EMP Report shall be prepared for peak capacity (.....MTPA) operation in an ML/project area of.....ha based on the generic structure specified in Appendix III of the EIA Notification, 2006.	Peak Production – 37908Ts (Limekankar) Depth – 2.3m bgl Mine Lease area – 3.54.5 Ha
1.2	An EIA-EMP Report would be prepared for peak capacity operation to cover the impacts and environment management plan for the project specific activities on the environment of the region, and the environmental quality encompassing air, water, land, biotic community, etc. through collection of data and information, generation of data on impacts including prediction modeling for.... MTPA of mineral production based on approved project/Mining Plan for.... MTPA. Baseline data collection can be for any season (three months) except monsoon.	Peak capacity of 37908Ts (Limekankar) operation to cover the impacts and environment management plan in chapter- IV and Chapter 10 covered in project specific activities. Baseline Data were collected for Winter Season Dec2024 – Feb 2025 as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. III
1.3	Proper KML file with pin drop and coordinate of mine at 500-1000 m interval be provided.	Noted, Google earth image showing lease area with Coordinates of pillars in chapter-II.
1.4	A Study area map of the core zone (project area) and 10 km area of the buffer zone (1: 50,000 scale) clearly delineating the major topographical features such as the land use, surface drainage pattern including rivers/streams/nullahs/canals, locations of human habitations, major constructions including railways, roads, pipelines, major industries, mines, and other polluting sources. In case of ecologically sensitive areas such as Biosphere Reserves/National Parks/WL Sanctuaries/ Elephant Reserves, forests (Reserved/Protected), migratory corridors of fauna, and areas where endangered fauna and plants of medicinal and economic importance found in the 15 km study area should be given. The above details to be furnished in tabular form also.	Land use and land cover of the 10km Radius of study area is discussed in Chapter No. III. Geology map of the project area covering 10km radius Figure No. 2.8. Geomorphology of the area is given in Chapter No 2 Figure No 2.9, There are No National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km Radius from the periphery of the project area.
1.5	Map showing the core zone delineating the agricultural land (irrigated and un-irrigated, uncultivable land as defined in the revenue records, forest areas (as per records), along with other physical features such as water bodies, etc should be furnished.	Land use and land cover of the study area is discussed in Chapter No. III with Physical features such as waterbodies, odai, canal etc.,
1.6	A contour map showing the area drainage of the core zone and 25 km of the study area (where the water courses of the core zone ultimately join the major rivers/streams outside the lease/project area) should also be clearly indicated in the separate map.	DEM data using Drainage pattern around 10km radius showing streams and lakes etc., discussed in Chapter No. 3.
1.7	Catchment area with its drainage map of 25 km area within and outside the mine shall be provided with names, details of rivers/ riverlet system and its respective order. The map should clearly indicate drainage pattern of the catchment area with basin of major rivers. Diversion of drains/ river need elaboration in form of length, quantity and quality of water to be diverted.	Drainage pattern around 10km radius showing streams and lakes etc., is discussed in Chapter No. 3.

1.8	(Details of mineral reserves, geological status of the study area and the seams to be worked, ultimate working depth and progressive stage-wise working scheme until the end of mine life should be provided on the basis of the approved rated capacity and calendar plans of production from the approved Mining Plan. Geological maps and sections should be included. The Progressive mine development and Conceptual Final Mine Closure Plan should also be shown in figures. Details of mine plan and mine closure plan approval of Competent Authority should be furnished for green field and expansion projects.	Details in chapter-2 showing the land features. And also enclosed Approved mining plan in annexure.
1.9	Details of mining methods, technology, equipment to be used, etc., rationale for selection of specified technology and equipment proposed to be used vis-à-vis the potential impacts should be provided.	The method of mining is by open cast method; excavator will be deployed for the formation of benches and loading. No drilling and blasting is carried out.
1.10	Impact of mining on hydrology, modification of natural drainage, diversion and channeling of the existing rivers/water courses flowing through the ML and adjoining the lease/project and the impact on the existing users and impacts of mining operations thereon.	Impact Studies and Mitigation Measures of Water Environment including Surface Water and Ground Water are discussed in Chapter 4.
1.11	A detailed Site plan of the mine showing the proposed break-up of the land for mining operations such as the quarry area, OB dumps, green belt, safety zone, buildings, infrastructure, Stockyard, township/colony (within and adjacent to the ML), undisturbed area -if any, and landscape features such as existing roads, drains/natural water bodies to be left undisturbed along with any natural drainage adjoining the lease /project areas, and modification of thereof in terms of construction of embankments/bunds, proposed diversion/re-channeling of the water courses, etc., approach roads, major haul roads, etc should be indicated.	Not Applicable. The details of waste dump management are given in the Chapter No. 4

1.12	Original land use (agricultural land/forestland/grazing land/wasteland/water bodies) of the area should be provided as per the tables given below. Impacts of project, if any on the land use, in particular, agricultural land/forestland/grazing land/water bodies falling within the lease/project and acquired for mining operations should be analyzed. Extent of area under surface rights and under mining rights should be specified. Area under Surface Rights					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 2.5.																																
	Sno	ML. project Land use	Area under Surface Rights(ha)	Area Under Mining Rights(ha)	Area under Both (ha)	<table><tr><th>Description</th><th>Present Area (Ha)</th><th>Area to be reclaimed at the end of present Mining Plan Period (Ha)</th><th>Area at the end of life of quarry (Ha)</th></tr><tr><td>Area under quarrying</td><td>Nil</td><td>1.64.4</td><td>2.54.2</td></tr><tr><td>Dumps</td><td>Nil</td><td>0.10.4</td><td>Nil</td></tr><tr><td>Infrastructure</td><td>Nil</td><td>0.01.0</td><td>0.01.0</td></tr><tr><td>Roads</td><td>Nil</td><td>0.03.0</td><td>0.03.0</td></tr><tr><td>Green Belt</td><td>Nil</td><td>0.20.0</td><td>0.37.0</td></tr><tr><td>Un utilized area</td><td>3.54.5</td><td>1.55.7</td><td>0.59.3</td></tr><tr><td>Total</td><td>3.54.5</td><td>-</td><td>3.54.5</td></tr></table>	Description	Present Area (Ha)	Area to be reclaimed at the end of present Mining Plan Period (Ha)	Area at the end of life of quarry (Ha)	Area under quarrying	Nil	1.64.4	2.54.2	Dumps	Nil	0.10.4	Nil	Infrastructure	Nil	0.01.0	0.01.0	Roads	Nil	0.03.0	0.03.0	Green Belt	Nil	0.20.0	0.37.0	Un utilized area	3.54.5	1.55.7	0.59.3	Total	3.54.5	-	3.54.5
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	3	Grazing Land																																				
	4	Settlements																																				
	5	Others (Specify)																																				
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4	Others (Specify)																																					
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1.15	Map (1: 50, 000 scale) of the study area (core and buffer zone) showing the location of various sampling stations superimposed with location of habitats, other industries/mines, polluting sources, should be provided. The number and location of the sampling stations in both core and buffer zones should be selected on the basis of size of lease/project area, the proposed impacts in the downwind (air) / downstream (surface water)/groundwater regime (based on flow). One station should be in the upwind/upstream/non-impact/non-polluting area as a control station. The monitoring should be as per CPCB guidelines and parameters for water testing for both ground water and surface water as per ISI standards and CPCB classification wherever applicable. Observed values should be provided along with the specified standards.	Details in chapter-3 showing the various sampling stations As per CPCB guidelines.
1.16	For proper baseline air quality assessment, Wind rose pattern in the area should be reviewed and accordingly location of AAMSQ shall be planned by the collection of air quality data by adequate monitoring stations in the downwind areas. Monitoring location for collecting baseline data should cover overall the 10km buffer zone i.e., dispersed in 10 km buffer area. In case of expansion, the displayed data of CAAQMS and its comparison	Air Quality Modelling and wind rose pattern for prediction of incremental GLC's of pollutant was carried out using AERMOD view 13 Model. Details in Chapter No. 4.
1.17	A detailed traffic study along with presence of habitation in 100 mts distance from both side of road, the impact on the air quality with its proper measures and plan of action with timeline for widening of road. The project will increase the no. of vehicle along the road which will indirectly contribute to carbon emission so what will be the compensatory action plan should be clearly spell out in EIA/ EMP report.	Traffic density survey was carried out to analyses the impact of Transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no significant impact due to the proposed transportation from the project area. Details in Chapter-II.
1.18	The socio-economic study to conducted with actual survey report and a comparative assessment to be provided from the census data should be provided in EIA/ EMP report also occupational status & economic status of the study area and what economically project will contribute should be clearly mention. The study should also include the status of infrastructural facilities and amenities present in the study area and a comparative assessment with census data to be provided and to link it with the initialization and quantification of need-based survey for CSR activities to be followed.	Detailed in chapter-3 socio-economic study with occupational status & economic status of the study area. The study should also include the status of infrastructural facilities and amenities present in the study area CSR are discussed under Chapter 8.
1.19	The Ecology and biodiversity study should also indicate the likely impact of change in forest area for surface infrastructural development or mining activity in relation to the climate change of that area and what will be the compensatory measure to be adopted by PP to minimize the impact of forest diversion.	Detailed Ecology and biodiversity study in chapter-3
1.20	Baseline data on the health of the population in the impact zone and measures for occupational health and safety of the personnel and manpower for the mine should be submitted.	Detailed in chapter-4 population in the impact zone and measures for occupational health and safety and proposed occupational health in chapter-X
1.21	Impact of proposed project/activity on hydrological regime of the area shall be assessed and report be submitted. Hydrological studies as per GEC 2015 guidelines to be prepared and submitted.	Noted and agreed

1.22	Impact of mining and water abstraction from the mine on the hydrogeology and groundwater regime within the core zone and 10 km buffer zone including long-term monitoring measures should be provided. Details of rainwater harvesting and measures for recharge of groundwater should be reflected in case there is a declining trend of groundwater availability and/or if the area falls within dark/grey zone.	The ground water table is at 20-25m below ground level. In this project, ultimate depth is 2.3m Bgl It is inferred the quarrying activities in the Cumulative EIA project (Quarry) will not intersect the Ground water table.
1.23	Study on land subsidence including modeling for prediction, mitigation/prevention of subsidence, continuous monitoring measures, and safety issues should be carried out.	Detailed in Chapter-IV Anticipated and mitigation measures of in the study area.
1.24	Detailed water balance should be provided. The break up of water requirement as per different activities in the mining operations, including use of water for sand stowing should be given separately. Source of water for use in mine, sanction of the Competent Authority in the State Govt. and impacts vis-à-vis the competing users should be provided.	Total Water Requirement: 2.0 KLD Discussed under Chapter 2, Table No 2.15, The required water will be met from rainwater accumulated in mine pit (when available) and from the approved water vendors.
1.25	PP shall submit design details of all Air Pollution control equipment (APCEs) to be implemented as part of Environment Management Plan vis-à-vis reduction in concentration of emission for each APCEs	Methodology And Instrument Used for Air Quality Analysis in chapter-3 and Air Pollution control equipment (APCEs) in chapter-10 sub 10.2 Environmental policy.
1.26	PP shall propose to use LNG/CNG based mining machineries and trucks for mining operation and transportation of mineral. The measures adopted to conserve energy or use of renewable sources shall be explored.	Details in Machinery and equipment details in Chapter-2 Table No 2.16
1.27	PP to evaluate the green house emission gases from the mine operation/ washery plant and corresponding carbon absorption plan.	Noted and agreed
1.28	Site specific Impact assessment with its mitigation measures, Risk Assessment and Disaster Preparedness and Management Plan should be provided.	A Risk Assessment and Disaster Preparedness and management Plan Chapter- 7
1.29	Impact of choice of mining method, technology, selected use of machinery and impact on air quality, mineral transportation, handling & storage/stockyard, etc, Impact of blasting, noise and vibrations should be provided.	Detailed in Machinery and technology used Chapter-3 Table 3.17 – Methodology and Instrument Used for Air Quality Analysis Detailed study in chapter-4 Impact of choice of mining method and impact on air quality and blasting and noise and vibrations.
1.30	Impacts of mineral transportation within the mining area and outside the lease/project along with flow-chart indicating the specific areas generating fugitive emissions should be provided. Impacts of transportation, handling, transfer of mineral and waste on air quality, generation of effluents from workshop etc, management plan for maintenance of HEMM and other machinery/equipment should be given. Details of various facilities such as rest areas and canteen for workers and effluents/pollution load emanating from these activities should also be provided.	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. 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.
1.31	Details of various facilities to be provided to the workers in terms of parking, rest areas and canteen, and effluents/pollution load resulting from these activities should also be given.	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

1.32	The number and efficiency of mobile/static water jet, Fog cannon sprinkling system along the main mineral transportation road inside the mine, approach roads to the mine/stockyard/siding, and also the frequency of their use in impacting air quality should be provided.	Detailed in chapter-2 for mineral transportation route with approach roads etc., and impacting air quality detailed given chapter-4
1.33	Conceptual Final Mine Closure Plan and post mining land use and restoration of land/habitat to the pre- mining status should be provided. A Plan for the ecological restoration of the mined-out area and post mining land use should be prepared with detailed cost provisions. Impact and management of wastes and issues of re-handling (wherever applicable) and backfilling and progressive mine closure and reclamation should be furnished.	Discussed under Chapter 2. Mine Closure Plan is a part of Approved Mining Plan enclosed as Annexure Volume – 1.
1.34	Adequate greenbelt nearby areas, mineral stock yard and transportation area of mineral shall be provided with details of species selected and survival rate Greenbelt development should be undertaken particularly around the transport route.	Greenbelt Development Plan is discussed under Chapter 4
1.35	Cost of EMP (capital and recurring) should be included in the project cost and for progressive and final mine closure plan.	The total cost and the details are given in the Chapter No. 10
1.36	Details of R&R. Detailed project specific R&R Plan with data on the existing socio- economic status of the population (including tribals, SC/ST, BPL families) found in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternate livelihood concerns/employment for the displaced people, civic and housing amenities being offered, etc. and costs along with the schedule of the implementation of the R&R Plan should be given.	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.
1.37	CSR Plan along with details of villages and specific budgetary provisions (capital and recurring) for specific activities over the life of the project should be given.	CSR are discussed under Chapter 8. And specific budgetary provisions (capital and recurring) for specific activities over the life of the project in chapter-10
1.38	Corporate Environment Responsibility:	CER are discussed under Chapter 8.
1.39	a) The Company must have a well laid down Environment Policy approved by the Board of Directors.	Detailed in chapter-10 The Environment Policy
1.40	b) The Environment Policy must prescribe for standard operating process/procedures to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions.	
1.41	c) The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions must be furnished.	The Environment Monitoring Cell discussed under Chapter 6
1.42	d) To have proper checks and balances, the company should have a well laid down 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.	The Environment Monitoring Cell discussed under Chapter 6
1.43	e) Environment Management Cell and its responsibilities to be clearly spell out in EIA/ EMP report	The Environment Monitoring Cell discussed under Chapter 6
1.44	f) In built mechanism of self-monitoring of compliance of environmental regulations should be indicated.	The Environment Monitoring Cell discussed under Chapter 6
1.45	Status of any litigations/ court cases filed/pending on the project should be provided.	No litigation is pending in any court against this project

1.46	PP shall submit clarification from DFO that mine does not falls under corridors of any National Park and Wildlife Sanctuary with certified map showing distance of nearest sanctuary.	Karaivetti Birds Sanctuary – 7.2km – SW It will Submit final EIA/EMP report
1.47	Copy of clearances/approvals such as Forestry clearances, Mining Plan Approval, mine closer plan approval. NOC from Flood and Irrigation Dept. (if req.), etc. wherever applicable	Noted and agreed
1.48	Details on the Forest Clearance should be given as per the format given: Total Mine lease area (ha): Total Forest Land (Ha) : Date of FC : Extent of Forest Land : Balance area for which FC is yet to be obtained: Status of application for diversion of forest Land: If more than one provides details of each FC	Vilangudi R.F. 13.30km- NE Total Mine Lease area 3.54.5ha Details on the Forest Clearance will Submit final EIA/EMP report.
1.49	In case of expansion of the proposal, the status of the work done as per mining plan and approved mine closure plan shall be detailed in EIA/ EMP report.	Noted and agreed.
1.50	Details on Public Hearing should cover the information relating to notices issued in the newspaper, proceedings/minutes of Public Hearing, the points raised by the general public and commitments made by the proponent and the time bound action proposed with budgets in suitable time frame. These details should be presented in a tabular form. If the Public Hearing is in the regional language, an authenticated English Translation of the same. should be provided.	The outcome of public hearing will be updated in the final EIA/EMP report.
1.51	PP shall carry out survey through drone highlighting the ground reality for at least 10 minutes.	Noted and agreed
1.52	Detailed Chronology of the project starting from the first lease deed allotted/Block allotment/ Land acquired to its No. of renewals, CTO /CTE with details of no. renewals, previous EC(s) granted details and its compliance details, NOC details from various Govt bodies like Forest NOC(s), CGWA permissions, Power permissions, etc as per the requisites respectively to be furnished in tabular form.	It is a fresh lease.
1.53	The first page of the EIA/ EMP report must mention the peak capacity production, area, detail of PP, Consultant (NABET accreditation) and Laboratory (NABL / MoEF & CC certification)	Noted and agreed. As per detailed in front page of Draft EIA/EMP, NABET, NABL certification detailed given in the report.
1.54	The compliances of Tor must be properly cited with respective chapter section and page no in tabular form and also mention sequence of the respective ToR complied within the EIA-EMP report in all the chapters section.	Noted and agreed. As per Tor compliance each chapter wise page and table, figure no given in the EIA/EMP report.

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1.INTRODUCTION

1.0 PREAMBLE

Project History: -

The project proponent Thiru.S. Subramanian applied for Limekankar Deposit quarry over an extent of 3.54.5Ha in S.F.Nos.189/2A, 2B, 190/1A, 1B, 2, 4, 5, Keelapalur Village &31/1 Karuppur Senapathy, Ariyalur Taluk, Ariyalur District

- Proponent applied for Limekankar deposit quarry lease on 14.07.2016
- Precise area communication letter was issued by the Principal Secretary vide Letter No.9561/MMC.2/2018-3, Dated: 04.03.2019.
- The Mining plan has been prepared by the Qualified person and got approval vide Letter No.2522/MM10/2018 Dated: 08.03.2019
- The Mining plan has been approved for the quantity of **69,449** Ts of ROM & 69,449 Ts of Limekankar up to the depth of 2m bgl for the period of Five years.

As per the EIA Notification, 2006 and subsequent amendments and OM The proposal falls in the B1 Category (Cluster quarries – 1 proposal and 2 Existing quarries forming Cluster Category {Total Extent of the Cluster is 13.33.5Ha}- Cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016).

- Proponent applied for Terms of Reference vide Proposal No. SIA/TN/MIN/474122/2024 dated 19.06.2024 and the ToR Was Granted vide **File. No.10926 TOR Identification No.TO24B0108TN5928344N Dated:12.07.2024**
- Based on the ToR Baseline Monitoring study has been carried out for one season i.e., **Dec 2024- Feb 2025** and this EIA/EMP report is prepared for considering cumulative impacts arising out of these projects, the Cumulative Environmental Impact Assessment study is undertaken, which is followed by preparation of a detailed Environmental Management Plan (EMP) to minimize those adverse impacts.

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

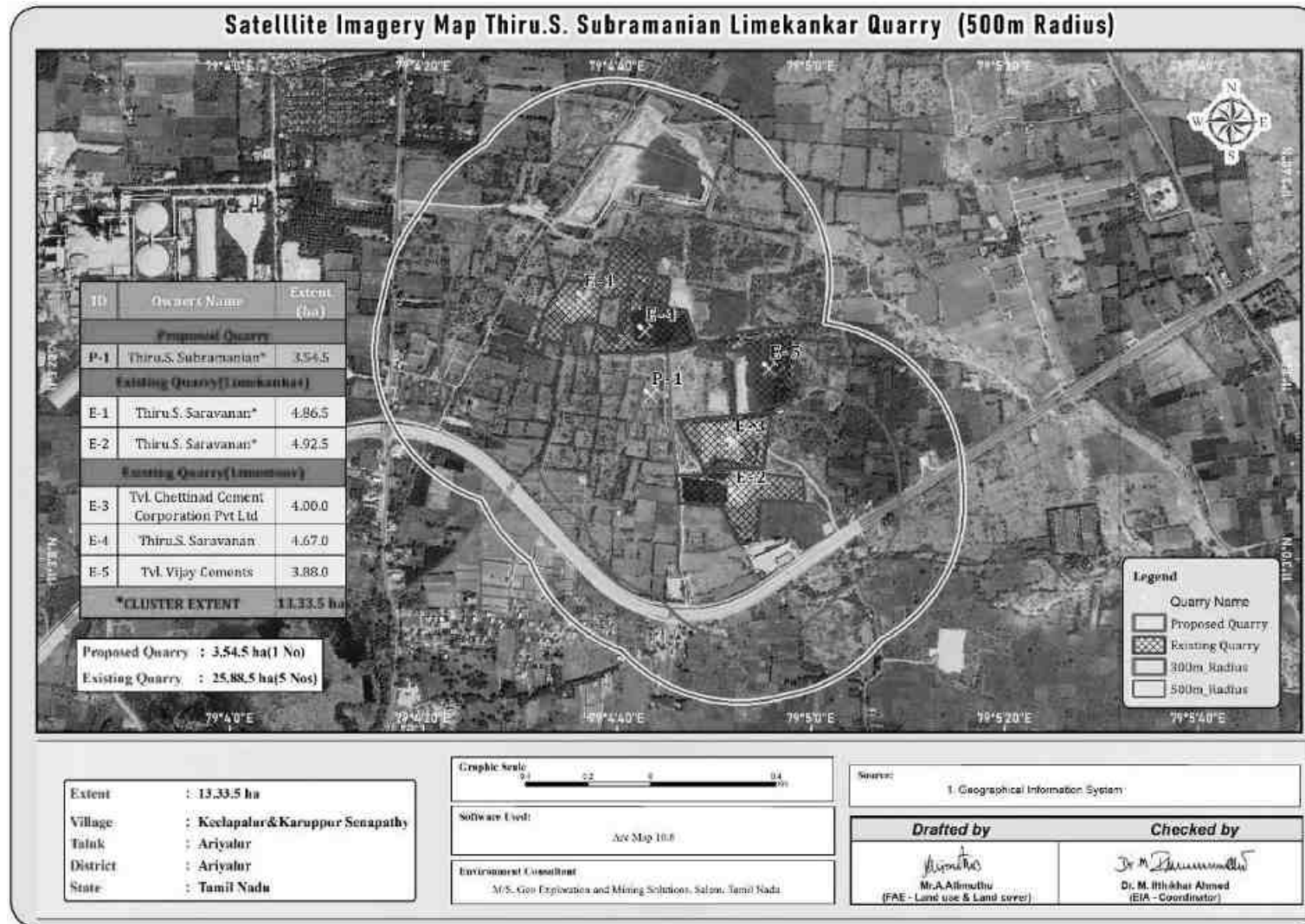
1.1 PURPOSE OF THE REPORT

The Ministry of Environment and Forests, Govt. of India, through its EIA notification S.O. 1533(E) of 14th September 2006 and its subsequent amendments as per Gazette Notification S.O. 1889 of 20th April 2022, Mining Projects are classified under two categories i.e. A (> 250 Ha) and B ($\leq$ 250 Ha), and Schematic Presentation of Requirements on Environmental Clearance of Minor Minerals including cluster situation in Appendix–XI.

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

TABLE 1.1: SALIENT FEATURES OF THE PROPOSED PROJECT

Name of the Project	Thiru.S.Subramanian limekankar quarry
S.F. No.	S.F.Nos.189/2A, 2B, 190/1A, 1B, 2, 4, 5, Keelapalur Village & 31/1 Karuppur Senapathy
Extent	3.54.5 ha
Land Type	Patta Land
Village Taluk and District	Keelapalur Village & Karuppur Senapathy Village, Ariyalur Taluk, Ariyalur District.

Source: Approved Mining Plan

1.2.1A Identification of Project Proponent

TABLE 1.1A: DETAILS OF PROJECT PROPONENT

Name of the Project Proponent	Thiru.S. Subramanian
Address	No. 69, Ganapathy Nagar, Thiruvanaikovil, Trichy District – 620 005.
Mobile	+91 94892 01001
Email	dcpmaruthi@gmail.com
Status	Individual

1.2.2 Identification of Project

TABLE 1.2: SALIENT FEATURES OF THE PROPOSED PROJECT

Name of the Project	Thiru. S. Subramanian Limekankar Deposit Quarry	
S.F. No.	189/2A, 2B, 190/1A, 1B, 2, 4, 5 & 31/1	
Extent	3.54.5 ha	
Village Taluk and District	Keelapalur & Karuppur Senapathy Village, Ariyalur Taluk, Ariyalur District.	
Land Type	patta land	
Land Ownership	It is Patta Land, registered in the name of Thiru. S. Saravanan, vide pata Nos. 874 & Thiru. S. Subramanian, vide patta Nos. 592 & 1115. The applicant has registered lease deed with Pattadar for 12 Years Doc. No 2813/2019	
Toposheet No	58 - M/04	
Latitude between	11° 03' 08.69"N to 11° 03' 21.46"N	
Longitude between	79° 04' 41.05"E to 79° 04' 49.00"E	
Elevation of the area	72m(Max) AMSL	
Lease period	10 Years	
Mining Plan period	5 years	
Proposed Depth of Mining	2m Bgl	
	Limekankar T _s	Top Soil T _s
Geological Resources	1,59,525 T _s	21,270 T _s
Mineable Reserves	1,13,360 T _s	16,166 T _s
Year wise Production Five Years	69,449	10,010
Peak Production	37,908	5,445
Ultimate Pit Dimension	Pit I-166m(L) x 55m(W) x 2.3m(D) Bgl Pit II-170m(L) x 72m(W) x 2.3m(D) Bgl	
Water Level in the region	20-25 m bgl	
Method of Mining	Opencast Mechanized Mining Method without Drilling and Blasting	
Topography	The lease applied area is situated in flat terrain. The area has gentle sloping towards South-eastern side. The altitude of the area is 72m (max) above Mean Sea level. The area is covered by Topsoil having an average thickness of 0.3m	

	and followed by Massive Lime kankar Which is clearly inferred from the adjacent existing quarry pit	
Machinery proposed	Excavator with Bucket and Rock Breaker	1 Nos
	Tipper	1 Nos
Proposed Manpower Deployment	15 Nos	
Fixed Asset Cost	Rs.34,37,778/-	
Operational Cost	Rs.17,00,000/-	
EMP Cost	Rs. 2,25,000/-	
Total Project cost	Rs. 53,62,778/-	
CER Cost	Rs. 5,00,000/-	
Nearby Water Bodies	Ematteri	110m East
	Kuttai	240m North
	Odai	370m East
	Periya Eri	1km SW
	Marudaiyar River	2.8km NE
	Tank	8km SW
Greenbelt Development Plan	Proposed to plant 1800 Nos of trees considering 500 Nos of trees/ Ha criteria. The plantation will be developed around the project site and nearby village roads	
Proposed Water Requirement	2.0 KLD	
Nearest Habitation	500m – South West	
Nearest Reserve Forest	Vilangudi R.F – 13.30 km – NE	
Nearest Wild Life Sanctuary	Karaivetti Birds Sanctuary – 7.2Km - SW	

Source: Approved Mining & Land Documents.

1.3 BRIEF DESCRIPTION OF THE PROJECT

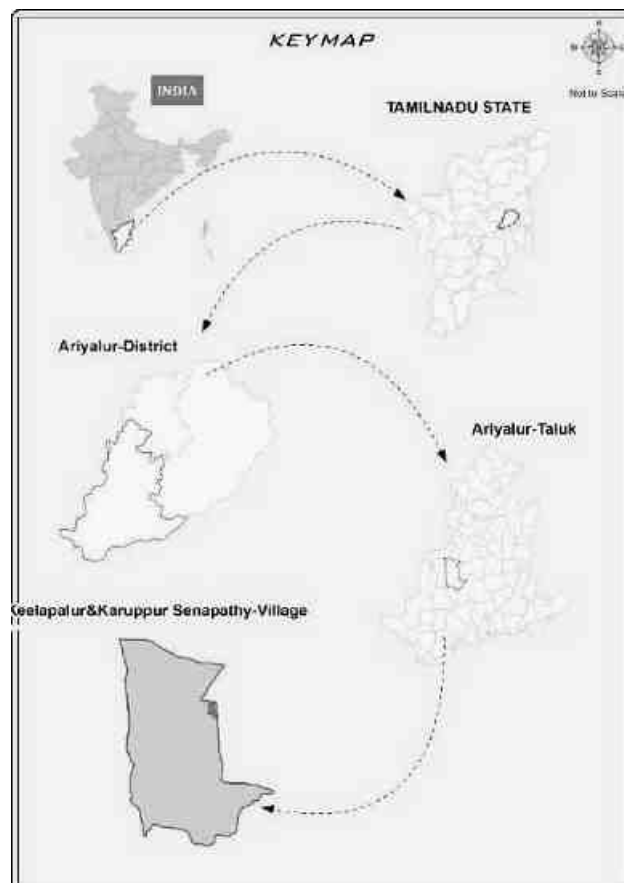
1.3.1 Nature and Size of the Project

The quarrying operation is proposed to be carried out by Opencast Mechanized Mining method with Hydraulic Excavator and tipper are used for Loading and transportation of Limekankar to the cement plants.

The peak production of Limekankar 37908 Ts and 5445 Ts of Top Soil for five years. The depth of the mining is 2.3mbgl.

1.3.2 Location of the Project

- The project site is located in Keelapalur & Karuppur Senapathy Village, Ariyalur Taluk, Ariyalur District.
- The lease applied area is located at a distance of about 1km Northeast from Keelpalur Village and 10.5km South from Ariyalur and 0.4 km Southern side from Trichy- Chidambaram(NH-81) National Highway Road.

FIGURE 1.2 LOCATION MAP OF THE PROJECT SITE

Source: Survey of India Toposheet 58-M/04,

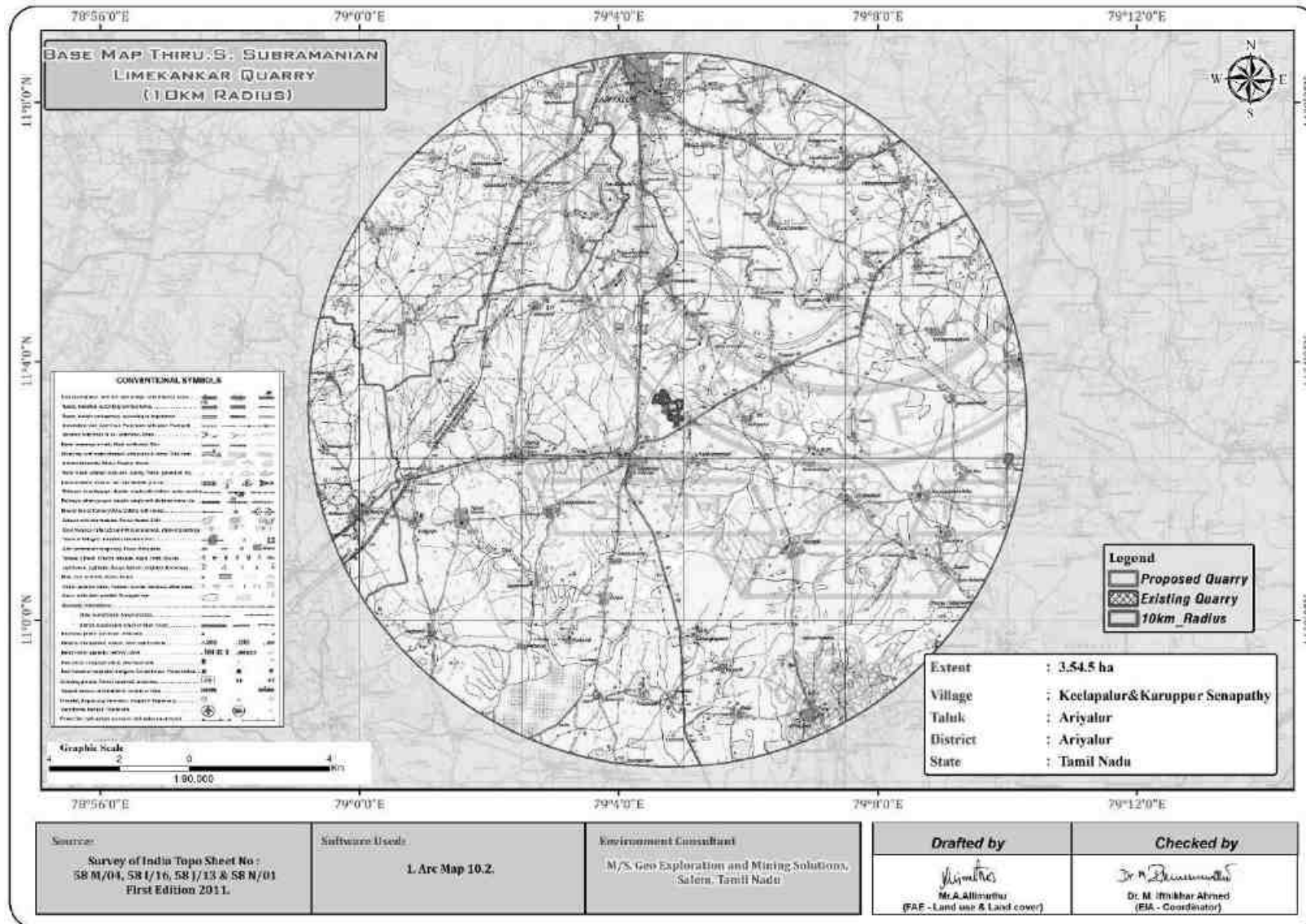
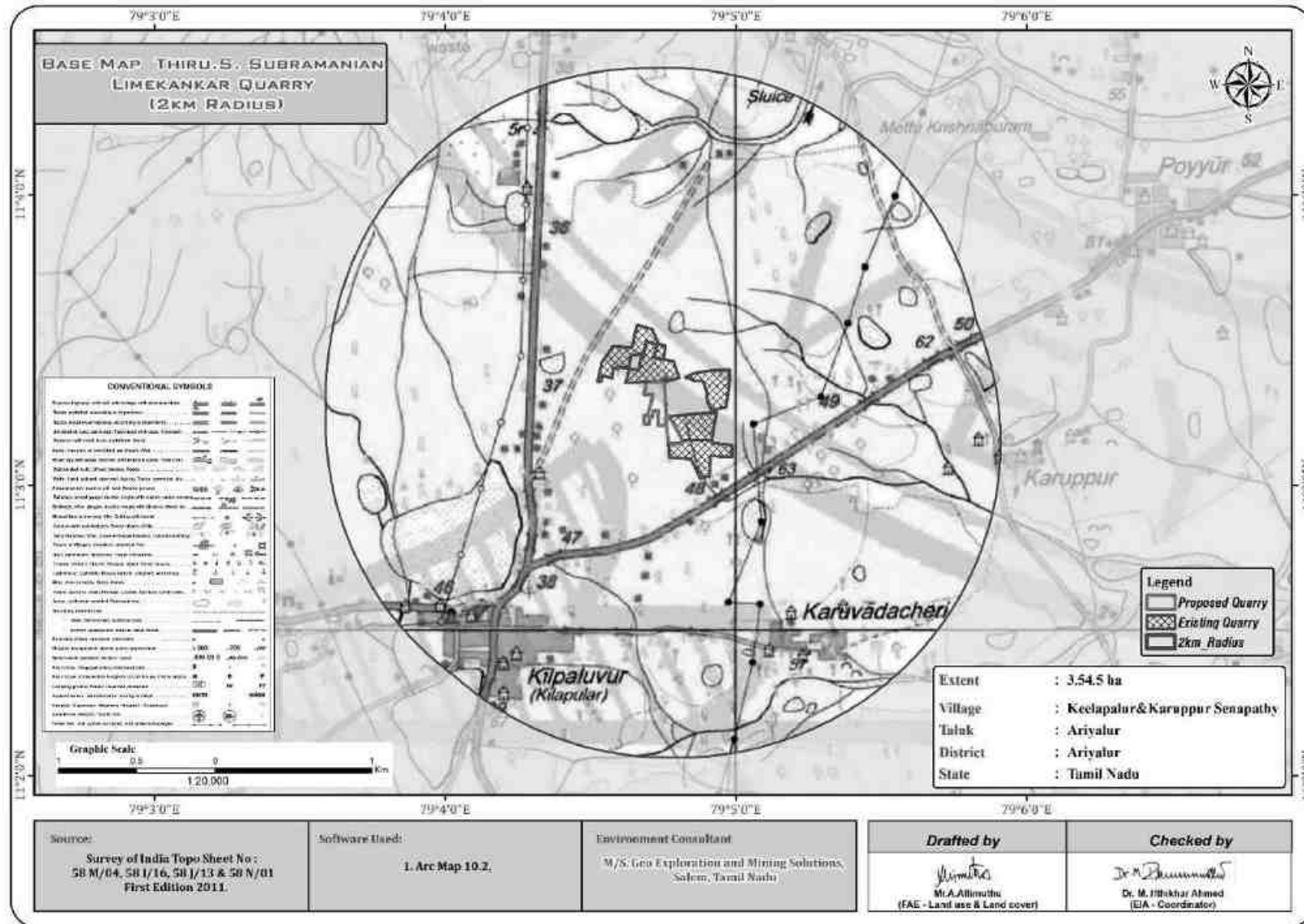
FIGURE 1.3: TOPOSHEET MAP OF THE STUDY AREA 10 KM RADIUS

FIGURE 1.4: TOPOSHEET MAP OF THE STUDY AREA 2KM RADIUS

1.4 ENVIRONMENTAL CLEARANCE

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

- Screening,
- Scoping
- Public consultation &
- Appraisal

SCREENING:

- Proponent applied for Limekankar Deposit Quarry lease on 14.07.2016
- Precise area communication letter was issued by the Principal Secretary vide Letter No.9561/MMC2/2018-3, Dated: 04.03.2019
- The Mining plan has been prepared by the Qualified person and got approval vide Letter No./2522/MM10/2018 Dated: 08.03.2019.
- 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/474122/2024 dated 19.06.2024

SCOPING:

- The proposal was placed in 477th SEAC meeting held on 20.06.2024 and the committee recommended for issue of ToR.
- The proposal was considered in 737th Authority meeting held on 09.07.2024&10.07.2024, issued ToR vide **File No.10926. TOR Identification No TO24B0108TN5928344N, dated: 12.07.2024**

PUBLIC CONSULTATION

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

APPRAISAL –

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

1.5 TERMS OF REFERENCE (ToR)

- The ToR was issued by the SEIAA vide **File No.10926. TOR Identification No TO24B0108TN5928344N, dated: 12.07.2024**

The Details of the ToR Compliance is given in the Page No. i to xvii

1.6 POST ENVIRONMENT CLEARANCE MONITORING

The 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. A detailed account of the emission sources, emissions control equipment, background Air quality levels, Meteorological measurements, Dispersion model and all other aspects of pollution like effluent discharge, Dust generation etc., have been discussed in this report. The baseline monitoring study has been carried out during the Winter season (Dec 2024 to Feb 2025) for various environmental components so as to assess the anticipated impacts of the cluster quarry projects on the environment and suggest suitable mitigation measures for likely adverse impacts due to the proposed project.

TABLE 1.3: 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 (1 Core & 6 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 6 locations during study period
7	Land use	Existing land use for different categories	Based on Survey of India topographical sheet and satellite imagery and primary survey.
8	Socio-Economic Aspects	Socio-economic and demographic characteristics, worker characteristics	Based on primary survey and secondary sources data like census of India 2011.

9	Hydrology	Drainage pattern of the area, nature of streams, aquifer characteristics, recharge and discharge areas	Based on data collected from secondary sources as well as hydro-geology study report prepared.
10	Risk assessment and Disaster Management Plan	Identify areas where disaster can occur by fires and explosions and release of toxic substances	Based on the findings of Risk analysis done for the risk associated with mining.

Source: Field Monitoring Data

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.
- Environment Protection Act, 1986
- ToR vide **File No.10926. TOR Identification No TO24B0108TN5928344N, dated: 12.07.2024**

2. PROJECT DESCRIPTION

2.0 GENERAL

The Proposed Thiru S. Subramanian Limekankar Quarry require Environmental Clearance. There are 1 proposed and 2 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 13.33.5 ha

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

2.1 DESCRIPTION OF THE PROJECT

The proposed project is site specific and there is no additional area required for this project. There is no effluent generation/discharge from this project. Method of mining is opencast mechanized method. Excavator will be deployed for the formation of benches and loading. No Drilling and blasting are carried out.

2.2 LOCATION OF THE PROJECT

- The project site is located in Keelapalur & Karuppur Senapathy Village, Ariyalur Taluk, Ariyalur District.
- The lease applied area is located at a distance of about 1km Northeast from Keelpalur Village and 10.5km South from Ariyalur and 0.4 km Northwest from Trichy- Chidambaram(NH-227) National Highway Road.

TABLE 2.1: SITE CONNECTIVITY

Nearest Roadway	(NH-81) -Trichy -Chidhambaram 0.4 km – South SH (139) – Ariyalur -Kumbakonam-7.5km-NE
Nearest Village	Keelapalur 1km-SW
Nearest Town	Ariyalur – 10.5 km-N
Nearest Railway Station	Ariyalur – 10.5 km – North
Nearest Airport	Trichy– 52.0 km –South West
Seaport	Tuticorin 275 km – South West

Source: Survey of India Toposheet

TABLE 2.2: CO-ORDINATES – PROJECT BOUNDARY

Corner Nos.	Latitude	Longitude
1	11° 03' 12.75"N	77° 04' 41.06"E
2	11° 03' 14.53"N	77° 04' 41.17"E
3	11° 03' 14.50"N	77° 04' 42.55"E
4	11° 03' 17.00"N	77° 04' 42.85"E
5	11° 03' 18.89"N	77° 04' 41.05"E
6	11° 03' 18.80"N	77° 04' 41.51"E
7	11° 03' 21.36"N	77° 04' 45.11"E
8	11° 03' 21.46"N	77° 04' 45.39"E
9	11° 03' 18.87"N	77° 04' 45.61"E
10	11° 03' 14.43"N	77° 04' 46.15"E
11	11° 03' 14.42"N	77° 04' 48.55"E
12	11° 03' 10.28"N	77° 04' 49.00"E

13	11° 03' 08.94"N	77° 04' 48.38"E
14	11° 03' 08.71"N	77° 04' 46.11"E
15	11° 03' 08.69"N	77° 04' 45.63"E
16	11° 03' 14.02"N	77° 04' 45.45"E
17	11° 03' 14.01"N	77° 04' 45.41"E
18	11° 03' 12.45"N	77° 04' 43.98"E
19	11° 03' 12.43"N	77° 04' 44.04"E
20	11° 03' 13.96"N	77° 04' 43.91"E
21	11° 03' 13.96"N	77° 04' 44.11"E
22	11° 03' 15.47"N	77° 04' 43.08"E
23	11° 03' 15.57"N	77° 04' 42.73"E
24	11° 03' 14.17"N	77° 04' 41.06"E
25	11° 03' 14.36"N	77° 04' 42.19"E
26	11° 03' 12.68"N	77° 04' 42.10"E
Datum: UTM-WGS84, Zone 43 North		

Source: Approved Mining Plan

FIGURE 2.1: TOPOGRAPHICAL VIEW OF PROJECT AREA



FIGURE 2.2 PHOTOGRAPHS OF GREEN BELT & FENCING



FIGURE 2.3: GOOGLE IMAGE OF THE PROJECT AREA



Source: Google Earth Imagery

FIGURE 2.4: QUARRY LEASE PLAN / SURFACE PLAN

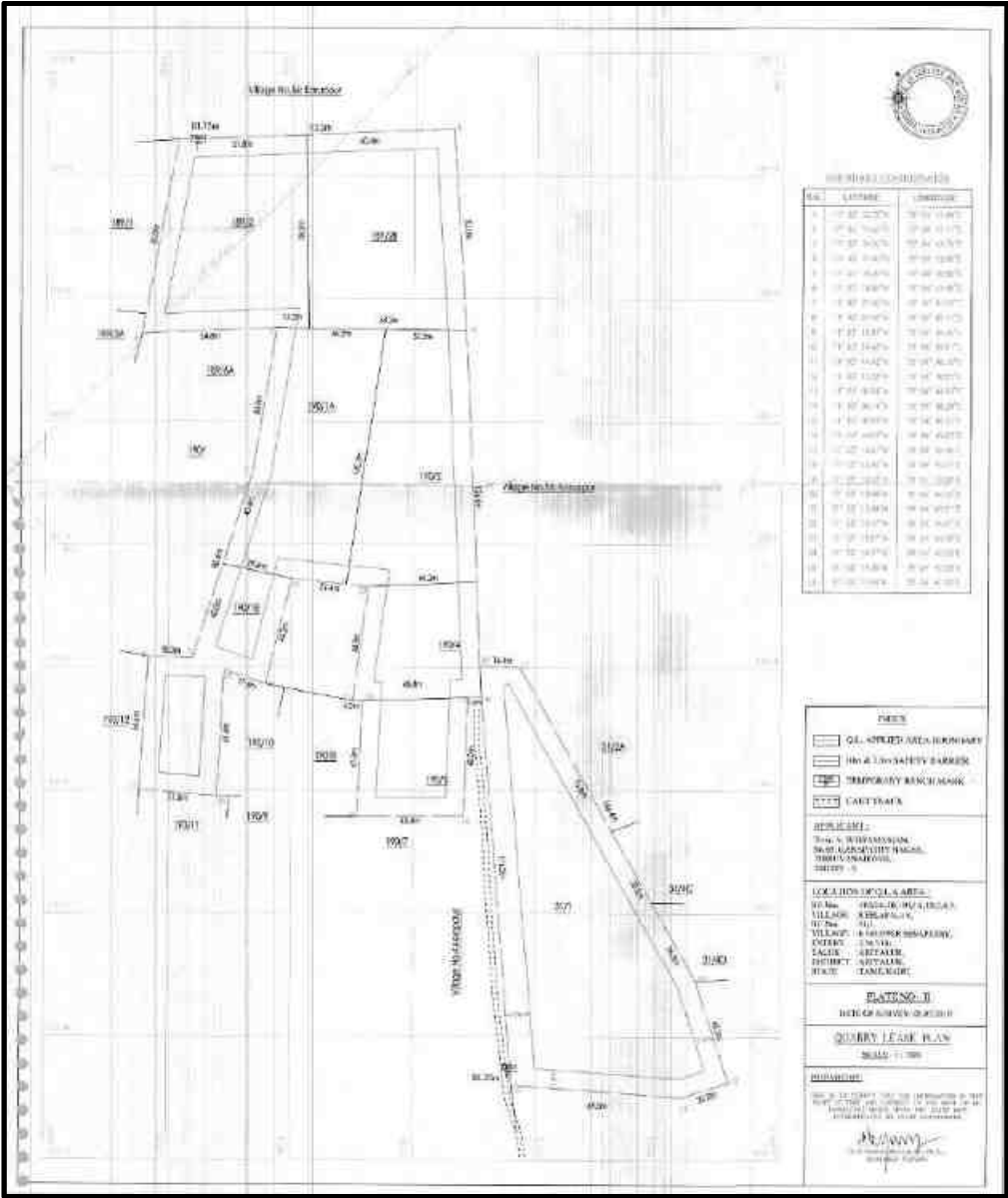


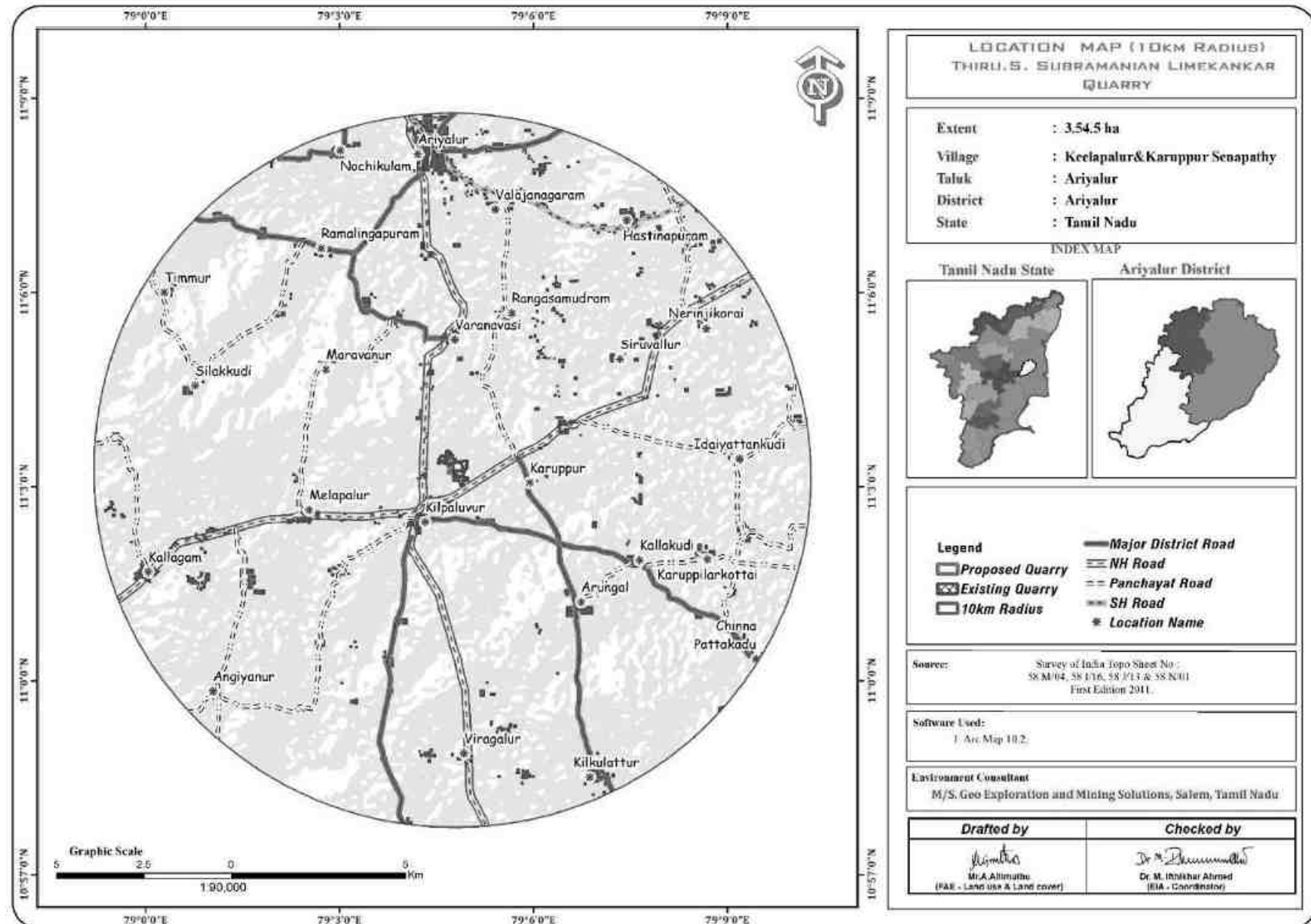
FIGURE 2.5: IMAGE SHOWING SURFACE FEATURES AROUND 10 KM RADIUS

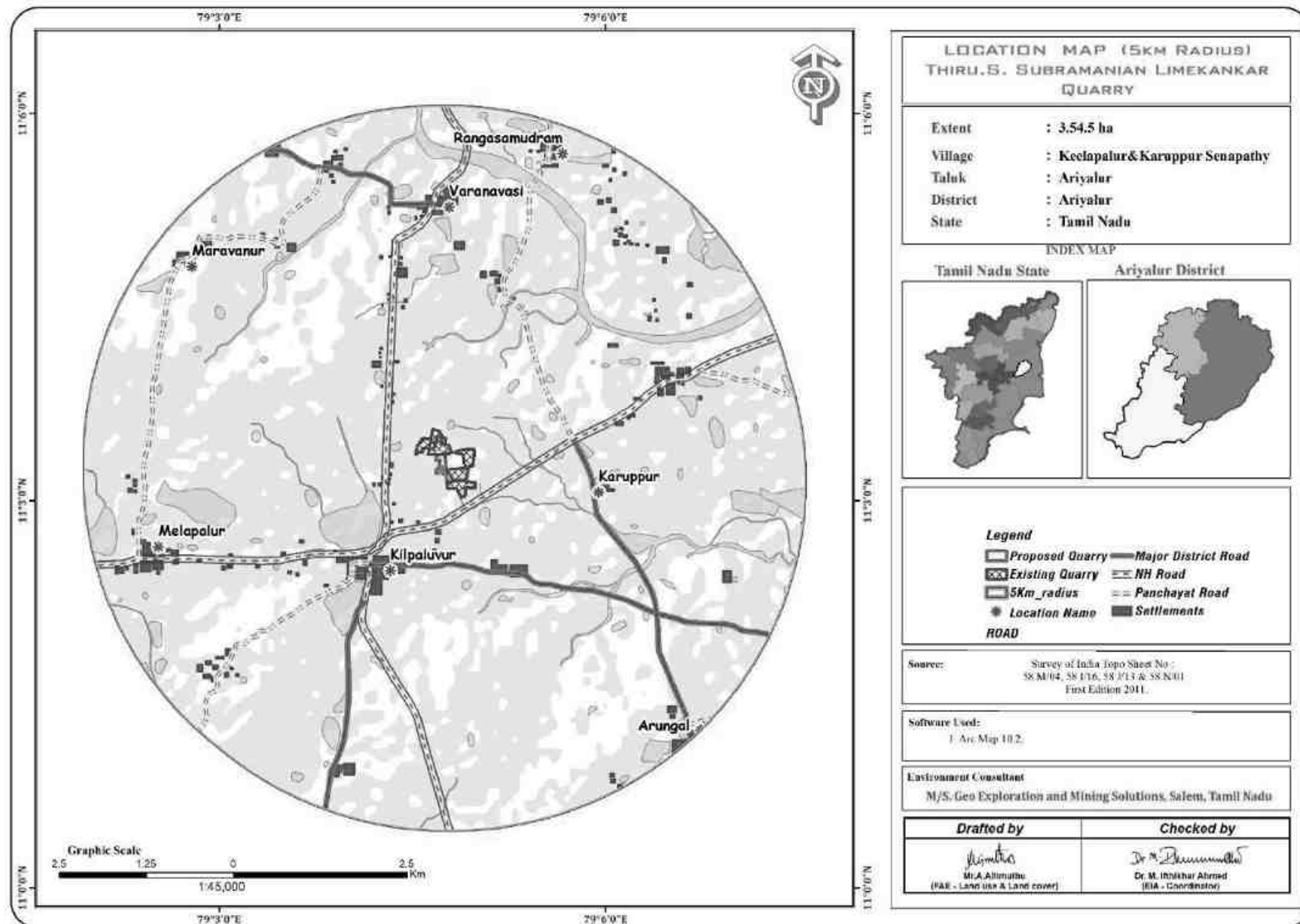
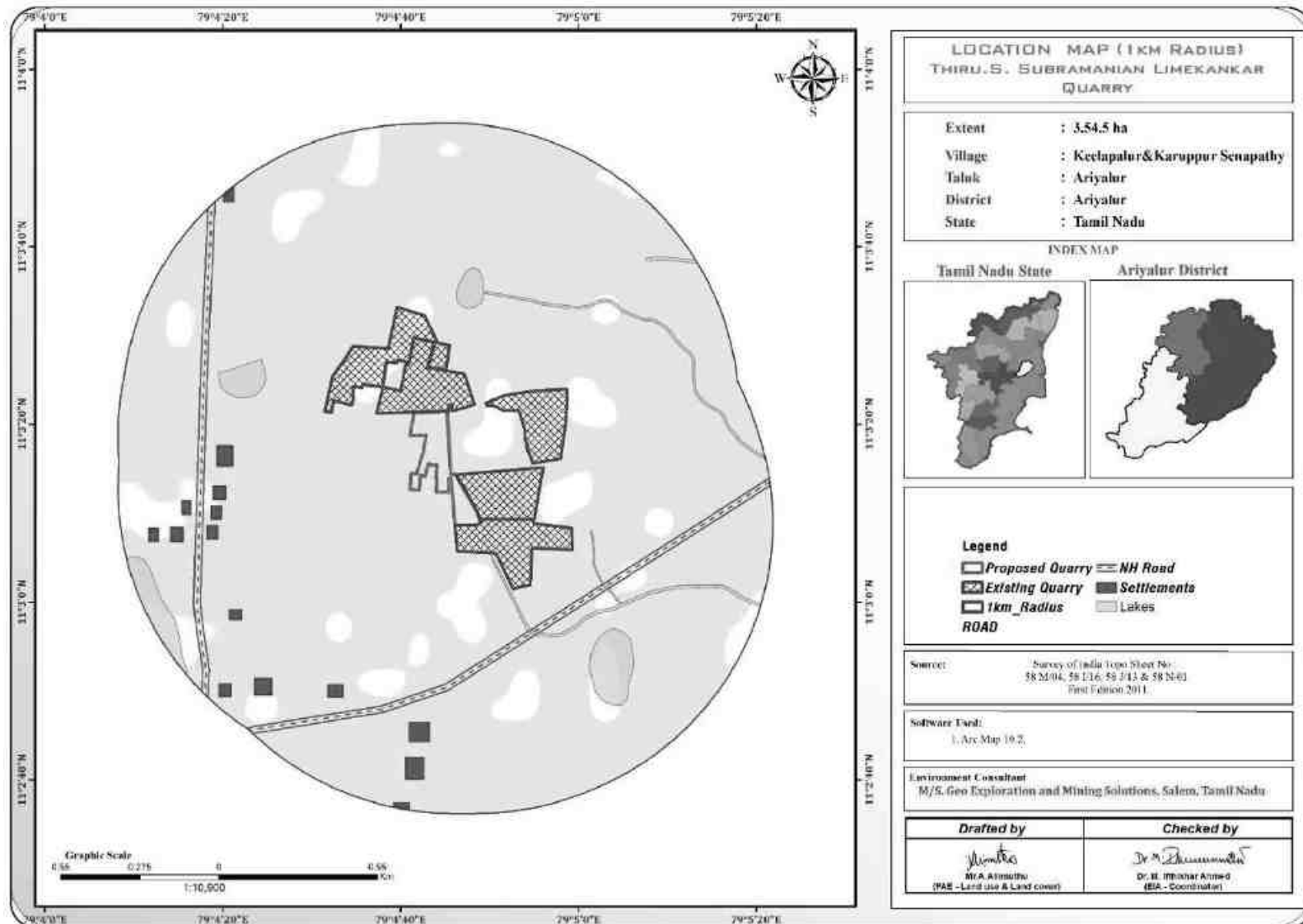
FIGURE 2.6: IMAGE SHOWING SURFACE FEATURES AROUND 5 KM RADIUS

FIGURE 2.7: IMAGE SHOWING SURFACE FEATURES AROUND 1 KM RADIUS

2.2.1 Project Area

- The project is site specific & no beneficiation or processing in the project site.
- There is no forest land involved in the proposed project and is devoid of major vegetation and trees.

TABLE 2.3: LAND USE PATTERN

Description	Present Area (Ha)	Area to be reclaimed at the end of present Mining Plan Period (Ha)	Area at the end of life of quarry (Ha)
Area under quarrying	Nil	1.64.4	2.54.2
Dumps	Nil	0.10.4	Nil
Infrastructure	Nil	0.01.0	0.01.0
Roads	Nil	0.03.0	0.03.0
Green Belt	Nil	0.20.0	0.37.0
Un utilized area	3.54.5	1.55.7	0.59.3
Total	3.54.5	-	3.54.5

Source: Approved Mining Plan

2.2.2 Size or Magnitude of Operation

TABLE 2.4: RESOURCES AND RESERVES FOR FIVE YEARS

PARTICULARS	DETAILS		
	ROM	Limekankar	Topsoil
Geological Resources	1,59,525	1,59,525	21,270
Mineable Reserves	1,13,360	1,13,360	16,166
Production for five-year plan period	69,449	69,449	10,010
Peak Production	37,908	37,908	5,445
Mining Plan Period / Lease Applied Period	5 Years		
Number of Working Days	300 Days		
Production per day	126	126	18
No of Lorry loads (12m ³ per load)	11	11	1-2
Total Depth of Mining	2.3m below ground level		

Source: Approved mining plan.

2.3 GEOLOGY

2.3.1 Regional Geology

The area around Ariyalur forms parts of the well-known cretaceous formation of Trichinopoly. These formations have been studied in detail during the past several decades by various organizations in view of their geological and paleontological interest. The Cretaceous formations of Trichinopoly exposed in the area may be generally classified as follows.

Stratigraphy of the area

Geological Age	Formation with Geological period	Lithology
Recent and Quaternary		Alluvium, Kankar, Laterite etc
Palaeocene	-Unconformity- Niniyur (Danian)	Variegated clays with Nodular limestones and Marls with occasional boulders of flint and chest.
Cretaceous	-Unconformity- Ariyalur (Maastrichtian)	
	Upper	White friable sandstone with purple clays, etc
	Lower	Clayey sandstones, loose conglomerates and yellowish fossiliferous limestone, marls and hard limestones.
	-Unconformity- Trichinopoly (Turonian to Sanonian)	
	Upper	Calcareous gritty sandstone, Shell Limestones and conglomeratic sandstones.

While there are a number of earlier reports relating to the geology of the formations of the area of Ariyalur, there is little information about the economic aspects of the limestones. In 1962, A.S.Narasimhan surveyed the occurrences of limestone and kankar in Nallampatti, Kallankurichi, Kattupiringiyam and Hasthinapuram areas and found them to be of good quality. He estimated a reserve 4,00,000 tons of kankar with a thickness of about half a metre, having a CaO content of 48.78% and insoluble of 6.08%, in the Natlampatti village. Between Ariyalur and Kallankurichi he described a kankar belt underlain by limestone, which is exposed in stone-quarries and well-sections. The CaO content of the kankar has been reported to range between 48% and 53% while the acid insoluble are around 5%. The kankar with an average thickness of about one meter is reported to extend over 5 Sq.kms and to carry reserves of 2.8 million tons. The limestone samples collected by A.S.Narasimhan near Kallankurichi for depths upto 3.66 meters have indicated a CaO content ranging from 46% to 51% while those at Pallakaveri analysed about 31% CaO. He has not quoted the reserves of limestone. At Kattupiringiyam, A.S.Narasimhan has reported kankar with an average thickness of about one meter and reserves of 5,40,000 tonnes, analyzing between 49% to 52% CaO. He has also described a good occurrence of limestone in the Hasthinapuram area, on both sides of Ariyalur-Jayamkondam road. On the basis of the samples collected from wells and outcrops, a reserve of 2 million tons of "proved" nature and a "probable" reserve of 4 million tons of limestone having an average of 49.06% CaO content, has been indicated by him. He had also suggested that the limestone and kankar could provide belt underlain by limestone, which are exposed in stone-quarries and well-sections. The CaO content of the kankar has been reported to range between 48% and 53% while the acid insoluble are around 5%. The kankar with an average thickness of about one meter is reported to extend over 5sq.kms and to carry reserves of 2.8 million tons. The limestone samples collected by A.S.Narasimhan near Kallankurichi for depths upto 3.66 meters have indicated a CaO content ranging from 46% and 51% while those at Pallakkaveri analysed about 31% CaO. He has not quoted the reserves of limestone, at Kattupiringiyam, A.S.Narasimhan has reported kankar with an average thickness of about one meter and reserves of 5,40,000 tone, analyzing between 49.06 and 52% CaO.

He was also described a good occurrence of limestone in the Hasthinapuram area, on the both sides of Ariyalur-Jayamkondam road. On the basis of the samples collected from wells and outcrops, a reserves of 2 million tons of "proved" nature and a "probable" reserve of 4 million tons of limestone having an average of 49.06% CaO content, has been indicated by him. He has noted that the MgO content of the limestone and kankar is very low.

2.3.2 Local Geology: -

The lease applied area is almost Plain terrain and forms part of the Sillakudi formation of cretaceous age and recent formation, have been studied in detail during the past several decades in view of their geological and paleontological interest.

Geological Age	Formations with geological period		Lithology
Recent and Quaternary	-		Alluvium, Kankar, Laterite, etc
Paleocene	Niniyur (Danian)		Varigated clays with nodules of limestone and marl with occasional boulders of flint and Chert.
Cretaceous	Ariyalur (Maastrichtian)	Upper	White friable Sandstone and purple clays
		Lower	Loose conglomerates and yellow fossil ferrous limestone, marls and hard limestone clays and sandstone
	Trichinopoly (Turonian to Santonian)		Calcareous, gritty sandstone, Shell Limestone and conglomerate sand stone

Kankar has developed over the limestone extensively and ranges in thickness from one to four meters. The formation of Kankar is evidently due to the alternating wet and dry spells of tropical climate, which has caused leaching out of the clayey and siliceous portions in the top layer of limestone. Thus though the Kankar is porous, pisolitic and red in colour due to dispersion of iron oxide, it analyses very high in calcium carbonate content (generally 85 to 95 per cent CaCO₃). The fragments of shells as well as cementing calcareous medium make the Kankar hard and difficult to break. The Kankar is at present being mined for use as road metal, and for manufactures slaked lime in country kilns for use in construction.

Thin tappings of laterite have developed over the limestones in Keelapalur & Karuppur Senapathy areas. Fragments of shell material are also found in the laterite.

Most of the soils in the area are of residual nature and are generally clayey. When wet they are highly plastic and slushy. Generally, the soil mostly of a sandy nature is found.

2.3.3 Hydrogeology

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

Quaternary - Laterites, Sands and Clays

Tertiary - Sandstone, Gravels and Clays

Cretaceous - Limestone, Calcareous Sandstone and Clay unconformity.

Archaean - Charnockites, Gneisses, Granites, Dolerites and Pegmatite

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

The Cretaceous formation is represented by Arenaceous Lime stone, Calcareous sand - stone and marl. The Tertiary formation is argillaceous comprising of Silty clay stones, argillaceous Lime stone.

The Quaternary deposits represented by the river deposits of Ponnaiyar and Varahanadhi spread over as patches in Ariyalur District. The alluvium consists of unconsolidated sands, gravelly sands, clays and clayey sands. The thickness of the sands ranges between 15 and 25m in the alluvial formation which also form potential aquifers. In some areas, sand stone of tertiary formation are the potential groundwater reservoirs.

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 Ariyalur 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 37m and the average thickness of the aquifer is approximately 12m. 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 are 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 are much less when compared to gneissic formations. The groundwater potential is low, when compared with the gneissic formations.

Aquifer Parameters

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

TABLE 2.5: RANGE OF AQUIFER PARAMETERS

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

Crystalline	27-224	0.8-2.5	16-60	5-20	1-2
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Source: <http://nwm.gov.in/sites/default/files/Notes%20on%20Ariyalur%20District.pdf>

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

TABLE 2.6: GROUND WATER LEVEL VARIATIONS OF ARIYALUR DISTRICT

Jan 2020	May 2020	Jan 2021	May 2021	Jan 2022	May 2022	Jan 2023	May 2023	Jan 2024	May 2024	5 Years Pre- Monsoon Average	5Years Post Monsoon Average
26.1	29.1	24.6	27.9	21.62	23.34	19.85	21.97	13.90	24.17	25.30	21.21

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

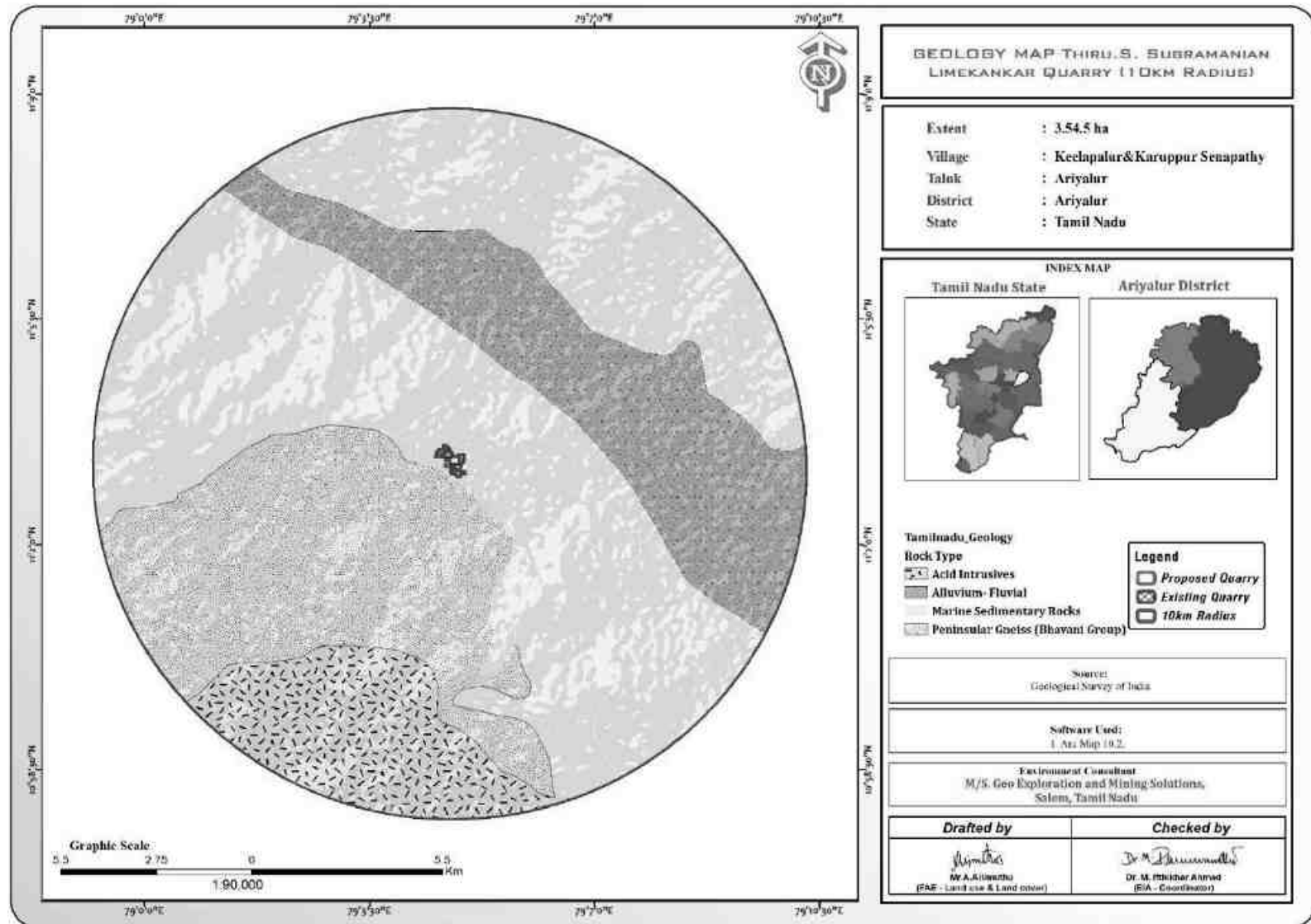
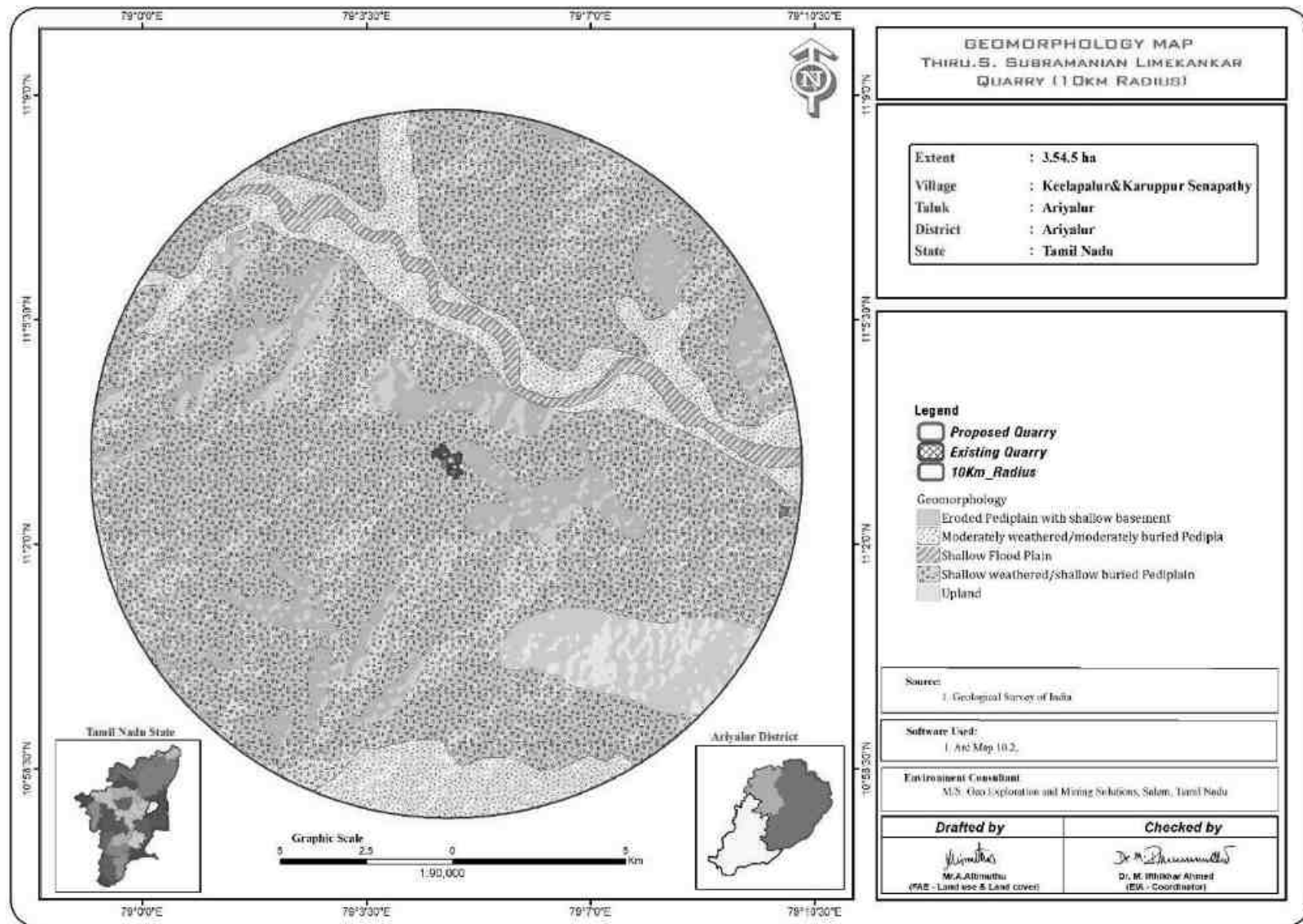
FIGURE 2.8: REGIONAL GEOLOGY MAP

FIGURE 2.9: GEOMORPHOLOGY MAP

2.4 RESOURCES AND RESERVES

The Resources and Reserves of Limekankar and Topsoil were calculated based on Cross-Section Method by plotting sections to cover the maximum lease area. For Reserve calculation the length and width of the deposit is shown in the Geological plan & cross sections (Please Ref. IV & V). The recovery percentage of Limekankar in this applied area is 100% which is well inferred knowledge gained by from the adjacent mine in this belt and also by the field tests carried out in the lease area and analysis done in NABL Laboratories.

As analyzed by applicant in-house laboratories for limekankar, which has more than 35% of Cao and 60% of TCo₃, is best suited for cement industries.

TABLE 2.7: RESOURCES AND RESERVES

Description	ROM in Ts	Limekankar in Ts	Top Soil in Ts
Geological Resource in m ³	1,59,525	1,59,525	21,270
Mineable Resource in m ³	1,13,360	1,13,360	16,166
Year wise production for five-year plan period	69,449	69,449	10,010
Peak Production	37,908	37,908	5,445

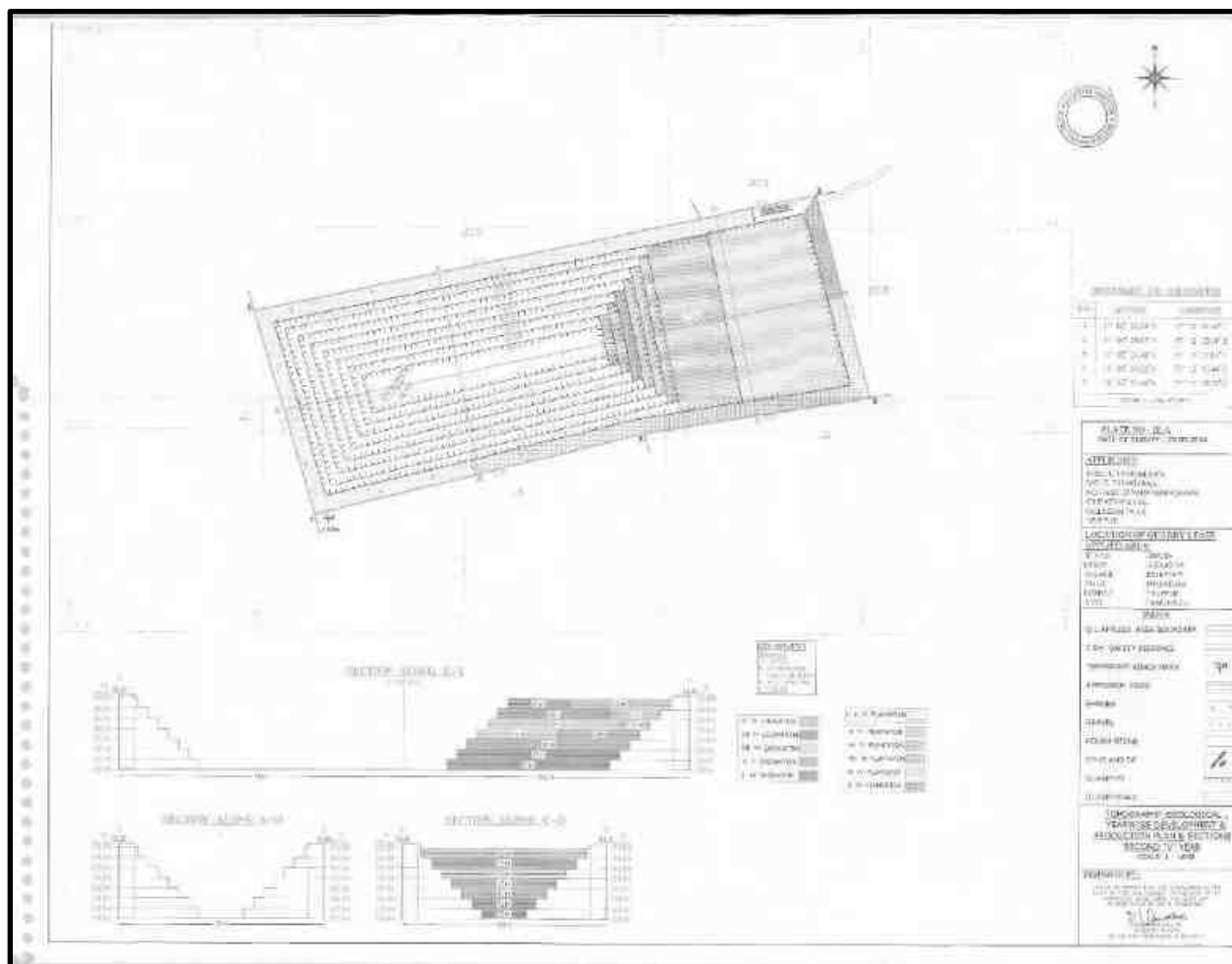
Source: Approved Mining Plan

TABLE 2.8: YEAR-WISE PRODUCTION PLAN

Years	ROM (Ts)	Limekankar Recovery@ 100%(Ts)	Top soil (Ts)
1 st year	37,908	37,908	5,445
2 nd year	8,829	8,829	1,363
3 rd year	9,050	9,050	1,301
4 th year	6,831	6,831	950
5 th year	6,831	6,831	950
Total	69,449	69,449	10,010

Source: Approved Mining Plan

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



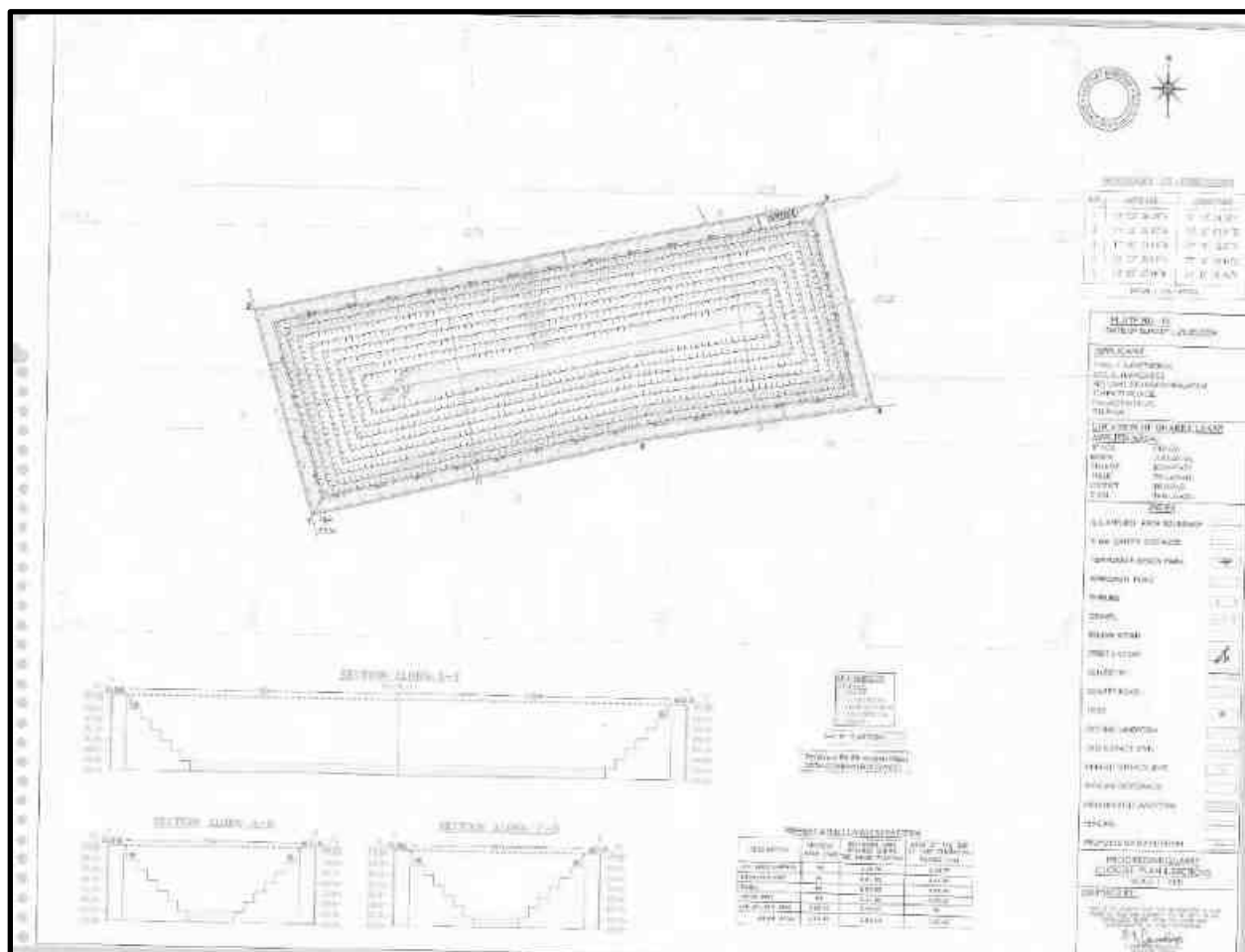
Conceptual Mining Plan/ Final Mine Closure Plan

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

TABLE 2.9: ULTIMATE PIT DIMENSION

Description	At the end of present plan period		At the end of life of Quarry		
	Pit-I	Pit-II	Pit-I	Pit-II	Pit-III
Length in m (max)	166	170	166	263	40
Width in m (max)	55	44(avg)	55	60(avg)	17
Depth in m	2.3	2.3	2.3	2.3	2.3

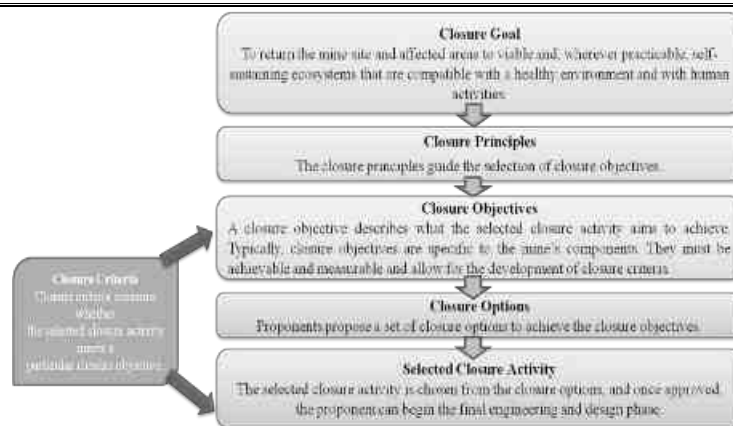
Source: Approved Mining Plan

FIGURE 2.11: CLOSURE PLAN AND SECTIONS

Source: Approved Mining Plan

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

Closure Objectives –



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

Closure Planning & Options Considerations in Mine Design –

- The closure of mine is well planned at the initial stage of planning & design consideration by the internal and external stake holders
- Construction of 2m height bund all along the mine pit boundary and ensure its stability all time & construction of garland drain along the natural slope to avoid sliding and collection of soil to the pit & surface runoff during rainfall
- After complete exploitation of mineral, the lowest bench foot wall side will be maintained as plain surface without any sump pits to avoid any accidents
- All the sharp edges will be dressed to smoother face before the closure of mine and ensure no loose debris on hanging wall side
- 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

2.5 METHOD OF MINING

The method of mining is by open cast method; excavator will be deployed for the formation of benches and loading. It is a conventional mechanized quarrying operation without drilling and blasting. The operation will be confined to general shift i.e., from 8.00 AM to 5.00 PM (1-hour lunch interval).

In topsoil is one bench is maintained with 0.3m height and 1.0m width and face kept at 45° slope. In mineral one bench is maintained with 2.0m height and width with 60° slope (Refer Plate No. V).

The advancement of the pit will be from the Southeast and center portion of the lease applied area starting from South and progress towards Northern side of the lease area upto 2.3m [0.3m Topsoil + 2m Limekankar] from RL 72.0m to RL 69.7m during the present plan period. During the present plan period, the mining operations are proposed to be carried out in the first and second benches.

There is no generation of mineral rejects in the applied area.

The topsoil that would be generated during the present plan period is proposed to be dumped on the Northern portion of the applied area and will be utilized for afforestation purpose.

Average annual production is about 13,890Ts of Limekankar @ 100% recovery with 300 working days in a year.

Afforestation is proposed in the 7.5m boundary barrier, nearly 400 sq.m/Year is proposed for afforestation on the Eastern boundary barrier.

Proper foot paths, ramps etc., will be established between benches for easy access of men and machinery and to transporting the quarry material. Haul roads with ramps consisting safety gradients are formed and transport of waste and mineral.

2.5.2 Extent of Mechanization

TABLE 2.10 PROPOSED MACHINERY DEPLOYMENT

S.NO.	TYPE	NOS	SIZE/CAPACITY	MOTIVE POWER
1	Excavator	1	0.9m ³	Diesel Drive
2	Tipper	1	20 Tonnes	Diesel Drive

Source: Approved Mining Plan

2.6 GENERAL FEATURES

2.6.1 Existing Infrastructures

Infrastructures like Mine office, Temporary Rest shelters for workers, Latrine and Urinal Facilities will be constructed as per the Mine Rule after the grant of quarry lease in all the proposed quarries.

2.6.2 Drainage Pattern

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 Limekankar is proposed to be transported mainly through

Traffic density measurements were performed at two locations

1. Approach Road

Traffic density measurement was 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
TS-1	Approch road	300m - SE	Village Road

Source: On-site monitoring by GEMS FAE & TM

TABLE 2.12: EXISTING TRAFFIC VOLUME

Station code	HNV		LMV		2/3 Wheelers		Total PCU
	No	PCU	No	PCU	No	PCU	
TS1	5	15	7	7	10	5	27

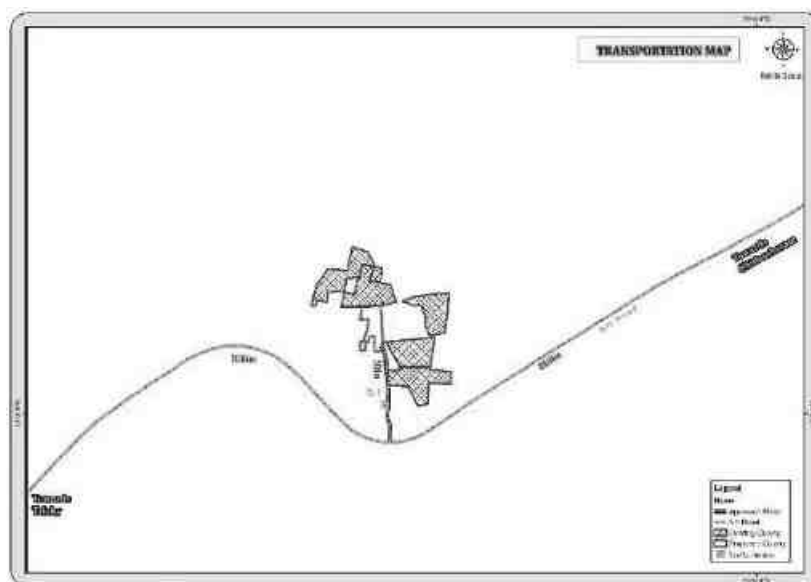
Source: On-site monitoring by GEMS FAE & TM

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

TABLE 2.13: LIMEKANKAR HOURLY TRANSPORTATION REQUIREMENT

Transportation of Limekankar per day		
Capacity of trucks	No. of Trips per day	Volume in PCU
20 tonnes	13	39

FIGURE.2.12: MINERAL TRANSPORTATION ROUTE MAP



*Transportation of Limekankar from quarry is to crusher located in Northern direction of the quarry.

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
Approach Road	27	39	66	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	0.5KLD	From the existing pit or from the water vendors
Green Belt	1.2KLD	From the existing pit or from the water vendors
Sanitation & Drinking	0.3KLD	From the existing pit or from the water vendors.
Total	2.0KLD	

Source: Prefeasibility report

2.7.2 Power and Other Infrastructure Requirement

Power is not required for the mining operation; the mining operation will be carried out using Diesel Generator and Earth moving machineries using 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 by project proponent.

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

For Topsoil:

Per hour Excavator will consume = 10 liters / hour

Per hour Excavator will excavate = 60m³ of Topsoil

Topsoil quantity = 10,010/60 = 167hours

Diesel consume = 167hours x 10 liters

Total diesel consumption = **1,670**Liters of HSD will be utilized for topsoil

For Limekankar:

Per hour Excavator will consume = 10 liters / hour

Per hour Excavator will excavate = 60m³ of Limekankar

Limekankar quantity = $69.449/60 = 1,157$ hours

Diesel consume = $1,157 \text{ hours} \times 10 \text{ liters}$

Total diesel consumption = **11,570 Liters** of HSD will be utilized for Limekankar

Total diesel consumption = **13,240 Liters** of HSD will be utilized for entire life period.

2.7.4 Project Cost

The Environmental Management plan has been prepared considering the mode of working, Safety of the employees and Monitoring periods the Total cost is 53,62,778/-

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

Designation	No of persons
Mines Manager	1
Mines Mate	1
Machinery Operators	4
Skilled Labour	3
Semi- Skilled	2
Unskilled	4
Total	15

Source: Approved Mining Plan

2.9 PROJECT IMPLEMENTATION SCHEDULE

The mining operation will commence after the grant of Environmental Clearance, Consent to operate (CTO), Execution of Lease Deed and Obtaining permission from the DGMS (Notice of Opening).

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						
3	Execution of Lease deed						
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

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 Dec 2024 to Feb 2025 with CPCB guidelines for the following attributes –

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

Environmental data has been collected with reference to cluster quarries by EHS 360 Lab Private Limited, – An accredited by ISO/IEC 17025:2017 (NABL) Laboratory

Study Area

An area of 10 km radius (aerial distance) from the periphery of the cluster is considered for EIA study. The study area has been divided into two zones viz **core zone** and **buffer zone**.

- Core zone is considered as cluster area
- 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 season **Winter Season** i.e., Dec 2024 to Feb 2025

Study Methodology

- The project area was surveyed in detail with the help of Total Station Survey instruments and pillars were marked. 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 in order to assess the impact due to mining activities and to recommend saplings for Greenbelt development.
- Ground water samples were collected from the existing bore wells, Surface water was collected from water bodies in the buffer zone and analysed as per CPCB Guidelines.
- 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.
- Air quality Data 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 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 hourlies twice a week (Dec 2024 to Feb 2025)	7 (1 core & 6 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 EHS 360 Lab Private Limited

* 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

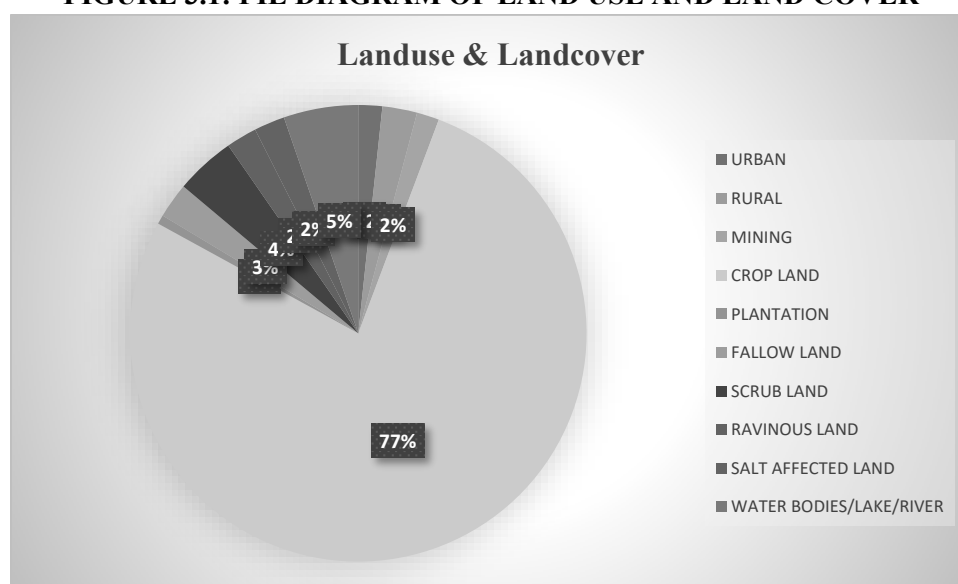
A visual interpretation technique has been adopted for land use classification based on the keys suggested in the chapter – V of the guidelines issued by NNRMS Bangalore & Level III classification with 1:50,000 scale for the preparation of land use mapping. Land use pattern of the area was studied through 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	Builtup Urban	550.59	1.69
2	Builtup Rural	799.61	2.46
3	Builtup Mining	517.16	1.59
AGRICULTURAL LAND			
4	Crop Land	25097.03	77.23
5	Plantation	209.28	0.64
6	Fallow Land	811.38	2.50
BARREN/WASTE LANDS			
7	Scrub Land	1378.59	4.24
8	Ravinous Land	709.72	2.18
9	Salt Affected Land	707.55	2.18
WETLANDS/ WATER BODIES			
9	Waterbodies	1716.96	5.28
TOTAL		32497.86	100.00

Source: Survey of India Toposheet and Landsat Satellite Imagery

FIGURE 3.1: PIE DIAGRAM OF LAND USE AND LAND COVER



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) 80.37 % followed by Built-up Lands – 4.15 %, Scrub land – 4.24 %, Ravinous land -2.18%, and Water bodies 5.28%.

The total mining area within the study area is 517.16 ha i.e., 1.59%. The cluster area of 13.33.5ha contributes about 2.57% of the total mining area within the study area. This small percentage of Mining Activities shall not have any significant impact on the environment.

3.1.2 Topography

The lease applied area exhibits plain topography. The area has gentle sloping towards Southeastern side. The altitude of the area is 72m (max) above Mean Sea level. The area is covered by 0.3m thickness of Topsoil and followed by Massive limekankar which is clearly inferred from the adjacent existing quarry pits.

3.1.3 Drainage Pattern of the Area

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

3.1.4 Seismic Sensitivity

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

3.1.5 Environmental Features in the Study Area

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

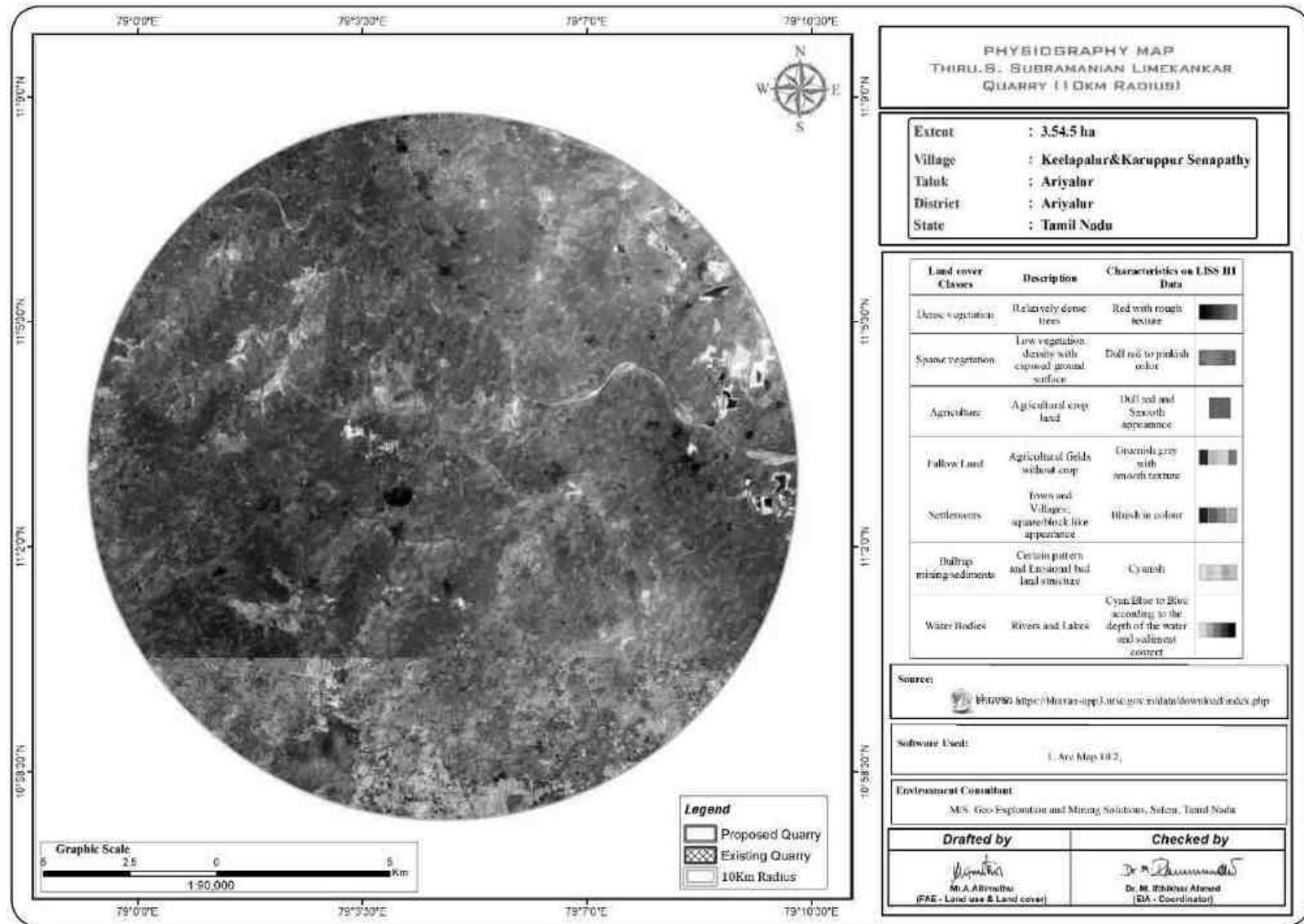
FIGURE 3.2: PHYSIOGRAPHIC MAP 10KM RADIUS

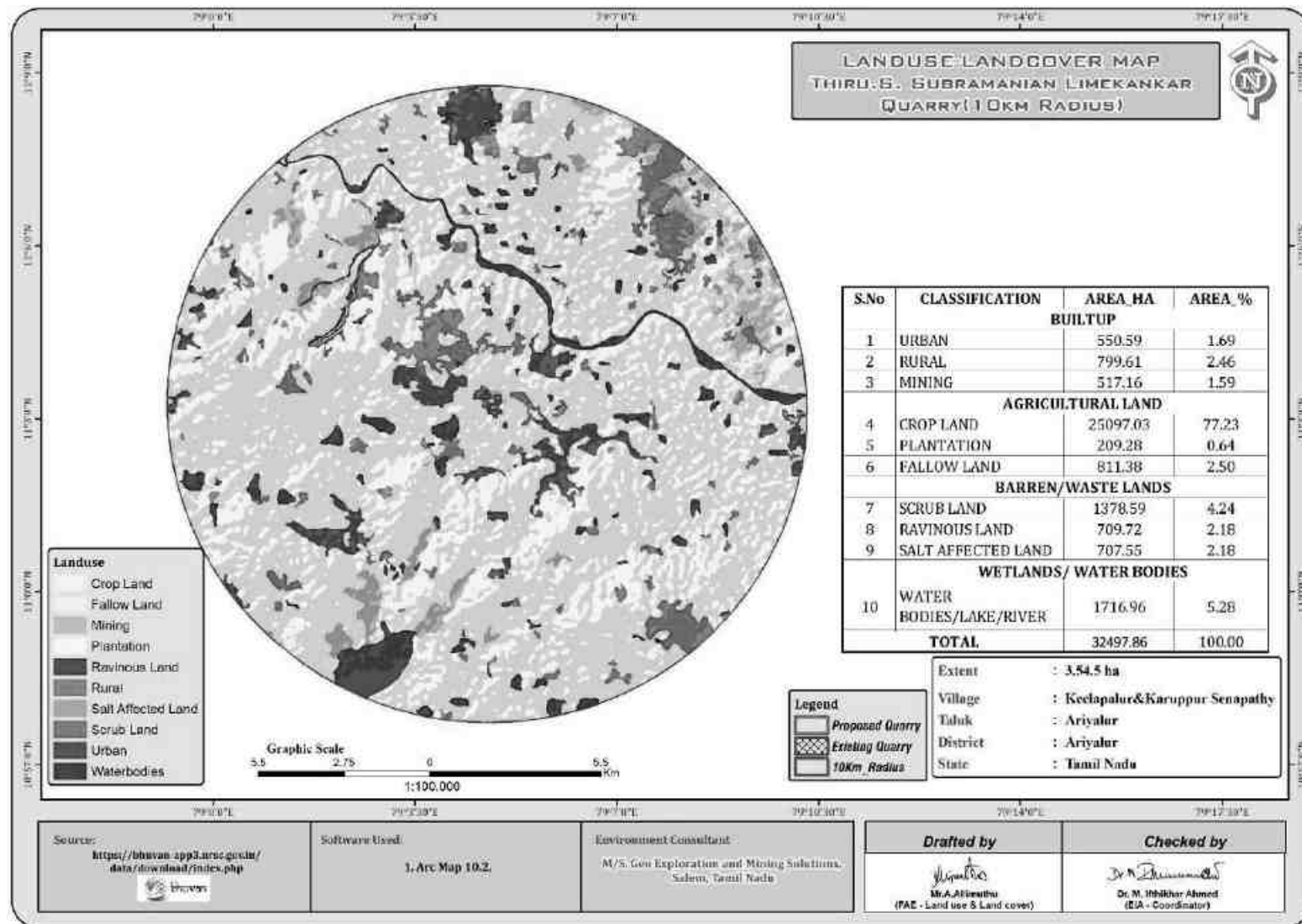
FIGURE 3.3: LAND USE LAND COVER MAP 10KM RADIUS

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	Karaivetti Birds Sanctuary	7.2Km - SW
2	Reserve Forest	Vilangudi R.F	13.30Km - NE
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	Ematteri	110m East
2	Kuttai	240m North
3	Odai	370m East
4	Periya Eri	1km SW
5	Marudaiyar River	2.8km NE

Source: Village Cadastral Map and Field Survey

Land use Landcover of the area within 500m radius were studied in detailed that the majority of the land within 500m is Agriculture land followed by Barren land and Built-up mining area are contributing majority of the land use.

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 3.5.

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	11° 3'15.61"N 79° 4'42.87"E
2	S-2	Near Project Area	400m SE	11° 2'57.50"N 79° 4'53.68"E
3	S-3	Poyyur	3.5km NorthEast	11° 3'57.73"N 79° 6'36.80"E
4	S-4	Melapalur	4km SW	11° 2'40.36"N 79° 2'30.50"E
5	S-5	Puthur	5.5km SW	11° 0'21.80"N 79° 3'39.29"E
6	S-6	Thavuthakulam	6km North	11° 6'22.77"N 79° 4'33.30"E

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

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 EHS360 Labs Private Limited 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 are presented below in Figure 3.4 and the physico-chemical characteristics of the Soil & Test Results in Table 3.7.

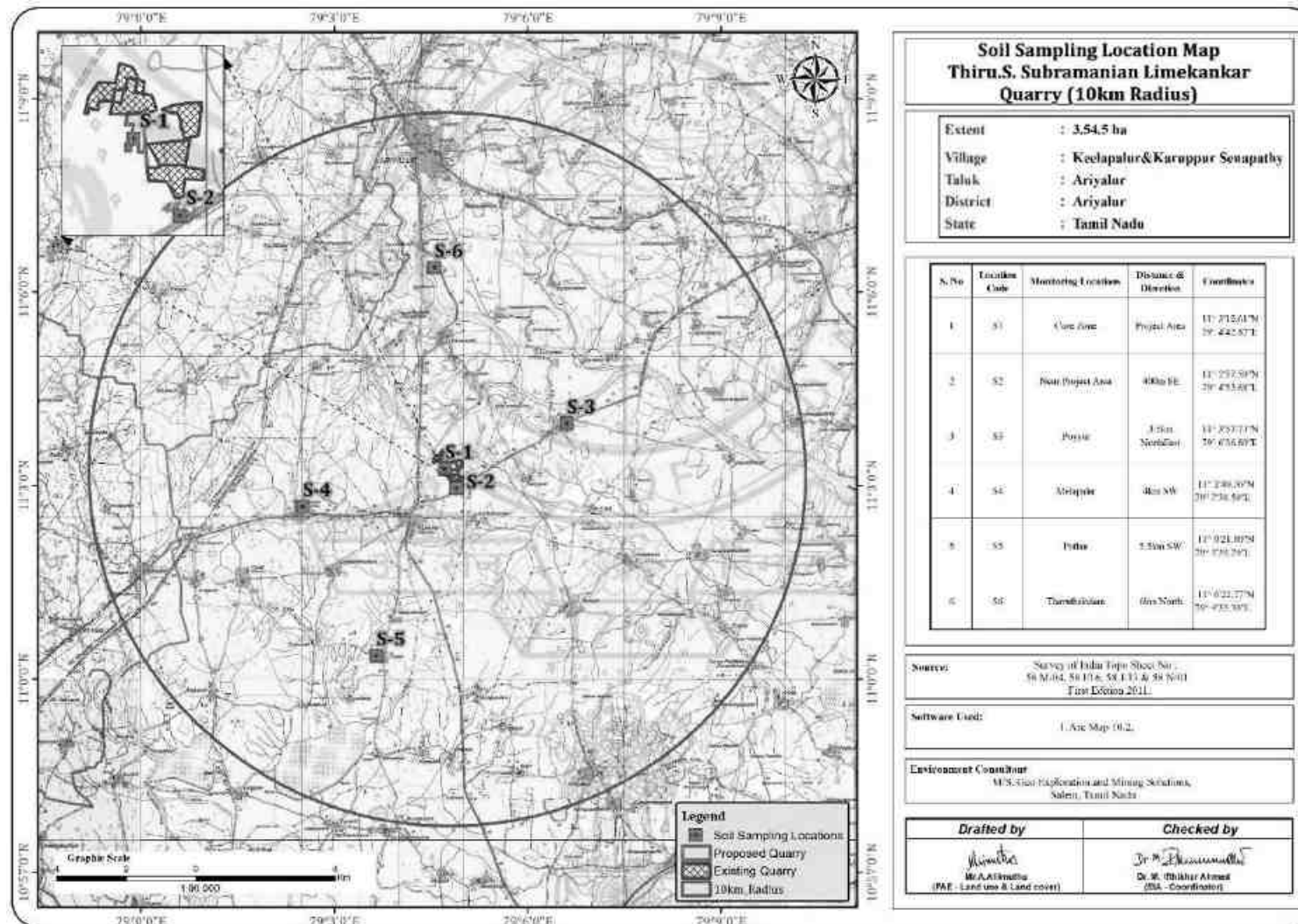
FIGURE 3.5: SOIL SAMPLING LOCATIONS AROUND 10 KM RADIUS

FIGURE 3.6: SOIL MAP

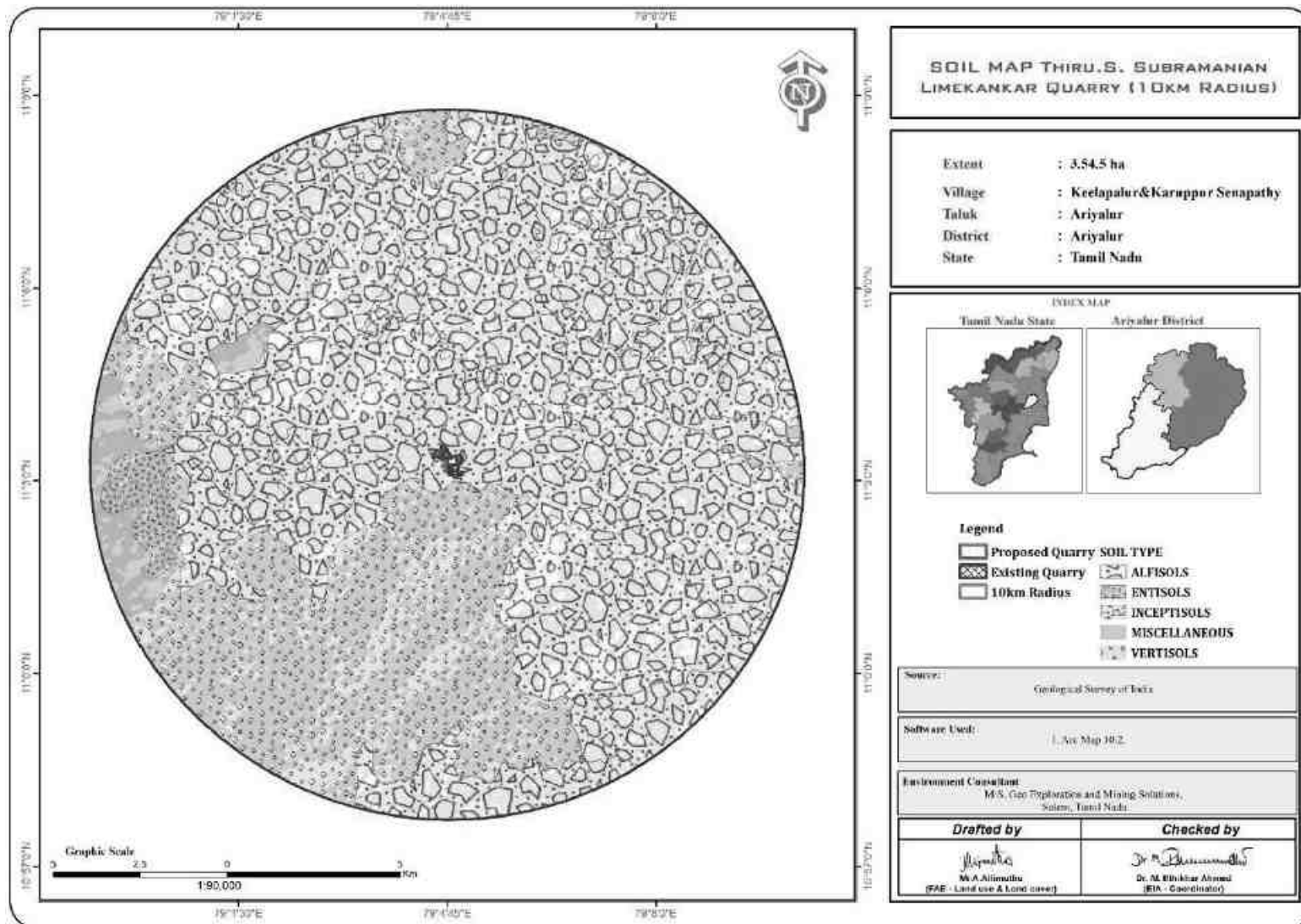


TABLE 3.7: SOIL QUALITY OF THE STUDY AREA

Parameter		Unit	S-1 Core Zone	S-2 Near Project Area	S-3 Poyyur	S-4 Melapalur	S-5 Puthur	S-6 Thavuthakulam
1	pH @ 25°C	-	8.55	8.14	8.98	8.11	8.10	8.23
2	Conductivity @ 25°C	µmhos/cm	419 µmhos/cm	395 µmhos/cm	389 µmhos/cm	490 µmhos/cm	403 µmhos/cm	469 µmhos/cm
3	Water Holding Capacity	%	47.9 %	47.1 %	49.5 %	45.9 %	48.6 %	46.8 %
4	Bulk Density	g/cm3	1.01 g/cm3	1.05 g/cm3	1.05 g/cm3	1.08 g/cm3	1.01 g/cm3	1.11 g/cm3
5	Porosity	%	46.8 %	47.9 %	47.4 %	46.6 %	48.9 %	47.7 %
6	Calcium as Ca	mg/kg	23.5 mg/kg	20.8 mg/kg	13.5 mg/kg	35.4 mg/kg	36.7 mg/kg	31.7 mg/kg
7	Magnesium as Mg	mg/kg	17.5 mg/kg	29.1 mg/kg	11 mg/kg	30 mg/kg	26.2 mg/kg	20.4 mg/kg
8	Chloride as Cl	mg/kg	12 mg/kg	14.5 mg/kg	21 mg/kg	27.5 mg/kg	19.5 mg/kg	21 mg/kg
9	Soluble Sulphate as SO4	%	0.0015 %	0.0031 %	0.0019 %	0.0022 %	0.0018 %	0.0022 %
10	Total Phosphorus as P	mg/Kg	4.15 mg/kg	3.87 mg/kg	4.2 mg/kg	5.13 mg/kg	4.86 mg/kg	3.7 mg/kg
11	Total Nitrogen as N	mg/Kg	400 mg/kg	.523.7 mg/kg	429.6 mg/kg	406 mg/kg	425 mg/kg	510 mg/kg
12	Organic Matter	%	1.53 %	1.88 %	2.69 %	2.12 %	1.90 %	1.71 %
13	Organic Carbon	%	0.89 %	1.09 %	1.56 %	1.23 %	1.10 %	0.99 %
14	Texture :							
	Clay	%	27.7 %	31.4 %	33.8 %	31.9 %	31.9 %	33.8 %
	Sand	%	26.5 %	32.9 %	29.1 %	34.2 %	29.9 %	31.2 %
	Silt	%	45.8 %	35.7 %	37.1 %	33.9 %	38.2 %	35.0 %
15	Manganese as Mn	mg/Kg	8.5 mg/kg	7.16 mg/kg	7.09 mg/kg	2.2 mg/kg	20.1 mg/kg	4.2 mg/kg
16	Zinc as Zn	mg/Kg	3.8 mg/kg	3.18 mg/kg	2.6 mg/kg	5.1 mg/kg	2.6 mg/kg	3.98 mg/kg
17	Boron as B	mg/Kg	2.9 mg/kg	2.6 mg/kg	2.1 mg/kg	3.45 mg/kg	7.1 mg/kg	0.63 mg/kg
18	Potassium as K	mg/Kg	32.1 mg/kg	48.6 mg/kg	45 mg/kg	51.4 mg/kg	41.0 mg/kg	60.2 mg/kg
19	Cadmium as Cd	mg/Kg	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)
20	Total Chromium as Cr	-	1.19	2.02	1.29	4.99	3.48	1.25
21	Copper as Cu	mg/Kg	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)
22	Lead as Pb	mg/Kg	0.57 mg/kg	0.81 mg/kg	0.85 mg/kg	0.81 mg/kg	1.05 mg/kg	0.75 mg/kg
23	Iron as Fe	mg/Kg	18.5 mg/kg	29.3 mg/kg	7.16 mg/kg	6.84 mg/kg	7.96 mg/kg	8.64 mg/kg
24	Cation Exchange Capacity	meq/100g	40.16 meq/100g of soil	43.8 meq/100g of soil	44 meq/100g of soil	48.6 meq/100g of soil	43.19 meq/100g of soil	41.07 meq/100g of soil

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 (27.7 % to 33.8%) to Sandy Loam Soil and Bulk Density of Soils in the study area varied between 1.01 to 1.11 g/cc. The Water Holding Capacity is found to be medium i.e., ranging from 45.9 – 49.5 %.

Chemical Characteristics –

- The nature of soil is slightly alkaline to strongly alkaline with pH range 8.1 to 8.98
- The available Nitrogen content range between 400 to 523.7 mg/kg
- The available Phosphorus content range between 3.7 to 5.13 mg/kg
- The available Potassium range between 32.1 to 60.2 mg/kg

Observation:

The pH of the Soil indicates that the soil is Neutral and arid region and ideal for plant growth.

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:

Marudaiyar 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., 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	CO-ORDINATES
SURFACE WATER				
1	SW-1	Periya Eri	1.2km SW	11° 2'43.80"N 79° 4'14.66"E
2	SW-2	Marudaiyar River	3.2km NE	11° 4'12.50"N 79° 6'22.11"E
GROUND WATER				
3	WW-1	Near Project Area	350m West	11° 3'24.80"N 79° 4'30.41"E
4	WW-2	Puthur	5.5km SW	11° 0'21.94"N 79° 3'43.79"E
5	BW-1	Near Project Area	180m SW	11° 3'8.55"N 79° 4'36.62"E
6	BW-2	Thavuthakulam	6km North	11° 6'32.84"N 79° 4'26.67"E

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

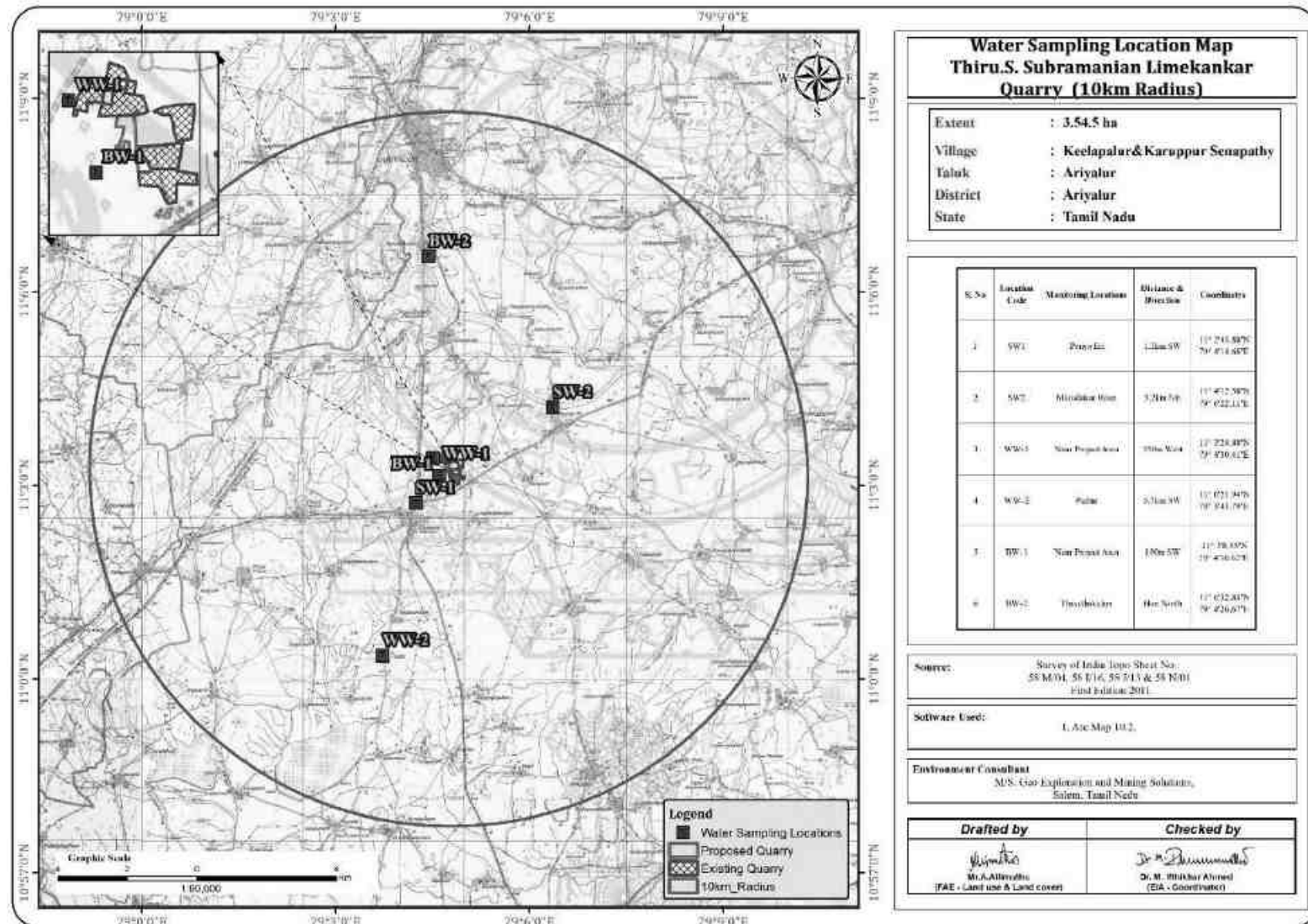
FIGURE 3.8: WATER SAMPLING LOCATIONS AROUND 10 KM RADIUS

TABLE 3.9: GROUND WATER SAMPLING RESULTS

S.NO	Parameter	BW-1 Near Project Area	BW-2 Thavuthakulam	WW-1 Near Project Area	WW-2 Puthur
1	Color	5	5	5	5
2	Odour	Agreeable	Agreeable	Agreeable	Agreeable
3	pH@ 25°C	6.89	7.33	6.80	7.89
4	Electrical Conductivity @ 25°C	644 µmhos/cm	837 µmhos/cm	968 µmhos/cm	1010 µmhos/cm
5	Turbidity	1.0 NTU	1 NTU	1.0 NTU	1.0 NTU
6	Total Dissolved Solids	380 mg/l	493 mg/l	571 mg/l	596 mg/l
7	Total Hardness as CaCO ₃	115.17 mg/l	154.0 mg/l	185.64 mg/l	180.06 mg/l
8	Calcium as Ca	22.1 mg/l	25.5 mg/l	36.5 mg/l	31.3 mg/l
9	Magnesium as Mg	14.6 mg/l	22 mg/l	23 mg/l	24.8 mg/l
10	Total Alkalinity	127 mg/l	125 mg/l	175.1 mg/l	172 mg/l
11	Chloride as Cl ⁻	85 mg/l	120 mg/l	130 mg/l	134 mg/l
12	Sulphate as SO ₄ ⁻	51.0 mg/l	61 mg/l	44 mg/l	71.3 mg/l
13	Iron as Fe	0.19 mg/l	0.29 mg/l	0.29 mg/l	0.21 mg/l
14	Free Residual Chlorine	BDL (DL:0.1 mg/l)	BDL (DL:0.1 mg/l)	BDL (DL:0.1 mg/l)	BDL (DL:0.1 mg/l)
15	Fluoride as F	0.27 mg/l	0.26 mg/l	0.34 mg/l	0.26 mg/l
16	Nitrates as NO ₃	4.26 mg/l	4.69 mg/l	5.02 mg/l	3.45 mg/l
17	Copper as Cu	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
18	Manganese as Mn	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)
19	Mercury as Hg	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)
20	Cadmium as Cd	BDL (DL:0.001 mg/l)	BDL (DL:0.001 mg/l)	BDL (DL:0.001 mg/l)	BDL (DL:0.001 mg/l)
21	Selenium as Se	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
22	Aluminium as Al	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
23	Lead as Pb	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
24	Zinc as Zn	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)
25	Total Chromium	BDL(DL : 0.02 mg/l)	BDL(DL : 0.02 mg/l)	BDL(DL : 0.02 mg/l)	BDL(DL : 0.02 mg/l)
26	Boron as B	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)
27	Mineral Oil	BDL(DL : 0.01 mg/l)	BDL(DL : 0.01 mg/l)	BDL(DL : 0.01 mg/l)	BDL(DL : 0.01 mg/l)
28	Phenolic Compunds as C ₆ H ₅ OH	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)
29	Anionic Detergents as	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
30	Cynaide as CN	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
31	Barium as Ba	BDL(DL:0.05 mg/l)	BDL(DL:0.05 mg/l)	BDL(DL:0.05 mg/l)	BDL(DL:0.05 mg/l)
32	Ammonia (as total ammonia-N)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
33	Sulphide as H ₂ S	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
34	Molybdenum as Mo	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)
35	Total Arsenic as As	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
36	Total Suspended Solids	BDL (DL:1.0 mg/l)	BDL (DL:1.0 mg/l)	BDL (DL:1.0 mg/l)	BDL (DL:1.0 mg/l)
37	Total Coliform	95 MPN/100ml	130 MPN/100ml	110 MPN/100ml	145 MPN/100ml
38	E-Coli	< 1.8 MPN/100ml	< 1.8 MPN/100ml	< 1.8 MPN/100ml	< 1.8 MPN/100ml

* 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- Periya Eri	SW2- Marudaiyar River
1	Colour	Hazen	7 Hazen	10 Hazen
2	Odour	-	Agreeable	Agreeable
3	pH@ 25°C	-	7.14	7.97
4	Electrical Conductivity @ 25°C	µs/cm	707 µmhos/cm	934 µmhos/cm
5	Turbidity	NTU	3.4 NTU	3.1 NTU
6	Total Dissolved Solids	mg /l	417 mg/l	551 mg/l
7	Total Hardness as CaCO ₃	mg/l	128.72 mg/l	178.17 mg/l
8	Calcium as Ca	mg/l	21.6 mg/l	34.5 mg/l
9	Magnesium as Mg	mg/l	18.2 mg/l	22.4 mg/l
10	Total Alkalinity as CaCO ₃	mg/l	113.1 mg/l	171 mg/l
11	Chloride as Cl ⁻	mg/l	98 mg/l	119 mg/l
12	Sulphate as SO ₄ ⁻	mg/l	40.2 mg/l	54.3 mg/l
13	Iron as Fe	mg/l	0.31 mg/l	0.18 mg/l
14	Free Residual Chlorine	mg/l	BDL (DL:0.1 mg/l)	BDL (DL:0.1 mg/l)
15	Fluoride as F	mg/l	0.29 mg/l	0.22 mg/l
16	Nitrates as NO ₃	mg/l	7.22 mg/l	7.08 mg/l
17	Copper as Cu	mg/l	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
18	Manganese as Mn	mg/l	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)
19	Mercury as Hg	mg/l	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)
20	Cadmium as Cd	mg/l	BDL (DL:0.001 mg/l)	BDL (DL:0.001 mg/l)
21	Selenium as Se	mg/l	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
22	Aluminium as Al	mg/l	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
23	Lead as Pb	mg/l	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
24	Zinc as Zn	mg/l	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)
25	Total Chromium	mg/l	BDL(DL : 0.02 mg/l)	BDL(DL : 0.02 mg/l)
26	Boron as B	mg/l	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)
27	Mineral Oil	mg/l	BDL(DL : 0.01 mg/l)	BDL(DL : 0.01 mg/l)
28	Phenolic Compounds as C ₆ H ₅ OH	mg/l	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)
29	Anionic Detergents as MBAS	mg/l	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
30	Cyanide as CN	mg/l	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
31	Biological Oxygen Demand, 3 days @ 27°C		18.5 mg/l	11.2 mg/l
32	Chemical Oxygen Demand		40 mg/l	30 mg/l
33	Dissolved Oxygen		5.1 mg/l	5.5 mg/l
34	Barium as Ba	mg/l	BDL(DL:0.05 mg/l)	BDL(DL:0.05 mg/l)
35	Ammonia (as Total Ammonia-N)	mg/l	1.06 mg/l	1.57 mg/l
36	Sulphide as H ₂ S	mg/l	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
37	Molybdenum as Mo	mg/l	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)
38	Total Arsenic as As	mg/l	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
39	Total Suspended Solids	mg/l	23.5 mg/l	20 mg/l
40	Total Coliform	MPN/ 100ml	480 MPN/100ml	410 MPN/100ml
41	E-Coli		150 MPN/100ml	100 MPN/100ml

Note: APHA – American Public Health Association, BDL – Below Detection Limit, DL – Detection Limit, MPN – Most Probable Number.

3.2.4 Interpretation & Conclusion

Surface Water

The pH varied from 7.14 to 7.97 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 1027 to 1210 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 417-551 mg/l. Nitrates varied from BDL 7.08- 7.22 mg/l, while sulphates varied from 40.2-54.3 mg/l.

Ground Water

The pH of the water samples collected ranged from 6.8 to 7.89 and within the acceptable limit of 6.5 to 8.5. pH, Sulphates and Chlorides of water samples from all the sources are within the limits as per the Standard. On Turbidity, the water samples meet the requirement. Total Dissolved Solids were found in the range of 115.17 – 185.64 mg/l in all samples. Total hardness varied between 380– 520mg/l for all samples.

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

3.2.5 Hydrology and Hydrogeological studies

The district is underlain by hard rock formation fissured and fractured crystalline rocks constitute the important aquifer systems in the district. Geophysical prospecting was carried out in that area by SSRMP-ATS Instrument by qualified Geo physicist with the help of IGIS software and it was inferred that the low resistance encountered at the depth between 20-25m. The maximum depth of proposed project is 2.3m below ground level.

Ground water levels and Flow Direction based on the Bore well and open well Data's

In general, the ground water movement is based on the gradient i.e., water moves from the highest static ground water elevation to lowest static ground water elevation point. The ground water movement is important aspect to locating the recharge and discharge areas. Therefore, the data has been collected in the study area. Water level measured in the 6 open well and 7 borewells.

The average water level in the open well is varies from = 11.7m to 13.9m bgl

The water level in the bore well is varies from = 33.4to 35.8m bgl

Based on the water level contour map of the open well and bore well the water flow direction in the particular region is towards North & South side.

The water level in the area is above 20-25m 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.

TABLE 3.11: WINTER SEASON WATER LEVEL OF OPEN WELLS 1 KM RADIUS

S.NO	LABEL	LONGITUDE	LATITUDE	DEC-24	JAN-25	FEB-25
1	OW1	79° 04' 30.4902" E	11° 03' 24.7586" N	12.6	13.2	13.8

2	OW2	79° 04' 50.4135" E	11° 03' 51.1461" N	12.3	12.9	13.5
3	OW3	79° 04' 27.1792" E	11° 03' 57.5716" N	11.7	12.3	12.9
4	OW4	79° 05' 16.3283" E	11° 03' 17.4348" N	12	12.6	13.2
5	OW5	79° 04' 35.3658" E	11° 02' 34.1881" N	12.4	13	13.6
6	OW6	79° 04' 02.8448" E	11° 03' 10.6547" N	12.7	13.3	13.9

Source: Onsite monitoring data

FIGURE 3.9: OPEN WELL CONTOUR MAP (Dec 2024 to Feb 2025)

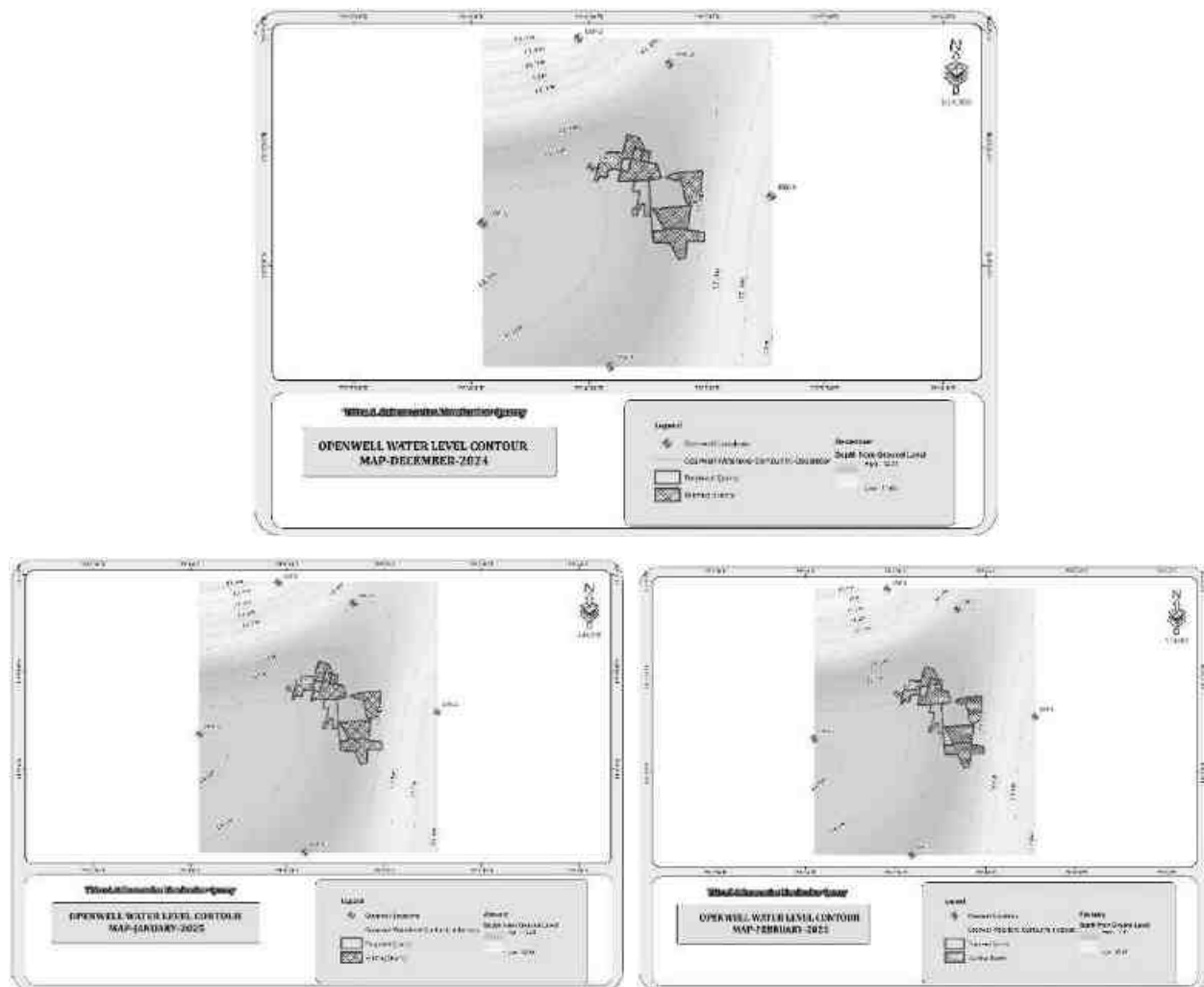


TABLE 3.12: WINTER SEASON WATER LEVEL OF BOREWELLS 1 KM RADIUS

S.NO	LABEL	LONGITUDE	LATITUDE	DEC-24	JAN-25	FEB-25
1	BW1	79° 04' 36.8563" E	11° 03' 08.3333" N	34.6	35.2	35.8
2	BW2	79° 04' 37.3478" E	11° 02' 38.3985" N	33.7	34.3	34.9
3	BW3	79° 05' 08.2776" E	11° 03' 04.1396" N	34	34.6	35.2
4	BW4	79° 05' 22.0898" E	11° 03' 33.2213" N	33.6	34.2	34.8
5	BW5	79° 04' 34.6066" E	11° 04' 00.3198" N	33.8	34.4	35
6	BW6	79° 04' 15.9391" E	11° 03' 38.3982" N	33.4	34	34.6
7	BW7	79° 03' 57.6905" E	11° 03' 07.9534" N	34.1	34.7	35.3

Source: Onsite monitoring data

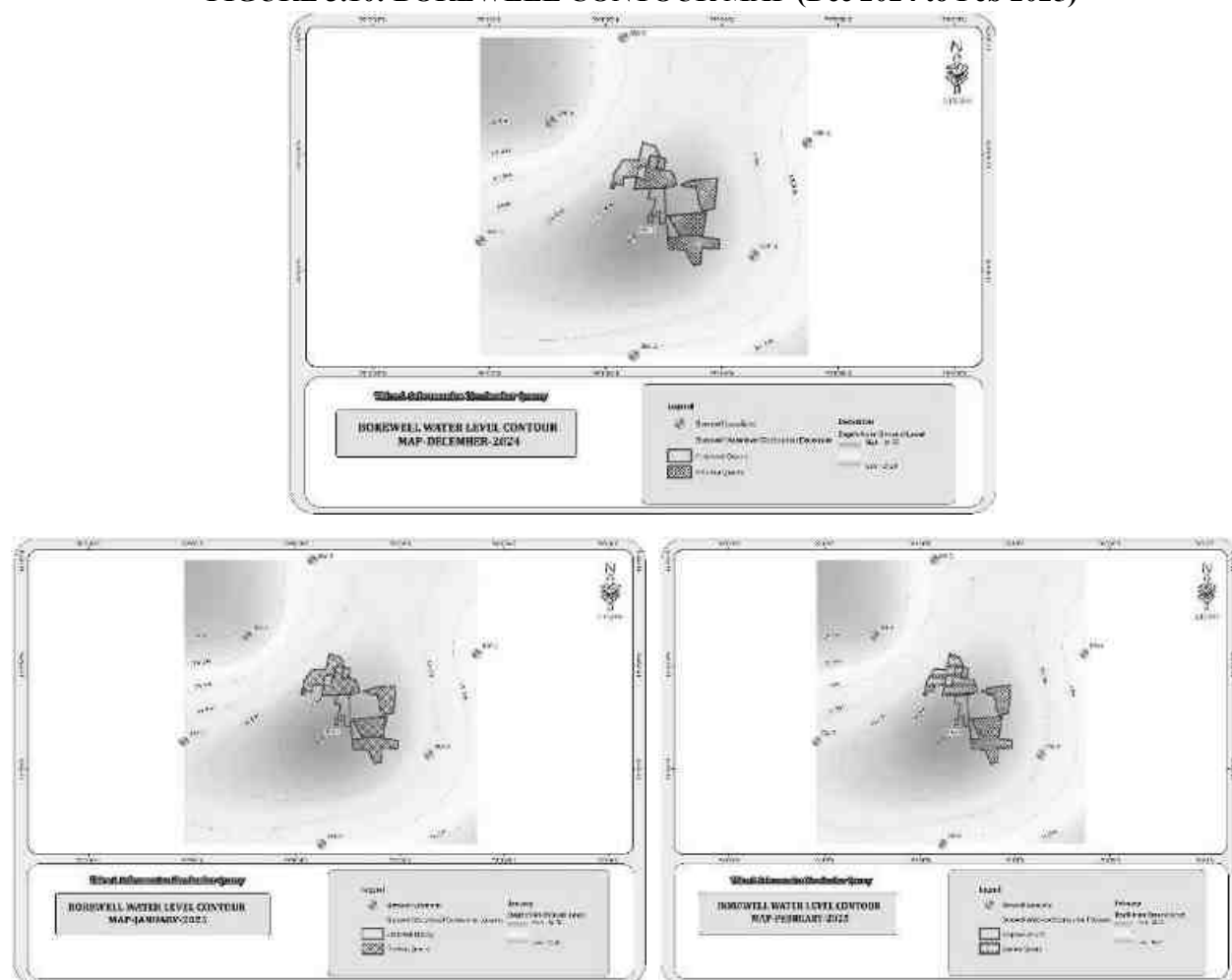
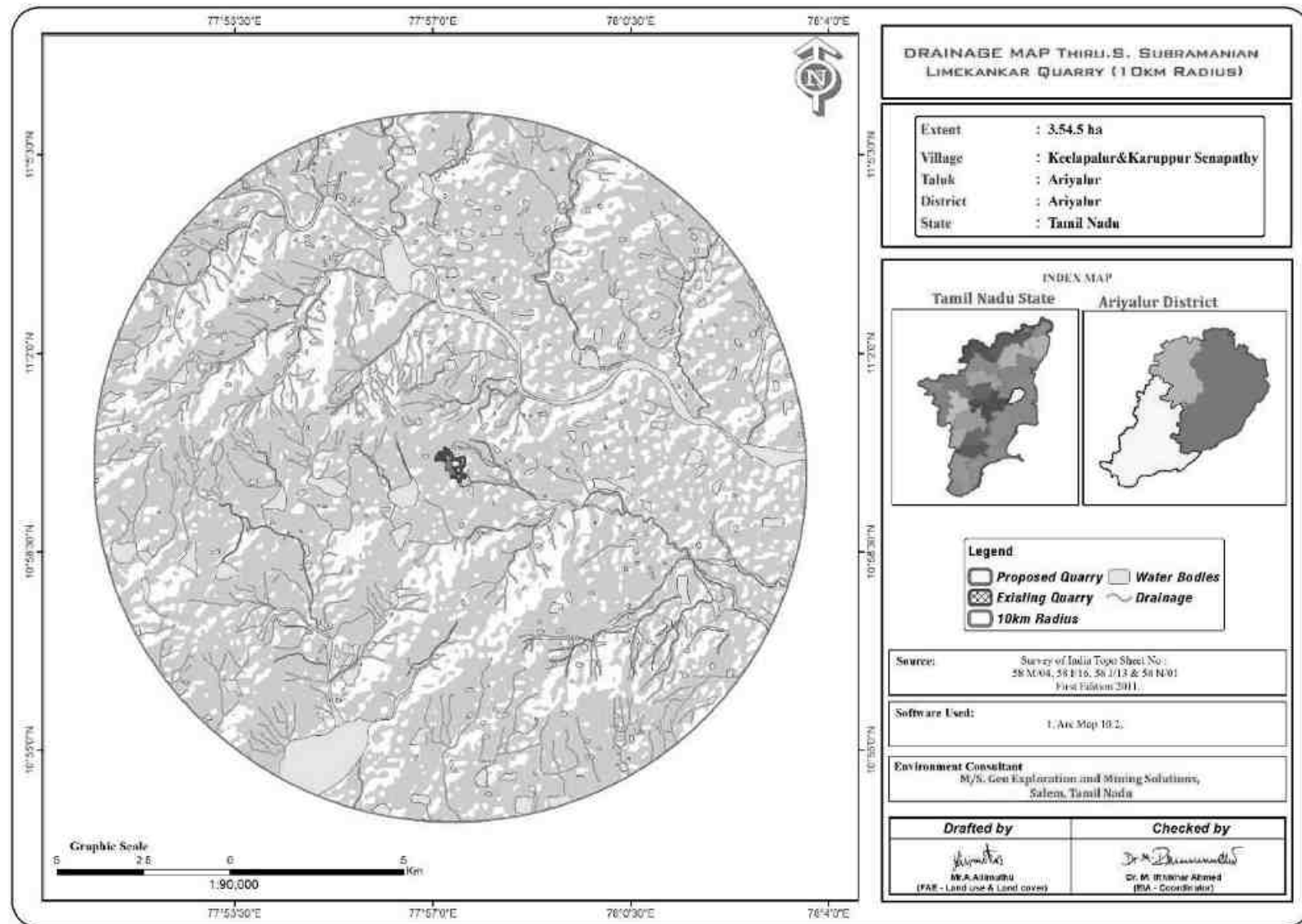
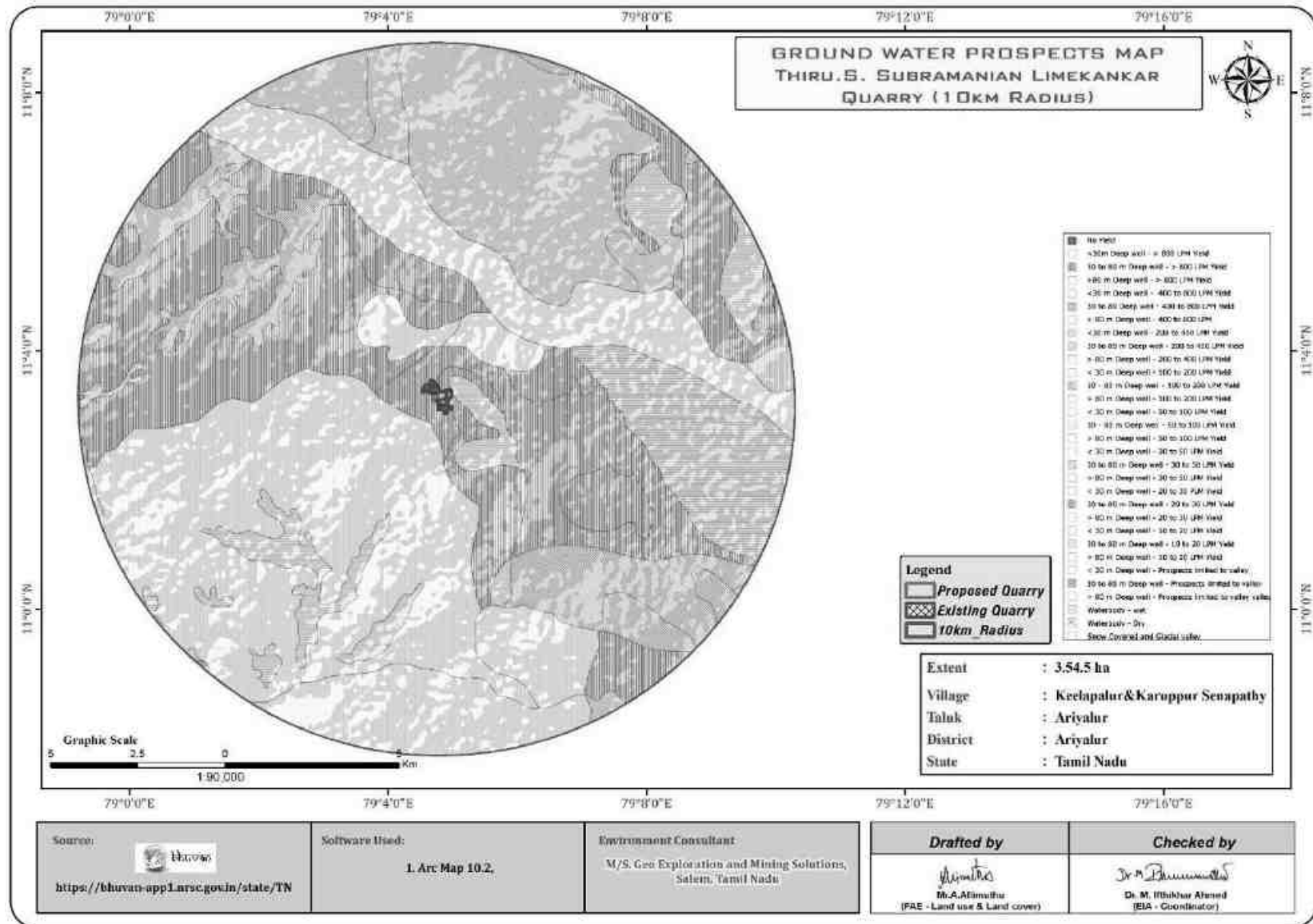
FIGURE 3.10: BOREWELL CONTOUR MAP (Dec 2024 to Feb 2025)

FIGURE 3.11: DRAINAGE MAP AROUND 10 KM RADIUS FROM PROJECT SITE

Remarks: it is inferred that the area is dendritic to sub dendritic pattern

FIGURE 3.12: GROUND WATER PROSPECT MAP

Geophysical Resistivity Survey

3.2.5.1 Methodology and Data Acquisition

The Geophysical Electrical Resistivity survey conducted in the area Schlumberger configuration, Vertical Electrical Sounding (VES) method. Schlumberger electrode set up was employed for making sounding measurements. Since it is least influenced by lateral in homogeneities and is capable of providing higher depth of investigation. This is four electrodes collinear set up where in the outer electrodes send current into the ground and the inner electrodes measure the potential difference.

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

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

ρ_r = Resistivity of Rocks

ρ_w = Resistivity of water in pores of rock

F = Formation Factor

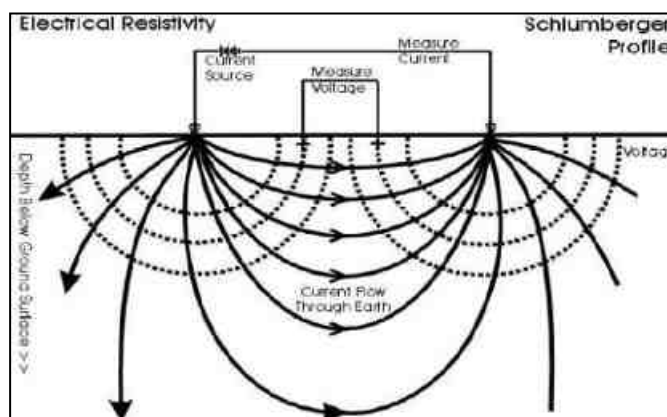
$\emptyset$ = Fractional pore volume

A = Constants with values ranging from 0.5 to 2.5

3.2.5.2 Survey Layout

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

RESISTIVITY SURVEY PROFILE



Measurements of ground Resistivity is essentially done by sending a current through two electrodes called current electrodes (C_1 & C_2) and measuring the resulting potential by two other electrodes called potential electrode (P_1 & P_2). The amount of current required to be sent into the ground depends on the contact resistance at the current electrode, the ground resistivity and the depth of interest.

3.2.5.3 Data Presentation

It was inferred that the low resistance encountered at the depth between 58-62m. The maximum depth proposed out of proposed projects 45m 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.

It is inferred that the existing quarries in the surrounding area reaches maximum of 42m and the water table is not intersected, only the seepage water during rainy season encountered from the upper layer and it will be used for the Greenbelt development, Dust suppression and quarrying operation.

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 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.

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 atmospheric conditions prevailing in this region are of a tropical nature. During the winter season, there is a significant decrease in precipitation levels within Ariyalur as compared to the summer months. This location is classified as Aw by Köppen and Geiger. The temperature here averages 28.1 °C | 82.6 °F. Annually, approximately 893 mm | 35.2 inch of precipitation descends.
- ✓ The region of Ariyalur is characterized by a temperate climate, and the summer season presents some challenges in terms of precise categorization. The most favored period for a visit is during the months of January, February, March, December.
- ✓ The month with the least amount of precipitation is February exhibiting a mere 11 mm | 0.4 inch rainfall. The month of November experiences the highest amount of precipitation, with an average value of 177 mm | 7.0 inch.
- ✓ The month of May boasts the highest average temperature, with a recorded maximum of 31.7 °C | 89.1 °F. The month of January is characterized by the lowest temperatures, which have an average reading of 24.2 °C | 75.6 °F.

<https://en.climate-data.org/asia/india/tamil-nadu/ariyalur-24038/>

Rainfall

TABLE 3.13: RAINFALL DATA

Actual Rainfall in mm					Normal Rainfall in mm
2019	2020	2021	2022	2023	
1111.4	1064.4	1646.1	1060	707	926.0

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

TABLE 3.14: METEOROLOGICAL DATA RECORDED AT SITE

S.No	Parameters		Dec-2024	Jan-2025	Feb-2025
1	Temperature (°C)	Max	26.75	25.57	27.57
		Min	22.83	22.86	23.84
		Avg	24.79	24.21	25.70
2	Relative Humidity (%)	Avg	89.71	84.57	79.45
3	Wind Speed (m/s)	Max	8.48	5.35	5.97
		Min	1.95	3.23	2.24
		Avg	5.21	4.29	4.10

4	Cloud Cover (OKTAS)		0-8	0-8	0-8
5	Wind Direction		NNE,NE	NE,NNE	ENE,NE

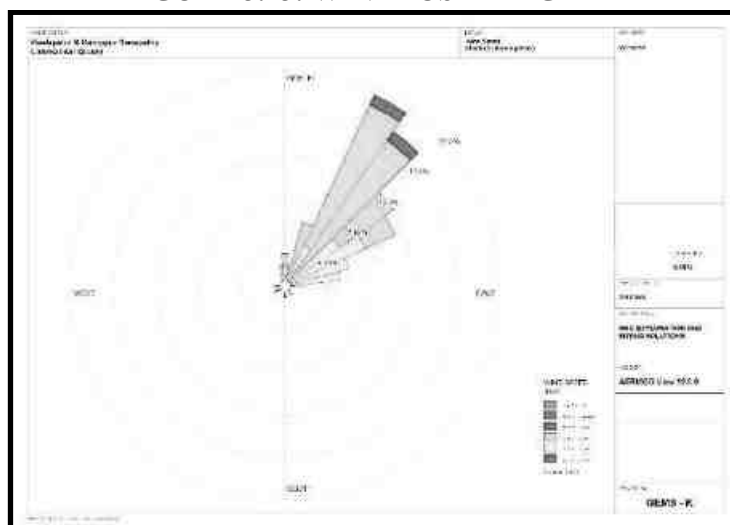
Source: On-site monitoring/sampling by EHS 360 Lab Private Limited

Correlation between Secondary and Primary Data

The average rain fall over the period of five years is 926mm. The meteorological data collected at the site is almost similar to that of secondary data collected from IMD Coimbatore_agro. A comparison of site data generated during the three months with that of IMD, Coimbatore_agro

Wind rose diagram of the study site is depicted in Figure. 3.14. Predominant downwind direction of the area during study season is NE, NNE, ENE

FIGURE 3.13: WINDROSE DIAGRAM



In the abstract of collected data wind rose were drawn on presented in figure No.3.13 during the monitoring period in the study area

1. Predominant winds were from NE, NNE, ENE
2. Wind velocity readings were recorded between 0.50 to 8.80m/s
3. Calm conditions prevail of about 0 % of the monitoring period
4. Temperature readings ranging from 24.21 to 25.70 °C
5. Relative humidity ranging from 79.45- 89.71%
6. The monitoring was carried out continuously for three months (Dec 2024 to Feb 2025)

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
PM _{2.5}	Gravimetric Method Beta attenuation Method	Fine Particulate Sampler Make – Thermo Environmental Instruments – TEI 121
PM ₁₀	Gravimetric Method Beta attenuation Method	Respirable Dust Sampler Make –Thermo Environmental Instruments – TEI 108
SO ₂	IS-5182 Part II (Improved West & Gaeke method)	Respirable Dust Sampler with gaseous attachment
NO _x	IS-5182 Part II (Jacob & Hochheiser modified method)	Respirable Dust Sampler with gaseous attachment
Free Silica	NIOSH – 7601	Visible Spectrophotometry

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

TABLE 3.16: NATIONAL AMBIENT AIR QUALITY STANDARDS

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

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

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

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

3.3.4 Frequency & Parameters for Sampling

Ambient air quality monitoring has been carried out with a frequency of two samples per week at Seven (7) locations, adopting a continuous 24 hourly (3 shift of 8-hour) schedule for the period Dec 2024 to Feb 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.

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	AAQ-1	Core Zone	Project Area	11° 3'20.38"N 79° 4'41.48"E
2	AAQ-2	Near Project Area	400m SE	11° 3'0.93"N 79° 4'59.33"E
3	AAQ-3	Poyyur	3km NorthEast	11° 3'57.57"N 79° 6'22.80"E
4	AAQ-4	Melapalur	4km SW	11° 2'40.54"N 79° 2'28.30"E
5	AAQ-5	Puthur	5.5km SW	11° 0'21.31"N 79° 3'42.54"E
6	AAQ-6	Thavuthakulam	6km North	11° 6'33.68"N 79° 4'24.97"E
7	AAQ-7	Kallakudi	6km SE	11° 1'48.71"N 79° 7'52.03"E

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

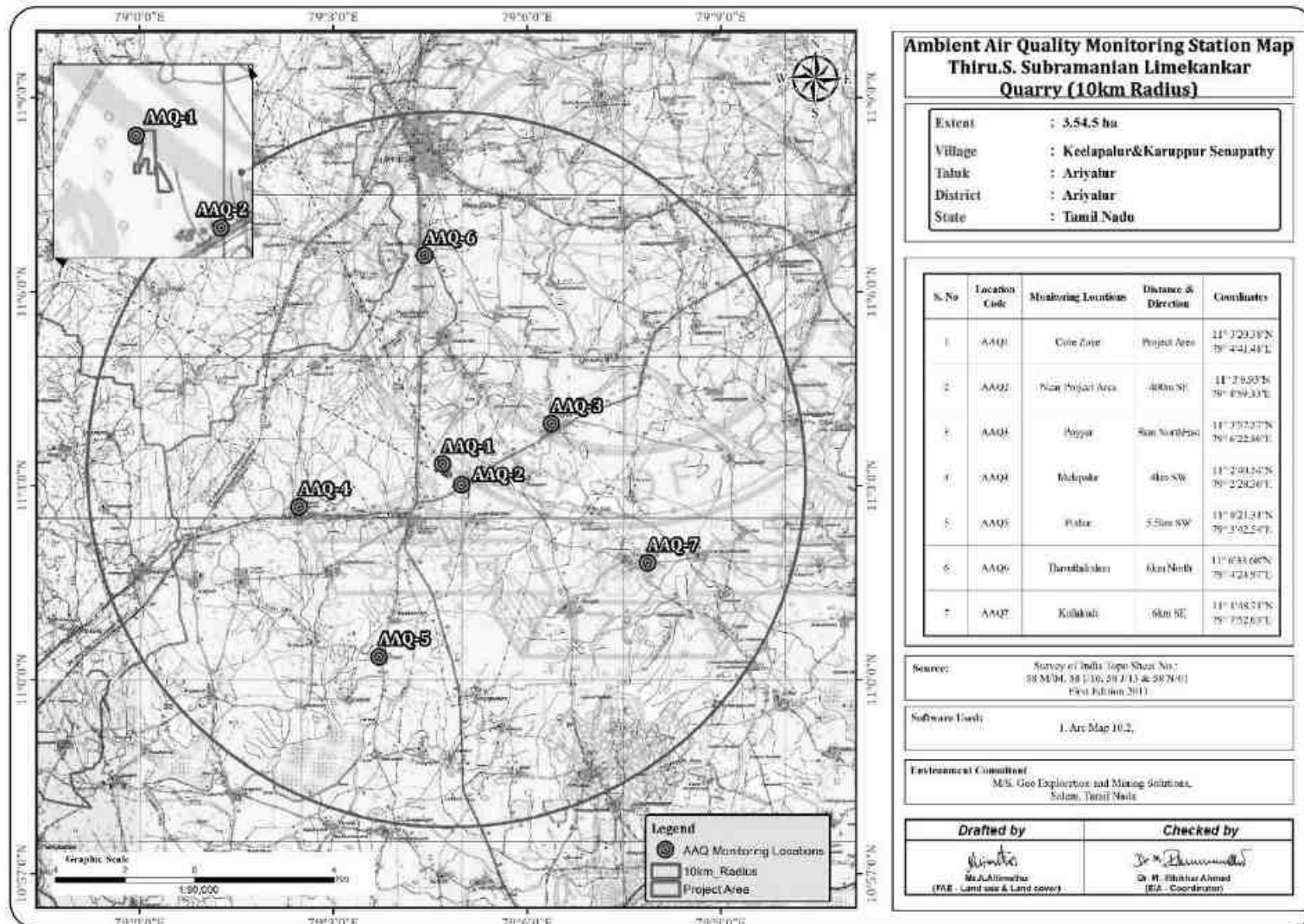
FIGURE 3.15: AMBIENT AIR QUALITY LOCATIONS AROUND 10 KM RADIUS

TABLE 3.25: SUMMARY OF AAQ 1 to AAQ 7

PM10	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	41.3	41.9	42.7	42.2	41.7	42.9	42.8
Minimum	38.9	40.1	41.2	41.1	40.3	41.5	40.5
Maximum	42.6	42.9	44.7	43.9	44.4	44.6	44.6
NAAQ Norms	100.0	100.0	100.0	100.0	100.0	100.0	100.0
PM2.5	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	18.4	19.7	20.5	18.8	18.5	19.3	20.3
Minimum	16.5	18.1	18.2	17.5	17.4	17.7	18.5
Maximum	19.7	21.7	22.4	20.5	19.8	21.5	21.9
NAAQ Norms	60.0	60.0	60.0	60.0	60.0	60.0	60.0
SO2	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	4.8	5.1	5.3	5.2	5.5	5.6	5.7
Minimum	4.1	4.1	4.1	4.1	4.1	4.3	4.1
Maximum	5.8	6.7	6.9	6.5	6.8	6.8	6.9
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0
NO2	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	22.6	21.5	21.9	22.0	21.4	23.2	22.9
Minimum	21.1	20.3	20.7	21.2	20.0	21.7	20.4
Maximum	23.9	23.2	23.8	22.8	22.9	24.9	24.7
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0

TABLE 3.26: ABSTRACT OF AMBIENT AIR QUALITY DATA

1	Parameter	PM10	PM2.5	SO ₂	NO ₂
2	No. of Observations	260	260	260	260
3	10th Percentile Value	40.6	17.9	4.2	21.0
4	20th Percentile Value	41.3	18.3	4.5	21.3
5	30th Percentile Value	41.7	18.6	4.7	21.5
6	40th Percentile Value	42.0	18.9	5.2	21.9
7	50th Percentile Value	42.2	19.3	5.3	22.1
8	60th Percentile Value	42.4	19.7	5.5	22.4
9	70th Percentile Value	42.7	20.1	5.7	22.7
10	80th Percentile Value	43.3	20.6	6.1	23.2
11	90th Percentile Value	43.8	21.5	6.5	23.7
12	95th Percentile Value	44.4	21.7	6.7	24.3
13	98th Percentile Value	44.6	22.3	6.9	24.6
14	Arithmetic Mean	42.6	19.9	5.6	22.6
15	Geometric Mean	42.6	19.9	5.5	22.6
16	Standard Deviation	1.3	1.5	0.9	1.2
17	Minimum	40.6	17.9	4.2	21.0
18	Maximum	44.6	22.3	6.9	24.6
19	NAAQ Norms*	100.0	60.0	80.0	80.0
	% Values exceeding Norms*	0.0	0.0	0.0	0.0

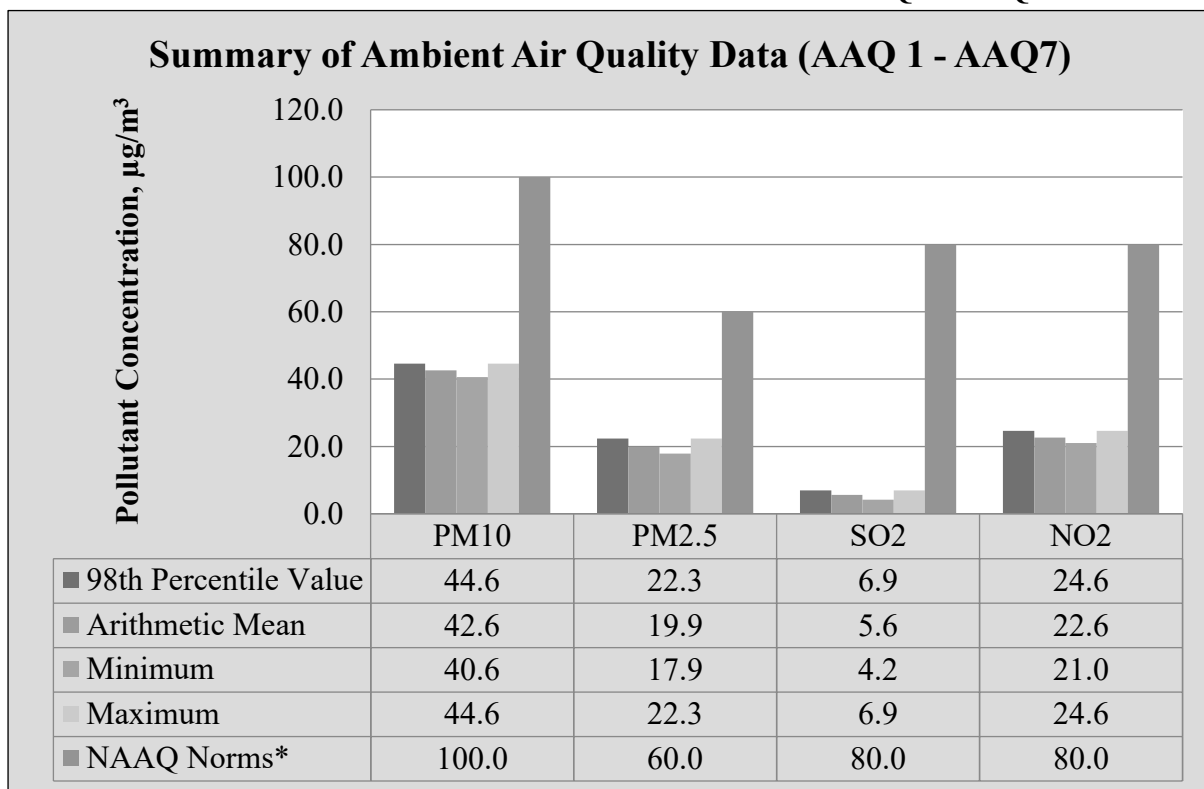
FIGURE 3.16: BAR DIAGRAM OF SUMMARY OF AAQ 1 – AAQ7

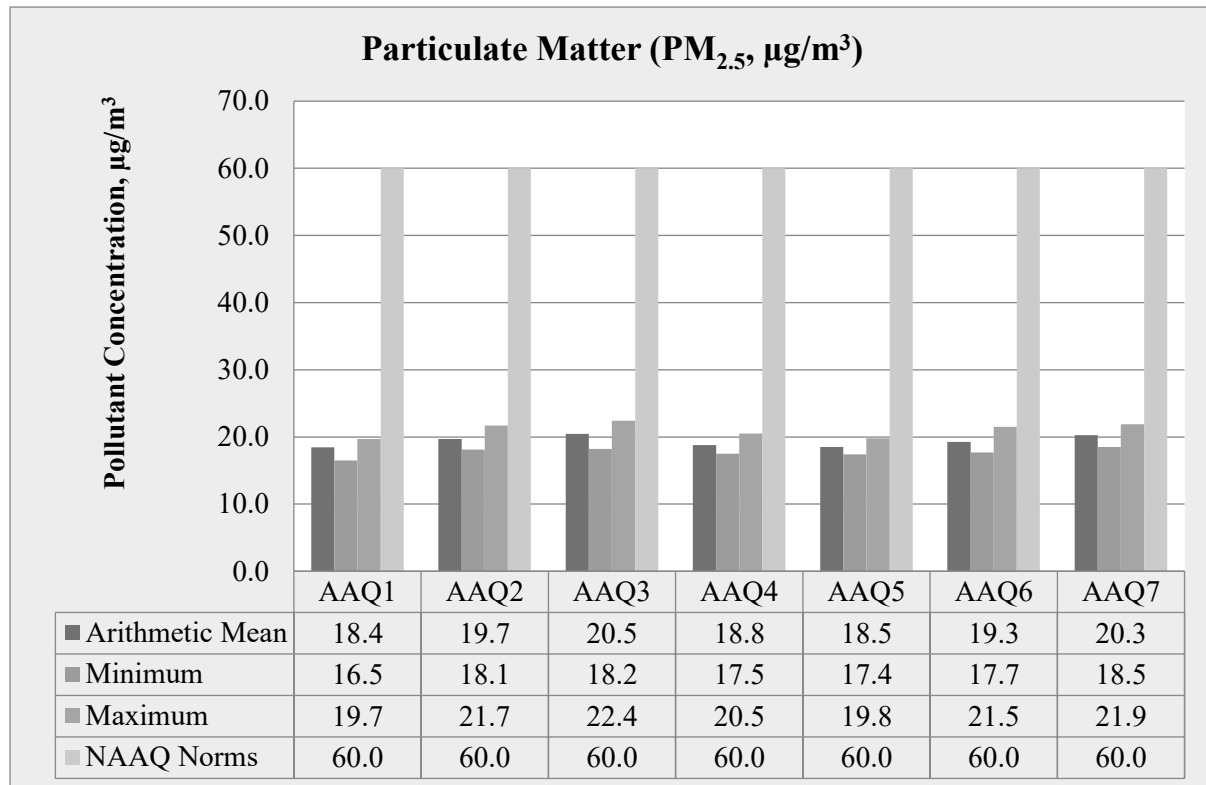
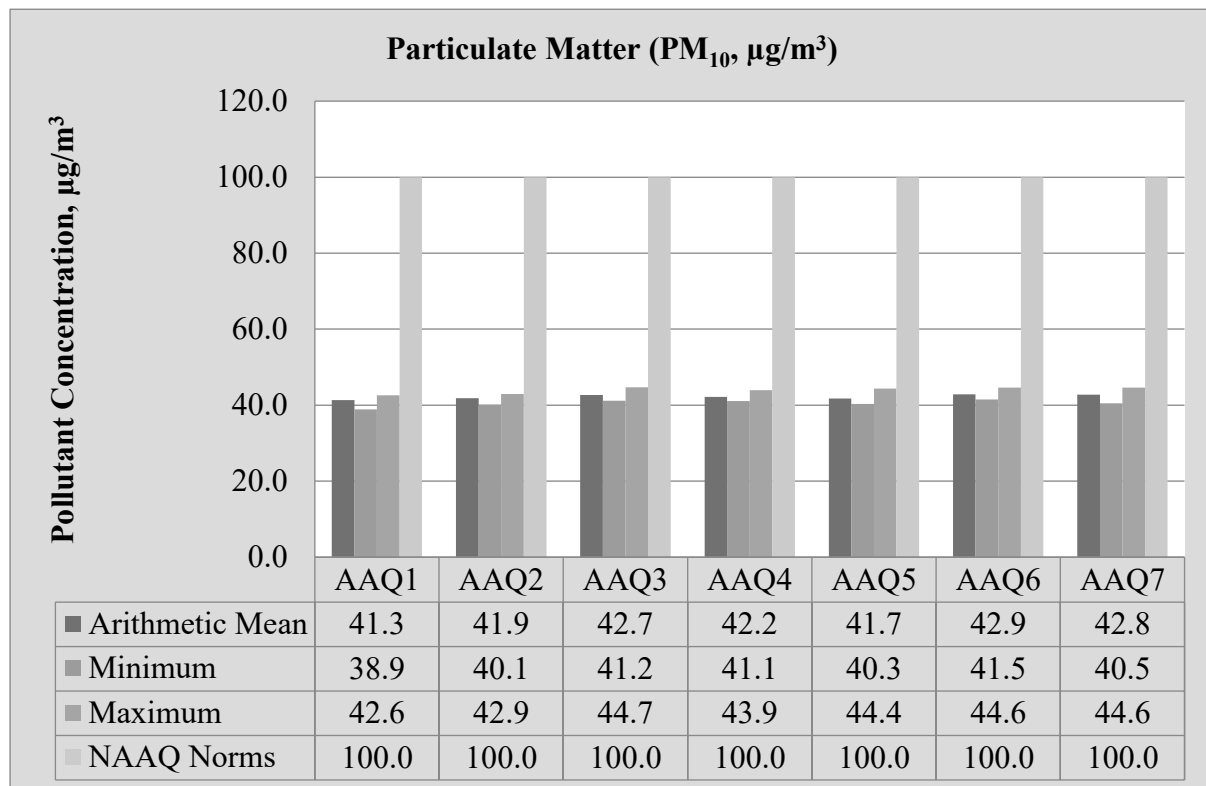
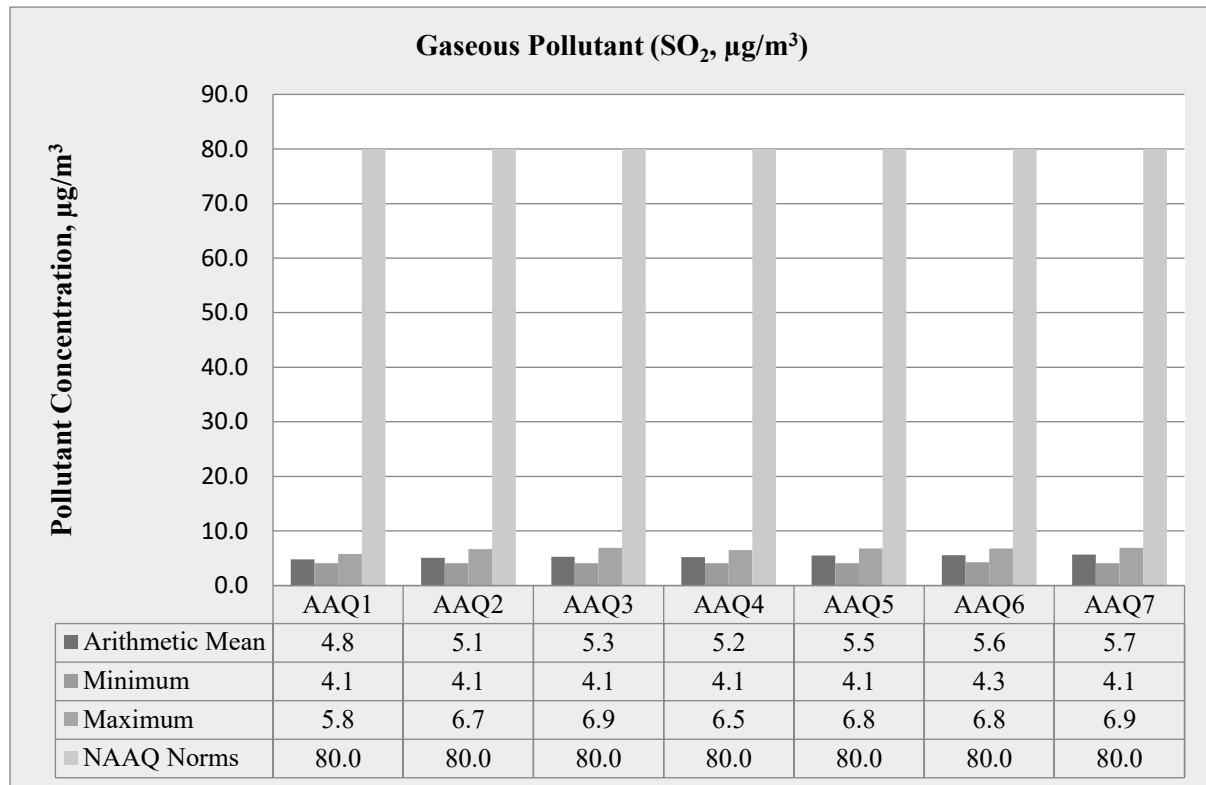
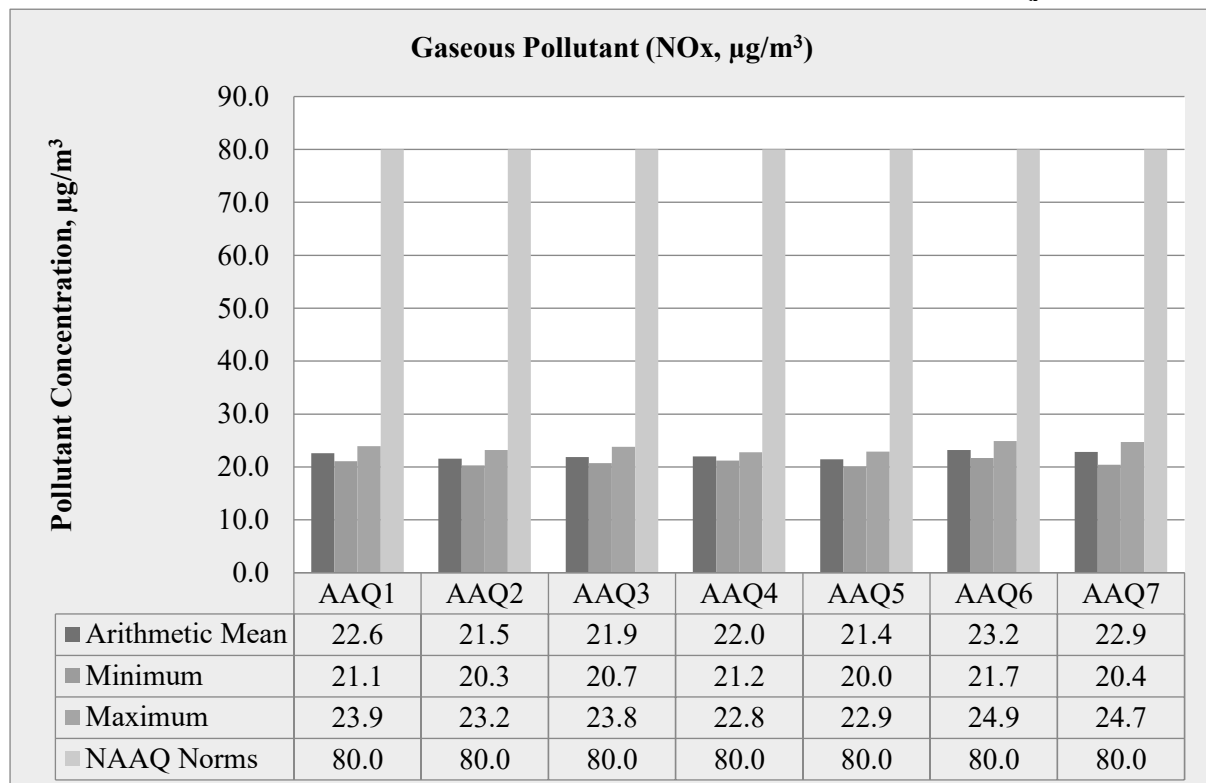
FIGURE 3.17: BAR DIAGRAM OF PARTICULATE MATTER PM_{2.5}**FIGURE 3.18: BAR DIAGRAM OF PARTICULATE MATTER PM₁₀**

FIGURE 3.19: BAR DIAGRAM OF GASEOUS POLLUTANT SO₂**FIGURE 3.20: BAR DIAGRAM OF GASEOUS POLLUTANT NO_x**

3.3.6 Interpretations & Conclusion

As per monitoring data, PM₁₀ ranges from 41.3 µg/m³ to 42.9 µg/m³, PM_{2.5} data ranges from 18.4 µg/m³ to 20.5 µg/m³, SO₂ ranges from 4.8µg/m³ to 5.7µg/m³ and NO₂ data ranges from 21.4 µg/m³ to 23.2

$\mu\text{g}/\text{m}^3$. 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 measurement was carried out at each ambient air quality station. The main aim of the noise level monitoring is

- To assess the ambient Noise level in the study area
- Type of noise pollution generated in the core zone
- To predict the temporal changes in the ambient noise level in the area

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 3.27: DETAILS OF SURFACE NOISE MONITORING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	N1	Core Zone	Project Area	11° 3'13.56"N 79° 4'45.17"E
2	N2	Near Project Area	400m SE	11° 3'1.35"N 79° 4'59.84"E
3	N3	Poyyur	3km NorthEast	11° 3'57.80"N 79° 6'22.02"E
4	N4	Melapalur	4km SW	11° 2'40.24"N 79° 2'29.46"E
5	N5	Puthur	5.5km SW	11° 0'20.74"N 79° 3'43.96"E
6	N6	Thavuthakulam	6km North	11° 6'32.55"N 79° 4'25.23"E
7	N7	Kallakudi	6km SE	11° 1'49.84"N 79° 7'47.71"E

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

3.4.2 Method of Monitoring

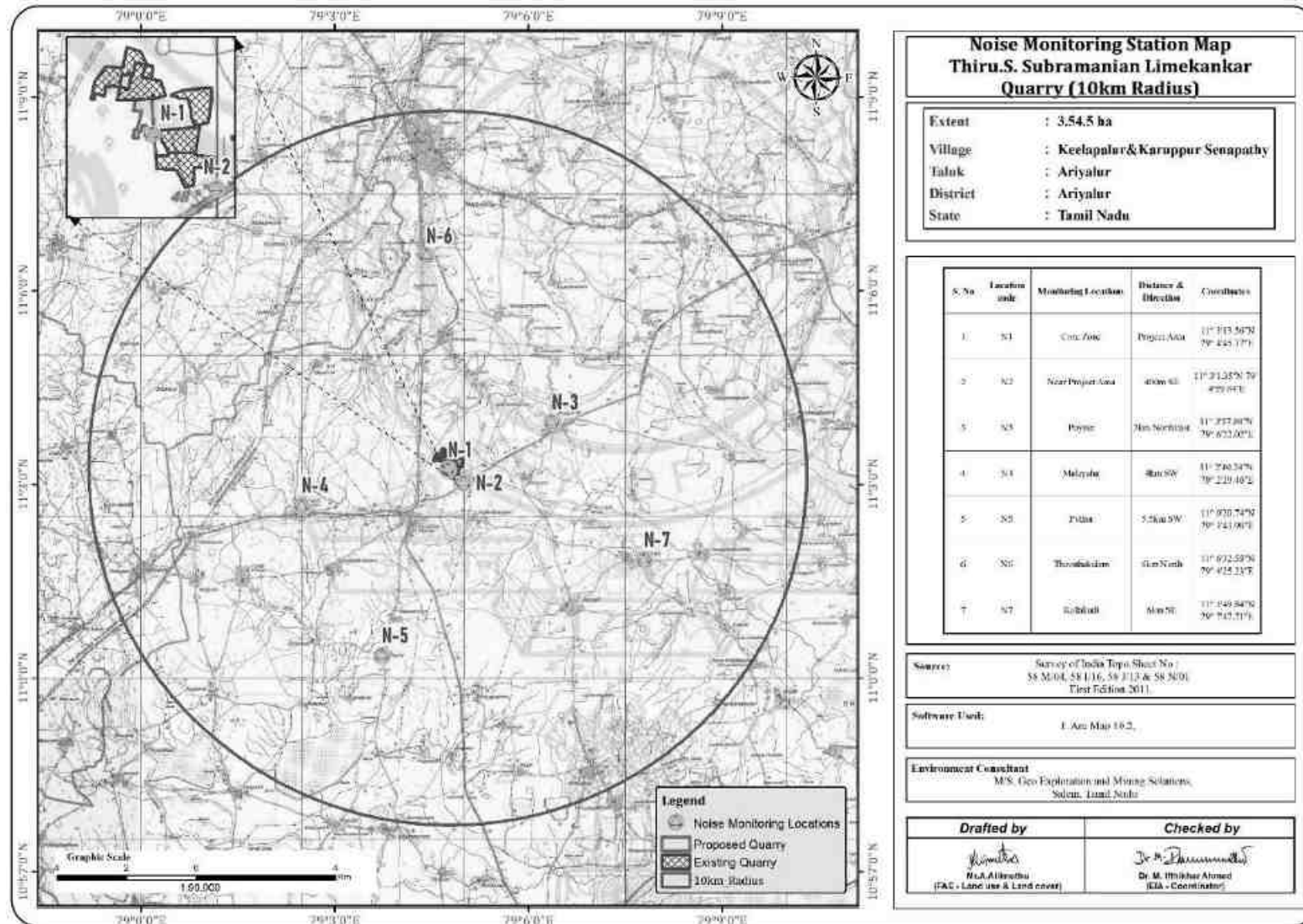
Digital Sound Level Meter was used for the study. All reading was taken on the 'A-Weighting' frequency network, at a height of 1.5 meters from ground level. The sound level meter does not give a steady and consistent reading and it is quite difficult to assess the actual sound level over the entire monitoring period. To mitigate this shortcoming, the Continuous Equivalent Sound level, indicated by L_{eq} , is used. Equivalent sound level, ' L_{eq} ', 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,

$$L_{eq} = 10 \log L / T \sum (10L_n/10)$$

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 60minutes are computed for equivalent noise levels. Equivalent noise level is a single number descriptor for describing time varying noise levels.

FIGURE 3.24: 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 3.28: AMBIENT NOISE QUALITY RESULT

S. No	Locations	Noise level (dB (A) Leq)		Ambient Noise Standards
		Day Time	Night Time	
1	Core Zone	41.0	38.2	Industrial Day Time- 75 dB (A) Night Time- 70 dB (A)
2	Near Project Area	38.0	36.4	
3	Poyyur	40.8	36.4	
4	Melapalur	39.3	36.6	
5	Puthur	38.5	36.2	Residential Day Time- 55 dB (A) Night Time- 45 dB (A)
6	Thavuthakulam	38.9	35.8	
7	Kallakudi	37.8	35.4	

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

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

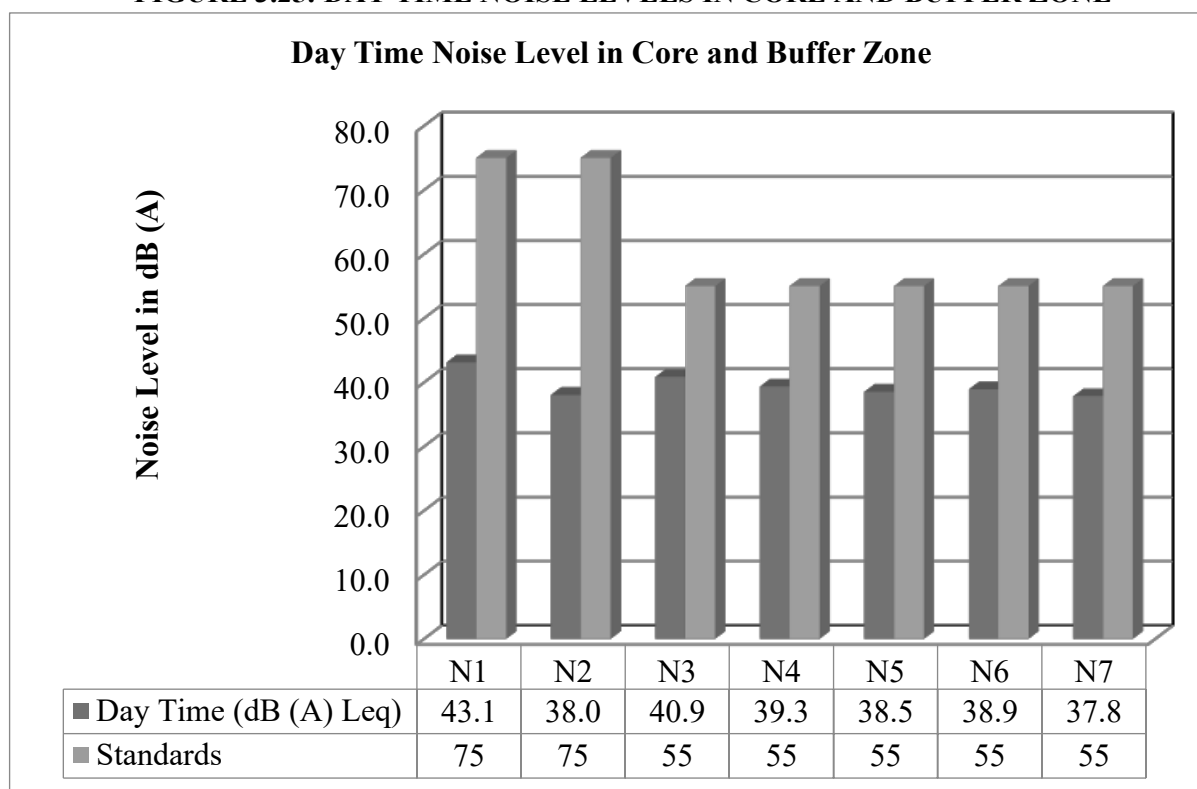
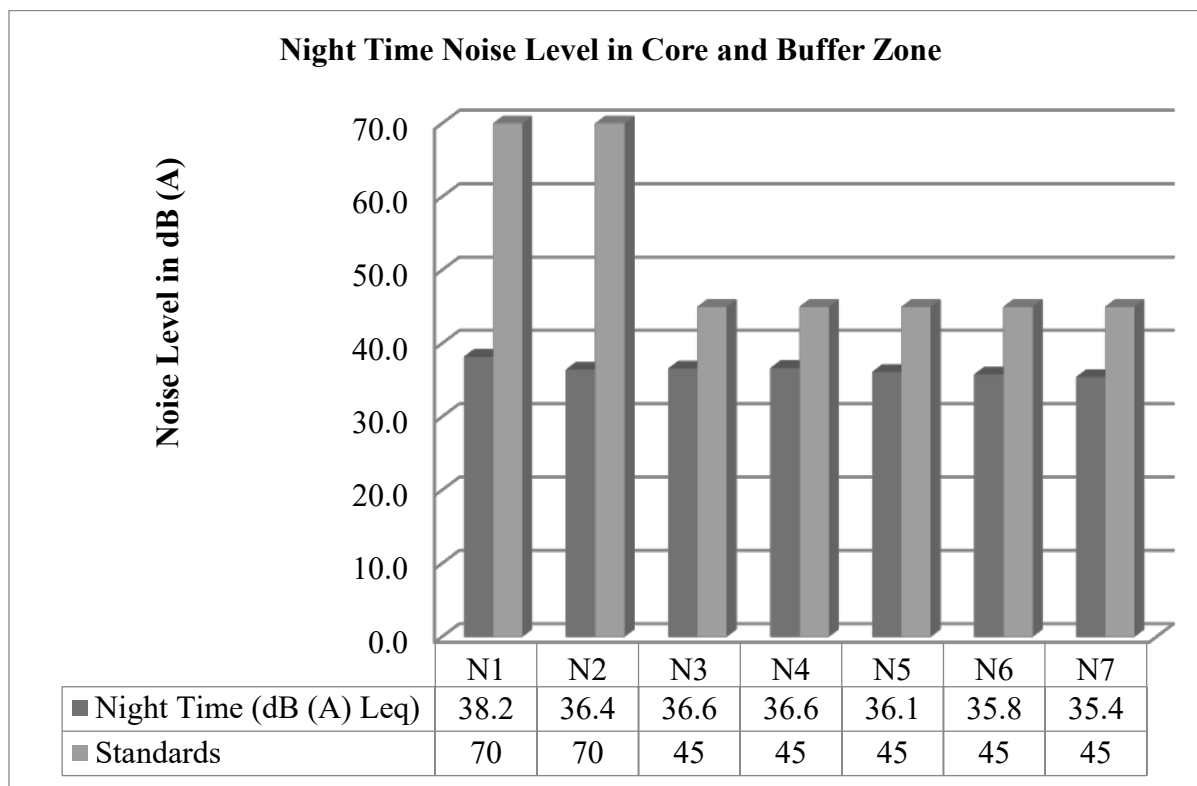


FIGURE 3.26: NIGHT TIME NOISE LEVELS IN CORE AND BUFFER ZONE

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 43.1 dB (A) Leq and during night time were from 38.2 dB (A) Leq. Noise levels recorded in buffer zone during day time were from 37.8 to 40.9dB (A) Leq and during night time were from 35.4 to 36.6 dB (A) Leq. Thus, the noise level for Industrial and Residential area meets the requirements of CPCB.

3.5 BIOLOGICAL ENVIRONMENT

Biological environment of any area constitute all living beings of that area, it is an integral part of the environment. Hence, any change in the surrounding environment could cause loss of species or decrease in biodiversity of the area. Therefore, the present study is proposed to assess the impact of the proposed projects on biological environment of the project site and surrounding area within 10 KM radius. Accordingly, mitigation measures are evolved to sustain the biological diversity. In general, biological environment is represented by flora and fauna. Flora constitutes the herbs, shrubs and trees and fauna constitutes the mammals, birds, reptiles, arthropods, amphibians, fishes etc.,

3.5.1 Objective of the study

The major objectives of the study were:

- * To document the diversity of the local flora within core & buffer zone.
- * To enlist the major agricultural crops, plantations and cultivated species.
- * To document the major fauna both invertebrate and vertebrate occurring in the selected 10Km study area.

The flora and fauna studies were carried out at randomly selected different sites representing the study area of 10 km radius. The detailed ecological assessment of the study area has been carried out with the following objectives:

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

The ecological status of the study area has been assessed based on the following methodology:

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

3.5.2 Study approach & methodology adopted

The baseline study for existing ecological environment was carried out during October to December, 2020. A participatory and consultative approach was followed. Field visits were undertaken for survey of the vegetation and animals in the study area. The study area has been divided in to two parts as core area consisting of project site and the buffer area as the 10 km radius of the project site.

3.5.3 Sampling Methodology

Flora and Fauna status was assessed in different habitat types in the study area. Quantitative data was collected using standard methods of quadrat method for Flora enumeration by standard sampling techniques. Random quadrates were laid in order to quantify the vegetation of the study area. Quadrat size for trees was 100 x 100m, for shrubs it was 5 x 5 m and for herbs it was 1 x 1m. Plots of 1 x 1 m were laid within the tree quadrat at each corner to record grasses. In each of the quadrates, species and their number were recorded.

3.5.4 Flora & Fauna at the study area

Table 3.15: List of Flora in the Core Zone (Project Area)

No major vegetation was found; the entire area is dry barren land.

Trees

Sl. No.	Scientific Name	Family	Common Name
1.	<i>Azadirachta indica</i>	Meliaceae	Vembu
2.	<i>Acacia leucophloea</i>	Fabaceae	Velvelam

Shrubs

Sl. No.	Scientific Name	Family	Common Name
1.	<i>Solanum torvum</i>	Solanaceae	Turkey berry, Sundaikkai
2.	<i>Abutilon indicum</i>	Malvaceae	Indian mallow, Thuthi

Flora in the buffer zone

Details of flora with scientific name observed in the buffer zone given in the table below.

Table 3.16: List of Flora in the Buffer Zone

Trees

S.No	Scientific Name	Family	Local Name
Trees			
1	<i>Cyperus rotundus</i>	Cyperaceae	muttakkacu
2	<i>Cassia auriculata</i>	Fabaceae	Avaram
3	<i>Tectona grandis</i>	Lamiaceae	Teak
4	<i>Grevillea robusta</i>	Proteas	Silver Oak
5	<i>Artocarpus heterophyllus</i>	Moraceae	Jackfruit tree
6	<i>Leucaena leucocephala</i>	Legumes	River tamarind
7	<i>Tamarindus indica</i>	Caesalpinaceae	Tamarind
8	<i>Casuarina equisetifolia</i>	Casuarina	Casuarinaceae
9	<i>Delonix regia</i>	Legumes	May Flower Tree
10	<i>Emblia officinalis</i>	Nelli	Euphorbiaceae
11	<i>Bambusa bamboo</i>	Bamboo	Gramenae
12	<i>Azadirachata indica</i>	Meliaceae	Veppa maram, Neem
13	<i>Cocus nucifera</i>	Palmaceae	Coconut
14	<i>Citrus limonum</i>	Rutaceae	Lemon
15	<i>Musa paradisiacal</i>	Musaceae	Banana
16	<i>Pongamia pinnata</i>	Fabaceae	Pungai
17	<i>Prosopis juniflora</i>	Moraceae	Cimaikaruvel
18	<i>Ficus benghalensis</i>	Moraceae	Banyan
19	<i>Moringa oleifera</i>	Moringaceae	Murungai
20	<i>Polyalthia longifolia</i>	Annonaceae	Nietilingam

21	Mangnifere indica	Anacardiaceae	Mango
22	Albizia Saman	Rain Tree	Legumes
23	Madhuca longifolia	Sapotaceae	Honey tree
24	Syzygium Jambolanumt	Myrtaceae	Jamun Tree

Shrubs

S.No	Scientific Name	Family	Local Name
Shrub Species			
1	Jasium sessiliflorum	Oleaceae	Sooman (Jasmin)
2	Calotropis gigantean	Asclepiadaceae	Erruku
3	Bougainvillea glabra	Nyctaginaceae	Bougainvillea
4	Nerium oleander	Apocynaceae	Oleander
5	Ocimum grabissium	Labiatae	Tulasi
6	Hybiscus rosinensis	Malvaceae	Sembaruthi
7	Solanum melan	Solanaceae	Brinjal
8	Solanum anuvum	Solanaceae	Mirchi

Fauna in the Core zone

The common insects are dragon fly, grass hoper ant scorpion, centipede, millipede, Butterflies, Indian Frags are found in the core zone.

Table 3.17: List of Fauna in the Core Zone

Mammals:

Scientific name	Common name	WPA 1972 Schedule	IUCN Status
Lepas nigricollis	<i>black-naped hare</i>	IV	Least concern

Birds

S.No	Scientific name	Common name	Family	IUCN /WPA schedule
1	Acridotherestrictis	<i>Common myna</i>	Sturnidae	Least concern / Schedule IV
2	Pavo cristatus	Indian peafowl	Phasianidae	Least Concern / Schedule I

Fauna in the buffer zone

Details of fauna with scientific name observed in the buffer zone given in the table below.

Table 3.18: List of Fauna's in the buffer zone

Birds

S.No	Scientific name	Common name	Family	IUCN /WPA Schedule
1	Psittacula Krammeri	Rose ringed parakeet	Parrots	IV
2	Coracias benghalensis	Indian Roller	Rollers	IV
3	Alcedo atthis	Common Kingfisher	Kingfisher	IV
4	Halcyon smyrensis	Barn Owl	Kingfisher	IV
5	Tyto alba	Little Egret	Tytonidae	IV
6	Egretta garzetta	Cattle Egret	Heron	IV
7	Gallinula chloropus	Moore Hen	Rail	IV
8	Milvus migrans	Common Kite	Accipitridae	IV
9	Corvus splendens	House crow	Crow family	IV
10	Turdoides striatus	White headed babbler	Leiothrichidae	IV
11	Columbus livibus	Rock Pigeon	-	IV
12	Dicrurus macrocerus	Black Drongo	Drongos	IV
13	Dicrurus longicaudatus	Grey Drongo	Dicruridae	IV
14	Dissemurus paradiseus	Rackete Tailed Drongo	Dicruridae	IV
16	Acridotheres tristis	Common mnyna	Starling	IV

Reptiles

S.No	Scientific name	Common name	Family	IUCN /WPA Schedule
1.	<i>Hemidactylus sp</i>	House Lizard	Geckos	IV

2.	<i>Calotes versicolor</i>	Garden Lizard	Agamid lizards	IV
3.	<i>Sitana pondiceriana</i>	Green Lizard	Agamidae	IV
4.	<i>Chameleon zeylanicus</i>	Lizard	Chameleons	IV
5.	<i>Varanus benghalensis</i>	Monitor Lizard	Varanidae	IV
6.	<i>Nerodia piscator</i>	Fresh water snake	Colubridae	III
7.	<i>Dendrophis</i> sps	Tree snake	Colubridae	III
8.	<i>Dendrolaphis</i> sps	Green tree snake	Colubrid	III
9.	<i>Hemibungarus</i> sps	Indian coral snake	-	II
10.	<i>Vipera russeli</i>	Viper	Viperidae	II
11.	<i>Trimeresurus meacrolepis</i>	Pit viper	Viperidae	II

Butterflies

S.No	Scientific name	Common name	Family	IUCN /WPA schedule
1.	<i>Pachliopta hector</i>	Pachliopta hector	Papilionidae	IV
2.	<i>Papilo demoleus</i>	Lime butterfly	Papilionidae	IV
3.	<i>Graphium agamemnos</i>	Tailed jay	Papilionidae	IV
4.	<i>Papilo polymnstor</i>	Blue mormon	Papilionidae	IV
5.	<i>Neptis hylas</i>	Common sailor	Nymphalidae	IV

Amphibians

S.No	Scientific name	Common name	Family	IUCN /WPA schedule
1	<i>Rana hexadactyla</i>	Frong	True Frog	IV
2	<i>Rana tigrina</i>	Bull Frog	Ranidae	IV

Mammals

S.No	Scientific name	Common name	Family	IUCN /WPA schedule
1.	<i>Lepus nigricollis</i>	Hare	Leporids	III
2.	<i>Funambulus spp</i>	Squirrel	Sciuridae	IV
3.	<i>Rattus norvegicus</i>	Field mouse	Murids	IV
4.	<i>Herpestes edwardii</i>	Common mongoose	Herpestidae	IV
5.	<i>Bandicota indica</i>	Bandicoot	Murids	IV

Among the fauna recorded most of them are of common residence population and there are no endangered species in the study area.

Interpretation:

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

Ariyalur District is located in central Tamil Nadu and is 265 km. away from Chennai. The District has an area of 1949 Sq.Km. It is an inland district without any coast line. The district has Vellar River in the North and Kollidam River in the South and it has no well-marked natural divisions. Ariyalur District consists of two Revenue Divisions viz., Ariyalur and Udayarpalayam, Four Taluks viz., Ariyalur, Sendurai, Udayarpalayam and Andimadam (Andimadam Taluk is formed as per G.O.(Ms) No. 167 Revenue (RA1(1)) Department dated: 08-05-2017) comprising of 195 Revenue Villages. The District has six blocks viz. Ariyalur, Thirumanur, Sendurai, Jayankondam, Andimadam and T. Palur comprising of 201 Village Panchayats. There are two Municipalities viz. Ariyalur & Jayankondam and two Town Panchayats viz. Udayarpalayam & Varadharajanpettai.

3.6.4 Study area:

KEELAPALUR VILLAGE

Keelapalur village is situated in Ariyalur District and in State of Tamil Nadu India. Village has population of 5417 as per census data of 2011, in which male population is 2671 and female population is 2746. Total geographical area of Keelapalur village is 1531 Hectares. Total number of house hold in village is 1484. As per the Census Data 2011 there are 2746 Female and 2671 males out of 5417 total population of village. There are 304 females per 298 males under 6 years of age in the village.

In Keezhapalur village population of children with age 0-6 is 602 which makes up 11.11 % of total population of village. Average Sex Ratio of Keezhapalur village is 1028 which is higher than Tamil Nadu state average of 996. Child Sex Ratio for the Keezhapalur as per census is 926, higher than Tamil Nadu average of 943.

TABLE 3.44: KEELAPLUR VILLAGE POPULATION FACTS

Number of Households	1484
Population	5417
Male Population	2671
Female Population	2746
Children Population	602
Sex-ratio	1028
Literacy	79.17%
Male Literacy	85.42%
Female Literacy	73.10%
Scheduled Tribes (ST) %	19%
Scheduled Caste (SC) %	0.20%

Source: <https://www.census2011.co.in/data/village/644389-Keelapalur-tamil-nadu.html>

Gram Panchayat name of the Keelapalur village is Keelapalur. Block name is Thirumanur and Teshil/Taluk or sub-district is Ariyalur. Data Reference year is 2009 of Census 2011. Sub District HQ Name is Ariyalur and Sub District HQ Distance is 11.9 km from the village. District Head Quarter name is Ariyalur and its distance from the village is 11.9km. Nearest Town of the Keelapalur village is Ariyalur and nearest town distance is 11.9 km. Pincode of Keelapalur village is 621707. As per census 2011 village code of village Keelapalur is 636477.

TABLE 3.45: DEMOGRAPHICS POPULATION OF KEELAPALUR VILLAGE

Total Population	Male Population	Female Population
5417	2671	2746

Source: <https://etrace.in/census/village/keelapalur-district-ariyalur-tamil-nadu-636477>

Sex Ratio of Keelapalur Village -Census 2011

As per the Census Data 2011 there are 1041 Female per 1000 males out of 5417 total population of village. There are 926 girls per 1000 boys under 6 years of age in the village.

Literacy of Keelapalur Village

Out of total population total 745 people in Keelapalur Village are literate, among them 365 are male and 380 are female in the village. Total literacy rate of Keelapalur is 79.17%, for male literacy is 85.42% and for female literacy rate is 73.10%.

Workers profile of Keelapalur Village

In Keezhapalur village out of total population, 2,062 were engaged in work activities. 58.5% of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 41.5% were involved in Marginal activity providing livelihood for less than 6 months. Of 2,062 workers engaged in Main Work, 136 were cultivators (owner or co-owner) while 151 were Agricultural labourers.

TABLE 3.46: KEELAPALUR VILLAGE CENSUS 2011 DATA

Description	Census 2011 Data
Village Name	Keelapalur
Teshil Name	Ariyalur
District Name	Ariyalur
State Name	Tamil Nadu
Total Population	5417
Total Area	1531 (Hectares)
Total No of House Holds	1484
Total Male Population	2671
Total Female Population	2746
0-6 Age group Total Population	602
0-6 Age group Male Population	298
0-6 Age group Female Population	304
Total Person Literates	745
Total Male Literates	365
Total Female Literates	380
Total Person Illiterates	1605
Total Male Illiterates	644
Total Female Illiterates	961
Scheduled Cast Persons	1029
Scheduled Cast Males	493
Scheduled Cast Females	536
Scheduled Tribe Persons	11
Scheduled Tribe Males	8
Scheduled Tribe Females	3

Source: <https://www.censusindia.co.in/villages/keezhapalur-population-ariyalur-tamil-nadu-636477>

TABLE 3.47: KEELAPALUR WORKING POPULATION ---CENSUS 2011

	Total	Male	Female
Main Workers	1207	1017	190
Main Workers Cultivators	136	115	21
Agriculture Labourer	151	134	17
Household Industries	44	31	13
Other Workers	876	737	139
Marginal Workers	855	449	406
Non-Working Persons	3355	1205	2150

Source: <https://www.censusindia.co.in/villages/keezhapalur-population-ariyalur-tamil-nadu-636477>

KARUPPUR SENAPATHY VILLAGE

Karuppur (Senapathy) is a village located in Ariyalur Taluk of Ariyalur district in Tamil Nadu. Around 954 families reside in Karuppur (Senapathy) village. Karuppur (Senapathy) village is administered by Sarpanch (Head of village) who is elected every five years.

As per the Census India 2011, Karuppur (Senapathy) village has population of 3514 of which 1706 are males and 1808 are females. The population of children between age 0-6 is 433 which is 12.32% of total population.

The sex-ratio of Karuppur (Senapathy) village is around 1060 compared to 996 which is average of Tamil Nadu state. The literacy rate of Karuppur (Senapathy) village is 60.42% out of which 69.46% males are literate and 51.88% females are literate. There are 15.57% Scheduled Caste (SC) and 0 Scheduled Tribe (ST) of total population in Karuppur (Senapathy) village.

TABLE 3.44: KARUPPUR SENAPATHY VILLAGE POPULATION FACTS

Number of Households	954
Population	3514
Male Population	1706
Female Population	1808
Children Population	433
Sex-ratio	1060
Literacy	60.42%
Male Literacy	69.46%
Female Literacy	51.88%
Scheduled Tribes (ST) %	0
Scheduled Caste (SC) %	15.57%

Source: <https://www.censusindia2011.com/tamil-nadu/ariyalur/ariyalur/karuppur-senapathy-population.html>

Gram Panchayat name of the Karuppur Senapathy village is Melakaruppur. Block name is Ariyalur and Teshil/Taluk or sub-district is Ariyalur. Data Reference year is 2009 of Census 2011. Sub District HQ Name is Ariyalur and Sub District HQ Distance is 11.9 km from the village. District Head Quarter name is Ariyalur and its distance from the village is 11.9km. Nearest Town of the Karuppur senapathy village is Ariyalur and nearest town distance is 11.9 km. Pincode of Keelapalur village is 621 707. As per census 2011 village code of village Karuppur senapathy is 636476.

TABLE 3.45: DEMOGRAPHICS POPULATION OF KARUPPUR SENAPATHY VILLAGE

Total Population	Male Population	Female Population
3514	1706	1808

Source: <https://etrace.in/census/village/karuppur-senapathy-district-ariyalur-tamil-nadu-636476>

Literacy of Keelapalur Village

Out of total population total 2680 people in Karuppur senapathy Village are literate, among them 1516 are male and 1164 are female in the village. Total literacy rate of Karuppur senapathy is 60.42%, for male literacy is 69.46% and for female literacy rate is 51.88%.

TABLE 3.46: KARUPPUR SENAPATHY VILLAGE CENSUS 2011 DATA

Description	Census 2011 Data
Village Name	Karuppur senapathy
Teshil Name	Ariyalur
District Name	Ariyalur
State Name	Tamil Nadu
Total Population	5417
Total Area	1713.35 (Hectares)
Total No of House Holds	954
Total Male Population	1706
Total Female Population	1808

Children Population	433
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TABLE 3.48: POPULATION DATA OF STUDY AREA

Sl.No.	Village Name	NO HH	Total Population	Male	Female	Total SC Population	Male SC	Female SC	Total ST Population	Male ST	Female ST	Total Literate	Male Literate	Female Literate	Total Illiterate	Male Illiterate	Female Illiterate
1	Alanduraiyarkattalai	544	2106	1090	1016	427	220	207	0	0	0	1048	655	393	1058	435	623
2	Ammenabath	170	654	315	339	122	59	63	0	0	0	349	218	131	305	97	208
3	Arungal	974	3581	1767	1814	827	415	412	259	120	139	1891	1073	818	1690	694	996
4	Avansuthamalli	507	1874	937	937	431	219	212	1	0	1	1076	629	447	798	308	490
5	Chinnapattakadu	729	2811	1402	1409	527	256	271	0	0	0	1585	903	682	1226	499	727
6	Edaayankurichi	1129	4038	1939	2099	480	234	246	67	29	38	2552	1407	1145	1486	532	954
7	Karaiyavetti	793	3051	1517	1534	161	82	79	0	0	0	1931	1100	831	1120	417	703
8	Karuppilakattalai	1038	4125	2082	2043	1385	686	699	6	1	5	2224	1297	927	1901	785	1116
9	Karuppur (Senapathy)	1239	4773	2385	2388	1031	530	501	120	53	67	2680	1516	1164	2093	869	1224
10	Kayarlabath	1349	5215	2602	2613	881	451	430	5	3	2	3937	2128	1809	1278	474	804
11	Keelaiyur	1454	5022	2423	2599	1036	493	543	0	0	0	3099	1663	1436	1923	760	1163
12	Keelakolathur	827	3012	1426	1586	1037	478	559	0	0	0	1817	971	846	1195	455	740
13	Keezhakavattankurichi	1348	5062	2576	2486	2023	1039	984	67	32	35	2942	1714	1228	2120	862	1258
14	Keezhapalur	1484	5417	2671	2746	1029	493	536	11	8	3	3812	2027	1785	1605	644	961
15	Melapalur	274	1003	470	533	287	136	151	1	0	1	593	315	278	410	155	255
16	Papanacheri	400	1492	736	756	342	171	171	0	0	0	1036	592	444	456	144	312
17	Periyagalur	1041	3538	1762	1776	692	347	345	0	0	0	1975	1175	800	1563	587	976
18	Periyathirukonam	718	2708	1320	1388	593	291	302	0	0	0	1639	963	676	1069	357	712
19	Poondi	1147	4149	1949	2200	361	168	193	20	10	10	2758	1474	1284	1391	475	916
20	Pudupalayam	922	3535	1750	1785	1072	536	536	3	2	1	2009	1187	822	1526	563	963
21	Reddipalayam	1125	4126	2095	2031	516	260	256	5	3	2	2457	1432	1025	1669	663	1006
22	Sannavur (North)	477	1520	734	786	313	142	171	0	0	0	770	432	338	750	302	448
23	Sathamangalam	734	2845	1445	1400	449	224	225	0	0	0	1685	976	709	1160	469	691
24	Siruvalur	594	2155	1043	1112	453	230	223	0	0	0	1261	743	518	894	300	594
25	Sullangudi	770	2983	1443	1540	492	238	254	0	0	0	1683	925	758	1300	518	782
26	Valajanagaram	1945	7355	3702	3653	1550	805	745	0	0	0	5078	2873	2205	2277	829	1448

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

TABLE 3.49: 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 Cultivation Workers Male	Main Cultivation Workers Female	Main Agriculture Workers
1	Alanduraiyarkattalai	1269	655	614	1244	645	599	172	94	78	973
2	Ammenabath	243	167	76	51	45	6	32	31	1	0
3	Arungal	2027	1057	970	1812	1019	793	577	390	187	993
4	Avansuthamalli	783	521	262	658	464	194	486	329	157	87
5	Chinnapattakadu	1569	882	687	1046	720	326	438	360	78	500
6	Edaayankurichi	1949	1080	869	1554	1034	520	547	464	83	725
7	Karaiyavetti	1744	975	769	1739	970	769	1248	716	532	451
8	Karuppilakattalai	2184	1248	936	1870	1088	782	1018	608	410	686
9	Karuppur (Senapathy)	2716	1518	1198	2423	1434	989	853	548	305	1337
10	Kayarlabath	1878	1414	464	1682	1320	362	238	219	19	351
11	Keelaiyur	2833	1429	1404	1914	1040	874	813	472	341	842
12	Keelakolathur	1632	873	759	1585	847	738	194	164	30	1198
13	Keezhakavattankurichi	2808	1546	1262	1713	1008	705	484	363	121	1031
14	Keezhapalur	2062	1466	596	1207	1017	190	136	115	21	151
15	Melapalur	483	278	205	475	275	200	103	63	40	256
16	Papanacheri	936	467	469	799	434	365	339	214	125	363
17	Periyanagalur	1805	1021	784	1580	936	644	756	452	304	331
18	Periyathirukonam	1565	820	745	1182	630	552	899	455	444	86
19	Poondi	2302	1181	1121	1772	986	786	1050	574	476	463
20	Pudupalayam	1691	1015	676	709	514	195	143	92	51	261
21	Reddipalayam	1946	1210	736	1541	994	547	362	267	95	569
22	Sannavur (North)	951	460	491	767	437	330	625	348	277	53
23	Sathamangalam	1659	882	777	1640	873	767	840	433	407	623
24	Siruvallur	1125	629	496	878	515	363	440	254	186	273
25	Sullangudi	1284	835	449	1115	766	349	404	371	33	631
26	Valajanagaram	3033	2017	1016	2136	1470	666	528	334	194	475

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

TABLE 3.50: COMMUNICATION & TRANSPORT FACILITIES IN THE STUDY AREA

Sl	Village Name	PO	SPO	PTO	T	PCO	MP	IC / CSC	PCF	BS	PBS	RS	NH	SH	MDR	BTR	GR	NWR	FP
1	Alanduraiyarkattalai	2	2	2	1	1	1	2	2	1	1	2	2	2	1	1	1	2	1
2	Ammenabath	2	1	2	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
3	Arungal	2	1	2	1	2	1	2	2	1	1	2	2	2	1	1	1	2	1
4	Avansuthamalli	2	1	2	1	1	1	2	2	1	2	2	2	2	1	1	1	2	1
5	Chinnapattakadu	2	2	2	1	1	1	2	2	1	1	2	2	2	1	1	1	2	1
6	Edaayankurichi	2	1	2	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
7	Karaiyavetti	2	2	2	1	1	1	2	2	1	1	2	2	2	1	1	1	2	1
8	Karuppilakattalai	2	1	1	1	2	1	2	2	1	1	2	2	2	1	1	1	2	1
9	Karuppur (Senapathy)	2	1	2	1	2	1	2	2	1	1	2	1	1	1	1	1	2	1
10	Kayarlabath	2	1	2	1	1	1	1	1	1	1	2	1	2	2	1	1	2	1
11	Keelaiyur	2	1	2	1	1	1	2	2	1	1	2	1	1	1	1	1	2	1
12	Keelakolathur	2	1	2	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
13	Keezhakavattankurichi	2	1	2	1	1	1	2	2	1	1	2	2	2	1	1	1	2	1
14	Keezhapalur	1	1	1	1	1	1	1	2	1	1	2	1	1	1	1	1	2	1
15	Melapalur	2	2	2	1	1	1	2	2	1	1	2	1	1	1	1	1	2	1
16	Papanacheri	2	2	2	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
17	Periyagalur	2	1	2	1	1	1	2	2	1	1	2	2	1	1	1	1	2	1
18	Periyathirukonam	2	1	2	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
19	Poondi	2	1	1	1	1	1	2	2	1	1	2	1	1	1	1	1	2	1
20	Pudupalayam	2	2	2	1	2	1	2	2	1	1	2	2	1	1	1	1	2	1
21	Reddipalayam	2	1	2	1	1	1	1	1	1	1	2	2	1	1	1	1	2	1
22	Sannavur (North)	2	2	2	1	1	1	2	2	1	1	2	2	2	1	1	1	2	1
23	Sathamangalam	2	2	2	1	1	1	2	2	1	1	2	1	1	1	1	1	2	1
24	Siruvalur	2	1	2	1	1	1	2	1	1	2	2	2	1	1	1	1	2	1
25	Sullangudi	2	1	2	1	2	1	2	2	1	1	2	2	2	1	1	1	2	1
26	Valajanagaram	2	1	2	1	1	1	1	1	1	1	2	1	1	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 3.51: WATER & DRAINAGE FACILITIES IN THE STUDY AREA

Sl	Village Name	TP	CW	UCW	HP	TW/BH	S	R/C	T/P/L	CD	OD	CT
1	Alanduraiyarkattalai	1	2	1	2	1	2	2	2	2	1	2
2	Ammenabath	1	2	2	2	1	2	2	2	1	1	2
3	Arungal	1	1	2	1	1	2	2	2	1	1	2
4	Avansuthamalli	1	1	2	1	1	2	2	2	2	1	1
5	Chinnapattakadu	1	2	2	1	1	2	2	2	1	1	1
6	Edaayankurichi	1	1	1	1	2	2	2	2	2	1	2
7	Karaiyavetti	1	2	1	1	1	2	1	2	1	1	1
8	Karuppilakattalai	1	1	2	1	2	2	2	2	1	1	1
9	Karuppur (Senapathy)	1	2	1	1	1	1	1	2	1	1	2
10	Kayarlabath	1	1	1	1	1	2	2	2	1	1	1
11	Keelaiyur	1	2	1	1	1	2	2	2	1	1	1
12	Keelakolathur	1	1	2	1	1	2	2	1	1	1	1
13	Keezhakavattankurichi	1	1	2	1	1	2	2	2	1	1	1
14	Keezhapalur	1	1	1	1	1	2	2	2	1	1	1
15	Melapalur	1	2	2	2	2	2	2	2	1	2	2
16	Papanacheri	1	2	2	2	1	2	2	2	1	1	1
17	Periyanagalur	1	1	1	1	1	2	2	1	1	1	1
18	Periyathirukonam	1	1	1	1	1	1	2	2	1	1	2
19	Poondi	1	2	2	2	1	2	2	2	1	1	1
20	Pudupalayam	1	1	1	1	1	2	2	1	1	1	2
21	Reddipalayam	1	1	1	1	1	2	2	2	1	1	1
22	Sannavur (North)	1	1	1	2	1	2	2	2	1	1	2
23	Sathamangalam	1	1	2	2	2	2	1	1	1	1	2
24	Siruvalur	1	2	1	1	1	1	2	2	2	1	2
25	Sullangudi	1	2	2	1	1	2	2	2	1	1	1
26	Valajanagaram	1	1	1	1	1	2	2	2	1	1	1

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 3.52: OTHER FACILITIES IN THE STUDY AREA

Sl	Village Name	ATM	CB	COB	ACS	SHG	PDS	RM	AMS	NC	NC-AC	CC	SF	PL		NPS	APS	BDRO	PS
1	Alanduraiyarkattalai	2	2	2	2	1	1	2	2	1	1	2	1	1		1	1	1	1
2	Ammenabath	2	2	2	2	1	1	2	2	1	1	2	2	2		1	1	2	1
3	Arungal	2	2	2	2	1	1	2	2	1	1	1	1	2		1	1	1	1
4	Avansuthamalli	2	2	2	2	1	1	2	2	1	1	2	1	1		1	1	1	1
5	Chinnapattakadu	2	2	2	2	1	1	2	2	1	1	2	1	1		1	1	1	1
6	Edaayankurichi	2	2	2	2	1	1	2	2	1	1	2	1	1		1	1	1	1
7	Karaiyavetti	2	2	2	1	1	1	2	2	1	1	2	2	2		1	1	1	1
8	Karuppilakattalai	2	2	2	2	1	1	2	2	1	1	2	2	2		2	1	1	1
9	Karuppur (Senapathy)	2	2	1	1	1	1	2	2	1	1	2	2	1		1	1	1	1
10	Kayarlabath	2	2	2	2	1	1	2	2	1	1	1	1	1		1	1	1	1
11	Keelaiyur	2	2	2	2	1	1	2	2	1	1	2	1	1		1	1	1	1
12	Keelakolathur	2	2	2	1	1	1	2	2	1	1	1	1	2		1	1	1	1
13	Keezhakavattankurichi	2	2	2	1	1	1	2	2	1	1	2	2	1		1	1	1	1
14	Keezhapalur	1	1	2	1	1	1	2	2	1	1	1	1	1		1	1	1	1
15	Melapalur	2	2	2	2	1	1	2	2	1	1	2	2	2		1	2	1	1
16	Papanacheri	2	2	2	2	1	1	2	2	1	1	2	1	1		1	1	1	1
17	Periyanaagalur	2	2	2	1	1	1	2	2	1	1	2	2	2		1	1	1	1
18	Periyathirukonam	2	2	1	1	1	1	2	2	1	1	2	2	1		1	1	1	1
19	Poondi	2	2	2	2	1	1	2	2	1	1	1	1	1		1	1	1	1
20	Pudupalayam	2	2	1	1	1	1	2	2	1	1	2	2	2		1	1	1	1
21	Reddipalayam	1	1	1	2	1	1	2	2	1	1	2	2	1		1	1	1	1
22	Sannavur (North)	2	2	2	2	1	1	2	2	1	1	2	1	2		1	1	1	1
23	Sathamangalam	2	2	2	2	1	1	2	2	1	1	2	1	2		1	1	1	1
24	Siruvallur	2	2	2	2	1	1	2	2	1	1	2	1	1		1	1	1	1
25	Sullangudi	2	2	2	2	1	1	2	2	1	1	1	1	2		1	1	1	1
26	Valajanagaram	2	2	2	2	1	1	2	2	1	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 Note - 1 - Available within the village; 2 - Not available

TABLE 3.53: EDUCATIONAL FACILITIES IN THE STUDY AREA

Sl	Village Name	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	Alanduraiyarkattalai	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	Ammenabath	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	Arungal	1	1	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
4	Avansuthamalli	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
5	Chinnapattakadu	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
6	Edaayankurichi	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	Karaiyavetti	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
8	Karuppilakattalai	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
9	Karuppur (Senapathy)	1	1	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
10	Kayarlabath	1	1	1	1	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
11	Keelaiyur	1	2	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
12	Keelakolathur	1	2	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
13	Keezhakavattankurichi	1	1	1	1	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
14	Keezhapalur	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
15	Melapalur	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
16	Papanacheri	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	Periyanaagalur	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2
18	Periyathirukonam	1	2	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
19	Poondi	1	2	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
20	Pudupalayam	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
21	Reddipalayam	1	1	1	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
22	Sannavur (North)	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
23	Sathamangalam	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
24	Siruvalur	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
25	Sullangudi	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
26	Valajanagaram	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	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 3.54: 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	Alanduraiyarkattalai	0	0	0	0	0	0	0	0	0	0	0	b
2	Ammenabath	0	0	0	0	0	0	0	0	0	0	0	a
3	Arungal	0	0	1	0	0	0	0	0	0	0	0	
4	Avansuthamalli	0	0	1	0	0	0	0	0	0	0	0	
5	Chinnapattakadu	0	0	0	0	0	0	0	0	0	0	0	
6	Edaayankurichi	0	0	0	0	0	0	0	0	0	0	0	
7	Karaiyavetti	0	0	1	0	0	0	0	0	0	0	0	b
8	Karuppilakattalai	0	0	1	0	0	0	0	0	1	0	0	b
9	Karuppur (Senapathy)	0	1	1	1	1	0	0	1	1	0	1	a
10	Kayarlabath	0	0	1	0	0	0	0	0	0	0	0	b
11	Keelaiyur	0	0	3	0	0	0	0	0	0	0	0	b
12	Keelakolathur	0	0	1	1	0	0	0	0	0	0	0	b
13	Keezhakavattankurichi	0	0	1	0	0	0	0	0	1	0	0	
14	Keezhapalur	0	1	1	1	1	0	0	1	1	0	1	b
15	Melapalur	0	0	1	0	0	0	0	0	1	0	0	
16	Papanacheri	0	0	0	0	0	0	0	0	0	0	0	
17	Periyanaalur	0	0	1	1	0	0	0	0	1	0	0	a
18	Periyathirukonam	0	0	1	0	0	0	0	0	0	0	0	
19	Poondi	0	0	1	0	0	0	0	0	0	0	0	a
20	Pudupalayam	0	0	1	0	0	0	0	0	0	0	0	a
21	Reddipalayam	0	0	1	0	0	0	0	0	0	0	0	b
22	Sannavur (North)	0	0	1	0	0	0	0	0	0	0	0	b
23	Sathamangalam	0	0	0	0	0	0	0	0	0	0	0	b
24	Siruvalur	0	0	0	0	0	0	0	0	0	0	0	
25	Sullangudi	0	0	1	0	0	0	0	0	0	0	0	
26	Valajanagaram	0	0	1	0	0	0	0	0	0	0	0	a

Abbreviations: CHC-Community Health Centre; TBC-TB Clinic; VH- Vetrernity 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 - Tamilnadu 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 Structure map up to 300m radius

FIGURE 3.27: Structure map 300m

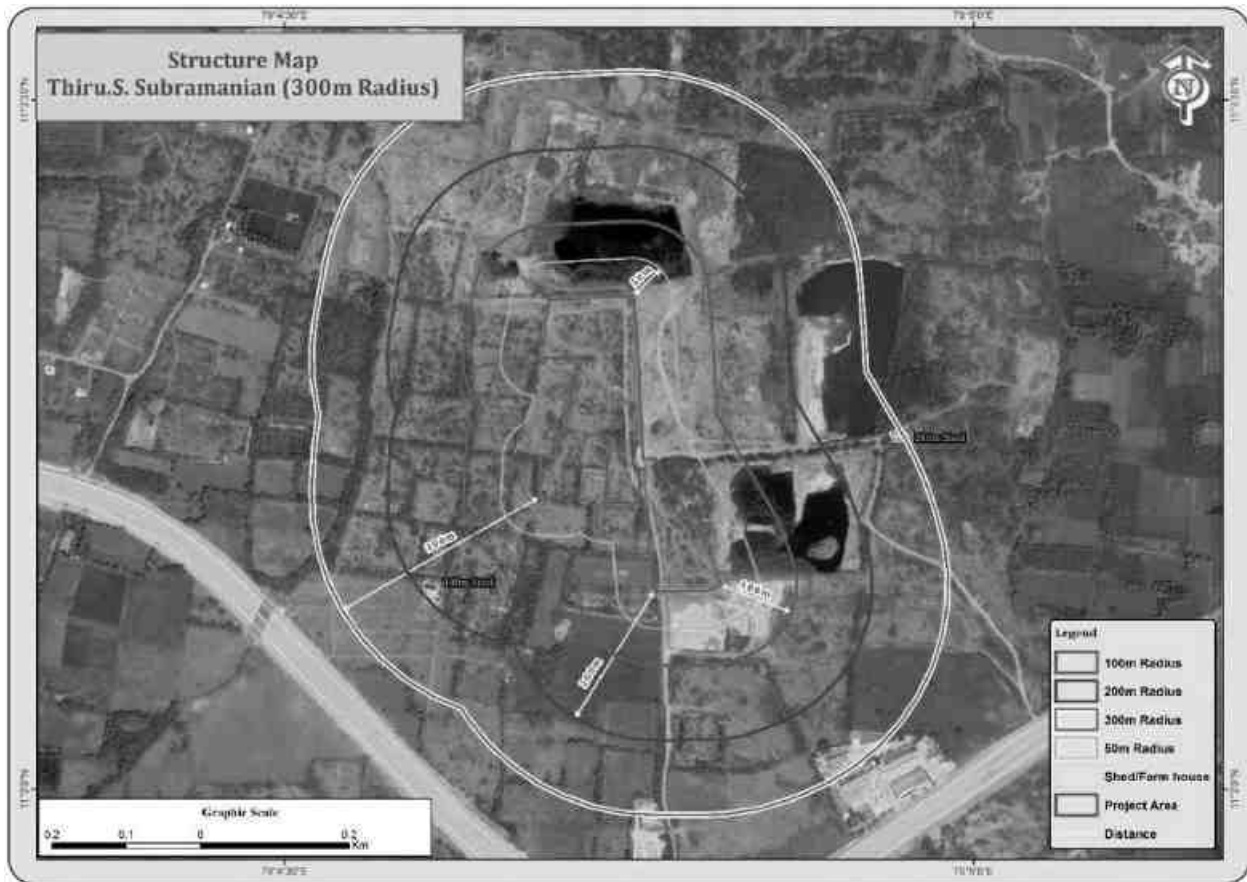


Table 3.55. Structure details in the study area around 300m radius

Enumeration of Structures from 0 - 300m Radius						
Structure Numbers	Distance & Direction from the project site	Structure Details and Usage Purpose	Type of Structure Structures (Kutchha/ Brick/ Cement/ RCC/ Framed Structures)	No. of Occupants	Structure belongs to owner (Yes/No)	Remarks
1	180m – SW	Shed	Sheet Structure	Nil	No	Used to Agriculture storage only – No Stay
2	280m – East	Shed	Sheet Structure	Nil	No	Used to Agriculture storage only – No Stay

3.6.8 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.

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

- 2.54.2 Ha of the land will be under mining since the Permanent or temporary change on land use and land cover will occur
- 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 cause the siltation of water course

4.1.2 Mitigation Measures

- The 2.54.2 Ha of the land will be converted into temporary reservoir which will full fill the water scarcity in the drought season and the nearby agriculture land will have benefitted by the supply of water
 - About 1800 Nos of trees will be planted in the lease area and approach road will retain the ecosystem
-

- The mining activity will be gradual confined in blocks and excavation will be undertaken progressively along with other mitigative measures like phase wise development in the production
 - Construction of garland drains all around the quarry pits and construction of silt trap 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.,
 - Fencing will be constructed before starting the mining operation and it will be maintained in the conceptual stage
- Security will be posted round the clock, to prevent inherent entry of the public and cattle.

4.1.3 Soil Environment

4.1.4 Impact on Soil Environment

- Removal of vegetation cover
- Soil Erosion in the project site during rainy season due to quarry operation

4.1.5 Mitigation Measures

- Garland drains will be constructed all around the project boundary to prevent surface flows from entering the quarry. 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 (Silt Pond). These trap sediments and reduce suspended sediment loads before runoff is discharged from the quarry site. Sedimentation ponds should be designed based on runoff, retention times, and soil characteristics. There may be a need to provide a series of sedimentation ponds to achieve the desired outcome.
- Retain vegetation – Retain existing or re-plant the vegetation at the site wherever possible.
- Monitoring and maintenance – Weekly monitoring and daily maintenance of erosion control systems so that they perform as specified specially during rainy season.

4.1.6 Waste Dump Management

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

4.2 WATER ENVIRONMENT

4.2.1 Anticipated Impact

- The major sources of water pollution normally associated due to mining and allied operations are:
 - Generation of waste water from vehicle washing.
 - Washouts from surface exposure or working areas
 - Domestic sewage
 - Disturbance to drainage course in the project area
 - Mine Pit water discharge
- Increase in sediment load during monsoon in downstream of lease area
- This being a mining project, there will be no process effluent. Waste from washing of machinery may result in discharge of Oil & grease, suspended solids.
- The sewage from soak pit may percolate to the ground water table and contaminate it.
- Surface drainage may be affected due to Mining
- Abstraction of water may lead to depletion of water table
- 2.0 KLD water will be utilized for the quarrying operation

4.2.2 Mitigation Measures

-
- Water for the quarrying operation such as sprinkling on haul roads, Greenbelt development will be sourced from the lower part of the mine pit which is specifically allotted to collect the rain water.
 - 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.
 - Periodic (every 6 months once) analysis of quarry pit water and ground water quality in nearby villages.
 - Domestic sewage from site office & urinals/latrines provided in ML is discharged in septic tank followed by soak pits.
 - Waste water discharge from mine will be treated in settling tanks before using for dust suppression and tree plantation purposes.
 - De-silting will be carried out before and immediately after the monsoon season.

4.3 AIR ENVIRONMENT

4.3.1. Anticipated Impact

- During mining, at various stages activities such as excavation 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 Limekankar, 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.

Prediction of impacts on air environment has been carried out taking into consideration cumulative production all the quarries fall in the Cluster. Air environment and net increase in emissions by Open pit source modelling in AERMOD Software AERMOD 12.

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 Limekankar. 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

Suspended Particulate Matter (SPM) is the major pollutant occurred during quarrying activities. The prediction included the impact of Excavation, 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 10km 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 4.1: ESTIMATED EMISSION RATE

PM ₁₀			
Activity	Source type	Value	Unit
Mineral Loading	Point Source	0.041990717	g/s
Haul Road	Line Source	0.002491073	g/s/m
Overall Mine	Area Source	0.062836506	g/s
So ₂	Point Source	0.000644729	g/s
Nox	Point Source	0.000044886	g/s

FIGURE 4.1: AERMOD TERRAIN MAP

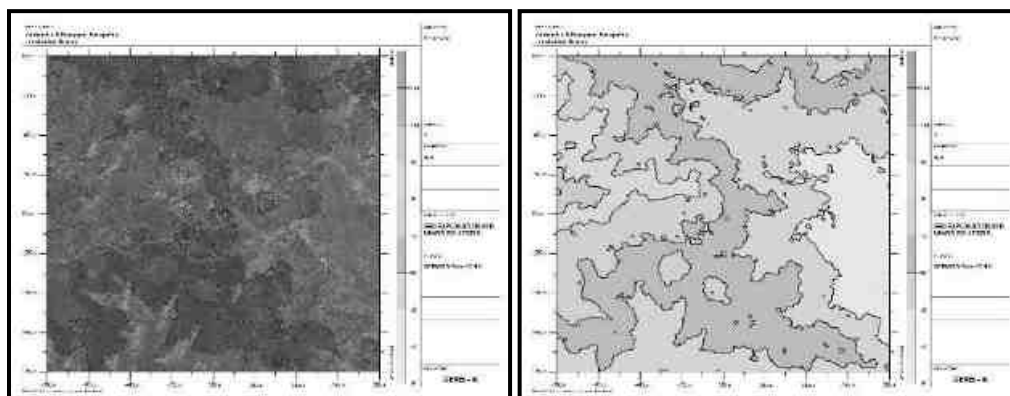


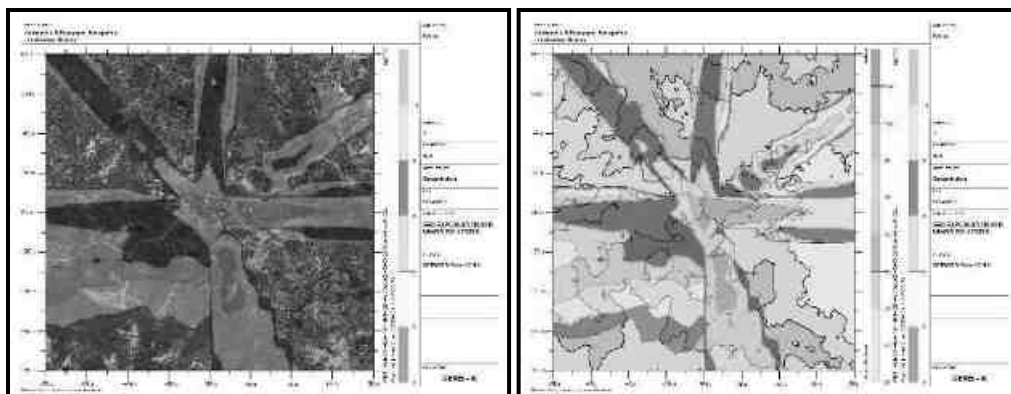
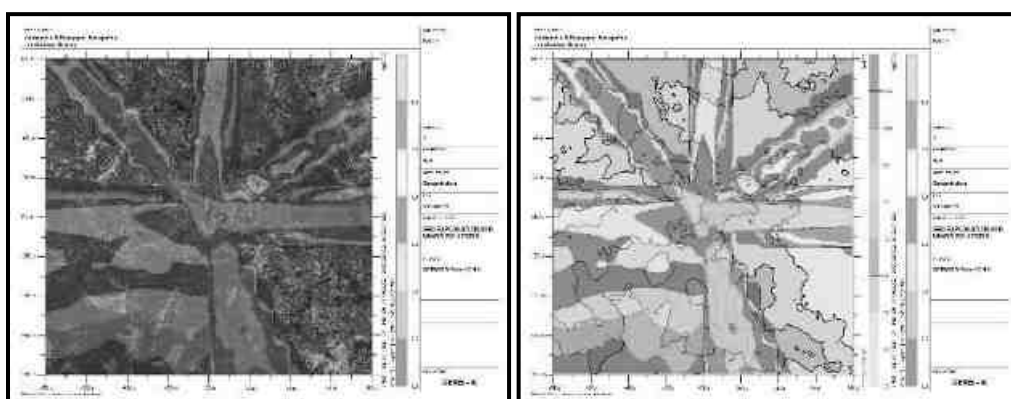
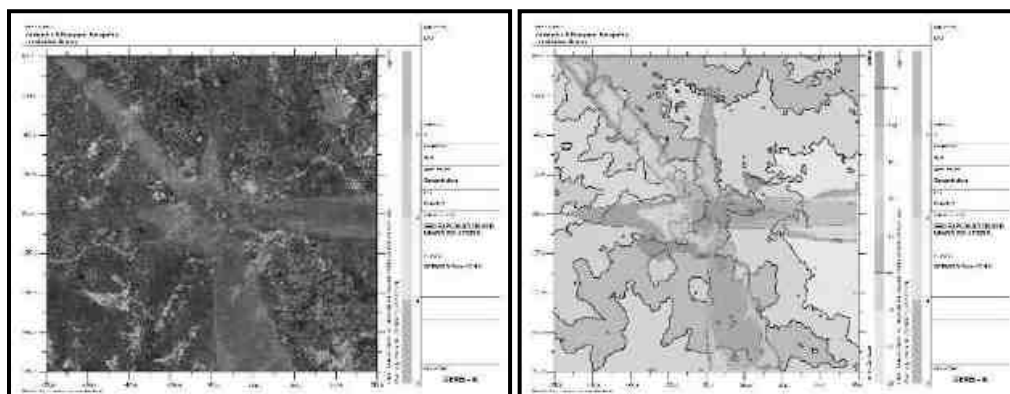
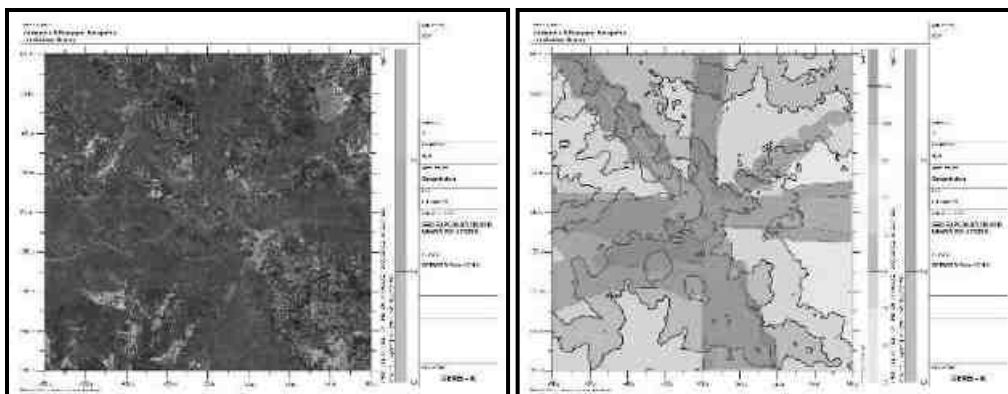
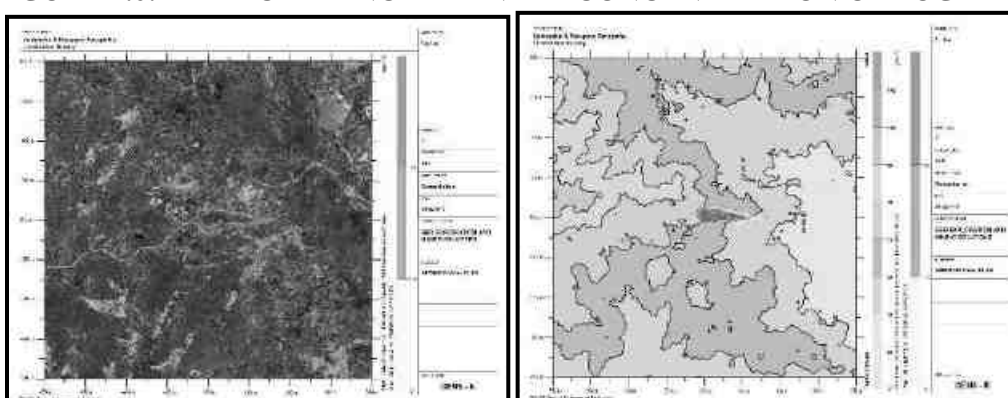
FIGURE 4.2: PREDICTED INCREMENTAL CONCENTRATION OF PM₁₀**FIGURE 4.3: PREDICTED INCREMENTAL CONCENTRATION OF PM₂₅****FIGURE 4.4: PREDICTED INCREMENTAL CONCENTRATION OF NO_x**

FIGURE 4.5: PREDICTED INCREMENTAL CONCENTRATION OF SO₂**FIGURE 4.6: PREDICTED INCREMENTAL CONCENTRATION OF FUGITIVE DUST**

4.3.2.1 Model Results

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

TABLE 4.2: 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	11° 3'20.38"N 79° 4'41.48"E	-66	110	41.3	10.00	51.3
AAQ2	11° 3'0.93"N 79° 4'59.33"E	625	-397	41.9	5.90	47.8
AAQ3	11° 3'57.57"N 79° 6'22.80"E	2657	586	42.7	7.86	50.56
AAQ4	11° 2'40.54"N 79° 2'28.30"E	-4132	-1129	42.2	5.16	47.36
AAQ5	11° 0'21.31"N 79° 3'42.54"E	-1864	-5428	41.7	1.79	43.49
AAQ6	11° 6'33.68"N 79° 4'24.97"E	215	6271	42.9	7.00	49.9
AAQ7	11° 1'48.71"N 79° 7'52.03"E	5754	-2729	42.8	0	42.8

TABLE 4.3: 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	11° 3'20.38"N 79° 4'41.48"E	-66	110	18.4	5.87	24.27
AAQ2	11° 3'0.93"N 79° 4'59.33"E	625	-397	19.7	5.28	24.98
AAQ3	11° 3'57.57"N 79° 6'22.80"E	2657	586	20.5	5.50	26
AAQ4	11° 2'40.54"N 79° 2'28.30"E	-4132	-1129	18.8	2.81	21.61
AAQ5	11° 0'21.31"N 79° 3'42.54"E	-1864	-5428	18.5	1.25	19.75
AAQ6	11° 6'33.68"N 79° 4'24.97"E	215	6271	19.3	3.60	22.9
AAQ7	11° 1'48.71"N 79° 7'52.03"E	5754	-2729	20.3	0	20.3

TABLE 4.4: 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	11° 3'20.38"N 79° 4'41.48"E	-66	110	4.8	1.00	5.8
AAQ2	11° 3'0.93"N 79° 4'59.33"E	625	-397	5.1	0.46	5.56
AAQ3	11° 3'57.57"N 79° 6'22.80"E	2657	586	5.3	0.93	6.23
AAQ4	11° 2'40.54"N 79° 2'28.30"E	-4132	-1129	5.2	0.39	5.59
AAQ5	11° 0'21.31"N 79° 3'42.54"E	-1864	-5428	5.5	0	5.5
AAQ6	11° 6'33.68"N 79° 4'24.97"E	215	6271	5.6	0.82	6.42
AAQ7	11° 1'48.71"N 79° 7'52.03"E	5754	-2729	5.7	0	5.7

TABLE 4.5: 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	11° 3'20.38"N 79° 4'41.48"E	-66	110	22.6	6.00	28.6
AAQ2	11° 3'0.93"N 79° 4'59.33"E	625	-397	21.5	0	21.5
AAQ3	11° 3'57.57"N 79° 6'22.80"E	2657	586	21.9	1.86	23.76
AAQ4	11° 2'40.54"N 79° 2'28.30"E	-4132	-1129	22.0	0	22
AAQ5	11° 0'21.31"N 79° 3'42.54"E	-1864	-5428	21.4	0	21.4
AAQ6	11° 6'33.68"N 79° 4'24.97"E	215	6271	23.2	0.19	23.39
AAQ7	11° 1'48.71"N 79° 7'52.03"E	5754	-2729	22.9	0	22.9

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

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 –

- 1800Nos of trees will be planted through this project in the lease area and village roads (Approach Road) 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 excavation while plying of trucks & HEMM. These activities will not cause any problem to the inhabitants of this area because there is no human settlement within 300m radius from the project site.

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

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

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

$$L_{p2} = L_{p1} - 20 \log (r_2/r_1) - A_{e1,2}$$

Where:

L_{p1} & L_{p2} are sound levels at points located at distances r_1 & r_2 from the source.

$A_{e1,2}$ is the excess attenuation due to environmental conditions. Combined effect of all sources can be determined at various locations by logarithmic addition.

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

4.4.1 Anticipated Impact

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

- Source data

- Receptor data
- Attenuation factor

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

TABLE 4.7: 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	No	94
2	Jack Hammer	No	88
3	Compressor	No	81
4	Excavator	No	85
5	Tipper	No	84
Total Noise Produced			95.8

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

The total noise to be produced by mining machineries 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 4.8: PREDICTED NOISE INCREMENTAL VALUES

Location ID	N1	N2	N3	N4	N5	N6	N7
Maximum Monitored Value (Day) dB(A)	49.7	46.2	46.8	45.9	49.8	48.1	47.9
Incremental Value dB(A)	56.6	52.1	43.8	33.9	24.2	25.7	25.3
Total Predicted Noise level dB(A)	54.5	53.1	48.6	46.2	49.8	48.1	47.9

The incremental noise level is found within the range of 56.6 dB (A) in Core Zone and 24.2 to 52.1 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

The following noise mitigation measures are proposed for control of Noise

- 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

4.5 IMPACT ON THE BIOLOGICAL ENVIRONMENT

4.5.1. Anticipated Impact on agricultural land associated with flora

1. Dust particle settle on adjoining lease area and existing mines located about 50m on the east, west and Southwest side. Mostly dust emission from nearby mines and during operation and minerals are transported in approach roads.
2. Dust deposition on leaf observed on nearby lease boundary local plant species which may result in decline the rate of photosynthesis and retards the plant growth.

4.5.2. Mitigation Measures

4.5.2.1. General Guidelines for Green Belt Development

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

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

4.5.3.2. Proposed Green Belt

Extensive green belt development will be started during the construction phase, which will continue till the operation of the plant. About 1800 trees will be planted per hectare all around the plant, approach roads, and township premises. Locally available types of trees that are resistant to pollutants will be planted. In addition to the above, all open spaces available within the premises will be developed as nurseries, parks, gardens, and other forms of greenery. 5 m wide greenbelt will be developed along the plant premises, as per land available.

4.5.3.3. Development of Green Belt

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

4.5.3.4. Selection of Plant Species for Green Belt Development

It is also recommended that the plantation has to be taken up randomly and the landscaping aspects could be taken into consideration. Multi-layered plantations comprising of medium height trees (7 m to 10 m) and shrubs (5 m height) are proposed for the green belt. Green belt is plantation of trees for reducing the air pollution as they absorb both gaseous and particulate pollutant, thus removing them from atmosphere. Green plants form a surface capable of absorbing air pollutants and forming sinks for pollutants. It improves the aesthetic value of local environment. Under present project, green belts have been planned with emphasis on creating biodiversity; enhance natural surroundings

and mitigating pollution. Regional tree saplings in eco-friendly bags like *Pterocarpus marsupium*, *Pongamia pinnata*, *Limonia acidissima*, and *Cassia roxburghii* will be planted along the Lease boundary and avenues as well as over non-active dumps with intervals 3m in between with the GPS Coordinates. The greenbelt development plan aims to overall improvement in the environmental conditions of the region Native plant species will be preferred.

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

Table No 4.10. List of plant species proposed for Greenbelt development

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

(*Source: Term of Reference-ToR)

Table No 4.11. Species suitable for abatement of noise and dust pollution

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

9	Delonix regia	Neruppu Kondrai
10	Cassia Fistula	Sara Kondrai

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

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

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

4.5.4. Anticipated Impact on Fauna

- Noise generation due to vehicle may affect avifauna.
- The lease area is not inhabited by any wild life, as there is no forest cover, hence there will not be any effect on migration or extinction of wildlife.
- There is no National Park, Biosphere Reserve, Wildlife corridors, and Tiger/Elephant Reserve found within 10 km radius of the project site.

4.5.4.1. Measures for protection and conservation of wildlife species

- Topsoil has a large number of seeds of native plant species in the mining area.
- Topsoil will be used for restoration and suitable surfaces for planted seedlings.
- Checks and controls the movement of vehicles in and out of the mine.
- Undertaking mitigative measures for a conducive environment to the flora and fauna in consultation with Forest Department.
- A dust suppression system will be installed within the mine and periphery of the mine.
- Plantation around the mine area will help in creating habitats for small faunal species and create a better environment for various fauna. Creating and developing awareness for nature and wildlife in the adjoining villages.

4.5.3. Impact on Aquatic Biodiversity

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

Table No. 4.12. Overall Ecological impact assessments of Keelpalur & Karuppur Senapathy Village, Limekankar Deposit Quarry, Ariyalur Taluk, Ariyalur District and Tamil Nadu.

S.No	Attributes	Assessment
	Activities of the project affect the breeding/nesting sites of birds and animals	No breeding and nesting site was identified in the mining lease site. The fauna sighted mostly migrated from the buffer area.
2	Located near an area populated by rare or endangered species	No Endangered, Critically Endangered, or vulnerable species were sighted in the core mining lease area.

3	Proximity to national park/wildlife sanctuary/reserve forest /mangroves/coastline/estuary/sea	Nil
4	The proposed project restricts access to waterholes for wildlife	‘No ‘
5	Proposed mining project impact surface water quality that also provides water to wildlife	‘No ‘scheduled or threatened wildlife animals are sighted regularly core in the core area.
6	Proposed mining project increase siltation that would affect nearby biodiversity areas.	Surface runoff management such as drains is constructed properly so there will be no siltation effect in the nearby mining area.
7	Risk of fall/slip or cause death to wild animals due to project activities.	‘No‘
8	The project release effluents into a water body that also supplies water to a wildlife.	No water body near to core zone so the chances of water becoming polluted is low.
9	Mining projects affect the forest-based livelihood/ any specific forest product on which local livelihood depended.	‘No‘
10	The project likely to affect migration routes.	‘No ‘migration route was observed during the monitoring period.
11	The project is likely to affect the flora of an area, which have medicinal value	‘No‘
12	Forestland is to be diverted, has carbon high sequestration.	‘No ‘There was no forest land diverted.
13	The project is likely to affect wetlands, Fish breeding grounds, and marine ecology.	‘No‘. Wetland was not present in the near core Mining lease area. No breeding and nesting ground is present in the core mining area.

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

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>Albiziafalcatoria</i>	Fabaceae	Tamarind, Puliymaram	Tree
3	<i>Polyalthialongifolia</i>	Annonaceae	Kattumaram	Tree
4	<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 Vilvam, Kondrai, Vembu, Puliyan, Badam, Naval, Vagai will be planted along the Lease boundary and avenue plantation will be carried out in the project site. The rate of survival expected to be 80% in this area. Greenbelt development Plan is given in

TABLE 4.14: GREENBELT DEVELOPMENT PLAN

Year	No. of trees proposed to be planted	Area to be covered in m ²	Name of the species
I	1800	The safety zone along the boundary barrier and village roads has been identified to be utilized for Greenbelt development.	Vilvam, Kondrai, Vembu, Puliyan, Badam, Naval, Vagai

4.6 SOCIO ECONOMIC

4.6.1 Construction Phase

Anticipated Impacts:

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

4.6.2 Mitigation measures:

- ♣ Deploying of mobile toilets or the construction of temporary toilets will be done near to the construction site with the adequate water supply.
- ♣ Awareness programme will be conducted before the monsoon season regarding the spread of water borne/ vector diseases.
- ♣ Mosquito repellents will be provided in the nearby villages and at construction site to avoid the spread of diseases.
- ♣ To overcome behavioural impact, proper site in charge with timely supervision will be done. In advance, facilities with equipped medical and safety services will be provided to take a control over the incident/violence if any caused.
- ♣ To overcome behavioural impact, supervision will be done by site in charge. In advance, emergency cell will be formed with fully equipped communication system, medical and safety services to take control over the incident/violence caused.

4.6.3 Operation Phase:

Anticipated Impacts:

- ♣ Long term exposure to the pollutants such as PM, SO₂ and NO₂ Cement dust have a potential to create health impacts such as risk of cardiovascular and respiratory disease, eye irritation, bronchitis, lung damage, increased heart ailments, etc.
- ♣ Other impacts, associated with the Proposed Limekankar Deposit quarry Project will create a positive impact as it will result in the overall development of the area in respect to the infrastructure development, educational growth, health facilities etc. as a part of the CSR activity.

Mitigation Measures:

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

4.6.4 Impact Evaluation:

Table 4.15 Impact Evaluation

Impact Evaluation Element	Impact on socio economics due to the Proposed project Thiru.S.Subramanian Limekankar Quarry 3.54.5Ha, Keelapalur & Karuppur SenapathyVillage, Ariyalur Taluk, Ariyalur District.			
Potential Effect/ Concern	Proposed project will provide direct & indirect employment opportunities to the local residents, which will help to increase their earning and better living standard as well as further up-liftment of socio-economic status of the area.			
Characteristics of Impacts				
Nature	Positive		Negative	Netural
	✓			
Type	Direct	Indirect	Cumulative	
Extent	Project area	Local	Zonal	Regional
	✓			
Duration	Short time		Long term	
			✓	
Intensity	Low		Medium	High

			✓	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C)
				✓
Significance of Impact				
Significance	Insignificant	Minor	Moderate	Major
			✓	

4.7 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;
- Natural barriers, temporary railing, or specific danger signals will be provided along rock benches or other pit areas where work is performed at heights more than 2m from ground level;
- Maintenance of yards, roads and footpaths, providing sufficient water drainage and preventing slippery surfaces with an all-weather surface, such as coarse gravel will be taken up

4.7.4 Occupational Health Survey

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

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

-
- Eye test

Essential medicines will be provided at the site. The medicines and other test facilities will be provided at free of cost. The first aid box will be made available at the mine for immediate treatment. First aid training will be imparted to the selected employees regularly. The lists of first aid trained members shall be displayed at strategic places.

4.8 MINE WASTE MANAGEMENT

No waste is anticipated, the entire mined out material will be sold to needy crushers and customers.

4.9 MINE CLOSURE

The ultimate depth of the mine is 2m bgl and the life of the mine is 5years, after completion of mining operation the following action will be taken in the project site as a part of Mine closure plan

- The total Mined out land would be around 2.54.2 Ha this land will be converted into temporary water reservoir which will facilitate to collect the rain water
- The stagnant water will be supplied to the nearby agriculture land during drought seasons
- Fencing will be re constructed around the pit after closure, the warning/ danger display board will be placed on all the sides of the project site
- The un utilized area and haul roads will be converted as plantation area, fruit bearing trees will be planted to retain the eco system of the area
- Final Mine closure plan will be prepared and submitted to the concerned authority

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

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 discharges 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

The surrounding areas already undergone quarrying operation, most of the quarries in the regions are Existing quarries. Hence this quarry will feed the Lime kankar material to the cement plant units.

The Lime Kankar Deposit Quarry Project for excavation of Limekankar, which is site specific. The proposed mining lease areas have following advantages: -

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

The existing quarries in the area operated by Opencast Mechanised Mining operation with excavation method will be used to extract Limkankar in the area. 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 / tippers and transported to the needy customers.
- Semi-skilled labours fit for quarrying operations are easily available around the nearby villages.

5.4 ANALYSIS OF ALTERNATIVE TECHNOLOGY

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

6. ENVIRONMENTAL MONITORING PROGRAMME

6.0 GENERAL

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 the project proponent. A comprehensive monitoring mechanism has been devised for monitoring of impacts due to this 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 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.

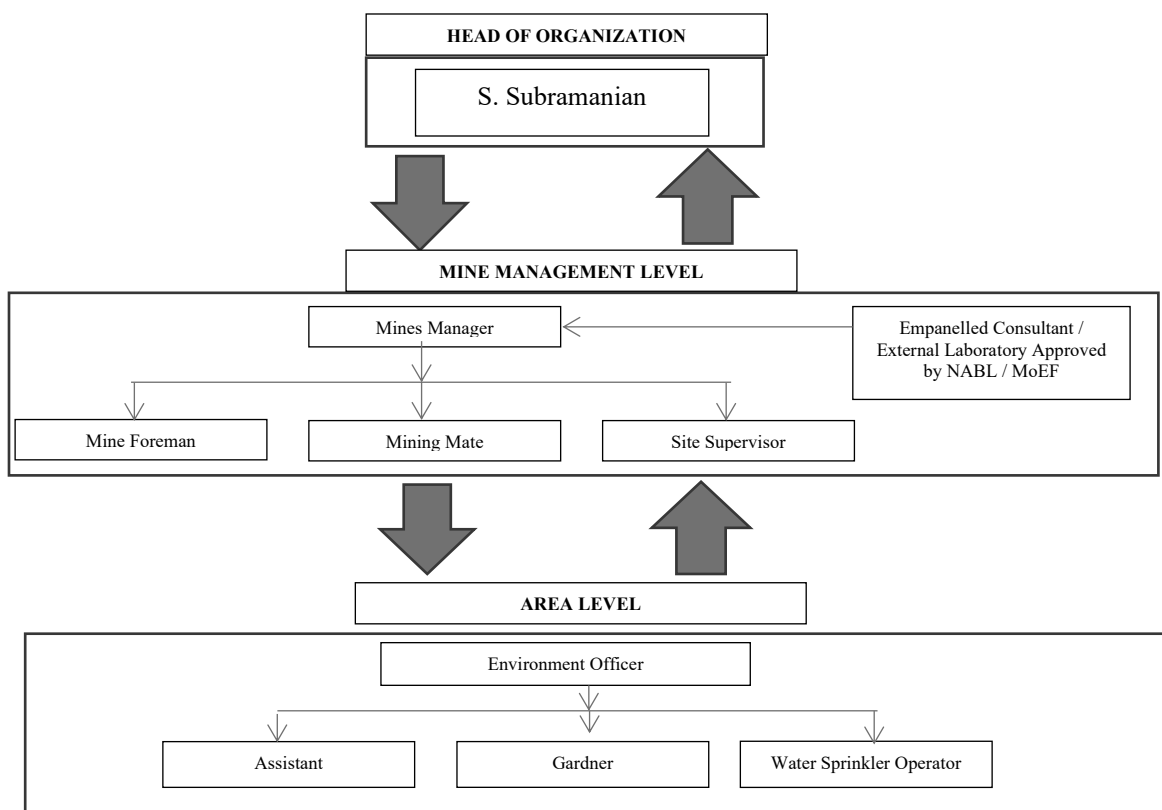
An Environment monitoring cell (EMC) will be constituted to monitor the implementation of EMP and other environmental protection measures for the proposed quarry.

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

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 (1 SW & 1 GW)	-	Once in 6 months	Parameters specified under IS:10500, 1993 & CPCB Norms
4	Hydrology	Water level in open wells in buffer zone around 1 km at specific wells	-	Once in 6 months	Depth in bgl
5	Noise	2 Locations (1 Core & 1 Buffer)	Hourly – 1 Day	Once in 6 months	L eq, L max, L min, L eq Day & L eq Night
6					
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 cost for Environmental Monitoring Programme is Rs 2,25,000/- per annum for Proposed Project.

TABLE 6.3 ENVIRONMENT MONITORING PROGRAM BUDGET

Sl.No.	Parameter	EMP Cost
1	Afforestation	Rs.2,25,000/-
2	Water Sprinkling	
3	Water Quality Test	
4	Air Quality Test	
5	Noise /Vibration Test	
6	Cost towards charity	
Total		Rs.2,25,000/-

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 Cluster Mine Management Coordinator and Respective 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

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	No Explosion is involved in this project.
2	Drilling	Improper and unsafe practices Due to high pressure of compressed air, hoses may burst	No Drilling is involved in this project.

		Drill Rod may break	
4	Blasting	Fly rock, ground vibration, Noise and dust. Improper charging, stemming & Blasting/fining of blast holes Vibration due to movement of vehicles	No Blasting is involved in this project.
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	There is no bench proposed in this project. Only one hydraulic excavator
8	Excavation	The hauling and loading equipment are situated in close proximity during excavation, with the bucket swinging over the tipper's body, and there is the presence of an unauthorized individual driving.	Operator shall not operate the machine when person & Vehicles are in such proximity Shall not swing the bucket over the cab and operator leaves the machine after ensuring the bucket is on ground Shall not allow any unauthorized person to operate the machine by effective supervision

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

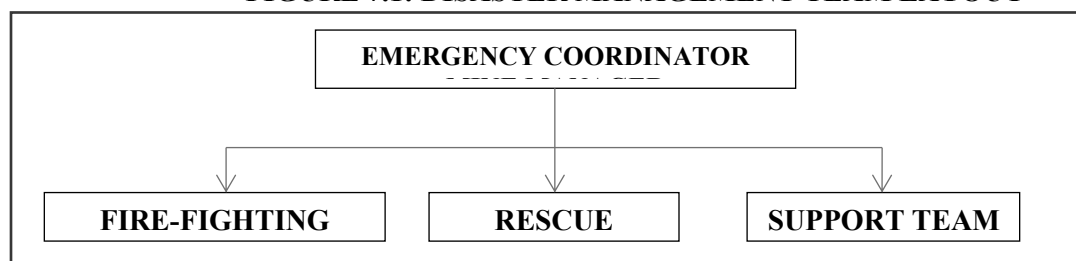
The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities.

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. 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.

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	Village	S.F. Nos	Extent in Ha	Status
P1	Thiru.S.Subramanian	Keelapalur & Karuppur Senapathy	189/2A, 2B, 190/1A, 1B, 2, 4, 5 &31/1	3.54.5	File No.10926 TOR Identification No. TO24B0108TN5928344N Dated:12.07.2024
	TOTAL EXTENT			3.54.5	
EXISTING QUARRIES					
Mineral: Limestone					
Code	Name of the Owner	Village	S.F. Nos	Extent in Ha	Status
E-1	Tvl.Chettinad Cement Corporation Private Limited	Karuppur Senapathy	31/2A,2B etc	4.00.0	29.04.2013 to 28.04.2033
E-2	S.Saravanan	Karuppur Senapathy	6/4 etc	4.67.0	03.03.2006 to 02.03.2026
E-3	Tvl.Vijay Cements	Karuppur Senapathy	30/2D, 30/3B etc	3.88.0	20.05.2003 to 19.05.2023
	TOTAL EXTENT			12.55.0	
Mineral: Limekankar					
E-4	S.Saravanan	Karuppur Senapathy	6/1,2,3A etc.	4.86.5	14.11.2022 to 13.1.2032
E-5	S.Saravanan	Karuppur Senapathy	32/1,3,33/2A etc	4.92.5	10.12.2021 to 09.12.2031

	TOTAL EXTENT	9.79.0	
ABANDONED / EXPIRED QUARRIES			
Nil			
	TOTAL CLUSTER EXTENT	13.33.5Ha	

- 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 Project	Thiru. S. Subramanian Limekankar Deposit Quarry	
S.F. No.	189/2A, 2B, 190/1A, 1B, 2, 4, 5 & 31/1	
Extent	3.54.5 ha	
Village Taluk and District	Keelapalur & Karuppur Senapathy Village, Ariyalur Taluk, Ariyalur District.	
Land Type	patta land	
Land Ownership	It is Patta Land, registered in the name of Thiru. S. Saravanan, vide pata Nos. 874 & Thiru. S. Subramanian, vide patta Nos. 592 & 1115. The applicant has registered lease deed with Pattadar for 12 Years Doc. No 2813/2019	
Toposheet No	58 - M/04	
Latitude between	11° 03' 08.69"N to 11° 03' 21.46"N	
Longitude between	79° 04' 41.05"E to 79° 04' 49.00"E	
Elevation of the area	72m(Max) AMSL	
Lease period	10 Years	
Mining Plan period	5 years	
Proposed Depth of Mining	2m Bgl	
	Limekankar T _s	Top Soil T _s
Geological Resources	1,59,525 T _s	21,270 T _s
Mineable Reserves	1,13,360 T _s	16,166 T _s
Year wise Production Five Years	69,449	10,010
Peak Production	37,908	5,445
Ultimate Pit Dimension	Pit I-166m(L) x 55m(W) x 2.3m(D) Bgl Pit II-170m(L) x 72m(W) x 2.3m(D) Bgl	
Water Level in the region	20-25 m bgl	
Method of Mining	Opencast Mechanized Mining Method without Drilling and Blasting	
Topography	The lease applied area is situated in flat terrain. The area has gentle sloping towards South-eastern side. The altitude of the area is 72m (max) above Mean Sea level. The area is covered by Topsoil having an average thickness of 0.3m and followed by Massive Lime kankar Which is clearly inferred from the adjacent existing quarry pit	
Machinery proposed	Excavator with Bucket and Rock Breaker	1 Nos
	Tipper	1 Nos
Proposed Manpower Deployment	15 Nos	
Fixed Asset Cost	Rs.34,37,778/-	
Operational Cost	Rs.17,00,000/-	
EMP Cost	Rs. 2,25,000/-	
Total Project cost	Rs. 53,62,778/-	
CER Cost	Rs. 5,00,000/-	
Nearby Water Bodies	Ematteri	110m East

	Kuttai	240m North
	Odai	370m East
	Periya Eri	1km SW
	Marudaiyar River	2.8km NE
	Tank	8km SW
Greenbelt Development Plan	Proposed to plant 1800 Nos of trees considering 500 Nos of trees/ Ha criteria. The plantation will be developed around the project site and nearby village roads	
Proposed Water Requirement	2.0 KLD	
Nearest Habitation	500m – South West	
Nearest Reserve Forest	Vilangudi R.F – 13.30 km – NE	
Nearest Wild Life Sanctuary	Karaivetti Birds Sanctuary – 7.2Km - SW	

TABLE 7.6: SALIENT FEATURES OF PROPOSAL “E1”

Name of the Project	Thiru. S. Saravanan Limekankar Deposit Quarry	
S.F. No.	6/1B,6/2,6/3A,6/3B(P),6/5A,7/2,7/4,7/6 & 7/7	
Extent	4.86.5 ha	
Village Taluk and District	Karuppur Senapathy Village, Ariyalur Taluk, Ariyalur District.	
Land Type	patta land	
Land Ownership	It is Patta Land, registered in the name of Thiru. S. Saravanan, vide patta Nos. 8 & 5150 and Thiru. S. Subramanian, vide patta No. 1115. The applicant has obtained consent from the pattathar.	
Toposheet No	58 - M/04	
Latitude between	11° 03' 21.44"N to 11° 03' 33.25"N	
Longitude between	79° 04' 31.44"E to 79° 04' 45.49"E	
Elevation of the area	72m(Max) AMSL	
Lease period	10 Years	
Mining Plan period	5 years	
Proposed Depth of Mining	2.3m Bgl	
	Limekankar T _s	Top Soil T _s
Geological Resources	2,18,925 T _s	29,190 T _s
Mineable Reserves	1,66,239 T _s	23,242 T _s
Year wise Production Five Years	1,02,920	14,382
Peak Production	50,814	7,156
Ultimate Pit Dimension	Pit I-187m(L) x 101m(W) x 2.3m(D) Bgl Pit II-171m(L) x 100m(W) x 2.3m(D) Bgl Pit III-73m(L) x 42m(W) x 2.3m(D) Bgl	
Water Level in the region	20-25 m bgl	
Water Bodies	Odai	300m-NE
	Eamatteri	240m-E
Method of Mining	Opencast Mechanized Mining Method without Drilling and Blasting	
Topography	The lease applied area is situated in flat terrain. The area has gentle sloping towards South-eastern side. The altitude of the area is 72m (max) above Mean Sea level. The area is covered by Topsoil having an average thickness of 0.3m and followed by Massive Lime kankar Which is clearly inferred from the adjacent existing quarry pit	
Machinery proposed	Excavator with Bucket and Rock Breaker	1 Nos

	Tipper	1 Nos
Proposed Manpower Deployment	15 Nos	
Fixed Asset Cost	Rs.39,26,040/-	
Operational Cost	Rs.17,00,000/-	
EMP Cost	Rs. 2,25,000/-	
Total Project cost	Rs. 58,51,040/-	
CER Cost	Rs. 5,00,000/-	
Greenbelt Development Plan	Proposed to plant 2450 Nos of trees considering 500 Nos of trees/ Ha criteria. The plantation will be developed around the project site and nearby village roads	
Proposed Water Requirement	5.45 KLD	
Nearest Habitation	480m – South West	
Nearest Wild Life Sanctuary	Karaivetti Birds Sanctuary – 7.3Km - SW	

TABLE 7.7: SALIENT FEATURES OF PROPOSAL “E2”

Name of the Project	Thiru. S. Saravanan Limekankar Deposit Quarry	
S.F. No.	32/1, 32/3, 32/2A, 33/2B, 33/2C, 33/2D, 33/2E, 35/1A1, 35/1A2, 35/1A3, 35/1A4, 35/1A5, 35/1A6 and 35/1A7	
Extent	4.92.5 ha	
Village Taluk and District	Karuppur Senapathy Village, Ariyalur Taluk, Ariyalur District.	
Land Type	patta land	
Land Ownership	It is Patta Land, registered in the name of Thiru. S. Saravanan, vide pata Nos. 8 and Thiru. S. Subramanian, vide patta No. 1115. The applicant has obtained consent from the pattathar.	
Toposheet No	58 - M/04	
Latitude between	11° 03' 01.47"N to 11° 03' 09.32"N	
Longitude between	79° 04' 46.11"E to 79° 04' 59.30"E	
Elevation of the area	72m(Max) AMSL	
Lease period	10 Years	
Mining Plan period	5 years	
Proposed Depth of Mining	2.3m Bgl	
	Limekankar T _s	Top Soil T _s
Geological Resources	2,21,625 T _s	29,550 T _s
Mineable Reserves	1,60,052 T _s	22,136 T _s
Year wise Production Five Years	1,10,012	15,134
Peak Production	53,663	7504
Ultimate Pit Dimension	Pit I-375m(L) x 107m(W) x 2.3m(D) Bgl	
Water Level in the region	20-25 m bgl	
Water Bodies	Odai	70m-E
	Tank	240m-S
Method of Mining	Opencast Mechanized Mining Method without Drilling and Blasting	
Topography	The lease applied area is situated in flat terrain. The area has gentle sloping towards South-eastern side. The altitude of the area is 72m (max) above Mean Sea level. The area is covered by Topsoil having an average thickness of 0.3m and followed by Massive Lime kankar Which is clearly inferred from the adjacent existing quarry pit	
Machinery proposed	Excavator with Bucket and Rock Breaker	1 Nos

	Tipper	1 Nos
Proposed Manpower Deployment	15 Nos	
Fixed Asset Cost	Rs.45,87,162/-	
Operational Cost	Rs.17,00,000/-	
EMP Cost	Rs. 2,25,000/-	
Total Project cost	Rs. 65,12,162/-	
CER Cost	Rs. 5,00,000/-	
Greenbelt Development Plan	Proposed to plant 2470 Nos of trees considering 500 Nos of trees/ Ha criteria. The plantation will be developed around the project site and nearby village roads	
Proposed Water Requirement	4.0 KLD	
Nearest Habitation	490m – South West	
Nearest Wild Life Sanctuary	Karaivetti Birds Sanctuary – 7.5Km - SW	

Air Environment –

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

TABLE 7.8: CUMULATIVE PRODUCTION LOAD OF LIMEKANKAR

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	69449	13890	46	4
Total	69449	13890	46	4
E1	102920	20584	69	6
E2	110012	22002	73	6
Total	212932	42586	142	12
Grand Total	282381	56476	188	16

TABLE 7.9: CUMULATIVE PRODUCTION LOAD OF TOPSOIL

Quarry	Production for one / three-year plan period	Per Year Production in m ³	Per Day Production in m ³	Number of Lorry Load Per Day
P1	10010	2002	7	1
Total	10010	2002	7	1
E1	14,382	2876	10	1
E2	15134	3027	10	1
Total	29516	5903	20	2
Grand Total	39526	7905	27	3

On a cumulative basis considering the proposed quarry, it can be seen that the overall production of Limekankar is 188m³ per day and overall production of top soil is 27 m³ per day with a capacity of 16Trips of Limekankar per day and 3 Trips per day of Top soil from the cluster.

Note: Per day production of Limekankar is calculated for 5 Years Lease Period and for top soil production with 5 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 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 7.14.

TABLE 7.10: EMISSION ESTIMATION FROM CLUSTER QUARRIES WITHIN 500 METER RADIUS

EMISSION ESTIMATION FOR QUARRY “P1”				
	Activity	Source type	Value	Unit
Estimated Emission Rate for PM ₁₀	Mineral Loading	Point Source	0.043515527	g/s
	Haul Road	Line Source	0.002494893	g/s/m
	Overall Mine	Area Source	0.060543171	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.000877502	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000055013	g/s
EMISSION ESTIMATION FOR QUARRY “E1”				
	Activity	Source type	Value	Unit
Estimated Emission Rate for PM ₁₀	Mineral Loading	Point Source	0.041154605	g/s
	Haul Road	Line Source	0.002489449	g/s/m
	Overall Mine	Area Source	0.050311742	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.000495456	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000021140	g/s
EMISSION ESTIMATION FOR QUARRY “E2”				
	Activity	Source type	Value	Unit
Estimated Emission Rate for PM ₁₀	Mineral Loading	Point Source	0.038682461	g/s
	Haul Road	Line Source	0.002486083	g/s/m
	Overall Mine	Area Source	0.046209504	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.000223263	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000008062	g/s

Source: Emission Calculation

TABLE 7.11: INCREMENTAL & RESULTANT GLC WITHIN CLUSTER

PM₁₀ in µg/m³	
Background	45.8
Incremental	15.25
Resultant	61.05
NAAQ Norms	100 µg/m³
PM_{2.5} in µg/m³	
Background	22.2
Incremental	8.30
Resultant	30.5
NAAQ Norms	60 µg/ m³
So2 in µg/m³	
Background	6.3
Incremental	2.20
Resultant	8.5
NAAQ Norms	80 µg/ m³
No2 in µg/m³	
Background	25.6
Incremental	11.23
Resultant	36.83
NAAQ Norms	80 µg/ m³

TABLE 7.12: PREDICTED NOISE INCREMENTAL VALUES FROM QUARRY

Location ID	N1	N2	N3	N4	N5	N6	N7
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Maximum Monitored Value (Day) dB(A)	49.7	46.2	46.8	45.9	49.8	48.1	47.9
Incremental Value dB(A)							
Total Predicted Noise level dB(A)	54.5	53.1	48.6	46.2	49.8	48.1	47.9

Source: Lab Monitoring Data

The incremental noise level is found within the range of 24.2 to 52.1 (Buffer zone) – 56.6 dB (A) in Core 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).

Socio Economic Environment –

The 3 mines shall contribute towards CER and the community shall develop.

TABLE 7.13: SOCIO ECONOMIC BENEFITS FROM CLUSTER QUARRIES

Location ID	Project Cost	CER
P1	Rs. 53,62,778/-	Rs.5,00,000
E1	Rs. 58,51,040/-	Rs.5,00,000
E2	Rs. 65,12,162/-	Rs.1,30,000
Total	Rs.17,725,980/-	Rs.11,30,000/-

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 Project shall fund towards **CER – Rs 5,00,000/-**
- Existing Projects shall fund towards **CER- Rs.6,30,000/-**

TABLE 7.14: EMPLOYMENT BENEFITS FROM CLUSTER QUARRIES

Description	Employment
P1	15
E1	15
E2	15
Total	45

A total of 15 people will get employment due to one proposed mines in cluster and 30 people are already employed at existing mines.

TABLE 7.15: GREENBELT DEVELOPMENT BENEFITS FROM CLUSTER QUARRIES

CODE	No of Trees proposed to be planted	Area Covered Sq.m	Name of the Species
P1	1800	The safety zone along the boundary barrier has been identified to be utilized for Greenbelt development	Vilvam, Kondrai, Vembu, Puliya, Badam, Naval, Vagai etc.,
Total	1800		
E1	2450		
E2	2470		
Total	4920		
G. Total	6720		

Based on the Proposed Mining Plans it's anticipated that there shall growth of native species of Vilvam, Kondrai, Vembu, Puliyam etc., in the Cluster at a rate of 6720 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 7.16: ACTION PLAN TO MANAGE PLASTIC WASTE

Sl.No.	Activity	Responsibility
1	Framing of Layout Design by incorporating provision of the Rules, user fee to be charged from waste generators for plastic waste management, penalties/fines for littering, burning plastic waste or committing any other acts of public nuisance	Mines Manager
2	Enforcing waste generators to practice segregation of bio-degradable, recyclable and domestic hazardous waste	Mines Manager
3	Collection of plastic waste	Mines Foreman
4	Setting up of Material Recovery Facilities	Mines Manager
5	Segregation of Recyclable and Non-Recyclable plastic waste at Material Recovery Facilities	Mines Foreman
6	Channelization of Recyclable Plastic Waste to registered recyclers	Mines Foreman
7	Channelization of Non-Recyclable Plastic Waste for use either in Cement kilns, in Road Construction	Mines Foreman
8	Creating awareness among all the stakeholders about their responsibility	Mines Manager
9	Surprise checking's of littering, open burning of plastic waste or committing any other acts of public nuisance	Mine Owner

Source: Proposed by FAE's and EC

8. PROJECT BENEFITS

8.0 GENERAL

The Proposed Project for Quarrying Limekankar at Keelapalur & Karuppur Senapathy Village aims to produce about 69449 Ts Limekankar over a period of 5 Years & Topsoil of 10010 Ts. 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 15 persons for carrying out mining operations and give preference to the local people in providing employment in the one proposed quarry in the cluster. In addition, there will be opportunity for indirect employment to many people in the form of contractual jobs, business opportunities, service facilities etc. the economic status of the local people will be enhanced due to mining project.

8.2 SOCIO-ECONOMIC WELFARE MEASURES PROPOSED

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

8.3 IMPROVEMENT IN PHYSICAL INFRASTRUCTURE

The proposed quarry is located in Keelapalur & Karuppur Senapathy Village, Ariyalur Taluk, Ariyalur District of Tamil Nadu and the area have communications, roads and other facilities already well established. The following physical infrastructure facilities will further improve due to proposed mine.

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

8.4 IMPROVEMENT IN SOCIAL INFRASTRUCTURE

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

8.5 OTHER TANGIBLE BENEFITS

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

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

CORPORATE SOCIAL RESPONSIBILITY

The 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.

CSR Cost Estimation

- CSR activities will be taken up in the Keelapalur & Karuppur Senapathy 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

For the existing quarries 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.

Proponent intends to spent Rs 5,00,000/- towards CER for the Chief Wildlife Warden Chennai Funds the details are given below:

TABLE 8.1 CER – ACTION PLAN

Activity	CER
• Expenditure on conservation measures or activities at karaivetti Bird Sanctuary	Rs 5,00,000/-

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 Thiru. S. Subramanian 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. 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
Refuelling to be undertaken in a safe location, away from vehicle movement pathways & 100 m away of any watercourse Refuelling activity to be under visual observation at all times. Drainage of refuelling areas to sumps with oil/water separation	Mine Foreman & Mining Mate
Soil and groundwater testing as required following up a particular incident of contamination.	Mines Manager
At conceptual stage, the mining pits will 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 overburden in the form of Gravel which will directly loaded into tippers for the filling and levelling of low-lying areas.

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 mines office. The quarrying operation is proposed up to

a depth of 45m BGL, the water table in the area is 58m – 62m below ground level, hence the proposed projects will not intersect the Ground water table during entire quarry period.

TABLE 10.3. PROPOSED CONTROLS FOR WATER ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.5. AIR QUALITY MANAGEMENT

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

TABLE 10.4. PROPOSED CONTROLS FOR AIR ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.6. NOISE POLLUTION CONTROL

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

TABLE 10.5.: PROPOSED CONTROLS FOR NOISE ENVIRONMENT

CONTROL	RESPONSIBILITY
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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 is carried out in the project area and in surrounding villages to assess the impact due to the mining activities and the efficacy of the adopted noise control measures. Additional noise control measures will be adopted if required as per the observations during monitoring	Mines Manager
Reduce maximum instantaneous charge using delays while blasting	Mining Mate
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination	Mines Manager
Undertake noise or vibration monitoring	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.7. GROUND VIBRATION AND FLY ROCK CONTROL

The Limekankar Deposit 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 1800 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

No. of tress proposed to be planted	Area to be covered in m ²	Name of the species
1800	The safety zone along the boundary barrier has been identified to be utilized for Greenbelt development.	Vilvam, Kondrai, Vembu, Puliyam, Badam, Naval, Vagai etc.,

Source: Approved Mining plan

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 FOR THE PLANTSATION

S.No	Botanical Name	Local Name	Importance
1	Azadirachta indica	Neem, Vembu	Neem oil & neem products
2	Tamarindus indica	Tamarind	Edible & Medicinal and other Uses
3	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree
4	Borassus Flabellifer	Palmyra Palm	Tall Wind breaker tree and its fruits are edible

Source: Proposed by FAE's & EIA Coordinator

10.9. OCCUPATIONAL SAFETY & HEALTH MANAGEMENT

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

10.9.1. Medical Surveillance and Examinations –

The health status of workers in the mine will 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)					

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.
 - 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.
 - 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 as per Metalliferous Mines Regulation, 1961.

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 10.10 gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE 10.10: EMP BUDGET FOR PROPOSED PROJECT

Activities	Mitigation Measure	Provision for Implementation	Capital	Recurring per annum
Air Environment	Haul road maintenance & Water sprinkling	Lump sum fund allocation for daily maintenance of haul roads and thrice a day water sprinkling by fixed sprinklers or water tankers	30,000	Nil
	No overloading of trucks/tippers/tractors	Lump sum fund allocation Manual Monitoring through Security guard	5,000	Nil
	Stone carrying trucks will be covered by tarpaulin	Lump sum fund allocation Manual Monitoring through Security guard	15,000	Nil
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	Nil	Nil
	Oiling & greasing of Transport vehicles and HEMM at regular interval will be done	Provision made in Operating Cost	Nil	Nil
	Adequate silencers will be provided in all the diesel engines of vehicles.	Provision made in Operating Cost	Nil	Nil
	It will be ensured that all transportation vehicles carry a fitness certificate.	Provision made in Operating Cost	Nil	Nil
	Safety tools and implements that are required will be kept adequately near blasting site at the time of charging.	Provision made in OHS part	Nil	Nil
Waste Management	Waste management (Spent Oil, Grease etc.,)	Provision for domestic waste collection and disposal through authorized agency	Nil	20000

		Installation of dust bins	Nil	2000
	Bio toilets will be made available outside mine lease on the land of owner itself	Provision made in Operating Cost	Nil	Nil
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	5000	Nil
	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	50000	Nil
	Workers will be provided with Personal Protective Equipment's	Lumpsum fund allocation	10000	Nil
	First aid facility will be provided	Lumpsum fund allocation	3000	
	Appointment of Competent person for ensuring the safety operation	Provision made in operational cost	0	Nil
CER	As per MoEF &CC OM 22-65/2017-IA.III Dated 25.02.2021	Lumpsum fund allocation	500000	Nil
TOTAL			6,68,000	22,000

In order to implement the environmental protection measures, an amount of Rs.6.68 lakhs as capital cost and recurring cost as Rs.22 thousand as recurring cost is proposed considering present market price considering present market scenario for the proposed project.

Cost inflation 5% per annum

Note: This Environmental Management plan cost will vary according to the public consultation comments

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

This EIA & EMP report prepared for the proposed Limekankar Deposit quarry project located in S.F. No 189/2A,2B,190/1A, 1B, 2, 4 & 5 in Keelapalur Village and S.F.No.31/1 in Karuppur Senapathy Village, Ariyalur Taluk, Ariyalur District belongs to Thiru.S. Subramanian the Project falls in the Cluster category consist of 1 Proposed, 2 Existing Quarries 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.

The proposed project is categorized under category “B1” Activity 1(a) (mining lease area in cluster situation) and will be considered at SEIAA – TN after conducting Public Hearing and Submission of EIA/EMP Report for Grant of Environmental Clearance. “Draft EIA report prepared on the basis of ToR issued for carrying out public hearing for the grant of Environmental Clearance from SEIAA, Tamil Nadu”.

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 Dec 2024 to Feb 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 Limekankar as per market demand. Sustainable and modern mining leads us to see positive impact of mining operation and providing consistent employment for nearly 15 people directly in the proposed projects and indirectly around 50 people.

As discussed, it is safe to say that the proposed quarries are not likely to cause any significant impact to the ecology of the area, as adequate preventive measures will be adopted to keep the various pollutants within the permissible limits. Green belt development around the area will also be taken up as an effective pollution mitigate

technique, as well as to serve as biological indicators for the pollutants released from the Thiru.S. Subramanian Limekankar Deposit quarry (Extent – 3.54.5 ha).

12. DISCLOSURE OF CONSULTANT

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

This EIA/EMP for Thiru.S. Subramanian Limekankar quarry over an Extent of 3.54.5 ha in Keelapalur & Karuppur Senapathy Village, Ariyalur Taluk, Ariyalur District of Tamil Nadu is prepared as per the Generic Structure of EIA Guidelines manual. 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:

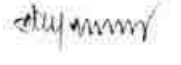
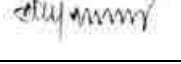


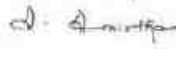
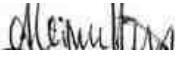
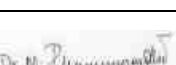
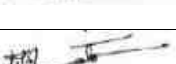
Period of Involvement: **March 2019 to till date**

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

DECLARATION BY THE HEAD OF THE ACCREDITED CONSULTANT ORGANIZATION

I, Dr. M. Ifthikhar Ahmed, Managing Partner, Geo Exploration and Mining Solutions, hereby, confirm that the above-mentioned Functional Area Experts and Team Members prepared the EIA/EMP for Thiru. S. Subramanian Limekankar Deposit Quarry over an Extent of 3.54.50 ha in Keelapalur & Karuppur Senapathy Village, Ariyalur Taluk, Ariyalur District of Tamil Nadu. It is also certified that information furnished in the EIA study are true and correct to the best of our knowledge.

Signature& Date:



Name:

Dr. M. Ifthikhar Ahmed

Designation:

Managing Partner

Name of the EIA Consultant Organization:

M/s. Geo Exploration and Mining Solutions

NABET Certificate No & Issue Date:

NABET/EIA/2225/RA 0276 Dated: 20-2-2023

Validity:

Valid till 06.08.2025